TAX POLICY REFORM IN SAUDI ARABIA: A GENERAL EQUILIBRIUM ANALYSIS

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Abstract

This document analyzes the impact of reducing tariff rates and introducing a different tax structure on the economy of Saudi Arabia using a computable general equilibrium model based on a social accounting matrix for 2000 developed for the purpose of this analysis. The results show that the welfare effects and the changes in real absorption from introducing different tax structures are small. Given virtually unchanged absorption and household consumption, if the government wants to raise additional resources for investments (infrastructure, human capital, etc.), then it will initially be necessary to reduce consumption by households and, if possible, the government. The results are more positive for the simulations where other distortions are removed (so that the VAT or the other taxes are not added to existing distortions). The last simulation shows that it is potentially more fruitful and much less painful for consumers if economic policy is focused on designing schemes for making good use of oil revenue, esp. during the current boom – a 10 percent increase in world prices has far more positive and significant macro effects than the tax reforms that are analyzed in this paper.

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I. INTRODUCTION

Over the past two decades, important changes in economic policy have taken place in the Gulf Cooperation Council (GCC) countries as these countries have had to accommodate volatile and, at least until quite recently, a long-term decline in real oil prices. Following the sharp increase in global prices in the 1970s and early 1980s, the authorities in these countries recycled the windfall oil gains through a generous welfare system, and a massive public investment program in infrastructures, utilities, and basic industries, initially leading to rapid growth in non-oil activities. They also encouraged the development of these activities through fiscal incentives, including subsidized provision of electricity and water, soft loans, and low taxation (Fasano and Wang, 2001). Like in the other GCC countries, oil wealth has made possible rapid economic development in Saudi Arabia, which began in earnest in the 1960s and accelerated spectacularly in the 1970s, transforming the kingdom. Oil accounts for more than 90% of the country's exports and nearly 75% of government revenues. Due to a sharp rise in petroleum revenues in 1974 following the 1973 Arab-Israeli war, Saudi Arabia became one of the fastest-growing economies in the world (Ghamdi, 1991). It enjoyed a substantial surplus in its overall trade with other countries; imports increased rapidly; and ample government revenues were available for development. However, at the beginning of the mid-1980s, worldwide oil demand decreased, and Saudi oil production, which had increased to almost 10 million barrels per day (b/d) during 1980-81, dropped to about 2 million b/d in 1985. Budgetary deficits developed, and the government drew down its foreign assets. Responding to financial pressures, Saudi Arabia gave up its role as the 'swing producer' within OPEC in the summer of 1985 and accepted a production quota. Since then, Saudi oil policy has been guided by a desire to maintain market stability and quotas shares. However, beginning in late 1997, Saudi Arabia again faced the challenge of low oil prices. Due to a combination of factors, mainly the East Asian economic crisis and an increase in non-OPEC oil production, demand for oil slowed and pulled oil prices down by more than one third.

Overall, and in the absence of alternative financing opportunities (e.g. via the domestic tax system), when oil prices go down governments have tried to cut expenditure or raise non-oil revenues. In practice, in Saudi Arabia, government revenues,

expenditures and deficits have all fluctuated considerably from year to year. Given the vulnerability of public finances to volatile oil prices, there is a push, within the government to: (i) establish a domestic tax system; (ii) rationalize expenditures by reducing the public-sector wage bill; (iii) better manage public resources; and (iv) raise user charges. In reality, and during periods of declining oil prices, cuts in capital outlays were typically the first line of defense because these outlays are generally import-intensive, and because eliminating investment projects can be politically and socially easier to implement than reducing current outlays, such as the wage bill or subsidies (Fasano and Wang, 2001 and 2002). In fact, despite the declining trend in oil revenue during much of the past two decades, the wage bill has grown continuously – reflecting the role of the government as the main provider of jobs for nationals. Conversely, during periods of rising oil prices, current expenditure rather than capital spending has tended to increase (Fasano and Wang, 2001). In order to absorb the Saudi "youth bulge" into productive employment, the Saudi economy needs to grow substantially faster than the population growth rate, which exceeds 3%. In order to achieve this, diversification and rapid growth in the non-oil economy are necessary. The government no longer has sufficient resources to act as employer of last resort and provide the funding needed for basic infrastructure. Furthermore, the government decision in May 2001 to reduce applied tariff rates on most imports to 5% resulted in lower customs receipts, adding to the need to find new revenue sources. The Finance Ministry is considering new ways to increase non-oil revenues including the introduction of a value added tax or a sales tax. It aims at designing these taxes in a manner that minimizes disincentives for private domestic foreign investors, who are urgently needed to develop and diversify the Saudi economy. The International Monetary Fund (IMF 2001, 2002 and 2003) has recommended the introduction of excise duties on selected consumer goods to compensate partly for the loss of customs revenues arising from the adoption of the Custom Union by the GCC and to reduce the dependency of the public budget on oil incomes. The IMF has endorsed the plans of the Saudi authorities to eliminate budget deficits and reduce public debt over the medium term by taking decisive measures on both the revenue and expenditure fronts, in particular by mobilizing non-oil revenues. The assessment emphasized that achieving a balanced budget over the medium term will

call for comprehensive expenditure restraint and skillful expenditure management, and supported the authorities' intention to reduce discretionary expenditures, further reduce subsidies in a transparent and coherent framework, enforce a cap on the wage bill, and reduce government employment. Implementation of these measures is expected to improve the structure of the budget and enhance the resistance of the fiscal situation to oil price fluctuations.

Using a computable general equilibrium (CGE) model of Saudi Arabia, this paper will analyze some issues related Saudi's dependence on oil and its fiscal reform plan. More specifically, we will analyze the potential impact on the Saudi economy of various tax scenarios. The CGE model provides a simulation laboratory for doing controlled experiments on the Saudi economy, changing parameters and exogenous variables and computing the impact of those changes on the economy. The results of these experiments provide information about the empirical magnitudes of such impacts, linking them to changes in the economic environment (e.g., world prices) and/or particular policy instruments. The use of simulation models to do "counterfactual experiments" is very useful for policy analysis, allowing the analyst to isolate the impact of particular policy changes or exogenous shocks. Such experiments, however, do not provide forecasts of how an economy will change over time—forecasting requires projections of changes in all exogenous variables and parameters, while counterfactual simulations involve changing only a few, selected, exogenous variables and parameters.

