The Economic Importance of Housing Sector in Tehran Province- Extraction Method Approach

"Preliminary Version[1]"

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ABSTRACT

Tehran is the most important province of economic activities in Iran. More than one fourth of economic activities are located in Tehran province. There is the fact that financial resources are limited and huge investment are required in different economic sectors, policy makers and regional planners are looking for activities those can bring more growth or create more jobs. According to many studies housing sector is one of the main sectors, this paper study the relative importance of this sector. We apply Hypothetical Extraction Method (HEM). To do so, regional input-output table for Tehran is required. We used Tehran input-output table 2001 which has been provided by Bazzazan *et. al.* (2007). Table has been aggregated into 18 main economic sectors of the province in which construction sector is considered separately. The results demonstrate that housing sector cannot be deemed as the main key sector of the province, since the main productive portion of this sector has been absorbed by the final demand and has been excluded from the production cycle. As a result, the housing sector has a relatively low importance compared to other economic sectors of the province. The amount of reduction in total economic taken amounts of the province is very trivial in comparison with the past circumstances (less than one percent).

JEL classification: R15; L74; D57; C67

Keywords: *Housing, Hypothetical Extraction Methods, key sector, inter-sectoral linkages, regional Input-Output table.*

Introduction:

Tehran Province is one of the influential economic poles of the country which is facing limitations on resources and unlimited investment needs in its different sectors. Hence,

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identifying the important sectors of the provincial economy in order to the optimum allocation of investment, is deemed necessary to prevent wasting resources and finally lead to economic growth over the area. The housing sector[4] has also received much attraction by economic planners and policy makers due to the high population absorbing potential of the province and the role this sector plays in production, employment and investment in a way that the appearance of many economic periods (prosperity or recession) are traced to the changed in this sector (Nasrollahi et. al, 2009). The limited dependence of the housing sector on import goods and services and higher reliance on foreign raw materials and native and low-skilled workforce has caused the level of the expense increase coefficient and employment to rise. The demand the demand in this sector leads to the demand for many other goods and services and moves in this sector give rise to economic moves in related sectors (Ghaderi, 2002).

Identifying the position and significance of this sector is important to determine the level of the effectiveness of this sector in provincial economy. The input-output model is one of identification methods. This model is a powerful tool to measure the linkage between the economic sectors and to assess their relative significance (Miller & Blair, 1985; Lean, 2001). The main goal of this paper is to determine and scale the economic sectors of the province in order to determine the position of the housing sector.

Achieving the above goal this paper is organized as follows: first, we review the importance of housing sector in Tehran Province and macroeconomic regard by using some economic indices. The second, we review also the economic literature of recognizing the importance of economic sector. The third research methodology is described. The fourth, model estimation and results are analyzed. Finally, conclusions are drawn in the last part.

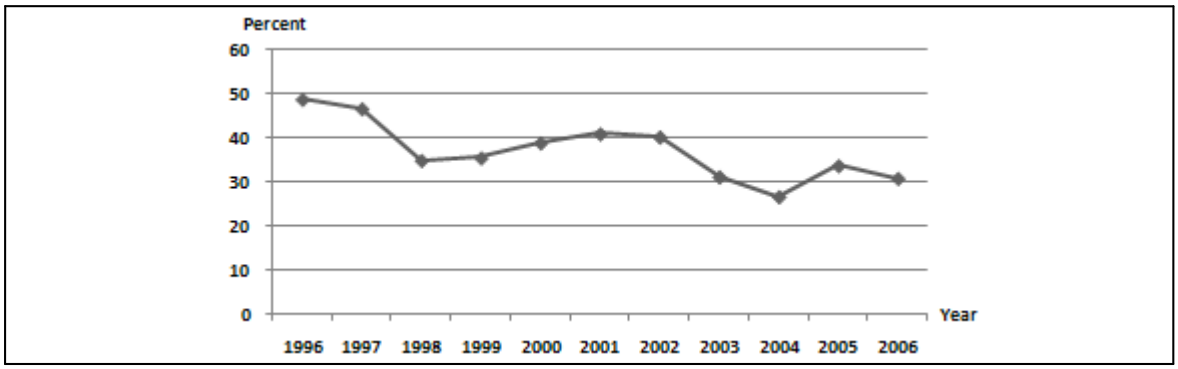
1- An overview of some economic components in the housing sector

The housing sector has always received much attraction by economic planners and policy makers at national and regional levels due to its relation with other economic activities. Therefore, housing planning would face deficiencies and shortcomings without considering its positive and negative effects on the overall economic life of Tehran Province and the country. Comparing the status of the housing sector in Tehran Province to the whole country will reveal possible advantages and shortcomings at provincial level in addition to identifying the differences in this sector between Tehran Province and the whole country. This will itself provide a suitable basis for planning and policy making to remedy deficiencies, better utilize existing advantages and, finally, making the province enjoy the macro country plans.

