Diversifying a Resource Dependent Economy: Private-Public Relationships in the Kuwaiti Economy

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Abstract:

The Kuwaiti economy is characterized by two major structural imbalances – heavy dependence on oil and dominance of the public sector. Kuwait has struggled over the years to implement a two-pronged development strategy – diversifying the country’s economic base away from oil and promoting private sector development. This paper will explore the economic impact of some options currently being considered by using a unique set of input-output tables, derived from supply-use tables, that distinguish transactions made by private and public enterprises as well as providing a matrix of imports by sector. The public-private sector interdependence analysis revealed interesting results regarding sectoral differences in strengths of forward and backward linkages. For instance, the findings indicated that the strength of the publicly owned oil sectors lie in their forward linkages, supplying other sectors with their outputs but their backward linkages is weak. On the other hand, the chemicals industry is identified as one of the few sectors, which have balanced and relatively strong forward and backward linkages in both public and private sector. The policy analyses conducted in this paper are highly relevant to the ongoing policy debate in Kuwait over the design of the economic reform programs. The public-private sector linkage analysis has revealed insights into policy synergies through which one instrument can affect more than one policy target.

Key Words: Input-output, economic linkages, public-private sectors, interdependence, Kuwait.

1 Introduction

Small national economies, such as Kuwait, share many similarities with large regional economies with the exception of having a separate currency and the ability to control fiscal policy. In Kuwait's case, the currency closely follows the US dollar, although it is pegged to a basket of undisclosed currencies. The country's exports are dominated by oil and oil-related products. This paper briefly describes the way a set of supply and use tables are used to construct several alternative input-output tables. These are then used to explore the options for the country to diversify away from public sector dominance and move to greater dependence upon private-sector production. Given Kuwait's size and location, the economy has many of the characteristics of a regional economy in the context of Middle Eastern countries that share a strong dependence on the public sector as well as oil and oil-related production activities.

A series of analyses on interconnectedness in the Kuwaiti economy was undertaken. The analysis started by describing the structure of the Kuwaiti economy by applying direct backward and forward linkage analysis. Leontief multipliers were computed and public-private interdependences were examined using sectoral output multipliers, backward linkages and forward linkage analysis.

The remaining part of the paper is divided into five sections. Section 2 is devoted to background analysis; discussing the policy context, the structure of the Kuwaiti economy and broader development strategies. Theoretical discussion is conducted in section 3. Section 4 presents the nature of the Kuwaiti input-output tables, its derivations, and application to undertake a preliminary description of the Kuwaiti economy. Section 5 undertakes a series of multiplier analysis, focusing on relative strengths of public and private sectors linkages and their interdependences in the Kuwaiti economy. The paper ends with concluding remarks in section 6.

2 Background

The Kuwait development plan for the period 2015-2020 (SCPD, 2015) identified two major structural imbalances existing in the Kuwaiti economy. The first one lies in the sectoral composition, dominance of the oil sector, while the second one is related to the ownership patterns, the dominance of the public sector. Additionally, there are serious segmentations in the labor market. Data displayed in Table 1 is organized to show changes in the structure and compositions of the Kuwaiti economy along these three dimensions.

Table 1. GDP and Employment Levels, Growth Rates and Shares in the Kuwaiti Economy (2013-2018)

			2013 Levels*	Growth Rates (%) 2013-2019**	Sectoral Shares (%)	
					2013	2016-2019***
GDP	Sectors	Total	70.0	-5.6	100.0	100.0
		Oil	37.1	-40.1	53.0	33.7
		Non-Oil	32.9	33.3	47.0	66.3
	Ownership	Total	70.0	-6.3	100.0	100.0
		Public	53.2	-21.1	76.0	64.0
		Private	16.8	40.5	24.0	36.0
Employment	Public	Total	439	5.9	100.0	100.0
		Nationals	309	11.6	70.4	74.2
		Expats	130	-7.7	29.6	25.8
	Private	Total	1,889	30.5	100.0	100.0
		Nationals	89	-27.8	4.7	2.6
		Expats	1,800	33.4	95.3	97.4

Source: GDP, (CSB 2017a, CSB 2018 and data directly acquired from Central Statistical Bureau), Employment (PACI 2013-2019)

*GDP in billion KD (at constant 2010 prices), employment in '000; ** Sectors 2013-2018, Ownership 2013-2016, employment 2013-2019; *** Sectors 2018, Ownership 2016, employment 2019

The size of the Kuwaiti economy shrank by 5.6% between 2013 and 2018. This was a period when oil prices experienced considerable declines in the world market. This has had adverse effects on the Oil sector which contracted by 40%. During such periods, the Kuwaiti government has often drawn down government savings to keep the economy afloat. Consequently, the non-oil sector expanded by 33%. The share of the oil sector fell from 53% in 2013 to 34% in 2018. The corresponding change in the share of the non-oil sector was an increase from 47% to 66%.

The oil price shock seems to have caused an apparent acceleration in the structural shift from oil to non-oil sector, but this is not necessarily a real and substantive change. Ironically, it was envisaged in the current medium term plan (2015-2020) the share of the non-oil sector would reach 66% by the end of the plan period. The exogenous oil shock meant the target was achieved two years earlier than planned. Yet this came at the expense of an overall GDP contraction.

