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Macroeconomic Framework for an Oil-Based Economy

The Case of Bahrain

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and
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Alternatives available to an oil-dependent economy with excessive producer and consumer subsidies and possibly misaligned currency.

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This paper — a joint product of the Transition and Macro-Adjustment Division, Policy Research Department, and the International Trade Division, International Economics Department — was prepared as background material for Bahrain's Country Economic Memorandum. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Anna Maranon, room N11-025, extension 31450 or Maria Teresa Sanches, room S7-022, extension 33731 (April 1993, 56 pages).

Bahrain's economy is characterized by producer and consumer subsidies and, possibly misaligned currency. These subsidies have resulted in lower savings rates than would be consistent with the country's endowment in oil and gas. In addition, the misaligned real exchange rate has encouraged imports, at the same time creating incentives biased against the non-oil tradable sectors. So, Bahrain's economy remains largely dependent on a rapidly depleting hydrocarbon resource base.

Elbadawi and Majd espouse a macroeconomic consistency framework to focus on the behavior of Bahrain's economy along two paths.

Path one is based on the assumption that the government's present macroeconomic policy will continue. In that case, the solution exhibits bubbles — fiscal and current account imbalances that would be unsustainable over time. Meanwhile, real appreciation of the dinar would suppress non-oil exports. As a result, the need for foreign borrowing would be more pressing. In an attempt to restore the equilibrium, the government would need to contain aggregate demand by compressing imports and investment, thereby worsening the economic situation.

Path two is based on a reform strategy that includes policies to raise the domestic savings rate, improve the fiscal situation (by rationalizing expenditures and introducing income taxes and cost recovery measures), and correct the misaligned exchange rate.

The results show that the expenditure-switching effect of the exchange rate alignment would shift resources in favor of the tradable sectors. Non-oil GDP and exports would register high growth rates while economic diversification, in the context of a growing and more dynamic economy, would foster investment efficiency. This would help Bahrainis maintain a high standard of living as the oil income dries up, without too much loss of consumption for the present generation.

MACROECONOMIC FRAMEWORK FOR AN OIL-BASED ECONOMY: THE CASE OF BAHRAIN

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I. INTRODUCTION

The current Bank view on the policy framework, adopted by Bahrain, is that it is characterized by the absence of taxation, excessive producer and consumer subsidies, and a misaligned currency. Such policies have resulted in two major problems for Bahrain. First, it precipitated considerably lower national saving rates than what would be consistent with Bahrain's nonrenewable resource endowment in oil and gas. If the current extraction rate continues, it is expected that the country's oil resources will dry out in the next fifty years or so.[1] Second, the misaligned real exchange rate has encouraged excessive imports, and hence lower savings, and more importantly it created a structure of incentives that are biased against the tradable non-oil domestic manufacturing and services sectors. As such, the initial drive at economic diversification is substantially retarded and Bahrain's economy remains to a large extent dependent on a rapidly depleting hydrocarbon resource base. For example over the period 1986-90, oil and gas contributed almost 70 percent of the total exports, over 60 percent of the total government revenue, and more than 18 percent of GDP. Furthermore, oil influences the non-oil GDP through its effect on government revenue and value added in the services sector.[2]

From the above it is clear that a reform strategy for Bahrain must include, as its key component, measures to raise the national saving rate to the level that allows maintaining a reasonably high standard of living in the post-oil era. On the part of the government this will require an improved fiscal effort and rationalized expenditure, especially current expenditure. In addition to more aggressive tax[3] and cost recovery measures, an appropriate macroeconomic policy, aiming at the exchange rate, will be required to generate higher private

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[1] The reserves from the on-shore fields is expected to last for only fifteen years if the current extraction rate of 42,000 b/d is maintained. This leaves the off-shore Abu Saafa oil field which is expected to remain productive over the next fifty years at the present extraction level of 72,000 b/d.

[2] Further discussion of the recent developments of Bahrain economy follows in Section III of this paper.

[3] Perhaps it is pertinent to emphasize the desirability of direct taxes such as the income tax as opposed to indirect taxes as foreign trade which negatively affect the traded goods sector.

investment and savings, thereby enhancing the growth of the non-oil tradable sector.

The objective of this paper is to address the above mentioned issues in the context of a macroeconomic framework which is developed specifically to capture the fundamental ingredients of a depletable resource-based economy such as Bahrain. In so doing, a macroeconomic (RMSM-XX) model[4] is devised with emphasis on the role of government to raise national savings, adjust the real effective exchange rate, and introduce other trade and fiscal policy measures to generate incentives for the private sector in order to achieve higher income and investment with minimal cost to private consumption.

Section II includes a brief discussion of the recent macroeconomic developments in Bahrain. In section III, the structure of the macroeconomic accounting framework will be given and its key components will be discussed. In addition, Section III contains a description of the behavioral equations and the model 'closure' rules. The estimation results are provided in section IV and Section V contains simulation and the model solution. Finally, some concluding remarks are given in Section VI.

[4] The RMSM-XX model represents the most recent generation of the World Bank macroeconomic modelling. The model integrates a behavioral core into a flow-of- funds consistency framework in addition to closure rules.

II. MACROECONOMIC DEVELOPMENT

Bahrain's economy has been predominantly dependent on the hydrocarbon and aluminum exports and in more recent years on the financial capital, characterized by the advent of numerous commercial and off-shore banking. The outgrowth of the services sector, dominated by the government economic activities, is a direct consequence of the oil revenues and should be viewed as peripheral, because in the absence of oil these activities would substantially decline.

II.1. Hydrocarbon and Aluminum Sectors.

During much of the 1980s, the oil production from Bahrain's onshore Jebel al Dukhan field has been more or less constant, remaining at about 15 million barrels per year (b/y). The production from the Abu Saafa field, on the other hand, has gained a modest increase of about 3 millions b/y since 1984, from about 24 millions b/y in 1984 to more than 27 millions b/y in 1990. Meanwhile, refinery output increased by 2.3 millions b/y, mainly due the large volume of the Saudi Arabian crude whose share in the total crude destined for the refinery is about 80 percent (the corresponding local crude share is 20 percent). The refined petroleum products exports were 2.7 percent higher in 1990 as compared with 1989. Meanwhile, the domestic oil consumption increased by 2.3 percent in 1990 to more than 3 millions b/y.

Contrary to the deficient performance of the oil exports, the gas and aluminum production and exports have been remarkable in recent years. Total production of BANAGAS increased by 6.5 percent in 1990 while ALBA's net production and exports respectively were about 12 percent and 18 percent higher in 1990 over 1989.

II.2. Production and Prices

During 1988-1990, real GDP growth declined continuously and reached 1.2 percent in 1990. Much of the contraction in the GDP growth rate was due to the dwindling performance of the services sector, mainly by sharp dips in the value added of the sectors such as transport and communication as well as finance and

real estate. Also, the recessionary conditions inflicted other sectors such as fishery, quarrying, and other services. On the other hand, other producing sectors such as agriculture and manufacturing registered positive growth rates.

During the period 1985-90, domestic consumption as a percentage of the GDP rose rapidly from about 54 percent in 1985 to almost 62 percent in 1990, mostly as a result of the contraction in the GDP. Over the same period, the fixed capital formation ratio fell to about 27 percent in 1990 from 35 percent in 1985. In addition, the overall price levels in Bahrain remained more or less in check during 1985-90.

II.3. Money and Banking

The second Gulf crisis has caused serious financial difficulties among the GCC members. While GCC banks have emerged reasonably well from the crisis, some 32 out of 59 Gulf banks reported a lower return on equity in 1990 compared to 1989. Accordingly, 11 banks reported losses of which 7 were Bahraini offshore banks. The impact to the Bahrain's commercial banks has also been severe as the net foreign assets of these banks plunged by more than $500 millions in 1990. The decline of the net foreign assets for the Bahrain Monetary Agency (BMA) was also estimated around $100 millions.[5]

The monetary aggregates in Bahrain are highly influenced by movements of government oil revenue. Therefore, the liquidity expansion in general moves in accordance with the oil market fluctuations. In the present recessionary period the government expenditure levels appear to have been maintained by recourse to the banking sector. In 1990, the government borrowing from the banking system increased by about BD 76 millions.

However, an accurate evaluation of the monetary developments is hampered by a combination of factors such as the openness of the economy and the inadequacy of the data. In addition, the existence of an unusually heavy

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[5] BMA is equivalent of the central bank for Bahrain.

extrabudgetary expenditures compounds the situation. It is also onerous to make a meaningful analysis of the monetary data as an input to government finances because the definition of government in the fiscal accounts is different from the one in the monetary accounts. The latter were expanded in 1984 to include public enterprises for which data are not available in the fiscal accounts. The government accounts only deals with the fiscal activities of the central government. For our present purposes, an attempt has been made to separate the central government accounts from those of public enterprises. This distinction is based on sporadic data for some 29 public enterprises.

II.4. Government Finances

Bahrain does not have any meaningful tax system. Direct and indirect taxes are virtually nonexistent and the bulk of government revenue arises from oil and gas receipts. Trade taxes levied are around 10 to 20 percent with the exception of alcoholic beverages for which there is a 120 percent tax rate.

Throughout the late 1980s, the government deficit has been high. In 1990, it reached around 9 percent of the GDP. The share of the oil receipts in total government revenue declined to about 61 percent in 1990 from about 70 percent in 1985. During the same period, the overall budget position deteriorated mainly as aresult of increases in the government current expenditures and large deficits in net extrabudgetary operations, forcing the authorities to scale back capital expenditures. Consequently, the share of capital expenditures in the GDP fell from around 12 percent in 15 to about 8 percent in 1990.

III. THE MACROECONOMIC MODEL

The RMSM-XX model for Bahrain is an integrated system which encompasses (1) a series of accounting identities and projection rules, (2) a system of behavioral equations, and (3) the 'closure rules' which determine the choice of the residual variables that satisfy the accounting identities.

The accounting identities form a consistency framework which involves assembling the macroeconomic statistics into a flow-of-fund format: any source of funds for one sector is a use for another sector. This ensures that the budget constraints for all economic sectors are simultaneously satisfied.

The behavioral module is developed based on interactions between the goods market and an integrated asset market composed of high-powered money, domestic debt, and foreign debt. In the goods market, it is assumed that the economy produces two goods: the domestic good which is an imperfect substitute for international goods and export goods, including oil. In the asset market, the foreign and domestic assets are assumed to be imperfect substitutes for the private sector.

The relative price of the domestic goods with respect to the foreign goods (the real exchange rate) and the real rate of interest are inversely related to maintain the equilibrium in the goods market. In this specification, a real depreciation creates excess demand for domestic goods which must be offset by a rise in the real interest rate to lower private investment. Since domestic prices are determined in the asset markets, the nominal exchange rate should be viewed as an endogenous variable.

The equilibrium in the asset market is achieved by adjustments in domestic prices and the real interest rate in the high-powered money and the domestic debt markets. The foreign asset market must clear, by Walras's law, as the other markets clear. For practical purposes, the asset market are assumed to always balance.

Finally, the 'closure rule' determines the choice of the residual variable(s). There are two options. The first option, referred to as the 'private closure', is the one in which the private sector is treated residually

as in the traditional RMSM, i.e., the behavioral equation for private consumption is replaced by the requirement that private saving and consumption balance the national accounts identity. The second option, referred to as the 'fiscal closure', replaces an exogenously determined public investment by a residual variable that balances the national accounts identity. For the case of Bahrain, we will opt for the fiscal 'closure rule'. As will be explained later, the 'fiscal closure' rule seems more appropriate, given the question at hand. Accordingly, the model will be solved recursively for residual variables for a set of user-specified "target values" for the real exchange rate, real interest rate, and the inflation rate.[6]

Figure 1 shows the main ingredients of RMSM-XX for Bahrain.

