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Exchange Rate Unification, the Equilibrium Real Exchange Rate, and Choice of Exchange Rate Regime: The Case of the Islamic Republic of Iran¹

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Abstract

This paper reviews recent developments in the exchange system in the Islamic Republic of Iran and in the real effective exchange rate (REER). It also considers the determinants of the REER in connection with the choice of exchange regime after unification. The study illustrates how economic policy variables and exogenous shocks affect the real exchange rate primarily through the fiscal balance, and consequently, the savings-investment gap. It further illustrates that the appropriate level of REER and its medium-term path depend upon the mix of monetary, fiscal, and structural policies that underpin the evolution of inflation, balance of payments, and productivity growth.

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I. INTRODUCTION

The Islamic Republic of Iran made two major attempts at liberalizing its exchange system in the 1990s. First, the number of exchange rates in the official market was reduced from seven to three in 1991, representing a significant simplification and rationalization of the multiple exchange rate system. Subsequently, in March 1993, the three official rates were unified, and the official rate was linked to the parallel exchange rate. While the premium on the parallel exchange market was virtually eliminated in the period immediately following unification, the continued provision of foreign exchange for essential imports and repayments of foreign debt at a more appreciated exchange rate, coupled with a steep decline in international oil prices negatively affected the fiscal position. This led to a discontinuation of the link between the official and the parallel exchange rates, and, in May 1994, the authorities reverted to a dual exchange rate system by establishing a more depreciated "export rate" in addition to the official rate.

The unification of the exchange rate and the achievement of a single digit inflation are among the key objectives of the Second Five-Year Development Plan (SFYDP) covering the period 1995/96–1999/2000. However, since May 1995 when the export rate was set at Rls 3,000 per U.S. dollar (compared to Rls 1,750 per U.S. dollar for the official floating rate) the exchange system has remained virtually unchanged for almost three years resulting in a constant appreciation in real effective terms of each of the two official rates and in a continued depreciation of the parallel exchange rate. In July 1997, the authorities responded by permitting exporters to sell 'import certificates' through the stock exchange at a substantially more depreciate exchange rate. Also, the average rate of inflation, which has fallen from 49.4 percent in 1995/96 to 23.2 in 1996/97, is still well above the planned target. These factors, coupled with the implicit subsidy/taxation inherent to a multiple exchange system, have had a negative impact on the external competitiveness of the export sectors and have, among other things, negatively affected growth prospects and the diversification of the economy. This has highlighted the need to re-examine the issues in bringing about unification of the exchange system in a sustained manner, building on the lessons of experience with unification in the early nineties.

Against this background, this paper examines recent developments in the exchange rate system in the Islamic Republic of Iran, and in the (REER), and considers the fundamental determinants of the REER as a basis to discuss the choice of exchange rate regime after unification. Specifically, Section II describes the developments in the exchange rate system since 1991, the unification in 1993, and subsequent emergence of a dual exchange rate in 1994. This section also examines the developments in the nominal and real effective exchange rate from the perspective of their impact on balance of payments, fiscal balance, and competitiveness of the non-oil export sector. One important result is that developments in the non-oil sector not only reflected developments in the real exchange rate, but also, the trade structure changed from the traditional non-oil exports to industrial goods in response to a depreciation of the real exchange rate. In Section III, the paper analyzes the fundamental determinants of the real effective exchange rate over the medium term in the specific context of the Iranian economy, and assesses empirically the impact of key determinants such as real price of oil,

non-oil terms of trade, productivity, fiscal balance, and exchange system regulations. One important finding is that fiscal consolidation will result in a permanent increase in the current account surplus, in turn allowing for an appreciation of the real equilibrium exchange rate. In this context, Section IV reviews issues relating to exchange rate unification and the choice of exchange rate regime, taking into account the impact on inflation and competitiveness, the capacity of the exchange regime to insulate the economy from shocks, and its implications for concomitant macro and structural policies and their effectiveness. The paper emphasizes that the appropriate level of real exchange rate and its medium-term path depend upon the mix of monetary, fiscal, and structural policies that underpin the medium-term evolution of inflation, balance of payments and productivity growth.

II. BACKGROUND ON EXCHANGE RATES IN IRAN

A. Developments in the Exchange Rate System

Exchange system and exchange rate arrangements in the Islamic Republic of Iran have been characterized since the 1970s by a system of multiple exchange rates, and the associated exchange regulations and import controls. The complexity and the extent of restrictiveness of the regime have varied considerably in response to major external and domestic shocks, and foreign exchange availability. A chronology of exchange rate developments during 1991–97 is presented in Table 1, which are highlighted below.

Liberalization attempts in the 1990s

The exchange rate system was significantly liberalized and simplified on January 21, 1991 when the number of exchange rates in the official market was reduced from seven to three. From this date to March 21, 1993, there were three official rates used within the banking system and one free market rate outside the banking system. The basic official rate, pegged to the SDR at Rls 92.3 per SDR (about Rls 70 per U.S. dollar), was applied to oil export receipts, imports of essential goods, and official debt repayment. The competitive rate, pegged to the U.S. dollar at Rls 600 per U.S. dollar, was applied to imports of intermediate and capital goods which were not eligible for the basic official rate.² The floating rate, which was determined by banks taking into account the free nonbank market rate, was applied to

²The authorities used a foreign exchange budget to allocate foreign exchange transactions applicable to either the basic official rate or the competitive rate.

Table 1. Islamic Republic of Iran: Chronology of Exchange Rate Developments, 1991-97

Starting Date	Exchange Rates	Rls per U.S. dollar	Transactions Taking Place at the Rates
1/21/91	Basic official rate	70	Oil exports; imports of essential goods; imports for priority projects; official debt service; and government supported students.
	Competitive rate	600	Imports of intermediate and capital goods not included above as well as related services.
	Floating rate	Floating—determined by banks based on free market rate	Non-oil exports; imports not covered by the above official rates; and most service payments and receipts.
	Free nonbank market rate	Market determined	Foreign exchange freely bought and sold.
3/21/93	Floating rate (unified official rate)	Managed float	All transactions (previously contracted debt were serviced at pre-March 1993 exchange rates and imports of certain essential goods were effected at the previous basic official rate through a government subsidy account during 1993/94).
	Free nonbank market rate	Market determined	Foreign exchange freely bought and sold.
12/21/93	Official rate	1,750	All transactions initially. Gradually, the eligible payments became limited to imports of essential goods; payments for essential services; and official debt service.
	Free nonbank market rate	Floating	All other transactions including non-oil exports; tourist receipts; payment for nonessential goods and services, and transfers.
5/4/94	Official rate	1,750	Oil exports; imports of essential goods; payments for essential services; and official debt service
	Official export rate	Initially Rls 50 below authorized dealers' rate; soon fixed at 2,345.	Non-oil exports and imports on a positive list.
	Authorized dealers' market rate	Floating (Rls 2,680 on 12/31/94; as depreciated as Rls 6,200 in 5/95).	All other transactions including non-oil exports; tourist receipts; payment for nonessential goods and services, and transfers.
	Parallel offshore market rate	Market determined (Rls 3,000-3,100 on 12/31/94).	Foreign exchange freely bought and sold.
5/20/95	Official rate	1,750	Oil exports; imports of essential goods; imports for priority projects; payments for essential services; and debt service on priority projects.
	Official export rate	3,000	All other transactions including non-oil exports; service receipts; and imports and service payments not covered by the official rate.
7/11/97	Official rate	1,750	Oil exports; imports of essential goods; imports for priority projects; payments for essential services; and debt service on priority projects.
	Official export rate	3,000	All other transactions including non-oil exports; service receipts; and imports and service payments not covered by the official rate..
7/11/97	Exchange rate for import certificates	4,600	Import certificates have been allowed to be traded through the Tehran Stock Exchange—up to 100 percent for carpet exporters and up to 50 percent for other nonoil exporters.

Source: Based on information provided by the Bank Markazi Jomhuri Islami Iran.

other transactions within the banking system.³ The free nonbank-market rate was determined by foreign exchange brokers and money changers in a market where foreign exchange was bought and sold freely.

Unification in 1993 and re-emergence of market segmentation

On March 21, 1993 the three official rates were formally unified at an initial level of Rls 1,500 per U.S. dollar, with a concomitant relaxation of some foreign exchange regulations. The new rate was determined on a daily basis by the Bank Markazi under a managed floating system and taking into account the free nonbank market rate. Allocation of foreign exchange through a foreign exchange budget was discontinued. Also, imports were subject to no outright restrictions, but all payments for imports (in excess of US\$500) were required to be made through the banking system and paid for by letters of credit (LCs). However, the unified rate was not applied in a comprehensive manner, as foreign exchange continued to be provided for essential imports and repayments of short-term foreign debt contracted before March 21, 1993 at the former basic rate (and the competitive rate for some repayments). This resulted in large quasi-fiscal losses and a concomitant expansion of the net domestic assets of the Bank Markazi. Moreover, as the unification had been widely anticipated, both debt contracted abroad at the basic rate, and imports surged prior to unification, thereby magnifying the subsequent quasi-fiscal losses.

As a consequence of these expansionary financial policies, exchange rate unification could not be sustained. The newly established official floating exchange rate, which was depreciated sharply from a weighted average exchange rate⁴ of Rls 515 per U.S. dollar before the unification to the initial level of Rls 1,500 per U.S. dollar, appeared at first credible. This was evidenced by a virtual disappearance of the premium of the free nonbank rate in the period following unification and by the virtual stabilization of the official rate at about Rls 1,600 per U.S. dollar until October 1993. Subsequently, however, the floating rate began to depreciate at a faster pace to reflect the fall of the free nonbank market rate triggered by the expansionary financial policies and also by the unexpectedly low oil export prices. On December 21, 1993 the authorities discontinued the practice of determining the official rate on the basis of the free nonbank market rate, by fixing the official rate at Rls 1,750 per

³The free nonbank market rate during that period was legal. The main source of foreign exchange in this market was non-oil exports, which met the demand for foreign exchange related to most nonessential goods and services which were not eligible for the official rate.

⁴The weights refer to the estimated shares of transactions occurring at each exchange rate.

U.S. dollar.⁵ From that date until May 4, 1994, the spread between the official rate (at Rls 1,750 per U.S. dollar) and the free nonbank market rate widened steadily.⁶

On May 4, 1994 the authorities introduced a second official exchange rate, the "export rate" fixed at Rls 2,345 per U.S. dollar.⁷ The export rate applied to all non-oil exports and to a positive list of imports and service payments. The objective of introducing the export rate was to encourage non-oil exports and curb certain imports, while at the same time applying a more appreciated official rate to oil exports, imports of essential goods and services, and payments for official debts.

In the year following the introduction of the export rate, and due to high inflation and the impact on expectations of the announcement by the United States of tightened trade sanctions against Iran, pressures on the two official rates increased substantially as evidenced by the rapid depreciation in the free nonbank market (to as much as Rls 6,200 per U.S. dollar in May 1995). On May 20, 1995, the authorities raised the repatriation and surrender requirements for non-oil exports to 100 percent (from the 50 percent level that was implemented in February), except for a 30 percent exemption on the surrender requirement on receipts for carpet exports.⁸ During the same month, the export rate was also depreciated from Rls 2,345 to Rls 3,000 per U.S. dollar. The new rate was determined on the basis of three indicators—purchasing power parity, specific competitiveness of certain traded goods, and a market supply-demand model—as well as on the level of the free market rate in 1994.⁹ Also, imports of nonessential goods and services (except travel allowances) were effective at the export rate without being subject to administrative allocation of foreign exchange; imports effected at the export rate represent about 40 percent of total imports. The share of carpet export receipts which was exempt from surrender requirements as well as receipts from services and private transfers (which were also exempt), could be sold domestically, but only through the banking system making de facto the free nonbank market illegal. The parallel or offshore market rate depreciated gradually from a range of Rls 3,500–4,000 per U.S. dollar during May–December 1995 to a range of Rls 4,000–4,200 per U.S. dollar during January–July 1996.

⁵Concurrently, in support of the peg, the system of administrative allocation of foreign exchange has been reintroduced.