Regarding the ownership imbalance, the share of the public sector in GDP declined from 76% in 2013 to 64% in 2016, while that of the private sector increased from 24% in 2013 to 36% in 2016 during the same period. The current medium term plan targeted a further shift to the private sector, reaching 41% by 2020, and this is highly likely to be achieved given rate of shifts already achieved.

However, the plan document does not specify whether this shift will take place through privatization or emergence of new private businesses.

Kuwait's development plan sets targets explicitly directed to redressing the two imbalances. However, the potential interactions between policy actions to separately influence the two imbalances has not yet been worked out. So far there is no explicit policy to privatize oil related activities that are currently exclusively in the control of the government (SCPD 2015) and (KPC 2015). However, the Ministry of Finance (Economic Affairs Committee 2016) stated it would seek to amend the privatization law to lift the ban on privatization of the oil industry towards the end of the current development plan, that is before 2020. The 2010-2014 Kuwait development plan stated the Kuwait's Vision 2035 as "the transformation of Kuwait into a financial and commercial center that attracts investment, where the private sector leads the economic activity...." (SCPD 2010). This falls in line with the government's intention to consolidate the private sector outside the oil domain.

The Kuwait development plan for the period 2015-2020 (SCPD 2015) identifies a number of public utilities and other entities that would be gradually privatized. These include electricity & water, storage & transportation services, management of public hospitals & schools, residential real estate, postal & fixed telephone services. The Kuwait Authority for Partnership Projects (KAPP) was established as an entity responsible for supervising the process of privatization and public private partnership projects.

The process of reducing public sector dominance in the Kuwaiti economy has been complicated because of the potential conflict of this reform with another public policy objective, that is guaranteeing Kuwaiti nationals secure employment (SCPD 2015). The medium term plan acknowledges distortions in the labor market coming from the concentration of Kuwaitis in the public sector. The plan states that among the policies to achieve this is a proposal to encourage private companies to hire Kuwaitis.

By enacting Law 391/2001, an established system of cash allowances for national labor in the private sector came into effect. Since then, this law has been amended a few times to increase the allowance, particularly strengthening links between allowances and skills. It also specified target percentages of Kuwaitis in private sector by industry and occupation types. The minimum monthly allowance (subsidy) given to per Kuwaiti working in the private sector was KD 456 (US\$1500)

while the maximum is KD 940 (US\$ 3,080) for non married workers (Aljarida 2020).

The lower part of Table 1 shows targets in the medium term plan regarding allocations of nationals and expatriates to the public and private sectors. Starting by concentrating on the public and private sector shares in the total employed labor force. In 2013, the size of the total employed labor force was 2.3 million, with the share of the public and private sectors as 19% and 81%, respectively. By 2019, the size of the labor force increased by 26% increase from the 2013 level. The relative shares of the public sector declined to 16% while that of the private sector increased to 84%.

The Kuwaiti labor market segmentation has two dimensions. The dualistic feature displays in terms of nationality (Kuwaiti nationals and expatriate). Job security for the nationals means their employment in the public sector, thereby causing concentration of the national labor force and predominance of the public sector in the economy. In 2013 about 70% of the workforce in the public sector was nationals and this increased to 74% in 2019. This sharply contrasts with the pattern of employment in the of the private sector where the share of nationals and expatriates was 5% and 95 in 2013 and 3% and 97% in 2019 respectively.

The majority of the labor force in the private sector is unskilled expatriate labor, including considerably large numbers who are employed in the household sector as chauffers or maids. On the other hand, the most highly skilled nationals and expatriates in the labor force are employed in the public sector. The share of the public sector GDP is large not just that it has a larger share of the skilled labor force but also because nationals are paid higher wages than expatriates and their employment is concentrated in the public sector.

Structural shifts measured in terms of sectoral and ownership compositions of the economy have moved in the desirable directions, with progressive reductions in the dominance of the public over the private as well as that of the oil sector over the nonoil sectors. However, complications in the Kuwaiti labor market remained. For instance, the desirable public policy outcome has been to progressively shift the employment of the national labor force from the public sector to the private sector. However, the opposite has been happening in recent years, the relative share of the nationals in the public sector rising and that in the private sector declining.

3 Theoretical Analysis

In a series of articles, Miller (1966, 1969, 1986) introduced the notion of interregional feedback effects into the literature of regional analysis. In this section, we explore a complementary vision of the role of feedbacks through the introduction of two additional notions – feedback loops and interregional hierarchies but applied to a division of activities between public and private using Kuwaiti input-output table 2013.

The approach adopted here may provide insights into the fine structure of inter-linkages between two main divisions of the economy. The methodology is not proposed as a replacement for the more formal analysis of feedback impacts. However, it also serves to trace the paths along which these feedbacks move from one set to the other set and ultimately back to the original source of change.

Miller's initial intention was 'to suggest one method of quantifying the error that results from ignoring interregional linkages.' We take the same idea to capture the interdependence between two groups of sectors as though they belonged to different "regions." Following Miller's suggestion, we aim to isolate the public-private sectors' feedback effects. The direct inputs can be represented by the following block matrix:

$$\begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \quad (1)$$

where subscripts 1 and 2 represent public and private sectors respectively, A_{11} and A_{22} are the quadrat matrices of direct inputs within the public and private sectors and A_{12} and A_{21} are the rectangular matrices showing the direct inputs purchased by the second and vice versa.