[4] In this study, the purpose of housing sector is residential building.

Investment, value added and employment in this sector are the macro statistics paying attention to which in the housing sector can indicate the economic status. Hence, the ratio of the investment in the housing sector in Tehran Province to the whole country at the fixed price in 2004 is shown in figure (1). It should be noted that the main part of the investment in the national housing sector and, accordingly, in Tehran Province belongs to the private sector. This issue is evident in the larger number of building licenses issued by the city hall to the private sector than to the state and cooperative ones (Tehran Province Housing and Urbanization Organization, 2008). Figure (1) shows that the ratio of the investment in the provincial housing sector to the whole country by the private sector increased from 1998 to 2001 and from 2004 to 2005. This can be attributed to the rise in population as a result of the influx of migrants to the province which caused the increase in the demand for housing. The government thus developed supportive policies in respond to housing demand, encouraged private sector invest more on construction activities. This diagram also shows the falling trend in ratio of the provincial investment to the whole country and the reduction in the relative significance of the housing sector in Tehran Province. The Provincial Housing and Urbanization Organization (2008) describes the density selling stoppage by Municipality as of the reasons to this issue. Given this diagram, it can be concluded that the housing supplying growth rate in Tehran Province is lower than in the whole country.

Figure (1) – the ratio of the investment in the provincial housing sector to the whole country by the private sector (percent)



Source: Tehran Province Housing and Urbanization Organization; Tehran Province Comprehensive Housing Plan, 2008

The same status can be observed about the value added. As it is shown in table (1), the value added had been always having a rising trend except the sharp but temporary fall the housing sector faced in 2003 (a negative growth of 28.31) as the highest increase in the value added of the provincial housing sector belongs to 2005.

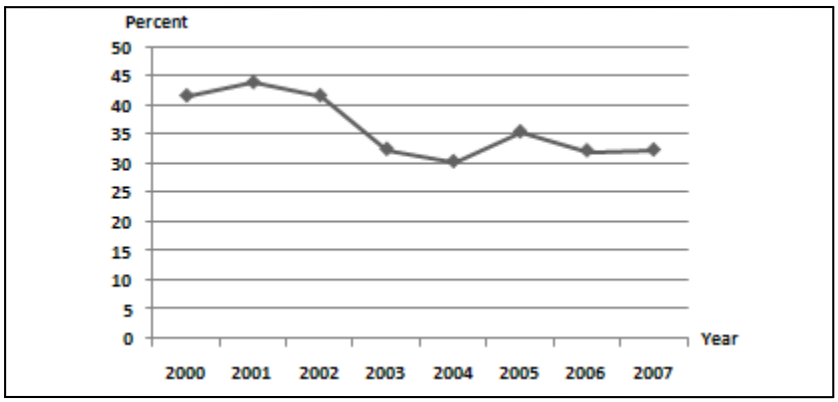
Table (1): the value added of the Tehran Province Housing Sector during 2000-2007 (million rials – fixed price)

Year / Item	2000	2001	2002	2003	2004	2005	2006	2007
value added	92091	104070	112641	80747	87555	137981	139938	173360
value added growth(Percent)	-	13.01	8.24	-28.31	8.43	57.59	1.42	23.88

Source: Iranian Statistics Center; regional calculations, 2000-2007

The ratio of the value added of the provincial housing sector to the value added of this sector in the whole country indicates a falling trend while it states the role of Tehran Province in creating value added of the whole country's housing sector (figure 2).

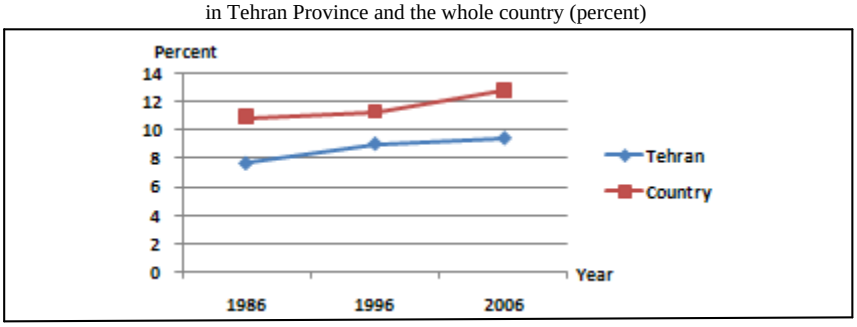
Figure(2): The ratio of the value added of Tehran Province housing sector to the value added of this sector in the whole country (percent)



