Dual Exchange Rates in Europe and Latin America

Nancy P. Marion

This article uncovers some important empirical regularities surrounding the operation of formal dual exchange rates in Europe and Latin America in the 1970s and 1980s. Although there are parallels between the European and Latin American experiences, there are also interesting differences in terms of the size and nature of the distortion created by two official exchange rates; the response of the distortion to foreign interest rates, real commercial exchange rates, and domestic budget deficits; and the motives for adopting this exchange rate regime. Empirical work on dual exchange rate regimes is made difficult by the transitory nature of these regimes and by frequent changes in institutional practices.

Countries adopt dual exchange rates in an attempt to insulate their economies from the effects of international capital movements. In the early 1970s, some European countries with fixed exchange rates faced large, speculative capital flows that brought about unwanted fluctuations in international reserves. The European authorities were reluctant to switch to flexible exchange rates, however, fearing large exchange rate movements with uncertain effects on trade. Dual exchange rates were adopted as a temporary middle ground between the extremes of fixed and flexible rates. Dual exchange rates involved the formal establishment of separate exchange markets, with separate exchange rates, for current account and capital account transactions. In the 1970s and 1980s, many developing countries used dual exchange rates to reduce the pressure from capital flight on their fixed exchange rate, thus avoiding the adverse inflationary consequences of an across-the-board devaluation. The arrangement was used as an interim measure prior to devaluing the currencies.

Dual exchange markets can be set up in a variety of ways. The authorities may establish a fixed commercial exchange rate for current account transactions and a floating financial rate for capital account transactions. Belgium and France operated their exchange markets in this way. Alternatively, the authorities may

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allow some current account transactions to take place at a fixed or managed rate, with the remaining current account transactions and all capital account transactions taking place at a floating rate. Argentina and Mexico, for example, used this version. Although it is common to fix the commercial exchange rate and let the financial exchange rate float freely, other intervention strategies have also been followed. Italy allowed both the commercial and the financial exchange rates to float freely. El Salvador and Jamaica had periods when both rates were fixed. Not all countries officially sanction both exchange markets. Before adopting two official exchange rates, the Dominican Republic adopted a more informal approach, permitting some commercial transactions to take place in an officially sanctioned market and relegating other transactions, mostly financial, to an unofficial parallel market. Some countries, such as Venezuela, establish more than two official exchange rates, thus combining aspects of dual exchange markets and a system of multiple exchange rates.

The European experience has inspired a large theoretical literature but scant empirical work. In addition, little is known about the more recent dual exchange rate episodes in developing countries. The purpose of this article is to uncover some empirical regularities surrounding the experience with dual exchange markets in Europe and Latin America.[1] The analysis highlights some important similarities and differences between the European and Latin American episodes that enhance understanding of dual exchange markets in practice.

Section I sets out a theoretical framework that describes the distortion created by dual exchange rates and examines the magnitude of this distortion in several countries. Section II identifies some of the economic factors that influence the distortion and looks at the empirical evidence. Section III confronts some serious issues that may compromise empirical work on dual exchange markets, and section IV provides concluding remarks.

I. A Theoretical Framework

The defining feature of a dual exchange market is that current account 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 (Fleming 1971; Lanyi 1975). Foreign exchange may stand at a premium or a discount in the financial exchange market compared with its price in the commercial exchange market. The classic dual rate system (DRS) introduces a distortion into asset portfolios. The distortion is created by the spread between the two exchange rates and its evolution over time.

1. Developing countries outside Latin America have also experimented with dual exchange rates. For example, Egypt, Iran, Nigeria, South Africa, Sudan, Syria, Uganda, Zaire, and the francophone African countries, among others, have tried dual exchange rates at various times.

The Distortion Created by Dual Rates

To illustrate the distortion created by dual rates, consider the case in which a resident of a country that operates a DRS wishes to hold a foreign currency–denominated asset for one period. The resident must purchase capital-account-eligible foreign exchange at the financial exchange rate, the applicable rate for financial transactions. In the next period, the resident repatriates the principal at the next period's financial exchange rate and repatriates the interest income at the next period's commercial exchange rate, the rate applicable for current account transactions. This period's expected nominal return from holding the foreign currency–denominated security for one period, N, is therefore

$$N = i^* \left(\frac{1}{z}\right)(1 + \delta) + f \tag{1}$$

where i^* is the interest rate on the foreign currency–denominated asset; z is the spread, which is the ratio of the home country price of foreign currency in the spot financial market to that in the spot commercial market; δ is the expected rate of depreciation of the commercial exchange rate; and f is the expected rate of depreciation of the financial exchange rate.

Equation 1 shows that the dual exchange market distorts the effective rate of return by means of the spread and the expected rates of change of the financial and commercial exchange rates. By distorting the effective rate of return, the DRS influences international capital flows. By implication, it also influences the individual's intertemporal allocation of consumption (and of output, if investment is allowed for). The DRS may provide insulation from foreign interest rate shocks if such shocks generate offsetting movements in the spread or in the expected rates of change in exchange rates.

The nature of the distortion is altered by the perceived temporariness of the dual exchange market. Dual exchange rates are usually adopted to ease the transition from a unified exchange rate peg to another kind of exchange rate regime or a different unified peg. For example, France and Italy adopted dual exchange rates for thirty-one months and fifteen months, respectively, as a transition from the unified fixed exchange rate regime under Bretton Woods to the more flexible arrangements of the post–Bretton Woods era. In the 1980s, Bolivia, Costa Rica, and Jamaica all used the arrangement for less than thirty-six months as a transition from one unified fixed exchange rate regime to another.

The domestic rate of return described by equation 1 was derived assuming that the dual exchange market would be in place when repatriation occurs. If, instead, the investor believes the dual market is temporary, the calculation of the return must take into account not only the possible exchange rate regimes to follow but also the probability of each being in effect at the time of repatriation. Clearly, the perceived temporariness of the dual exchange market combined with uncertainty about the regime to follow can alter the nature of the distortion, especially as the date of reunification approaches and probability estimates are revised (Flood and Marion 1982).

Table 1. *Descriptive Features of the Latin American DRS in the 1980s*

Feature	*Argentina* 1981	*Argentina* 1982	*Bolivia*	*Costa Rica*	*Dominican Republic*	*El Salvador*	*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	Dollar peg	Dollar peg	Dollar peg	Dollar peg	Dollar peg	Dollar peg	Controlled float
Post-DRS regime	Controlled float	Controlled float	Dollar peg	Dollar peg	Controlled float	Dollar peg	Dollar peg	Dollar 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 market									
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 preceding reunification (percent)	38	20	384	3.6	206	93	3.6	66	2
Management of principal rate	Controlled float (mini devaluation)	Controlled float (mini devaluation)	Peg	Peg, then float	Peg	Peg	Peg	Peg	Controlled float (mini devaluation)
Management of secondary rate	Free	Free, peg	Free	Managed, peg	Controlled float	Managed, peg	Free, controlled float	Free, peg	Free, crawl

Note: DRS denotes dual rate system, or a dual exchange rate market. In the Mexican and Guatemalan cases, reunification is de facto, not de jure.
Source: IMF (various years a); IMF (various issues b); International Currency Analysis, Inc. (various issues).

Although theoretical work on dual exchange markets often assumes a complete segmentation of the two exchange markets, in practice this is not possible (Bhandari and Decaluwe 1987; Gros 1988). When the spread widens, agents have an increased incentive to channel transactions through the market with the more attractive rate. The authorities have sometimes tried to discourage fraudulent leakages across markets by reclassifying transactions in such a way as to narrow the spread. Moreover, current account transactions that are difficult to monitor, such as tourist expenditures and remittances, are often assigned to the financial exchange market from the start. In most developing countries, reclassification of transactions occurs frequently. These cross-market leakages change the nature of the distortion facing asset holders because only a fraction of foreign assets is purchased or repatriated at the financial rate and only a fraction of interest income is repatriated at the commercial rate. The distortion still depends on the spread and rates of exchange rate change, but in a much more complicated way.

Cross-market leakages also distort relative prices of goods and services. If P^* is the foreign price level, SP^* is the domestic price of goods and services channeled through the commercial exchange market, and XP^* is the domestic price of goods and services channeled through the financial exchange market, then the spread between the financial and commercial exchange rates measures the distortion in the relative price of goods bought and sold in the financial market.

A Look at the Data

Among European countries, Belgium (actually the Belgium-Luxembourg Economic Union, or BLEU), France, and Italy were the major countries that used dual exchange rates in the early 1970s. (Belgium adopted its system in 1957 and kept it in place until 1990.) The United Kingdom and the Netherlands used a second exchange rate for a small group of capital account transactions, as did France before adopting its full-fledged dual rate system and again in the 1980s. Because of the limited availability of financial exchange rate data for these more minor episodes, this analysis focuses on the dual exchange market in Belgium between 1963 and 1988, in France between 1971 and 1974, and in Italy between 1973 and 1974.[2]

The list of Latin American countries that operated formal dual exchange rates is more extensive. In the 1970s, dual rates were used by Argentina, Chile,

2. Belgium operated a dual exchange market from 1957 to 1990. France used a dual exchange market from August 23, 1971, to March 21, 1974. France operated a devise titre, a second exchange rate applicable to resident purchases and sales of foreign securities, from August 11, 1969, to October 20, 1971, and again from May 21, 1981, to 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 guilder bonds between September 6, 1971, and February 1, 1974. The United Kingdom operated a separate investment currency exchange rate for certain capital account transactions conducted by residents in the United Kingdom from 1947 until October 23, 1979.

Ecuador, Jamaica, Nicaragua, Paraguay, Peru, and Uruguay. In the 1980s, formal dual exchange rates were also used by several countries. Table 1 provides details. Mexico operated such a system during much of the 1980s, and Argentina adopted dual rates for a period in 1981 and again in 1982. Bolivia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, and Jamaica also used dual exchange rates for a time. A number of Latin American countries had informal dual exchange markets as well.

