The Impact of Export Earning Falls on the Growth of Other Sectors in Iranian Economy

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Abstract

The purpose of this paper has been to estimate the impact of export earning falls on other sectors of Iranian economy. We have aggregated input-output table of Iran into 37 sectors and separating imports from domestic production to estimate the impact of fall in export earnings on other sectors of Iranian economy. We have also disaggregated imports to show the impact of falls in exports on intermediate imports, the result shows that a unit change in exports would have the highest negative impact on the output of mines other than oil and natural gas production followed by service sector, rubber and plastic, agriculture sector, construction, construction materials and chemicals products and tobacco and food product industries and Manufacture of basic Iron and Steel products, fabricated metals and manufacture of other transport equipments respectively, indicating probably, the sensitivity of these industries to fluctuation in oil export earnings. While industries such as textiles, office machinery and accounting, wood and wood products, Manufacture of medical and optical instruments, household applicants and recycling and other likewise industries are least affected. The decline in intermediate imports paid by oil exports, however, is relatively high in products related to mines other than oil and natural gas, followed by service sector, rubber and plastics, construction materials and chemicals products, agriculture, water, gas and electricity, manufacture of transport equipments, manufacture of glass, Iron and still and Fabricated metal products. This finding shows that in addition to high import intensive industries such just mentioned, other important sectors such as agriculture and service sector are also highly adversely affected. Taking into account the fact that these are the main economic activities of Iran it is Plausible that the economy of Iran on its entirety would be adversely affected by decline in export earnings.

Key Words: Export Earning Falls, Intermediate Imports, Iranian Economy, Input-output Technique.

JEL Classification: O21, Q32, Q38

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1-Introduction

While export plays a very important role in economic development\textsuperscript{1}, its impact varies among countries depending on countries sectoral composition, their institutional structures and the level of development\textsuperscript{2}. Oil has been the main source of Iran exchange earnings, thus any fluctuation in its export would have adverse impact on the entire economy. While positive oil price shock increases the real effective exchange rate and appreciate domestic currency in medium terms which is one of the syndromes of a “Dutch diseases”. This reduces the price of imports and increases the price of exports. With increase in oil price and its exchange earnings real government expenditure also increases leading to inflationary tendencies.\textsuperscript{3}

However, the Iranian economy is much more vulnerable to the negative shocks of oil prices, the real effective exchange rate falls significantly as the domestic currency depreciates. This leads to increase in price of imports while being ineffective in raising non-oil exports. Thus while positive and negative oil price shocks translate into demand side inflationary effects, the supply side is highly vulnerable to negative oil revenue shocks. Given this negative supply shocks of fall in oil exchange earnings, the real output which depend heavily on imported Machinery, raw and intermediary material will decline. The question is which sector is more vulnerable to the fall in oil exports? In this Paper we use input-output technique to evaluate the impact of falls in oil export earnings of Iran. The following section would discuss the impact of oil Industry on the economy of Iran. Section three, presents’ methodology and data sources. In section four we analyses the findings and finally, in section fifth and the last we conclude the paper.

2- The Impact of Oil Industry

Iran being an oil exporter ever since the discovery of the first oil well in Masjed Soleiman in 1908. It is the second largest producer and exporter of crude oil after Saudi Arabia. Oil is the major source of exchange earning and the main source of government revenue and an important component of GDP (see table-1). Thus the

\textsuperscript{2}- Cunado and Garcia de (2005)
\textsuperscript{3}- Mohammad Reza Farzanegan and Gunther Markwardt (2009) PP.134-152
entire development program of Iran economy is financed by the revenue earned from oil exports\textsuperscript{1}.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
Year & Share of Oil Sector in Export & Share of Oil Sector in Government Revenues & Share of Oil Sector in GDP \\
\hline
1991 & 85.80\% & 51.19\% & 6.80\% \\
1992 & 84.96\% & 52.06\% & 7.84\% \\
1993 & 79.28\% & 72.51\% & 15.65\% \\
1994 & 75.14\% & 73.45\% & 16.22\% \\
1995 & 82.26\% & 70.79\% & 15.29\% \\
1996 & 86.07\% & 66.79\% & 14.20\% \\
1997 & 84.17\% & 58.43\% & 11.56\% \\
1998 & 75.72\% & 42.01\% & 6.12\% \\
1999 & 81.26\% & 47.85\% & 10.20\% \\
2000 & 85.31\% & 56.81\% & 17.58\% \\
2001 & 80.90\% & 57.35\% & 15.20\% \\
2002 & 81.33\% & 62.14\% & 17.20\% \\
2003 & 80.48\% & 61.65\% & 17.45\% \\
2004 & 82.81\% & 58.99\% & 19.52\% \\
2005 & 83.62\% & 48.07\% & 21.57\% \\
2006 & 81.54\% & 43.94\% & 20.70\% \\
2007 & 83.51\% & 36.69\% & 21.35\% \\
\hline
\end{tabular}
\caption{Importance of Oil sector in Iranian economy(Percent )}
\end{table}