III.1. Accounting Identities

The accounting identities ensures consistency in the data as the budget constraints for all economic sectors are satisfied simultaneously. Each budget constraint consists of two statements: current and capital, respectively of the type:

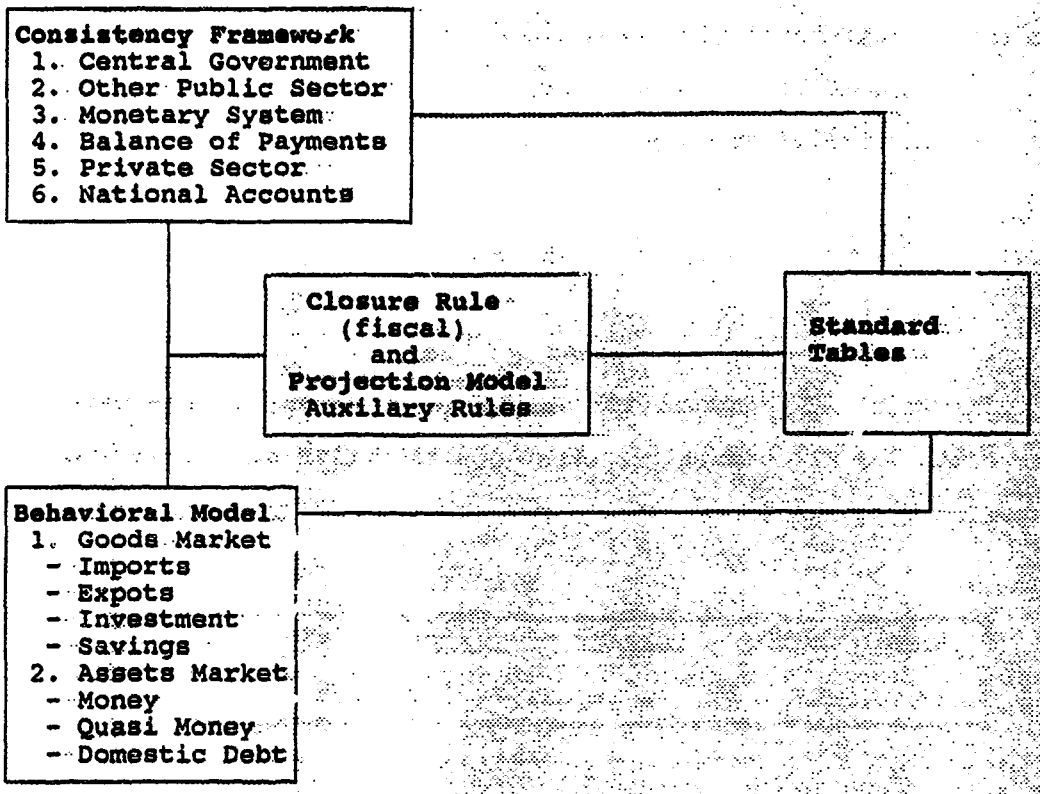
CURRENT INCOME - CURRENT EXPENDITURE = NET SAVINGS
NET SAVINGS = NET ACCUMULATION OF WEALTH

These two equations can be reduced into a single expression:

CURRENT INCOME - CURRENT EXPENDITURE = NET ACCUMULATION OF WEALTH

[6] In this paper, however, the real exchange rates and the nominal rates consistent with both reform and non-reform scenarios are obtained from a formal model of the real effective exchange rate (RER), estimated in a companion paper (Elbadawi and Majd, (1992)). Once the exchange rates are specified, domestic prices are derived for given international prices.

Figure 1. RMSM-XX for Bahrain



III.2. Definition of Variables and Intersectoral Flows

Sector-specific variables and sectoral flows are shown by the following abbreviations attached to the end of each variable:

b	Budgetary Government
o	Other non-financial public sector
g	Consolidated public sector
p	Private sector
m	Monetary sector
f	External sector
t	Total
cen	Central bank
com	Commercial Bank

For instance, Yfc_b (see Eq.1 below) denotes factor income of the budgetary government, and L_{mp} stands for loans from the monetary system to the private sector.[7]

We assume that there are five sectors in the economy: (1) government budgetary, (2) other government (primarily non-financial public sector), (3) monetary system (central bank and others), (4) foreign sector, and (5) private sector. The current and capital accounts for each sector, interpreted as 'ex-post', are defined as follows:

Equations (1) - (7) will determine savings of the budgetary government (S_b), loans of the private sector to the budgetary government (L_{pb}), savings of the other public sector (S_o), loans of the private sector to the other public sector (L_{po}), monetary system loans to the budget (L_{mb}), foreign saving (S_f), and foreign loans to the private sector (L_{fp}). Equations (2.8) and (2.9)

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[7] For other definitions and model nomenclature see Appendix A.

will be used to complete the accounting system of the model.[8]

Central Government

Current Account Budgetary Government:

(1) $Td + Ti + OTHR + Yfc_b + COG_b + N_{ob} - P_{cb}.C_b - T_{bo} - Sub_b - T_{bp} - N_{bm}\&N_{bp} - N_{bf} = S_b$

Capital Account Budgetary Government:

(2) $P_i.I_b + L_{bo} + L_{bp} - KOG_b - L_{pb} - L_{mb} - L_{fb} = S_b$

Equation (1) shows that the government budgetary saving (S_b) is equal to the current revenue minus expenditure. The revenue consists of the direct and indirect taxes, government factor income, and profit transfers from public enterprises. The government revenue is used to finance interest payments on foreign and domestic debt instruments, current transfers to other economic sectors, subsidies, and government consumption. On the capital account, the government saving (S_b) is determined by the difference between the government borrowing from the private, monetary, and foreign sectors as well as unrequited official grants, on the one hand, and the outlays on investment and lending to the private and public enterprises, on the other.

Public Enterprises

Current Account Other Public Sectors:

(3) $DRS + T_{bo} + COG_o - Sub_o - N_{ob} - N_{om}\&N_{op} - N_{of} - T_{op} - P_{co}.C_o = S_o$

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[8] Note that the variables used in the accounting identities are all in nominal terms whereas those in the behavioral equations are in real terms.

Capital Account Other Public Sectors:

(4) $P_i \cdot I_o + L_{op} - KOG_o - L_{bo} - L_{po} - L_{mo} - L_{fo} = S_o$

Because of the importance of the oil and gas production in Bahrain, it would have been better to treat this sector separately from other public enterprises. Unfortunately, in the absence of data, such a distinction was not possible[9]. Therefore, we have used the consolidated accounts of the other public sector, shown by equations (3) and (4), which determine the sector's savings (S_o) in terms of revenues generated by profits, surpluses, depreciation, (DRS), transfers (T_{bo}), and grants (COG_o). The expenditure is composed of interest payments to all other sectors, including foreign, transfer payments, subsidies, and consumption. Similarly, the capital account equation (4) derives (S_o) as a balancing item between borrowing by public enterprises and the outlays on investment as well as public enterprise lending to the private sector.

<u>Monetary System</u>

Capital Account Monetary System:

(5) $DC_g + L_{mb} + L_{mo} + L_{mp} + NFA_{cen} + NFA_{com} - MQM - NOL = 0 = S_m$

The main feature of the monetary system is that the assets and liabilities of the banking sector always remain in balance, i.e., savings by the monetary system (S_m) are equal to zero. For the identity (5 to hold, the money market operates in a way that the following conditions are simultaneously satisfied: (1)

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[9] Time series data for the public enterprises do not exist in Bahrain as there is no central agency in charge of systematically compiling statistics on the country's existing 21 public enterprises. Except for some sporadic information on the six fully government-owned companies, the others are treated as private sector firms. The Government of Bahrain holds equities in the latter group, ranging from 5 percent to 80 percent, as in the case of Alba. Therefore, the bulk of data on public enterprises are derived either as residuals to the central budgetary accounts or based on some ratios to the other key macroeconomic indicators such as sectoral value-added, consumption, imports, or investment. The introduction of a system of accounting to expand the current data base to include public.enterprises would be a major step towards better understanding of the macroeconomic issues in Bahrain.

the market for the real money balances (MQM) is cleared on the basis of factors such as real interest rates, price expectation, and real income (more about this later), (2) movements in the net foreign assets of the central and deposit money banks (NFA_{cen} and NFA_{com}) that instantaneously respond to the BOP financing requirements, (3) exogenously determined borrowing by the public enterprises and private sector (L_{mo} and L_{mp}) in terms of real GDP, (4) exogenously domestic credit expansion (DC_g), and (5) the central government borrowing (L_{mb}) from the monetary sector which serves as a residual and balancing item.

This is a simplified assumption, given the importance of the deposit money banks in the Bahrain economy. However, data limitations, especially the difficulties in isolating the public enterprise deposits and borrowing from the private sector and the central government have obstructed an in depth analysis of the banking system in Bahrain.

Balance of Payments

Current Account Balance of Payments:

(6) $N_{bf} + N_{of} + N_{pf} + NS_{pf} + Nknei + Prof - P_x.exp + P_m.imp - COG_b - COG_o - COG_p - T_{fp} - N_{fm} = S_f$

Capital Account Balance of Payments:

(7) $L_{fb} + L_{fo} + L_{fp} + LS_{fp} + KOG_b + KOG_o + KOG_p + DFI + Knei - NFA_{cen} - NFA_{com} = S_f$

Identities (6) and (7) are the familiar balance of payment current and capital accounts. Accordingly, the balance between the current payments abroad by the domestic sectors and the current revenues by the foreign sector determine the foreign savings (S_b). Thus, imports of goods and non-factor services and net factor payments in the forms of interest payments and profit remittances plus foreign savings are equal to exports plus current transfers to the domestic economy.

Similarly, the capital account shows that foreign savings must equal the net financing of the foreign debt (net of foreign reserves changes) plus the

financing flows of direct foreign investment and unrequited official transfers.

Private Sector

Current Account Private Sector:

$$(8) \quad Yfc_p + T_{bp} + T_{op} + T_{fp} + COGp + N_{bm}\&N_{bp} + N_{om}\&N_{op} + N_{fm} - P_c.C_p - Td - OthR - Prof - N_{pf} - NS_{pf} - Nknei = S_p$$

Capital Account Private Sector:

$$(9) \quad P_i.I_p + L_{pb} + L_{po} + MQM + NOL - L_{bp} - L_{op} - L_{mp} - L_{fp} - LS_{fp} - DFI - KOG_p - Knei = S_p$$

The budget constraints of the private sector, expressed in identities (8) and (9), are the final budget constraints in our consistency framework. The private sector revenues include its own factor income, interest receipts on domestic debt, dividends to the banking system, transfers receipts from the domestic and foreign sectors, and private savings (S_p). These revenues are used to finance tax payments to the government, interest payments on domestic and foreign debt, profit remittances, and private sector consumption.

The capital account consists of total financing which is equal to the sum of private savings, capital transfers from government, net credit from the banking system, and the net changes in foreign debt stock.