We will proceed as follows: Section 2 describes some aspects of Saudi's economic structure, drawing on the Social Accounting Matrix (SAM) of Saudi Arabia around which the model is built. Section 3 presents the main features of the government budget and the fiscal policy in Saudi Arabia. Section 4 describes the CGE model used in this study. Section 5 present and analyze our simulations of changes in tax policy and Section 6 concludes.

II. STRUCTURE OF THE SAUDI ECONOMY

The economic situation in Saudi Arabia is quite unique. Per capita GDP has eroded substantially since 1981, when the United States and Saudi Arabia had comparable per capita GDP figures of about $15,600. By 2002, U.S. per capita GDP had

risen to about $38,000 while that of Saudi Arabia had dropped to $8,530. Following healthy economic growth in 2000 due to high oil production and oil prices, the Saudi economy grew at a slower pace in 2001 and 2002 in response to weakened global demand for oil and a modest growth rate in the non-oil sectors.

Typically, oil GDP represents a high share of total GDP in the economy. During the last six years, its contribution to total GDP averaged 36 percent, while the corresponding figure for the non-oil sector (which here and in the rest of this paper is defined to include the entire non-oil economy, both private and public, except for government administration) averaged 41 percent during the same period. The government sector continues to occupy a large share of the Saudi GDP with an average of 22.7% (cf. Table 1). Year-to-year changes in the GDP shares for these three sectors are driven by changes in oil incomes.

Table 1: Distribution of GDP at factor cost by Sectors (%)

	1997	1998	1999	2000	2001	2002	Average 1997-2002
Oil	37.5	28.5	33.5	41.5	37.6	37.5	36
Non-Oil	39.7	45.7	42.9	38	40.5	41	41.3
Government	22.8	25.8	23.6	20.5	21.9	21.5	22.7
Total	100	100	100	100	100	100	

Source: Author's calculations

Tables 2 and 3 provide information on the structure of the Saudi economy. The data are from 2000. Table 2 shows a macro social accounting matrix (SAM), which is a tabular presentation of the national accounts. Each entry represents a payment by a column account to a row account, and the corresponding row and column sums must be equal. They represent the income and expenditure accounts of various economic actors, and the SAM effectively shows the circular flow of income and expenditure from producers through factor markets to different non-government institutions (households, enterprises, and the rest of the world and back to producers through commodity markets. The CGE model is based on a more detailed SAM (a "micro" SAM), with disaggregation of activities, commodities, factors, and domestic non-government institutions, and a

macro savings-investment account (S-I). The (rest of the) world is also an actor, buying exports, selling imports, and providing and receiving transfers and factor income. In the SAM, GDP at factor cost is the payment by activities to factors (692.2 billion SR). Government revenue is shown along the government row, and is largely from oil (factors to government and private institutions to government) and receipts from investments abroad (world to factors, factors to government). Tax revenue is a very small share of total government revenue. Domestic non-government savings represents about 77% of aggregate investment. Exports (rest of world payment to commodities) represent 42% of GDP, while imports (commodity payments to rest of world) are much smaller, reflecting the fact that Saudi Arabia has a large current account surplus, equivalent to large negative foreign savings (negative payment from the rest of the world to the savings-investment account).

Table 3, which is derived from the micro SAM, provides information about the sectoral structure of value added, output, and trade. Oil represents 39.9% of total value added and the second largest sector, real estate and related services, represents 8.9%, followed by the government services (which only accounts for part of the public sector) with 7.5%. Imports are concentrated in other manufacturing products (33.5% of total imports) followed by textiles, wearing apparels and leather industries (12.6% of total imports). Exports are concentrated in crude petroleum and natural gas (78% of total exports), petroleum refining (11.3%) and other chemical products (5.6%).

Table 2. Saudi macro SAM, 2000 (billion SR)

	Activities	Commodities	Factors	Dom. Non-Gov't	Govern-ment	Indirect Taxes	Savings-Investment	Rest of World	Tariffs	Total
Activities		1084.4								1084.4
Commodities	379.5			253.7	183.8		140.1	297.5		1254.7
Factors	692.2							31.3		723.5
Domestic. Non-Gov't Institutions.			723.5	104.4	5.5			5.5		838.9
Government				235.7		12.7			9.7	258.1
Indirect taxes net of subsidies	12.7									12.7
Savings-Investment				107.7	22.7			9.7		140.1
Rest of World		160.6		137.3	46.0					343.9
Tariffs		9.7								9.7
Total	1084.4	1254.7	723.5	838.8	258.0	12.7	140.1	344.0	9.7	

Source: Social Accounting Matrix for Saudi Arabia 2000
Note: Data are rounded to one decimal point

Table 3. Economic structure in 2000 (%)