⁶To further support the fixed rate, additional restrictions were applied to current payments through a gradual tightening of the foreign exchange allocation mechanism. Also, Bank Markazi intervened in the free nonbank market (for authorized dealers), so that the rate in this market started to lag behind than in the offshore free market, which was free of any restrictions and was without any central bank intervention.

⁷For a few days, the "export rate" floated at a rate more appreciated by Rls 50 per U.S. dollar than the free nonbank market rate.

⁸The surrender of export receipts at the official export rate had to be effective within three months (six months for carpets) of shipment.

⁹The level of the free market rate in the more recent months was not considered relevant because special factors came into effect.

During the first half of 1996/97 the authorities implemented two changes involving the liberalization of the exchange and trade system designed to encourage exports. First, they extended the period between the date goods are exported and the date foreign exchange earnings must be repatriated to the banking system. In the case of carpet exports, this period was extended from six months to eight months; for other exports, it was extended from three months to five months. Second, the surrender requirement on export of carpets was eliminated in December 1996. During the period January-March 1997, there were no changes in either of the two rates set by the Bank Markazi. However, the import coverage of the more appreciated official floating exchange rate had been gradually reduced and a market for import certificates had been created through the Teheran Stock Exchange. In the parallel offshore market, the increased demand for foreign exchange by exporters (i.e., anticipated export repatriation) for importing from a newly expanded positive list of goods has contributed to a depreciation of the exchange rate from about Rls 4,200 per U.S. dollar in July 1996 to about Rls 4,800 per U.S. dollar in December 1996, a level that was roughly maintained throughout 1997.

In view of the relatively high inflation rate in Iran and the appreciation of the U.S. dollar, the fixed exchange rates appreciated by about 27 percent in real effective terms in 1996/97, and by an additional 11 percent during the first half of 1997/98. The authorities reacted by reducing the import coverage of the more appreciated official floating exchange rate, introducing a bonus system for early repatriation of non-oil exports, and permitted exporters to trade freely their import entitlements—the “right” to use a portion of their earnings for imports (100 percent for all exporters by March 1998)—at the Teheran Stock Exchange. At the end of 1997 these import entitlements were traded at about Rls 1,600 per U.S. dollar, and combined with the export exchange rate of Rls 3,000 per U.S. dollar implied a market exchange rate of Rls 4,600 per U.S. dollar.

B. Multiple Exchange Rates as Elements of Taxation and Market Segmentation

Any difference between the actual exchange rate and the equilibrium exchange rate can be viewed as involving a tax or subsidy on external transactions, with corresponding income redistribution effects. Multiple exchange rates imply a complicated subsidy/taxation system. As noted by Huizinga (1996), “multiple exchange rate practices, or any official selling or buying of foreign exchange at a rate different from the “equilibrium” rate, have long been recognized to be quasi-fiscal activities as they immediately impact on the public finances.” The use of appreciated exchange rates to provide subsidies to beneficiaries of imports¹⁰ and rent-seekers and taxes (on actual and potential exporters and on the central bank) involves significant redistribution effects that need to be addressed in case of unification of the exchange rate.¹¹

The maintenance of multiple exchange rates also require a set of exchange regulations and limitations on market arrangements in order to ensure that foreign exchange is surrendered and allocated according to the specified official rates that apply to different

¹⁰In the case of Iran the magnitude of the implicit import subsidy in 1997/98 can be estimated at 40 percent.

¹¹For an analysis of implicit taxes and subsidies and of the impact of unification on the fiscal position, see Agenor and Ucer (1995).

sources and uses of foreign exchange, and that transactions in the free market are kept segmented from those at official rates. Therefore, the unification of exchange rates also involves unification of exchange regulations and trading arrangements so that the new exchange rate regime is supported by an efficient and uniform regulatory and operational framework of exchange markets.

Such an implicit subsidy/taxation system involves many distortions that negatively impact on the performance of the economy (see below).

C. Developments in the Real Effective Exchange Rate (REER)

Definition/measurement of competitiveness

There is a vast amount of literature relating to the determination and the characteristics of the real exchange rate. While the exchange rate is a nominal magnitude that measures the relative price of monies, the real exchange rate measures the relative price of nontradable goods to tradable goods and is typically regarded as an indicator of competitiveness of the traded goods sector. An increase in the price of nontradables relative to tradables represents an appreciation of the real exchange rate. The real exchange rate is typically measured as a ratio of domestic to a foreign price, using broad-based price indices that include both traded and nontraded goods. The real effective exchange rate (REER) is a weighted real exchange rate index, with the weights assigned to trading partners and competitors of the local economy. If domestic prices increased while prices abroad were unchanged, this would raise the relative price of nontradables and the country's international competitiveness falls. However, if this decline (or increase) in relative price results from changes in the real conditions in the economy, such as technological changes, then the resulting equilibrium changes are consistent with macroeconomic balance and do not require policy intervention.

A depreciation of the REER induces a transfer of resources from nontradables to tradables and a switching of domestic consumption from tradables to nontradables. This increase in external competitiveness results in an improvement in the trade balance. It is therefore common for developing countries to try to maintain external competitiveness at a level that is consistent with a sustainable balance of payments position through financial policies, including exchange rate adjustments, that will bring about desired values of the REER. In light of the critical role of the exchange rate in maintaining external competitiveness, it is important that this rate remains close to equilibrium level. As the equilibrium real exchange rate is determined endogenously in response to accompanying financial policies and nonpolicy factors, the exchange rate policy should take into account the stance of these policies as well as the effect of various domestic and external shocks on this rate. This implies that the exchange rate regime should facilitate nominal exchange rate adjustments that, together with other policies, will achieve the macroeconomic objectives for inflation and competitiveness.

Empirically, it is difficult to identify good proxies for the price levels of traded and nontraded goods even in developed countries, although a number of different indices have been used in different countries. In developing economies, it is common to use the home country's CPI and the foreign country's wholesale price index (WPI), since the latter is a good proxy for the price of tradables and the former contains a large fraction of nontraded goods.

Treatment of multiple rates in the computation of REER

The real effective exchange rate to be used in the empirical model of the determination of the real equilibrium exchange rate to be developed in Section III should be based on a weighted average not only of the official exchange rates in Iran but also of the parallel market rate for the rial. For instance, under the present exchange rate system the weighted average exchange rate to be used for calculating the REER could be derived as follows:

$$e_s = \alpha_1 e_f + \alpha_2 e_x + \alpha_3 e_o$$

where: α_1 = the share of external trade transactions taking place at the official floating rate, e_f ;
 α_2 = the share of external trade transactions taking place at the official export rate, e_x ;
and
 α_3 = the share of external trade transactions taking place at the parallel market rate, e_o .

To the extent that these shares themselves are determined by the configuration of different rates in relation to equilibrium values, the simple weighted average formula could yield misleading results. Using the estimates of e_s together with price data for the domestic economy and data on both prices and exchange rates for trading partner countries, the REER can be computed as follows:

$$REER = (P * e_s) / \exp \left(\sum_{i=1}^n (w_i * \ln (P_i * e_i)) \right) * 100$$

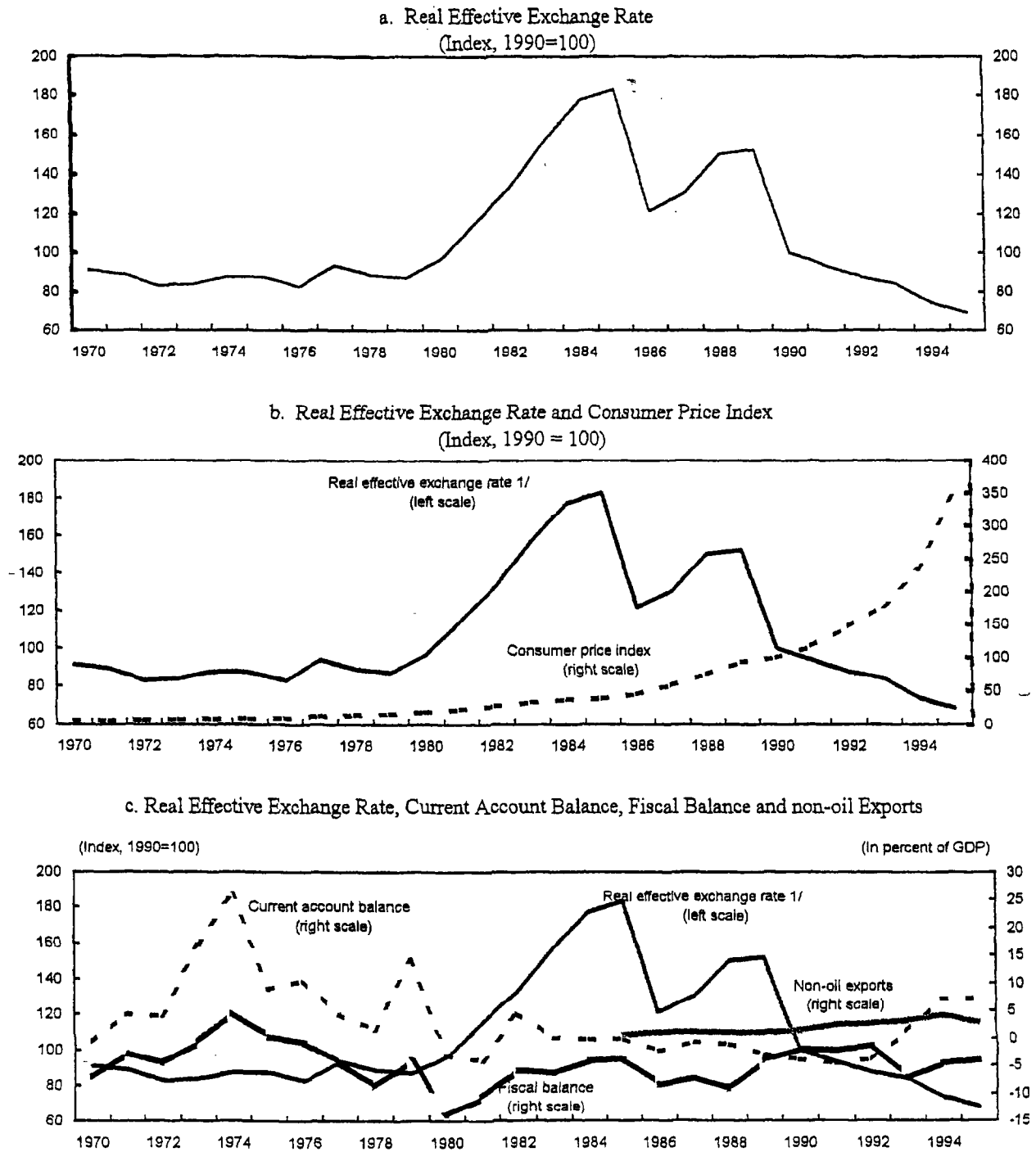
where P = Iran's consumer price index;
 P_i = consumer price index for the i th trading partner;
 e_i = trading partner exchange rate index;
 n = number of trading partners; and
 w_i = weight of trading partner.

The two expressions above indicate that the calculated REER is sensitive to the shares of external transactions taking place at the official floating rate, the export rate, and the parallel market exchange rate. These shares, in turn, reflect the restrictiveness of the regulatory regime.

The Real Effective Exchange Rate (REER) index—calculated by using the weighted official exchange rate—has shown major variations since the 1980s, in part, reflecting the shift in exchange regulations and exchange rate arrangements.¹² The index appreciated rapidly during the first half of the 1980s before it fell sharply in 1986/87 (Chart 1). It again appreciated sharply between 1987/88 and 1989/90, until the liberalization measures led to sharp depreciation in 1990/91. Since then the REER associated with the weighted official exchange rate has continued to depreciate. The depreciation since 1990/91 has taken place in spite of domestic inflation rates that are much higher than partner countries because of sharp devaluations of the official exchange rates in 1991 and 1993, and because of the shift of

¹²The weighted official exchange rate series is compiled by the Central Bank of Iran and is published in *International Financial Statistics (IFS)*. This rate is calculated on the basis of estimates of import transactions at the official floating rate and at the official export exchange rate.