Final demand (F) and gross output (X) vectors are partitioned in a similar fashion

$$F = \begin{bmatrix} f_1 \\ f_2 \end{bmatrix}, \quad X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

To isolate the feedbacks, Miller compared the following vectors:

$$X^{NF} = (I - A_{11})^{-1} f_1, \quad \text{and} \\ X^F = [I - A_{11} - A_{12}(I - A_{22})A_{21}]^{-1} f_1 \quad (2)$$

NF and F represent no feedback and feedback cases, respectively. If we rework Miller's procedure using the Leontief inverse:

$$B = (I - A)^{-1} \begin{bmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{bmatrix} \quad (3)$$

Miller's interpretation can be reconsidered in terms of an extended or augmented Leontief inverse (see Yamada and Ihara, 1969), further elaborated with the help of the Schur formula (Schur, 1917; Sonis and Hewings, 1993):

$$B = \begin{bmatrix} B_{11} & B_{11}B_{12}B_2 \\ B_{22}B_{21}B_1 & B_{22} \end{bmatrix} = \begin{bmatrix} B_{11} & B_1B_{12}B_2 \\ B_2B_{21}B_1 & B_{22} \end{bmatrix} \quad (4)$$

Where the matrices $B_1 = (I - A_{11})^{-1}$ and $B_2 = (I - A_{22})^{-1}$ represent the Leontief inverses of public and private sector blocks (revealing the intra-block feedback effects) while the matrices B_1A_{12} , $A_{21}B_1$, $A_{12}B_2$ and B_2A_{21} show the induced effects on output or input between public and private blocks (Miyazawa, 1966; see also Sonis and Hewings, 1995).

In addition, the following formulations:

$$B_{11} = [I - A_{11} - A_{12}B_2A_{21}]^{-1} \quad (5)$$

$$B_{22} = [I - A_{22} - A_{21}B_1A_{12}]^{-1} \quad (6)$$

provide the extended Leontief multipliers for the public and private sector blocks, inverses of the so-called Schur complements:

$$S_1 = A_{11} + A_{12}B_2A_{21} \quad (7)$$

$$S_2 = A_{22} + A_{21}B_1A_{12} \quad (8)$$

They include the direct inputs, A_{11} , A_{22} , circulating within the blocks and inputs $A_{12}B_2A_{21}$, and $A_{21}B_1A_{12}$, which represent the economic self-influence transactions of public sector through the private sector and vice versa.

Miller's concept of inter-block feedbacks will be considered within the wider framework of feedback loops of economic self-influence (Sonis and Hewings, 1998b).

In the two-block system, the inter-block feedback loops appeared in an explicit form in the Schur complements, S_1 and S_2 , and their corresponding extended block Leontief inverses, B_{11} and B_{22} :

- The component, $A_{12}B_2A_{21}$, presents a loop connecting both blocks
- The component $A_{21}B_1A_{12}$ presents a loop in the opposite direction

The non-diagonal components of the Leontief inverse $B_{11}A_{12}B_2$ and $B_{22}A_{21}B_1$ together generate a closed feedback loop, which provides the *building blocks* for the identification of the myriad economic interactions within an input-output system. The set of transaction flows in the input-output system can be revealed through the superposition of hierarchically ordered multi-block feedback loops. In essence, this approach offers a more detailed view of feedback effects by first identifying the paths of influence across blocks and then proposing an hierarchical extraction method to identify the paths in terms of the order of their economic importance.

Recent analysis of the Chicago regional economy over time discovered a hollowing-out process whereby *intraregional* transactions were being replaced by *interregional* flows (Hewings *et al.*, 1998). Furthermore, circularity (or multi-block interdependence) is one of the four basic concepts of structural analysis articulated by Leontief (1963), together with *dependence*, *interdependence* and *hierarchy*.

Feedback loop analysis occupies an intermediate position between macro analysis of linkages derived from typical input-output analysis and the very micro structural path analysis. Feedback loop analysis is another method of structural decomposition. It decomposes the total flows into the sum of sub-flows hierarchically. Feedback loop analysis emphasizes the loop characterizing the flow (or “round-trip” of flow).

This self-influence can be represented by a *chain of transactions* in which the flows leave a block and “journey” through the rest of the blocks before returning to the origin – hence, the adoption of the term “cycle” in the description of the methodology. A series of aggregate transactions are specified such that each region is allowed precisely one transaction flow entering it and one flow leaving it. Economically, a series of transactions, of course, represents a chain of *bilateral influences* that are based on either *backward or forward linkages* depending on the point of view one takes. Such a series of transactions, in which each block appears only once with one incoming flow and one outgoing flow, may indeed be called a production cycle because each and every block

in such a cycle influences itself at the end of the cycle (assuming one starts the cycle with the block at hand).

A production cycle is complete if it includes all blocks. The economic interpretation is straightforward; the production cycle indicates how strongly (at each hierarchical level) each block is tied to all other blocks included in that cycle.

4 The Kuwaiti Input-output Table, 2013

The analytical framework for calculating public-private interactions is applied to Kuwaiti supply and use tables (SUTs) prepared for 2013. This was a special issue in that all activities and products were spilt into public and private sectors. There were 50 industries and 58 product groups for each ownership category. This means the Kuwaiti SUTs 2013 has a dimension of 100 (industries) by 116 (products).