Source: Iranian Statistics Center; regional calculations, 2000-2007

Now if have a look at the housing sector of Tehran Province from the employment aspect, we can see that the ratio of employment in this sector to the whole province has increased (figure 3). But according to this diagram, this rate is lower in Tehran than the same rate in the whole country since the government has implemented supportive policies in construction on construction activities in small and middle-sized cities of the country to prevent the centralization of population, facilities and services in a few areas of the country like Tehran Province. Consequently, investment and employment in the housing sector have increased in those areas (Tehran Province Housing and Urbanization Organization, 2008).

Figure (3) – the ratio of the employment in the housing sector to the total employment in Tehran Province and the whole country (percent)



Source: Iranian Statistics Center; population and dwelling census in 1986, 1996 and 2006

Given the above information, the investment, value added and housing sector employment data in Tehran Province in relation to the whole country over time were examined. However, we need to present a special technique which will follow to state the status and position of this sector in the provincial economic structure and also its relationship with other economic sectors.

2- Literature Review

A detailed knowledge of the significance and position of the housing sector among the other sector in Tehran Province and a study of the dependence in its production structure can be one of the necessities for developing any planning model for the housing sector at the regional level. The regional input-output table can be thus used as an experimental basis to study the economic structure of the area. Analyzing economical inter-sectoral linkages and determining the significance of the sectors in relation to the total regional economy are some of the applications of this table. The analysis of the linkages aims to study the dependence between economic sectors and identify the key sectors of the economy to adopt a suitable strategy for regional development in each sector. Key sector means, the sector whose growth cause the growth in other sectors due to their technology and consequent dependences and generate higher income in the end. The interdependence among sectors can be thus used as an appropriate index to rank sectors in economy (Farajidana, 1987).

Having reviewed the researched carried out in Iran and in the world; we found that different methods are presented to measure inter-sectoral linkages in the form of the input-output model. These methods can be divided into two groups: traditional and modern methods. Traditional methods refer to models in which measurement criteria are backward linkages (BL), forwards linkages (FL) and intermediate transactions or current technology. This approach included two methods: Chenery-Watanabe Method (1958) and Rasmusen Method (1956). Chenery-Watanabe proposed the use of the column and aggregates of the technical coefficients matrix to measure backward and forward linkages respectively. Rasmusen presented the use of the column and row aggregates of Leontief's reverse matrix to measure these linkages.

Many researches were conducted on the building and housing sector at the international level using the input-output model which are most based on the traditional model. Bon and Pietroforte (1990) are the pioneers who studied the building sector using the analysis from the traditional approach to the input-output table. They used the input-output method as an ideal tool to examine the usefulness of direct and indirect resources in the building sector. Rameezdeen (2008) studied building linkages in the developing economy of Sri Lanka. The results of his analyses indicate that the share of building in gross production and gross earnings in Sri Lanka is lower than in developed countries.

Most researches on the determining the importance of economic sectors conducted in Iran, are based on the traditional approach. For example, Nazari (1996) studied the significance of the housing sector at national level using 1986 input-output table issued by the Statistics Center of Iran found that this sector can create highest growth rate. Using the 50-sector input-output tables 1986 and 1993, Sorashjani Samani (1999) concluded that the housing sector

was the 8th in terms of the effectiveness degree in Iranian economy in 1986 and 16th in 1973. Using the 50- sector regional input-output table by Sameti and Naraghi (2003) studied the significance and the employment multiplier in the housing sector of Isfahan Province. Given the results of their findings, the housing sector has stronger backward linkage than forward ones. Based on the 21- sector provincial 2004 input-output table and using traditional method, Tehran Province Comprehensive Housing Plan (2008) in Tehran municipality founded that the housing sector is a key sector.

However, traditional methods have ambiguities like the same weight to all sectors, simultaneous BL and FL overlapping and ignoring the final demand and the value added. The assessment criteria in this approach largely depend on the intermediate cost rate and sectors' intermediate demands of productive sectors (Bazzazan *et. al,* 2008). Different models in the form of modern methods like the hypothetical extraction method (HEM) which indicate the significance of the relative size of economic sectors of a region through a different image are presented to resolve these ambiguities. This method was first proposed by Paelink *et. al.* (1965) and Strassert (1968) used this idea to show the reduction in the total production of the economy after eliminating a certain economic sector. This method was later expanded by Schultz (1977) to identify key sectors. HEM approach indicates that if one of the economic sectors is eliminated, to what extent the total output of the economy decreases. The difference in the output of the sectors before and after the elimination shows the linkages between the eliminated sector and the remained ones. Using the mentioned method without considering the open trade assumption is basically impossible in a way that the intermediate needs of other economic sectors to the eliminated one can be provided through export (Banouei *et. al,* 2007).