Chart 1. Iran: Real Effective Exchange Rate, Consumer Prices, Current Account Balance, Fiscal Balance and Non-oil Exports, 1970-95



Sources: Iranian authorities; and staff estimates.

1/ Using official weighted average exchange rate.

transactions from the official rate (Rls 1,750) to the export rate (Rls 3,000). However, the exchange rate applied to transactions that have not been shifted to the export rate or to those that have remained at the export rate has appreciated continuously in real effective terms.

D. Impact of the Exchange Rate on the Macroeconomy: Review of Recent Developments

Current account, non-oil exports

Developments in the current account balance in Iran have displayed, some responsiveness to the developments in real effective exchange rate; however, the sensitivity of the current account to exchange rate variations has been mitigated, however, by the presence of significant trade and exchange controls that affect export competitiveness and import transactions (see Chart 1).¹³

The developments in non-oil exports broadly mirrored real exchange rate developments. In each of the fiscal years 1988/89 and 1989/90, non-oil exports averaged about US\$1 billion at a time when the REER was almost stable, but increased in 1990/91 by about 30 percent, and doubled in 1991/92 (see Chart 1). This strong non-oil export performance reflected, in part, the shift of a large amount of export transactions to the more depreciated floating rate, effective as of January 1991. The trade structure also changed during this period, as strong performance in the traditional non-oil export sector (carpets, fresh fruits, and pistachios) was reinforced by strong growth in some industrial goods (vehicles and textiles). More recently, reflecting the impact of the loss of competitiveness, non-oil exports fell sharply to US\$3.2 billion in 1995/96 from US\$4.8 billion in the previous year. In addition to the influence of the real exchange rate, the strong non-oil export performance was made possible by the restoration of productive capacity resulting from investments associated with the First Five-Year Development Plan and the reallocation of resources away from wartime activities.

Import performance primarily reflected the intensity of import restrictions that varied with the availability of foreign exchange. Imports surged from below US\$11 billion in 1988/89 to a level of over US\$24 billion in 1991/92, reflecting a relaxation of quantitative restrictions in the context of highly overvalued official exchange rates. Subsequently, in 1992/93, strong demand for consumer goods and expectations of a sharp currency devaluation boosted the demand for imported consumer products. On the other hand, developments in imports continued to be dominated by the government's policy of tightened import licensing. During the period between 1994/95–1995/96 following the reimposition of widespread trade and exchange controls in 1993/94, the value of imports plummeted, averaging about one-half of its level in 1991/92. However, an attempt was made to stem imports by shifting the importation of certain goods from the official rate of Rls 1,750 per U.S. dollar to the export rate of Rls 3,000 per U.S. dollar. In 1995/96, 34 percent of the total value of imports was affected at the more depreciated export exchange rate, compared to 19 percent in 1994/95.

¹³Further analysis of the factors influencing the current account balance will be developed in Section III.3 below.

Inflation

Exchange rate developments, among other factors, had a significant impact on inflation. The consumer price inflation decelerated sharply over 1988/89–1990/91, partly as a result of the reallocation of resources away from wartime activities, decelerating liquidity expansion, and a surge of private sector activity (see Chart 1). However, from 1991/92, inflation gained as a result of price and exchange liberalization efforts of the previous year, and of an expansionary wage policy, but also of the shift of some important transactions to the more depreciated rate. Unification of the exchange rate in 1993 and the subsequent temporary stability of the unified exchange rate was associated with a virtual stabilization of inflation (22.9 percent in 1993/94 compared to 24.4 percent in 1992/93). Subsequently, the creation of the export rate and its increasing significance, together with the monetization of losses due to exchange rate guarantee and a continued drift in the parallel exchange rate were associated with an increase of inflation. In annual average, inflation reached 49.4 percent in 1995/96 with a peak of 58.8 percent in May 1995 compared with May 1994.

More recently, however, the stability of the two official rates coupled with a lower rate of monetary growth translated into a lowering of the inflation rate: 18.1 percent in February 1997 compared to 43.0 percent in February 1996.

Fiscal balance

Iran's fiscal position is also highly sensitive to exchange rate developments (see Chart 1, page 64): (i) either directly through the exchange rate used to convert oil revenues into rials or that used for servicing external debt obligations; or (ii) indirectly through inflation developments and the monetization of quasi-fiscal losses in the central bank due to the provision of exchange rate guarantees on debt contracted at more appreciated rates.

These elements are illustrated in Table 2. In particular, the move to a unified and more depreciated nominal exchange rate in 1993/94 translated into a jump in the oil and gas revenues represented by a percentage of GDP from 7.7 percent in 1992/93 to 23.1 percent in 1993/94. This sharp increase would have been even greater had world oil prices not fallen to low levels in late 1993 and early 1994. At the same time, current expenditures surged to 28.6 percent. As the fiscal stance was not adjusted to reflect the impact of exchange rate losses and the fall in oil revenues, the deficit was allowed to grow from 1.2 percent of GDP in 1992/93 to 7.2 percent of GDP in 1993/94.

A symmetric impact is observed in 1995/96 where the stability of the official floating rate at Rls 1,750 per U.S. dollar at which oil revenues are converted into rials has contributed to the fall in budgetary oil and gas revenues in percentage of GDP forcing a more than proportional adjustment of the budgetary expenditures to meet the lower deficit objective.

Table 2. Iran: General Government Fiscal Operations (1991/92–1995/96)
(In percent of GDP)

	1991/92	1992/93	1993/94	1994/95	1995/96
Total revenue	16.7	18.5	31.0	26.1	24.7
<i>of which</i> : oil and gas	7.1	7.7	23.1	18.6	16.0
Total expenditure and net lending	18.9	19.7	38.2	30.5	28.4
<i>of which</i> : Foreign exchange obligations account and quasi-fiscal losses	0.0	0.0	14.0	6.6	5.0
Overall deficit	-2.2	-1.2	-7.2	-4.5	-3.8

Source: Bank Markazi Jomhuri Islami Iran and staff estimates.

III. DETERMINANTS OF THE EQUILIBRIUM EXCHANGE RATE AND THE TRANSMISSION OF EXCHANGE RATE POLICY

A. Determinants of the Equilibrium

Analytical definition of equilibrium exchange rate

The equilibrium real exchange rate (ERER) is defined as the relative price of non-tradables to tradables, given long-run sustainable values of other relevant variables such as tariffs, capital flows, and technology, that are consistent with the simultaneous attainment of equilibrium in the internal and the external sectors of the economy.¹⁴ The ERER is therefore not a single rate, but a path of exchange rates over time that is affected by the current and expected values of variables that affect internal and external equilibrium. These variables are known as fundamentals.

¹⁴One of the early definitions of equilibrium real exchange rate is based on the concept of the purchasing power parity (PPP), which is the rate that converts the cost of a given basket of goods at domestic prices to their foreign currency cost. According to this view, deviations from the PPP rate are eliminated by arbitrating commodity flows. However, this does not take into account the presence of tariffs and transport costs, and it implies that equilibrium real exchange rate will remain constant if there is no change in foreign prices. For definitions of the equilibrium real exchange rates, see Williamson (1983).

While there are several approaches to defining and estimating the equilibrium real exchange rate in this paper, the ERER is defined in a medium-term context based on the macroeconomic balance approach. This approach specifies the real equilibrium exchange rate as the value that yields internal and external balance in the medium term. More specifically, internal balance is usually defined as achieving potential output with stable inflation and requires that over the medium term national savings and investment, when output is at potential, are at levels that match foreign savings. External balance occurs when current and future current account (foreign savings) are consistent with sustainable capital flows. Combining these objectives with behavioral specifications for savings-investment balance and current account balance, a relationship can be derived that links the real exchange rate with other exogenous and endogenous variables, some representing the impact of fiscal, monetary, and structural policies. In this definition, given the fundamental determinants—both policy and non-policy factors—of savings, investment and the current account, equilibrium real exchange rate brings about a sustainable current account balance that matches the gap between savings and investment. The medium-term settings of these fundamentals are geared to be consistent with some notion of sustainable balance of payments deficit.¹⁵

Adaptations when exchange markets are segmented

In order to apply this approach to the case of Iran, adaptations are needed to reflect multiple exchange rates and other import and exchange controls. Multiple exchange rates may all be legal, or a combination of legal and illegal systems,¹⁶ but in both cases their economic effects are similar. Illegal rates appear when restrictions on transactions in foreign exchange at the official exchange rate that result in an excess demand at that exchange rate are introduced. For example, in attempting to insulate domestic prices from short-term shocks in the financial market, some developing countries including, as noted earlier, Iran, have adopted multiple exchange rate regimes in which certain current account transactions occur at one or more fixed exchange rates, while other transactions take place at a floating rate (the parallel market rate).¹⁷

The existence of market segmentation—multiple exchange rates and import rationing—means that shifts in exchange system regulations will influence the current account balance and the equilibrium real exchange rate. Therefore, the model of determination of the equilibrium exchange rate (discussed below) needs to take into account the impact of regulations that allocate foreign exchange at different exchange rates and intensity of import rationing. For instance, a shift in the allocation of imports of selected basic commodities from

¹⁵For a comprehensive discussion of macroeconomic balance approach to defining ERER, see IMF (1997).

¹⁶Illegal systems cover themselves with two types of situations: illegal but tolerated parallel rates or illegal rates with an active enforcement of the legislation forbidding transactions at nonofficial rates. While the economic consequences are similar, the magnitude of the premium on the parallel rate will vary positively with the intensity of efforts to enforce regulations.

¹⁷A typical multiple rate system that was used in several countries was to apply a single unified and fixed rate to all current account transactions, and a freely floating rate for all capital account transactions.

the present floating official rate of 1,750 rials per U.S. dollar to the exported rate of 3,000 rials per U.S. dollar will result in a depreciation of the REER. While this is captured in the weights applied to different domestic exchange rates for the rial in the computation of REER, other variables that signify the degree of restrictiveness could also affect REER (see below).

In Section II.C, we determined that the ideal REER to be used in the model below should be derived by use of the weighted exchange rate e_s . However, as there is no precise way of estimating the transactions in the parallel market, and because using a weighted average of only the two official rates would probably underestimate the level of the equilibrium exchange rate, the approach followed in the estimation process in Section III.B (below) is to analyze separately the REER obtained by using each of the three existing rates: e_f , e_x , and e_o , together with the weighted average of the two official exchange rates. The difference between an estimated equilibrium REER (i.e., the exchange rate obtained by projection of the fundamental factors derived from the macroeconomic balance approach discussed earlier) and the current level of the REER will indicate the extent of the misalignment of that exchange rate. The actual equilibrium exchange rate would be expected to be in the range defined by the projections of the REER equations estimated using the official weighted average and that using the parallel exchange rate.

B. The Model

Algebraic presentation

The conceptual framework begins with the standard national accounting identity as follows:

$$Y = C + I + G + X - M \quad (1)$$

and rearranged as

$$(Y - C - G) - I = X - M. \quad (2)$$

Introducing the fiscal deficit (FISC) as government expenditures on goods and services (G) and transfers (TR) less taxes (T):

$$FISC = G + TR - T \quad (3)$$

gives:

$$(Y + TR - T - C) - FISC - I = X - M. \quad (4)$$

Equation (4) states that the savings investment balance is equal to the current account (X-M). While this is simply a definitional identity, a structure for the model can be elaborated by specifying the determinants of savings, investment, and the current account in the specific context of Iran.

The current account balance CAB (with $CAB = X - M$), in the case of Iran, is best analyzed by splitting it into its oil and non-oil components.

$$CAB = CAB_{oil} + CAB_{nonoil} \quad (5)$$

where the oil component (net exports of oil and oil products) is determined mainly by the exogenously determined price of oil and the rate of extraction of oil (ROIL), and by the external demand factors affecting export sales. A rise in the real price of oil (POIL) will result in a larger current account. Approximating the external demand factors by the gap between actual and potential output of trading partners abroad (GAPF), we can specify

$$CAB_{oil} = CAB_{oil} (POIL, ROIL, GAPF, \dots). \quad (5a)$$

The nonoil current account balance can be specified as

$$CAB_{nonoil} = CAB_{nonoil} (FISC, E, TOT, NFA, KCON, ECON, GAP, GAPF, \dots). \quad (5b)$$

The fiscal adjustment reflected in the fiscal balance variable could influence the current account either directly through its impact on public sector purchases of imported goods, or indirectly through the effects of fiscal policy on savings, investment and growth. Direct effects are captured in equation 5b.