The Kuwaiti SUTs were accompanied by related import, trade and tax margins at the same dimension with the industry and product tables at basic prices. These data were utilized to transform the SUTs to an industry-by-industry input-output table with the following dimensions: inter-industry flows (100 by 100 industries) and imported inputs (100 by 100 industries).

Table 2 presents a few indicators computed from the Kuwaiti input-output table 2013. Miller & Blair (2009, pp. 556-557) suggest the following relationships to compute direct and normalized backward and forward linkages, $(\overline{BL}d_j)$ and $(\overline{FL}d_i)$ respectively¹:

$$\overline{BL}(d)_j = \frac{\sum_i^n a_{ij}}{\sum_i^n \sum_j^n a_{ij}} \quad (9)$$

and

$$\overline{FL}(d)_i = \frac{\sum_j^n a_{ij}}{\sum_j^n \sum_i^n a_{ij}} \quad (10)$$

¹ Having defined direct BL(d) on page 556, Miller & Blair went on to defining the normalized version, BL with a bar, on page 557. In doing so, they expressed the denominator term in the definition of the normalized BL(b) with a bar as $\sum_i^n a_{ij} \sum_j^n a_{ij}$. Clearly, this cannot be the correct since this expression yields an n x n matrix rather than a scalar, the sum of all intermediate inputs.

Table 2 presents the direct normalized backward and forward linkage are presented together with shares of imported inputs and shares of exports. Import and export shares are, respectively, intermediate imports expressed as percentage of total industry inputs and exports expressed as percentage of total commodity output.

Table 2. Key Indicators from the Kuwaiti Input-Output Table 2013

	Industries	Normalized Direct		Inputs imported (%)	Output exported (%)
		Backward linkages	Forward linkages		
PB40I	Electricity	2.9	0.6	1.4	0.0
PB41I	Water	2.8	1.0	1.3	0.0
PB23I	Petroleum	2.6	1.0	1.9	61.8
PB67I	Finance related services	2.4	0.1	3.7	0.0
PB62I	Air transport	2.1	0.8	29.5	38.3
PR63I	Transport services	2.1	2.4	12.1	0.0
PR72I	Computer and related activities	1.9	0.7	14.5	0.0
PR62I	Air transport	1.7	0.4	12.2	42.9
PR24I	Chemical products	1.7	1.7	4.7	36.8
PB24I	Chemical products	1.6	0.7	6.7	71.0
PB74I	Other business activities	1.5	1.0	0.2	1.1
PR0509I	Mining & Quarrying	1.5	1.8	8.4	0.2
PR45I	Construction	1.3	0.4	28.1	0.2
PR67I	Finance related services	1.2	0.9	2.4	0.0
PR64I	Post & telecommunications	1.2	1.0	5.9	43.1
PB90I	Sewage & sanitation services	1.2	0.0	10.2	0.0
PR9799I	Extraterritorial organizations	1.2	0.1	4.8	0.0
PB1016I	Food products and beverages	1.2	1.5	48.2	10.7
PR37I	Recycling	1.2	0.8	1.0	54.9
PR25I	Rubber and plastics	1.2	1.9	35.6	12.2
PR50I	Retail sale & maintenance of automotive fuel	1.1	0.7	1.1	0.0
PR92I	Recreational, cultural and sporting activities	1.1	2.1	19.0	0.5
PR0104I	Agriculture & Fishing	1.1	1.0	14.9	2.9
PR60I	Land transport	1.1	2.1	7.9	0.0
PR26I	Non-metallic minerals	1.0	2.1	45.0	8.5
PR55I	Hotels & restaurants	1.0	1.3	28.6	0.0
PR93I	Activities of private households for own use	1.0	0.0	10.0	0.0
PR52I	Retail trade	1.0	0.8	3.1	0.7
PB92I	Recreational, cultural and sporting activities	0.9	0.7	4.7	0.0
PR1016I	Food products and beverages	0.9	0.7	37.7	19.2
PR19I	Leather	0.9	0.6	35.6	21.8
PR23I	Petroleum	0.9	2.8	51.7	0.0
PR22I	Publishing	0.9	2.0	26.8	8.3

Table 2. (Continued)