National Accounts

In addition to the budget constraints mentioned above, the national accounts identities are included to complete the system. These are simply defined in terms of current prices which maintain equilibrium in the goods market. Accordingly, GDP needs to be equal to consumption plus total savings which is equivalent to the savings and investment identity in (2.1.11).

(10) $Y = C_b + C_o + C_p + S_b + S_o + S_p + S_f$

(11) $I_b + I_o + I_p = S_b + S_o + S_p + S_f$

III.3. The Behavioral Equations

In this section we describe the behavioral equations that reflect the salient features of Bahrain's economy and allow us to study the macroeconomic requirements of the policy target. This module draws on Easterly et al (1990) in that it incorporates similar behavioral functions for the main macroeconomic variables, namely private consumption, private investment, money demand, demand for quasi-money, export supply, and import demand.

However, the present model incorporates two major extensions to Easterly's model. The first extension is an explicit consideration of the resource constraint that characterized the Bahrain economy (see introduction). The exhaustible nature of the main resource base in an economy implies a higher national saving rate, if the pre-resource standard of living is to be maintained after that resource is dried out. Subscribing to the popular optimizing models in this literature (see Elbadawi and Majd, 1992), we derived the estimates of "optimum" saving ratio (relative to GDP) for given assumptions about extraction rates and the expected life of oil reserves, future oil prices, the expected real interest rates of return on investment, and the assumed post-oil saving rate.[10]

The second major feature of our model is that it simulates the required public sector behavior consistent with jointly specified "target values" for real exchange rate and real interest rates. Like RMSM-XX, our model generalizes the Easterly *et al* framework which allows only for recursive solutions.

The behavioral model described below presents the structure of the goods and asset markets. The main emphasis here is to succinctly explain the main economic features of the model and to illustrate how it can be used to address

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[10] For a sketch of the optimum saving model and as well as the derived optimum saving ratio, see Elbadawi and Majd, (opcit, (1992)).

the issues of interest. A discussion of the goods and asset markets follows.

Goods Markets

The goods market equilibrium is reflected by the basic macroeconomic equilibrium condition which requires the current account deficit, given by net imports and debt interest, to be equal to investment less national saving.

$$(12) \qquad IM - X = I_p + I_g - S_p - S_g$$

Where IM is imports (inclusive of net interest payments), X is total exports, I_p and I_g are private and public investment, S_p is private saving and S_g is public saving; all measured in constant prices.

Imports

Imports are disaggregated into consumption (C), capital (K), and intermediate (int) goods. A further disaggregation of IM_k into private (IM_{kp}), budgetary government (IM_{kb}), and other government (IM_{ko}), and of IM_c into IM_{cp} and IM_{cb} is also adopted.

$$(13) \qquad \begin{aligned} IM = {} & IM_{cp} + IM_{cb} + IM_{kp} + IM_{kb} \\ & + IM_{ko} + IM_{int} \end{aligned}$$

The behavioral equations for the above categories of imports are stated below:

$$(14) \qquad \frac{IM_{cp}}{Y} = \frac{IM_{cp}}{Y} \left(\underset{(+)}{e}, \underset{(+)}{\frac{Y_p}{Y}} \right)$$

Equation (14) expresses imports of consumer goods by the private sector as

a ratio to the real GDP as a function of the RER and the ratio of the permanent income to the real GDP. The *a priori* signs for the independent variables are based on the notion that (1) an appreciation of the RER would increase imports of consumer goods, because it causes consumer goods imports to be cheaper than in the domestic market, and (2) an increase in permanent income relative to current income would increase imports.

$$(15) \qquad \frac{IM_{cb}}{Y} = \alpha_{cb}$$

Equation (15) shows that imports of consumption goods by the budgetary government is linked to the real GDP through an exogenously determined constant (α_{cb}) .

$$(16) \qquad \frac{IM_{kp}}{Y} = \frac{IM_{kp}}{Y} \underset{(+)}{(e)}$$

Imports of capital goods by the private sector as a ratio to the real GDP are shown to be dependent on the RER with *a priori* positive sign, equation (16). This implies that an appreciation of the RER would increase imports of the capital goods by the private sector. Similarly, imports of capital goods by public enterprises are defined the same way as shown by equation (17).

$$(17) \qquad \frac{IM_{ko}}{Y} = \frac{IM_{ko}}{Y} \underset{(+)}{(e)}$$

On the other hand, capital goods imports by the budgetary government are

assumed to be dependent on the real income through a fixed constant (α_{kb}), as shown in equation (18), on the basis of its historical trend.

$$(18) \qquad \frac{IM_{kb}}{Y} = \alpha_{kb}$$

Equation (19) gives the imports of intermediate goods, expressed in terms of the ratio to the real GDP, as a function of RER and the ratio of permanent income to the GDP with positive signs.

$$(19) \qquad \frac{IM_{int}}{Y} = \frac{IM_{int}}{Y} \underset{(+)\ (+)}{(e, \frac{Y_p}{Y})}$$

In all the equations above, Y is GDP at constant prices, e is the real exchange rate (the IMF definition)[11] . Y_p is the permanent income that is defined as the fitted value of the real GDP in terms of a trend factor by:

$$(20) \qquad Y_p = \beta_0 + \beta_1\ TREND$$

where β_0, β_1 *are estimated through* $Y = \beta_0 + \beta_1 TREND$

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[11] The RER multilateral index is defined as the nominal effective exchange rate index adjusted for relative movements in national prices or cost indicators of the home country and its partner - or competitor - countries.

Exports

Export supply is disaggregated into two sections. The oil and gas sector exports (X_{oil}) and other exports (X_{noil}).

$$(21) \qquad X = X_{oil} + X_{noil}$$

$$(22) \qquad X_{oil} = \overline{X}_{oil}$$

$$(23) \qquad \frac{X_{noil}}{Y} = \frac{X_{noil}}{Y} \begin{matrix} (e) \\ (-) \end{matrix}$$

The oil exports are given by the assumed extraction rates- which represent the maximum capacity for the existing technology. Given the assumption that the real price of oil is expected to remain constant in the future, the maximum extraction rates are also optimal (see Elbadawi and Majd (1992)). The ratio of non-oil exports to GDP, on the other hand, is specified to depend on the real exchange rate.

Investment and Saving

Investment by budgetary government is given as a constant ratio to GDP:

$$(24) \qquad \frac{I_b}{Y} = \alpha_{Ib}$$

However, private and other nonbudgetary public sector investment as ratios to GDP are simple functions of the real exchange rate and real interest rate.

$$(25) \qquad \frac{I_p}{Y} = \frac{I_p}{Y}\ (\underset{(-)}{r_L}\ ,\ \underset{(?)}{e})$$

$$(26) \qquad \frac{I_o}{Y} = \frac{I_o}{Y}\ (\underset{(-)}{r_L}\ ,\ \underset{(?)}{e})$$

where r_L is given by:

$$(27) \qquad r_L = \frac{i_L - \hat{p}_i^e}{1+\hat{p}_i^e}$$

and i_L is the nominal lending interest rate and $\hat{p}_i^e$ is the expected rate of change in the investment goods price.[12]

Aggregate private saving as a ratio to real GDP depends on the ratio of permanent income Y_p to current income and the real rate of interest:

$$(28) \qquad \frac{C_p}{Y} = \frac{C_p}{Y}\ (\underset{(+)}{\frac{Y_p}{Y}}\ ,\ \underset{(?)}{r_c})$$

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[12] For the sake of simplicity or data limitations a common real interest rate for the economy $\frac{i-\hat{p}^e}{1+\hat{p}^e}$ was used instead of deposit and lending rates. For the same reason, the inflation expectation was derived by a time series autoregressive representation of the general form:

$$\pi_t = A(L)\ \pi_{t-1}$$

where A(L) is a finite polynomial in the lag operator. .

where $$\frac{S_p}{Y} = 1 - \frac{C_p}{Y}$$

and r_c is the real exchange rate appropriate for consumption (defined in an analogous fashion to r_I in (27).[13]

Finally, the oil resource constraint is reflected by the condition that total national saving rate should be equal to the targeted saving rate, i.e.:

$$(29) \qquad \frac{S_p + S_g}{Y} = \bar{s}$$

where $\bar{s}$ is determined by the model of the optimum saving rate based on the assumptions about oil extraction rates, real rate of returns on investment, future oil prices, the post-oil saving rates (Elbadawi and Majd (1992)) and S_p and S_g stand for private and government savings, respectively.

The goods market equilibrium in a behavioral form given the resource constraint (29) can be succinctly written as:

$$(30) \qquad \underset{(+)}{M}\,(e,\ \underset{(+)}{Y},\ \underset{(+)}{\frac{Y_p}{Y}}) - \underset{(-)}{X}\,(e,\ \underset{(+)}{Y})$$

$$= \underset{(-)}{I_p}\,(\underset{(?)}{r}\ ,\underset{(+)}{e}\ ,Y) + \underset{(-)}{I_o}\,(\underset{(?)}{r},\ \underset{(+)}{e},\ Y) + \alpha_{Ib}.Y - \bar{s}Y$$

---

13 See footnote (8) above.

$$(31) \qquad S_g = \bar{S}Y - S_p\left(\underset{(+)}{r_c}, \underset{(-)}{\frac{Y_p}{Y}}, \underset{(+)}{Y}\right)$$

Assuming that the real exchange rate elasticity in the current account is of larger magnitude than that in the investment demand function, it is clear that for given GDP growth (and disposable income), the goods market equilibrium defines a negative relationship between real interest rate (r) and the real exchange rate (e).

Assets Market

Following Easterly et al (1990), we specify two relations for equilibrium in two of the three asset markets. The three assets in the core model are high powered money, domestic debt, and foreign debt. Figure 2 presents the balance sheets of the three sectors in the assets market.

We look at the equilibrium condition for money and domestic debt.[14]

$$(32) \quad NFA_{cen} + DC_g = h \cdot p \cdot QM\left(\underset{(+)}{r_L}, \underset{(-)}{\pi}, \underset{(+)}{Y}\right) + P \cdot M1\left(\underset{(-)}{\pi}, \underset{(+)}{Y}\right)$$

Where the sum of domestic credit to the government (DC_g) and the net foreign assets of central bank (NFA_{cen}) must be equal to its liabilities which is the stock of high powered money, disaggregated in the equation into reserve against the nominal value of quasi-money (P.QM) at the reserve ratio h and nominal currency holdings (P.M1). The equilibrium in the money market implies a negative relationship between inflation and real interest rate. A fall in inflation (and P, since expectations are assumed static) leads to lower the value of nominal currency holdings as long as we are in the left side of the inflation tax Laffer curve. For a given stock of domestic credit (DC_g) and foreign

[14] In the case of Bahrain, no loans from the central bank to the banking system (L_{cbbs}) or to the private sector (L_{cbp}) exist.

Figure 2. Balance Sheets of Central and Commercial Banks

Central Bank

Stock of Net Foreign Assets Stock of $Loans_{cong}$	Stock of Reserves Stock of Currency

Commericial Banks

Stock of Net Foreign Assets Stock of Reserves Stock of $Loans_{cong}$ Stock of $Loans_{comp}$	Stock of Quasi Money Stock of M1 + Currency Stock of Net Other Items

Foreign Sector

Stock of $Loans_{fb}$ Stock of $Loans_{fo}$ Stock of $Loans_{fp}$ Stock of Direct Foreign Investment	Stock of Net Foreign Asset$_t$

reserves NFA_{cen}, the real interest rate must rise to maintain equilibrium in the demand for high-powered money by raising demand for bank reserves against quasi-money.