An appreciation of the exchange rate (E) will increase the cost of nontradables to tradables, resulting in a worsening of the current account position, while an improvement in the non-oil terms of trade (TOT) will result in a larger current account surplus. In addition, if prices are sticky, then output is determined by demand factors in the short run, and may not be equal to potential output. The current account surplus will be lower, the greater the difference between the actual and potential output (GAP), and conversely for the foreign output gap (GAPF). The ECON variable represents exchange controls and trade restrictions, while the KCON variable represents capital controls. A tightening of exchange controls and trade restrictions will increase the demand for nontradables relative to tradables, leading to an immediate improvement in the current account balance (and resulting in an appreciation of the real exchange rate). An increase in capital controls may reduce capital inflows and expenditure on both imports and nontradables resulting in an improvement in the current account balance. The level of net foreign assets could influence the intensity of exchange controls and restrictions, as a means to build up NFA to desired levels and thereby influence the current account. Thus, the current account balance can be written by summing equations 5a and 5b as follows:

$$CAB = CAB (E, TOT, POIL, NFA, KCON, ECON, GAP, GAPF, \dots). \quad (5)$$

Savings are positively determined by the level of real interest rates π , which in the Iranian economy varies almost entirely with inflation, since nominal rates are changed infrequently.¹⁸ The effects of excess demand pressures on savings can also be captured by the

¹⁸Rate of return and rates of charge are determined, in the Islamic banking system, by ex ante rates of return on investments and various profit sharing arrangements. In practice, ex post rates are seldom changed.

inclusion of the money supply variable (M2).¹⁹ The empirical evidence strongly supports the existence of a positive impact on monetary factors on savings. Fiscal consolidation will increase public sector savings, as well as national savings. Demographic factors (DEM) are also important in intertemporal saving behavior. For instance, when a large part of the population is in the labor force (or a low dependency ratio), the savings rate is higher. The savings equation can be written as follows:

$$S = S(\pi, FISC, GAP, M2, DEM, \dots). \quad (6)$$

Similarly, the investment equation can be written as:

$$I = I(\pi, PROD, GAP, K, \dots), \quad (7)$$

where the productivity variable PROD is introduced as a determinant of investment. The stock of capital is inversely related to the rate of return to capital and the level of investment. Thus, for developing countries with low levels of capital stock (K), the rate of return to capital and the rate of investment would be high. Combining the expressions for savings, investment, and the current account balance, we can rewrite equation (4) in the following way:

$$S(\pi, FISC, GAP, M2, DEM, K_{-1}) - I(\pi, PROD, GAP, DEM, K_{-1}) = CAB(E, PROD, POIL, TOT, NFA, ECON, KCON, GAP, GAPF). \quad (8)$$

The above equilibrium condition can be rewritten to express the real exchange rate as a function of other underlying determinants of savings, investment, and the current account balance. By using the long run or the desired values of these other determinants, different measures of equilibrium real exchange rate can be computed.

To derive an equilibrium exchange rate, it can be assumed that fiscal policy is adjusted for cyclical factors or modified to a desirable level, possibly one that prevents the ratio of government debt to GDP from increasing, and other determinants are then set at medium-term levels that eliminate the effects of temporary variations or cyclical factors. For example, output gaps at home and abroad are set at zero. Using the adjusted or medium-term settings of the variables, equation (8) can be respecified as:

$$S(\pi, FISC, DEM, M2) - I(\pi, PROD) = CAB(E^*, TOT, POIL, NFA, KCON, ECON), \quad (9)$$

where E^* denotes the desired equilibrium exchange rate corresponding to the medium-term settings of the other (policy and non-policy) variables that equate medium-term savings-investment gap with the desired current account balance. Equation (9) can be re-written to express the desired real exchange rate equation as a function of other fundamental variables that operate through their impact on internal and external balance in the following way:

¹⁹The real interest rate is dropped from the estimation process, since inflation is captured by the M2 variable.

$$E = f(\text{FISC}, \text{TOT}, \text{POIL}, \text{PROD}, \text{M2}, \text{NFA}, \text{KCON}), \quad (10)$$

(signs) + + + + + - +

Such an equation can be estimated using the actual values of real exchange rates and their determinants so as to capture the long-term relationship, and the estimated equation together with desired values of the determinants can then be used to compute the desired or targeted real exchange rate. Hence, one can arrive at the extent of possible misalignment of the exchange rate in relation to its fundamentals. The rationale of the real exchange rate equation can be illustrated by examining the impact of various fundamentals.

Terms of trade shocks can influence the equilibrium real exchange rate through its effects on relative prices, as well as its effects on fiscal balance (FISC). A positive terms of trade shock causes the output of nontradables to fall, resulting in an excess demand in this sector and cause an increase in relative price of nontradables (Chart 2). The external balance will also improve, reflecting the need for an appreciation of the exchange rate. Also, a positive terms of trade shock will lead to an increase in government revenues and a fiscal surplus, which will also require an appreciation in the exchange rate.

The relative price of traded goods is a principal determinant of goods and nonfactor services component of the current account. The current account, in turn, follows the determinants of national savings and investment and since one of the major components of national savings is the fiscal balance (FISC), it follows that the fiscal balance is strongly related to the relative price component of the real exchange rate. In the traditional Mantel-Fleming two-country model, fiscal consolidation, which increases national savings, would reduce real interest rates and depreciate the real exchange rate, resulting in a current account surplus.²⁰ This model, however, does not take into account the effects of stock implications of the initial current account imbalance. On the other hand, the portfolio balance models (Frenkel and Mussa, 1988) account for the stock implications of the initial fiscal consolidation. In this case, the current account is balanced in the long run, at which point interest earnings from net foreign assets are offset by a corresponding trade imbalance. A permanent fiscal consolidation (an increase in FISC) will lead to an increase in net foreign assets and an appreciation of the real exchange rate in the long run.

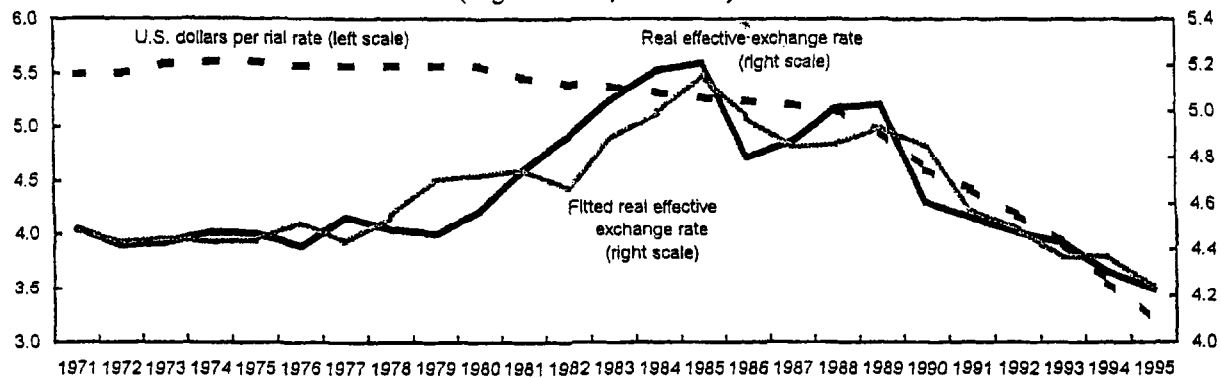
The real price of oil (POIL) is also included as one of the fundamental variables that will determine the long-term equilibrium exchange rate because of its effects on the relative price of traded goods as well as on the budget balance (Chart 3). In the case of an oil exporter such as Iran, it is expected that a rise in real price of oil would lead to an appreciation of the domestic currency.

Changes in productivity (PROD) will also affect the equilibrium real exchange rate (see Chart 2). An increase in the productivity of the traded goods sector relative to the nontraded goods sector will expand the traded goods sector at a faster rate. The resulting excess demand for traded goods will require an appreciation of the exchange rate in order to maintain equilibrium. The positive productivity shock results in an improvement in the trade balance, and this also requires a real appreciation of the exchange rate in order to maintain the trade account at a sustainable level.

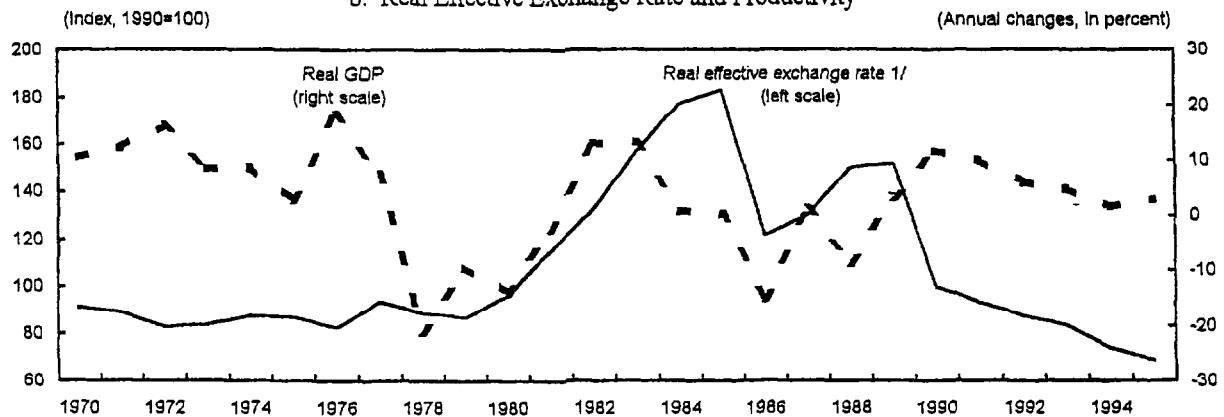
²⁰ For further reading see Fleming (1962) and Mundell (1968).

Chart 2. Iran: Actual and Fitted Real Effective Exchange Rate, Bilateral Exchange Rate, Productivity, and Terms of Trade, 1970-95

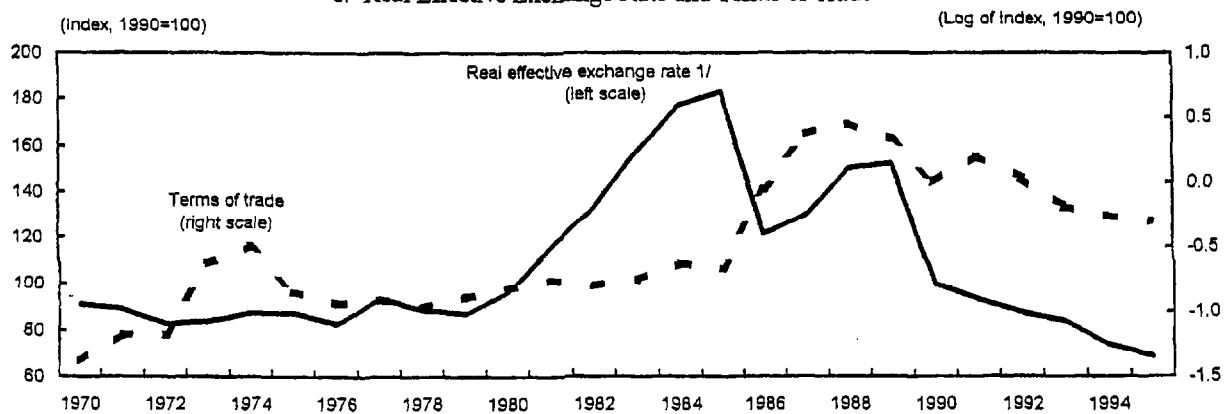
a. Actual and Fitted Real Effective, and Bilateral Exchange Rates 1/
(Log of Indices, 1990=100)



