"Economic Multipliers for Jordanian Economy: (Input-Output Analysis)" By

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Abstract

This study aims to assess the impact of different sectors in the Jordanian economy by using Input-Output Multipliers Analysis and how they developed. The paper attempts to prove it by using Input- Output tables of Jordan economy to the years: 1987, 2000, and 2009. To facilitate the comparison process between activities the researcher assembled and aggregated them to 15 sectors. This study applied input-output technique to determine economic effects to gauge the significance of these industries in generating Output, Income, and Employment.

Index terms— input-output model (iom), jordanian input-output tables (jiot), output multipliers (om), income multipliers (im), employment multipliers (em).

1 Introduction

conomists have long been interested in measuring the total impact upon output, income and employment resulting from a given change in demand or investment. To this end, the multiplier as developed by Keynes is one of the most useful analytical techniques **??**Mieryk, 1967).

One of the most important uses of Input-Output Tables in the analytical models is to assess the effects on the economy due to change in one of the elements of exogenous variables of the economy by using multipliers analysis. In this study we will use the table built by the researcher for 2000 using the actual data and the updating table for 2009 which built by the researcher using RAS method, in addition to 1987 table which built by government of Jordan.

2 II. Research Problem and Objectives

There are no such studies analyzing different multipliers by using IOT, which debilitating decisionmaking process to motivate final demand on economic sectors products.

The aim of this study to analyze the multipliers in Jordanian Economy to determine the most influential economic sectors in production, income and employment, which thru the polices toward true decision making to direct final demand on sectors products that most affected according to the economic priorities in Jordan if decreasing the unemployment through motivation the demand on products of sectors which have the highest using of multipliers, or increasing the income through affected the demand on products which have the highest income multipliers, and so on.

3 III.

4 The Importance of Research

Jordanian economic is suffering since the end of eighties in last century from several economic problems which obstruct its growth and progress; from weakness of output and inability to meet local needs in various forms, to shrinking the level of income and rising unemployment.

To mitigate the severity of these problems through formulate plans, the planners and decision makers should depend on scientific studies in specify the economic sectors which have the greater impact on incentive the yield, growing up the income, and rising the employment.

5 IV.

6 Methodology

To achieve objectives of this paper, we will employ method based on Leontief's input-output framework (e.g. Leontief, 1966;Miller & Blair, 1985) where the structure of an economy is analyzed in terms of interconnection between production sectors.

V.

7 Theoretical Framework

Input-Output tables are part of the Jordanian national accounts, complementing the quarterly and annual series of national income, expenditure and product aggregates. They provide detailed information about the supply and nature of commodities in the Jordanian economy and about the structure of, and inter-relationships between, Jordanian industries.

Detailed data on supply and use of commodities, inter-industry flows and a assortment of derived data, such as input-output multipliers, are provided for economic planning and analysis, and construction of models for forecasting purposes. The data can also be useful for non-economists seeking a thorough knowledge of relationships in the Jordanian economy.

This study is intended to serve three main purposes. First, it provides a guide to the construction and interpretation of input-output multipliers. Second, it provides details of the way in which the input-output multiplier tables can be used. Third, it provides a means of answering some of the questions often requested by input-output practitioners.

These queries tend to arise because of the types of "what if?" analysis for which input-output tables can be used (for example, what would be the impact on employment of an x% change in output by the x industry). This type of analysis is really dependent on acknowledge of input-output multipliers and their weaknesses. Using input-output tables, multipliers can be calculated to provide a simple means of working out the flow on effects of a change in output in an industry on one or more of imports, income, employment or output in individual industries or in total.

8 VI.

9 Literature Review

Literature on the calculation of Keynesian multipliers traces back to Richard Kahn's (1931) description of an employment multiplier for government expenditure during a period of high unemployment. According to Leontief (1941), who developed a set of national-level multipliers that could be used to estimate the economy-wide effect that an initial change in final demand has on an economy, all the calculation of I-O multipliers traces back to him. And Isard (1953) applied input-output analysis to a regional economy.