The spread between the two exchange rates represents the observable part of the distortion created by the dual exchange market. Some sense of the magnitude of the distortion is revealed by the data on spreads for a set of countries that have operated dual exchange markets. Table 2 summarizes key statistics on the spreads.

Figure 1 illustrates monthly movements in the spreads in Belgium, France, and Italy during the early 1970s. The figure reveals that the spreads between the

Table 2. *Key Statistics on Spreads in Formal and Informal Dual Exchange Markets*
(percent)

Country and time period	*Mean*	*Maximum*	*Minimum*	*Standard deviation*
European DRS				
Belgium, May 1971–March 1974	0.04	1.27	−2.05	0.67
France, August 1971–March 1974	−0.46	5.03	−5.54	2.35
Italy, January 1973–March 1974	3.90	7.48	0.76	2.08
Latin America (formal DRS)				
Argentina, June–December 1981	44.33	57.21	32.08	8.21
July–October 1982	48.50	79.72	19.92	26.29
Bolivia, April–October 1982	289.79	524.01	84.70	167.34
Costa Rica, March 1981–October 1983	18.78	76.51	−4.59	17.13
Dominican Republic, August 1982–December 1984[a]	69.73	113.33	48.58	17.53
El Salvador, August 1982–December 1985	62.99	93.2	43.00	12.20
Guatemala, November 1984–June 1988[b]	80.50	280.00	0.40	96.44
Jamaica, January–October 1983	57.90	66.15	52.12	5.87
Mexico, August 1982–February 1988[c]	15.14	108.79	−1.26	18.54
Latin America (informal/black DRS)				
Peru, January 1980–July 1986	12.57	63.08	−2.15	18.70
Dominican Republic, January 1980–July 1982	38.00	50.00	29.00	3.97

Note: In formal dual exchange markets, the spread is defined as $[(X - S)/S]*100$ where X is the financial exchange rate and S is the commercial rate, both expressed as the ratio of domestic currency to the U.S. dollar. In informal dual exchange markets, the spread is defined as $[(B - S)/S]*100$ where B is the parallel (or black) exchange rate. Calculations are based on monthly data and are period averages for Belgium, Italy, and El Salvador and end-of-period observations for all other countries.

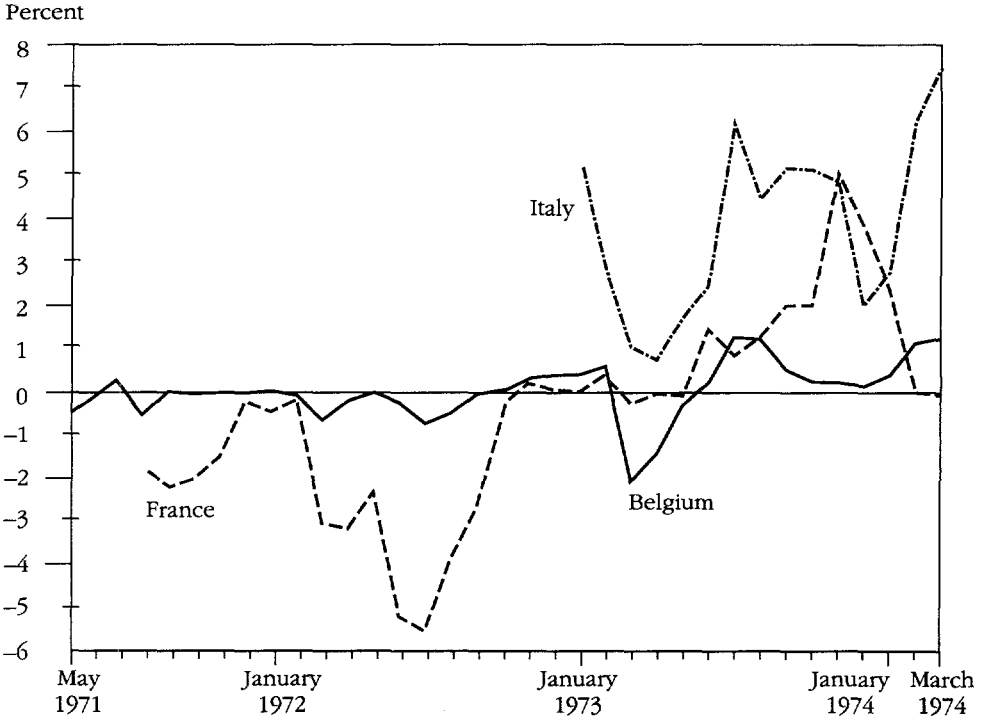
a. The DRS operated de jure over this period.

b. De facto reunification occurred in June 1988.

c. De facto reunification occurred in February 1988.

Source: IMF (various issues b); International Currency Analysis Inc. (various issues); unpublished country data.

Figure 1. *Spreads between the Official Financial and Commercial Exchange Rates in Belgium, France, and Italy, 1971–74*

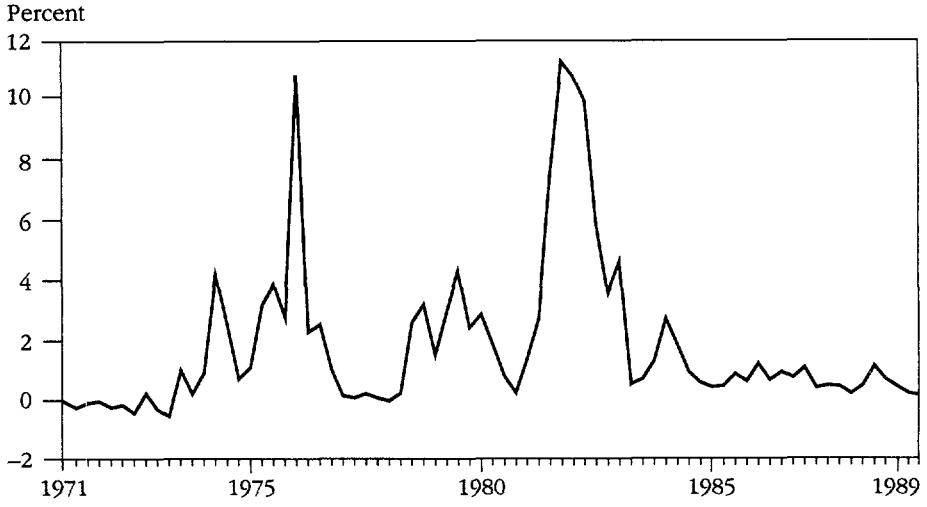


Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: Unpublished country data.

commercial and financial exchange rates were small for the three European countries. The Belgian spread was usually 1 percent or less. During the turbulent period surrounding the breakdown of Bretton Woods (May 1971 to March 1974), the mean spread was 0.04 percent, with a standard deviation of 0.67 percent. In France, the mean spread over the duration of its dual exchange market was −0.46 percent, with a standard deviation of 2.35 percent. Italy experienced somewhat larger spreads, on average, than its two European neighbors; spreads between 4 and 7 percent prevailed during eight of the fifteen months in which the Italian system operated. The mean spread was consequently a bit higher, at 3.9 percent, with a standard deviation of 2.08 percent. In all three countries, spreads in excess of 5 percent never persisted for more than two consecutive months in the early 1970s.

Figure 2, which shows the Belgian spread during a twenty-year period, reveals that the early period was not an aberration. Over the last two decades of Belgium's dual exchange market, the mean spread was 1.8 percent, with a standard deviation of 2.6 percent. The only big jumps in the spread occurred in

Figure 2. *Spread between the Official Financial and Commercial Exchange Rates in Belgium, 1971–89*



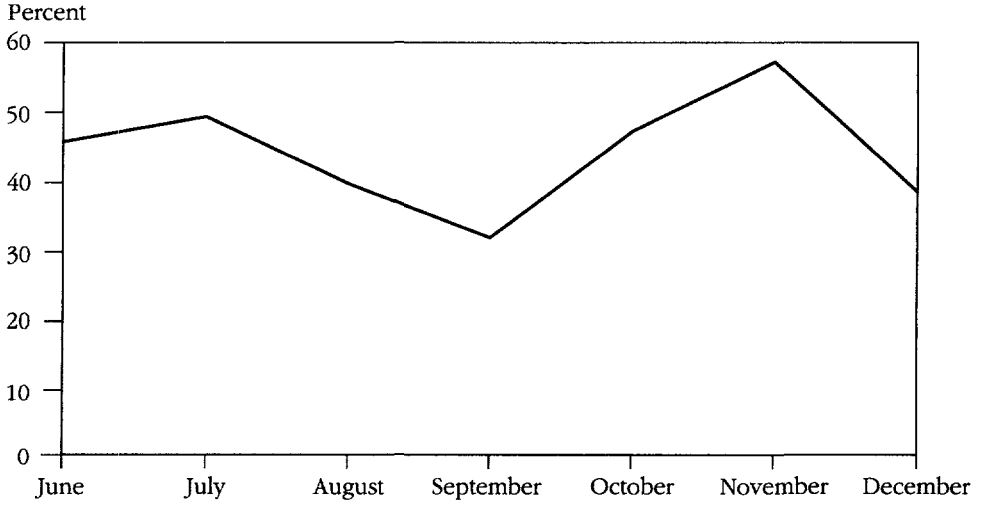
Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Quarterly data are used.
Source: IMF (various issues b).

the first quarter of 1976, when the spread exceeded 10 percent, and between the third quarter of 1981 and the second quarter of 1982, when spreads of 6 to 11 percent emerged.

