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Parallel Currency Markets in Developing Countries:
Theory, Evidence, and Policy Implications

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Abstract

The paper reviews recent theoretical and empirical developments in the analysis of informal currency markets in developing countries. The basic characteristics of these markets are highlighted, and alternative analytical models to explain them are discussed. The implications for exchange rate policy --including imposition of foreign exchange restrictions, devaluation, and unification of exchange markets-- in countries with a sizable parallel market are also examined.

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Summary

The paper reviews recent theoretical and empirical developments in the analysis of parallel currency markets in developing countries. The first part of the paper discusses the scope and nature of these markets and highlights the common features that are likely to be found in a variety of institutional settings. Unofficial markets in foreign exchange have emerged primarily out of foreign trade restrictions. The size of the market depends upon the range of transactions subject to exchange controls as well as the degree to which these restrictions are enforced. The supply of illegal foreign exchange may come from under-invoicing or smuggling of exports, over-invoicing of imports, tourism, remittances from abroad, or diversion of foreign exchange from the official market. Demand results from needs for imports, travel, portfolio diversification, and capital flight.

The second part reviews alternative analytical models of parallel currency markets and discusses their implications regarding the impact of macroeconomic policies on parallel market exchange rates. Partial equilibrium approaches stress the role of the premium in the determination of illegal trade. The monetary approach emphasizes the impact of expansionary fiscal and credit policies on the behavior of parallel exchange rates and prices. Portfolio-balance models stress the role of asset composition and forward-looking expectations in the determination of the unofficial exchange rate. Lastly, models of dual exchange markets with leakages emphasize the flow of arbitrage activity resulting from a non-zero premium.

The final part of the paper focuses on the policy implications of the theoretical and empirical literature, and leads to the following conclusions. Exchange and trade restrictions are largely ineffective as long-term policies to maintain the viability of an (overvalued) exchange rate or to "impose" balance of payments adjustment. Although "socially beneficial" in some respects, parallel currency markets generate a variety of costs. In particular, they increase the potential to evade the inflation tax on domestic cash balances. Permanent unification of foreign exchange markets cannot be achieved via devaluation of the official exchange rate alone. Such a policy has only a temporary effect on the premium, and furthermore is inherently inflationary. Attempts at unification by floating the currency are likely to be accompanied by an inflation burst, which results not from the depreciation of the official exchange rate per se, but from the loss of the implicit tax on exports. To be successful, unification must be accompanied by a relaxation of exchange restrictions and by supportive financial policies.

I. Introduction

There has been growing recognition over the past few years that widespread exchange and trade restrictions in developing countries have been ineffective in preserving foreign reserves or in supporting an inadequate exchange rate. Evasion has been endemic and illegal markets for goods and foreign currencies have expanded, defeating the very purpose of controls. Although the nature of parallel markets precludes collection of detailed and reliable data, they appear to be common phenomena in developing countries, with parallel exchange rates deviating in some cases considerably from official rates. 1/

This paper reviews recent theoretical and empirical analyses of parallel foreign currency markets in developing countries. Section II reviews the scope and nature of parallel currency markets in developing countries, and highlights the basic structural characteristics that are likely to be found in a variety of institutional settings. Section III provides an overview of alternative analytical models of the parallel market for foreign exchange that have been developed over the past few years --real trade models, the monetary approach, the portfolio balance and currency substitution framework-- and examines as well the implications of the recent literature on dual exchange systems in which leakages exist between markets. Section IV considers the conduct of exchange rate policy in countries with a sizable parallel currency market. The analysis focuses, in particular, on the impact of foreign exchange restrictions, the role of nominal devaluations as an instrument to control the spread between the official and parallel markets, and strategies for unifying official and parallel foreign exchange markets. Finally, Section V provides some concluding remarks and highlights some of the directions in which the recent theoretical and empirical literature could be extended.

II. Scope and Nature of Parallel Currency Markets

Due to the often illegal --albeit perhaps officially tolerated-- nature of transactions, information on the functioning of parallel currency markets is neither readily available, nor very reliable. 2/

1/ According to data presented in the World Currency Yearbook, 1987, parallel currency markets exist in all developing countries, except the high-income oil exporters. The evidence available suggests that parallel currency markets have recently increased in size and sophistication in many countries, in relation with capital movements.

2/ As such, magnitudes mentioned here should be treated with a certain amount of caution.

The major qualitative features of these markets are, however, well documented, suggesting that there are common features to be found in a variety of institutional settings. This Section discusses how parallel markets emerge, the nature of transactions in those markets, as well as their economic consequences.

1. Emergence of parallel markets

Parallel markets generally develop in conditions of excess demand for a commodity subject to legal restrictions on sale, or to official price ceilings, or both. 1/ Foreign exchange transactions in a large majority of developing countries are subject to both kinds of restrictions. 2/ Typically, the exchange rate is officially pegged by the central bank, and only a small group of intermediaries are permitted to engage in transactions in foreign exchange. Sale of foreign currencies is, in principle, restricted to uses judged by the authorities to be "essential" for reasons such as economic development or balance of payments viability. As a consequence, some of the supply is diverted and sold illegally, at a market price higher than the official price, to satisfy the excess demand. The proportion by which the parallel market exchange rate exceeds the official rate, the "parallel market premium", will depend upon a host of factors --in particular, the penalty structure and the amount of resources devoted to apprehension and prosecution of delinquents-- and may vary substantially over time and across countries.

Figure 1 shows the evolution of the parallel market premium in twelve developing countries during the early eighties. 3/ The charts show that the premium typically displays large fluctuations over time and across countries --a phenomenon often seen as reflecting the

1/ The expressions "parallel", "fragmented", "informal", "black" (which has an illicit connotation), and "curb" markets have been used interchangeably in the literature. Lindauer (1989) provides an analytical distinction between these alternative descriptions of market structure. He defines a parallel market (p. 1873) as "...the structure generated in response to government interventions which create a situation of excess supply or demand in a particular product or factor market". Government price fixing (through taxes, regulations, and prohibitions) plays, therefore, a prominent role in the creation of excess demand at official prices and in the emergence of a parallel market. See also Feige (1989).

2/ The nature of these restrictions is well documented in the Annual Report on Exchange Restrictions published by the Fund.

3/ Parallel exchange rates are taken from the World Currency Yearbook (formerly Pick's Currency Yearbook), and official exchange rates are from the IMF database. Data are end-of-period exchange rates relative to the US Dollar.

FIGURE 1

PARALLEL MARKET PREMIA IN DEVELOPING COUNTRIES, 1980-86

(In percent)

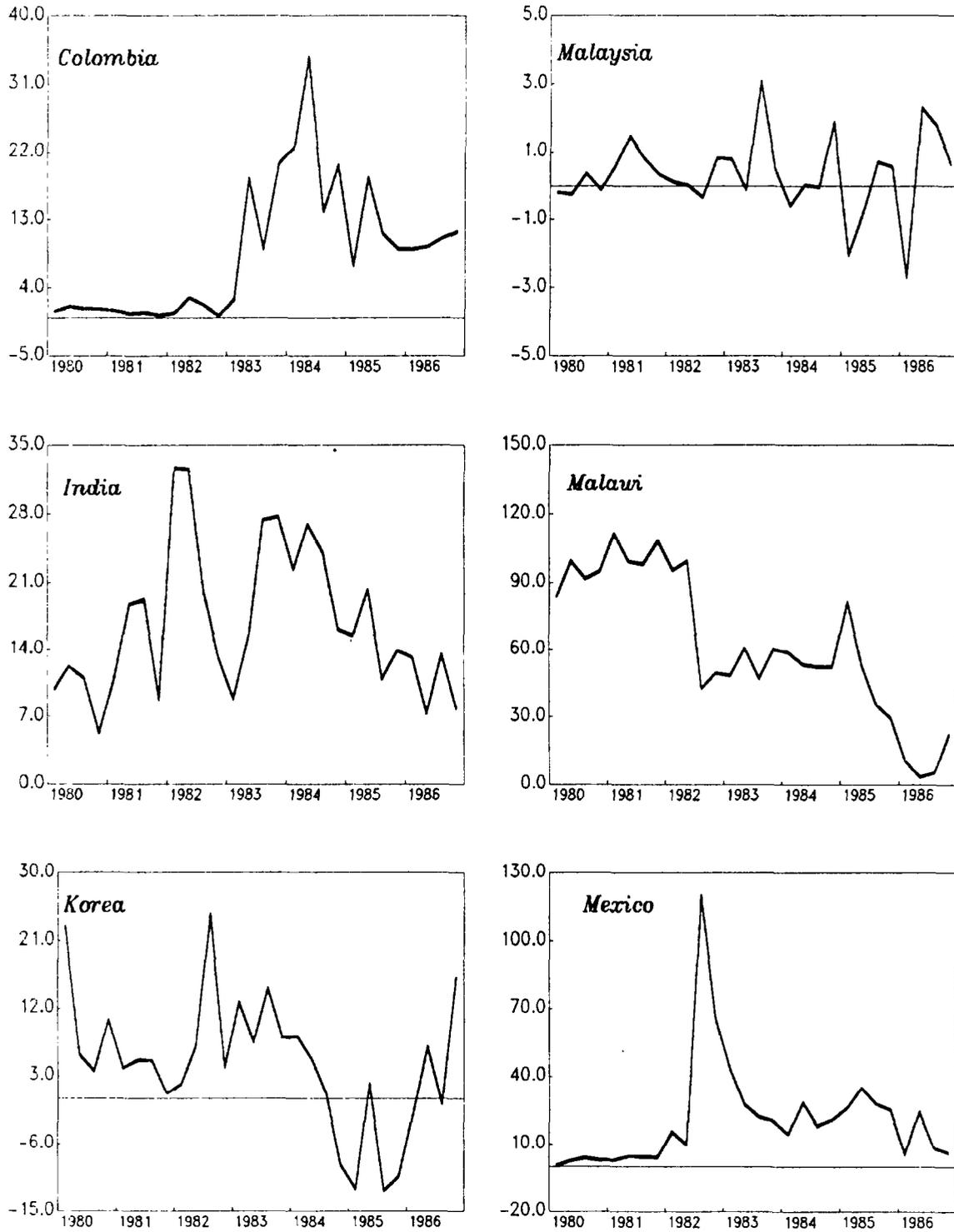
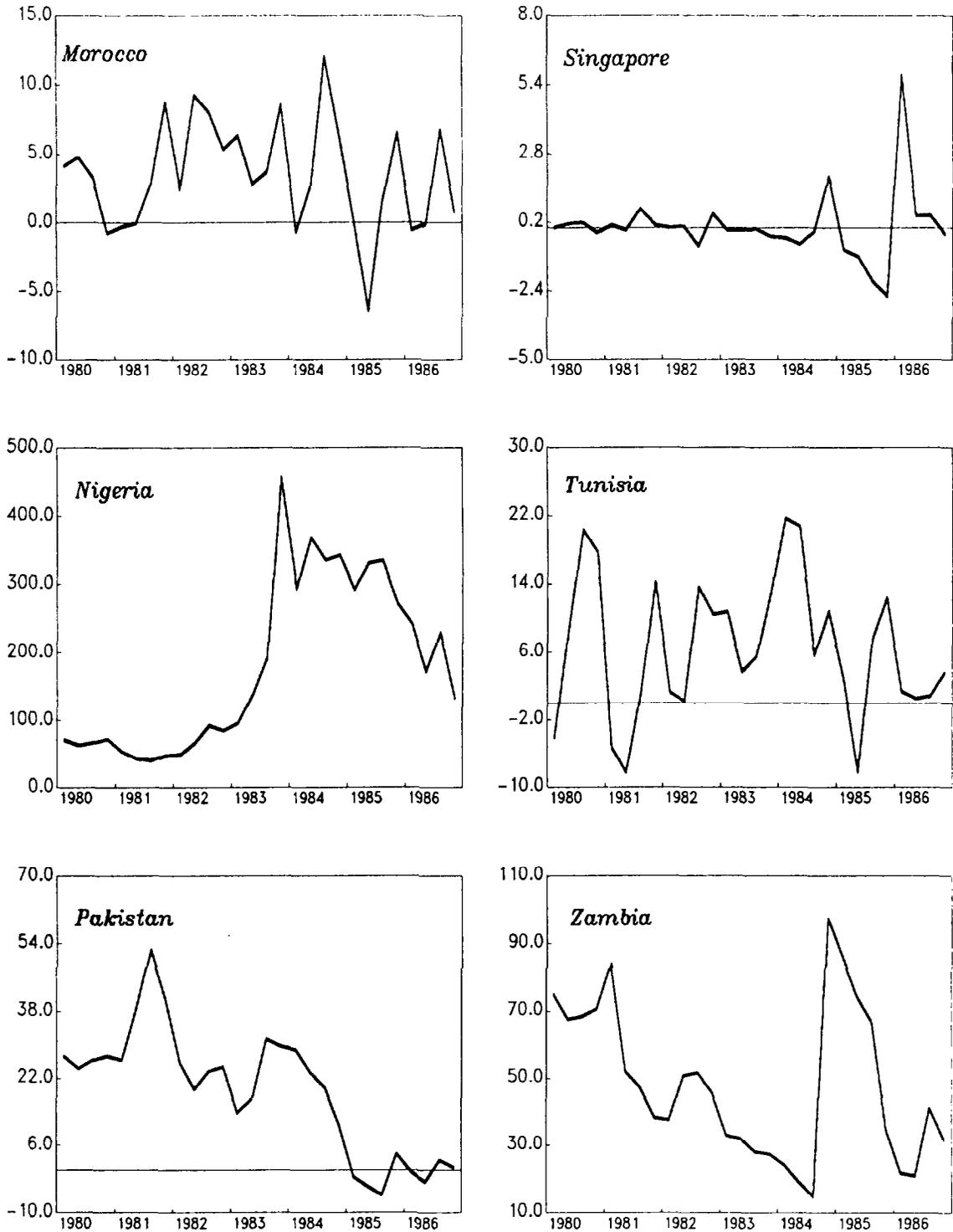