According to Richardson (1985), the first attempt to create regional multipliers by adjusting national data with regional data was Moore and Peterson (1955) for the state of Utah.

In a parallel development, Tiebout (1956) specified a model of regional economic growth that focuses on regional exports. His economic base multipliers are based on a model that separates production sold to consumers from outside the region to production sold to consumers in the region. The magnitude of his multiplier is based on the regional supply chain and local consumer spending. Hughes (2003) discusses the limitations of the application of multipliers and provides a checklist to consider when conducting regional impact studies. Siegfried, Sanderson, and McHenry (2006) discuss the application of regional multipliers in the context of college and university impact studies, another area where the multipliers are commonly misused Paper by Bess &Ambargis (2011), they said: "Input-output models, when applied correctly, can be powerful tools for estimating the economy-wide effects of an initial change in economic activity. To effectively use these models, analysts must collect detailed information about the project or program under study. Analysts also need to be aware of the assumptions and limitations of these models. In this paper, we will focus on these assumptions and on the information that is required to use regional input-output multipliers correctly. We focus specifically on multipliers generated by the Regional Input-Output Modeling System (RIMS II) developed by the Bureau of Economic Analysis".

A study by (Bekhet, 2011) attempts to investigate the success or failure development policies for Malaysia economy through the multipliers indices over the period 1983-2000. The study used four inputoutput tables had published so far by Department Statistics of Malaysia (DSOM) for the period under study.

The study employed the Leontief inverse model that is open with respect to household for simple multipliers of the output, income and employment. New evidence is found in this study: first, there is still a high dependency on the primary sectors, such us Oil palm, Rubber primary products and Wood sectors. Second, output and income multipliers for Agriculture sector are still very weak even where some success has resulted from planning

policies. Third, the main result of the investment policy was to transform Malaysia from a country of surplus labor to one with a shortage. Fourth, there is no consideration of efficiency or comparative cost in the selection of 'key' sectors by reference to multiplier indices.

10 VII.

11 Data and Mathematical Techniques a) Output Multipliers

An output multiplier is defined as the change in gross output resulting from a unit change in final demand in a given sector (Miller, & Blair, 1985).

12 b) Simple Output Multipliers

For the simple output multiplier, the total production is the direct and indirect output effect obtained from a model in which households are exogenous. The initial output effect on the economy is defined to be simply the initial JD's (Jordan Currency, Dinar) worth of sector j output needed to satisfy the additional final demand (Bekhet, H. A., 1990).

Simple output multipliers for each sector defined as the sum of the column, refer to the specific sector, in Leontief invers matrix divided by JD, this JD is an initial impact on the production of specific sector resulting from the initial increasing in the final demand by one JD for products of that sector, then we can formulated simple output multipliers as follows (Bulmer, 1982):OM j = ? = n 1 i r ij**(1)**

Where: OM j : value of simple output multiplier for sector j (j=1,2,3??

13 c) Total Output Multipliers

To estimate the value of these multipliers will be considered the matrix of technical coefficients as closed form (closed model), which means that the household sector is part of this matrix and not part of the final demand, this means that the household sector has become an endogenous variable, in which case the output multipliers will include additional effect (Induced Effect) for household income as a supplier of labor services (Miller and Blair, 1985).

14 By using(

? A) instead of (A), we can write the general wording of the equation as (Bulmer, 1982):? OM j = ? + = 1 n 1 i ? r ij (2)

? OM j : Value of total output multiplier for sector j (j=1, 2, 3??). The results of applying thisequation to the Jordanian input-output tables between 1987 and 2009 are shown in table (1).