Finally, equilibrium in the domestic debt market is given by equating holdings of quasi-money less reserve requirements equal to the sum of loans to private and public sectors from the rest of the banking system.

$$(33)\quad NFA_{com} + Lcom_g + Lcom_p(\underset{(+)}{r_L}) = (1-h)\cdot P\cdot QM(\underset{(+)}{r_L}, \underset{(-)}{\pi}, \underset{(+)}{Y}) + Stk_{NOL}$$

This equilibrium implies a positive relationship between real interest rate and inflation.

In our model, as mentioned before, inflation and interest rates are adjusted to maintain the equilibrium in the market for real balances. Moreover, the net foreign assets of the central bank adjusts instantaneously to correct changes in the overall balance of payments situation. The market for domestic debt is simultaneously cleared with the equilibrium in the market for high powered money so that the savings are zero in the domestic asset markets. By Walras's law, the foreign debt market needs to be in equilibrium when two out of the three asset markets are in equilibrium.

III.4. The Fiscal Closure

The above specification of the model results in the so called "fiscal closure"[15] In this closure the public sector will be the residual. The implications of the fiscal closure on the above model are described in Diagram I below.

A key result of this closure is that instead of exogenously projecting public saving and consumption, they will be the residual variables to balance the national accounts identify and the resource constraint. In terms of the BOP, the fiscal closure requires that the change in reserves be determined exogenously (for example, that necessary to meet a target rate of imports), while net loans to the public sector will be the residual. Given the rather low debt ratio for

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[15] The other closure generated by this model is the "private closure" which gives the private sector as a residual as in the case of the traditional RMSM (see Easterly et al (1990) for details).

Diagram I: Fiscal Closure

	Oil Resource Constraint Identity	National Accounts	Balance of Payments	Monetary Identity	Other
Residual Variable	Public saving S_g	Public Consumption C_g	Changes in public foreign debt	Credit to public sector (DC_g)	Capital flows are residual for public sector account

Bahrain, deriving the stock of debt as an unconstrained residual is not likely to present a problem.

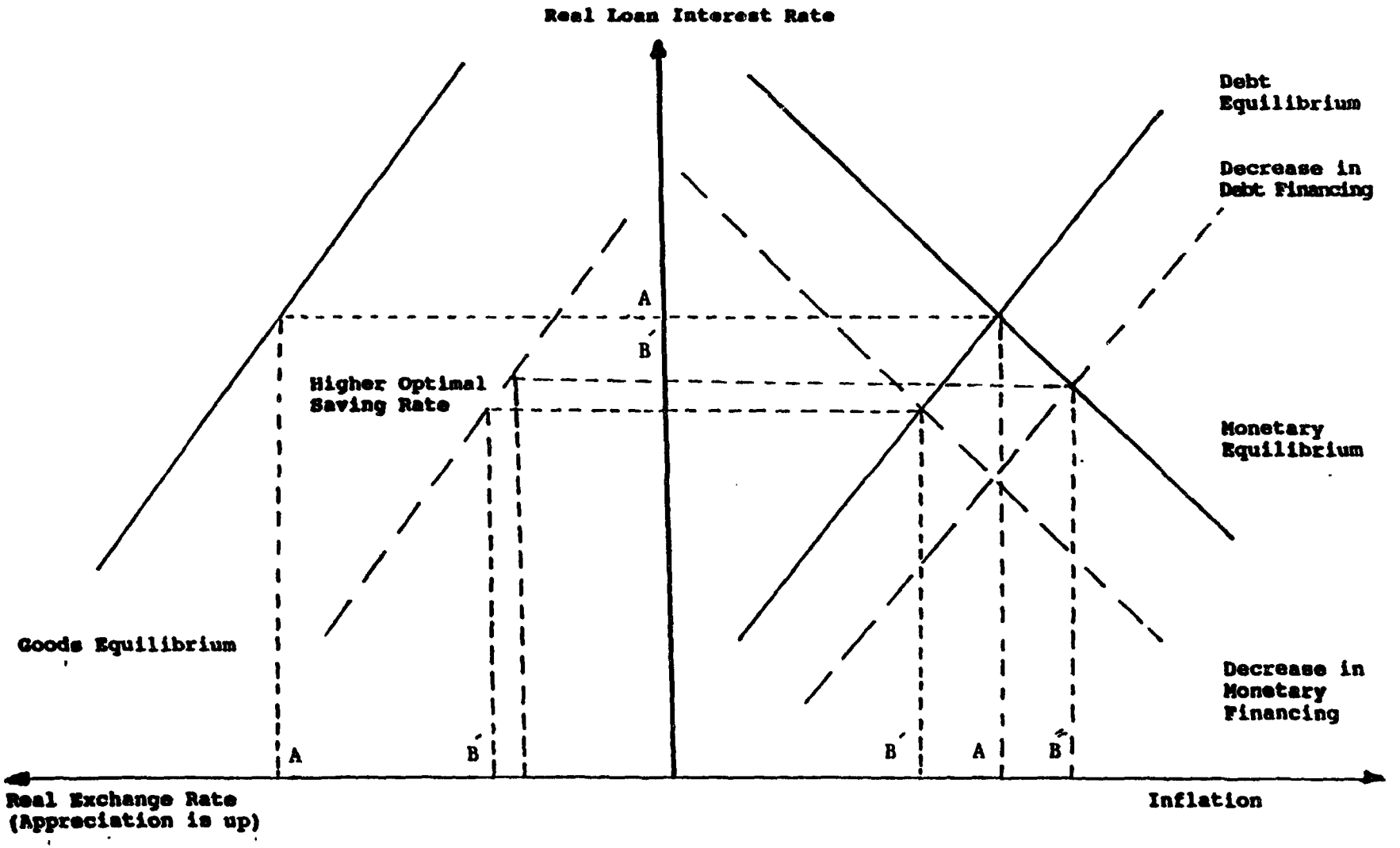
Equations (30), (32) and (33) which respectively gives the conditions for the equilibrium in the goods market, money markets and domestic debt; can be used to determine endogenously the real interest rate, the real exchange rate, and domestic price inflation. This provides a framework that allows us to discuss the implications of targeting those variables. The determination of the equilibrium and some comparative statics are provided in Diagram II (a la Easterly), which provides a schematic view of the working of the model.[16] The Diagram depicts the equilibria in the goods market (Eq. 30 and 31) and the asset market (Eq. 32 and 33); the interaction of the two markets gives the equilibrium solutions for inflation (A), the real interest rate (B), and the real exchange rate (C).

Diagram II can be used to draw comparative static for three polar cases. First, an increase in the national saving rate shifts the goods market schedule inward. If conditions in the asset market did not change, the real interest rate would adjust and a real depreciation would take place from (C) to (C'). Second, if the increase in the savings rate were achieved through reduced monetary

[16] For a definition of all the variables see Appendix A and for the other identities and auxiliary projection rules see Appendix B.

financing, with debt financing remaining as before, the money market equilibrium would shift inward. In that case, the real exchange rate will remain unchanged at (C), but both the real interest rate and inflation will adjust. The real interest rate will decline from (B) to (B') and inflation will be also be reduced from (A) to (A''). Third, if on the other hand increased saving is matched by reduced debt financing, with the money market conditions remaining unchanged, the debt schedule will shift inward. Here again, the real exchange rate remains fixed at (C) and the real interest rate will decline to (B'), but inflation will rise from (A) to (A'). A combination of the reduction in both monetary and debt financing for a target increase in national saving will lead to real exchange rate depreciation and lower real interest rate. Finally, depending on the relative magnitudes of the reduction in the debt and monetary financing, inflation could either increase, decrease, or remain stationary.

DIAGRAM II. Determination of Real Exchange Rate, Real Interest Rate, and Inflation Rate



IV. ESTIMATION RESULTS

In this section we will briefly discuss the estimation results for the behavioral equations specified in Section III of the paper. To get sensible empirical estimations for the export, import, and consumption equations, we have imposed normalization by getting the dependent variables in levels ratios (LR) with respect to a scale variable, e.g., GDP. This helps overcome problem of "nonstationarity" when only a few degrees of freedom are available and reduces the "spurious regression problem" (see for example, Granger and Newbold (1974)).

IV.1. Non-Oil Exports

The first equation to report is the equation for the non-oil exports. While exports of oil are assumed to remain unchanged during the projection period, the non-oil exports are allowed to vary with changes in the real effective exchange rate (RER) as well as the dependent variable, lagged one period as shown in equation (34). Accordingly, the non-oil exports are derived as [17]

$$\frac{X_{Noil}}{Y} = \underset{(3.14)}{0.20} - \underset{(2.57)}{0.15}\,(e)_{-1} + \underset{(2.24)}{0.56}\left(\frac{Y_{oil}}{Y}\right)_{-1} \qquad (34)$$

R.Sq = 0.64 AdjR.Sq = 0.53 DW = 1.96

As expected, equation (34) implies that an appreciation of the RER will reduce non-oil exports in the next period. All the estimators, including the constant term, are statistically significant, respectively at 1, 3, and 6 percent

[17] All *the t-statistics* are in parentheses.

levels (based on a two-tailed test).

IV.2. Imports

Imports are disaggregated into consumption (C), capital (K), and Intermediate (Int) goods.

The first import equation to report is the ratio of the imports of consumer goods to GDP as a function of the RER and the ratio of the permanent income (PY) to the real GDP. The permanent income is defined as

$$(35) \qquad GDP_{TN} = \underset{(19.4)}{1304.43} + \underset{(6.2)}{42.0}\ (TREND)$$

R.Sq = 0.52 Adj.RSq = 0.47 DW = 1.28

Imports of Consumer Goods

Imports of consumer goods are derived based on equation (14). The estimates are presented below in equation (36) in terms of levels ratios and are strongly robust as far as the explanatory variables are concerned.

$$(36) \qquad \frac{Imp_{cp}}{Y} = \underset{(4.56)}{0.049}(e) - \underset{(-3.51)}{0.045}(e)_{-1} + \underset{(11.52)}{0.22}\frac{PY}{Y} + \underset{(6.15)}{0.015}\ Dummy$$

R.sq = 0.93 Adj.Rsq = 0.89 DW = 2.93

Based on equation (36), an appreciation of the RER will instantaneously raise imports of consumer goods. As expected, when RER increases the price of domestic goods (nontradables) will become higher than the price of tradables, thereby making imported goods (which are tradable goods) cheaper for Bahrainis. The long-run effect of an the RER appreciation is, however, much smaller (with coefficient at 0.004), even though it still implies an increase in consumer goods imports.

Equation (36) also shows a positive and highly significant effect for income on the imports of consumer goods. Moreover, the dummy variable depicts the peak periods of the dependent variable in the years 1980 and 1990. This reflects the sharp declining trends of the GDP growth rates in response to the weakening of the oil exports. All results are statistically significant and the signs are consistent with the prior expectations.

Imports of Investment Goods

Two equations have been estimated for the imports of investment goods in terms of the real effective exchange rate. The first equation shows the imports of ivestment goods to the private sector and the second the imports to the government parastatals. Based on equation (37), the import demand of investment goods by the private sector increases directly with an appreciation of the RER. The instantaneous coefficient of the RER, estimated at 0.27, is statistically significant at 1 percent level. The high value of the R-square, estimated at 81 percent, is associated with the good fit, implying that RER serves as a robust explanatory variable in the equation. However, the low value of the Durbin-Watson statistics may be related to our extremely small sample size.