b. Real Effective Exchange Rate and Productivity



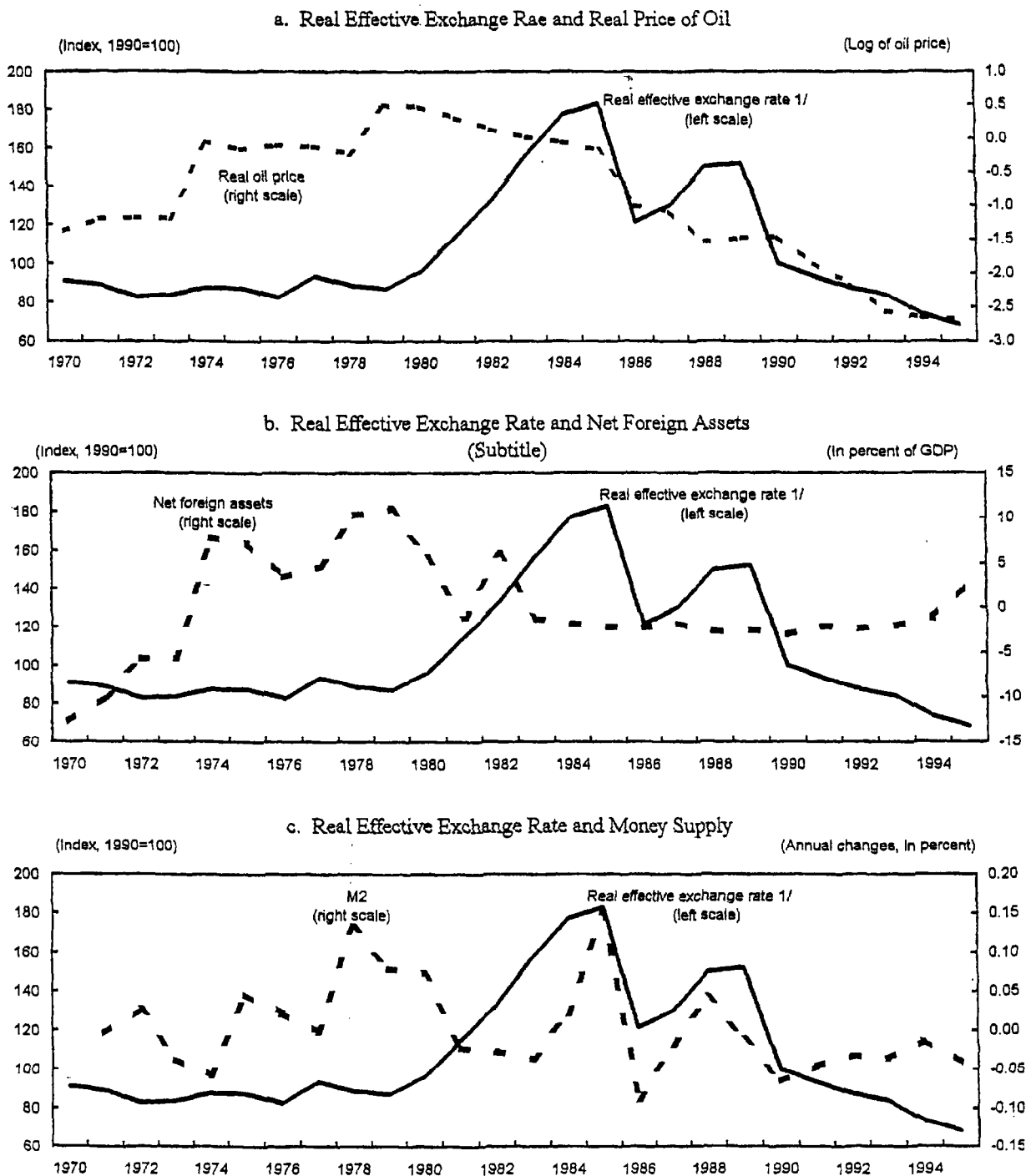
c. Real Effective Exchange Rate and Terms of Trade



Sources: Iranian authorities; and staff estimates.

1/ Using official weighted average exchange rate.

Chart 3. Iran: Real Effective Exchange Rate, Real Price of Oil, Net Foreign Assets, and Money Supply, 1970-95



Sources: Iranian authorities; and staff estimates.

1/ Using official weighted average exchange rate.

Finally, changes in policies affecting the exchange system or changes in capital controls (KCON) can affect the real exchange rate. In the latter case, a relaxation of capital controls that results in increased capital inflows will increase the levels of both imports and nontradables. Since foreign prices are given, only domestic prices will respond to the increased demand, and consequently the real exchange rate will appreciate. If the relaxation of capital controls result in net outflows on account of larger external debt service payments or capital flight, then the real exchange rate will depreciate.

We need to introduce an important refinement to the above discussion in order to adapt the model to the special characteristics of the Iranian economy. In Iran, fiscal balance is highly sensitive to the price of oil, several fundamental variables influencing the real exchange rate, and the real exchange rate itself. The major dependence of budgetary revenue on oil receipts and trade related taxes, and the large exchange rate sensitivity of certain expenditure components, such as subsidies on account of certain imported products and debt service payments (the latter reflecting exchange rate guarantees) suggest the following specification.

$$FISC = FISC(REER, POIL, TOT, ECON, PROD, DISCPOL) \quad (11)$$

For instance, an appreciation of REER will sharply increase the fiscal deficit (reduce FISC), as nontradables (the prices of which are rising faster than those of tradables) constitute a much larger share of government expenditures; an appreciation of nominal rate will raise fiscal deficit by reducing the revenue from oil exports and trade taxes by more than the offsetting reduction in exchange rate sensitive expenditures. Clearly, an increase in the real price of oil and productivity will reduce the fiscal deficit. Exchange restrictions that reduce imports will raise the fiscal deficit by lowering customs revenues. Finally, discretionary adjustments in fiscal policy (DISCPOL) play a critical role in an oil producing economy, such as Iran, to offset the major vulnerabilities of the fiscal balance to exogenous shocks, particularly the price of oil and exchange rate based subsidies.

On substituting equation (11) into equation (10) we can eliminate FISC, and write

$$E = E(DISCPOL, TOT, POIL, PROD, M2, NFA, ECON, KCON). \quad (12)$$

The endogeneity of FISC (i.e., the dependence of FISC on REER) needs to be recognized in estimating the real exchange rate equation (10). In contrast, by including only the discretionary fiscal policy component, the problem of simultaneity bias can be overcome in estimation.

Data

The annual data series covers the period 1970–1995. Four different versions of the real effective exchange were estimated. In all cases, the real exchange rate REER calculations include the CPI-based series that is published in the International Financial Statistics (IFS) on a monthly basis. Four different nominal exchange rates are employed as follows: the official floating exchange rate, the export exchange rate, the weighted official exchange rate, and the parallel market exchange rate. The "official floating" rate and the official weighted exchange rate are obtained from IFS, and the "export" rate and the parallel market rate were obtained from the authorities. The trade weights of partner countries, and the exchange rates and consumer prices of partner countries are estimated by the IMF. The REER variable is

expressed in logarithms in all four cases. An increase in the exchange rate shows an appreciation. The terms of trade variable TOT is calculated by dividing the export price index by the import price index (both of these indices as obtained from IFS) relative to a similar variable for Iran's trading partners (calculated by the IMF). The productivity variable PROD that is required is the difference between productivity in Iran and its trading partners, but these data are proxied by the growth rate of GDP in Iran. The variable FISC is the ratio of fiscal balance to GDP as published in IFS, and DISCPOL is calculated as the non-oil fiscal balance to GDP ratio. The real price of oil POIL is the nominal price of oil as calculated by the IMF divided by the import price of Iran obtained from IFS and the World Economic Outlook (WEO). The variable NFA is the net foreign assets of the banking system and M2 is money plus quasi-money; these data were obtained from IFS. Both variables are shown as proportions of GDP, and they indicate the impact of monetary policies on the REER. The KCON variable is the short-term capital inflows item in the capital account of the balance of payments. These data were obtained from IFS for the period 1976–95 and from the WEO of the IMF for the period 1970–75. Finally, the variable CAB is the current account of the balance of payments, but it is derived from IFS as the difference between the exports and imports of goods and services in the gross domestic expenditures. These data are, in essence, the current account of the balance of payments converted into rials by the national accounts compilers in Iran. A non-oil current account series was constructed by substituting oil export receipts from the current account balance.

The stationarity properties of all variables were examined, since the fundamentals are required to have the same order of integration as the REER. If the real exchange rate is stationary then the fundamentals should also be stationary. On the other hand, if the exchange rate is nonstationary, then a stationary variable cannot be a fundamental. This is because the exchange rate is drifting stochastically away from its mean and cannot be affected in the long run by a variable that reverts to its mean. In addition, nonstationary variables should be analyzed by use of cointegration methods. The univariate statistical properties of the variables are shown in Table 3 below. The existence of a unit root cannot be rejected for LREER, LTOT, NFA, POIL, and M2.²¹ The latter four variables are included as fundamentals in the cointegration analysis shown below. We then test for the existence of a relationship between the set of fundamentals and the real effective exchange rate using the Johanson cointegration test (Table 4). In the unrestricted VAR, we included lagged values of the REER, the fundamentals (LPOIL, LTOT, NFA, and M2), FISC, PROD, and a dummy variable for the collapse of oil production in the immediate post revolution period (1979–81).

²¹The operator L indicates that the variable is a logarithm.

Table 3. Iran. Univariate Statistical Properties

Variable	Trend	Lags	ADF	ADF on first difference
LREER	No	1	-1.316	-3.391 ^{2/}
FISC	No	0	-2.905 ^{1/}	...
PROD	No	0	-3077 ^{2/}	...
LTOT	No	0	-1.791	-3.878 ^{3/}
LPOILPM	No	0	-1.633	-5.485 ^{3/}
NFA	Yes	0	-2.799	-5.300 ^{3/}
M2	No	0	-1.351	-4.005 ^{3/}

1/ Rejection of unit root at 10 percent confidence level.

2/ Rejection of unit root at 5 percent confidence level.

3/ Rejection of unit root at 1 percent confidence level.

Table 4. Iran. Johansen Cointegration Test

Eigenvalue	Likelihood Ratio	5 percent Critical Value	1 percent Critical Value	Hypothesized No. of CEs
0.677856	77.03933	68.52	76.07	None ^{2/}
0.560005	49.85318	47.21	54.46	At most 1 ^{1/}
0.453120	30.14939	29.68	35.65	At most 2 ^{1/}
0.430451	15.66475	15.41	20.04	At most 3 ^{1/}
0.085875	2.154917	3.76	6.65	At most 4

1/ Denotes rejection of the hypothesis at 5 percent significance level.

2/ Denotes rejection of the hypothesis at 1 percent significance level.

Likelihood Ratio (LR) test indicates 4 cointegrating equation(s) at 5 percent significance level and one cointegrating vector at 1 percent significance level.

Methodology

In this section we employ a cointegration analysis to seek out whether a long-run relationship exists between the real exchange rate and the fundamental variables. Such a long-run relationship can be written as follows:

$$E_t = x_t B + z_t, \quad (14)$$

where x_t = vector of fundamentals;
 B = vector of cointegrating coefficients; and
 z_t = error term.

The following cointegration test explores whether a relationship exists between the real exchange rate and the fundamentals. Once such a relationship is established, we test for the significance of each variable in the cointegrating vector. The exchange rate will not deviate for long from the fundamentals, implying that the error term z_t should be stationary. This exercise will be conducted for four different versions of REER, calculated by employing the real exchange rate, the official floating rate, the export rate, the weighted official rate, and the parallel market rate.

We also examine the short-term dynamics of the real exchange by modeling the following error correction mechanism (ECM):

$$dE_t = a z_{t-1} + \sum b_i dE_{t-1} + \sum c_i dx_{t-1} + \sum f_i ds_{t-1} + g_t \quad (15)$$

The above equation shows that the change in the real exchange rate is affected by past deviations from equilibrium, its past changes, and past changes in the fundamentals and other short term factors, s_t .