Many studies using HEM approach have been carried out at the international level, But there are not many cases to examine the housing sector specifically. For instance, the study by Song *et. al.* (2005) can be mentioned which considered four HEMs to identify linkages in the property sector using the 36-sector input-output table in the seven countries of OECD. He called this sector the provider of delivering services in the size chain of the building sector and called the building sector one of the biggest providers of properties. Khalili-Araghi (2005) studied the investment in the housing sector using input-output analysis. The results of his analysis show that more than 20 percent of the investment in the country is dedicate to this sector. Song *et. al*. (2006) measure the building sector linkage using the last OECD input-output table issued by the Organization for Economic Cooperation and Development based on fixed prices. They found that the total, backward and forward linkages show falling tends which confirm the decreasing role of the building sector in economic growth during all the experiment period.

Different studies using the modern hypothetical extraction approach have been carried out in Iran in recent years. The most important research using this method was conducted by Banouei *et. al.* (2007). Making use of the 54-sector input-output table of the year 1999, they used both the traditional and the HEM approaches. Their results indicate that two sectors of the distributional service subgroup are known as key sectors in HEM while the lack such a feature in the traditional approach. Among the previous researches, Bazzazan *et. al*. (2009) used also HEM method at the national level and found that housing sector has a high position in terms of backward linkages and a very low position in terms of the forward ones.

Having reviewed the literature, we found that HEM was less frequently used to state the significance of the housing sector in the area; therefore, testing this method in Tehran Province can the reveal the potentials of the housing sector in the sectoral-regional planning of the province. We have thus explained the methodology used in this research in the following part.

3- HEM Method

Having reviewed the literature on HEM methodology, it can be observed that seven extraction methods on both the demand and the supply side of the economy (Leontief's demand side input-output model (LDM) and Ghosh's supply side input-output model (GSM)) have been mentioned (Miller, R.E. & Lahr, M.L.; 2001). In all the above states, it is first supposed that all the economic activities in an *n* sector economy are composed of two blocks (groups): the first block including the sectors extracted from the economy hypothetically shown as sector one (k) and the second block including the rest of sectors in the economy which are the second or other sectors (n-k). Now, if k=1, the technical coefficient matrix A (or the direct coefficients matrix B) in Leontief's demand side input-output model or Ghosh's model will be assumed as $A=\begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$ (or $B=\begin{bmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{bmatrix}$) a sector can be extracted by seven methods in the assumed matrix A (or B) summarized in three general methods:

State One – All three secondary matrices in which the extracted sector (or sectors) exists are extracted; indeed, they are replaced by the zero matrix which signifies one extraction method:

1) Originally extracting the row and the column of the intersectoral intermediate transaction coefficients and the row and the column of the intersectoral intermediate transaction coefficients of one section $(A_{11}=A_{12}=A_{21}=0)$ $\begin{bmatrix} 0 & 0 \\ 0 & \blacksquare \end{bmatrix}$

State two – two of the three secondary matrices in which the extracted sector (or sectors) exists are extracted which can be divided in three ways:

2) Extracting of the row and the column of the intersectoral intermediate transaction coefficients of a sector as well as maintaining the intersectoral transactions $(A_{12} = A_{21} = 0)$ $\begin{bmatrix} \blacksquare & 0 \\ 0 & \blacksquare \end{bmatrix}$

3) Originally extracting the column of the intersectoral intermediate transaction coefficients $(A_{11} = A_{21} = 0)$ $\begin{bmatrix} 0 & \blacksquare \\ 0 & \blacksquare \end{bmatrix}$

4) Originally extracting the column of the intersectoral intermediate transaction coefficients $(A_{11} = A_{12} = 0)$ $\begin{bmatrix} 0 & 0 \\ \blacksquare & \blacksquare \end{bmatrix}$

State three – one of the secondary matrices in which the extracted sector (or sectors) exists are extracted which includes three extraction methods:

5) Extracting the intersectoral intermediate transaction coefficients of a sector to other sectors $(A_{12} = 0)$ $\begin{bmatrix} \blacksquare & 0 \\ \blacksquare & \blacksquare \end{bmatrix}$