Manufacturing sector ranked as the top one in 2009, the value of this multiplier means that if the final demand on the products of this sector increased by One JD, it will be generate an increase in the total production - including labor services produced by household sector-for all sectors which is 5.23 JDs in 2009, compared with 4.04 JDs in 2000, and 1.82 JDs in 1987, it indicates as the total output multipliers. In the other side the real estate ranked in the last place of terms value of the multipliers over the three years. The important observation that the manufacturing sector moved from 12th rank in 1987 to 4th place in 2000 , and the 1st in 2009 , the growth in Manufacturing sector as a result of establishing several industrial zones stretched in all Provinces in Jordan due to "Jordan Free Trade Agreement with US (FTA), 2009"(www.ustr.gov).

15 d) Income Multipliers i. Simple Income Multipliers

This multiplier can be found by using elements of Leontief invers matrix(I-A) -1 with household exogenous, mathematically we can represent this as: H j = h' (I-A) -1

(3) Where: H j : simple income multipliers h':row vector of technical coefficients of labor income.

Applying equation (**??**)onThe Jordanian Input-Output Tables to the same era **??**1987, 2000, and 2009), we have the results are shown in Table (2).

These figures illustrate the changes in household income in other words "when the final demand changed by One JD through the impact on production of the sector concerned and other related sectors", which will create an impact on the workers' income in that sector.

16 ii. Total Income Multipliers

In this multiplier Leontief inverse matrix is used, in the closed model considering the household sector as an endogenous variable, the results show the total income effect (direct and indirect and induced), which is called the total household income multiplier, as shown by the following equation:? H = h (I- ? A) -1 (4)

Table (2) illustrates the result of this equation when Appling it on the Jordanian input output tables for the same period. The value of this multiplier reflects the direct and indirect effects on household income due to the increase of final demand by One JD; for example, if final demand on products of the first sector (agriculture) by One JD, the income of workers in the same sector will grow by 0.440 JDs in the year 2009 as a result of direct and indirect effects on this increase.

iii. Type I Income Multipliers Another kind of multipliers which is simple income multiplier, through this type we can express the direct and indirect effects on income resulting from One JD increase in final demand for sector j. The primary increase in production of sector j will generate successive increases in the production of other sectors and that will affect the production to the same sector as well, as it increases the income of workers in the sector j it will also generate effects on the production of the same and other sectors, more over that will affect again the workers' income in this sector, the value of this factor equals the sum of all these effects. We can find the value of this multiplier by using the formula of simple income multiplier given in equation (3) as a numerator, and uses as a denominator not the initial JD worth of output, but rather its initial labor income effect, h (Bradley & James, 1969). Y j = h' (I-A) -1 h -1

(5) Y j : Type I income multipliers h' (I-A) -1 : Simple income multipliers

17 B

Income multipliers attempt to translate the impacts of final demand spending changes into changes in income received by household sector as a labor supplier (Miller and Blair, 1985), this will cause many changes in production of other sectors and in income of labor in the same sectors, so we can distinguish between four kinds of multipliers as follow: h -1 : Technical coefficient of household income (Value of Labor Income Divided by Total Production).

The result of applying this formula to Jordanian Input-output tables shown in table (3). We can see in Table (3) sharp rise in the value of this multiplier for Agriculture, Manufacturing, Electricity and Construction in the years 2000 and 2009 compared with the year 1987.

18 iv. Type II Income Multipliers

This kind represents the ratio of the direct, indirect and induced income change to the direct income change due to a unit increase in final demand. It takes into account the effects of secondary rounds of consumer spending in addition to the direct and indirect inter industry effects, also it has the total income multiplier (numerator) as in equation (**??**), and it used as a denominator the initial labor income effect, h (Miller and Blair 1985).? Y j = h' (I- ? A) -1 h -1 (6) ? Yj: Type II Income Multiplier, h' (I-A) -1 : total income multiplier h -1 : Technical Coefficient of Household Income

We can see the results after applying formula (6) on JIOT in table (3). These multipliers show how much the initial income effects (household input coefficients) are blown up, or multiplied. This occurs when direct, indirect and induced effects (due to household spending because of increased household income) are taken into account, in which household are an endogenous sector.