Results

The results of the estimation of the REER equation, where the weighted official exchange rate was used in calculation of the dependent variable indicate a long run relationship between the real exchange rate and the economic fundamentals as follows:²²

$$\text{LREER} = 4.14 + 0.15 \text{LTOT} + 0.04 \text{LPOIL} + 2.08 \text{M2} + 0.65 \text{DISCPOL} - 0.43 \text{DUMMY}. \quad (16)$$

(s.e.) (0.25) (0.07) (0.04) (0.39) (0.40) (0.08)

²²The weighted official exchange rate does not provide a good basis for calculating the REER, since it does not take into account the weight of imports at the parallel market rate. Further, it includes a weight for transactions in refined oil imports at Rls 70 per U.S. dollar, while the latter should be calculated at Rls 1,750 per dollar.

The coefficients shown above display the expected signs. The macroeconomic policy variables included in the equation are money supply M2 and discretionary fiscal policy DISCPOL. The positive sign of the money supply variable M2 indicates that an expansive monetary policy under a fixed exchange rate regime will lead to inflation in which the price of nontradables increases at a faster rate than import prices, resulting in a deterioration in the current account and a reduction in international reserves, consequently the real exchange rate will appreciate. The impact of the fundamentals is strengthened by the inclusion of a dummy variable for the collapse of oil production during 1979–81.

The terms of trade variable LTOT is included in the equation to measure the effect of commodity shocks. The coefficient of this variable has a positive sign, indicating that an improvement in the terms of trade would result in an appreciation of the equilibrium exchange rate. The LPOIL variable has a similar impact on the real exchange rate for oil producing countries such as Iran. Finally, the positive sign that is displayed for the FISC variable is consistent with the assumption of portfolio balance models that suggests that fiscal consolidation will lead to an appreciation of the exchange rate. This result has very important implications for exchange rate policy in Iran, since the magnitude of a necessary devaluation to regain loss of competitiveness of the exchange rate may be reduced to the extent that the authorities are able to achieve fiscal consolidation.

Alternative relationships were also derived between the REER and the fundamentals, in cases where the dependent variable was based (alternatively) upon the official floating exchange rate ($REER_o$), the export rate ($REER_x$), and the parallel market rate ($REER_p$). In the case of $REER_p$, the dependent variable $LREER_p$ was found to be stationary, as well as the

FISC, NFA_{dt} , and $dM2$ variables. The estimated equation relating to the parallel market rate is as follows:

$$LREER_p = 5.57 + 0.48 FISC - 0.01 NFA_{dt} - 0.39 dM2 - 0.70 DUMMY \quad (17)$$

(s.e.) (1.77) (2.18) (0.02) (1.07) (0.23)

In this case the coefficients of the FISC and NFA had the expected signs. The positive sign displayed by the FISC variable is consistent with the result obtained in equation (16) that fiscal consolidation will lead to an appreciation of the real exchange rate.

$REER_o$ and $REER_x$ do not reflect the depreciation in recent years as shown by the REER based on the weighted exchange rate (reflecting the shifting of transactions from the official to the export rate). The results of these two estimated equations are summarized in the equations below.

$$LREER_o = 5.31 - 0.10 LTOT + 0.36 LPOIL - 0.02 NFA + 1.02 M2 + 0.56 DISCPOL - 0.52 DUMMY \quad (18)$$

(s.e.) (0.27) (0.08) (0.06) (0.008) (0.40) (0.53) (0.09)

$$LREER_x = 5.60 - 0.11 LTOT + 0.60 LPOIL - 0.03 NFA + 0.82 M2 - 0.35 DUMMY \quad (19)$$

(s.e.) (0.69) (0.37) (0.18) (0.02) (1.23) (0.24)

We also estimated the short-run adjustment by use of the ECM in the case of the REER derived from the weighted official exchange rate. The ECM helps to explain deviations of the actual exchange rate from the estimated long run. The error term of the cointegrating equation (at one percent significance level in Table 4) is included in the right-hand side of the ECM, in addition to current and past differenced fundamentals and other variables (FISC and PROD) that affect the real exchange rate in the short run.

$$\begin{aligned} dLREER = & -0.10 - 0.34 z1_{t-1} + 0.16 dLREER_{t-1} + 0.29 dLTOT_{t-1} + 0.41 dDISCPOL \\ & (s.e.) \quad (0.06) \quad (0.20) \quad (0.23) \quad (0.14) \quad (0.47) \\ & - 0.66 dM2_{t-1} + 0.10 dLPOIL_{t-1} - 1.66 FISC + 0.005 PROD - 0.04 DUMMY \quad (20) \\ & (0.80) \quad (0.08) \quad (0.97) \quad (0.005) \quad (0.16) \end{aligned}$$

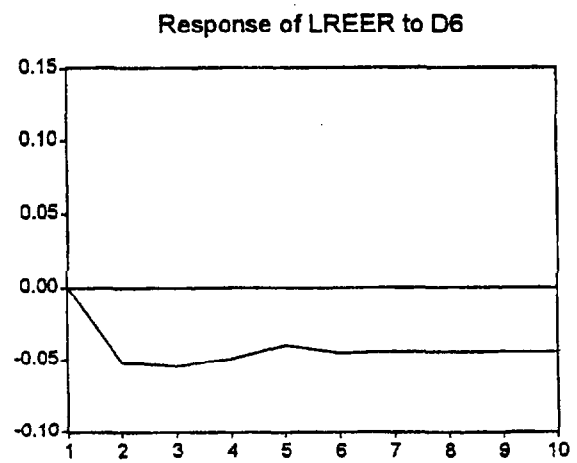
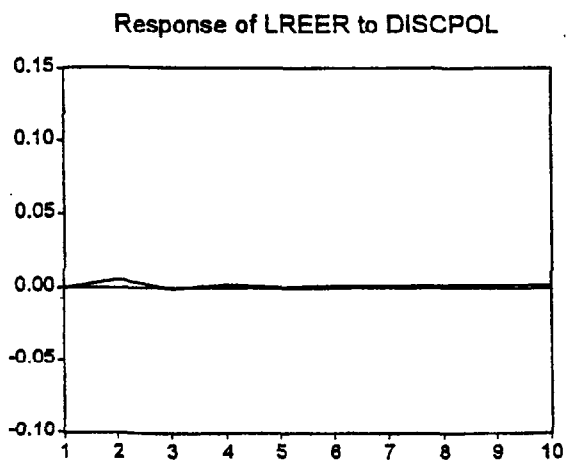
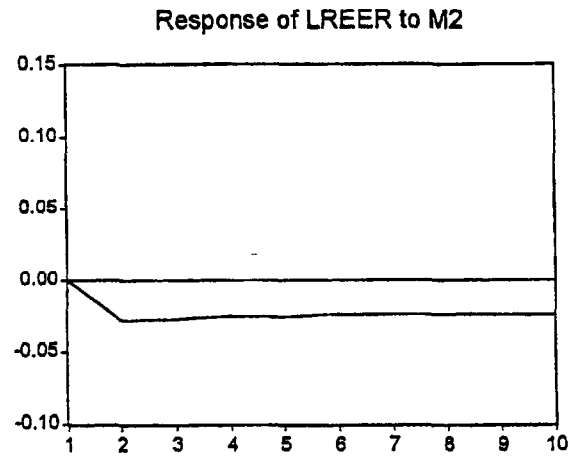
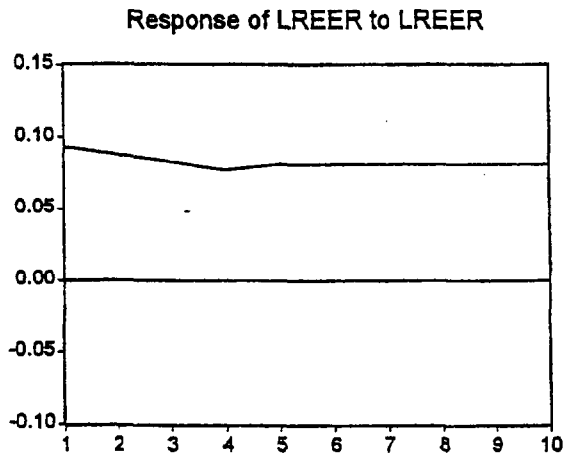
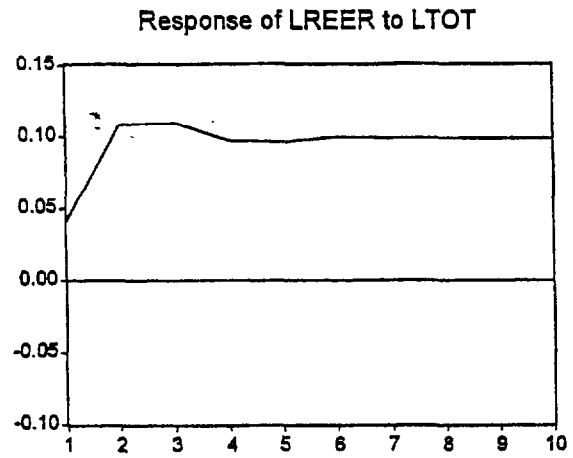
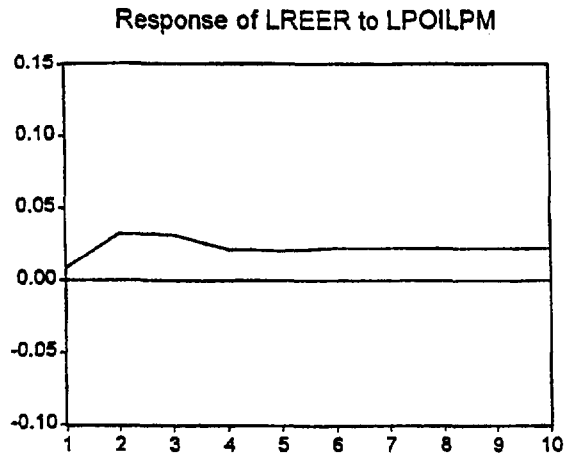
The coefficients of the M2 and FISC variables do not have the expected signs, but these are only first period effects. The negative coefficient of the M2 variable reflects the monetary expansion associated with deficit financing of government, unlike the longer term positive impact (associated with inflation) on the exchange rate that is displayed above. The positive impact of the real price of oil on the fiscal balance is established in equation (22) below, and the positive impact of the fiscal balance on the external current account is shown in equation (21) below (both of these impacts also having long-run positive impacts on the real exchange rate). The impulse response of the real effective exchange rate to shocks in underlying fundamental variables are displayed in Chart 4. The variable ordering that is reflected is LPOILM, LTOT, LREER, M2, and DISPOL. This ordering is intended to reflect the relative exogeneity of the series, starting with a shock from the international crude oil price through its impact on the terms of trade, to its impact on net foreign assets and the real exchange rate, and their combined impacts on domestic liquidity. The positive impacts of the price of oil and the terms of trade on the real exchange rate are maintained in the very long term. The REER impact remains positive in the long term, but is reduced after two years, while the M2 impact remains negative in the long term. In general, the short-run exchange rate dynamics in response to a shock do not appear to be very strong, but the impact of a shock is likely to last for a very long time.

C. The Transmission of Exchange Rate Policy

The impact on the non-oil current account balance

It was shown above that the policies and exogenous shocks affected the real exchange rate through the fiscal balance that influenced the savings-investment gap or the current account that affected the demand for tradables. We will now estimate the impact of the fiscal balance and other fundamentals on the current account. The current account is influenced by the determinants of the national savings and investment, which in turn affect the real exchange rate. Since the fiscal balance is an important component of national savings, it should have a strong direct effect on the current account and possibly also an indirect effect through the real exchange rate. In the case of Iran, as we are primarily concerned with the issue of competi-

CHART 4. Iran: Response to One S.D. Innovations



tiveness, it is useful to estimate a non-oil current account balance equation. The results of the cointegration analysis are as follows:

$$\text{CAB}_{dt} = 0.04 + 0.35 \text{ FISC} + 0.003 \text{ NFA}_{dt} + 0.04 \text{ DUMMY} \quad (21)$$

(s.e.) (0.08) (0.25) (0.003) (0.03)

The coefficient of FISC has the expected sign, showing that fiscal consolidation will result in a permanent increase in the current account surplus (which will in turn allow for an appreciation in the exchange rate).