6) Extracting the sectoral intermediate transaction coefficients of a sector from other sectors

$(A_{21} = 0)$ $\begin{bmatrix} \blacksquare & \blacksquare \\ 0 & \blacksquare \end{bmatrix}$

7) Extracting intersectoral intermediate transaction coefficients of a sector

$(A_{11} = 0)$ $\begin{bmatrix} 0 & \blacksquare \\ \blacksquare & \blacksquare \end{bmatrix}$

Each of the above methods can yield a sort of intersectoral linkages from the aspect of policy making; however, using all the seven method together makes analyses difficult. Hence, some researchers (Song, Liu, Langston (2006), Aydin (2007) and Andreosso & Yue (2000)) have reduced the seven extraction methods to four ones Original extraction (the first method of the seven extraction methods), Cella (the second method), Dietzenbacher and Vander Linden (the third and fourth methods), Song *et. al.*(the seventh method) which are also used in this research to analyze the results.

4 – Data Base

The main data base used in this study is regional input-output table of Tehran Province (2001) provided in 71 sectors by Bazzazan *et. al.* (2007). These sectors are aggregated and reduced to 18 main sectors of the provincial economy whose codes and names are presented in table (2).

Table (2): the sectors aggregated from the 71-sector input-output table of Tehran Province

Sector code	New sector name	The name of the aggregated sectors
1	Agriculture	Farming and gardening, husbandry, raising silkworm and honeybee and hunting, foresting, fishing
2	Mines	Crude oil and natural gas, other mines
3	Food, drink and tobacco product production	Producing food products and different drinks, producing products from tobacco
4	Other agriculture -based product	Producing textile, making clothes, preparing and dying fur, tanning, making leather and other leather products, making wood and wood products, making paper and paper products, publication, printing and reproducing recorded media
5	Chemical, rubber and plastic, coke and oil refining by-products and nuclear fuel production	Making coke and oil refining by-products and nuclear fuel production, making chemical materials and products, making products from plastic and rubber
6	Fabricated metal product, machinery, products and equipment production	Making fabricated metal products except products and equipments, making machinery and products categorized nowhere else, making official, accounting and computational machinery, making electrical machinery and devices categorized nowhere else, making radio, television and communicational devices and tools, making medical tools, optical tools, precise tools and different types of watch
7	Manufacturing vehicle, trailer and semitrailer	Manufacturing vehicle, trailer and semitrailer
8	Other industries	Making other non-metal mineral products, making basic metals, making other transportation equipments, making furniture, ornamental objects categorized nowhere else and recycling
9	Water, electricity and gas	Electricity, natural gas distribution, water
10	Residential buildings (housing)	Residential buildings (housing)
11	Other buildings	Other buildings
12	Whole-sale, retailing, and repairing vehicle and goods	Whole-sale, retailing, and repairing vehicle and goods
13	Hotels and restaurants	Hotel and motels, restaurant
14	Transportation and communication	Railroad, road transportation, pipe transportation, water transportation, aerial transportation, transportation backup services, post and telecommunication
15	Financial intermediary and their side activities	Bank, financial intermediary and their side activities, insurance
16	Properties, renting and business activities	Private residential building services, rented residential building services, non-residential building services, property broker services, fare and business services
17	Public affairs, defense and compulsory social security	Public affairs, urban services, defensive affairs, police affairs, compulsory social security
18	Other services	State and private primary school education, state and public junior high, high and vocational schools education, state and private higher education, state and public adult education, state and public hygiene and treatment, veterinary field, social aids, recreation, tourist, cultural and sports services, religious and political services, other services

Source: the 71- sector input-output table of Tehran Province (2001) and the research aggregation operations

5 – Results and analysis

In this part, the results of the four hypothetical extraction methods according to the statistical bases of this article are presented in the form of two approaches, the demand and the supply sides, and then results of analyzing each of the methods are stated then.

5-1- the results of the original extraction method

Table (3) shows the absolute and relative values of the reduced output[5] in the entire economy according to the demand and the supply side models. According to this table, the highest and lowest values of the reduced output of the entire economy is done through the original extraction of sectors seven (manufacturing vehicle, wholesale and retailsale) and two (mines). Having extracted the linkages between the housing sector (10) and other economic sectors and its subsectors, the total input of the economy to the pre-extraction state reduces for 0.75 and 0.71 percent on the demand and supply sides respectively. This figure dedicates the 13 place of the table to this sector.