PR91I	Activities of membership organizations n.e.c.	0.9	0.1	1.2	0.0
PR3233I	Medical & precision instrument	0.9	0.5	20.7	1.3
PR18I	Wearing apparel	0.9	0.0	18.4	1.0
PR21I	Paper products	0.9	1.5	44.3	19.9
PR66I	Insurance and pension funding	0.8	0.2	1.7	82.8
PR74I	Other business activities	0.8	1.5	7.1	23.7
PR17I	Manufacture of textiles	0.8	0.2	34.4	11.7
PR35I	Transport equipment	0.8	0.3	41.1	0.0
PB60I	Land transport	0.7	1.7	15.9	0.0
PR28I	Fabricated metals	0.7	0.9	47.6	20.1
PR31I	Electrical equipment	0.7	0.3	54.3	10.6
PR90I	Sewage & sanitation services	0.7	2.7	15.9	0.0
PB52I	Retail trade	0.7	0.8	1.0	0.0
PR27I	Basic metals	0.6	1.9	56.1	18.6
PB85I	Health & social work	0.6	0.0	21.0	0.0
PR80I	Education	0.6	0.2	3.1	0.0
PR2930I	Machinery and equipment	0.6	1.4	56.7	6.5
PB70I	Real estate activities	0.6	0.8	1.2	0.0
PR51I	Wholesale trade	0.6	1.2	2.2	1.6
PR85I	Health & social work	0.6	2.3	14.6	0.1
PR36I	Furniture	0.5	0.2	47.1	40.2
PB75I	Public administration	0.5	0.0	9.8	0.0
PB91I	Activities of membership organizations n.e.c.	0.5	0.0	2.6	0.0
PR65I	Financial intermediation	0.5	1.7	4.2	6.7
PR71I	Renting of machinery and equipment	0.5	2.5	3.9	0.0
PR34I	Motor vehicles	0.4	0.3	42.7	46.5
PR20I	Wood products	0.4	1.8	44.5	8.5
PR61I	Water transport	0.3	0.1	1.5	97.6
PB61I	Water transport	0.3	0.1	14.6	98.0
PB65I	Financial intermediation	0.3	1.5	2.2	2.9
PB80I	Education	0.2	0.0	6.3	0.0
PB55I	Hotels & restaurants	0.2	1.1	8.5	14.0
PR70I	Real estate activities	0.2	0.5	0.2	0.1
PB0509I	Mining & Quarrying	0.1	0.8	1.2	70.1

Average shares of domestic intermediate purchases and sales, expressed in the denominators of equations (9) and (10), were given as 0.33 and 0.36 respectively. Purchases of domestic intermediate inputs accounted for 33% of aggregate industry input. Similarly, sales of intermediate inputs accounted for 36% of aggregate industry output. Purchases or sales of intermediate inputs

by individual industry groups were expressed as ratios of these averages to obtain normalized direct backward and forward linkages.

In table 2, the normalized backward linkage of (BL(d)) and forward linkages (FL(d)) of 28 and 26 industries were greater than 1, this means that these industries have above average direct linkages. The data is sorted in descending order of BL(d). The top five BL(d) terms were Electricity, Water, Petroleum, Financial Services and Air Transports. Ironically, mining & quarrying (which includes the extractive industries, including primary sectors of Crude Oil and Gas) is situated at the bottom, indicating that the extractive industries have the lowest direct backward linkages.

In terms of FL(d), the top five sectors were: Petroleum, Sewage & Sanitation Services, Renting of Machinery & Equipment, Transport services, and Health & social work. It is interesting to note that the economic linkages of the oil & gas industry the strongest in its secondary sector (oil processing) both in BL(d) and FL(d) terms while the primary and extractive Oil & Gas industry remains to have lower than average linkages.

There are unique patterns of distinctions between public and private sectors in terms of strengths of direct linkages. For instance, in terms of direct backward linkages, the top four industries belong to the public sector, with no distinct differences between public-private sectors in the remaining rank distribution. However, in terms of forward linkages, the top fifteen industry groups belong to the private sector. This means the private sector seem to have much stronger direct sales linkages.

Four industries (Machinery & Equipment, Basic Metals, Electrical Equipment, Petroleum) rely on imported inputs for more than 50% of their expenditure on inputs. The share of imported inputs ranged between 40% and 50% for a further eight industries (all in manufacturing), and between 20% and 40% for a group of ten other industries. Nearly all of the remaining industry groups spent less than 10% of total production costs on imported inputs.

Five industry groups, including extractive industries, export more than 70% of their outputs. These ranged from crude oil and chemical products (70% and 71% respectively) to Public and Private Water Transport (98% and 97%, respectively). About 61% of petroleum products is exported. Twenty four industry groups exported at least 10% of their total outputs.

5 Multiplier Analysis

5.1 Leontief multipliers

It proves useful to start by comparing sizes of multipliers for the two economic subsystems. Table 2 compares output multipliers separately for public and private sectors,; these are shown in columns A and B respectively. In each case, an output multiplier value of unity indicates that activity does not exist in that ownership category, for instance, e.g. agriculture & fishing in the public sector and electricity and water in the private sector. The private to public sector multiplier ratio is reported in column C.

Table 3. Output Multipliers

ISIC	Descriptions	Public	Private	Ratio
		A	B	C=(B/A)
01-04	Agriculture & Fishing	1.000	1.478	
05-09	Mining & Quarrying	1.048	1.753	1.672
10-16	Food products and beverages	1.636	1.524	0.932
17	Manufacture of textiles	1.000	1.455	
18	Wearing apparel	1.000	1.480	
19	Leather	1.000	1.551	
20	Wood products	1.000	1.245	
21	Paper products	1.000	1.537	
22	Publishing	1.000	1.471	
23	Petroleum	2.113	1.507	0.713
24	Chemical products	1.987	2.209	1.112
25	Rubber and plastics	1.000	1.766	
26	Non-metallic minerals	1.000	1.582	
27	Basic metals	1.000	1.335	
28	Fabricated metals	1.000	1.384	
29-30	Machinery and equipment	1.000	1.355	
31	Electrical equipment	1.000	1.353	
32-33	Medical & precision instrument	1.000	1.537	
34	Motor vehicles	1.000	1.273	
35	Transport equipment	1.000	1.354	
36	Furniture	1.000	1.310	
37	Recycling	1.000	1.581	
40	Electricity	2.924	1.000	
41	Water	2.835	1.000	
45	Construction	1.000	1.739	