Source: Statistical Center of Iran, Statistical Yearbook Various Issues and Central Bank of Iran Reports and Balanced Sheets(2012)

Theoretically, it may be expected that the oil industry influences the economy of oil producers directly and indirectly\textsuperscript{2}. The direct impact of oil industry maybe studied in terms of the flow of resources between oil industry and non oil sectors on the one hand ,oil industry may be expected to generate demand for various output of indigenous sector ,capital equipment, labor supply and requirement of industrial goods and services, on the other hand there is the demand of domestic economy for its cheap sources of energy and raw materials for such energy intensive industries like petrochemicals and oil refineries .Indirectly the influence of oil industry may be studied in terms of its revenue and expenditure in the economy of oil producing nations. In the course of development it is noticed that

\textsuperscript{1} Youssefi(1996 )
\textsuperscript{2} Amuzegar and Fekrat( 1971 )
demand for imports tend to exceed the export capacity to import and the poor countries then confront a conflict between accelerating their internal development and external balance. Iran, however, managed through its oil revenue to bridge the balance of payments gap which otherwise would have been very large. Oil industry no doubt helped Iran to surmount the investment and foreign exchange barrier which has been such a serious obstacle for the majority of developing countries. It has no doubt succeed in raising the standard of living of their population, though despite this it continue to remain underdeveloped and share most of the problems and characteristics of other underdeveloped countries. It still continues to depend on oil for its exports with no sign of diversification of its export base. As a result the country is highly vulnerable to fluctuations in oil prices or its export revenue.

In fact inflationary effects are much more pronounced during negative shocks. This is mainly because of increased import prices and the mechanisms of financing budget deficit in Iran. In fact oil price fluctuations have marginal impact on real government expenditures. The dominant position of Iranian government in the economy leading to over employment in public sector and consequently a large and growing wage bill and various kinds of implicit and explicit subsidies such as free or blow cost provision of government services such as utilities, education, health, transport and input for specific sectors, etc., making public expenditure highly rigid.

3-Methodology and Data Sources
The basic data is input-output table of the Iranian economy for the year 2001 prepared by the Statistical Centre of Iran.

The basic equation in IO is used:

\[ X = Z + F \] (1)

Relationship (1) shows that, Total output(X) of an economy is divided into intermediate demand (Z) and final demand (F). In the standard model of input-output is assumed that there is a constant ratio between intermediate exchange and total product of each sector, by considering that the IO coefficients can be calculated.

1. Gerald, M. Meir (1963) P.74
\[ A_{ij} = \frac{z_{ij}}{x_j} \]  \hspace{1cm} (2)

And,

\[ Z = AX \]  \hspace{1cm} (3)

By substituting equation (3) in (1):

\[ X = (I - A)^{-1} . F = L . F \]  \hspace{1cm} (4)

Where “\( L \)” is Leontief Inverse Matrix which shows the impact of Final demand sectors on output level. Thus the impact of fall in exchange earnings of crude oil and Natural gas on other sectors can be estimated through the following equations

\[ \partial X = L . \partial F \]  \hspace{1cm} (5)

That is crude oil sector and natural gas column in Leontief Inverse Matrix

Shows the impact of a unit change in export sector on the other sectors. In other words how other sectors output would change when oil export changes (declined in our case) by one unit.