Figures 3 to 11 present the spreads for Latin American countries operating formal dual markets in the 1980s. The data illustrate that dual exchange markets created larger and more persistent distortions in Latin America than in Europe. Whereas the spreads in the European episodes were quite small, usually in the 1 to 4 percent range, the Latin American spreads were large, generally in the 15 to 80 percent range. The figures show that in all the formal dual exchange market episodes, spreads in excess of 50 percent occasionally appeared, and in four out of the nine episodes spreads exceeded 100 percent at times. Guatemala experienced a period with spreads above 200 percent and Bolivia saw some spreads above 500 percent. Mexico and Costa Rica had relatively small spreads by Latin American standards, but even they had average spreads far in excess of the European spreads. Mexico's mean spread between 1982 and 1988 was 15 percent, and Costa Rica's was almost 19 percent. All Latin American countries experienced spreads in excess of 10 percent for sustained periods of six months or more. Figures 12 and 13 show that spreads in informal dual markets could be quite large and persistent as well.

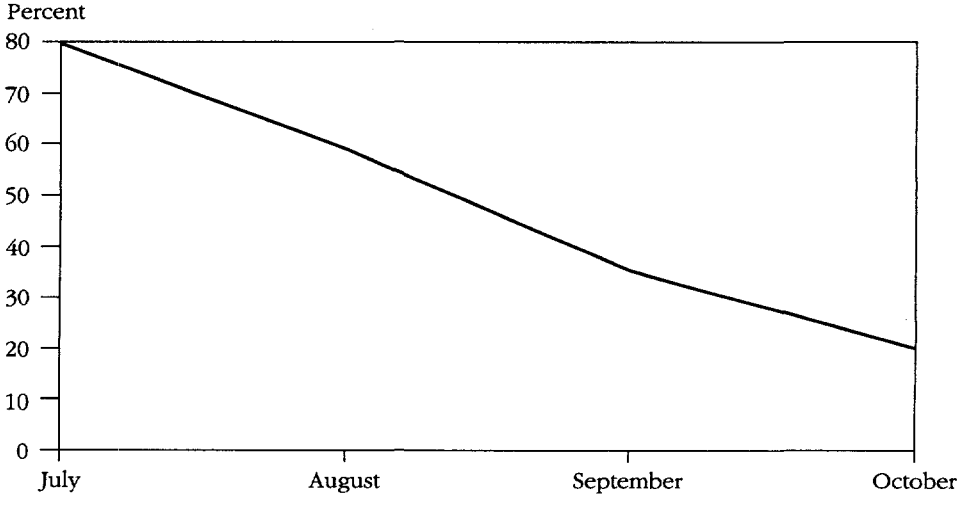
In summary, European spreads were small and spreads above 5 percent were short-lived, but Latin American spreads were large and persisted for extended

Figure 3. *Spread between the Official Financial and Commercial Exchange Rates in Argentina, 1981*



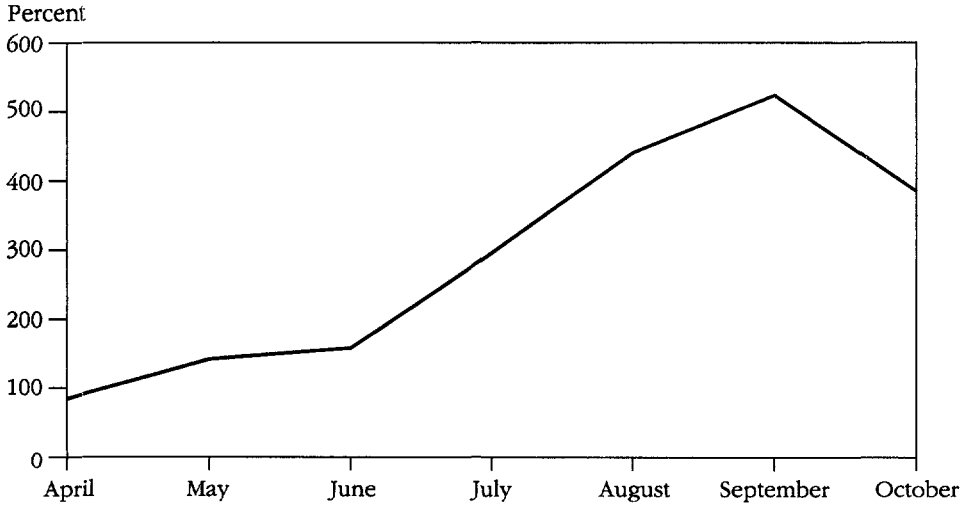
Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

Figure 4. *Spread between the Official Financial and Commercial Exchange Rates in Argentina, 1982*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

Figure 5. *Spread between the Official Financial and Commercial Exchange Rates in Bolivia, 1982*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

periods. The figures also reveal another difference across regions. In Europe, the price of foreign exchange could stand at a premium or discount in the financial exchange market compared with its price in the commercial exchange market. In Latin America, the price of foreign exchange invariably stood at a premium in the financial exchange market.

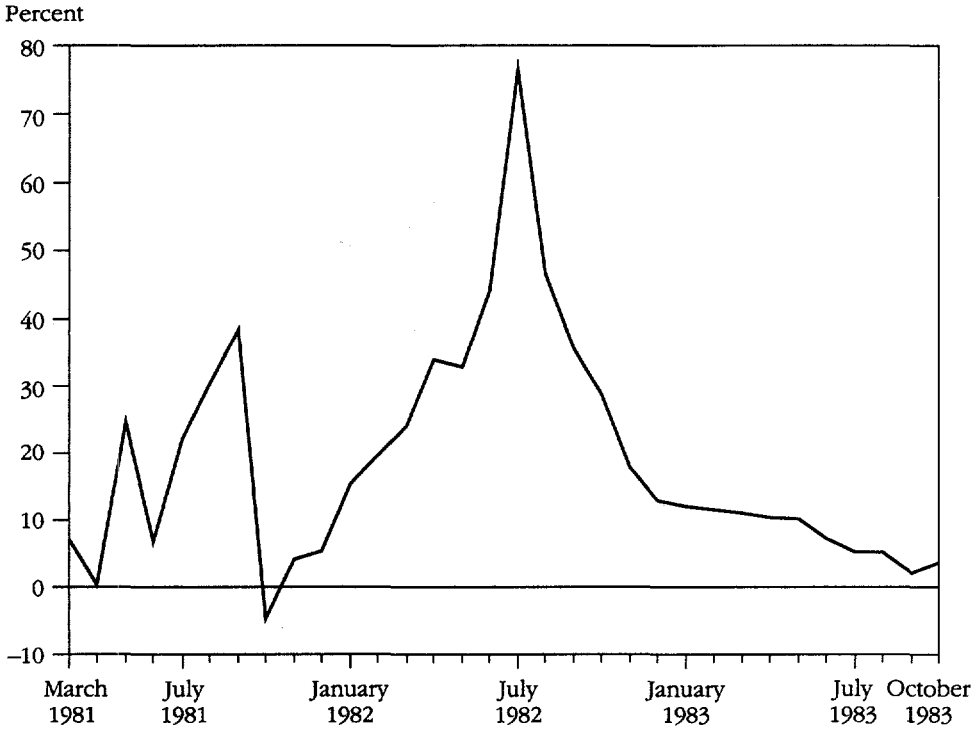
II. Determinants of the Spread

The data raise the puzzling question of why spreads are so much larger and more persistent in Latin America than in Europe. It could be that the Latin American and European spreads are determined by the same set of economic variables, with the high-spread countries subject to larger disturbances in those underlying variables. Alternatively, the Latin American and European spreads could be determined by different factors, reflecting, in part, different institutional practices surrounding the operation of the dual exchange market. To shed some light on the puzzle, a simple model is used to identify key determinants of the spread and to derive a reduced-form equation for the spread. The equation is estimated using European and Latin American data to see whether the spreads in the two regions are determined by similar factors.

The Theory

The simplest model for highlighting determinants of the spread between dual exchange rates is a stock-flow model that assumes a fixed or crawling commer-

Figure 6. *Spread between the Official Financial and Commercial Exchange Rates in Costa Rica, 1981–83*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

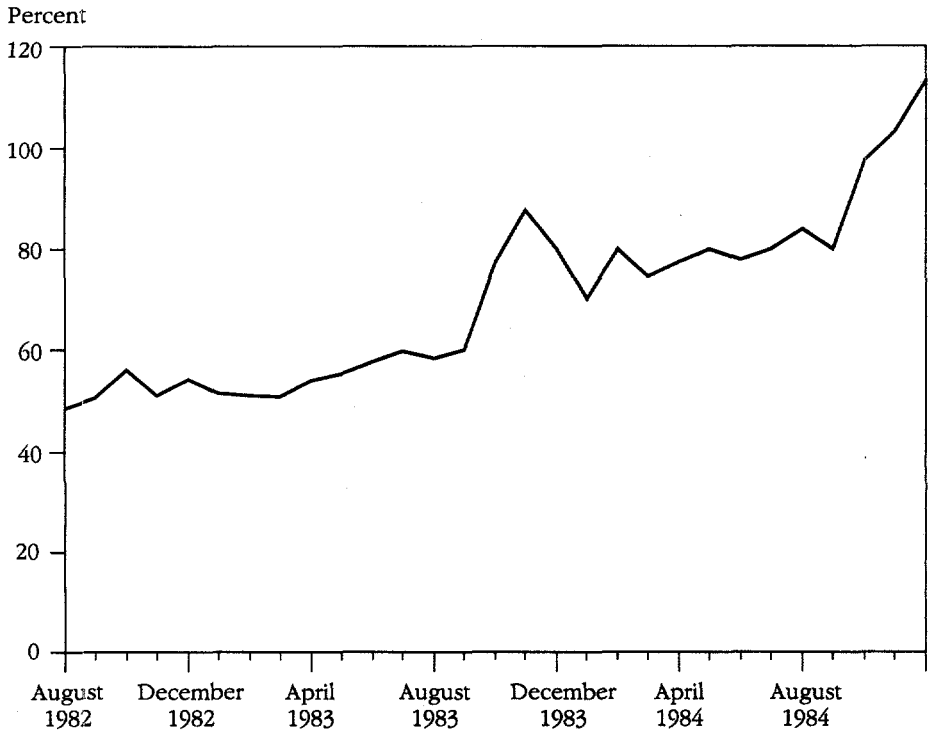
cial rate, a flexible financial exchange rate, domestic money and foreign bonds, purchasing power parity, and perfect foresight.[3] All commercial transactions are conducted at the commercial exchange rate and all financial transactions at the financial exchange rate. Complications arising from leakages are discussed later.