Table 3. (Continued)

		Public	Private	Ratio
ISIC	Descriptions	A	B	C=(B/A)
50	Retail sale & maintenance of automotive fuel	1.000	1.603	
51	Wholesale trade	1.000	1.307	
52	Retail trade	1.472	1.532	1.041
55	Hotels & restaurants	1.115	1.536	1.378
60	Land transport	1.465	1.578	1.077
61	Water transport	1.180	1.185	1.005
62	Air transport	2.374	1.921	0.809
63	Transport services	1.000	2.435	
64	Post & telecommunications	1.000	1.623	
65	Financial intermediation	1.126	1.232	1.094
66	Insurance and pension funding	1.000	1.375	
67	Finance related services	2.109	1.660	0.787
70	Real estate activities	1.442	1.125	0.781
71	Renting of machinery and equipment	1.000	1.244	
72	Computer and related activities	1.000	1.828	
74	Other business activities	1.626	1.407	0.866
75	Public administration	1.344	1.000	
80	Education	1.137	1.329	1.170
85	Health & social work	1.334	1.313	0.984
90	Sewage & sanitation services	1.600	1.345	0.840
91	Activities of membership organizations n.e.c.	1.346	1.494	1.110
92	Recreational, cultural and sporting activities	1.513	1.667	1.101
93	Activities of private households for own use	1.000	1.611	
95-96	Activities of private households as employers of domestic staff	1.000	1.000	
97-99	Extraterritorial organizations	1.000	1.658	

The ratio is computed only where activities exist in both public and private sectors. There are 18 industry groups involving operations of both public and private sectors (with values greater than zero under column C). In 10 out of the 18 cases, the private sector output multipliers are greater than the corresponding public sector multipliers (value greater than 1 in column C). This includes primary activities of oil & gas and the chemical industries. This has an important policy implication in that the private sector has very limited operations in these sectors. For instance, according to the 2013 establishment survey, the share of the private sector in primary oil & gas value-added was 0.4%. Bizarrely though, the corresponding private sector share in employment was 28% in that year, indicating the considerably high pay differentials in public and private sectors that seems to be even more pronounced in the oil & gas sector. In the chemical industry,

however, the private sector already has a strong share of 76% in gross value-added and 43% in number of persons engaged.

5.2 Backward and forward linkage effects

Table 4 separately presents backward and forward linkages of the public and private sectors. The dominance of the oil sector in the Kuwaiti economy is well known, but its status in inter-industry linkages has not been that clear. This is revealed in the inter-industry linkage indicators displayed in table 4. The primary and secondary oil industries (Crude oil & natural gas and petroleum products, each mostly under public sector ownership) have by far the largest forward linkages (6.37 and 6.65 respectively).

Table 4. Backward and Forward Linkages

ISIC	Descriptions	Backward			Forward		
		Public	Private	%	Public	Private	%
		A	B	C=(B/A)	A	B	C=(B/A)
01-04	Agriculture & Fishing	1.000	1.478		1.000	1.184	
05-09	Mining & Quarrying	1.048	1.753	1.672	6.372	1.164	0.183
10-16	Food products and beverages	1.636	1.524	0.932	1.175	1.306	1.112
17	Manufacture of textiles	1.000	1.455		1.000	1.021	
18	Wearing apparel	1.000	1.480		1.000	1.006	
19	Leather	1.000	1.551		1.000	1.043	
20	Wood products	1.000	1.245		1.000	1.014	
21	Paper products	1.000	1.537		1.000	1.237	
22	Publishing	1.000	1.471		1.000	1.323	
23	Petroleum	2.113	1.507	0.713	6.648	1.032	0.155
24	Chemical products	1.987	2.209	1.112	1.129	3.991	3.534
25	Rubber and plastics	1.000	1.766		1.000	1.173	
26	Non-metallic minerals	1.000	1.582		1.000	1.510	
27	Basic metals	1.000	1.335		1.000	1.492	
28	Fabricated metals	1.000	1.384		1.000	1.459	
29-30	Machinery and equipment	1.000	1.355		1.000	1.060	
31	Electrical equipment	1.000	1.353		1.000	1.035	
32-33	Medical & precision instrument	1.000	1.537		1.000	1.032	
34	Motor vehicles	1.000	1.273		1.000	1.001	
35	Transport equipment	1.000	1.354		1.000	1.013	
36	Furniture	1.000	1.310		1.000	1.018	
37	Recycling	1.000	1.581		1.000	1.052	

Table 4. (Continued)