19 e) Employment Multipliers

If we assume there is a very close relationship between the levels of employment and output industry j, then the employment/output ratio can be defined for all levels of output, so the entries in the input-output system can be converted to employment terms to yield employment multipliers (Ghosh, 1970).

When we calculate the employment multipliers we will see the major difference in calculations of wages content of products so the physical labor input coefficients will be used instead of monetary labor input coefficients (European Commission, 2008), then we can calculate employment multipliers, rather than income multipliers for each sector, because of that we used here the employment output ratio (numbers of jobs per thousand JD of output).

20 i. Simple and Total Employment Multipliers

As I mentioned in income multipliers about the measures that affect the income multipliers, there is a difference between employment and income multipliers which is using number of employees (as material units) rather than the monetary value of labor inputs in the production process (Miller and Blair, 1985), thus we can formulate simple multiplier as follows: L = w' (I-A) -1 Where:L: employment multiplier.

w?: row vector represent number of employees. Table (4) shows us the results after we applied quotation (7) on JIOT. For each sector the employment multipliers represent jobs created per One JD of additional final demand, construction sector has the highest multiplier in 2009, which means it has been use labor intensely. If the final demand for construction products were increased by one thousand JD, 0.735 positions for employees would be created in this sector. By using the closed input-output tables, we're going to get what is known the total employment effect or total employment multiplier which given in the following formula (Bekhet, H.A., 1990):? L = w? (I- ? A) -1 (8)

The total employment multipliers for the Jordan economy are shown in table (4).

ii. Type I and Type II Employment Multipliers Type I and type II employment multipliers follow from the same argument as was presented for type I and type II income multipliers, (Richardson, 1972). One may wish to relate the simple or total employment effect to an initial change in employment, not final demand (and output) in monetary terms. The type I employment multiplier uses simple employment multiplier as a numerator and (w) which equal the percentage of number of employees to production as the denomination. Mathematically, the vector of the employment multiplier (t) is given by: T = w? (I-A) -1 w -1 (9)

The results for the Jordan economy are shown in table (5). It means for each new job created in any sector, for example electricity product, there is a total of1.185 , 4.643, and 5.009 jobs created in all sectors throughout the economy in the years 1991, 2000, and 2009 respectively.

When using closed input-output model by (I-) -1 rather than (I-A) -1 it allows us to measure the type II employment multiplier. Using (t) for the vector of this multiplier which is parallel to the type II income multipliers, the following equation show represent this multiplier (Katz, J.L. 1980):? L = w? (I- ? A)-1w-1 (10)

The results obtained by this equation for the Jordan Economy are shown in Table (5)

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21 Recommendation

Jordan's economy suffering high poverty and unemployment problems, this result demonstrated through multipliers values. To lessen the unemployment problems, the decision makers should focus on the sectors which have higher employment multipliers like construction and other services sectors which often consist of small and medium enterprises. [1] [2]

Figure 1:

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2): Simple and Total Income Multipliers Table (3) : Type I and II Income Multipliers

Table (2): Simple and Total Income Multipliers

No	Sector Name		Simple Income Multipliers 1987	Simple Income Multipliers 2000	Simple Income Multipliers 2009	Total Income Multipliers 1987	Total Income Multipliers 2000	Total Income Multipliers 2009
1	Agriculture, forestry and fishing	Value	0.126	0.365	0.380	0.144	0.535	0.440
		Rank	12	7	8	12	7	10
2	Mining and Querying	Value	0.158	0.339	0.370	0.180	0.497	0.464
		Rank	9	9	10	9	9	8
3	Manufacturing	Value	0.104	0.350	0.420	0.119	0.512	0.399
		Rank	14	8	6	14	8	13
4	Electricity	Value	0.124	0.334	0.370	0.141	0.489	0.413
		Rank	13	11	9	13	11	11