In the asset markets, the desired ratio of domestic money to foreign interest-bearing assets, M/XF, depends on the rate of return on foreign assets:

$$\frac{M}{XF} = L\left[i^*\left(\frac{1}{z}\right)(1+\delta)+f\right] \qquad L' < 0. \tag{2}$$

3. For examples of models with most or all of these features, see Flood (1978), Marion (1981), Flood and Marion (1982), Dornbusch and others (1983), Dornbusch (1986), Lizondo (1987), Pinto (1989), and Ghei and Kiguel (1992). Optimizing models can also be used to isolate economic determinants of the spread. See Adams and Greenwood (1985), Guidotti and Vegh (1988), Frenkel and Razin (1986), and Flood and Marion (1988).

Figure 7. *Spread between the Official Financial and Commercial Exchange Rates in the Dominican Republic, 1982–84*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

Domestic money earns no return. The return on foreign assets is calculated under the assumption that interest income, a current account transaction, is repatriated at the commercial exchange rate. The home currency price of foreign currency in the financial market is denoted by X, the stock of foreign assets by F, and the value of foreign assets in domestic currency by XF.

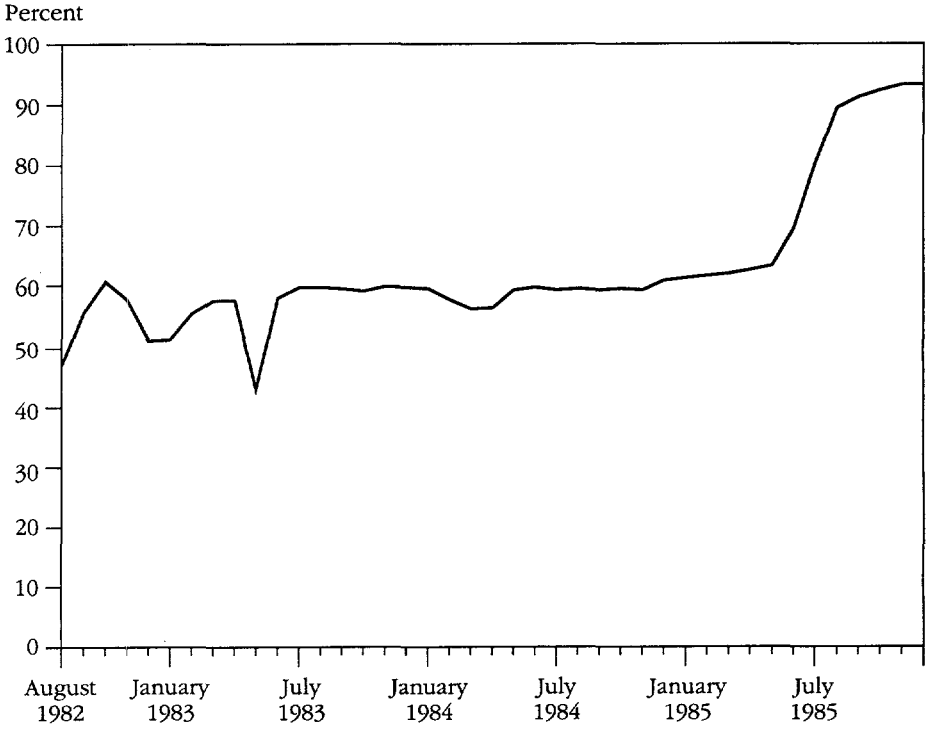
The rate of change of the spread, $\dot{z}/z$, is equal to the difference between the rate of depreciation of the financial exchange rate and the rate of crawl (managed depreciation) of the commercial exchange rate:

$$\frac{\dot{z}}{z} = f - \delta. \tag{3}$$

Substituting equation 3 into equation 2 and inverting gives the evolution of the spread over time:

$$\frac{\dot{z}}{z} = h\left(\frac{m}{zF}\right) - \left(\frac{i^*}{z}\right)(1 + \delta) - \delta, \qquad h = L^{-1}, h' < 0 \tag{4}$$

Figure 8. *Spread between the Official Financial and Commercial Exchange Rates in El Salvador, 1982–85*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

where $m = \frac{M}{S}$ and $z = \frac{X}{S}$

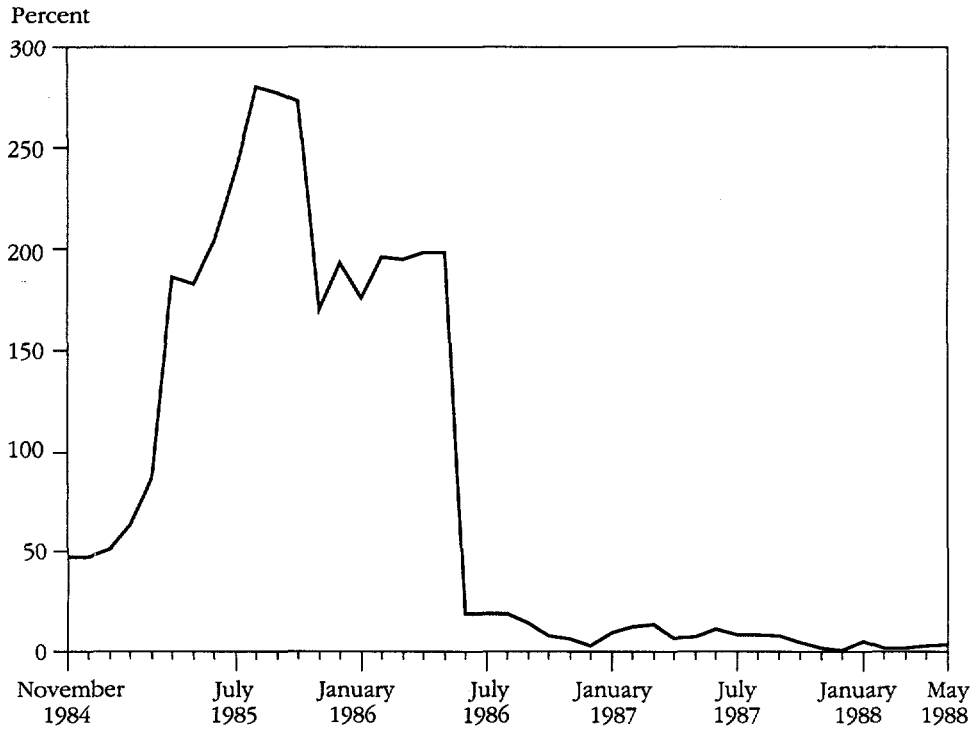
and S is the home currency price of foreign currency in the commercial market. Equation 4 is the first dynamic equation of the model.

The second dynamic equation comes from equating expected real asset accumulation to planned real saving:

$$(5) \qquad \dot{m} + \left[h\left(\frac{m}{zF}\right) - \left(\frac{i^*}{z}\right)(1+\delta) - \delta\right]zF = s(y, m + zF) \qquad s_1 > 0, s_2 < 0.$$

Households may increase their domestic currency wealth in several ways. They can add to their money holdings as the economy acquires reserves through current account surpluses or as the government undertakes domestic credit creation to finance budget deficits. They can also experience capital gains on their foreign asset holdings as a result of a depreciation of the financial exchange rate. They cannot increase their holdings of foreign assets, however. The flexible

Figure 9. *Spread between the Official Financial and Commercial Exchange Rates in Guatemala, 1984–88*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

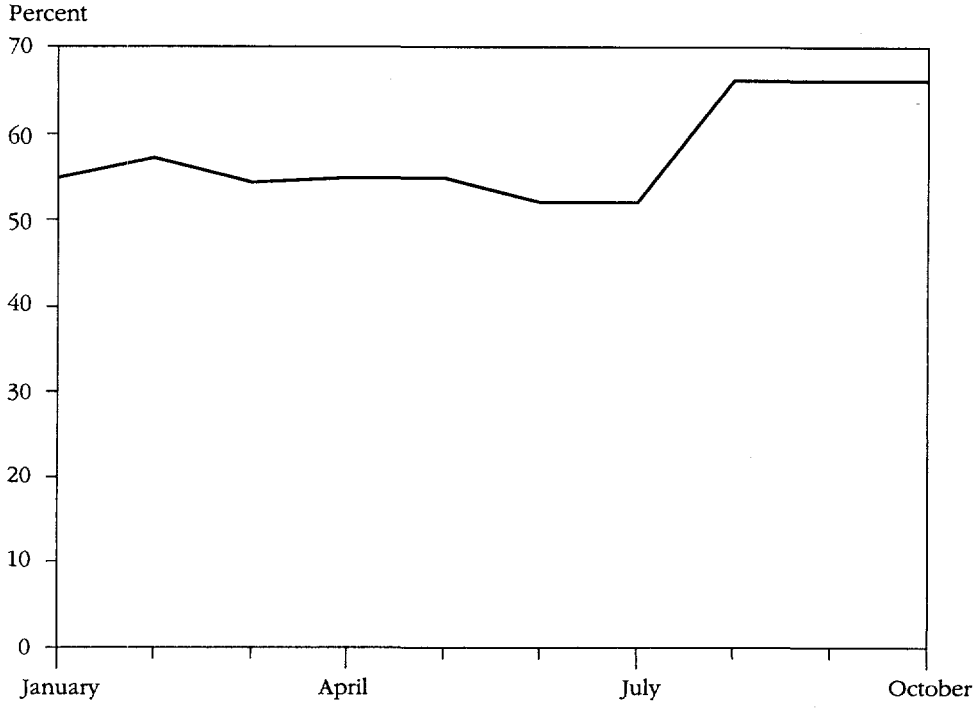
financial exchange rate prevents net capital flows through the capital account exchange market. Households cannot acquire foreign assets through the current account exchange market either, because proceeds from commercial transactions must be exchanged at the commercial exchange rate for domestic assets.