Table (3): linkage assessment results in all the economic sectors of the province in the original extraction method

Sector code	The absolute value of the reduced output in the entire economy (million rials)		Absolute value ranking		The relative value of the reduced output in the entire economy(percent)		Relative value ranking	
	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side
1	3325003	3462886	9	9	0.942	0.981	9	9
2	124931	116247	18	18	0.035	0.033	18	18
3	4625335	4942737	6	5	1.311	1.401	6	5
4	2834306	2783808	12	12	0.803	0.789	12	12
5	4747890	4413350	5	6	1.346	1.251	5	6
6	6095555	5899114	4	4	1.728	1.672	4	4
7	11759630	12026905	1	1	3.333	3.408	1	1
8	3774692	3784388	8	8	1.070	1.073	8	8
9	2302933	2183657	14	15	0.653	0.619	14	15
10	2493065	2646694	13	13	0.707	0.750	13	13
11	2862357	3177333	11	10	0.811	0.900	11	10
12	10239459	9645144	2	2	2.902	2.733	2	2
13	734635	777701	17	17	0.208	0.220	17	17
14	7926896	7670161	3	3	2.247	2.174	3	3
15	3281285	3087750	10	11	0.930	0.875	10	11
16	4464454	4387027	7	7	1.265	1.243	7	7
17	1533223	1671367	16	16	0.435	0.474	16	16
18	2098557	2229750	15	14	0.595	0.632	15	14

Source: research calculations

[5] In this case the output, is the total supply.

5-2- The results of the Cella method

Table (4) shows the relative and absolute values of the reduced output in the entire economy in Cella Method. It can be seen that the primary place of the reduction in the entire value takes place after extracting the transactions of the whole-sale, retailing and repairing vehicle and goods sector (12) from other economic sectors and the last place of this index is related to the mines sector (2). However, the place of the housing sector in comparison to the first in the ranking indicates that the amount of reduction in production as a result of extracting this section is not too large. Hence, this sector has weak intersectoral linkages with other economic sectors. The low value of the reduced output value after extraction in Cella method in comparison to the original extraction method is quite logical and it goes back to the remaining internal transactions of the housing sector in the total linkage.

Table (4): linkage assessment results in all the economic sectors of the province in the Cella Method

Sector code	The absolute value of the reduced output in the entire economy (million rials)		Absolute value ranking		The relative value of the reduced output in the entir economy (percent)		Relative value ranking	
	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side
1	3147903	3267580	9	9	0.892	0.926	9	9
2	124837	116158	18	18	0.035	0.033	18	18
3	4198617	4475438	5	5	1.190	1.268	5	5
4	2314692	2269345	13	13	0.656	0.643	13	13
5	4088394	3831822	6	7	1.159	1.086	6	7
6	4894186	4752375	3	3	1.387	1.347	3	3
7	4873204	4557730	4	4	1.381	1.292	4	4
8	3621223	3633308	8	8	1.026	1.030	8	8
9	1872095	1793613	15	15	0.531	0.508	15	15
10	2394096	2543773	12	11	0.678	0.721	12	11
11	2722515	2998387	10	10	0.772	0.850	10	10
12	9865559	9299721	1	1	2.796	2.636	1	1
13	733754	776756	17	17	0.208	0.220	17	17
14	6543553	6361014	2	2	1.854	1.803	2	2
15	2582643	2491949	11	12	0.732	0.706	11	12
16	4048966	3974708	7	6	1.147	1.126	7	6
17	1521913	1659221	16	16	0.431	0.470	16	16
18	1922195	2043629	14	14	0.545	0.579	14	14

Source: research calculations

5-3- The results of the Dietzenbacher and Vander Linden Method

According to the findings in table (5), the highest reduced value of the output is related to the manufacturing vehicle, trailer and semitrailer sector (7) which shows strong backward and forward linkages but weak independence of this sector on both the demand and the supply sides. The lowest reduced value of the output belongs to sector (2) i.e. the mining sector which means that the intermediate demand for goods and services in this sector is lower than other sectors; meanwhile, this sector makes a small portion of its products

available for other sectors or its subsectors. Now if the relationship between the housing sector and other sectors or its subsectors from buyer's view is extracted from the whole economic system, the whole economic output decreases by 0.50 percent in comparison to the pre-extraction state and places this sector in the eleventh position. On the other hand, the relationship between the housing sector and other sectors or its subsectors from buyer's view is extracted, the whole economic output decreases by 0.30 percent in comparison to the pre-extraction state and gives the 13 position to this sector. In this case, the position of the housing sector on both the demand and the supply sides signifies weak backward and weaker forward linkages of this sector among the other 18 sectors on the provincial economy.