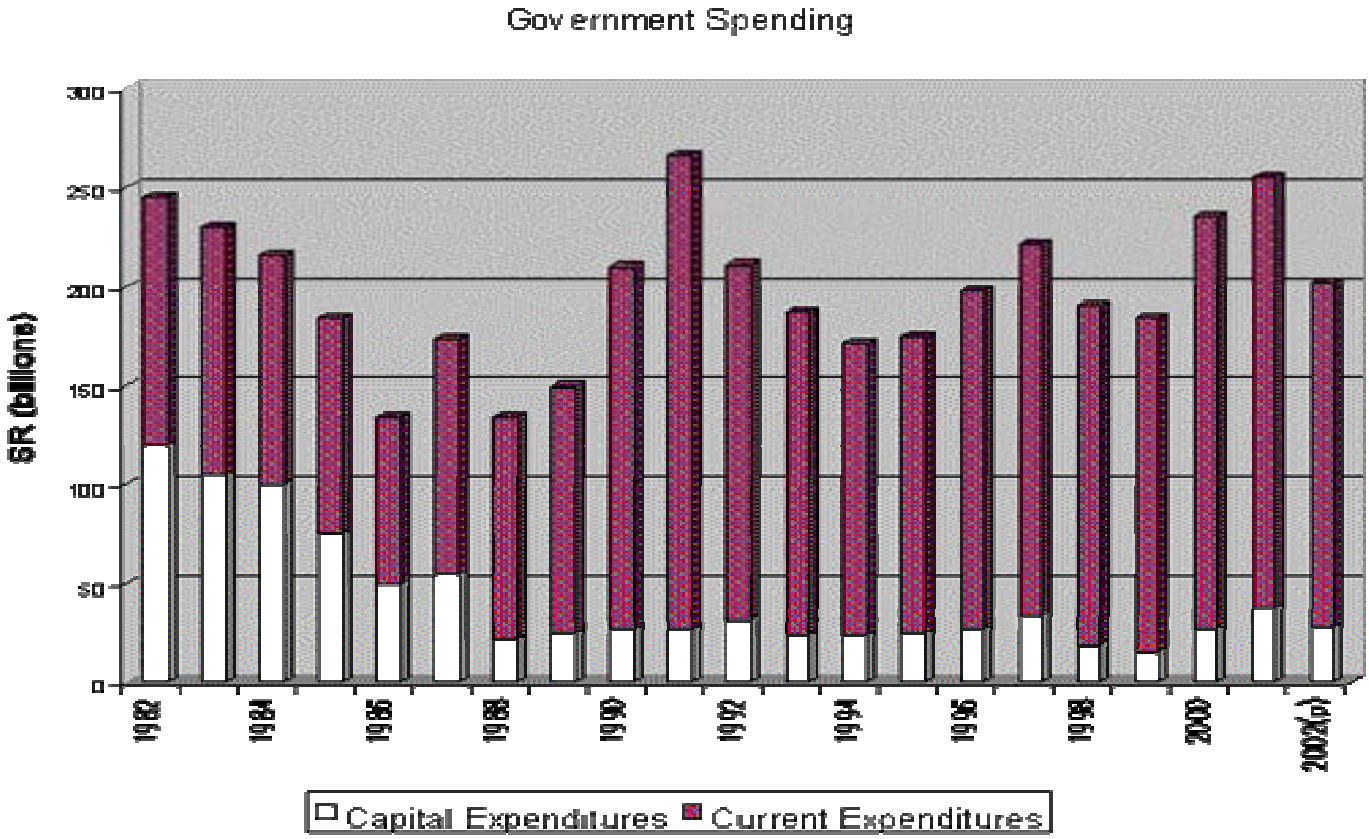
	Value added (VA)	Output (X)	Exports (E)	Export/ Output (E/X)	Imports (M)	Import/final demand (M/Q)
Agricultural, hunting and forestry	4.9	4.3	0.1	0.5	3.7	14.8
Fishing	0.2	0.2	0.0	0.0	0.0	0.0
Crude petroleum and natural gas	36.9	25.8	78.0	82.9	0.0	0.0
Other mining and quarrying	0.4	0.3	0.0	4.1	0.5	80.2
Petroleum refining	3.0	5.0	11.3	62.1		2.0
Food, beverages and tobacco	0.2	1.5	0.6	11.1	0.1	58.6
Textiles, wearing apparels and leather industries	0.3	0.3	0.2	15.9	12.6	80.7
Wood, wood products, and furniture	0.2	0.3	0.0	0.0	4.7	68.1
Paper products, printing and publishing	0.3	0.5	0.2	11.6	2.2	21.2
Other chemical products (except petroleum refining)	5.6	7.5	5.6	20.4	0.4	28.6
Basic metal industries, fabricated metal products, machinery and equipment	1.6	2.4	1.5	17.2	9.2	86.6
Other manufacturing industries	0.7	2.3	0.1	1.8	33.5	20.8
Electricity, gas, and water supply	0.7	0.8	0.0	0.0	3.5	0.0
Construction	3.8	8.5	0.1	0.4	0.0	4.8
Wholesale and retail trade; repair of motor vehicles and personal household goods	4.9	6.0	0.1	0.3	1.7	82.6
Hotels and restaurants	1.8	1.4	0.1	2.3	3.4	17.3
Transport, storage, and communications	4.5	5.7	1.8	8.7	1.5	129.1
Financial institutions	2.0	1.7	0.1	0.9	12.4	579.0
Real estate, renting and business activities	8.9	6.2	0.1	0.6	2.5	13.6
Public administration and defense, compulsory social security	7.5	8.6	0.0	0.0	2.8	9.2
Education	6.9	5.2	0.0	0.0	5.2	0.0
Health and social work	2.6	3.3	0.0	0.0	0.0	0.0
Other community, social and personal activity	1.6	1.8	0.0	0.7	0.0	0.0
Private households with employed persons	0.6	0.4	0.0	0.0	0.0	0.0
Total	100.00	100.00	100.00	27.4	100.00	27.8

Source: Social Accounting Matrix for Saudi Arabia 2000.
Note: Data are rounded to one decimal point.

III. OVERVIEW OF GOVERNMENT BUDGET AND FISCAL POLICY

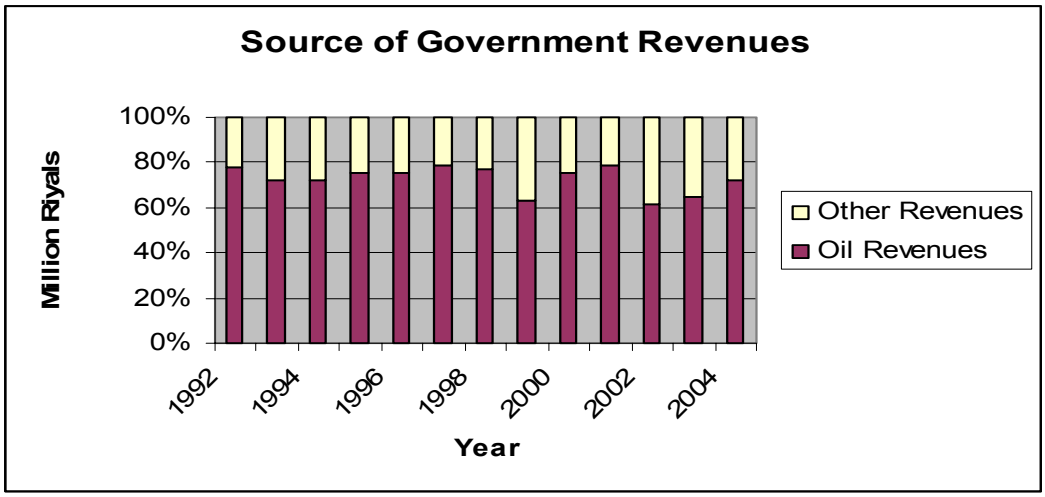
The Saudi budget planning process is opaque. Little is known about the method of planning and the actual breakdown of anticipated revenues and expenditures. Some items are off budget. Most important, the forecast for oil revenues, which represents approximately 75% of total current revenues, is not officially released. Typically, current expenditures (wages, debt servicing, supplies and maintenance) make up the bulk of the budget while current capital expenditures for infrastructure investment are a declining share (cf. Figure 1).