Assuming purchasing power parity and a fixed foreign price level normalized to one, the domestic price deflator is $P = S$. Then, using equations 3 and 4 and setting $\dot{F}/F = 0$ (F is the initial stock of foreign assets at the onset of the dual exchange market) and $\dot{m} = [d(M/S)]/dt$, expected real asset accumulation is

$$d\frac{[(M + XF)/P]}{dt} = \dot{m} + (f - \delta)zF = \dot{m} + \left[h\left(\frac{m}{zF}\right) - \frac{i^*}{z}(1 + \delta) - \delta\right]zF.$$

The right-hand side of equation 5 specifies savings behavior. Planned real saving is assumed to depend positively on real income, y, and negatively on real wealth, $m + zF$. Using the national income identity and ignoring investment spending, saving represents the sum of the current account surplus and the

Figure 10. *Spread between the Official Financial and Commercial Exchange Rates in Jamaica, 1983*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

government budget deficit, all in real terms. Equation 5 describes the evolution of real wealth over time.

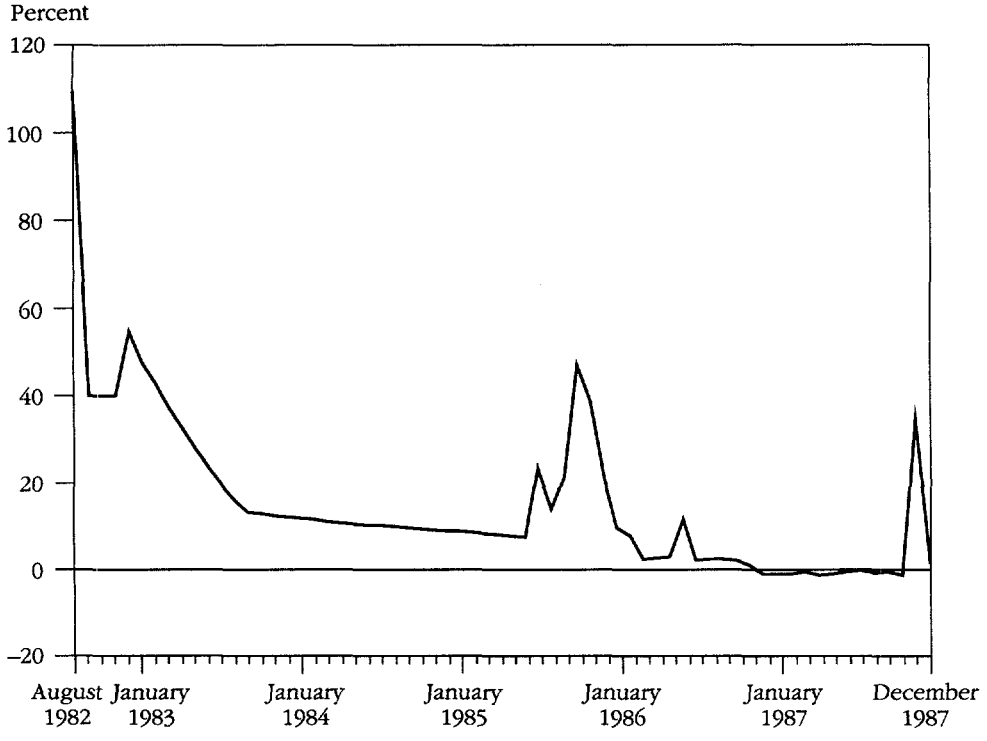
The steady state is attained when $\dot{z} = \dot{m} = 0$. In the steady state, the spread is constant. The financial and commercial exchange rates depreciate at the same rate. The real money stock is also constant. The growth of the nominal money stock is offset by the depreciation of the commercial exchange rate. The current account is balanced and the government deficit is financed by credit creation, with the depreciation of the commercial exchange rate taxing money balances.

Combining equations 4 and 5 and assuming convergence to the steady state, a reduced-form equation for the spread, z, depends on the foreign interest rate, the rate of depreciation of the commercial exchange rate, real income, and the initial stock of foreign assets at the onset of the dual exchange market:

$$z = z(i^*, \delta, y, F). \tag{6}$$

An increase in the foreign interest rate or the rate of depreciation of the commercial exchange rate shifts asset holders from money to foreign assets.

Figure 11. *Spread between the Official Financial and Commercial Exchange Rates in Mexico, 1982–87*



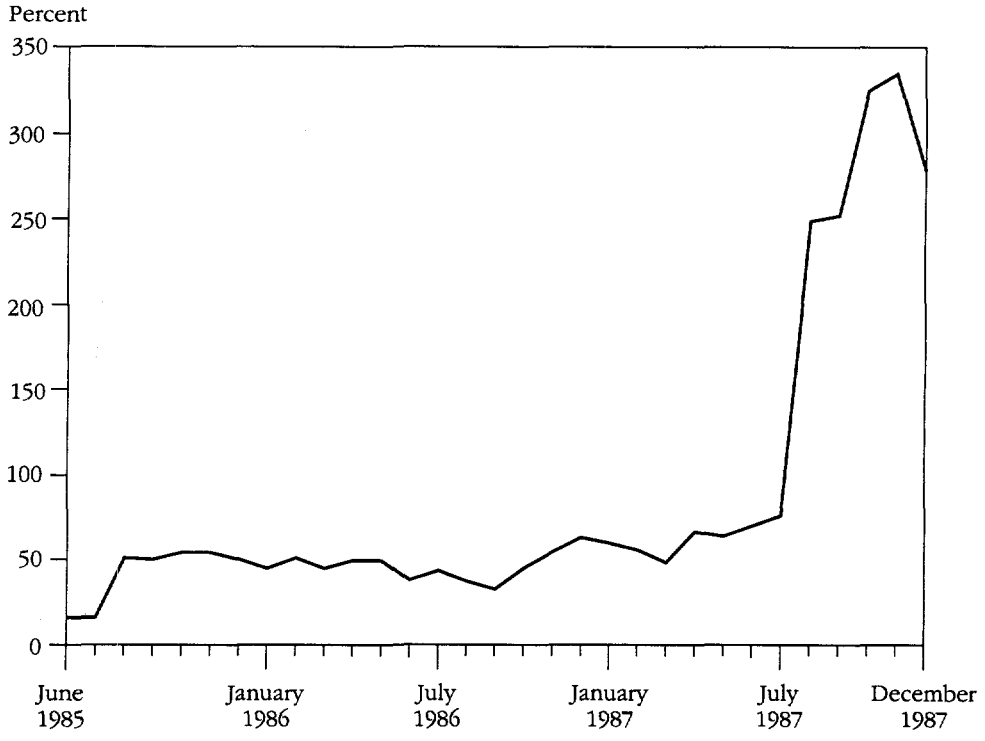
Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b) and unpublished country data.

Given the fixed supply of foreign assets, the spread must widen to restore portfolio balance. An increase in income will stimulate saving, generating current account surpluses that cause the real money stock to rise as the central bank intervenes in the commercial exchange market. The spread will rise as asset holders attempt to shift some of their new wealth into foreign assets.

An increase in the government budget deficit also widens the spread. With money demand inelastic with respect to inflation, an increase in the deficit financed by credit creation requires an increase in the rate of depreciation of the commercial rate to raise the needed inflation tax revenue. A faster depreciation of the commercial rate in turn widens the spread.

A shift in expectations also has an impact on the spread. For example, if agents believe that the government will increase the budget deficit and the rate of depreciation of the commercial exchange rate at some time in the future, they will now attempt a portfolio shift from money to foreign assets, which will lead to a jump in the spread. Thus, as described by Dornbusch (1986), changing expectations about the future course of fiscal policy can generate large fluctua-

Figure 12. *Spread between the Black Market and Official Commercial Exchange Rates in Peru, 1985–87*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b); Intenational Currency Analysis, Inc. (various issues).

tions in the spread. In addition, a shift in expectations about future income affects the spread because saving depends on some notion of expected permanent income.

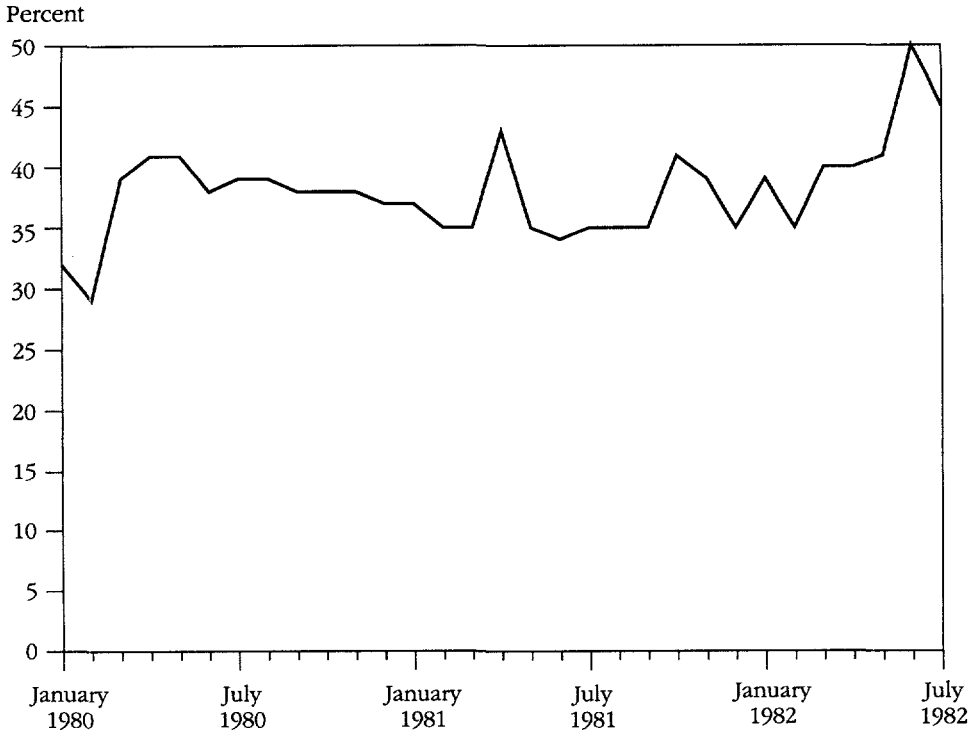
Empirical Estimation of the Spread

Equation 6 guides the choice of economic variables in the regression analysis of the determinants of the spread in the European and Latin American dual exchange markets. The European spreads are estimated with quarterly data using the following initial specification:

$$\log z_t = \beta_0 + \beta_1 \log z_{t-1} + \beta_2(i_t^*) + \beta_3[L](\log y_t - \log y_{t-1}) + \beta_4[L](\log S_{t+1} - \log S_t) + \epsilon_t \tag{7}$$

where β[L] is a polynomial in the lead/lag operator L, $\log z_t$ is the log of the spread in time t, i^* is the nominal foreign interest rate in percentage terms, ($\log y_t - \log y_{t-1}$) is the growth of real income, and ($\log S_{t+1} - \log S_t$) is the actual rate of depreciation of the commercial exchange rate, which is equal to the

Figure 13. *Spread between the Black Market and Official Commercial Exchange Rates in the Dominican Republic, 1980–82*



Note: The spread is the difference between the financial and commercial exchange rates in percentage terms. Monthly data are used.
Source: IMF (various issues b); International Currency Analysis, Inc. (various issues).

expected rate of depreciation plus a random component under rational expectations.

Although the spread is a real variable, its variance is dominated by the variance of the financial exchange rate because the commercial rate is generally fixed. Economists have had no success in explaining the variance of a flexible exchange rate solely in terms of fundamentals, so there is no reason to expect considerably more success in explaining the variance of the spread on the basis of fundamentals alone. Hence the lagged spread is included on the right-hand side as well. Dickey-Fuller tests confirm that the European spreads are stationary (as are the Latin American spreads), so the regression is run using the log-level spread rather than its rate of change. The variables on the right-hand side are also constructed to be stationary processes.[4]

4. Dickey-Fuller tests fail to reject the hypothesis of a unit root for the foreign interest rate, but on a priori grounds the interest rate should be bounded by reasonable limits.

Recognizing that the expected rate of depreciation of the commercial exchange rate may in fact deviate from its actual rate of depreciation, I also experiment with other specifications for expectations. I hypothesize that expectations may be influenced by factors such as movements in international reserves, the evolution of the real commercial exchange rate, and the size of the real budget deficit. A faster rate of reserve depletion brought about by increasing current account deficits may signal that the authorities are under pressure to increase the rate of depreciation of the commercial exchange rate. An increasing appreciation of the real commercial exchange rate that worsens the current account balance may also indicate the need to increase the rate of depreciation of the nominal commercial exchange rate. Finally, an increase in the real budget deficit may signal an eventual increase in the rate of depreciation of the commercial exchange rate to raise seigniorage revenue. Thus a modified version of equation 7 substitutes the terms $(\log R_t - \log R_{t-1})$, $(\log r_t - \log r_{t-1})$, and (def_t) for the term $(\log S_{t+1} - \log S_t)$, where R is the foreign currency value of international reserves, r is the real commercial exchange rate, and def is the real budget deficit. The deficit variable is not logged because some observations (surpluses) have negative values. I also experiment with various lag/lead structures for these variables. Note that the empirical work departs from the theoretical model by allowing for variation in the real commercial exchange rate.

In the regressions, the spread is calculated using end-of-quarter observations for the financial and commercial exchange rates. Foreign variables are proxied by U.S. data. The three-month U.S. Treasury bill rate is used for the foreign interest rate. Quarterly data on gross national product (GNP) are unavailable, so an index of industrial production is used for the income measure. Data on the net stock of foreign assets are also unavailable, but because the net stock does not change during the operation of dual exchange markets, F can be subsumed in the constant term. The stock of nongold international reserves is chosen as the reserves variable. The real commercial exchange rate is measured by the consumer price–adjusted bilateral exchange rate with the United States. The real budget deficit is calculated by deflating the nominal budget deficit (in billions of national currency units) by the domestic consumer price index.

Ideally, the same set of explanatory variables would be used in the Latin American regressions. Unfortunately, data problems make this impossible. Income figures are often unavailable on a quarterly basis. For two countries, budget deficit figures are also lacking on a quarterly basis. Two compromises are needed to estimate similar regressions for the European and Latin American spreads. First, the European regressions are run with and without the income variables in order to have one version of the regression duplicate the Latin American regressions. Second, when required, figures for the annual budget deficit are used to compute quarterly estimates.

The first set of regressions based on equation 7 is reported in table 3. Because most dual exchange market episodes are too short for estimation procedures, the European data and the Latin American data are each pooled. Belgium, however,

Table 3. *Estimation Results for Models Using the Rate of Depreciation of the Commercial Exchange Rate*

Variable or statistic	Europe[a]	Belgium[b] With income terms	Belgium[b] Without income terms	Latin America[c]
Constant	−0.008*	−0.008	−0.004	0.075
	(−1.65)	(−1.56)	(0.84)	(1.42)
Spread between exchange rates last period, $\log z_{t-1}$	0.512**	0.55**	0.56**	0.82**
	(6.26)	(6.88)	(6.85)	(18.57)
Nominal foreign interest rate, i^*	0.009**	0.008**	0.007**	−0.01
	(3.20)	(2.83)	(2.36)	(−0.54)
Rate of depreciation of the commercial exchange rate				
Next period $\log S_{t+1} - \log S_t$	0.03	0.04	0.04	0.02
	(0.96)	(1.12)	(1.34)	(0.36)
In two periods, $\log S_{t+2} - \log S_{t+1}$	0.05	0.07**	0.05	−0.04
	(1.51)	(2.05)	(1.56)	(−0.79)
Growth of real income				
This period, $\log y_t - \log y_{t-1}$	0.12	0.13*		
	(1.64)	(1.78)		
Next period, $\log y_{t+1} - \log y_t$	0.14**	0.16**		
	(1.99)	(2.28)		
$\bar{R}^2$	0.57	0.56	0.53	0.71
Sample size	103	94	94	201

* Significant at the 90 percent confidence level.

** Significant at the 95 percent confidence level.

Note: The dependent variable is the (log) spread between exchange rates in the financial and commercial foreign exchange markets. Quarterly data are used. *t*-statistics are in parentheses.

a. Regression uses pooled data for Belgium (second quarter 1963 to fourth quarter 1971 and first quarter 1973 to third quarter 1987), France (fourth quarter 1971 to second quarter 1973), and Italy (second quarter 1973 to third quarter 1973).

b. Regression uses data for Belgium (second quarter 1963 to fourth quarter 1971 and first quarter 1973 to third quarter 1987).

c. Regression uses pooled data for Argentina (fourth quarter 1971 to first quarter 1976), Chile (second quarter 1970 to second quarter 1975 and fourth quarter 1982 to second quarter 1988), Costa Rica (second quarter 1970 to second quarter 1972 and fourth quarter 1981 to first quarter 1983), the Dominican Republic (fourth quarter 1982 to second quarter 1984), El Salvador (fourth quarter 1982 to third quarter 1984), Guatemala (first quarter 1985 to fourth quarter 1988), Jamaica (third quarter 1977 to fourth quarter 1977), Mexico (fourth quarter 1982 to fourth quarter 1988), Paraguay (second quarter 1983 to fourth quarter 1986), Peru (second quarter 1971 to first quarter 1977 and second quarter 1987 to fourth quarter 1988), and Uruguay (second quarter 1972 to second quarter 1978).

Source: IMF (various issues b); unpublished country data.

had a long continuous experience with dual exchange markets, so separate regressions of the Belgium spread are also reported.

The first regression reported in table 3 uses pooled Belgian, French, and Italian data. The results show that all the explanatory variables affect the spread in ways consistent with the stock-flow model and that some are significant at the 95 percent confidence level. An increase in the foreign interest rate has a positive and highly significant effect on the spread, as does an expected increase in income growth. An expected increase in the rate of depreciation of the commercial exchange rate also widens the spread, but the effect is not significant. Together with the lagged spread, these variables explain 57 percent of the variation in the Eu-

ropean spreads. Since country and time dummies were all insignificant, they are not reported. Additional lags on the spread or leads on the rate of depreciation and on income growth were also insignificant.

The results are quite similar for the same regression run on Belgian data alone, although the expected rate of depreciation of the commercial exchange rate is highly significant as well. The strong correlation between the expected increase in the rate of depreciation and the spread helps explain the behavior of the Belgian spread in the first quarter of 1976 and from the third quarter of 1981 to the second quarter of 1982 (figure 2). The dramatic widening of the Belgian spread in the first quarter of 1976 corresponded to speculative pressures against the French franc that spilled over to the Belgian commercial franc when the French franc departed from the snake and the Belgian current account shifted into a deficit that quarter.[5] The wider spread during the period from the third quarter of 1981 to the second quarter of 1982 (7 to 11 percent range) reflected speculative activity surrounding three devaluations of the Belgian commercial franc against the deutsche mark that occurred within the European Monetary System in the fourth quarter of 1981 and the first and second quarters of 1982.

The Belgian regression is run a second time without the income terms in order to make it identical to the Latin American regression. The omission of income terms marginally reduces the explanatory power of the regression compared with the one for Belgium with income terms.