To estimate the impact of decline in export on import at first we have calculated the import ratio. i.e. we have divided the imports to output for every sectors to obtain import requirement of domestic output. To estimate the decline in imports resulting from fall in oil exports, we have multiplied this ratio by oil export: Thus,

\[ \text{Reduction of import of any sector resulting from a reduction in oil export} = \frac{m_i}{x_i} \times l_{ij} \]  \hspace{1cm} (6)

However, to be realistic we have to use input-output table based on domestic output. Thus, at first we have to estimate domestic input-output table, for which imports have to be separated. For this purpose following procedures are adopted:

\[ x = Ze + fh + Ex - m \]
\[ f = fh + Ex \]  \hspace{1cm} (7)

\[ x - Ex = Ze + fh - m \]
\[ fh = c + g + cf \]
\[ x = Ze + fh + e - m \]
\[ d = \frac{x - Ex}{Ze + fh} = 1 - \frac{m}{Ze + fh} \]  \hspace{1cm} (8)
In the above equation” d” has domestic content, by multiplying it to any variable we shall obtain domestic content of that variable. Value of “d” varies from zero to unity, thus we can write the following equation:

\[ x - Ex = dZe + dfh \]  

(9)

Where” c”, ”g”, and” cf”, are vectors of household consumption, government consumption and capital formation including imports respectively. ”mc”, ”mg”, “mcf” are vectors of import consumption of households, governments, and imports of capital goods respectively. Differences of each of the vectors give us domestic consumption of households, governments and domestic investment respectively.

Thus we can write domestic output balance sheets as follows:

\[ x = (\bar{De} + \bar{Me}) + [(ch + mc) + (gh + mg) + (cfh + mcf)] + Ex - m \]  

(10)

In this method also raw sum of matrix is equal to import raw matrix in final demand. That means sector wise and economy wise “mc”, “mg”, “mcf” is equal to “ m” cancelling each others. Raw sum of matrix and column sum of vectors “mc”, “mg”, “and” mcf” are in value added area and in region IV of the table.

Thus

\[ x = \bar{De} + (ch + gh + cfh) + Ex \]  

(11)

\[ x = (I - A_d)^{-1}[(ch + gh + cfh) + Ex] \]  

(12)

\[ x = (I - A_d)^{-1}FD \]  

(13)

The above relation shows Leontief output balance sheet based on domestic intermediate transactions. This output balance sheets are used in the present paper.

4- Analysis of Findings

Table 2, presents the findings of input-output technique as described above. The first column shows the fall in output resulting from a unit change (decline) in exports. The second column of the table shows the fall in imports resulting from decline in oil exports. As can be seen from the table, a unit change in exports would have the highest negative impact on the output of mines other than oil and natural gas production followed by service sector, rubber and plastic, agriculture sector, construction, construction materials and chemicals products and tobacco and food product industries and Manufacture of basic Iron and Steel products, fabricated metals and manufacture of other transport equipments respectively. Indicating probably, the sensitivity of these industries to fluctuation in oil
exports. On the other hand the result show that industries such as textiles, office machinery and accounting, wood and wood products, Manufacture of medical and optical instruments, household applicants and recycling and other likewise industries are least affected. The decline in intermediate imports paid by oil exports is largest in mines other than oil and natural gas, followed by service sector, rubber and plastics, construction materials and chemicals products, agriculture, water, gas and electricity, manufacture of transport equipments, manufacture of glass, Iron and still and Fabricated metal products. This finding shows that in addition to high import intensive industries such as machinery and transport equipments, rubber and plastics, construction machinery, Iron and still and fabricated metal products, other important sectors such as agriculture and service sector are also highly adversely affected. In other words taking into account the fact that these are the main economic activities of Iran it is Plausible that the economy of Iran on its entirety would be adversely affected by decline in oil exchange earnings.
Table 2: Production loss and Decline in Intermediate imports due to a unit Fall in oil exports (Million Rials)