The impact of the exchange rate on the fiscal balance

In most oil producing countries, a depreciation of the nominal exchange rate normally translates into an improvement in the budget position (by removal of at least part of the implicit subsidy that overvaluation represents). In contrast, in the case of Iran, as shown in Table 5, the unification of the two official exchange rates at the current export rate of Rls 3,000 per US dollar does not have a positive impact on the budget mainly because of the extent of the exchange rate guarantees implicitly provided on most of the external debt service. In addition, the fiscal loss is substantially larger when retail prices of basic goods are not adjusted to reflect the new import prices. However, as the unified exchange rate is further depreciated, the fiscal loss incurred becomes gradually smaller due to the positive impact of valuation of the share of the oil revenues that are currently sold at Rls 3,000 at the new exchange rate.

This rough estimate of the fiscal impact of unification implies that unification would have to be accompanied by further fiscal discipline. Two approaches would be highly advisable: either passing through to consumers and corporations part of the burden, or cutting both current and capital expenditure. The latter approach may be facilitated by the sizable increase in both current and capital expenditure in 1997/98. As regards the former point, a crucial decision for the policy maker is to determine the extent of the subsidy represented by the multiple exchange rate that should be eliminated. Given the social consequences that the elimination or reduction of subsidies on some commodities may have, it is advisable that these measures be accompanied by a comprehensive review of the social safety net and by increased targeting of the remaining subsidy on the most vulnerable segments of the population. In addition, the policy toward government guarantees of external debt service should be modified to encourage a redistribution of exchange rate risks toward enterprises and banks.

The impact of the REER on the fiscal balance can also be observed by estimating the following equation:

$$\text{FISC} = -0.03 \text{ dLREER} + 0.05 \text{ dLPOIL} + 0.001 \text{ PROD} - 0.02 \text{ DUMMY} \quad (22)$$

(s.e.) (0.03) (0.01) (0.0006) (0.02)

All of the coefficients of the above equation have the expected signs. The impact of the real price of oil is strengthened by the inclusion of a dummy variable for the collapse of oil

production during 1979-81. Of most importance, this equation confirms the results in Table 5 that an appreciation of the exchange rate in Iran will worsen the fiscal balance, and a depreciation will improve the fiscal balance.

Table 5. Impact of an Exchange Rate Adjustment on the Fiscal Balance^{1/}

	Unified Exchange Rate Assumed ^{2/}		
	Rls 3,000	Rls 4,000	Rls 5,000
	(In billions of Rials)		
Impact on:			
1. Oil and gas revenues	11,800	28,000	44,200
2. Other tax revenues ^{3/}	900	1,600	2,300
3. Subsidy on basic commodities:			
if full pass-through	0	0	0
if no pass-through	-5,000	-9,000	-13,000
4. Other current expenditure	-1,100	-2,000	-2,900
Capital expenditure	-4,150	-7,500	-10,800
5. Quasi-fiscal losses			
Rescheduled debt	-5,000	-9,100	-13,100
LCs	-3,500	-5,900	-8,400
Oil prefinance	-1,250	-2,250	-3,250
6. Total			
if full pass-through	-2,300	-2,850	8,050
if no pass-through	-7,300	-6,150	-4,950

Source: Staff estimates.

1/ Estimate made on the basis of 1997/98 budget data; results may vary significantly with other base years.

2/ For illustrative purposes.

3/ It is assumed that half of the effect of the valuation of imports at Rls 3,000 per U.S. dollar instead of Rls 1,750 will be compensated by a drop in tariffs.

D. Impact on the Banking System

Unifying the two official exchange rates and further depreciating the official rate to reach the equilibrium real exchange rate level may have significant adverse implications on the commercial banks. While the Bank Markazi will profit from the depreciation of the exchange rate through a revaluation of its net foreign assets due to surrender requirements, commercial banks may be indirectly adversely affected through a possible degradation of the financial health of borrowers. Depending on the magnitude of this impact, recapitalization of the commercial banks will have to be implemented with a negative impact on the fiscal position (public sector banks). A similar fiscal effect occurs, if the financial health of enterprises are protected by extending subsidies to cover the impact on enterprise debt service of exchange rate changes (in the form of partial or full exchange rate guarantees). From an approach that passing the exchange risk to enterprises deals with the consequences for the banking system, this is more efficient as it prevents moral hazard and improves resource allocation.

E. Magnitude of Supply Response

While the adoption of a more realistic exchange rate would strengthen competitiveness of Iran's economy and growth prospects in the tradables sector, the supply side response would be more complete if exchange rate depreciation were to be supplemented by wide-ranging structural reforms covering, among other factors, liberalization of the domestic price system, of the trade system, and of the labor and investment regimes. A relaxation of restrictions on foreign direct investment—like the constraints on repatriation of profits and capital gains—would also enhance the private sector supply response.

IV. CHOICE OF EXCHANGE RATE REGIME

The term exchange rate regime refers to an operational framework for exchange rate management, commonly classified as fixed or pegged at one extreme, and fully flexible at the other, with various forms of managed systems in between. Indeed, managing the exchange rate seems to be the revealed preference of most developing countries, including in some cases through multiple rate systems. An operational framework for exchange rate management can be viewed as consisting of three components: (i) operating or intermediate targets (for exchange rates or international reserves or interest rates or money supply); (ii) indicator variables to guide the targets; and (iii) policy instruments (e.g., intervention rules, monetary policy instruments).²³

²³In practice, however, the distinction between targets and indicators is not exact. Even if the central bank has a specific exchange rate target, it may view a number of other variables as particularly important (monetary aggregates, level of reserves, etc.) for day-to-day decision making.

In this section, general considerations and country experiences relating to the choice of exchange rate regime are presented, and this, together with the findings of earlier sections are then used to discuss the choice of appropriate exchange rate regime for Iran.

A. The Need for Unification

Usually the introduction of an official dual (or multiple) exchange rate (Lizondo 1987, Kiguel and O'Connell, 1995) intends to prevent international reserves from being depleted by persistent excess demand in the foreign exchange market and to limit the inflationary impact of exchange rate adjustments. In a fixed unified exchange rate as in the exchange rate regime introduced in Iran in 1993, the central bank must be willing and have the required amount of foreign exchange (at a given set of interest rates/fiscal policy stance) to meet the excess demand (or supply) for foreign exchange at the official rate. Introducing a second and more depreciated exchange rate (often coupled with a tightening of exchange restrictions) is a way to stem in the short term the outflow of official reserves when excess demand for foreign exchange continues. However, international experience shows that the effectiveness of this technique is limited and short-lived. In particular, the maintenance of overly expansive monetary/fiscal policies after the introduction of multiple exchange rates will continue to feed the expectations of the private sector for a subsequent devaluation and encourage over-invoicing of imports and under-invoicing of exports together with capital flight in the parallel market. The introduction of a dual exchange rate can also, in the short term, limit the consequences of external shocks on domestic prices. But, as noted by Kiguel and O'Connell (1995) "such systems, however, are most effective during the first six to nine months of the crisis; the degree of price insulation decreases significantly after that. Complete separation of two foreign exchange markets become difficult to enforce, and the parallel rate becomes more important in determining prices."

The limited and temporary effectiveness of multiple exchange rates explains their elimination by all industrial countries and their maintenance by only a limited number of developing countries.²⁴ They have also been largely abandoned because of the inefficiencies they involve (Agenor 1992, El-Erian 1994, and Kiguel and O'Connell, 1995). These regimes can severely distort economic incentives and impose costs on the economy by misallocating production and consumption resources. The distortions derive from two main sources:

- distortions in foreign exchange allocation due to the underlying exchange regulations and exchange restrictions that give rise to multiple rates and segmented markets; and
- distortions in relative prices due to the subsidies and taxes implicit in the multiple exchange rate system.

²⁴As of December 1997, only 7 countries maintain multiple exchange rate regimes. See the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions, 1997*.

In addition, the shift of authorized transactions to other segments of the multiple exchange rate regime could have uncertain monetary and fiscal effects, and hence raise the uncertainty, or cause instability, in the real exchange rates. Finally, experience shows that the system tends to be abused even when enforced through strict but costly and distortive controls. The rise in illegal activity that results from attempts to garner rents in current account transactions will also spread to other areas of economic activity like tax evasion in the fiscal sector (see Argentina example in Kamin, 1992).

In view of these inefficiencies, Fund surveillance over exchange rate policies has generally discouraged multiple exchange rate systems. However, Fund jurisdiction—e.g., the requirement of Fund approval under Article VIII—applies only to multiple currency practices relating to current account transactions that are officially sanctioned (and that are not maintained under the transitional provisions of Article XIV). For example, a parallel market to which authorities do not relegate transactions, and hence is illegal (even if tolerated), does not give rise to multiple currency practice subject to Fund jurisdiction. Nevertheless, economic inefficiencies of official trade, exchange and capital restrictions continue to exist, even if the resulting parallel markets are illegal and not officially sanctioned. As a result, Fund surveillance has often included a close monitoring of parallel market premiums.²⁵

A shift to unified exchange rate regime will eliminate the distortions noted above, and help foster a competitive and efficient foreign exchange market. For this to occur, however, the unification has to be supported by structural fiscal adjustments and improvements in the social safety net to compensate for the effects of elimination of taxes and subsidies implicit in the multiple rate system, an appropriate policy and operational framework for monetary and exchange management that is consistent with the macro economic objectives, and structural reforms to strengthen exchange markets and progressively liberalize exchange regulations. The rest of the section deals with issues in choosing and managing such a framework for monetary and exchange policy management.

Finally, the elimination of the official dual exchange rate regime would, everything being equal, leave intact the distortions created by the existence of an unofficial offshore exchange rate. Arguments similar to those presented above would make the case for an early move toward current account convertibility and ultimately toward full convertibility of the rial.

B. The Choice of Exchange Rate Regime and Concomitant Policies—General Issues

The purpose of an exchange rate regime is to guide the nominal rate adjustments in such a way that the level of the real effective exchange rate is consistent with the fundamentals, and with the underlying macro objectives for inflation and balance of payments. In light of the key conclusion of the previous section that the appropriate level of REER and its medium-term path depend upon the mix of monetary, fiscal, and structural policies that underpin the

²⁵See Galbis (1996) for a recent discussion of Fund policies to deal with multiple currency practices.

medium-term evolution of inflation, balance of payments and productivity growth, the choice of exchange rate regime should be considered in the broader dynamic context of designing the monetary policy framework, fiscal systems and objectives, and the supporting structural policies.

A convenient way to consider the exchange rate regime is to view it as consisting of a band around a moving central parity. The decisions that need to be made then consist of how to adjust the central parity, how wide to make the band around the parity, and how to intervene within the band. The use of very wide bands with no intervention within the band amounts to fully flexible rates, while a fixed parity with very narrow bands amounts to fixed or pegged exchange rate regimes. The distinction between fixed and pegged is important from an operational perspective: the central bank can either directly set the market exchange rate and stand ready to meet whatever excess demand results (fixed), or manage the rate indirectly by targeting a specific level through market operations (pegged). The closer the policy is to a fixed or pegged exchange rate regime, the greater the burden on domestic interest rates and/or the money supply (with supporting fiscal stance) to adjust to shocks in order to achieve balance of payments/inflation objectives.

More generally, the choice of exchange rate regime is closely linked to the choice of monetary policy framework, because the policy and operational aspects of monetary or interest rate management directly influence, and are influenced by, the exchange rate regime.²⁶ The central bank can determine only one nominal variable the level of a monetary (or credit) aggregate M , the interest rate I , or the exchange rate e . A flexible exchange rate regime typically corresponds to the choice of M as a policy variable with the exchange rates and interest rates adjusting to equate aggregate supply and demand. In the flexible regime, the authorities can also set the interest rate and allow the exchange rate and money supply to be endogenously determined. Alternatively, when the exchange rate is chosen as a policy anchor, as in fixed or pegged exchange rate regime, M and I become endogenous, and any disequilibrium in the domestic money market would be eliminated, in part, through the balance of payments and a separate targeting of M , or I , would not be feasible. Of course, when there are strong impediments to capital mobility, or when domestic and foreign assets are not perfect substitutes, separate objectives could be pursued for monetary and exchange rate policy; however, the existence of parallel exchange market as a conduit for private capital movements, and the increasing integration with world financial markets, would limit the scope for separate monetary and exchange policies in the medium term; as a result, monetary aggregates, exchange rates and interest rates cannot all be fixed by the monetary authorities.