FIGURE 1 (Concluded)

PARALLEL MARKET PREMIA IN DEVELOPING COUNTRIES, 1980-86

(In percent)





asset-price characteristics of the parallel exchange rate. 1/ In periods characterized by uncertainty over macroeconomic policies, unstable political and social conditions, parallel market rates tend to react swiftly to expected future changes in economic circumstances. The charts also indicate that the premium has been at times substantially negative in some countries, a somewhat surprising fact since exchange restrictions in the official market relate typically to the purchase of foreign currency and not on the sale. Although it is difficult to systematically rationalize episodes of negative premia, a number of cases can be accounted for by the following factors. First, in outward-oriented economies that have experienced high rates of growth and large external surpluses (notably in Asia), the central bank has at times restricted the rate of accumulation of foreign exchange by the banking system, leading to periods of temporary excess supply of foreign currency in the parallel market. Second, periods during which a significantly negative premium has emerged may have been associated in some countries (Morocco, for instance) with expectations of a revaluation of the official exchange rate. Finally, a negative premium may have emerged during periods when commercial banks have not been allowed to buy foreign currency without proper identification of the seller. In such circumstances, a negative premium represents essentially a "laundering charge" (Dornbusch et al., 1983) which is paid by agents who have no legal right to possess the foreign exchange that they are offering for sale.

Parallel currency markets in developing countries have emerged primarily out of foreign trade restrictions. 2/ Typically, the process starts with the government trying to impose regulations (licensing procedures, administrative allocations of foreign exchange, prohibitions, etc.) on trade flows. The imposition of tariffs and quotas creates incentives to smuggle and fake invoices (so as to lower the tariff duties), by creating excess demand for goods at illegal, pre-tax prices. 3/ Illegal trade creates a demand for illegal currency

1/ Figure 1 also suggests the existence of a clear seasonal pattern for some countries (Malaysia and Morocco, for instance). At a more formal level, Akgiray, Booth and Seibert (1988) provide a statistical analysis of the distribution properties of parallel market exchange rates for 12 Latin American currencies. See also Akgiray, Aydogan, and Booth (1990).

2/ In some countries, however, capital controls (often motivated by recurrent balance-of-payments difficulties) were the primary factor leading to the emergence of an informal market in foreign exchange. See, for instance, Kamin's (1990) account of Argentina's experience in the 1930's.

3/ For a general description of illegal transactions, see Bhagwati (1978, pp. 64-81). An interesting case study of Indonesia is described by Cooper (1974).

which, in turn, stimulates its supply, and leads to the creation and establishment of a parallel currency market if the central bank is unable, or unwilling, to meet all the demand for foreign exchange at the official exchange rate. 1/ At a later stage, the parallel market expands to become a major element in financing capital flight and portfolio transactions, foreign currency being a hedge against adverse political change and --in high-inflation economies-- a hedge against the inflation tax. 2/ There are, evidently, many other factors that may help explain the development of a parallel currency market in a particular country; in Pakistan for instance, the rapid expansion of the illegal market for foreign exchange in the late seventies is primarily the result of the sudden influx of worker remittances from the Middle East (Banuri, 1989). In Colombia and Guyana, the development of the illegal market for dollars has been closely associated with drug-related activities (Thomas, 1989).

Whatever the initial factors leading to the emergence of a parallel market in foreign currencies, in any given country, the size of this market will depend upon the range of transactions subject to exchange controls, as well as the degree to which these restrictions are enforced by the authorities. In countries where the degree of demand rationing in the official market for foreign exchange is low, the parallel market will play only a marginal role. Conversely, in countries where balance of payments deficits are chronic and where the central bank does not have sufficient reserves (or the borrowing capacity) to satisfy the demand for foreign currency at the official parity, parallel currency markets will typically be well developed and organized, with an exchange rate substantially more depreciated than the official rate.

The coexistence of an official and a parallel market in foreign exchange results from the possibility of potential penalties --or, in other words, expected costs-- on private agents who fail to conform

1/ The imposition of a tariff, by itself, creates incentives for smuggling but does not create incentives for the emergence of a parallel currency market. Such a market will usually emerge only if foreign exchange controls are in place. In the particular case where legal trade requires the sale or purchase of legal foreign exchange, the existence of a positive tariff will also be sufficient to induce illegal trade activities and foreign currency transactions (Pitt, 1984).

2/ Restrictions on capital flows may take the form of taxes or discriminatory reserve requirements on non-resident bank deposits, etc. Phylaktis and Wood (1984) provide an analytical framework for classifying, and appraising the impact of, various forms of exchange controls. Swidrowski (1975) provides an extensive discussion of various aspects of foreign exchange and trade restrictions.

with pricing or other regulatory directives (surrender requirements on exports, etc.). 1/ Pitt (1984), and Jones and Roemer (1987), for instance, suggest that the existence of legal and illegal markets is based on how penalties are levied, that is, on the determinants of getting caught. Both the legal and the parallel markets will exist if the risk of penalties is reduced by engaging in legal sales which mask profitable but illegal transactions. However, even if the probability of detection depends upon illegal sales, the official market may still exist. This will occur if the expected penalties for illegal transactions drive the net marginal revenue of parallel market sales below the official selling price at quantities where official sales remain profitable. Without these requirements and given the pressure of competitive forces, the parallel market would likely collapse and a unified official market would emerge.

Parallel currency markets, although illegal, are often tolerated by the authorities in developing countries. 2/ Although exchange dealers do not always advertise their services, "local" markets are substantially unified and the prevailing price is common knowledge among all those with an interest in it. 3/ In some countries, users of the market appear to go through personal intermediaries, which may be a reason why the market seems so uniform. In other countries, the market is dominated by a small number of "big" operators --who fix the exchange rate, sometimes on a daily basis, based on their judgement of supply and demand-- followed by a large number of intermediaries, who are physically present in the market on a day-to-day basis. The spread between what the intermediaries pay and what the major operators pays them is the source of the intermediaries' income, thereby leading to the emergence of a spread between asking and trading rates. One consequence of this type of intermediation is that the actual size of the market is difficult to evaluate, and estimates become subject to wide margins of error.

1/ Greenwood and Kimbrough (1986) motivate the existence of a parallel currency market with a cash-in-advance requirement that forces individuals to accumulate foreign currency (either officially or illegally) before they can consume.

2/ A strictly illegal market often develops into a tolerated one --or becomes officially recognized and legitimized, as in Bangladesh in 1972, in the Dominican Republic in 1982 or in Guyana in 1987-- as its scope of operations expands and the authorities recognize its inevitable character and relative benefits.

3/ This does not preclude substantial variations within countries. For instance, in Guyana, the exchange rates offered in border towns are significantly more depreciated relative to those quoted in the "Wall Street" area of Georgetown (Thomas, 1989).

2. Supply and demand for foreign currency

Transactions in parallel currency markets take usually the form of operations in cash, but checks are also commonly used in some countries. In markets where the risk of default is low and the surveillance of international transfers is ineffective, transactions in foreign currency notes are sometimes completed abroad. In Latin America and Asia, the principal traded item is US currency notes, although bilateral trade with the United States accounts for only a small share of external transactions for some countries. 1/ Sources of supply and demand vary from country to country, and depend heavily on the nature and effectiveness of exchange restrictions imposed by the authorities.