Table (5): linkage assessment results in all the economic sectors of the province in the Dietzenbacher and Vander Linden Method

Sector code	The absolute value of the reduced output in the entire economy (million rials)		Absolute value ranking		The relative value of the reduced output in the entir economy (percent)		Relative value ranking	
	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side
1	1519744	2306848	12	8	0.431	0.654	12	8
2	83122	47992	18	18	0.024	0.014	18	18
3	1848945	3828159	9	3	0.524	1.085	9	3
4	1840718	1684880	10	13	0.522	0.478	10	13
5	3822508	1744943	5	12	1.083	0.495	5	12
6	4458023	3166540	4	5	1.263	0.897	4	5
7	8454885	11324155	1	1	2.396	3.209	1	1
8	2134185	2042025	8	9	0.605	0.579	8	9
9	1712764	1125258	11	16	0.485	0.319	11	16
10	1054855	1755060	13	11	0.299	0.497	13	11
11	440214	2951235	15	6	0.125	0.836	15	6
12	7654208	3442375	2	4	2.169	0.976	2	4
13	249588	562736	16	17	0.071	0.159	16	17
14	5696703	4004855	3	2	1.614	1.135	3	2
15	2846350	1217940	6	15	0.807	0.345	6	15
16	2778700	2351958	7	7	0.787	0.667	7	7
17	134887	1565370	17	14	0.038	0.444	17	14
18	595243	1885124	14	10	0.169	0.534	14	10

Source: research calculations

5-4- The results of the Song *et. al.* method

Having observed the results in table (6), it is obvious that if the internal transactions of the housing sector are extracted from the economy, the total output decreases by 0.03 percent on both the demand and the supply sides of the economy in relation to the total output before extraction and causes this sector to fill the fifteenth place. The low position of this sector shows that the flow of transaction in the mentioned sector and its subsectors is very low while the manufacturing vehicle, trailer and semitrailer (7) is the first and lowest place belongs to the mining sector (2). As a result, the housing sector has weaker internal linkages in

comparison to the seventh sector. This can be due to the low number of subsectors in the housing sector and it thus has fewer linkages with its subsectors.

Table (6): linkage assessment results in all the economic sectors of the province in the Song *et. al.* Method

Sector code	The absolute value of the reduced output in the entire economy (million rials)		Absolute value ranking		The relative value of the reduced output in the entir economy (percent)		Relative value ranking	
	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side	The supply side	The demand side
1	263904	285451	11	11	0.075	0.081	11	11
2	113	107	18	18	0.000	0.000	18	18
3	528737	576090	8	7	0.150	0.163	8	7
4	627742	620476	6	6	0.178	0.176	6	6
5	835038	746032	5	5	0.237	0.211	5	5
6	1434556	1373161	3	3	0.407	0.389	3	3
7	7780722	8305921	1	1	2.205	2.354	1	1
8	236602	234488	12	12	0.067	0.066	12	12
9	581028	533932	7	8	0.165	0.151	7	8
10	116168	121195	15	15	0.033	0.034	15	15
11	187509	231448	14	13	0.053	0.066	14	13
12	451511	418573	10	10	0.128	0.119	10	10
13	1055	1129	17	17	0.000	0.000	17	17
14	1706606	1623358	2	2	0.484	0.460	2	2
15	871559	762628	4	4	0.247	0.216	4	4
16	452010	448172	9	9	0.128	0.127	9	9
17	12294	13219	16	16	0.003	0.004	16	16
18	192442	203217	13	14	0.055	0.058	13	14

Source: research calculations

However, the above calculated indices does not specify the average performance of each sector in comparison to the average performance of the total economy (which is a unit); the linkage indices of each method should be normalized to correct this deficiency i.e. the ratio of the linkage index value of each sector to the average linkage index of all economic sectors is obtained. In each method, the sector in either demand or supply side of the economy with a normalized linkage of more than one is a key sector of the economy.Table-7 shows the indices of a normalized linkage in the applied extraction methods along with the final share of demand from the total production of each sector. The four sectors, namely the manufacturing vehicle, trailer and semitrailer (7), the transportation and communication (14) and the fabricated metal product, machinery, products and equipment production (6) sectors were repeated as the key sectors of the provincial economy one after another in all the four extraction methods i.e. the performance of the mentioned sectors is higher than the average level of the economy since each has a lower share of final demand from the total production than the same share for the whole economy (87.1 percent). Hence they stay in the production cycle for long and generate value added. However, the housing sector has weak linkages both on the demand and the supply sides of the economy in all the extraction methods in this

study. In other words, the above sector has a lower performance than the average level of the economy. According to the results in table (7), the share of the final demand from the total production of the housing sector is 93.4 percent which is a greater role than the whole economy. Hence, a large portion of the total production of the mentioned sector is absorbed by the final demand and leaves the production cycle and a small portion of the total production of this sector is provided as an intermediate for its subsectors and other sectors. Hence, this sector does not have a considerable effect on the economic growth of the region and cannot be regarded as a key sector of Tehran Province.