The regression for the Latin American spreads uses pooled data from eleven countries: Argentina, Chile, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay. The panel contains the set of countries that operated official dual exchange markets in some part of the period between the first quarter of 1970 and the second quarter of 1989. The Argentine episodes of 1981 and 1982 and the Bolivian episode of 1982 were excluded from the panel because they contained only two quarterly observations. Country and time dummies are not reported.

In contrast to the European experience, in Latin America movements in the foreign interest rate have no effect on the spread. This finding suggests that while insulation of domestic interest rates from foreign interest rate disturbances may have been a motive for adopting the DRS in Europe, this was not the case in Latin America. The expression for the effective return in equation 1 indicates that the DRS may provide insulation from foreign interest rate shocks if such shocks generate offsetting movements in the spread. In the European and Belgian regressions, an increase in the foreign interest rate does in fact generate some offsetting increase in the spread. The same pattern of response is not evident in the Latin American data.

The regression results for Latin America also show that a change in the future rate of depreciation of the commercial exchange rate has no effect on the Latin

5. The snake refers to the close margins for the bilateral exchange rates of European currencies that were negotiated near the end of the Bretton Woods system.

American spreads. This result is not surprising because actual and expected rates of depreciation of the commercial exchange rate are likely to be quite different. Because the Latin American authorities always ended DRS episodes with a devaluation of the commercial exchange rate (see table 1), agents would naturally expect, with some positive probability, a devaluation in the next quarter or two even though the realized commercial rate stayed fixed for extended periods.

One final observation is that the coefficient attached to the lagged spread is a bigger fraction in the Latin American regression than in the European one. This result captures what was seen in the figures, namely, that the spreads are more per sistent in the Latin American cases. Indeed, the higher R^2 for the Latin American regression comes from the fact that the lagged spread is a very important determinant of the current spread.

Table 4 reports estimation results for variations on the regressions in table 3.

Table 4. *Estimation Results for Models Using Alternative Proxies for the Rate of Depreciation of the Commercial Exchange Rate*

	Belgium[a]		
Variable or statistic	*With income terms*	*Without income terms*	*Latin America*[b]
Constant	−0.003	−0.001	−0.03
	(−0.72)	(−0.34)	(−0.63)
Spread between exchange rates last period, z_{t-1}	0.58**	0.58**	0.79**
	(8.02)	(8.0)	(17.92)
Nominal foreign interest rates, i^*	0.005*	0.005*	0.008
	(1.82)	(1.67)	(0.31)
Real budget deficit, *def*	0.36E-02*	0.32E-02	0.32E-05**
	(1.71)	(1.54)	(2.41)
Change in foreign-currency value of international reserves, $\log R_t - \log R_{t-1}$	−0.06**	−0.06**	−0.06**
	(−5.03)	(−5.52)	(−2.07)
Change in real commercial exchange rate, $\log r_t - \log r_{t-1}$	−0.02	−0.02	−0.43**
	(−0.79)	(−0.67)	(−7.68)
Growth of real income	0.006		
This period, $\log y_t - \log y_{t-1}$	(0.09)		
Next period, $\log y_{t+1} - \log y_t$	0.11*		
	(1.67)		
$\bar{R}^2$	0.63	0.63	0.81
Sample size	94	94	175

* Significant at the 90 percent confidence level.

** Significant at the 95 percent confidence level.

Note: The dependent variable is the (log) spread between exchange rates in the financial and commercial foreign exchange markets. Quarterly data are used. *t*-statistics are in parentheses.

a. Regression uses data for Belgium (second quarter 1963 to fourth quarter 1971 and first quarter 1973 to third quarter 1987).

b. Regression uses pooled data for Argentina (first quarter 1973 to first quarter 1976), Chile (first quarter 1974 to second quarter 1975 and fourth quarter 1982 to second quarter 1988), Costa Rica (first quarter 1971 to second quarter 1972 and fourth quarter 1981 to first quarter 1983), the Dominican Republic (fourth quarter 1982 to second quarter 1984), El Salvador (fourth quarter 1982 to third quarter 1984), Guatemala (first quarter 1985 to fourth quarter 1988), Jamaica (third quarter 1977 to fourth quarter 1977), Mexico (fourth quarter 1982 to fourth quarter 1988), Paraguay (second quarter 1983 to fourth quarter 1986), Peru (second quarter 1971 to first quarter 1977 and second quarter 1987 to fourth quarter 1988), and Uruguay (second quarter 1972 to second quarter 1974 and second quarter 1976 to second quarter 1978).

Source: IMF (various issues b); unpublished country data.

The regression results in table 4 use the real budget deficit and the rates of change in both international reserves and the real commercial exchange rate to capture expectations about future movements in the nominal commercial exchange rate. Because the European and Belgian regression results are nearly identical, only the Belgian regressions are reported.

The regression for Belgium with income terms shows that the variables proxying for expectations have sensible and important effects on the Belgian spread. An increase in the real budget deficit widens the spread, as does a more rapid rate of reserve depletion. The coefficient is significant at the 90 percent confidence level on the deficit variable and at the 95 percent level on the reserve variable. A faster real appreciation of the commercial exchange rate has no significant effect on the spread, however. Using a different real exchange rate specification, such as the bilateral rate with Germany, did not change the insignificance of the real commercial exchange rate variable. Expected future income growth and current increases in the foreign interest rate have positive and significant effects on the Belgian spread, as in the earlier regressions.

Although the coefficient on the real deficit variable is positive, it is not highly significant. One possible reason may be that, in practice, an increase in the budget deficit has opposing effects on the spread. As described by the theoretical model, a budget deficit financed by credit creation ultimately requires a more rapid depreciation of the commercial exchange rate, which raises the return on foreign assets, triggers an attempted portfolio shift, and widens the spread. However, an increase in the deficit may also be financed by bond sales. In that case, although the accumulation of domestic bonds tends to widen the spread as agents try to diversify their new wealth, higher domestic interest rates tend to narrow the spread as agents try to shift into the higher-yielding domestic assets. The positive coefficient on the deficit term suggests that the wealth effects may dominate the interest rate effect, but not by much. Additional regressions were run using both the foreign and domestic interest rates or the interest differential as right-hand-side variables. The results must be treated cautiously because the domestic interest rate is not really an exogenous variable. Nevertheless, it is interesting to note that, controlling for domestic interest rates, an increase in the real budget deficit has a highly significant positive effect on the spread.[6]

6. The regression using Belgian data is

$$\log z_t = \underset{(0.56)}{0.001} + \underset{(13.51)}{0.76 \log z_{t-1}} + \underset{(4.08)}{0.01(i_t^* - i_t)} - \underset{(-1.06)}{0.06(\log y_t - \log y_{t-1})} + \underset{(0.26)}{0.017(\log y_{t+1} - \log y_t)}$$

$$+ \underset{(2.55)}{0.44\text{E}{-05}\, def_t} - \underset{(-4.94)}{0.059(\log R_t - \log R_{t-1})} - \underset{(-1.95)}{0.064(\log r_t - \log r_{t-1})}$$

$$R^2 = 0.75, n = 94$$

(t-statistics are in parentheses). A correction has been made for serial correlation. Regressions of the black market spread commonly include the interest differential on the right-hand side in the belief that activities in the black market do not affect domestic variables such as the interest rate. For the European DRS

The regression for Belgium without the income terms highlights determinants of the Belgian spread in a way that duplicates the regression for the Latin American spreads. The omission of the income terms has little effect on the estimation results.

In the regression for Latin America, expectational factors also seem to be important. Both increased budget deficits and a faster depletion of international reserves widen the spread and are highly significant explanatory variables. In addition, and in contrast to the Belgian case, a faster real appreciation of the commercial exchange rate also has a positive and highly significant effect on the spread. Indeed, the size of the coefficient indicates that real appreciations have economically significant effects on the Latin American spreads. Because real appreciations are more dramatic in Latin America, they apparently provide a stronger signal of a pending devaluation of the commercial exchange rate. As before, the lagged spread is an important determinant of the current spread, but the foreign interest rate has no effect on the spread.

To test whether the positive relation between the budget deficit and the Latin American spread is robust, the regression for Latin America was rerun over different samples. In some cases, the coefficient on the deficit variable is insignificant. Although there is convincing evidence that the budget deficit is a strong predictor of the black market premium, the spread between two official exchange rates appears to be less sensitive to this factor. What holds up across all samples and specifications is the importance of the lagged spread and real commercial exchange rate in determining the Latin American spread. Real appreciations of the commercial exchange rate appear to affect expectations strongly. Moreover, to the extent that these appreciations induce the authorities to shift some current account transactions that are in large deficit at the commercial exchange rate to the financial exchange market, they may help explain why the spreads are so much larger in Latin America than in Europe.

III. Drawbacks in Empirical Estimation

Some important caveats about the empirical tests are in order. I have analyzed the spread on the assumption that there is a structural relationship between the spread and its determinants. However, because the dual exchange market is generally a temporary arrangement and because institutional practices vary during its operation, this assumption may not be appropriate.

Consider first the issue of temporariness. With the exception of Belgium, which used a dual exchange market for more than thirty years, countries adopt

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episodes, however, the financial exchange rate and domestic interest rate are jointly determined endogenous variables.

When the first regression in table 4 was rerun using current and future values of the real budget deficit, the coefficient on the deficit one quarter ahead was negative and highly significant. One explanation consistent with this result is that an increase in the next period's budget deficit puts upward pressure on current domestic interest rates, causing a portfolio shift into domestic assets that narrows the current spread.

the DRS for a relatively short time. France used the arrangement for thirty-one months and Italy for fifteen months. Table 1 shows that the Latin American dual exchange markets were also of limited duration. Argentina used the official dual exchange market for six months or less in 1981 and again in 1982, Bolivia operated a DRS for seven months, Jamaica for ten months, and so on. When private agents believe the dual exchange market is temporary, the spread will be influenced by probability-weighted beliefs of the possible regimes to follow. These beliefs build into the data elements that are difficult to model in empirical work and contaminate the link between the spread and its determinants, particularly around the time of reunification.