The supply of illegal foreign currency comes in general from five possible sources: under-invoicing or smuggling of exports, over-invoicing of imports, foreign tourists, and diversion of remittances through non-official channels. 2/ In most circumstances, although all five sources are likely to be utilized to some degree, there is in general a "dominant" source which may vary over time and across countries. For instance, the smuggling of exports was considered to be a major source of supply in Pakistan, India and Turkey in the early seventies (Gupta, 1981, 1984). More recently, Gulati (1985) has estimated that during the period 1977-83, under-invoicing of exports as a percentage of official exports was 20 percent for Argentina, 13 percent for Brazil, and 34 percent for Mexico. Foreign tourism is regarded as a dominant source of supply of foreign currency in the case of Caribbean countries, while worker remittances represent the key component in the case of Egypt (Bruton, 1983), Morocco, Pakistan in the late seventies, Turkey, and Sudan. For Pakistan, Banuri (1989) estimates the volume of illegal remittances to be anywhere between 15 percent and 35 percent of the officially recorded amount. This source alone of illegal dollars amounted to between 20 and 47 percent of international reserves (excluding gold) in 1983, and between 8 and 20 percent of the official money stock -- a quite significant increase in liquidity. In the case of Bangladesh, studies in the early eighties found that 35 percent of the migrants remit their savings through private, informal channels. Similar observations have been made for several other remittance countries (Keely and Tran, 1989).

1/ This may be the result of the "convenience" of the US dollar in international transactions or a "safe haven" effect. The use of US currency notes may also result from the importance of non-trade-related sources of supply and demand for foreign exchange in the parallel market.

2/ Government officials may also allow diversion foreign exchange from the official to the parallel market in return for bribes and favors.

Remittances and tourism differ from illegal trade sources of foreign currency in that they do not necessitate an additional illegal transaction (Banuri, 1989). Smuggling of exports, for example, requires that the export good be illegally transported across the country's borders. This raises the real costs (in terms of clandestine transportation, payoffs to officials, risk of confiscation and of other legal penalties) of supply. This implies that the parallel market premium should be high enough to compensate the supplier for the higher risk, as well as for higher real costs. Unless there are significant economies of scale and learning by doing in smuggling activity, this argument suggests that, everything else equal, the parallel market premium will be lower in remittance countries.

Available estimates, although generally subject to error, stress the importance of smuggling, 1/ under-invoicing of exports and over-invoicing of imports as the major sources of supply of foreign currency in most developing countries. 2/ It should be noted, however, that the incentive for over-invoicing of imports exists only when the tariff rate on imported goods is sufficiently lower than the parallel market premium. In a country with high tariff barriers, the price incentive is for under-invoicing (smuggling in) of imports rather than for over-invoicing --the one exception being, of course, the case of capital goods imports, where tariffs are generally lower than average, or even zero. Consequently, it appears likely that the single major source of unofficial currency supply from illegal trade is the

1/ Smuggling may take place with regards to legal or prohibited goods. Cocaine exports, for instance, is considered to account for a large share of the unofficial inflow of US dollars in certain Latin American countries. In Brazil, illegal trade (gold and coffee exports, in particular) is believed to account currently for nearly 30 percent of foreign currency supply in the parallel market (Novaes, 1990).

2/ The extent to which traders engage in fake invoicing is typically measured by partner country trade-data comparisons. To investigate the scale of under-invoicing or over-invoicing of exports, for instance, one would need to look at the ratio of exports to major partner countries, as shown by domestic data, to the corresponding imports as recorded in partner country data. When this ratio is less than unity, the evidence points to under-invoicing of exports. To be able to make these partner-country comparisons, however, it is important to adjust the trade data for transport costs, timing of transactions, and classification of transactions. See McDonald (1985), Gulati (1988), and Arslan and van Wijnbergen (1989) for recent attempts to use these procedures to estimate the degree of under- and over-invoicing in foreign trade transactions.

under-invoicing of exports. When there is a tariff on exports, under-invoicing permits the exporter to avoid the tariff and to sell the illegally acquired foreign exchange at a premium; when there is a subsidy on exports which is less than the parallel market premium, the sale of foreign exchange in the parallel market more than compensates for the loss of the subsidy. Thus, for given taxes, the higher the parallel market premium, the higher the propensity to under-invoice exports. ^{1/}

The demand for foreign currency in the parallel market results generally from four main components: imports (legal and illegal), residents traveling abroad, portfolio diversification, and for purposes of capital flight. The demand for foreign currency to finance legal imports stems from the existence of rationing in the official market for foreign exchange. Demand is also to finance illegal imports of goods which are either prohibited or highly taxed and which are smuggled into the country. The inherent "confidentiality" of transactions in the parallel market --and the absence of legal accountability to anyone operating in it-- provides an incentive to agents to use it for concealing illicit activities.

The portfolio motive is particularly acute in high-inflation economies, and in countries where considerable uncertainty over economic policies prevails, because foreign currency holdings represent an efficient hedge against domestic inflation bursts. Econometric evidence suggests that in middle-income developing countries, this component accounts for a substantial part of the demand for foreign exchange in the parallel market (Agénor, 1990d). This phenomenon is conducive to a high degree of substitution between domestic and foreign currencies, with consequent problems of monetary control, as discussed below. Finally, the capital flight motive derives from the existence of restrictions on private capital outflows in many countries. Attempts at circumventing the regulations are funded through the parallel market.

3. Consequences of parallel currency markets

What are the consequences of a large parallel currency market? The following arguments have often been advanced in favor of these markets. First, parallel markets make available commodities (food, intermediate inputs, durable goods, etc.) which would not have otherwise been forthcoming, due to the existence of rationing in the official market for foreign exchange. Second, the increased supply of goods through these markets has often reduced social and political tensions. Third, the existence of informal markets for goods and foreign exchange provides employment and income opportunities to small traders.

^{1/} See Arslan and van Wijnbergen (1989) for econometric evidence supporting this proposition in the case of Turkey.

There are, however, a variety of distortions created by the existence of parallel currency markets. First, and most generally, the expansion of a parallel market for foreign exchange weakens the effectiveness of capital controls imposed by the central bank. Formally, it has effects similar to an increase in capital mobility --which may help accelerate capital flight-- and may lead to an increase in the degree of substitution between domestic and foreign currencies. The potential for currency substitution --defined as the ability of domestic residents to switch between domestic and foreign money-- becomes an effective way of avoiding the inflation tax on the holdings of domestic cash balances. The shift from domestic to foreign money results therefore in a loss of seignorage for the government which, for a given real fiscal deficit, may call for a higher inflation rate, an expansive monetary policy, or recurrent devaluations of the official exchange rate (see Agénor, 1990b).

Second, although informal markets increase the supply of goods, parallel exchange rates have an impact on domestic prices. Since trade takes place at both the official exchange rate (through official channels) and the parallel market rate (through smuggling), the domestic price of tradable goods will reflect both exchange rates. However, in most countries where foreign exchange rationing by the banking system prevails, the officially fixed exchange rate is not relevant for the determination of market prices of tradable goods. It only measures the rents captured by those (usually the government and a small group of "privileged" importers) to whom foreign exchange is made available at the official rate. If domestic prices of tradables are based on the marginal cost of foreign exchange --or its implicit resale value, that is, the parallel market rate-- the aggregate price level will reflect to a large extent the behavior of the unofficial exchange rate. It has been noted that in Ghana and Uganda for instance, prices of tradable goods have tended to reflect more the prevailing exchange rate in the parallel market than that in the official market (Chhibber and Shafik, 1990; Roberts, 1989). To the extent that parallel exchange rates --being very sensitive to actual and anticipated changes in economic conditions-- are more volatile than official exchange rates, domestic prices are likely to display a significant degree of instability, which may adversely affect economic decision making.

Table 1, which presents data over the period 1975-86 on exchange rate variability and consumer price volatility for the group of twelve developing countries referred to in Figure 1, provides some empirical evidence on this issue. The results shown clearly suggest that parallel exchange rates have been substantially more variable than official rates (except in Pakistan and, to a lesser extent, Korea), and that countries with the highest degree of parallel exchange rate variability have also exhibited a significantly greater degree of price volatility (Figure 2).

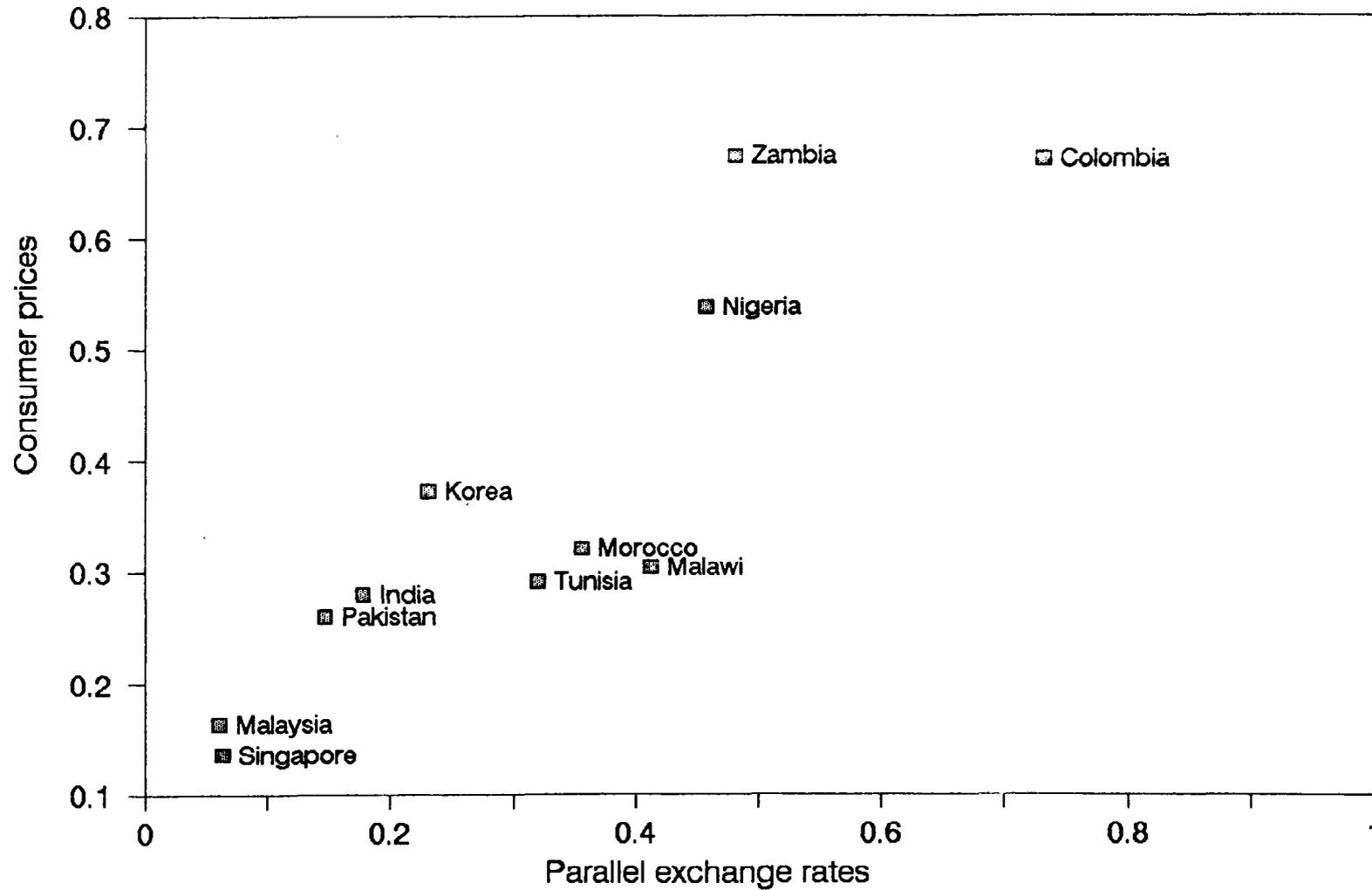
Table 1. Variability in Exchange Rates and Prices
in Developing Countries, 1975-86 1/

Country	Exchange Rates		Consumer Prices
	Official	Parallel	
Colombia	0.693	0.732	0.672
India	0.173	0.178	0.280
Korea	0.243	0.231	0.373
Malawi	0.324	0.413	0.304
Malaysia	0.058	0.061	0.165
Mexico	1.604	1.637	1.446
Morocco	0.371	0.356	0.321
Nigeria	0.214	0.458	0.539
Pakistan	0.216	0.147	0.260
Singapore	0.061	0.064	0.137
Tunisia	0.306	0.320	0.291
Zambia	0.437	0.481	0.675

Sources: International Financial Statistics (IMF),
and World Currency Yearbook, various issues.