Table (7): the status of the sector from the view of key sectors on the original extraction, Cella, Dietzenbacher and Song Method

Sector code	Original extraction			Cella			Dietzenbacher			Song *et. al.*			The share of the final demand from the total production (percent)
	Normal linkage		Sector status	Normal linkage		Sector status	Normal linkage		Sector status	Normal linkage		Sector status	
	The supply side	The demand side		The supply side	The demand side		The supply side	The demand side		The supply side	The demand side		
1	0.796	0.832		0.922	0.967		0.578	0.883		0.292	0.311		83.12
2	0.030	0.028		0.037	0.034		0.032	0.018		0.000	0.000		89.61
3	1.107	1.188	Key	1.229	1.324	Key	0.703	1.466		0.585	0.629		91.9
4	0.678	0.669		0.678	0.671		0.700	0.645		0.694	0.677		86.29
5	1.136	1.061	Key	1.197	1.134	Key	1.454	0.668		0.923	0.814		79.37
6	1.459	1.418	Key	1.433	1.406	Key	1.696	1.213	Key	1.586	1.498	Key	85.09
7	2.814	2.890	Key	1.427	1.348	Key	3.216	4.336	Key	8.603	9.062	Key	79.98
8	0.903	0.909		1.060	1.075	Key	0.812	0.782		0.262	0.256		76.86
9	0.551	0.525		0.548	0.531		0.651	0.431		0.642	0.583		74.38
10	0.597	0.636		0.701	0.753		0.401	0.672		0.128	0.132		93.42
11	0.685	0.764		0.797	0.887		0.167	1.130		0.207	0.253		96.07
12	2.450	2.318	Key	2.889	2.751	Key	2.911	1.318	Key	0.499	0.457		86.82
13	0.176	0.187		0.215	0.230		0.095	0.215		0.001	0.001		94.85
14	1.897	1.843	Key	1.916	1.882	Key	2.167	1.534	Key	1.887	1.771	Key	82.98
15	0.785	0.742		0.756	0.737		1.083	0.466		0.964	0.832		76.16
16	1.068	1.054	Key	1.186	1.176	Key	1.057	0.901		0.500	0.489		94.83
17	0.367	0.402		0.446	0.491		0.051	0.599		0.014	0.014		99.37
18	0.502	0.536		0.563	0.605		0.226	0.722		0.213	0.222		97.63

Source: research calculations

6 – Conclusion

This article is a test to determine the importanse of the housing sector in the economic structure of Tehran Province in 2001. In order to do so, the intersectoral linkages of the provincial economy focusing on the housing sector were calculated by using four extraction methods: the original extraction, Cella, Dietzenbacher and Vander Linden and Song *et. al.* methods. Given the analyses based on the modern approach to the demand and supply sides of the economy, the housing sector has a low position in the provincial economy in terms of total, backward, forwards and internal linkages in a way that according to results of the hypothetical extraction methods, we observed that this sector is averagely the eleventh to

fifteenth in the in the ranking among the 18 sectors of the provincial economy on both the demand and the supply sides. This position is not desirable because the reduction in the total output of the economy is really small. It shows that this sector has little effect on total production of the provincial economy. The findings from the calculations in this research revealed that only the performances of three sectors, namely the manufacturing vehicle, trailer and semitrailer (7), the transportation and communication (14) and the fabricated metal product, machinery, products and equipment production (6), are higher than the average level of the economy. These sectors are more reliable in sectoral-regional planning and policy making since they are common as key sectors in all methods. Calculations also show that the share of the final demand from the total production is rather high (93.4 percent) for this sector. As a result, does not have a significant role in providing the intermediate needs of the other sectors of the provincial economy and there is a weak linkage on both the demand and the supple sides. Hence, it is not regarded as a key sector in the province. Accordingly, we can say that the housing sector is not prioritized in allotting resources and the maximum growth expected as a result of the investment in the key sectors of the province is not achieved and the limited resources of the province are even wasted since this sector is given a special position over other provincial sectors. Therefore, it would be more appropriate if regional authorities and planners identify the effective sectors in provincial economy first though new linkage analysis methods and make decisions on allotting resources to provincial sectors using this knowledge in order to achieve more growth and development over the area.

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