Similarly, the imports of investment goods by public enterprises is estimated as a function of the RER (equation 38). Here again the instantaneous impact of the RER appreciation on such imports is statistically significant but the magnitude of the coefficient is small at 0.07 compared to 0.027 for private sector demand.

$$(37) \qquad \frac{Imp_{ip}}{Y} = \underset{(3.30)}{0.083} + \underset{(5.35)}{0.27}\,(e) - \underset{(-3.88)}{0.22}\,(e)_{-1}$$

R.Sq = 0.81 Adj.Rsq = 0.76 DW = 1.44

In both of the above equations for imports of investment goods, the long-run effect of an RER appreciation is positive though substantially smaller than the case of the demand for imports of consumer goods. [18].

$$(38) \qquad \frac{Imp_{io}}{Y} = \underset{(3.30)}{0.02} + \underset{(5.35)}{0.07}\,(e) - \underset{(-3.89)}{0.06}\,(e)_{-1}$$

R.Sq = 0.81 Adj.Rsq = 0.76 DW = 1.44

Imports of Intermediate Goods

Imports of intermediate goods (int) - equation (39) below - are specified as a function of the RER and the ratio of permanent income to the real GDP. As with other imports, an appreciation of the RER or an increase in permanent income both lead to a rise in imports of (int). The dummy variable shows the sharp upward trend of the Imp_{int}/Y for the years 1980-82 and 1980. Once again, all the

[18] Note that, in the absence of data, the time series for the imports of investment goods to the government parastatals are constructed based on the corresponding ratios of the gross fixed capital formation between the central government and public enterprises in total public investment.

variables, with the exception of lagged RER, are statistically significant with the expected signs, despite the relatively small sample size.

$$(39) \qquad \frac{Imp_{bx}}{Y} = \underset{(2.83)}{0.82}\,(e) - \underset{(-1.56)}{0.56}\,(e)_{-1} + \underset{(1.82)}{0.87}\left(\frac{PY}{Y}\right) + \underset{(3.68)}{0.22}\,Dummy$$

$$R.Sq = 0.88 \qquad Adj.Rsq = 0.82 \qquad DW = 2.35$$

IV.3. Investment and Savings

We have estimated the gross fixed capital formation as a ratio to the real GDP for the private sector as well as the government parastatals. Given the 'normative' closure rule of the model, the central government investment is derived as a fixed ratio to the real GDP. Based on the national income accounting methodology in Bahrain, the change in stocks have been traditionally determined as a residual item to balance the GDP components. To be consistent with this practice, we have maintained this method in our simulation model.

While the interest rate considerations are of prime importance for the private sector investment, the investment by public enterprises do not appear to be sensitive to the variations in the real interest rates[19]. Equation (40) presents the estimates for the private sector investment as a function of the real rate of interest, the real effective exchange rate, and the real GDP. Accordingly, investment is shown to be inversely related to the real interest rate and positively to both RER and the real GDP. The sign of the coefficient of the RER can not be determined *a priori*. A positive coefficient, as depicted in equation (40), may be interpreted as the situation in which an appreciation of the RER would encourage investment in domestic nontradables. With the

[19] In the absence of data for the lending rate, we have used the time series for the deposit rate as a proxy for the general level of interest rate in Bahrain.

exception on the coefficient of the real interest rate, all of other variables are highly significant at less than 1 percent levels. The former is statistically significant at 6 percent.

$$(40) \qquad Ip = \underset{(-4.45)}{-1013.4} - \underset{(-2.28)}{1.68}\,(r)_{-1} + \underset{(5.93)}{4.24}\,(e) + \underset{(5.42)}{0.67}\,(Y)$$

R.Sq = 0.86 Adj.Rsq = 0.79 DW = 2.44

Equation (41) shows the estimates for the gross fixed capital formation by the government parastatals in terms of real interest rate, the RER, and the real GDP. All estimators exhibit the proper signs and with the exception of the real interest rate all are statistically highly significant. As was mentioned above, the interest cost of capital does not appear to play a crucial role in the investment decisions by public enterprises in Bahrain.

$$(41) \qquad I_o = \underset{(-4.31)}{-485.52} - \underset{(-0.66)}{0.24}\,(r)_{-1} + \underset{(5.25)}{1.85}\,(e) + \underset{(4.02)}{0.24}\,(Y)$$

R.Sq = 0.83 Adj.Rsq = 0.75 DW = 2.44

Subscribing to equation (28), consumption was estimated as a function of the permanent income (interest rate was found to be highly insignificant and was

subsequently dropped). The corresponding estimates are given in equation (42) below. Accordingly, the ratio of permanent to current income has a positive effect, albeit, with only marginally significant level. The dummy variable reflects the year 1989 in which the dependent variable (C_p/Y) had reached its peak of 37 percent.

$$(42) \qquad \frac{C_p}{Y} = \underset{(2.49)}{0.22} + \underset{(1.31)}{0.11}\left(\frac{PY}{Y}\right) + \underset{(3.37)}{0.04}\ \text{Dummy}$$

R.Sq = 0.72 Adj.Rsq = 0.55 DW = 1.94

During the past ten years, the government consumption share of the GDP in real terms has doubled from about 14 percent in 1980 to about 27 percent in 1990. Together with the increasing private consumption, this has resulted in a lower than usual domestic saving rate for a prototypal oil-based economy such as Bahrain. Our simulation model uses the results from the optimum saving model derived for Bahrain (Elbadawi and Majd, (1992)) consistent with the equilibrium exchange rate in order to determine the government consumption in line with the given behavioral assumptions of the private consumption.

IV.4. Assets and Money Markets

Real money balances have been estimated for transaction demand for money as well as the speculative demand. The transaction demand has been derived as a function of income and inflation expectation. The estimation results are presented in equation (43). Although, the equation has a relatively good fit and all the coefficients have the appropriate signs, the latter are, however, only marginally significant.

$$M1 = 162.3 - 2.35\,(\pi) + 0.07\,(Y)_{-1} - 22.3\,(D1) + 24.7(D2) \quad (43)$$
$$(1.80)\ (-1.77)\qquad (1.15)\qquad (-1.42)\qquad (1.59)$$

R.Sq = 0.70 Adj.Rsq = 0.49 DW = 2.31

where D1 and D2 are the corresponding dummies, reflecting the peak periods for the dependent variable in the years 1984 and 1987.

The speculative demand for money, on the other hand, is specified as a function of the rate of inflation (π), the real rate of interest (r), and real GDP (Y). Equation (44) presents the estimation results:

$$QM = -\,803.0 - 36.8\,(\pi) + 0.32\,(r) + 1.13\,(Y) - 145.5\,(D3) - 156.1\,(D2) \quad (44)$$
$$(-1.61)\ (-4.50)\qquad (0.12)\qquad (3.25)\qquad (-1.69)\qquad (-1.65)$$

R.Sq = 0.92 Adj.Rsq = 0.82 DW = 2.41

The equation above shows that the real interest rate appears not to have influenced the speculative demand for money in Bahrain. On the other hand, real GDP is shown to have had a significant and appreciable effect.

V. BAHRAIN'S MEDIUM-TERM PROSPECTS

In this section, we discuss the medium-term prospects for Bahrain's economy, focusing in particular on the evolution of the hydrocarbon sector, saving and investment patterns, and growth. We will first solve the model for the 'base case' in which we set the targets for the RER, the real rate of interests, and inflation not to be much different from the base year. For the given RER assumptions,[20] the inflation is derived on the basis of considerations such as foreign inflation and the movements in the nominal effective exchange rate. On the other hand, the real interest rate target is set exogenously in accordance with movements in the LIBOR.

In the 'policy based' scenario, we use the equilibrium RER that is consistent with variations in the RER fundamentals: the terms of trade, government expenditures, and the external capital flows - conceived to be sustainable. The RER, derived as such, would also be in line with the Bahrain's oil resources and extraction rate as well as the associated optimum saving rate that is required to sustain the same standard of living in the post-oil era. This specification, as will be shown later in this section, calls for a realignment of the currency in 1993 in order to make it possible for a higher level of economic activities in Bahrain.

In both simulations we observe the implications of the alternative target variables for the size and composition of the financeable fiscal deficits. Since GDP is allowed to grow at a higher rate in the 'policy-based' simulation than the one in the 'base case', the ramifications for the sources of financing of the public deficit (internal and external) will also be observed very closely.

V.1. Uses and Sources of Funds Matrix

The model uses the flow-of-funds framework. This framework allows for the historical and projection data on income, expenditure, saving, investment, and

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[20] The RER is derived on the basis of the error-correction equation defined in our companion paper "The Optimum Saving Rate and the Equilibrium Real Exchange rate in Bahrain: A Case of An Irreproducible Resource Base Economy". The World Bank, December 1992.

financing flows of different sectors to satisfy the budget constraints in the accounting identities. The consistent macroeconomic accounts for 1990 are presented in Table 1.[21]

The upper left-quarter of the matrix shows the current income and expenditure streams, with expenditure flows shown down and income flows shown across. Each current account framework is followed by a capital account matrix for the same sector. The balancing item for each sector is saving which ensures that current sources are equal to current uses. Therefore, by definition the totals in each row and column of the matrix must be equal. The capital account framework utilizes the "below the line" concepts of the public sector and balance of payments accounts as well the income-expenditure identity in the national income accounts, e.g., saving-investment identity. In other words, uses of financing is equivalent to their sources, including own saving, i.e., for each sector the excess investment over saving is equal to net borrowing from domestic and external sources.

[21] A similar set of frameworks for the projection periods are given in Appendix B. For the definition of the variables see Appendix A.

(BASE CASE)

TABLE 1 SOURCES AND USES OF FUNDS MATRIX FOR 1990

Current Account:	Budget	Other Public	Private Sector	Monetary System	Balance of Payments	National Accounts	Total
Budget	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Nob 0.0	Td 0.0 OthR 126.9	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	COGb 26.3	Ti 37.8 -Subb -12.3 Yfcb 306.7	485.4
Public Enterp.	Tbo 20.7	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	COGo 0.0	DRS 312.0 -Subo -20.7	312.0
Private	Tbp 3.8 Nbm&Nbp 0.0	Top 0.0 Nom&Nop 0.0	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Tfp 102.4 Nfm 121.2 COGp 0.0	Yfcp 844.0	1071.4
Bal Payment	Nbf 17.7	Nof 0.0	Npf 0.0 NSpf&Nil 0.0 Nknei 393.1 Prof 133.4	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	RG -212.8	331.4
Nat Acct	Cb 415.3 Sb 27.9	Co 0.0 So 312.0	Cp 526.2 Sp -107.9	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Sf 81.5	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	1255.0
Total	578.6	312.0	978.5	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	331.4	1254.7	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,
Capital Account:							
Budget	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Lpb 167.2	Lmb 11.7	Lfb -192.5 KOGb 145.7	Sb 27.9	160.0
Public Enterp.	Lbo 44.3	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Lpo -323.0	Lmo -20.0	Lfo -2.4 KOGo 0.7	So 312.0	11.6
Private	Lbp 0.0	Lop 0.0	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Lmp -7.8	DFI -1.3 Lfp LSfp 12.6 Knei 0.0 KOGp 0.0	Sp -107.9	-104.5
Monetary	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	MOM -121.7 NOLA -13.1	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	-134.8
Bal Pay	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	NFAcb 70.5 NFAdb -189.2	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	Sf 81.5	-37.2
Nat Acct	Ib 115.7	Io 11.6	Ip 276.3 ChgStk -90.1	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,	313.5
Total	160.0	11.6	-104.3	-134.8	-37.4	313.5	,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,

V.2. Simulation Model: Base Case Scenario

The "base case" projection presented below assumes neither major changes in the government policy nor unforeseen external shocks. It will show that under the best circumstances continuation of the present government policy would result in sluggish output and export growth rates, fiscal and current accounts imbalances, mounting external debt, and a deterioration of the standard of living, particularly in the light of declining oil revenues.[22]

The closure rule adopted for the core consistency framework is "normative". The idea is to find fiscal implications of the user-specified "target values". A combination of the "normative" rule and the "requirements" version of the model determines the endogenous variables such as government current and capital expenditures as well as the foreign and domestic borrowing needs for the given behavior of the private sector.