1/ Standard deviation of the quarter-to-quarter rate of change
of the relevant variable, divided by the sample mean.

Figure 2
Variability in Consumer Prices and Parallel Exchange Rates
in Developing Countries, 1975-86



Source: Table 1.

Third, since there are two prices at which foreign exchange can be bought and sold, exports whose proceeds are repatriated at the official exchange rate are taxed relatively to other exports. Consequently, the parallel market premium may be seen as an implicit tax on exports (Pinto, 1989), implying that, in order to depreciate the real exchange rate and stimulate exports, the premium must be reduced. 1/

Fourth, the parallel market for foreign currency plays an important role in the transmission mechanism of short-term macro-economic policies. How do shocks in the real economy influence conditions in a parallel market for foreign exchange? How is adjustment to these shocks helped or hindered by the existence and size of this market? How does a parallel currency market constrain policy responses to shocks? Detailed, quantitative analysis of these issues has only recently begun. 2/ The available analytical and econometric evidence, which will be reviewed below, supports the view that the parallel exchange rate plays an important role in the transmission process of short-run macroeconomic policies.

Finally, it should be noted that the welfare implications of the existence of a parallel market in foreign currencies are unclear. 3/ The gains and losses depend on a number of factors, in particular the penalty structure. If expected costs of engaging in parallel market activities are low, for private transactors welfare is likely to be higher than if they carried out their transactions only through official channels. For instance, workers abroad remitting funds or foreign tourists selling dollars would get more units of domestic currency at the parallel exchange rate than at the official price. If penalties (fines, prison terms, etc.) are enforced to some degree,

1/ This view suggests the existence of a trade-off between the premium and the rate of inflation in financing a given real fiscal deficit. The implications of this trade-off for unification strategies is examined below.

2/ Montiel (1990) provides an analytical discussion of the role of parallel foreign currency markets (as well as informal credit markets) in the transmission mechanism of monetary policy.

3/ The welfare effects of foreign exchange restrictions have been analyzed by Greenwood and Kimbrough (1986). Using a choice-theoretic cash-in-advance general equilibrium model, they examine how the imposition of foreign exchange controls affects decision making by private agents, notably the decision to evade the restrictions by purchasing foreign currency illegally in the parallel market. They show that while foreign exchange controls may improve the trade balance and the balance of payments of an economy with parallel markets, they unambiguously lower economic welfare. This is because foreign exchange controls essentially place a quota on imports, thus raising their domestic relative price in the same manner as a tariff would.

however, expected costs for private transactors may be quite high. Though it is not possible, in general, to quantify the exact magnitude of gains and losses, it can be shown (see Bhagwati and Hansen, 1973) that in the case of smuggling losses can outweigh gains. This is when smuggling operations are subject to rising costs (on account of penalties) so that smuggling activity only replaces the official imports without lowering the cost of imports to domestic consumers. This result may not, however, carry over to other forms of cheating like fake invoicing and diversion of remittances. For instance, if manipulation of invoices is associated with negligible costs, welfare gains will probably outweigh potential losses (Gupta, 1984).

From the point of view of the authorities, parallel markets have some obvious adverse effects. First, there is a cost of enforcement, to counteract somewhat parallel market activities and punish offenders. Second, there is a loss of tariff revenue (due to smuggling and under-invoicing), a loss in income taxes and domestic indirect taxes, and a reduced flow of foreign exchange to the central bank, which lowers the capacity to import of the government. Third, parallel markets encourage rent-seeking activities (corruption of government officials, for instance), which lead to a sub-optimal allocation of scarce resources. Despite these costs, however, parallel currency markets are widely tolerated in developing countries. The usual argument to justify this is that governments realize that as long as there is demand rationing in the official market for foreign exchange, there is bound to be a "secondary" market, whose cost of elimination is likely to be prohibitive. Viewed in this way, a parallel market in foreign currency can be taken to be "socially desirable" --even though ultimately the authorities' goal is to remove discriminatory practices and stress legality in economic activities-- as it meets the demands of operators rationed in the official market. Another interesting argument which may help explain why authorities tend to accommodate rather than confront unofficial markets has recently been put forward by McDermott (1989). The existence of a parallel currency market may yield, according to McDermott, two types of benefits. First, it increases employment by raising the domestic availability of imported inputs. Second, it may actually raise the flow of foreign currency to the central bank. This latter --somewhat paradoxical-- effect may arise when the increased availability of inputs allows total exports to be increased, and so much so that foreign currency flows in in increased amounts, both clandestinely and legally.

The foregoing analysis suggests that, to a large extent, exchange restrictions are inoperative. Instead of increasing the foreign exchange reserves at their disposal, the controls imposed by the authorities only succeed in diverting a substantial part of the foreign exchange underground, implying that they not only fail to solve the problem, but they actually worsen it. The logical and obvious implication is that if parallel markets emerge in response to the imposition of controls, the most effective way to reduce their

size is to eliminate these restrictions and let prices reflect the full scarcity of foreign exchange. 1/ Indeed, in the past decade, several developing-country governments have shifted towards relatively less restrictive trade and exchange regimes. 2/ There are, however, a variety of costs associated with such a liberalization process which are not yet fully understood. These issues will be examined in light of the predictions derived from analytical models, and the evidence pertaining to the behavior of parallel exchange rates.

III. Analytical Models of Parallel Currency Markets

Over the past few years, parallel markets for foreign exchange have been analyzed and modeled from a number of different perspectives. This section briefly reviews these alternative approaches and highlights their major implications. 3/

1. Smuggling and real trade models

Following the early partial equilibrium analyses of Boulding (1947), Bronfenbrenner (1947) and Michaely (1954) of a consumption commodity market subject to price control and rationing, "real trade" models of the determination of the premium focus on the parallel market for foreign exchange and neglect its interactions with the rest of the economy. Specifically, the parallel market for foreign exchange is modeled as reflecting the demand for foreign currency to purchase illegal imports and the supply of foreign currency derived from illegal sources. Martin and Panagariya (1984), McDermott (1989), Sheikh (1976), and Pitt (1984) for instance emphasise the role of smuggling and under-invoicing of exports as the main sources of foreign exchange supply, whereas Culbertson (1975) stresses the resale of the officially allocated foreign exchange.

1/ Policies of active repression of parallel markets have been attempted by some countries (Guyana in 1980, Tanzania in 1983, or Algeria in May 1990). It has proved difficult to maintain an aggressive or punitive stance against well-entrenched informal activities.

2/ See Quirk et al. (1987, 1989).

3/ In addition to the approaches discussed here, there have been some recent attempts to integrate informal markets in goods and foreign currencies in Computable General Equilibrium models; see Franco (1985), Azam and Besley (1989), and Nguyen and Whalley (1989). See also Charemza and Ghatak (1990) for a disequilibrium approach.

This class of models emphasizes the impact of rising trade taxes on smuggling activities and illegal currency transactions. ^{1/} As shown by Macedo (1987) and Branson and Macedo (1989) for instance, an importer will tend to smuggle if the tariff is so high that it pays to purchase foreign exchange in the parallel market at a premium, given the possibility of getting caught by the customs enforcement agency. If τ denotes the tariff, π the probability of success in smuggling, and ρ the premium, a necessary condition for import smuggling to occur is $\pi\tau > \rho$. Similarly, under the same detection technology, the incentive to smuggle exports out will exist when $\vartheta < \pi\rho$, that is, when the subsidy (or tax rate) on exports ϑ is smaller than the parallel market premium weighted by the probability of success in smuggling.

In this framework, planned smuggled imports are interpreted as the flow demand for foreign currency in the parallel market, while successfully smuggled exports are interpreted as the flow supply of foreign currency. The long-run parallel market premium is then determined by the equilibrium conditions for legal and illegal trade. In the long-run equilibrium, where legal exports equal legal imports and successfully smuggled exports pay for planned smuggled imports, the premium can be expressed as a weighted average of τ and ϑ , and is therefore determined (as is the smuggling ratio) by the structure of tariff barriers.

Real trade models provide an adequate framework for an analysis of the impact of trade restrictions (as opposed to exchange controls) on the parallel market exchange rate. The basic limitation of the approach is that, since the only reason to deal in foreign currency is to buy imported goods, the sole purpose of black market activity is to enable smuggling to take place. This, however, assumes away the portfolio motive which has been identified as a critical component of the demand for foreign currency. Moreover, although the approach provides a useful analysis of the long-run determinants of the exchange rate differential, there is no mechanism providing a satisfactory explanation of the short-run behavior of the premium (which is taken as given by exporters and importers in most models). The approach can, however, be extended in this respect. Macedo (1987) for instance develops a model where the long-run premium is determined by the structure of trade taxes, while the short-run premium results from the requirement of portfolio balance.

^{1/} The treatment of risk in real trade models of smuggling is critically examined by Sheikh (1989).