<table>
<thead>
<tr>
<th>No.</th>
<th>Sectors</th>
<th>Production Loss</th>
<th>Rank</th>
<th>Fall in Intermediate Imports</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agriculture</td>
<td>0.00161</td>
<td>5</td>
<td>0.0000624</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Crude oil and natural gas</td>
<td>0.00023</td>
<td>15</td>
<td>0.0000004</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>Other mines</td>
<td>1.00083</td>
<td>1</td>
<td>0.0399065</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Manufacture of food products and beverages</td>
<td>0.00003</td>
<td>28</td>
<td>0.0000046</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>Manufacture of tobacco products</td>
<td>0.00060</td>
<td>8</td>
<td>0.0000376</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Manufacture of textiles</td>
<td>0.00000</td>
<td>37</td>
<td>0.0000000</td>
<td>37</td>
</tr>
<tr>
<td>7</td>
<td>Manufacture apparel, processed and colored furs</td>
<td>0.00012</td>
<td>18</td>
<td>0.0000129</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Tanning of leather, manufacture of luggage, handbag, saddle, shoes</td>
<td>0.00004</td>
<td>27</td>
<td>0.0000017</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>Manufacture of wood and wood products</td>
<td>0.00001</td>
<td>35</td>
<td>0.0000007</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>Making paper and paper products</td>
<td>0.00004</td>
<td>26</td>
<td>0.0000025</td>
<td>26</td>
</tr>
<tr>
<td>11</td>
<td>Publishing, printing and recorded media</td>
<td>0.00012</td>
<td>17</td>
<td>0.0000118</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>Manufacture of refined petroleum products and coal, coke and nuclear fuel processing</td>
<td>0.00007</td>
<td>20</td>
<td>0.0000068</td>
<td>18</td>
</tr>
<tr>
<td>13</td>
<td>Construction materials and chemical products</td>
<td>0.00090</td>
<td>7</td>
<td>0.0000182</td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td>Manufacture of rubber and plastic products</td>
<td>0.00186</td>
<td>4</td>
<td>0.0001543</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>Manufacture of glass and glass products</td>
<td>0.00024</td>
<td>13</td>
<td>0.0000322</td>
<td>9</td>
</tr>
<tr>
<td>16</td>
<td>Non-metallic mineral products not elsewhere classified</td>
<td>0.00003</td>
<td>32</td>
<td>0.0000018</td>
<td>29</td>
</tr>
<tr>
<td>17</td>
<td>Manufacture of food products and beverages</td>
<td>0.00038</td>
<td>10</td>
<td>0.0000223</td>
<td>12</td>
</tr>
<tr>
<td>18</td>
<td>Manufacture of basic iron and steel products</td>
<td>0.00041</td>
<td>9</td>
<td>0.0000313</td>
<td>10</td>
</tr>
<tr>
<td>19</td>
<td>Manufacture of copper products</td>
<td>0.00007</td>
<td>19</td>
<td>0.0000039</td>
<td>21</td>
</tr>
<tr>
<td>20</td>
<td>Manufacture of aluminum products</td>
<td>0.00005</td>
<td>22</td>
<td>0.0000038</td>
<td>22</td>
</tr>
<tr>
<td>21</td>
<td>Manufacture of basic metals and metal casting</td>
<td>0.00005</td>
<td>23</td>
<td>0.0000036</td>
<td>24</td>
</tr>
<tr>
<td>22</td>
<td>Fabricated Metal Products except Machinery and Equipment Manufacturing</td>
<td>0.00035</td>
<td>11</td>
<td>0.0000274</td>
<td>11</td>
</tr>
<tr>
<td>23</td>
<td>Construction machinery with general application</td>
<td>0.00005</td>
<td>21</td>
<td>0.0000022</td>
<td>28</td>
</tr>
<tr>
<td>24</td>
<td>Construction machinery, with particular application</td>
<td>0.00020</td>
<td>16</td>
<td>0.0000094</td>
<td>17</td>
</tr>
<tr>
<td>25</td>
<td>Manufacture of household appliances</td>
<td>0.00003</td>
<td>29</td>
<td>0.0000037</td>
<td>23</td>
</tr>
<tr>
<td>26</td>
<td>Manufacture of office machinery, accounting and computing</td>
<td>0.00000</td>
<td>36</td>
<td>0.0000001</td>
<td>36</td>
</tr>
<tr>
<td>27</td>
<td>Manufacture of electrical machinery and apparatus not elsewhere classified</td>
<td>0.00023</td>
<td>14</td>
<td>0.0000212</td>
<td>13</td>
</tr>
<tr>
<td>28</td>
<td>Manufacture of radio, television and communication equipment</td>
<td>0.00003</td>
<td>31</td>
<td>0.0000032</td>
<td>25</td>
</tr>
<tr>
<td>29</td>
<td>Manufacture of medical and optical instruments</td>
<td>0.00001</td>
<td>34</td>
<td>0.0000005</td>
<td>34</td>
</tr>
<tr>
<td>30</td>
<td>Manufacture of motor vehicles, trailers and semi-trailer</td>
<td>0.00004</td>
<td>25</td>
<td>0.0000008</td>
<td>32</td>
</tr>
<tr>
<td>31</td>
<td>Manufacture of other transport equipment</td>
<td>0.00034</td>
<td>12</td>
<td>0.0000436</td>
<td>7</td>
</tr>
<tr>
<td>32</td>
<td>Furniture Manufacture</td>
<td>0.00004</td>
<td>24</td>
<td>0.0000041</td>
<td>20</td>
</tr>
<tr>
<td>33</td>
<td>Manufacturing products not classified elsewhere and Recycling</td>
<td>0.00001</td>
<td>33</td>
<td>0.0000011</td>
<td>31</td>
</tr>
<tr>
<td>34</td>
<td>Fabricated Metal Products except Machinery and Equipment Manufacturing</td>
<td>0.00003</td>
<td>30</td>
<td>0.0000023</td>
<td>27</td>
</tr>
<tr>
<td>35</td>
<td>water, elec &amp; gas</td>
<td>0.00342</td>
<td>3</td>
<td>0.0000517</td>
<td>6</td>
</tr>
<tr>
<td>36</td>
<td>Construction</td>
<td>0.00102</td>
<td>6</td>
<td>0.0000697</td>
<td>4</td>
</tr>
<tr>
<td>37</td>
<td>Service</td>
<td>0.02093</td>
<td>2</td>
<td>0.0004991</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.03443</td>
<td></td>
<td>0.0411</td>
<td></td>
</tr>
</tbody>
</table>