Figure 1: Government Current and Capital Spending 1982-2002 (billion SR)



Source: Ministry of Planning, Saudi Arabia (2003b)

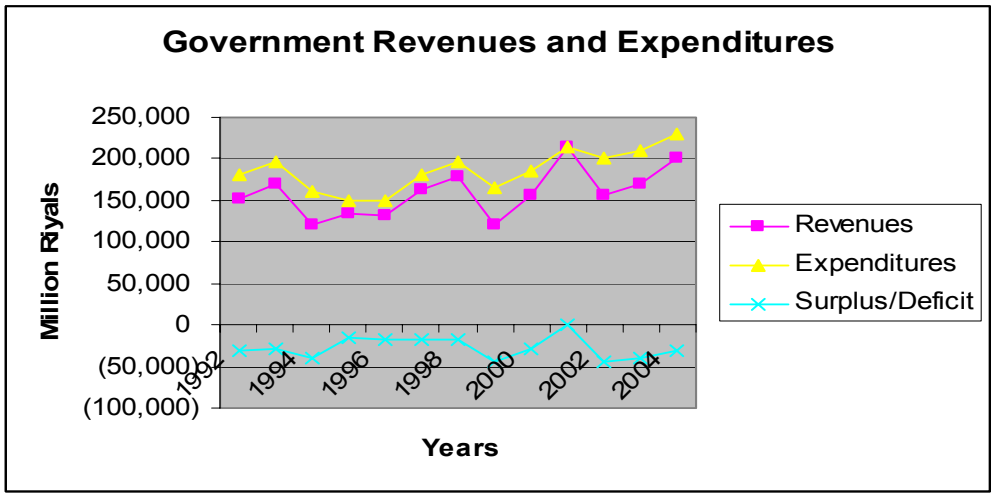
Figure 2 shows that oil income accounts for nearly 75% of government revenues in 2004. During the last decades, the contribution of the oil sector to government revenues as varied between 62% in 2002 and nearly 80% in 1992 and 1998. This contribution is positively correlated with the Saudi oil export quota and the average international oil price during every year.



Source: Ministry of Planning, Saudi Arabia (2003b)

In 2001, rather than the balanced budget projected, the government ran a $6.7 billion deficit equal to 4% of GDP as oil revenues fell, non-oil revenues remained sluggish, and expenditures increased. Increased borrowing to finance the deficit led to resumption in the buildup of government domestic debt, which by mid-2001 had risen to 92% of GDP. Given that oil revenues exceeded projections, this deficit increase reflected a sever overshooting of spending relative to plans. In 2002, the fiscal position weakened despite some strengthening of fiscal effort. The overall central government budget deficit increased to 6% of GDP as oil revenues fell and non-oil revenues showed only a small increase. However, the non-oil primary deficit fell in 2002. Government domestic debt rose to 97% of GDP by end 2002. A simple calculation is sufficient to show the importance of oil revenues in the government budget: every $1 increase in the average price per barrel results in an additional $2.5 billion in annual oil revenues for the central government.[2] Given this continued government budget deficit, Saudi Arabia's public sector debt-to-GDP ratio was about 118% at the end of 2001. Regarding the sectoral distribution of government spending, defense and national security currently absorbs almost 40% of the budget. Figure 3 shows the recent trends in government revenues, expenditures, and surpluses (deficits).

[2]This estimation is based on the Saudi Arabia's quota of slightly more than 7 million barrel/day during the year 2003.



Source: Ministry of Planning, Saudi Arabia (2003b)

III.1. Taxation Policy: Saudi Arabia has a very liberal tax system. The few taxes paid by individuals and companies are set at very low rates. Income taxes of Saudi and expatriate employees were abolished in 1975. All Saudi citizens and all Saudi companies, however, must pay a religious tax – Zakat – of 2.5% annually on profits and on the assessable amount for individuals. In general, Saudi law requires that all foreign and Saudi companies pay a tax on profits earned in the country. Companies with joint-ventures having at least 25% Saudi ownership are exempt from income tax for a period of ten years. Different tax rates are applied to companies working in petroleum industries. In May 1993, the government decided that all foreign companies that are actively involved in the capital expansion of various industrial projects in Saudi Arabia will be exempted from paying taxes on profits made in the country in order to stimulate foreign participation in industrial projects and in technology transfer. Currently, no local, regional, property or other sales taxes are imposed. Corporate tax is levied on net income. Saudi corporate tax rates range from 25% (on annual taxable income of up to SR 100,000) to 45% (on annual taxable income of over SR 1 million).

One of the main tax instrument used by Saudi Arabia is custom duties. Until recently (December 2002), some Saudi industries (such as aluminum or wooden frames) were protected by moderately high import duties, at 20%. Most consumer goods, however, were (and remain) duty-free. Other items carried duties of 12% of the total cost (including insurance and freight). The adoption of the Custom Union by the GCC in January 2003 has changed the tariff structure in the country. Under this agreement, tariffs have been reduced from 20% and 12% to a uniform 5% for 92% of

imported items throughout the GCC, with the proceeds to be shared among the member countries on the basis of a pre-approved formula.

In line with Saudi government directives and in order to support Saudi businesses, contractors must buy equipment and materials from a Saudi importer or manufacturer. If supplies are not available locally, the contractors are allowed to import from foreign sources. Many exemptions are in force given that, in general, contracts provide for duty-free imports of supplies and machinery.