2. Monetary approach

The monetary approach, developed initially by Blejer (1978a), emphasises the role of monetary factors in the behavior of parallel market exchange rates. Blejer outlines a model of the premium by grafting a flow parallel market for foreign currency into a monetary model of the balance of payments in which the rate of devaluation of the official exchange rate depends on the inflation differential with the rest of the world. In Blejer's model, an increase in the domestic money stock --initiated, say, by a rise in net domestic credit-- results in an ex ante disequilibrium between supply and demand in the money market. 1/ As excess cash balances are worked off by agents, domestic prices rise. This reduces the demand for domestic goods, raises the demand for foreign goods and foreign currency, and entails a depreciation of the parallel exchange rate. This, in turn, increases the differential between the official and the parallel rate, thereby raising the incentive to under-invoice exports, to smuggle exports, or to divert remittances through unofficial markets. Although the increase in the illegal supply of foreign exchange tends to reduce the initial upward pressure on the parallel rate, a higher stock of money will in general be associated with a depreciation of the free exchange rate. Therefore, a restraint on the rate of growth of domestic credit is a key policy instrument for preventing official reserve losses when there exists a parallel market for foreign currency.

The monetary model provides important insights into the relationships between monetary policy and the behavior of parallel market exchange rates. In addition to the empirical results reported by Blejer for Brazil, Chile, and Colombia, the model has been tested for India (Biswas and Nandi, 1986) and Turkey (Olgun, 1984), with generally good results. Blejer's formulation suffers, however, from an important limitation. The model assumes that the demand for foreign exchange on the unofficial market arises only because the public desires to alter the composition of its portfolio of financial assets and not for the purpose of carrying out international purchases of goods. By doing away with the existence of restrictions on trade (like tariffs and quotas), it is further assumed that no foreign exchange is demanded in the parallel market to pay for goods that are imported into the home country without declaration at the border. Thus, all the current account needs are assumed to be satisfied by the official foreign exchange market. This assumption may be particularly inadequate in view of the exchange controls on both the current and

1/ In Blejer's model, flow monetary disequilibrium is measured as the difference between the expansion of the domestic-credit component of the base (and variations in the money multiplier) and the changes in the demand for real cash balances.

capital account operations and the quantitative restrictions on foreign trade imposed by most developing countries, which divert a substantial part of the transactions demand for foreign exchange --as emphasized in real trade models-- from the official market to the parallel market.

Agénor (1990d) has recently developed a model which extends Blejer's (1978a) monetary model so as to deal with some of the restrictive features described above. The model provides a synthesis between the monetary approach and the currency substitution framework described below, and is based on a careful formulation of stock-flow interactions. Econometric estimates of the model using quarterly data for a group of twelve developing countries confirm the role of monetary disequilibria, as well as changes in the official exchange rate and expected rates of return, as major determinants of the behavior of the parallel market exchange rate.

A full macroeconomic model based on the monetary approach has also been discussed by Agénor (1990a). The model, which is estimated using cross-section annual data for eight countries, incorporates illegal trade transactions, foreign exchange rationing, currency substitution features, and forward-looking rational expectations. The simulation results indicate that anticipated expansionary credit and fiscal policies have a positive impact on real output and prices, a negative effect on foreign assets, and are associated with a depreciation of the parallel exchange rate. The analysis also shows that the adjustment process following a temporary shock is inversely related to the degree of rationing in the official market for foreign exchange. The higher the degree of rationing is, the lower will be the offsetting effect on the money supply coming through the balance of payments, and the higher the rate of depreciation of the parallel exchange rate generated by an expansionary policy. The simulation results for a once-and-for-all devaluation are also of considerable interest, and will be discussed after reviewing the analytical predictions of portfolio models regarding the relationship between the official and the parallel exchange rate.

3. Portfolio and currency substitution models

The portfolio-balance approach, developed by Macedo (1982, 1985) and Dornbusch et al. (1983), stresses the role of asset composition in the determination of the parallel market exchange rate, in contrast to the "flow" approach typical of smuggling models. The general observation underlying this class of models is that foreign exchange is a financial asset --even in countries with a low level of capital market development. Loss of confidence in the domestic currency, fears about inflation and increasing taxation, and low real interest rates give rise to a demand for foreign currency, both as a hedge and a refuge for funds, and as a means of acquiring and hoarding imports. Expectations are taken to play a key role in determining short-term

supply and demand shifts and in accounting for the volatility of parallel exchange rates.

Although the partial equilibrium formulation of Dornbusch et al. (1983) assumes the existence of domestic and foreign interest-bearing assets, the essential features of the approach are best captured by models where domestic agents hold in their portfolios only non-interest bearing domestic and foreign money. 1/ This class of models, based on the "currency substitution" hypothesis, provides considerable insight into the short- and long-run behavior of parallel market exchange rates. 2/

In all these models, output is exogenous and the desired proportion between domestic and foreign currencies is given by a "liquidity preference function" (Calvo and Rodriguez, 1977) which depends on the expected --and, under perfect foresight, actual-- rate of depreciation of the parallel market exchange rate. Private capital transactions are usually ignored, so that the reported current account is equal to the change in central bank reserves, which determines in turn --together with an exogenously determined rate of growth of domestic credit-- changes in the domestic money stock. The unreported current account determines the change in the stock of foreign currency held in private agents' portfolios. The flow supply of foreign exchange in the parallel market usually derives from under-invoicing exports. The propensity to under-invoice, when endogenous, is assumed to depend positively on the level of the premium. The probability of detection is also assumed to rise as fraudulent transactions increase, and this translates into a rising --but at a decreasing rate-- marginal under-invoicing share.

Portfolio balance implies that at each instant the domestic currency value of the stock of foreign assets is equal to a desired proportion of private wealth. In the short run, the parallel market rate moves so as to set portfolio demand equal to the existing stock of foreign currency, implying that flow demand and supply may diverge at any given moment. The determination of the parallel exchange rate at any instant of time is made therefore through the portfolio balance

1/ The Dornbusch et al. formulation (and also that of Frenkel, 1990) is not particularly adequate for the majority of developing countries with underdeveloped financial systems. Moreover, the process of currency substitution --whereby foreign-currency denominated money balances increasingly substitute for domestic money as a store of value, unit of account, and medium of exchange-- has gained importance in many countries over the past few years.

2/ See Dornbusch (1986), Edwards (1989), Edwards and Montiel (1989), Kamin (1988b), Kharas and Pinto (1989), Kiguel and Lizondo (1990), Lizondo (1987, 1990), Pinto (1986, 1988), and Samiei (1987).

equation, with the stock of foreign currency assumed fixed. In the long run, the parallel rate and the private sector holdings of foreign currency are determined by the requirements of both portfolio and current account equilibrium.

Although there remain important differences between the individual formulations, 1/ some general conclusions can be derived from this class of models. In a fixed-exchange rate regime, an expansionary fiscal and credit policy generates a depreciation of the parallel exchange rate, a rise in prices, an appreciation of the official real exchange rate, and a decline of the relative price of exports surrendered via the official market relative to those that use the parallel market. As a consequence, the proportion of export proceeds repatriated at the official exchange rate falls, and foreign reserves decline. 2/ Eventually, the central bank will "run out" of reserves, and a balance of payments crisis will ensue. At this point, the inconsistency between expansive macroeconomic policies and a pegged official exchange rate will become unsustainable, and corrective measures will need to be implemented --for instance, in the form of a parity change. This process leading to a "devaluation crisis" has been well documented by Edwards (1989), and Edwards and Montiel (1989).

In a crawling-peg regime, the official and parallel exchange rates depreciate at the same rate in the steady state, thereby leaving the spread unaffected. An increase in the rate of devaluation of the official exchange rate leads to an equivalent rise in the rate of depreciation of the parallel rate, and this generates a portfolio shift away from domestic money holdings. If the official and parallel foreign exchange markets are effectively segmented, the supply of foreign currency is fixed in the steady state, so that only an increase in the premium can restore portfolio equilibrium. The increase in the steady-state level of the premium caused by a higher rate of official exchange rate depreciation has been emphasized by

1/ Edwards and Montiel (1989) for instance consider a three-good economy and develop a fairly general analytical framework, but they assume that foreign currency holdings remain constant --excluding therefore an important source of dynamics.

2/ In addition to its impact on the propensity to under-invoice exports, an increase in the premium --without an equivalent increase in domestic prices-- may generate a positive wealth effect on aggregate demand, which may further deteriorate the current account of the balance of payments.

Dornbusch (1986) and Pinto (1986). 1/ It is important to note that the steady state premium does not depend on the level of the official exchange rate, but only on its rate of change. This implies that discrete, one-shot devaluations, will reduce the premium only temporarily, in the absence of fundamental changes in fiscal and monetary policies. This result has important implications regarding attempts at unifying the official and parallel foreign exchange markets. 2/

In more elaborate models where cross transactions exist and where the under-invoicing share is treated as endogenous, however, the long-run impact of a once-and-for-all official devaluation on the parallel rate becomes ambiguous. The effect will in general depend on the degree to which fraudulent transactions react to changes in the premium, the rationing scheme imposed by the central bank, and the elasticity of export volumes to changes in relative prices. The greater the response of the under-invoicing share to the change in the premium, the smaller the central bank's marginal propensity to resell officially remitted foreign exchange, and the smaller the response of export volumes, the more likely it will be that the parallel market rate will depreciate --less than proportionally, so that the premium falls-- in response to a parity change. 3/

Another source of ambiguity in the long-run effects on the premium of an increase in the rate of crawl relates to the role of the exchange rate differential as an implicit tax on exports (Pinto, 1989, and Kharas and Pinto, 1989). On the one hand, a higher rate of devaluation raises the rate of depreciation of the parallel market rate, making foreign currency holdings more attractive. This, by itself, would raise the premium. At the same time, however, for a given real fiscal deficit, a smaller domestic currency base is required to generate a given amount of revenues from the inflation tax, creating therefore the ambiguity. Whether the premium rises or falls depends upon the inflation elasticity of the share of domestic currency holdings in total financial wealth. If this is less than

1/ In some models of dual exchange markets with leakages discussed below --in particular those of Gros (1988) and Bhandari and Végh (1990)-- arbitrage flows between markets eliminate the exchange rate differential through time, so that the steady-state value of the premium is zero. This result, however, derives from the implicit assumption that arbitrage activity is subject to negligible transaction costs.

2/ The unification issue is discussed below.

3/ Nowak's (1984) result, according to which an official devaluation will be associated with an appreciation of the parallel exchange rate, depends critically on the assumption that the central bank does not accumulate foreign exchange (Kamin, 1988b, pp. 8-9).

unity, raising the rate of devaluation of the official exchange rate raises the unit yield of the inflation tax, and lowers the premium. Otherwise, the premium will actually rise. Thus, an acceleration of the official rate of devaluation does not necessarily lower the premium; the outcome depends crucially on the inflation elasticity of the demand for foreign currency. In turn, this elasticity rises with the rate of inflation --that is, the propensity to shift into foreign currency to avoid the inflation tax becomes stronger as the rate of growth of domestic prices rises. This results in a "seignorage Laffer curve", with the (unit) yield of the inflation tax rising for inflation rates below the seignorage-maximizing level of inflation and falling above it. A similar reasoning yields a U-shaped curve linking the steady-state premium and the inflation rate, representing the trade-off between the tax on exports and the inflation tax.