Source: Research results
The literature on the impact of oil revenue on the economy of oil exporters show that with increase in oil export earnings both tradable and non tradable sectors are expanded, the decline on the oil exchange earnings however, would not counteract these trends, leading to inefficiency and high cost and to what is called cost diseases\(^1\). This finding support the conclusion reached by scholars such as Eltony and Al-awadi(2001),Raguindin and Reyes(2005),Elanahasy(2006) and Berunent and Ceylon(1989) and Yousefi(1995) who studied the impact of oil revenues on the economy of oil producers, though they differ in their methodologies.

**Conclusion**

The purpose of this paper has been to estimate the impact of export earning falls on other sectors of Iranian economy. Iran is an oil producer and exporter. Oil is the major source of exchange earning and the main source of government revenue and an important component of GDP. Thus the entire development program of Iran economy is financed by the revenue earned from oil exports\(^2\). A unit change in exports would have the highest negative impact on crude oil and natural gas production followed by service sector, water, electricity, and gas connections, Rubber and plastic industries, agriculture sector, construction materials and chemicals products and tobacco industries and Manufacture of basic Iron and Steel products, fabricated metals and manufacture of other transport equipments respectively. Indicating probably the sensitivity of these industries to fluctuation in exports. On the other hand the result show that industries such as textiles, office machinery and accounting, wood and wood products, Manufacture of medical and optical instruments, household applicants and recycling and other likewise industries are least affected. The decline in output resulting from decline in imports paid by oil exports is largest in manufacture of rubber and plastics, followed by service sector construction materials and chemicals products, crude oil and natural gas, construction machinery with particular application, agriculture sector and the manufacture of electrical machinery, Iron and still and Fabricated metal products and machinery and transport equipments. The least sensitive industries are construction, textiles, household applicants, recycling, fabricated metal products, office machinery and accounting. In both cases in addition to high import intensive

\(^1\) Baumol(1967) and Baumol.et.al(1985)
\(^2\) Yousefi(1996)
industries such as machinery and transport equipments, rubber and plastics, construction machinery, Iron and still and fabricated metal products that are adversely affected, our finding also shows that agriculture and service sector are highly affected. The literature on the impact of oil revenue on the economy of oil exporters show that with increase in oil export earnings both tradable and non tradable sectors are expanded, the decline on the oil exchange earnings, however would not counteract these trends. In other words the economy of Iran on its entirety would be adversely affected by decline in oil exchange earnings

References