Specific choices of policy targets by the authorities would however be dictated by the types of shocks affecting the economy. The standard prescription is that domestic real (goods-markets) shocks call for exchange rate flexibility, while domestic nominal (money-market) shocks call for fixed exchange rates. Thus the nature of the likely shocks could influence the

²⁶See Guitián (1996) for a discussion of policy and operational aspects of exchange rate regimes, including the coordination of exchange rate and interest rate policy.

authorities' focus on the exchange rate or money/interest rate as the targets for policy. More specifically, the choice of exchange regime determines the mechanisms through which the shock is transmitted in the domestic economy, thereby influencing the achievement of the desired mix of macroeconomic objectives. For example an increase in domestic money demand could raise real interest rates and cause inflows of capital, or substitution from foreign to domestic assets; this could, under fixed exchange rate, lead to larger foreign exchange reserves, monetary expansion and inflation, partly offsetting the initial increase in real interest rates (an offsetting expansionary effect). In contrast, under flexible rates, exchange rate will appreciate, inflation will slow, and domestic real rates could remain high (causing a contractionary effect), and output growth and balance of payments will weaken.

This analysis suggests that the choice of exchange rate regime will be influenced by the relative priority attached to inflation and competitiveness objectives of the authorities, as well as the type of shocks affecting the economy. In addition to the types of macroeconomic shocks and policy priorities, a host of structural and institutional features could also influence the choice of monetary and exchange rate regimes, as argued below. While the ultimate objective of monetary and exchange arrangements is achieving and maintaining some concept of price stability, the nominal anchors for the arrangements could differ. The policy anchor could be the exchange rate, or it could be the control of some monetary aggregate, or direct targeting of inflation or nominal income. In the latter cases, exchange rates would be more flexible, and the extent of flexibility—as well as the extent of discretion in nominal exchange rate adjustment—would vary according to the time varying mix of inflation and balance of payment objectives. (See Box 1 for country examples of exchange rate regimes and nominal anchors).

Several structural features of the economic system also play an important role in the choice of exchange rate regime. These include: (i) the extent of openness of the economy; (ii) the state of development of foreign exchange and domestic money/securities markets; (iii) technical capacity of the central bank to undertake policy analysis to support discretionary regimes; and (iv) the need to gain policy credibility from markets—given a history of inconsistent policies—by adopting rule-based regimes (e.g., currency boards). In addition, initial conditions such as high and unsustainable external and domestic public debt that strains the confidence in the sustainability of domestic financial policies, and fragility and unsoundness in domestic banking system also limit the scope for rule-based regimes generally, including fixed exchange rate systems.

Box 1: Exchange Rate Regime and Nominal Anchor

In some countries with **explicit inflation targeting**, the authorities have permitted temporary departures from the pre-established inflation targets (e.g., Canada and New Zealand) or have allowed for sufficiently wide inflation target bands (e.g., the United Kingdom) in order to give room for nominal exchange rate adjustments that would preserve competitiveness in the face of external shocks.

In countries with **multiple objectives**, the exchange rate plays a key indicator role in the conduct of monetary policy, and the exchange rate regime has been used in many of them to balance the inflation and real exchange rate (competitiveness) objectives. For example, several countries use a crawling band regime (e.g., Chile, Israel, Poland, and Colombia) to pursue both a disinflation objective and a real exchange rate objective. In Chile, monetary policy seeks to achieve an inflation target by using real short-term interest rate as an operating target, while pursuing the real exchange rate objective by adjusting the nominal exchange rate within a band around a preannounced path based on the targeted real exchange rate. This band was recently widened (from ± 7 percent to ± 10 percent around the midpoint) to allow for real exchange rate appreciation in the face persistent capital inflows.

Several countries which use **exchange rate as nominal anchors** (e.g., Argentina and Hong Kong, which operate a currency board, Egypt and Gulf Cooperation Council (GCC) countries, where central bank stands ready to buy and sell foreign exchange at given quoted rates, and the Netherlands which maintains a narrow (2.25 percent) band in the exchange rate mechanism of European Monetary System), continue to use monetary policy actively to ensure that interest rates are at a level adequate to achieve the desired exchange rate target. Thus, although monetary policy cannot be independent under a fixed rate regime, it still plays a fine-tuning role for facilitating prompt and smooth interest rate adjustments, and fostering smooth functioning money markets. The sustainability of such fixed/pegged exchange rate systems require, in addition to monetary policy tools to manage money and exchange markets, structural policies to foster rapid productivity growth, efficient labor market and wage and price flexibility, and prompt fiscal adjustments to influence domestic real interest rates and real exchange rates.

V. CHOICE OF EXCHANGE RATE REGIME FOR IRAN

The empirical analysis of Section III shows that the Iranian economy has been subject to large variability in the real exchange rate, reflecting the corresponding variability in both domestic (fiscal deficits and inflation) and external (real price of oil and terms of trade) factors. At the same time, the paramount importance of promoting non-oil exports requires that real exchange rates are kept in line with fundamentals by managing exchange rates as needed, while also reducing inflation (and containing fiscal deficits) to ensure adequate domestic savings in support of growth and diversification. There is strong empirical evidence that the rate of inflation is a major determinant of domestic savings in Iran.²⁷ Thus the reduction in inflation is critical to sustain competitiveness and growth. The need to pursue the dual objectives—further reduce inflation, and maintain appropriate real exchange rate

²⁷El-Erian et al.

targets—can be best achieved, by a managed peg regime or managed fixing—for example, as in Chile—with a band around the central parity which is wide enough to deal with potential short-term variability in the fundamentals and to accommodate the disinflation objectives. The variability of fundamentals is fairly substantial—as seen from the comparison with a sample of countries in Table 6— and this would also require moderately wide bands around central parity.²⁸ For example, the presence of sizeable terms of trade and real oil price shocks may call for real appreciation or depreciation from time to time. The dominance of such real shocks calls for some flexibility of exchange rate to cushion the impact on domestic output and supplies. In addition, the still nascent state of money and exchange and securities markets in Iran could, however, limit the scope of interest rate management in support of exchange rate objectives, and this factor might also require an exchange regime, where the parity is set and adjusted by the authorities, but within wider bands initially. Moreover, the objective of preserving competitiveness given the moderately high levels of inflation at present, suggests that prompt adjustments in central parity in line with prospective inflation differentials—together with firm stance of stabilization policies to ensure the achievement of inflation targets—would provide greater certainty to non-oil exporters, and facilitate forward planning and investment in the non-oil sector. While the needed monetary policy instruments and institutional arrangements for targeting inflation are not yet available in Iran, a preannouncement of the prospective adjustments in central parity in line with inflation expectation of the authorities could serve as a nominal anchor to reduce inflation in steps.

Table 6. Comparison of Variability of Fundamentals between Iran and Selected Countries 1/

	Iran	Colombia	Venezuela	Pakistan
Real effective exchange rate	0.06	0.06	0.06	0.07
Terms of trade	1.02	1.15	0.95	0.98
Money supply	0.27	0.16	0.25	0.11
Real price of oil	1.12
Discretionary fiscal policy	0.44	0.16	0.14	0.10

Source: Staff estimates.

1/ Variability is estimated as the standard deviation divided by the mean.

²⁸Delgado and Dumas (1991) argue that size of band around central parity is a cubic function of variability in fundamentals.

VI. CONCLUDING REMARKS

While the operational modalities of such a managed peg regime, and the associated monetary arrangements, deserve detailed consideration, the overall financial policy and operational framework that would need to be set in place or developed over time to support the proposed exchange regime can be summarized as follows:

- fiscal consolidation consistently within a medium-term framework;
- progressive adoption of more flexible, market-based instruments of monetary policy coupled with the adoption of a monetary policy stance resulting in progressive reduction in inflation and a positive real rate of returns for depositors;
- elimination of multiple rates, progressive relaxation of exchange regulations, and structural reforms to strengthen interbank foreign exchange markets; and
- setting up indicators and operating targets for exchange rate management to underpin the managed peg regime, while developing progressively market-based instruments of exchange market intervention.

Appropriate operational sequencing of reforms mentioned above would necessarily begin with the unification of exchange rates as part of a stabilization package, and a host of other institutional and operational reforms would then be phased in to sustain the unification and support the chosen exchange rate regime.

References

- Agénor, Pierre-Richard, 1992, "Parallel Currency Markets in Developing Countries: Theory, Evidence, and Policy Implications", *Princeton Essays in International Finance*, No. 188 (November).
- Aghevli, Bijan B., Mohsin S. Khan, and Peter J. Montiel, 1991, "Exchange Rate Policy in Developing Countries: Some Analytical Issues", IMF Occasional Paper No. 78 (Washington: International Monetary Fund).
- Clark, Peter, Leonardo Bartolini, Tamim Bayoumi, and Steven Symansky, 1994, "Exchange Rates and Economic Fundamentals", IMF Occasional Paper No. 115 (Washington: International Monetary Fund).
- Delgado, Francisco and Bernard Dumas, 1991, "Target Zones Big and Small", *NBER Working Paper*, No. 3601.
- El-Erian, Mohamed, 1994, "Multiple Exchange Rates: The Experience in Arab Countries," *Finance and Development* (December) pp. 29–31.
- Fleming, J. Marcus, 1962, "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates" *Staff Papers* (Washington: International Monetary Fund).
- Frenkel, Jacob and Michael Mussa, 1988, "Exchange Rates and the Balance of Payments" in *Handbook of International Economics*, Edited by R. Jones and P. Kenen, (Amsterdam: North Holland).
- Galbis, Vicente, 1996, "Currency Convertibility and the Fund: Review and Prognosis" Working Paper (Washington: International Monetary Fund).
- Gutián, Manuel, 1996, "Policy and Operational Aspects of Exchange and Interest Rate Coordination," paper prepared for the 21st SEANZA Central Banking Course, Kunming, China (Unpublished).
- Huizinga, Harry, 1996, "The Taxation Implicit in Two-Tiered Exchange Rate Systems," IMF Working Paper, No. 96/120 (Washington: International Monetary Fund).
- Kamin, Steven B., 1992, "Multiple Exchange Rate Systems: The Case of Argentina" in "Approaches to Exchange Rate Policy: Choices for Developing and Transition Countries", edited by Barth, Richard C. and Chorng-Huey Wong (Washington: International Monetary Fund).

- Kiguel, Miguel and O'Connell, Stephen A., 1995, "*Parallel Exchange Rates in Developing Countries*," *The World Bank Research Observer*. Vol. 10, No. 1 (February): pp. 21–52.
- Lizondo, J. Saúl, 1987, "Unification of Dual Exchange Markets", *Journal of International Economics* (Netherlands)
- Lizondo, J. Saúl, 1991, "*Alternative Dual Exchange Market Regimes: Some Steady-State Comparisons*," *Staff Papers*, Vol. 38, No. 3 (September): pp. 560–581 (Washington: International Monetary Fund).
- Mazarei, Adnan, 1995, "*The Parallel Market for Foreign Exchange in an Oil Exporting Economy: The Case of Iran, 1978–1990*", Working Paper (Washington: International Monetary Fund).
- Mundell, Robert A., 1968, "International Economics" (New York: Macmillan)
- Sherwood, Joyce, 1956, "*Revenue Feature of Multiple Exchange Rate Systems: Some Case Studies*," Working Paper No. 5, pp. 74–107 (Washington: International Monetary Fund).
- Ugolini, Piero, 1996, "Crawling Exchange Rate Bands Under Moderate Inflation", Operational Paper of the IMF/Monetary and Exchange Affairs Department. (Washington: International Monetary Fund).
- Williamson, John, 1983, "*The Exchange Rate System*" Institute of International Economics, Policy Analysis and International Economics Series 5. Cambridge Mass.: MIT Press.
- Zinnes, Clifford F., 1993, "*Causes and Effects of Exchange Rate Misalignment in Zambia*" Development Discussion Paper No. 462, Harvard Institute for International Development.