The short-run behavior of the parallel exchange rate and the premium in response to a devaluation reflects the typical behavior of asset prices. Consider first the case where the devaluation is unexpected. The parity change causes a decline in the flow supply of foreign currency to the private sector (since the premium falls) at the initial parallel rate. ^{1/} For current account balance to be maintained, a depreciation of the parallel rate is required. At the moment of the devaluation, the parallel rate depreciates sharply. Subsequently, current account losses of foreign currency drive the unofficial exchange rate up still further until it reaches a new long-run equilibrium at the same moment foreign currency holdings reach their new steady-state level.

Suppose now that the devaluation is anticipated, that is, it is announced before being implemented. The announcement of the future devaluation raises immediately the anticipated --and actual, since expectations are rational-- rate of depreciation of the parallel exchange rate, so that the free rate depreciates and foreign currency holdings rise. After the initial jump, the parallel rate continues to depreciate while private agents accumulate foreign currency in their portfolios until the economy hits a new stable saddle path at the instant the devaluation actually occurs. From this point on, the parallel rate continues to depreciate while foreign currency holdings now decline, since the unofficial current account deteriorates following the devaluation. At the date of the announcement of the

^{1/} An increase in the parallel market rate, given the official exchange rate, increases the share of exports channeled through the unofficial market for foreign currency via under-invoicing or smuggling, and thus increases the flow supply of foreign exchange. Conversely, import demand will fall, as well as the share of imports channeled through the parallel market (as a result of over-invoicing or smuggling), which will in turn decrease the flow demand for foreign currency.

future devaluation, the under-invoicing share jumps upwards, and grows as the parallel market rate depreciates. When the devaluation is effectively enacted, the premium and the under-invoicing share fall sharply, but then recover partially, since the parallel market rate continues to depreciate, until reaching its new steady-state level.

This description of the transmission mechanism of a parity change provides an interesting explanation for the seemingly puzzling empirical results on sixty devaluation episodes in developing countries described by Kamin (1988a). The study shows that prior to the typical devaluation, the growth rates of exports and imports fall sharply, while the current account balance and reserve levels deteriorate markedly. Immediately following the devaluation, exports recover strongly and the current account improves (contrary to what a "J-curve" model would predict), while imports continue to fall --albeit at a slower pace-- and rebound sharply in the second year after the devaluation. A rationale for this sequence is as follows (Kamin, 1988b). Continuous inflation and hence appreciation of the real (official) exchange rate lead to increases in the parallel market premium, increases in export under-invoicing, and reductions in officially measured exports. In turn, this drop in export proceeds leads to reserve losses and declines in imports as the authorities tighten foreign exchange allocations. The expectation that the deteriorating external balance will prompt an official devaluation induces a speculative rise in the parallel market rate which further reinforces the need for official exchange rate adjustment. Following the devaluation, the parallel market premium falls, reducing under-invoicing and increasing officially recorded exports. Improved reserve flows allow the authorities to expand progressively sales of foreign exchange, so imports increase as well.

Overall, the predictions of the currency substitution models have been found to be well supported by empirical tests. ^{1/} Although the impact of a devaluation on the parallel market premium is theoretically ambiguous, empirical evidence supports in general the

^{1/} Dornbusch et al. (1983) present empirical tests of their model for Brazil, while Phylaktis (1989) considers the case of Chile. The results show a significant impact of the interest rate differential --as well as, for Chile, the degree of capital restrictions-- on the parallel market premium. Fishelson (1988), using the actual rate of depreciation of the parallel market rate as a proxy for the expected rate of official devaluation, tests the Dornbusch et al.'s model for a group of for 19 countries over the period 1970-79. More recently, Kaufman and O'Connell (1990) have provided estimates of the model for Tanzania, over the period 1967-88. Portfolio factors are shown to affect the behavior of the parallel market premium mainly in the short run, while flow factors play a predominant role in the long run.

presumption that parallel market rates depreciate, but less than proportionally, in response to a devaluation of the official exchange rate, and that the premium falls initially. Studies by Edwards (1989), Edwards and Montiel (1989), and Kamin (1988b) on a large sample of devaluation episodes in developing countries have well documented this fact. Similarly, in the empirical model presented in Agénor (1990a), a once-and-for-all devaluation of the official exchange rate is associated in the short run with an output contraction, a rise in the inflation rate, an increase in net foreign assets, and a less-than-proportional depreciation of the parallel rate. In the long run, the official devaluation results in a permanently higher price level and a more depreciated parallel exchange rate, but has no effect on the premium. The econometric results presented in Agénor (1990d) also support the view that the parallel rate depreciates less than proportionally following an official parity change.

4. Models of dual exchange rate markets with leakages

There have been some major developments, over the past few years, in the literature dealing with the properties of formal two-tier exchange rate regimes which may prove useful for understanding the behavior of parallel currency markets. 1/ The recent analytical literature has focused on the possibility of illegal cross-operations between the commercial and financial exchange markets; see for instance Bhandari (1988), Bhandari and Decaluwé (1986, 1987), Bhandari and Végh (1990), Gros (1987, 1988), and Guidotti (1988). Gros (1988) has shown that a divergence between the two exchange rates induces in the short run a flow of arbitrage activity, the magnitude of which depends on both the costs of evading exchange controls and the size of the exchange rate differential. Bhandari and Végh (1990) have developed an optimizing model in which the coefficient of leakage is endogenously determined by utility-maximizing agents.

Several aspects of dual exchange rate models with leakages are relevant for the analysis of illegal or quasi-legal markets for foreign exchange in developing countries. 2/ In models of economies with dual legal markets with a floating "financial" exchange rate, the floating rate plays a role similar to the parallel market exchange

1/ The early strand of literature was based on the assumption that the dual exchange markets were effectively segmented, implying that the freely floating exchange rate would ensure a zero capital account. As a result, a major channel of transmission of external disturbances --via movements in foreign assets-- was completely eliminated.

2/ Note that in a dual rate system (with a fixed commercial rate and a freely floating financial rate) an illegal parallel market may persist, owing to the retention of (some) capital controls.

rate. Moreover, formal economic modeling of legal and illegal parallel markets for foreign exchange may look very similar, since risk and transaction cost functions may be indistinguishable. By incorporating smuggling and a generalized cash-in-advance constraint in the Bhandari-Végh model, Agénor (1990c) for instance derives a set of asset demand equations which displays the same properties as the "liquidity preference function" used in the portfolio models described above.

Consider, for example, the model of a legal, dual exchange rate system with leakages provided by Bhandari (1988). The model, which explicitly recognizes both private (fraudulent) and officially-sanctioned cross transactions between the two exchange markets, is based on a stochastic, rational expectations approach. Both the real and financial sectors of the economy are explicitly considered. Asset accumulation equations in the model are specified in beginning-of-period, ex-ante equilibrium, rather than in end-of-period, ex-post terms for analytical tractability. Although there is no currency substitution, agents may hold foreign-currency denominated bonds in their portfolios. The interest parity condition, properly modified to reflect leakages between markets from repatriated interest receipts, is assumed to hold continuously.

The conclusions of the model can be readily re-interpreted for an economy in which the dual exchange rate system is composed of a legal and an illegal market. A positive supply shock raises output and causes excess demand in the money market, necessitating an increase in the yield on domestic assets to restore equilibrium. As a consequence, the parallel exchange rate must appreciate in order to maintain uncovered asset yields in line. A permanent increase in the foreign price level is associated with an appreciation of the parallel exchange rate and --as a result of the partial offset provided by the movement in the free rate-- leads to a less than equi-proportionate rise in domestic prices. In the long run, a devaluation of the official exchange rate --anticipated or unanticipated-- leads to an equi-proportionate depreciation of the parallel exchange rate, thereby leaving the spread unaffected. In the short run, a once-and-for-all unanticipated devaluation leads initially to an increase in prices and real output. At the same time, the reported current account improves, since the premium falls, leading to reserve accumulation and an expansion of money supply, while the unreported current account deteriorates, leading to a fall in the stock of foreign assets held by the private sector. The increase in domestic prices reduces the real money stock, thus necessitating an increase in the domestic asset yield to re-equilibrate the market. This, in turn, requires a rise in the expected rate of depreciation of the parallel exchange rate, which brings an immediate depreciation of the free rate. The higher the degree of compulsory cross-transactions, or the higher the penalty costs associated with fraudulent cross-transactions, the greater will be the rate of depreciation of the parallel exchange rate. Overall, the devaluation leads to a less-than-proportionate depreciation of the

parallel exchange rate, implying therefore a fall in the premium. The conclusions regarding the short- and long-term effects of an official devaluation are qualitatively very similar to those derived from currency substitution models.

A disturbing feature of the model, however, is its treatment of the dynamics of asset accumulation. Private savings are arbitrarily allocated between money and foreign assets, and it is not clear how alternative allocation processes would affect the results. This is an important question, since as shown above, stock-flow relationships play a crucial role in the short- and long-term dynamics of the premium.

IV. Policies Towards Parallel Currency Markets

In light of the foregoing theoretical and empirical evidence, several key issues will now be examined from a policy perspective: the effectiveness of foreign exchange restrictions, the role of nominal devaluations as a tool to control the parallel market premium, and strategies for unifying official and parallel foreign exchange markets.

1. Effectiveness of foreign exchange controls

As discussed above, there is considerable evidence that foreign exchange controls have not been effective. Rationing creates shortages of imported goods --which encourages smuggling activities-- and makes it highly lucrative for "rent-seeking" traders to acquire foreign exchange at the official rate (through personal connections or other illegal means) and to resell it in the parallel market. Moreover, foreign exchange rationing may have a negative output and employment effect (Austin, 1989). By reducing the supply of intermediate goods to import-dependent industries (including the export-oriented sector), exchange controls may not only reduce the official supply of foreign exchange, but may also reduce activity to low levels of capacity utilization. They can, therefore, aggravate the very problems that they were intended to solve.

Several countries have recently moved in the direction of liberalization of foreign exchange restrictions. In November 1989 for instance, Guatemala announced the lifting of exchange controls and the establishment of a free exchange market, in an effort to end the parallel market and liberalize foreign currency trading. Similar reforms have also been introduced in African and Asian countries (see Quirk et al., 1989).

2. Devaluations and parallel market premia

Typically, the existence of a parallel currency market, where transactions take place at an exchange rate that is more depreciated than the official exchange rate is considered prima facie evidence that the official parity is inappropriate. In these circumstances, the question of whether or not to adjust the official exchange rate --and in what proportion-- becomes a major issue of exchange rate policy.