III.2. Subsidizing Policy: Saudi government intervention in economic activities has taken many forms, one of these forms was the subsidies that have been provided to goods and services, in an effort to encourage some industries, lower prices of selected goods and services, and to redistribute incomes. But those subsidies have caused over-utilization of available resources and misuses of public services (electricity, gas, fuel, water, telephone services, etc.). In the long run, the continuation of this situation is not sustainable, in particular given that these expenditures create instability and inefficiencies in many sectors. Together with other protective policies, subsidies benefiting both consumers and producers have aimed at ensuring low and stable prices for essential foodstuffs and basic services, achieving social objectives in the health and education areas, and promoting industries.

Explicit subsidies through the budget have generally included cash payments to farmers and to utility companies to cover their operating losses. There are substantial implicit subsidies in the form of free or below-cost provision of government services (utilities, education, health, transportation, and sector-specific inputs). It has generally proved difficult to quantify the magnitude of implicit subsidies or their effectiveness. As example of the importance of subsidizing policy in Saudi Arabia, the government provides water at a highly subsidized rate, only representing 60-70% of its actual cost.

IV. THE STRUCTURE OF THE CGE MODEL FOR SAUDI ARABIA.

There is in increasing number of studies which has used CGE model for evaluating the efficiency and equity aspects of introducing an optimal value-added tax. Devarajan (1989) surveys the use of CGE models for tax analysis in developing countries till the year 1988. Shoven and Whalley (1972, 1973) were the first to analyze taxes using a full general equilibrium computational procedure. In their 1972

paper, an artificial commodity is used to incorporate the tax distortions, which effectively limits the applicability of the analysis to one tax at a time. In 1973, they developed a procedure to deal with several simultaneous tax distortions without using artificial commodities. Their work has been applied in some models by Whalley (1977) on UK, Piggott and Whalley (1976) on Australia and Karadag-Westaway (1999) on Turkey. In a well-known study, Ballard et al. (1985) applied a CGE model to analyze the United State tax system. More recently a study by Lofgren et al. (2004) analyzes various scenarios of fiscal reform in Kuwait. Their study includes scenarios related to reduction in subsidy on water and electricity, and the introduction of value-added and personal income taxes.

The model used in this study is based on the static CGE model built for Kuwait by Lofgren et al. (2004). The Saudi standard CGE model explains all of the payments that are recorded in the SAM with which it is associated.[3] The model therefore follows the SAM disaggregation of factors, activities, commodities, and institutions. In its mathematical form, the CGE model is a system of simultaneous, non-linear equations. The equations define the behavior of the different actors. In part, this behavior follows simple rules captured by fixed coefficients (for example, *ad valorem* tax and subsidy rates). For production and consumption decisions, behavior is captured by non-linear, first-order optimality conditions – that is, production and consumption decisions are driven by the maximization of profits and utility, respectively. The equations also include a set of constraints that have to be satisfied by the system as a whole but which are not necessarily considered by any individual actor. These constraints cover markets (for factors and commodities) and macroeconomic aggregates (balances for savings-investment, the government, and the current account of the rest of the world).

Regarding the domestic supply, each producer (represented by an activity) is assumed to maximize profits, defined as the difference between revenue earned and the cost of factors and intermediate inputs. Profits are maximized subject to constraints that capture the production technology and optional rigidities in factor employment. At the top level, the technology is specified by a constant elasticity of substitution (CES) function or, alternatively, a Leontief function of the quantities of value added and aggregate intermediate input. Value added is itself a CES function of

[3] Lofgren et al. (2002) includes a more detailed explanation of most features of the Saudi standard CGE model.

primary factors whereas the aggregate intermediate input is a Leontief function of disaggregated intermediate inputs. Each activity produces one or more commodities according to fixed yield coefficients. As noted, a commodity may be produced by more than one activity. Revenue of the activity is defined by the level of the activity, yields, and commodity prices at the producer level. Factor incomes are distributed to domestic and foreign institutions in fixed shares that are defined by factor and activity.

The user can choose between alternative factor market closures (mechanisms for equilibrating supplies and demands in factor markets). According to the default closure, the quantity supplied of each factor is fixed at the observed level of total employment. An economy-wide wage variable is free to vary to assure that the sum of demands from all activities equals the quantity supplied. Each activity pays an activity-specific wage that is the product of the economy-wide wage and an activity-specific wage (distortion) term. For the default closure, the activity-specific terms are fixed. Alternatively, it is possible to assume that a factor is unemployed and the real wage is fixed. This assumption may, for example, be appropriate in settings where there is considerable unemployment for a given labor category. Compared to the default closure, the only change is that the economy-wide wage variable is fixed (or exogenized) while the supply variable is "flexed" (or endogenized). Each activity is free to hire any desired quantity at its fixed, activity-specific wage (which, implicitly, is indexed to the model numéraire). In this setting, the supply variable is superfluous; it merely records the total quantity demanded (and employed). Under a third closure, the factor market is segmented and each activity is forced to hire the observed, base-year quantity – that is, the factor is activity-specific. This closure may be preferred in short-run analyses and/or when there are significant quality differences between the units of a factor that are used in different activities. For this case, the quantities of activity-specific factor demands and the economy-wide wage are fixed while the activity-specific wage terms and the supply variables are flexible. A fourth closure, which is an extension of the third closure, imposes that, for factors with a fully segmented market, not only the quantity employed by each activity but also the wage paid is exogenous. This closure may be appropriate for Saudi labor, especially in short-run simulations. In order to assure that total factor payments be equal to total value added for activities employing such an activity-specific, fixed-wage factor, it is

necessary to specify one factor (most appropriately a capital or land factor) as the recipient of residual value added.