Given the economic importance of the hydrocarbon sector, the logical starting point would be a discussion of the developments in the oil sector. It will be followed by an analysis of the aluminum production and exports and the evolution of the money market. The underlying projection assumptions will then ensue and the implications for the fiscal, monetary, balance of payments, and real GDP growth as well as the prospects for the private sector will subsequently be discussed.

In the "base case" scenario the oil production from Bahrain's fields is assumed to remain constant at about 42,000 b/d until 1996 which would, then, tail off to 30,000 b/d for the rest of projection period. The Abu Saafa production is being set at a rate which would make the overall oil production decline by six percent per year.

The prospects for bahrain's oil production and exports are not very promising due to the rapid depletion of reserves, aging of the field, unfavorable exploration results, and the low grade of the relatively heavy crude from Abu

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[22] A caveat is in the order due to the data limitations which hampers a thorough analysis of the macroeconomic situation in Bahrain. Some of the accounts, especially those for public enterprises, were needed to be estimated by the authors while inconsistencies among various sectors were brought into balance.

Saafa which has, in the past, been subject to the wide lifting and price fluctuations. Therefore, the average annual volume growth rate of the oil exports is assumed to initially decline (see Table 2) and, then, to remain unchanged for most of the projection period. In addition such a modest outlook accommodates for the rising domestically consumed petroleum products.[23]

Accordingly, domestic production and exports of petroleum are calculated for the refined products separately from the Abu Saafa crude as well as imports from the Saudi Arabia's Dammam field to BABCO refinery and its share in total exports of the petroleum products. Similarly, the export proceeds to Caltex, a minority partner which holds 40 percent of the refined products share, is distinguished from the proceeds to the government of Bahrain.

Table 2 presents the basic assumptions behind the oil and non-oil exports. Given the fact that oil accounts for about 80 percent of the total exports and also in the absence of appropriate trade and exchange rate policies in our 'base case' projections, the petroleum products would continue to remain the major source of export earnings during the period 1991-2005.

Table 2: Projection Assumptions for Oil and Non-Oil Exports
(Percent)

	1990	1991	1992	1993	1994	1995	2000	2005
Export Price Growth Rate								
Oil	22.9	-19.6	-8.5	2.2	2.6	3.6	3.6	-1.2
Non-Oil	-20.4	-22.1	-3.0	7.4	2.9	5.8	3.9	-1.6
Total	13.8	-20.1	-7.3	3.3	2.7	4.1	3.7	-1.3
Export Volume Growth Rate								
Oil	1.0	3.5	-5.5	-0.3	-0.3	1.5	-0.5	-0.6

[23] The assumptions concerning the hydrocarbon sector are based on the findings of the recent energy and industry study for Bahrain (background paper to the CEM).

Oil price projections as well as prices for the international inflation, G5-MUV as a proxy for import prices other than food, aluminum export prices, and the LIBOR are based on the World Bank PAC assumptions.

GDP is estimated to initially decline by 2 percent in 1991 as the oil prices declined by about 20 percent in real terms. However, it would grow between 2 to 3 percent in the outer years as the global oil market situation improves somewhat. However, the meager outlook for the mining sector, in general, would be the main contributing factor for the slow GDP growth; not only because of its direct influence on the GDP but also indirectly by affecting the value added in the services sector which is chiefly dependent on the government sector. In 1990, the share of the government services in total value added of the services sector was about 36 percent.

The Non-oil GDP is assumed to grow moderately by an annual average of about 2 to 2.5 percent per year to maintain the non-oil per capita income at more or less the same level as the base year. The value added in the mining sector would decline initially by about 17 percent, reflecting the depressed oil price prospects in the global petroleum market. By 1994, however, the situation is reversed as oil prices rise which would propel the value added in the oil and gas sub-sector. Moreover, the government proposed privatization policy is assumed to have some effects on the slightly increased GDP share of the manufacturing sector.

However, the non-oil GDP growth rate is inflicted by the fixity of the nominal currency. Because the economy is not sufficiently flexible to allow for a shift of resources towards the sectors producing tradable goods, an economic stagnation would result. The ensuing economic stagnation would have enormous implications for domestic savings and investment. On the one hand, the government needs to invest sufficiently to maintain the existing stocks of capital of the 21 public enterprises currently operating in Bahrain. And on the other hand, the continued increases in the fixed capital formation by the government would have a "crowding-out" effect on the investment by the private sector. In addition, it is shown that the rapidly increasing government

budgetary current expenditures, on goods and services and interest payments on foreign debt, would inhibit the government budgetary capital expenditures.

Traditionally, the government investment expenditures have been earmarked for the services sectors and to a certain extent for loss-making public enterprises. Therefore, the efficiency of investment has been low in Bahrain when compared with similar countries. This is shown by a historically high incremental capital output ratio (ICOR) which remained at a double-digit level during the 1980s. In the "base case' scenario, this trend is assumed to remain unchanged. As can be seen from Table 3, the implied 5-year ICOR is high (more than 10) for most of the projection period.

However, there are reservations in interpreting the efficiency of investment on the basis of a simple ICOR parameter, measured in terms of actual GDP (as is the case here) rather than on the time path of the potential output. In our model, the implied ICOR may be interpreted as a mixture of efficiency factors (determining the path of potential GDP) and capacity utilization (determining the discrepancy between actual and potential GDP). In that sense, changes in ICOR may imply changes in efficiency or in the degree of capacity utilization or a mixture of both.

Domestic inflation proxied by the GDP deflator is computed based on the derived projections for the real effective exchange rate (RER) (Elbadawi and Majd, (1992)). It is projected to be around 4 percent which is in line with the historically low rate of inflation in Bahrain. This, in turn, reflects the present government policy of price controls, the presence of various forms of implicit and explicit subsidies for the domestic consumption of petroleum products and foodstuff, and the absence of appropriate cost recovery measures for government services.

The deterioration in the terms of trade would reduce the capacity to imports. By 1993 the resource balance in real term would become negative as imports of goods and non-factor services exceed exports. Consequently, the resource gap is projected to reach to more than $2 billion in 2005.

The most dramatic effects are increases in the current account deficit of the balance of payments, which is projected to reach around 46 percent of the GDP by the end of the simulation period and the budgetary fiscal deficit, surging to more than 83 percent of the GDP by the year 2005.

The current account deficit is a consequence of the behavior of imports which increase rapidly between 1990-2005 and exports, which remain stagnant due to a combination of the meager performance of the hydrocarbon sector and the terms of trade deterioration. As the current account deficit widens so does the external debt situation which is projected to climb to more than $33 billions by the end of the projections period. This would result in a debt service ratio of about 36 of exports of goods and services and to 26 percent of the GDP in 2005.

Given the amount of implicit and explicit subsidies in the economy, increases in the government current expenditures have always been the prime source of fiscal imbalances in Bahrain. The present trend appears not to be sustainable. The oil and gas revenues would not be not sufficiently high to offset the rapidly growing government current expenditures in the future. In addition, the rapid rise in interest payments on foreign and domestic loans would compound fiscal imbalances further when government resorts to more borrowing from foreign and domestic nonbank sectors as a means to finance its deficit.

The future need for the external financing of the current account and fiscal deficits would be extremely high, thus putting additional pressures on the services accounts. Unlike its neighboring GCC countries, Bahrain has not been actively involved in any major foreign investment ventures. The only source of foreign investment income has been the interest receipts from the country's international reserves and minor returns from the investments in the GCC countries. Perhaps provisions for establishing a "stabilization scheme" *a la* Kuwait would help smooth out the balance of payments swings in the future. With the exception of large amounts of medium and long-term foreign borrowing requirements to offset the current account deficit, the other items of the capital accounts are assumed to remain more or less unchanged during the projection period.

One peculiar aspect of the Bahrain economy has been the developments in the money market. During most of the 1980s, the government has been a net lender to the banking system while running substantial fiscal deficits. This is shown by large deposits by the central government in the money market. The situation is assumed to continue in the future albeit with the government deposits declining overtime, from about BD 600 millions in 1991 to around 350 millions. Meanwhile, the private sector borrowing from the banking system is projected to increase from about half a billion BD in 1991 to more than one billion BD by 2005.

Moreover, the share of broad money in the GDP is projected to increase from 61 percent in 1991 to more than 77 percent by the end of projected period. The evolution of the monetary growth partially reflects increases in the real income and the real interest rate and partly the negative impact of the inflation expectation as specified in equations (43) and (44).

TABLE 3: KEY INDICATORS' Base Case

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
GDP Growth Rate	-2.0	2.0	2.0	2.0	2.0	2.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0
Non-Oil GDP Growth Rate	4.8	2.2	2.1	2.0	1.8	2.5	2.7	2.4	2.5	2.6	2.3	2.3	2.3	2.3	2.4
GDP Per Capita Growth Rate	-4.30	-0.39	-0.39	-0.39	-0.39	0.10	0.59	0.59	0.59	0.59	-0.39	-0.39	-0.39	-0.39	-0.39
Pvt Consumption Per Cap. Gr. Rate	-2.38	0.71	-0.67	-0.67	-0.67	-0.19	-1.36	0.01	0.01	0.01	-0.96	-0.66	-0.66	-0.66	-0.66
Debt Service (in US$)	74	124	195	288	392	511	640	785	945	1123	1321	1548	1808	2094	2407
Debt Service/XGS	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.23	0.26	0.29	0.33	0.36
Debt Service/GDP	0.02	0.03	0.04	0 06	0.08	0.10	0.11	0.13	0.14	0.16	0.18	0.20	0.22	0.24	0.26
Stock of External Debt/GDP	0.19	0.39	0.62	0.86	1.11	1.34	1.57	1.80	2.02	2.24	2.50	2.78	3.05	3.32	3.59
Domestic Savings/GDP	0.36	0.31	0.27	0.25	0.22	0.19	0.13	0.09	0.05	0.02	-0.03	-0.02	0.01	0.04	0.07
National Savings/GDP	0.20	0.16	0.11	0.07	0.04	-0.01	-0.08	-0.13	-0.18	-0.22	-0.28	-0.29	-0.28	-0.26	-0.25
Gross Investment/GDP	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.22	0.23	0.25	0.26	0.28
Public Investment/GDP	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.07	0.07	0.08	0.08	0.09
Private Investment/GDP	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.15	0.16	0.17	0.18	0.19
5-Year ICOR	17.3	12.2	22.6	24.6	21.4	12.4	11.3	10.4	9.7	9.0	9.1	9.6	10.4	11.4	12.7
Government Revenues/GDP	0.22	0.21	0.21	0.22	0.22	0.23	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.24	0.23
Government Expenditures/GDP	0.28	0.31	0.49	0.54	0.59	0.64	0.73	0.80	0.87	0.93	1.01	1.04	1.05	1.06	1.07
Deficit/GDP (+)	-0.06	-0.11	-0.28	-0.32	-0.36	-0.41	-0.49	-0.55	-0.61	-0.67	-0.75	-0.78	-0.80	-0.82	-0.83
GDP Deflator (1985=1)	0.98	1.02	1.06	1.11	1.15	1.19	1.23	1.28	1.33	1.38	1.43	1.48	1.54	1.60	1.67
Inflation (% Change GDP Deflator)	4.3%	3.9%	4.1%	4.0%	3.8%	3.7%	3.7%	3.7%	3.7%	3.8%	3.8%	3.8%	3.9%	4.0%	4.0%
Nominal Exchange Rate ($/BD)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Real Exchange Rate (1985=1)	0.58	0.53	0.50	0.48	0.49	0.51	0.53	0.55	0.56	0.56	0.56	0.55	0.52	0.49	0.45
Terms of Trade Index (1985=1)	0.73	0.66	0.91	0.90	0.91	0.92	0.95	0.96	0.96	0.96	0.91	0.87	0.83	0.79	0.75
Implied 5-Year Import Elasticity	1.13	1.09	1.16	1.09	1.13	1.07	1.11	1.10	1.09	1.07	1.05	1.03	1.01	0.99	0.99
Exports/GDP	0.79	0.71	0.72	0.73	0.74	0.76	0.79	0.80	0.80	0.80	0.78	0.76	0.74	0.73	0.72
Imports/GDP	0.99	0.97	0.98	1.00	1.02	1.03	1.06	1.07	1.07	1.07	1.07	1.06	1.04	1.03	1.01
Current Account Deficit (in US$)	880	1167	1319	1441	1594	1684	1819	2009	2217	2442	2820	3223	3552	3886	4278
Current Account Deficit/GDP	0.22	0.28	0.29	0.30	0.32	0.31	0.32	0.33	0.34	0.35	0.38	0.41	0.43	0.44	0.46
Net Reserves (in US$)	539	577	689	798	925	1055	1234	1390	1544	1706	1842	1980	2096	2214	2358
Gross Reserves (in months imports)	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99