The view that a once-and-for-all devaluation of the official exchange rate may reduce permanently the level of the premium seems to be a recurrent theme in discussions relative to exchange rate policy in developing countries. Indeed, an argument often made is that a devaluation, if a sizable parallel market exists, reduces the incentive to fake foreign trade invoices, thereby attracting foreign exchange back to the official market. This argument has been used recently to motivate several attempts to reduce the parallel market premium by exchange rate changes. In October 1989, the USSR announced a new dollar exchange rate for foreign travel of 6.26 rubles per US dollar versus 0.63 rubles previously, as a measure to stop the leak of hard currency through the parallel market. In November 1989, the Argentine government announced its intention to try to reduce the 54 percent premium in the parallel market through fiscal reforms, rather than devaluation, which would fuel inflation. In early December 1989, however, the austral was devalued by 54 percent (to 1,000 australes to the US dollar from 650) with the premium being cited as one of the reasons underlying the decision to adjust the exchange rate. On April 28, 1990, the Nicaraguan Government devalued the Cordoba by 30 percent against the US dollar --from 53,800 to 70,000-- and presented the measure as a key instrument in their attempt to control black market activities. Finally, in June 1990, the authorities in Guyana devalued the domestic currency by 36 percent (relative to the US Dollar) and announced that a series of devaluations will take place during 1991 until the official and parallel market rates for the currency are equal.

The flaw in the above argument comes, of course, from its partial equilibrium nature and its neglect of macroeconomic interactions. A major implication --largely supported by the available empirical evidence-- of the general equilibrium, currency substitution models of the parallel currency market reviewed earlier is that following a nominal devaluation the premium will typically fall. However, this reduction will only be temporary (since the initial fall in the spread reduces supply and increases the unofficial demand for foreign exchange) if fiscal and credit policies are maintained on an expansionary course. A devaluation, by itself, cannot permanently lower the premium. Permanent unification of the official and parallel

exchange markets cannot be achieved by attempting to eliminate the spread via devaluation of the official rate alone. 1/

Moreover, there is evidence that devaluations aimed at maintaining the premium below a given level may lead to increasing rates of depreciation and therefore to accelerating inflation. An often-cited example is Bolivia in the early eighties (Kharas and Pinto, 1989). 2/ In the three years preceding 1983, the rates of inflation in Bolivia reached 47, 32 and 124 percent, respectively. In 1983, the inflation rate reached 276 percent. In the last quarter of 1984, with the premium reaching 174 percent compared to 22 percent in december 1980, there was considerable pressure to unify exchange rates. The authorities decided to use nominal exchange rate policy to minimize the spread. The belief that the equilibrium nominal exchange rate was a weighted average of the official and parallel rates, 3/ and that the official rate should be devalued towards it, resulted in a rule that directly linked official depreciation to the parallel market premium. Official devaluation reached 350 percent in the last quarter of 1984, and 455 percent in the first quarter of 1985. The premium fell at first, but with the parallel market rate responding, it rose again, resulting eventually in an inflation rate of 496 percent in the first quarter of 1985, an annualized rate of 126,000 percent. This episode illustrates that targeting the premium through exchange rate policy alone can be costly. Such a policy carries an inherent risk of inflation, which can be limited only if restrictive financial policies are implemented at the same time. The episode also suggests that there is a sequencing issue in the introduction of fiscal and exchange rate reforms. As a rule, fiscal reform, which takes longer and is

1/ The recent experience of Argentina provides a good illustration of this proposition. Following the devaluation of December 1989, the premium dropped immediately. But, because of the lack of financial discipline, the free market rate rose quickly to 1,230 (continued from page 25) australes, bringing the premium back to 23 percent. See Kamin (1990) for a further analysis.

2/ Bolivia has since moved to a fairly flexible exchange system, based on daily auctions of predetermined amounts of foreign exchange without restrictions on access to participants. Other countries that have recently pursued an exchange rate policy involving the adjustment of the official exchange rate to the parallel market premium include Bangladesh and Ghana.

3/ Policy discussions have often been centered on the idea that the restriction-free equilibrium exchange rate lies "somewhere" between the official exchange rate and the parallel rate --although it has long been recognized that the latter is often subject to erratic movements due to fluctuations in the demand and supply of foreign currency. In fact, as shown by Lizondo (1987), the equilibrium official rate can be either above or below the parallel rate.

more difficult to implement, and therefore takes time to be credible, should be implemented first. Once the fiscal reform process is under way, devaluations may be valuable in speeding up adjustment.

3. Unification of foreign currency markets

The unification of foreign exchange markets (that is, the process whereby the premium is lowered and the official and parallel market rates are gradually brought close to each other so as to ultimately give rise to a unique exchange rate), and the transition to a fixed or a floating exchange rate regime remain key policy issues for a large number of developing countries. The purpose of unification, when a parallel currency market is significant as a source of import financing, is to absorb and legalize it, rendering official the "de facto" (partial) import liberalization, and eliminating the inefficiencies and market fragmentation associated with (quasi-) illegality. Unification attempts may aim at adopting a uniform floating exchange rate, or a uniform fixed or crawling official rate. In the first case, the official exchange rate clears the foreign exchange market, while in the second, changes in the banking system's foreign reserves serve to adjust supply and demand for foreign currency.

Consider first the policy of adopting a floating exchange rate. Theoretically, the impact of such a policy shift on the short- and long-run behavior of the exchange rate and the rate of inflation is ambiguous. In the long-run, the effect depends crucially on the fiscal impact of the exchange rate reform. If the dual arrangement provides profits (in the form of tax revenues from currency operations, etc.) to the authorities, the rate of depreciation of the exchange rate and the rate of inflation would generally rise, as the authorities may compensate for a fall in revenue by an increase in monetary financing; conversely, if the system caused losses, the rate of depreciation and the inflation rate would typically fall. ^{1/}

In the short run, the behavior of the floating exchange rate upon unification will depend on a number of factors, in particular the behavior of expectations regarding the reform process. If the unification attempt is anticipated, in order to avoid capital losses (or to realize capital gains) agents will adjust their portfolios

^{1/} The effect will also depend on whether the balance of payments before the unification attempt is in deficit or in surplus. An initial deficit for instance --which implies that the excess demand for foreign exchange was partly accommodated through changes in international reserves-- will translate, upon unification, into a higher rate of depreciation of the official exchange rate and a higher inflation rate.

towards foreign-currency denominated assets if the uniform floating exchange rate is expected to be more depreciated than the existing parallel rate, and towards domestic-currency denominated assets if it is expected to be more appreciated. As a result of this portfolio adjustment, the parallel market rate will depreciate immediately --at the moment where expectations are formed-- towards the level asset holders expect the post-unification floating rate to be. In the limiting case where private agents anticipate perfectly the evolution of the post-unification exchange rate, the parallel market rate would initially jump and then depreciate steadily towards that level at the time of unification (Lizondo, 1987; Lizondo and Kiguel, 1990).

Consider now the case where the authorities attempt to unify the official and parallel markets by adopting a crawling peg regime, possibly following a one-shot devaluation of the official exchange rate. In the long-run, the rate of crawl must be consistent with balance of payments equilibrium, and such a rate is equal to the rate of depreciation that would prevail in the long run under a uniform floating regime (Lizondo, 1987). In the short-run, the behavior of the parallel exchange rate upon unification will also depend crucially on the behavior of expectations. If agents anticipate the unification attempt, the same type of portfolio adjustments described above will be initiated. As a result, the parallel market rate will move towards the expected level of the post-unification official rate. 1/

What is the evidence available concerning the behavior of exchange rates following a unification attempt? Few developing countries have attempted to unify their foreign exchange markets by adopting a crawling peg regime. Since, as shown above, a once-and-for-all devaluation cannot lead by itself to permanent re-unification of exchange markets, a sensible approach is therefore to examine unification attempts that have taken the form of floating the domestic currency.

Indeed, recent evidence points to greater flexibility in the exchange arrangements of some developing economies, with several countries adopting market-oriented exchange systems. Roberts (1989) has studied the experience of African countries in the mid-eighties with market-based exchange-rate determination arrangements, and

1/ This helps illustrate the difficulty involved in using the parallel market rate as an indicator for the initial level of the official exchange rate in the crawling peg regime. If private agents anticipate the unification attempt, the parallel rate will move immediately --before the reform is implemented-- towards the level the authorities are expected to set the official crawling rate. Consequently, setting the initial, post-reform rate at the level the parallel rate is at the time of unification will be consistent with balance-of-payments equilibrium only if expectations are correct.

specifically with foreign-exchange auctions and floating. ^{1/} These reforms often had as an explicit goal the absorption of the parallel market in foreign currency and a reduction in --or elimination of-- the premium. Table 2 summarizes the results. The rates of nominal devaluations which followed the introduction of floating/auctioning were massive in Nigeria, Sierra Leone, Somalia, Uganda, Zambia, and Zaire. The Table shows clearly that the failures of floats and auctions are associated with a loss of control over monetary policy (Zambia and Ghana, for instance), and the successes with at least a stabilization, if not a reduction, of liquidity growth (for example Gambia). Table 2 and Figure 3 (which presents monthly data on the spread for Guinea, Nigeria, Uganda, and Zaire) shows that the parallel market premium rose substantially before the reform of the exchange system. This can be interpreted as being partly the result of expectations about the reform process. ^{1/} Figure 3 also shows that the premium fell sharply following the exchange rate reform in all countries, while a significant premium reemerged subsequently in those countries where money growth could not be kept under control (Ghana, Sierra Leone, Somalia, Zambia). Interestingly enough, the post-unification exchange rate is typically close to the pre-reform parallel rate, casting doubt on the argument that the "equilibrium" exchange rate is some average of the official and parallel rates. This is not surprising if the resale of foreign exchange is at a large scale (Nigeria, for instance) and if prices are determined at the margin. A second misconception, as pointed out by Pinto (1989), is that the large initial one-shot depreciation of the official exchange rate, which is typically associated with unification attempts, will be inflationary. This has apparently not been the case in countries

^{1/} Other developing countries that have recently adopted a floating regime include Uruguay (in late 1982), Jamaica and the Phillipines (in 1984), Bolivia and the Dominican Republic (1985). The move occurred in most cases at a time of increasing external payments difficulties and increasing arrears (with reserves no longer available to support the fixed exchange rate), extensive parallel currency markets (siphoning off foreign exchange from the official channels) and capital flight. See Quirk et al. (1987, 1989), and Pinto (1989). See also Branson and Macedo (1989) for an analysis of the (failed) attempt by Sudan to unify its exchange system in November 1981-March 1982, and Hausmann (1990) for a review of the Venezuelan experience with multiple exchange rates during 1983-89.

^{1/} Faced with the possibility of a future depreciation of the parallel rate, asset holders reallocate their portfolio away from domestic money, thereby causing the free exchange rate to depreciate immediately, and thus the premium to increase prior to the depreciation of the official rate. The pattern depicted in Figure 3 is consistent with the results reported by Kamin (1988b), Edwards (1989), and Edwards and Montiel (1989).

where money growth was initially kept under control (Nigeria, Zaire), since the more depreciated parallel rate is already reflected in domestic prices. Post-unification inflation seems to depend rather on the fiscal implications of unification and subsequent or concomitant changes in macroeconomic policies.