40	Electricity	2.924	1.000		2.682	1.000	
41	Water	2.835	1.000		1.634	1.000	
45	Construction	1.000	1.739		1.000	1.926	
50	Retail sale & maintenance of automotive fuel	1.000	1.603		1.000	1.104	
51	Wholesale trade	1.000	1.307		1.000	1.736	
52	Retail trade	1.472	1.532	1.041	1.009	2.250	2.231
55	Hotels & restaurants	1.115	1.536	1.378	1.045	2.173	2.080
60	Land transport	1.465	1.578	1.077	1.020	1.193	1.170
61	Water transport	1.180	1.185	1.005	1.000	1.001	1.001
62	Air transport	2.374	1.921	0.809	1.143	1.024	0.896
63	Transport services	1.000	2.435		1.000	2.730	
64	Post & telecommunications	1.000	1.623		1.000	1.752	
65	Financial intermediation	1.126	1.232	1.094	1.656	5.280	3.188
66	Insurance and pension funding	1.000	1.375		1.000	1.021	
67	Finance related services	2.109	1.660	0.787	1.001	1.125	1.124
70	Real estate activities	1.442	1.125	0.781	1.006	3.447	3.427
71	Renting of machinery and equipment	1.000	1.244		1.000	1.386	
72	Computer and related activities	1.000	1.828		1.000	1.174	
74	Other business activities	1.626	1.407	0.866	1.171	2.292	1.957
75	Public administration	1.344	1.000		1.000	1.000	
80	Education	1.137	1.329	1.170	1.040	1.013	0.974
85	Health & social work	1.334	1.313	0.984	1.010	1.156	1.145
90	Sewage & sanitation services	1.600	1.345	0.840	1.000	1.155	
91	Activities of membership organizations n.e.c.	1.346	1.494	1.110	1.007	1.007	1.000
92	Recreational, cultural and sporting activities	1.513	1.667	1.101	1.357	1.278	0.942
93	Activities of private households for own use	1.000	1.611		1.000	1.003	
95-96	Activities of private households as employers of domestic staff	1.000	1.000		1.000	1.000	
97-99	Extraterritorial organizations	1.000	1.658		1.000	1.015	

It is interesting to note that backward linkages (2.11 and 1.51 respectively) of the petroleum industry have relatively small differences in multiplier sizes between public and private sectors, but the two sectors are sharply contrasted in terms of forward linkages (6.65 and 1.03 respectively). There are two explanations for these discrepancies. First, although the Kuwaiti SUTs was constructed at two-digit levels, ISIC23 in public and private sectors are essentially different subsectors if further disaggregation was undertaken. For the public sector, it is related to oil refineries. For the private sector, however, supporting activities that are closely linked to the oil processing sectors, essentially providing inputs the public sector. Secondly, the backward linkage of oil refineries is confined to extractive industries but little else, while the oil processing industries supply vital inputs to many domestic industries, particularly petrochemicals and power plants. For that reason, its backward linkages are much weaker than its forward linkages.

Electricity & Water provides an interesting case in that these are largely jointly produced, sharing production facilities, hence their backward linkages are about equal (2.92 and 2.84). However, the products are allocated differently to different user groups and in different proportions, hence, their forward linkages are different, Electricity (2.68) and Water (1.63). The chemical products branch has the largest multiplier in manufacturing both in public and private sectors with backward linkage multiplier of 2.0 and 2.21, respectively, and forward linkage multipliers of 1.13 and 4.0 respectively.

Finance and related services has stronger backward linkages (2.11 and 1.67, respectively) than forward linkages (1.01 and 1.13, respectively) in both public and private sectors. The backward multiplier of Air Transport was 2.37 (public) and 1.92 (private) while forward linkage multipliers were 1.14 (public) and 1.02 (private).

For each industrial group, the private sector multipliers were divided by public sector multipliers to see their relative sizes. This comparison is applicable in cases where the industry is operated by both the public and private sectors. There are seventeen such groups, the rest being operated either by public or private sectors but not both. For backward multipliers (10 out of 17) and forward multipliers (12 out of 17), the private-public multipliers ratio were greater than unity, that is to say, private sector multipliers were greater than public sector multipliers. In some cases, particularly forward linkages of private sector multipliers considerably larger than public sector multipliers: chemical products (3.5 times), financial intermediation (3.19 times) and real estate (3.43 times).

5.3 Decomposing Public-Private Sector Multipliers

The output multipliers discussed in the preceding section were obtained from the Leontief inverse of the full Kuwaiti industry-by-industry input-output table (100 x 100), which is represented by equation (1). This section presents decomposed multipliers, which are obtained by applying relationships discussed in connection with equations (2) to (8). Table 5 presents details of decomposed multipliers separately for the public and private sectors.

Table 5. Feedback effects in public and private sector multipliers

ISIC Descriptions		Public			Private		
		Isolated	Feedback	%	Isolated	Feedback	%
		A	B	$C = (B-A) / A * 100$	A	B	$C = (B-A) / A * 100$
01-04	Agriculture & Fishing	1.00	1.000	-	1.421	1.426	0.35
05-09	Mining & Quarrying	1.00	1.007	0.25	1.604	1.617	0.85
10-16	Food products and beverages	1.18	1.221	3.86	1.314	1.334	1.55
17	Manufacture of textiles	1.00	1.000	-	1.307	1.317	0.77
18	Wearing apparel	1.00	1.000	-	1.250	1.265	1.13
19	Leather	1.00	1.000	-	1.362	1.378	1.18
20	Wood products	1.00	1.000	-	1.115	1.123	0.73
21	Paper products	1.00	1.000	-	1.417	1.429	0.89
22	Publishing	1.00	1.000	-	1.360	1.370	0.69
23	Petroleum	1.94	1.952	0.57	1.400	1.410	0.74
24	Chemical products	1.43	1.472	2.62	2.105	2.128	1.08
25	Rubber and plastics	1.00	1.000	-	1.632	1.649	1.04
26	Non-metallic minerals	1.00	1.000	-	1.454	1.464	0.69
27	Basic metals	1.00	1.000	-	1.242	1.248	0.54
28	Fabricated metals	1.00	1.000	-	1.254	1.264	0.75
29-30	Machinery and equipment	1.00	1.000	-	1.270	1.277	0.54
31	Electrical equipment	1.00	1.000	-	1.296	1.302	0.46
32-33	Medical & precision instrument	1.00	1.000	-	1.273	1.290	1.35
34	Motor vehicles	1.00	1.000	-	1.130	1.139	0.83
35	Transport equipment	1.00	1.000	-	1.305	1.309	0.29
36	Furniture	1.00	1.000	-	1.207	1.215	0.64
37	Recycling	1.00	1.000	-	1.501	1.507	0.40