Table (3):Type I and II Income Multipliers

. No	Sector Name	Type I Income Multipliers 1987	Rank	Type I Income Multipliers 2000	Rank	Type I Income Multipliers 2009	Rank	Type II Income Multipliers 1987	Rank	Type II Income Multipliers 2000	Rank	Type II Income Multipliers 2009	Rank
1	Agriculture, forestry and fishing	1.471	4	3.972	1	3.182	2	1.680	4	5.820	1	1.957	8
2	Mining and Querying	1.385	7	1.739	8	1.772	8	1.580	7	2.550	8	1.964	7
3	Manufacturing	1.741	3	3.418	2	3.213	1	1.990	3	5.000	2	3.555	1
4	Electricity	1.752	2	2.529	3	2.505	4	2.000	2	3.700	3	2.771	2
5	Water	1.284	9	1.741	7	1.746	9	1.473	9	2.550	7	1.934	9
6	Construction	1.146	12	2.292	4	2.649	3	1.310	12	3.360	4	2.382	3
7	Retail & wholesale Trade, and repair maintenance	1.402	5	1.249	12	1.385	11	1.600	5	1.830	12	1.533	11
8	Hotels & Restaurants	1.332	8	1.790	5	1.798	6	1.520	8	2.620	5	1.990	5
9	Transport	1.385	6	1.754	6	1.784	7	1.580	6	2.570	6	1.976	6
10	Communications	1.056	15	1.284	11	1.318	12	1.210	15	1.880	11	1.460	12
11	Financial & insurance	1.096	13	1.174	14	1.241	14	1.250	13	1.720	14	1.374	14
12	Real estate and Business services	64.011	1	1.678	9	1.944	5	73.180	1	2.460	9	2.099	4
Educa		1.149	11	1.132	15	1.222	15	1.310	11	2.660	15	1.353	15
14	Health and social wo	1.0	14	1.4	10	1.4	10	1.2	14	2.0	10	1.5	10

Figure 2: Table (

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4) : Simple and Total Employment Multipliers	Table (4): Simple and Total Employment Multipliers	Simple Employment Multipliers	Total Employment Multipliers	. No	Sector Name

Figure 3: Table (

"Economic Multipliers for Jordanian Economy: (Input-Output Analysis)"

	2009	Rank	7	2	3	1	5	14	15	6	13	9	11
	2000	Value	2.286	7.099	5.502	7.864	3.090	3.954	1.453	2.553	2.618	3.075	3.705
Type II Employment Multipliers		Rank	11	2	3	1	6	4	15	9	8	7	5
		Value	2.681	6.088	4.679	8.484	4.137	1.662	1.438	3.547	1.763	2.126	2.029
		Rank	13	3	5	12	6	15	2	7	8	9	4
Table (5) : Type I and II Employment Multipliers	Type I	2000	Rank	12	4	3	10	7	14	2	5	6	11	8
		2009	Value	1.866	3.820	3.606	4.643	1.843	2.477	1.118	1.752	1.738	1.568	1.412
	Employment Multipliers	1987	Rank	5	2	3	1	6	4	15	7	8	9	12
			Value	2.189	3.276	3.067	5.009	2.467	1.041	1.106	2.434	1.170	1.084	0.773
			Rank	7	2	3	1	5	14	12	6	10	13	15
			Value	1.222	2.716	2.537	1.269	2.149	1.086	3.497	2.136	2.133	1.618	2.548
	1987	Value		1.148	1.935	2.109	1.185	1.599	1.052	2.878	1.757	1.640	1.157	1.466
Employment Multipliers	Sector Name			Agriculture, forestry & fishing	Mining and Quarrying	Manufacturing	Electricity	Water	Construction	Retail & and	Wholesale maintenance	Hotels & Restaurants	Transport	Communication	Financial & insurance
(5)Type I and II	. No Table			1	2	3	4	5	6	7	8	9	10	11	

Figure 4: B

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