Fiscal factors can indeed account for a substantial rise in the rate of growth of domestic prices following a unification attempt. Table 2, for instance, shows that in Sierra Leone inflation rose substantially in the first year following the attempted unification of official and parallel exchange markets through floating. An explanation of the often-observed inflationary burst related to unification has been provided by Pinto (1989). The government in developing countries is, typically, a net buyer of foreign exchange from the private sector. Since the parallel market premium is an important implicit tax, there is a trade-off between the premium (tax on exports) and inflation (a tax on domestic currency holdings) in financing the deficit. Therefore, unifying official and parallel exchange rates could raise inflation substantially (and permanently), even if the level of government spending remains constant in real terms, as the loss in revenues from exports is replaced by an increase in monetary financing of the budget deficit and a higher tax on domestic cash balances.

There are two major lessons from the above discussion of the recent experience of African countries with exchange rate reform. First, unification of exchange markets by exchange rate policy alone cannot succeed without measures of (at least partial) import liberalization, specifically the relaxation of import licensing schemes. The combined effect of relaxing licensing schemes and administrative allocations of foreign exchange makes importing goods once again market-determined--subject only to the distortion of tariffs. In Ghana for example, concurrently with the process of exchange rate reform, the exchange and trade system was gradually liberalized, during the 1986-89 period. The import licensing scheme was first streamlined, then liberalized and finally abolished in early 1989, while other current transactions were progressively made eligible for funding through the auction. As a result of these measures, only a few restrictions on current transactions, relating essentially to invisible transactions, remained in effect by mid-1989.

Second, complete elimination of the premium requires the removal of all restrictions on capital and commercial transactions. In most of the countries considered (notably in Nigeria and Zaire), the currency was floated only for commercial transactions with capital controls being retained for outwards flows. The "best" route to unification, therefore, might be to gradually relax foreign exchange rationing in the official market (starting with commercial transactions), accompanying this with discrete devaluations, with the pace of reform being set by the speed of fiscal adjustment. In the process, monetary policy and liquidity controls are important for

Table 2. Changes in Exchange Rates, Money Supply and Prices in Nine African Countries

Country	Currency	Date of start of float/ auction	Rate to \$ before Depreciation		Rate to \$ immediately after Depreciation	Initial nominal depreciation (%)	Further nominal Depreciation over first year of float (%)	Broad money growth in first year (%)	Inflation in retail prices first year (%)
			Official	Parallel					
	1	2	3	4	5	6	7	8	9
Gambia	Dalasi	Jan 1986	3.5	7.0	6.8	49	10.0	7	54.2
Ghana	Cedi	Sept 1986	90.0	150.0	120.0	25	30.0	65	45.0
Guinea	Syli/Franc	Jan 1986	270.0	420.0	340.0	20	15.0	75	71.0
Nigeria	Naira	Sept 1986	1.6	4.0	4.8	66	-12.5	15	15.0
Sierra Leone	Leone	July 1986	5.0	15.0	12.0	58	78.0	126	320.0
Somalia	Shilling	Jan 1985	26.0	90.0	90.0	71	22.0	81	38.0
Uganda	Shilling	Aug 1982	100.0	360.0	300.0	67	-2.8	42	40.0
Zaire	Zaire	Sept 1983	5.8	66.0	30.1	80	26.0	35	50.0
Zambia	Kwacha	Sept 1985	2.2	3.9	5.0	56	29.0	70	55.0

Source: Roberts (1989, p. 130).

stabilizing expectations and parallel exchange rates. Expectations of inflation and further depreciation at times of expansionary credit policies --typically caused by the monetization of fiscal deficits-- may provide a destabilizing influence. In this sense, unification is a complex process, involving perhaps changes in policy institutions and requiring gradual adjustment on the part of market participants.

V. Concluding Remarks

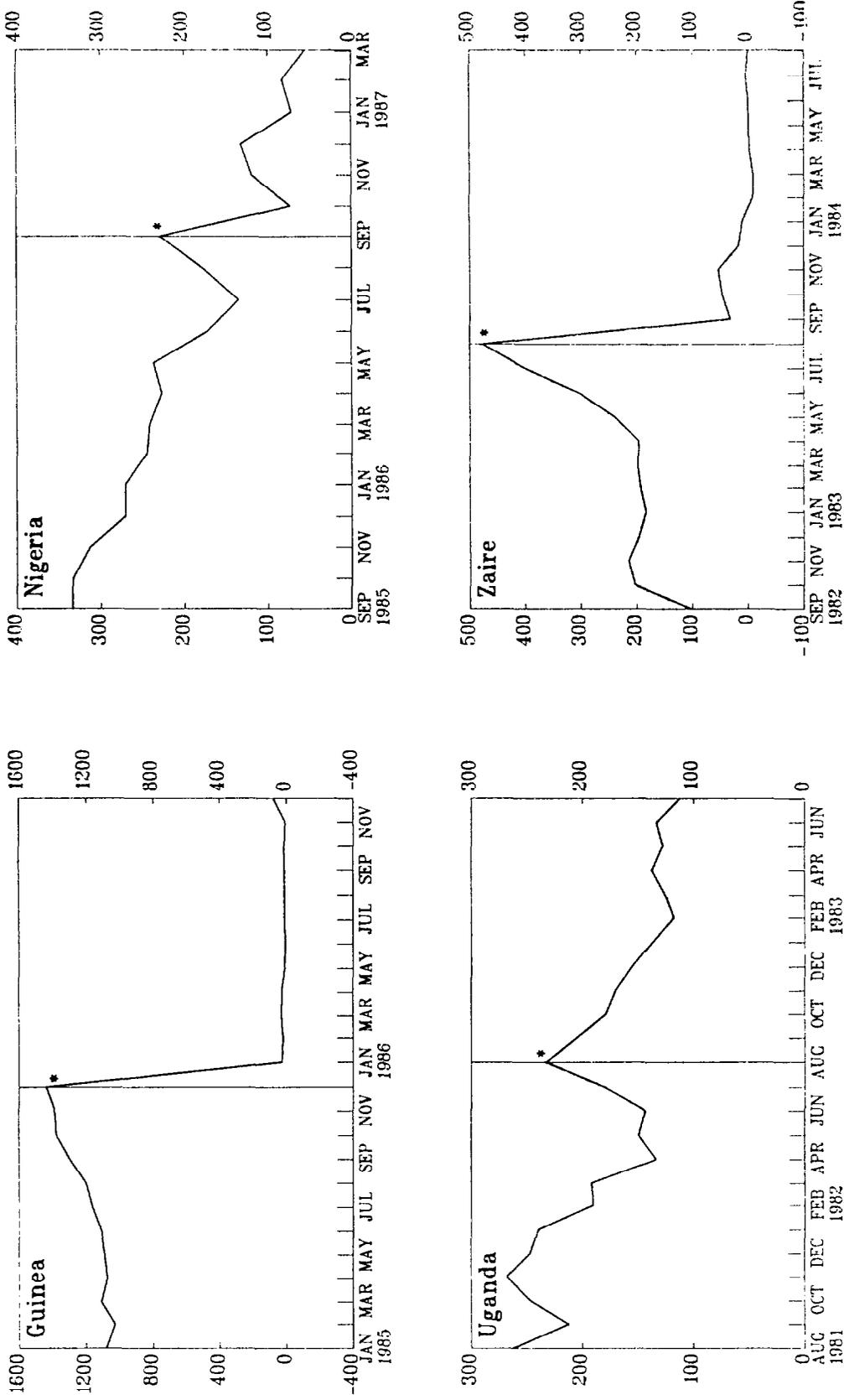
The purpose of this paper has been to discuss in a consistent and coherent framework recent theoretical and empirical developments in the analysis of parallel currency markets in developing countries. The policy implications of the results have also been assessed, and the issue of exchange market unification has been discussed in light of the recent experience of a group of developing countries with flexible exchange rate arrangements.

In the process of reviewing the recent literature on parallel currency markets, it is clear that a number of substantive issues have not yet been adequately addressed. The transition costs associated with exchange market unification, for instance, are not well understood. Issues related to the distributional effects, 1/ as well as the pace, of the unification process have received only scant attention, and criteria for choosing between a "gradual" or an "overnight" attempt --as well as the implications of the alternative options for fiscal and monetary policies, inflation, and the balance of payments-- have not been fully addressed. Existing discussions of this issue, based on models of legal dual exchange rate systems with no leakages between markets, assume for instance that the central bank can determine which transactions can be conducted through the different foreign exchange markets --a possibly inappropriate hypothesis for developing countries with sizable, informal foreign currency transactions.

Similarly, the role of the premium as a "signalling" device in the context of stabilization programs has not been fully explored. Recent analytical models of devaluation crises have emphasized the role of the premium in the determination of the degree of credibility forward-looking agents attach to the official exchange rate, and its consequent effect on devaluation expectations (Agénor, 1990b). An interesting extension of this framework might be to analyze the role of the premium, in an economy subject to a variety of stochastic shocks, as conveying (noisy) information about the policy stance of

1/ Distributional implications of parallel currency markets are examined by González-Vega and Zinser (1987), in the context of the Dominican Republic.

FIGURE 3
PARALLEL MARKET PREMIA IN AFRICAN COUNTRIES
(In percent)



Source: See Appendix.
* Start of float/auction.

the authorities, and to examine how, when agents face a "signal extraction" problem, expectations of the collapse of a stabilization program can become self-fulfilling. Finally, the implications of alternative exchange rate rules (like a constant real exchange rate policy, for instance) for the behavior of the parallel market premium have not been fully worked out. A systematic analysis of the impact of external shocks (such as changes in the terms of trade, as in Edwards and Montiel, 1989) on the behavior of the premium remains to be done.

Nevertheless, there are some general policy implications that emerge from the present literature. Exchange and trade restrictions are largely ineffective as long-term policies to maintain the viability of an (overvalued) exchange rate or to "impose" balance of payments adjustment. In these circumstances, the emergence of parallel exchange markets is a normal outcome. Although "socially beneficial" in some respects, parallel currency markets generate a variety of costs. In particular, they increase the potential to evade the inflation tax on domestic cash balances. Furthermore, unofficial exchange rates have a substantial impact on domestic prices, and play an important role in the transmission mechanism of macroeconomic policies. Permanent unification of official and parallel foreign exchange markets cannot be achieved by attempting to eliminate the spread via devaluation of the official exchange rate alone. Such a policy is also inherently inflationary. Attempts at exchange market unification by floating the currency are likely to be accompanied by an inflation burst, which results not so much from the depreciation of the official exchange rate (since prices will have already reflected the more depreciated parallel rate), but rather from the loss of the implicit tax on exports upon unification. To be successful, unification must be accompanied by a relaxation of exchange restrictions and by supportive financial policies.

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