In the CGE model, institutions are represented by households, enterprises, the government, and the rest of the world. The households (disaggregated as in the SAM) receive income from the factors of production (directly or indirectly via the enterprises) and transfers from other institutions. More specifically, each household receives fixed shares of factor income flows (disaggregated by factor and source, either domestic activities or the rest of the world). Transfers from the rest of the world to households are fixed in foreign currency. The households use their income to save, consume, and make transfers to other institutions. In the current model, direct taxes and transfers to other institutions (both domestic and the rest of the world) are defined as fixed shares of household income whereas the savings share is flexible for selected households. Household consumption, at market prices (adjusted for taxes and subsidies) is allocated across different commodities according to linear expenditure system (LES) demand functions, derived from maximization of a Stone-Geary utility function. Instead of being paid directly to the households, factor incomes may be paid to one or more enterprises. Enterprises may also receive transfers from other institutions. Enterprise incomes are allocated to savings and transfers to other institutions. Enterprises do not consume. Apart from this, the payments to and from enterprises are modeled in the same way as the payments to and from households. The government collects taxes and receives transfers from other institutions. In the current model, all taxes are at fixed *ad valorem* rates. Transfers from the rest of the world are exogenous in foreign currency whereas transfers from domestic institutions are fixed shares of the net (post-tax and post-savings) incomes of these institutions. The government uses this income to finance its own consumption, commodity subsidies, and transfers to other institutions. Government consumption is fixed in real (quantity) terms whereas government transfers to domestic institutions (households and enterprises) are CPI-indexed. Government savings (the difference between government income and spending) is a flexible residual. The final institution is the rest of the world. In addition to transfer payments from the rest of the world to domestic institutions and factors (which all are fixed in foreign currency), Saudi Arabia receives payments from the rest of the world for exports. Saudi Arabia spends foreign exchange on transfers to the rest of the world and imports. Foreign savings (or

the current account deficit) is the difference between foreign currency spending and receipts.

Commodities pass through a chain, the first stage of which consists of generating aggregated domestic output from the output of different activities of a given commodity. These outputs are imperfectly substitutable, as a result of, for example, differences in timing, quality, and location between different activities. A CES function is used as the aggregation function. The demand for the output of each activity is derived from the problem of minimizing the cost of supplying a given quantity of aggregated output subject to this CES function. Activity-specific commodity prices serve to clear the implicit market for each disaggregated commodity. At the next stage, aggregated domestic output is allocated between exports and domestic sales on the assumption that suppliers maximize sales revenue for any given aggregate output level, subject to imperfect transformability between exports and domestic sales, expressed by a constant elasticity of transformation (CET) function. In the international markets, export demands are infinitely elastic at given world prices. The price received by domestic suppliers for exports is expressed in domestic currency and adjusted for the transactions costs (to the border) and export taxes (if any). The supply price for domestic sales is equal to the price paid by domestic demanders minus the transactions costs of domestic marketing (from the supplier to the demander) per unit of domestic sales. If the commodity is not exported, total output is passed to the domestic market.

Domestic demand is made up of the sum of demands for household consumption, government consumption, investment, intermediate inputs, and transactions (trade and transportation) inputs. If the supply of a commodity destined for domestic use is made up of both imports and domestic output, then all domestic market demands are for a composite commodity made up of imports and domestic output, the demands for which are derived on the assumption that domestic demanders minimize cost subject to imperfect substitutability. Total market demand is directed to imports for commodities that lack domestic production and to domestic output for non-imported commodities. Demander prices are adjusted for commodity taxes and subsidies. The derived demands for imported commodities are met by international supplies that are infinitely elastic at given world prices. The import prices paid by domestic demanders also include import tariffs (at fixed *ad valorem* rates). Similarly, the derived demand for domestic output is met by domestic

suppliers. Flexible prices equilibrate demands and supplies of domestically marketed domestic output.

V. TARIFFS AND TAX SIMULATIONS

The tax experiments are described in Table 4. They are divided into five groups. The first group consists of a single simulation where we introduce a uniform tariff at 5% as stipulated by the Customs Union Agreement between the GCC countries. The second group includes two simulations. In the first, in addition to a uniform tariff rate of 5%, a uniform value added tax of 10 percent is imposed. In the second simulation, the VAT rate is 15 percent instead of 10%.

The third group of simulations involves the simultaneous imposition of a selected tax structure and the uniform tariff rate of 5 percent. Government savings is fixed at the level attained in the simulation with a 5% tariff rate and a 10% VAT. The fourth group of simulations involves eliminating all distorting taxes (import tariffs, and taxes and subsidies on gross output), and introducing an additional tax in order to achieve the objective of keeping government savings at the same level as the one imposed in the third group of simulations. Finally, in the last simulation, in order to provide a comparative perspective, we conduct a simulation where we introduce a 10 percent increase in the export price for crude and refined oil.

In all simulations, foreign savings, real government consumption, and real investment are fixed while the real exchange rate and household saving rates are flexible. In each simulation, the objective of keeping government saving at a given level is achieved by means of a major policy tax tool, except in the first, second, and fifth simulation groups, where the objective is limited to the evaluation of the effects of reducing tariffs, introducing a VAT, or increasing the export oil price. The macro results of these experiments are summarized in Table 5. Tables 6 and 7 provide additional details on government tax revenue and real household consumption (welfare indicators). Appendix Tables 1 and 2 show the different tax rates in the tax simulations.

Table 4: Assumptions for simulations

Simulation	Description
1st Group: TARCUT	* Imposing a uniform tariff of 5%
2nd Group	
TVA10-UNI	* uniform tariff rate of 5%; uniform VAT of 10%
TVA15-UNI	* uniform tariff rate of 5%; uniform VAT of 15%
3rd Group	
* TVA-DIST	* uniform tariff rate of 5%; same government saving as TVA10-UNI, endogenous distorted VAT
* TDIR	* uniform tariff rate of 5%; same government saving as TVA10-UNI; endogenous direct tax on households
* TSAL-UNI	* uniform tariff rate of 5%; same government saving as TVA10-UNI; endogenous uniform sales tax
* TSAL-DIST	* uniform tariff rate of 5%; same government saving as TVA10-UNI; endogenous distorted sale tax
4th Group	
* TVA-UNI0	* same government saving as TVA10-UNI, uniform VAT; removal of all other distorting taxes
* TVA-DIST0	* same government saving as TVA10-UNI, endogenous distorted VAT, removal of all other distorting taxes* same
* TDIR0	government saving as TVA10-UNI, endogenous direct tax on households, removal of all other distortions.
* TSAL-UNI0	* same government saving as TVA10-UNI, imposing uniform sales tax for adjustment and removing of all other distortions.
* TSAL-DIST0	* same government saving as TVA10-UNI, imposing a distorted sales tax for adjustment and removing of all other distortions.
5th Group: PWEOIL+10P	* 10% increase in export price for crude and refined oil.

Note: In all simulations, foreign savings, government consumption and investment demand are fixed. Exchange rate is flexible and saving rates for households vary.