Table 5. (Continued)

ISIC Descriptions		Public			Private		
		Isolated	Feedback	%	Isolated	Feedback	%
		A	B	$C = (B-A) / A * 100$	A	B	$C = (B-A) / A * 100$
40	Electricity	2.74	2.753	0.50	1.000	1.000	-
41	Water	2.65	2.660	0.52	1.000	1.000	-
45	Construction	1.00	1.000	-	1.553	1.567	0.94
50	Retail sale & maintenance of automotive fuel	1.00	1.000	-	1.324	1.342	1.32
51	Wholesale trade	1.00	1.000	-	1.209	1.217	0.68
52	Retail trade	1.29	1.308	1.16	1.330	1.345	1.11
55	Hotels & restaurants	1.02	1.033	0.80	1.341	1.363	1.69
60	Land transport	1.30	1.314	1.06	1.339	1.360	1.54
61	Water transport	1.09	1.102	0.64	1.088	1.098	0.93
62	Air transport	1.96	2.000	1.88	1.357	1.401	3.28
63	Transport services	1.00	1.000	-	2.262	2.281	0.87
64	Post & telecommunications	1.00	1.000	-	1.573	1.578	0.28
65	Financial intermediation	1.02	1.028	0.73	1.160	1.166	0.56
66	Insurance and pension funding	1.00	1.000	-	1.294	1.300	0.49
67	Finance related services	1.16	1.226	5.37	1.390	1.411	1.49
70	Real estate activities	1.26	1.281	1.37	1.075	1.078	0.34
71	Renting of machinery and equipment	1.00	1.000	-	1.157	1.164	0.66
72	Computer and related activities	1.00	1.000	-	1.558	1.581	1.48
74	Other business activities	1.06	1.098	3.14	1.289	1.299	0.77
75	Public administration	1.17	1.188	1.26	1.000	1.000	-
80	Education	1.05	1.057	0.68	1.201	1.212	0.85
85	Health & social work	1.08	1.099	2.10	1.199	1.209	0.82
90	Sewage & sanitation services	1.05	1.092	3.94	1.252	1.260	0.63
91	Activities of membership organizations n.e.c.	1.22	1.229	0.98	1.302	1.321	1.53
92	Recreational, cultural and sporting activities	1.20	1.239	3.39	1.314	1.349	2.71
93	Activities of private households for own use	1.00	1.000	-	1.254	1.277	1.79
95-96	Activities of private households as employers of domestic staff	1.00	1.000	-	1.000	1.000	-
97-99	Extraterritorial organizations	1.00	1.000	-	1.359	1.398	2.82

The “isolated” case under each sector represents output multipliers obtained from the Leontief inverse of the corresponding column separately. On the other hand, the “feedback” cases are obtained from the extended Leontief inverse that takes the interactions between the two sectors into account.

Extended Leontief multipliers are higher than the isolated on average by about 1.75% in the public sector and 1.02% in the private sectors. This reveals an interesting point that the economic self-influence of the public sector through the private sector is much stronger than the economic self-influence of the private sectors through the public sectors. Food processing in the public sector and chemicals in the private sector are among sectors that show strong public-private interactions.

6 Conclusion

Kuwait’s economic policy reform targets overcoming structural imbalances in the economy – heavy dependence on oil and dominance of the public sector. In order to remove these imbalances, the authorities have often struggled to achieve a two-pronged development strategy – diversifying the country’s economic base away from oil and promoting private sector development. In this regard, the policy debates on diversifications and privatizations have often viewed the two in isolation, as if they are mutually exclusive economic realities. This study reveals that diversification and privatization may not be necessarily isolated cases. In designing Kuwait’s economic reform, it will prove useful to focus on interconnections between the major challenges.

This paper explored linkages between the public and private sectors in Kuwait using a unique set of input-output tables, derived from supply-use tables, that distinguish transactions made by private and public enterprises as well as providing a matrix of imports by sector. The explorations first examined the strength of the interdependencies between public and private sectors and then investigated policy options to implement private sector development.

The public-private sector interdependence analysis revealed interesting results regarding sectoral differences in strengths of forward and backward linkages. For instance, the findings indicated that the strength of the primary and secondary oil sectors lie in their forward linkages, supplying other sectors with their outputs but their backward linkages, rooted in buying inputs from other industries, is not as strong. On the other hand, the chemicals industry is identified as one of the

few sectors, which have balanced and relatively strong forward and backward linkages in both public and private sector.

The policy analyses conducted in this paper are highly relevant to the ongoing policy debate in Kuwait over the design of the economic reform programs. The inter-industry linkage analysis has revealed insights into policy synergies through which one instrument can affect more than one policy target.

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