Changes in institutional practices during the operation of a dual exchange market also affect the structural stability of the regression equation. Regressions for various sample periods of a single DRS episode show that determinants of the spread can differ in their importance across time as institutional practices change. There are numerous examples of these institutional changes. For instance, between the second quarter of 1971 and the first quarter of 1983, Belgium channeled both capital inflows and outflows through the financial market. Before and after that period, Belgium treated capital flows asymmetrically, with capital outflows assigned to the financial market and capital inflows free to go through either market. Italy introduced a 50 percent deposit requirement on capital exports six months after adopting its DRS. Costa Rica, El Salvador, and Jamaica heavily managed and even fixed the financial exchange rate for a time during the operation of their dual exchange markets.

The lack of data makes it impossible to measure the extent of European 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 (Bindert-Bogdanowicz 1979). In the French and Italian cases, the general view is that there was little or no management of the financial exchange rate, at least through direct foreign exchange intervention. More indirect ways of influencing the rate, such as encouraging public sector borrowing and lending through the financial market, were attempted.

All three European countries did have periods when both exchange rates floated. Between August and December 1971, the Belgian commercial franc floated against all currencies except the Dutch guilder. The Italian commercial lira floated between January and March in 1974. The Italian commercial lira began its float on February 13, 1973, just weeks after the Italian DRS was established. The Italian commercial lira floated in its separate exchange market until the DRS was abolished in March 1974.

The reduced-form equation for the spread and the estimation relied on the assumption that all current account transactions are channeled through the commercial exchange market and all capital account transactions through the financial market. In practice, officially sanctioned and fraudulent cross-market leakages occur. To the extent that these leakages depend on the size of the

spread, the reduced-form equation for the spread is unchanged. Nevertheless, these leakages have macroeconomic consequences and can moderate the response of the spread to various disturbances.

Consider the case where some current account transactions are officially channeled through the financial exchange market. This modified segmentation of the exchange market has several macroeconomic implications. The theoretical model is complex because there are three dynamic variables: the real money stock, the stock of foreign assets, and the spread. A flexible financial exchange rate no longer prevents the net accumulation of foreign assets. To keep balanced trade in the financial exchange market, net accumulation of foreign assets must accompany exports of goods and services channeled through that market. (Similarly a net decumulation accompanies imports.) If the authorities want to limit net accumulation of foreign assets even more, they must supplement the DRS with quantitative capital controls. Most Latin American countries, in fact, employed capital controls when operating dual exchange markets (see table 1), as did France and Italy to a lesser extent.

With some current account items traded in the financial exchange market, the aggregate price level becomes an expenditure-weighted function of both the financial and commercial exchange rates. In addition, relative prices are distorted, with the relative price of goods traded in the financial market measured by the spread. The DRS thus provides less insulation of domestic prices and reserves from financial shocks. Changes in expectations about the future commercial exchange rate, for example, generate portfolio shifts that alter the spread and affect aggregate and relative prices, spending, and the current account.

Even if the authorities try to achieve a complete separation of current account and capital account transactions, illegal leakages occur. When the spread widens, private agents have an incentive to buy foreign exchange at the commercial exchange rate and sell it at the financial exchange rate. Lanyi (1975) has described how these illegal transactions can take place. Exporters underinvoice their sales receipts and invest the unrecorded payments in foreign assets. The proceeds from the sales of these assets are then repatriated at the financial rate. This strategy succeeds if the authorities minimize administrative costs by requiring documentation only for the purchase and sale of foreign exchange in the commercial exchange market. Importers overinvoice and follow a similar strategy. Thus when the spread widens in response to a disturbance, leakages may quickly dampen the spread (Gros 1988). In addition, the authorities may encourage such leakages by officially reclassifying certain transactions. The correlation between economic factors and the spread may thus be difficult to detect except in high-frequency data.

It is important to look at how the European and Latin American countries segmented their exchange markets in practice. If current account and capital account transactions are broadly separated, the distortion created by the DRS is essentially an intertemporal one. If a number of current account transactions are

Table 5. *Division of the Foreign Exchange Market*

Country	*Date*	*Principal market*	*Secondary market*
Argentina	1981	Imports, most exports, amortization payments on foreign loans (mixed rate for trade[a])	All else
Argentina	1982	Imports, exports (mixed rate for trade[a])	All else
Bolivia	1982	Wheat imports, public debt service payments	All else
Costa Rica	May 1983	Payments of external debt service, imports of certain essential commodities, 40 percent of private sector debt service payments, 99 percent of export proceeds, 100 percent of official capital inflows	All else, including most imports
Dominican Republic (the)	December 1984	Debt repayments, oil imports, specified imports	All else
El Salvador	December 1984	70 percent of export proceeds, 60 percent of import payments	All else
El Salvador	Late 1985	Proceeds from coffee and sugar exports, inflows of foreign loans to public sector and 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	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 percent of exports and 35 percent of imports); mixed export rate in effect	All else
Guatemala	June 1986	Exports, imports, most capital transactions	Remittances, tourism, low-priority imports
Jamaica	1983	Essential imports, traditional exports, specified invisibles, exports to CARICOM (the non-Caribbean Common Market) countries	All else
Mexico	August 1982	Priority imports, petroleum export proceeds, foreign debt payments	All else
Mexico	December 1982	Merchandise export proceeds, foreign debt repayments including principal and interest, specified import payments	All else

a. Mixed rate means that a set percentage of the transactions goes through the principal market and the remainder through the secondary market.
Source: IMF (various years a).

combined with capital account transactions in the financial exchange market, the distortion becomes as much a distortion of the goods market as one of the assets market.

In the 1970s all three European countries segmented the exchange market so as to bring about an almost complete separation of current account and capital account transactions. (Of course, private arbitrage activity made the separation less than perfect.) In May 1971, a period of heightened speculation against the dollar, Belgium made important changes in the classification of transactions—changes that resulted in an almost complete separation of the commercial and financial exchange markets. Nevertheless, a small number of current account 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 bank notes, representing private travel expenses and so forth, could be bought and sold on the financial market. In January 1974 outward payments of investment earnings could be channeled through either market.

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 bank note 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 account and capital account transactions were as nearly as possible separated into the corresponding exchange markets. Nevertheless, all purchases and sales of foreign bank notes, which accounted for a substantial portion of tourist expenditures and workers' remittances, were assigned to the financial exchange market. For details, see IMF (various years a).

In Latin America, the official segmentation was much less along commercial-financial lines. As seen in table 5, many current account items were assigned to the financial exchange market. In Argentina in 1981 and 1982, imports, most exports, and amortization payments on foreign loans were channeled through the commercial exchange market, and everything else went though the financial market. Yet in both episodes, a time-varying mixed rate, which specified that a percentage of export receipts and import payments had to be settled in the financial market, was quickly established. El Salvador and Guatemala also established a mixed rate. Costa Rica initially channeled specified imports, most exports, and certain debt repayments through the commercial exchange market, but eventually most imports were directed to the financial market. Mexico achieved the broadest separation between current account and capital account transactions, but it was by no means complete. The overall picture that emerges is that the Latin American dual exchange markets distorted relative prices of goods and services to a much greater extent than did the European dual exchange markets.

IV. Conclusion

A number of theoretical models have been developed to analyze dual exchange markets, but no attempt has been made to develop some empirical regularities about the distortion created by this sort of exchange rate arrangement. This article tries to fill that gap by examining the data from three European countries and eleven Latin American countries that operated official dual exchange markets in the 1970s or 1980s.

Section I examined the behavior of the spread between the commercial and financial exchange rates. The spread and its evolution over time generate the intertemporal distortion that influences international capital flows. The spread also measures the distortion in relative prices if some current account transactions are directed to the financial exchange market. The spreads have been quite small in European dual exchange markets but quite large in Latin American ones.

Section II set out a standard stock-flow macroeconomic model to isolate some of the economic determinants of the spread between the two exchange rates. It then presented a reduced-form equation for the spread based on the model and fitted it to the data. The regressions of the spread showed that portfolio variables are important determinants of the spread in both Europe and Latin America. However, there are interesting differences in the relative importance of these variables. In Europe, the foreign interest rate and rate of change of international reserves, along with the lagged spread, explained almost two-thirds of the variation in the spread. An increase in the real government budget deficit also widened the spread, but the effect was not highly significant. The rate of change of the real commercial exchange rate was uncorrelated with the spread. In Latin America, the rate of change of the real commercial exchange rate and the rate of international reserve depletion were important determinants that, along with the lagged spread, explained around 80 percent of the variation of the Latin American spreads. Latin American spreads were positively related to budget deficits, but only in some specifications. Latin American spreads were not responsive to movements in foreign interest rates, however, suggesting that the DRS was not adopted to insulate domestic interest rates in Latin America. Instead, the dual exchange market was designed to delay an across-the-board devaluation of the currency.

One reason for the absence of empirical work on dual exchange markets is the transitional nature of most of these regimes. Section III acknowledged that the regression results presented in this article should be treated with caution because the inherent temporariness of dual exchange markets casts doubt as to the stability of the structural relationship between the spread and its economic determinants. Frequent rule changes during the operation of a dual exchange market further weaken the claim that a dual exchange market episode can be treated as a single event. In addition, officially sanctioned and fraudulent cross-market leakages that dampen the spread between the two exchange rates can

make it difficult to detect the links between the spread and its determinants in low-frequency data. Alternatively, reclassifying current account transactions that are in large deficit at the fixed commercial rate as "financial" transactions can widen the spread and also make it difficult to uncover the links between the spread and its other determinants. Finally, when official dual exchange markets are not broadly divided between commercial and financial transactions, the distortion created by dual exchange markets becomes as much a distortion of the goods market as of the assets market.

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