V.3. 'Reform Based' Scenario

The 'reform based' simulation involves changes in the model's key variables such as the RER adjustment, higher domestic national saving ratios, more rapid GDP and non-oil growth rates, removal of subsidies, and introduction of a 4 percent general sales tax. The results are summarized in Table 4.

Given the limited life span of the on-shore hydrocarbon resource base, the government of Bahrain needs to diversify the economy from its heavy dependence on oil. The RER, roughly defined as the relative prices of home goods *vis-avis* the tradables, would be adjusted, thereby making production of tradables more profitable. The reallocative impact of the RER adjustment when accompanied by higher savings due to more prudent revenue-generating and cost-reducing measures by the government would eliminate the pressures on fiscal and external imbalances.

The immediate impact would be an improvement in the current account balance and the government fiscal situation. The accumulation of wealth due to the higher saving rate is reflected in significant increases in the stock of foreign reserves by as much as $23 billions at the end of the simulation period. The interest receipts from the stock of gross reserves appear to be high enough to accommodate for higher imports, thus compensating for the declining oil export earnings. Moreover, the pursuance of the exchange rate policy would boost the non-oil export. The combined effects of both of these measures are reflected in a drastic improvement in the current account balance which would remain in surplus for most of the projection period.

Meanwhile, the central government would be able to realize higher oil revenues in terms of the Bahrainis Dinar due to the realignment of the currency. Similarly, the non-oil revenue would be increased as a results of the introduction of either a non-cascading value-added tax or a general sales tax.

As in the 'base case' scenario, the government is projected to continue to be the net lender to the domestic banking system and, thereby receiving reasonable amounts of interests to finance the public sector investment, despite rapidly increasing current expenditures. Moreover, the removal of subsidies

(implicit and explicit) would alleviate the present burden on the fiscal situation. Yet as another measure in reducing public expenditures, the government needs to abolish the present practice of keeping a separate extra-budgetary accounts by unify it with the other central government accounts to minimize the uncertainties associated with the former account which has been in the past a major source of the public deficit in Bahrain.

On the goods market, the implications for the non-oil GDP growth would also be dramatic as the value added of this sector increases on the average by about 5 percent per year during the projections period. Moreover, the adjustment of the RER would shift the resources away from the statutory sectors of the economy to the real sectors, thereby boosting the non-oil exports by as much as two fold in real terms, from about BD 500 millions in 1991 to more than BD 2 billions in the year 2005. In addition, the expenditure switching effect of the RER adjustment is reflected in higher investment and consumption by the private sector. The net result would be higher efficiency of investment as shown by improvements in the implied 5-year ICOR, declining from 17 in 1991 to about 7 by the year 2000.

One important feature of the "policy based' scenario is the introduction of a 'stabilization scheme'. Bahrain is a small island with limited absorptive capacity. Therefore, there are considerable constraints in boosting aggregate demand when income rises beyond a certain limit. An stable and continuous growth rate of output beyond 4 percent, as is the case here, requires additional savings through creating a 'stabilizing fund' outside the domestic market. This 'fund' not only would smooth out the future balance of payments swings but help the country maintain the standard of living of the future generation in the post-oil era.

In the assets and money markets, the projected currency adjustment would help the Bahrain Monetary Agency (BMA) increase its stock of net foreign assets by more than BD 22 billions by 2005. At the same time, the real balances of the quasi-money would increase sharply, implying large amounts of private sector deposits within the banking system.

TABLE 4: KEY INDICATORS' Reform Base Scenario

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
GDP Growth Rate	-2.0	2.0	4.0	5.0	5.0	6.0	6.0	5.0	5.0	5.0	4.0	4.0	4.0	3.5	3.5
Non-Oil GDP Growth Rate	4.8	2.2	-2.0	5.9	5.7	7.0	6.5	4.9	5.1	5.2	4.8	4.8	4.7	4.1	4.1
GDP Per Capita Growth Rate	-4.30	-0.39	1.56	2.54	2.54	3.52	3.52	2.54	2.54	2.54	1.56	1.56	1.56	1.07	1.07
Pvt Consumption Per Cap. Gr. Rate	-2.31	0.62	1.30	1.58	1.27	2.27	0.58	1.14	1.45	1.47	0.53	0.81	0.82	0.35	0.48
Debt Service (in US$)	74	124	195	242	281	299	327	352	374	383	394	404	416	427	438
Debt Service/XGS	0.02	0.04	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04
Debt Service/GDP	0.02	0.03	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05
Stock of External Debt/GDP	0.19	0.39	0.67	0.75	0.75	0.76	0.76	0.75	0.70	0.67	0.63	0.60	0.57	0.55	0.52
Domestic Savings/GDP	0.36	0.31	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.45
National Savings/GDP	0.20	0.16	0.26	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.49	0.51	0.54	0.56	0.56
Gross Investment/GDP	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.21	0.23	0.25	0.27
Public Investment/GDP	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.07	0.08	0.08	0.09	0.10
Private Investment/GDP	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.14	0.15	0.16	0.18
Implied 5-Year ICOR	17.3	12.2	16.7	12.5	9.1	5.9	5.1	4.9	4.9	5.0	5.3	5.5	5.7	6.1	6.6
Government Revenues/GDP	0.30	0.29	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.35	0.35	0.34	0.33	0.31	0.31
Government Expenditures/GDP	0.37	0.41	0.26	0.25	0.24	0.23	0.22	0.21	0.19	0.18	0.16	0.15	0.13	0.12	0.12
Deficit/GDP (+)	-0.09	-0.15	0.06	0.06	0.08	0.09	0.10	0.12	0.13	0.15	0.16	0.16	0.17	0.17	0.15
GDP Deflator (1985=1)	0.98	1.02	1.06	1.11	1.15	1.19	1.23	1.28	1.32	1.38	1.43	1.49	1.55	1.61	1.67
Inflation (% Change GDP Deflator)	4.3%	4.2%	4.0%	3.8%	3.6%	3.5%	3.8%	3.7%	3.8%	3.9%	3.9%	4.0%	4.1%	4.0%	3.8%
Nominal Exchange Rate ($/BD)	0.38	0.38	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Real Exchange Rate (1985=1)	0.58	0.47	0.46	0.47	0.50	0.55	0.55	0.58	0.57	0.56	0.54	0.50	0.45	0.42	0.41
Terms of Trade Index (1985=1)	0.73	0.66	0.91	0.90	0.91	0.92	0.95	0.96	0.96	0.96	0.91	0.87	0.83	0.79	0.75
Implied 5-Year Import Elasticity	1.13	1.09	1.15	1.06	1.08	0.97	0.99	1.01	1.00	1.00	1.03	1.00	0.95	0.98	1.01
Exports/GDP	0.79	0.71	1.13	1.21	1.26	1.29	1.31	1.31	1.30	1.29	1.26	1.22	1.20	1.19	1.17
Imports/GDP	0.99	0.96	0.97	0.97	0.97	0.94	0.94	0.98	0.97	0.96	0.96	0.93	0.91	0.92	0.94
Current Account deficit (in US$)	876	1163	-343	-840	-1229	-1743	-2215	-2399	-2827	-3231	-3434	-3901	-4361	-4699	-4902
Current Account deficit/GDP	0.22	0.27	-0.10	-0.23	-0.31	-0.41	-0.47	-0.47	-0.50	-0.53	-0.52	-0.55	-0.56	-0.57	-0.55
Net Reserves (in US$)	542	583	1782	3360	5041	7336	10036	12877	15956	19451	23120	27275	31867	36783	41865
Gross Reserves (in Month Imports)	4.0	4.0	9.6	14.3	18.4	24.1	29.1	32.5	37.2	41.4	45.2	50.9	55.8	59.2	60.9

VI. CONCLUSION

In this paper we have shown that an adjustment of the real effective exchange rate together with higher savings and output growth rates would make it possible for the Bahrain's economy to shift away from a an oil based economy to a more diversified economic structure. Moreover, it has been demonstrated that a drift towards an optimum and higher national saving ratio would cause the country to change from a net borrower posture to a net lender stance. Accordingly, the present generation needs not be deprived of its consumption. The higher savings in the forms of increased net foreign assets of the banking system as well as other portfolio arrangements abroad due to savings out of oil windfalls, and thereby the ensuing interest receipts from the extra assets, would by far exceed the uses of these funds.

Moreover, it has been shown that the expenditure switching effect of the real exchange rate alignment would cause a dramatic shift in resource allocation in favor of the tradable sectors. Higher future output and improved efficieny in investment (as shown by much lower ICOR) would be possible if the government decides to offset the tendency for its own recurrent spending and investment to skew towards nontraded sectors.

This result is corollary to the conclusions reached by Gelb (1985a and 1985b) in his pioneer analysis of the impact of oil windfalls on various types of expenditures in the context of an oil-based economy. An appreciation of the real exchange rate, he argues, is most likely to result in increased consumption if the supply of consumer goods is fairly elastic and there are no changes in the savings rates. He concludes that even under the conditions of favorable discriminatory export subsidies, import tariffs, or quotas on the one hand and an adoption of a dual exchange rate system on the other, it would not be possible to fully insulate the nonoil trade sector from lagging behind the general economic growth unless government spending is tapped below pre-oil-boom levels.