Table 5: Results of simulations: macro-indicators

	BASE	TARCUT 3	TVA10-UNI	TVA15-UNI	TVA-DIST	TDIR	TSAL-UNI
Real absorption	638.2	0.024	-0.018	-0.05	-0.033	0.026	0.02
Real household consumption	331.1	0.046	-0.035	-0.097	-0.064	0.049	0.038
Total real exports	296.3	0.03	-0.979	-1.440	-1.023	0.031	0.008
Total real imports	159.4	0.056	-1.82	-2.678	-1.901	0.058	0.015
Real exchange rate	100	-0.456	-6.55	-9.287	-5.039	-0.356	-0.227
Government savings	22.7	18.983	62.012	83.233	62.012	62.012	62.012
Direct taxes						42.618	
Import taxes	9.6	7.982	7.282	6.976	7.286	7.99	7.561
Value added tax			81.771	120.161	47.024		
Sales tax							54.008

Notes: Base values in billions of SR unless otherwise indicated: indices are set at 100. Non-base values are % change from base.

Base values are rounded to one decimal point

Table 5: Results of simulations: macro-indicators (Continued)

	TSAL-DIST	TVA-UNIO	TVA-DISTO	TDIR	TSAL-UNI0	TSAL-DIST0	PWEOIL+10P
Real absorption	0.012	0.007	-0.015	0.042	0.033	0.028	4.154
Real household consumption	0.023	0.014	-0.028	0.081	0.064	0.054	8.006
Total real exports	0.01	-0.688	-0.737	0.589	0.558	0.561	-1.366
Total real imports	0.018	-1.278	-1.37	1.096	1.037	1.043	14.088
Real exchange rate	-0.386	-4.934	-2.916	2.908	3.084	2.871	-5.608
Real government saving	62.012	62.012	62.012	62.012	62.012	62.012	62.012
Direct taxes				52.65			37.783
Import taxes	7.464						9.756
Value added tax		100.956	57.514				
Sales tax	45.325				65.984	55.103	

The first simulation (TARCUT 3) evaluates the impact of setting a uniform tariff rate of 5% instead of the current tariff rates which averaged 8%. On the macro level, total absorption and real household consumption were improved at a very small rate. But at a detailed level, real household consumption falls for Saudi but grew up for non-Saudi households (-0.2 percent compared to about 1 percent). The effect is also so small on the government revenue where tax revenue passed from 222.236 to 220.713 billions of SR. Given the low tariff rates applied in Saudi Arabia in 2000, the reduction of tariff rates in the context of custom union with the other GCC countries will not affect the economy. The effect is too small to be considered as a real challenge both for government revenue or domestic competitiveness.

Both the second and the third simulations use a uniform tariff rate of 5 percent complemented by the introduction of VAT at two rates: 10 and 15%. Like the first simulation, the macro effect still very small. Tax revenue for the government grew up from 222.2 billions SR in the base year to 262.9 with a 10% VAT and to 283.7 billions SR. Tax revenue contribution in the current government income grew up from 10.1 percent in the base to 38.4 in the second scenario (TVA10-UNI) and to 49.1 percent in the third scenario (TVA15-UNI). In both scenarios, the changes in real household consumption are larger than the first simulation, with an increase of 2.3 and 3.7 percent respectively for VAT rates of 10 and 15 percent for Saudi-Household compared to a fall of 8.6 and 14.1 percent for non-Saudi households respectively where VAT rates are 10 and 15 percent. The reason for this shift in real household consumption is due to the fact that the non-Saudi households are assumed to keep transfers to the rest of the world unchanged.

Table 6: Results of simulations: government tax revenue

	BASE	TARCUT3	TVA10-UNI	TVA15-UNI	TVA-DIST	TDIR	TSAL-UNI
Direct taxes						42.6	
Import taxes	9.6	8.0	7.3	7.0	7.3	8.0	7.6
VAT			81.8	120.2	47.0		
Tax on output	12.7	12.9	12.4	12.2	12.5	12.9	12.2
Sales tax							54.0
Total Tax Income	22.4	20.8	101.5	139.4	66.8	63.5	73.7
Total current Income	222.2	220.7	262.9	283.7	251.9	263.6	262.4
Tax In./Total C. In.	10.1%	9.4%	38.6%	49.1%	26.5%	24.1%	28.1%

Notes: Values in billions of SR.
Data are rounded to one decimal point

Table 6: Results of simulations: government tax revenue (Continued)

	TSAL-DIST	TVA-UNIO	TVA-DISTO	TDIRO	TSAL-UNIO	TSAL-DISTO	PWOIL+10P
Direct taxes				52.7			37.8
Import taxes	7.5						9.8
VAT		101.0	57.5				
Tax on output	12.0						12.7
Sales taxes	45.3				66.0	55.1	
Total Tax Income	64.8	101.0	57.5	52.7	66.0	55.1	60.3
Total current Income	251.0	265.4	251.9	266.4	264.9	250.8	263.1
Tax In./Total C. In.	25.8%	38.0%	22.8%	19.8%	24.9%	22.0%	22.9%

Table 7: Results of simulations: real household consumption

	BASE	TARCUT3	TVA10-UNI	TVA15-UNI	TVA-DIST	TDIR	TSAL-UNI
Saudi Households	261.3	-0.219	2.271	3.665	2.187	2.37	2.714
Non-Saudi Households	69.9	1.038	-8.657	-14.163	-8.485	-8.629	-9.965
TOTAL	331.1	0.046	-0.035	-0.097	-0.064	0.049	0.038

Notes: Base values in billions of SR. Non-base values are % change from base.
Base values are rounded to one decimal point

Table 7: Results of simulations: real household consumption (continued)

	TSAL-DIST	TVA-UNI0	TVA-DIST0	TDIR0	TSAL-UNI0	TSAL-DIST0	PWEOIL+10P
Saudi Households	2.793	2.779	2.725	2.989	3.338	3.432	6.983
Non-Saudi Households	-10.333	-10.327	-10.326	-10.79	-12.176	-12.578	11.834
TOTAL	0.023	0.014	-0.028	0.081	0.064	0.054	8.006

The third set of simulations uses in addition to the uniform tariff rate of 5 percent a new tax instrument to generate the target fixed government saving as in the second simulation (TVA10-UNI). The first tax instrument used is a distorted VAT while the second is a direct tax on household income and the third is a uniform sales tax and the last is a distorted sales tax. These simulations causes a depreciation of the real exchange rate and a quasi unchanged exports and imports, except in the TVA-DIST scenario, where a declines in both imports and exports is registred, which is the expected result of introducing a distorting commodity-level tax. Overall, the government generates additional resources without compromising the economic situation (Table 6). Compared to the previous simulations, real non-Saudi consumption fall much higher (Table 7).