The macroeconomic model has proved useful in capturing the macroeconomic policy trade-offs. It has shown that higher per capita GDP and private consumption are possible with a slight correction of the currency misalignment,

allowing for rapid growth of savings, income, and investment. The diversification from heavy dependence on oil would be attainable in the context of growing non-oil GDP and exports with overall improvements in the areas of fiscal and external balance situations, something which was not possible under the situation of economic stagnation.

We have seen that in the non-reform scenario the economic stagnation, incited by the meager outlook for the hydrocarbon sector, would result in huge fiscal and external imbalances and mounting foreign and domestic debt. As oil revenue declines and real appreciation prevails, then the government needs to contain the aggregate demand to restore equilibrium. If the government continues to spend on non-productive sectors, and within the existing oil extraction pattern and no prospects for new discovery, the long-run impact on the traded goods sectors would be enormous.

On the contrary, if appropriate macroeconomic policy reforms are pursued, the resulting oil surpluses would be saved and invested in either productive sectors or put aside in a "reserve fund scheme", in the cases where the absorptive capacity is a binding constraint. The present paper has shown that in a growing and dynamic economy with higher efficiency of investment and income, it would be possible to maintain the standard of living of Bahrainis in the post oil era without too much loss of the present generation's consumption.

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APPENDIX A

DEFINITION OF VARIABLES

The model nomenclature is based on prefixes attached to each variable, except for current price flow variables in Dinars. The prefixes are:

H	Historical Data (1987-1989)
Dol	Nominal Variables denominated in US$
K	Constant Price Variables
P	Prices
Stk	Stock Variables
z	Assumptions
d	Ratios

Some variables have two prefixes. For instance, a stock denominated in US$ would have both Stk and Dol as prefixes.

Sector-specific variables and intersectoral flows are represented by the following abbreviations at the end of each variable:

b	Budgetary Government
o	Other Non-financial Public Sector
g	Consolidated Public Sector
p	Private Sector
m	Monetary Sector
f	External Sector
t	Total
cen	Central Bank
com	Commercial Bank
LF	Employment

So, for instance, Yfc_b denotes factor income of the budgetary government, and L_{mp} denotes loans from the monetary system to the private sector.

The nomenclature used for specific variables is presented next in alphabetical order. The upper-case letters are used for current prices while the lower-case letters show the variables in constant prices.

C	Consumption
COG	Current Official Grants
DC_t	Domestic Credits to Government by the Central Bank
DFI	Direct Foreign Investment
DRS	Depreciation, Interest and Retained Surplus of the Other Public Sector
Exp	Exports
GDP	Gross Domestic Product in Current Prices
GroRes	Gross International Reserves
I	Gross Investment
INT	Interest Rate

Imp	Imports
ImpC	Imports of Consumer Goods
ImpINV	Imports of Investment (or Capital) Goods
ImpINT	Imports of Intermediate Goods
IntlLiab	International Short-Terms Liabilities of the Central Bank
Knei	Foreign Capital Flows not Elsewhere Included
KOG	Capital Official Grants from Abroad
L	Domestic and Foreign Loans other than LS
LS	Short-term Foreign Loans
M1	Money Supply
QM	Quasi Money
MQM	Change in Current-Price Money Stock
N	Interest Payments on Domestic Loans and Medium-long Term Foreign loans
NFA_t	Change in Net Foreign Assets (Total)
NFA_{cen}	Change in Net Foreign Assets (Central Bank)
NFA_{com}	Change in Net Foreign Assets (Commercial Banks)
NOL_{com}	Change in Net Other Liabilities of Commercial Banks to Private Sector
h	Reserve Ratio of Commercial Banks
NS	Interest Payments on Short-term Foreign Loans
OthR	Other Revenues of the Budgetary Government Collected from the Private Sector
Prof	Profit Remittances Abroad
RG	Resource Gap
S	Saving
Sub	Subsidies paid by the Budgetary Government
T	Current Transfers
Td	Direct Taxes
Ti	Indirect Taxes
Yfc	Factor Income

National accounts constant price variables and deflators are defined as follows, where the first definition is as it appears in the model and the second, in parentheses, as it appears in the Javelin program.

Nomen-clature	Var in Javelin	Definition
E	(P ExRNIndex80)	Nominal Exchange Rate Index
P	(P ImplGDPDef80)	GDP deflator
px	(P ExpPILCU)	Domestic Price Index for Exports
p_{x*}	(P ExpPIDol)	Foreign Price Index for Exports
p_m	(P ImpPILCU)	Domestic Price Index for Imports
p_{m*}	(P ImpPIDol)	Foreign Price Index for Imports
p_{mc}	(P ImpCPELCU)	Domestic Price Index for Consumer Goods Imports
p_{mc}*	(P ImpCPIDol)	Foreign Price Index for Consumer Goods Imports
p_{minv}	(P ImpINVPILCU)	Domestic Price Index for Investment Goods Imports
p_{minv*}	(P ImpINVPIDol)	Foreign Price Index for Investment Goods Imports
p_{mint}	(P ImpINTPILCU)	Domestic Price Index for Intermediate Goods Imports
pmint*	(P ImpINTPIDol)	Foreign Price Index for Intermediate Goods Imports
p_{cb}	(P CbDef80)	Budgetary Government Consumption Deflator
p_{co}	(P CoDef80)	Other Public Sector Consumption Deflator
p_{cp}	(P CpDef80)	Private Consumption Deflator
p_i	(P ItDef80)	Total Gross Investment Deflator
y	(K GDP)	Gross Domestic Product in Constant Prices

x	(K Exp)	Exports in Constant Prices
m	(K Imp)	Imports in Constant Prices
c_o	(K Co)	Other Government Consumption in Constant Prices
c_b	(K Cb)	Budgetary Consumption in Constant Prices
c_p	(K Cp)	Private Consumption in Constant Prices
i_b	(K Ib)	Budgetary Government Investment in Constant Prices
i_o	(K Io)	Other Public Sector Investment in Constant Prices
i_p	(K I_p)	Private Investment in Constant Prices
y	(K GDP)	Gross Domestic Product in Constant Prices
PDY^p	(K DYP_p)	Permanent Disposable Income in Constant Prices
k	(Stk Cap)	Capital Stock at Constant Prices
M	(Stk M)	Money Supply
i	(INT)	Interest Rate
π	(Pi e)	Price Expectation
Ω	(Omega)	Export Subsidies
ϵ_x	(ELS X)	Export Price Elasticity
ϵ_m	(ELS M)	Import Income Elasticity
DY_p	(K DispInc)	Disposable Private Income in Constant Prices
Exp	(EXP)	Exports in Current Prices
Imp	(IMP)	Imports in Current Prices

Appendix B

Money Market Identities and Projection Rules

(C.1) $MQM = (M - M_{-1})$

(C.2) $Stk\ NOL = Stk\ NOL_{-1}\ (1 + GRNOL)$

(C.3) $NOL = Stk\ NOL - Stk\ NOL_{-1}$

(C.4) $L_{mo} = L_{mo}\%GDP.GDP$

(C.5) $L_{mp} = Stk\ L_{mp-1}(GDPNomGR.ELCvp)$

(C.6) $Nknei = Stk\ Knei_{-1} \cdot INTknei$

(C.7) $N_{fm} = Stk\ GroRes_{-1} \cdot MSEarn\ Gros\ Res - Stk\ IntLiab_{-1} \cdot MSPay\ IntLiab$

(C.8) $NFA_{oss} = GroRes - IntLiab$

(C.9) $NFA_{com} = NFA_{t} - NFA_{oss}$

PRICE BLOCK and Projection Rules

(C.10) $P = e\overset{*}{p}(NER)$ where e = RER and $\overset{*}{P}$ is international inflation

(C.11) $P_x = P_x^{*} . E$

(C.13) $P_m = P_m^{*} . E$

(C.14) $P_i = \lambda\ (P\ y - Px.x)/(y - x) + (1 - \lambda)\ P_m$

(C.15) $P_{cb} = (1 + \hat{P}_{cb})\ P_{cb-1}$

(C.16) $P_{cp} = [P.y_d - P_{cb}.c_b - P_i\ (i_b + i_o + i_p) - P_x.x + P_m.m]/c_p$

(C.17) $P_{co} = 0$

AGGREGATE DEMAND Current Prices

(C.18) $Y = C_p + C_b + C_o + I_p + I_b + I_o + X - IM$

(C.19) $C_p = P_{cp}.c_p$

(C.20) $C_b = P_{cb}.c_b$

(C.21) $C_o = 0$

(C.22) $I_p = P_i.i_p$

(C.23) $I_b = P_i.i_b$

(C.24) $I_o = P_i.i_o$

(C.25) $DY_p = [P.y + T_{bp} + T_{op} + E.(Tfc_p + COG_p + Prof) + N_{bp} + N_{op} - Td$
$- Othr - N_{pf} - NS_{pf}]/P_{cp}$

(C.26) $I_T = I_p + I_b + I_o$

INCOME IDENTITIES (Nominal Terms)

(C.27) $P \cdot y = Yfc_b + DRS + Yfc_p + Ti - Sub_b - Sub_o$

(C.28) $S = P_i \cdot I_p + P_i \cdot I_b + P_i \cdot I_o - S_f$

(Nominal national saving = Nominal gross domestic investment minus nominal foreign saving)

(C.29) $GDP = P.y$

(C.30) $Exp = P_x.x$

(C.31) $Imp = P_m.m$

AUXILIARY PROJECTION RULES

(C.31) $Td = Td\%GDP \cdot GDP$

(C.32) $Ti = Ti\ prod\%GDP \cdot GDP + Ti\ imp\%Imp \cdot Imp + Ti\ exp\%Exp \cdot Exp$

(C.33) $Yfc_b = Yfc_b\%GDP \cdot GDP$

(C.34) $OthR = OthR\%GDP \cdot GDP$

(C.35) $Sub_b = Sub_b\%GDP \cdot GDP$

(C.36) $T_{bo} = T_{bo}\%GDP \cdot GDP$

(C.37) $T_{bp} = T_{bp}\%GDP \cdot GDP$

(C.38) $L_{bp} = Lbp\%GDP \cdot GDP$

(C.39) $L_{bo} = L_{bo}\%GDP \cdot GDP$

(C.40) $I_b = I_b\%y^e \cdot y$

(C.41) $DRS = DRS\%\ GDP \cdot GDP$

(C.42) $Sub_o = T_{bo}$

(C.43) $T_{op} = T_{op}\%GDP \cdot GDP$

(C.44) $C_o = C_o\%GDP = 0$

(C.45) $L_{op} = L_{op}\%GDP \cdot GDP$

(C.46) $Prof = Prof_{-1} + (DFIProfRate \cdot DFI_{-1})$

(C.47) $T_{fp} = T_{fp}\%GDP \cdot GDP$

(C.48) $DFI = DFI\%I_p\ I_p$

Interest Payments:

(C.49) N_{ob} = Stk Lbo_{-1} · INTob

(C.50) Nbm&Nbp = Stk Lmb_{-1} · INTbm + Stk Lpb_{-1} · INTbp

(C.51) N_{bf} = Stk Lfb_{-1} · INTbf

(C.52) N_{of} = Stk Lfo_{-1} · INTof

(C.53) N_{pf} = Stk Lfp_{-1} · INTpf

(C.54) NS_{pf} = Stk $LSfp_{-1}$ · INTSpf

(C.55) Nom&Nop = Stk Lmo_{-1} · INTom + Stk Lpo_{-1} · INTop

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