The fourth set of simulations tests the effect of eliminating all distorting taxes (tax on output and import tariffs), keeping the government saving at its level in the second scenario by using a selected tax structure. The tax instruments introduced include a uniform VAT, a distorting VAT, a direct tax on household, a uniform sales tax, and a distorting sales tax. The results of these simulations are more positive (but still small), which is also expected where other distortions are removed so that the new tax (VAT and sales tax) are not added to existing distortions. The trend is almost the same as in all previous scenarios: small macro effects, a high improvement in tax revenue for the government and a fall in the welfare of non-Saudi households.

The last scenario, which evaluates the effect of a 10 percent increase in world prices in real terms for crude and refined oil, has far more positive macro effects than any adjustments by taxes. The main finding of this study, that the Saudi government have the possibility to diversify it's income sources by introducing taxes without severely compromising the economic growth and the development of the private non-oil sector. The results show that the government can easily increase the rate of tax revenues in the total current government income. One of the main disadvantage of the introduction of new tax system in Saudi Arabia is related to the high expected decrease in the welfare for non-Saudi households which will affect certainly the development of the private non-oil sector in Saudi Arabia. In fact, a similar increase in wages for expatriate workers will be a necessary condition to keep most of them in the country. On a other front, such tax policy can be used also as instrument to stimulate the substitution of expatriate workers by nationals. However, such substitution is not so easy as most of nationals still attracted by the high wages in the public sector in addition to low productivity of most of national workers.

VI. CONCLUSION

Given the strong dependence of government revenue in Saudi Arabia on oil export earnings, other taxes, direct or indirect, currently have little role. Using a general equilibrium model for Saudi Arabia based on a social accounting matrix for 2000 developed for the purpose of this analysis, this study analyzes the impact of reducing tariff rates and introducing a different tax structure on the economy of Saudi Arabia. The results show that the welfare effects and the changes in real absorption from introducing different tax structures are small. Given virtually unchanged absorption and household consumption, if the government wants to raise additional resources for investments (infrastructure, human capital, etc.), then it will initially be necessary to reduce consumption by households and, if possible, the government. The results are more positive for the simulations where other distortions are removed (so that the VAT or the other taxes are not added to existing distortions). The last simulation shows that it is potentially more fruitful and much less painful for consumers if economic policy is focused on designing schemes for making good use of oil revenue, esp. during the current boom – a 10 percent increase in world prices has far more positive and significant macro effects than the tax reforms that are analyzed in this paper.

Given the structure of the economy of Saudi Arabia, with very large shares of oil and services in GDP, it is difficult to design a value added tax that would have broad enough coverage to be non-distorting. If the goal is to increase government revenue, the results from these experiments suggests that it probably makes the most sense to introduce some form of income tax or sales tax.

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APPENDIX

Table 1: Rates for VAT simulations (some of them are fixed exogenously and some others are generated endogenously by the model)

Activity and imported commodity	TVA10-UNI	TVA15-UNI	TVA-DIST	TVA-UNI0	TVA-DIST0
Agriculture	10	15		12	
Fishing	10	15		12	
Crude petroleum & gas	10	15		12	
Other mining and quarrying	10	15	14.3	12	16.9
Petroleum refining	10	15		12	
Foodstuffs and beverages	10	15		12	
Textiles, Apparels, leather	10	15	14.3	12	16.9
Wood and its products	10	15	14.3	12	16.9
Paper and it's products	10	15	14.3	12	16.9
Other chemicals products	10	15	14.3	12	16.9
Metal products	10	15	14.3	12	16.9
Other manufacturing	10	15	14.3	12	16.9
Electricity, gas and water	10	15		12	
Construction	10	15		12	
Trade and repair services	10	15	14.3	12	16.9
Hotels and restaurants	10	15	14.3	12	16.9
Transport, storage and communication	10	15	14.3	12	16.9
Financial services	10	15	14.3	12	16.9
Real estates and business services	10	15	14.3	12	16.9
Public administration	10	15		12	
Education	10	15		12	
Health and social services	10	15		12	
Other community and personal services	10	15		12	
Private household services	10	15		12	

Note: rates in % applied both on activities and imported commodities (when imports exist for a given commodity)

Table 2: Rates for Sales Tax simulations (all of them are generated endogenously by the model)

Domestic and imported commodity	TSAL-UNI	TSAL-DIST	TSAL-UNIO	TSAL-DISTO
Agriculture	5.6		6.8	
Fishing	5.6		6.8	
Crude petroleum & gas	5.6		6.8	
Other mining and quarrying	5.6	9.4	6.8	11.4
Petroleum refining	5.6		6.8	
Foodstuffs and beverages	5.6		6.8	
Textiles, Apparels, leather	5.6	9.4	6.8	11.4
Wood and its products	5.6	9.4	6.8	11.4
Paper and it's products	5.6	9.4	6.8	11.4
Other chemicals products	5.6	9.4	6.8	11.4
Metal products	5.6	9.4	6.8	11.4
Other manufacturing	5.6	9.4	6.8	11.4
Electricity, gas and water	5.6		6.8	
Construction	5.6		6.8	
Trade and repair services	5.6	9.4	6.8	11.4
Hotels and restaurants	5.6	9.4	6.8	11.4
Transport, storage and communication	5.6	9.4	6.8	11.4
Financial services	5.6	9.4	6.8	11.4
Real estates and business services	5.6	9.4	6.8	11.4
Public administration	5.6		6.8	
Education	5.6		6.8	
Health and social services	5.6		6.8	
Other community and personal services	5.6		6.8	
Private household services	5.6		6.8	

Note: rates in % and applied on both domestic and imported commodities (if imports exist for a given commodity)