

HOW STRONG ARE SECTORS LINKED TO EACH OTHER? AN INPUT-OUTPUT ANALYSIS FOR THE CASE OF TURKEY

Ester Biton Ruben *

1. Introduction

The measurement of the strength of linkages between different sectors can help us to analyse various aspects of an economy. In its simplest way the pattern and measurement of the linkages among sectors, indicates a given sector's capacity to stimulate other sectors. The stimulation can occur by means of production and employment. An output increase in a given sector, due to various reasons ranging from a simple technological change to the implementation of a different industrialization strategy, can give rise to production increases in other sectors if the linkages are strong enough. The production increase can also have employment generation effects particularly if the stimulated sector is a relatively labour intensive one. The degree of strength between sectors of an economy can indicate also a sector's import dependence. If, for example, there is an important decrease in the strength of linkages among one sector and the other, this may be due to increase in the import dependence of that sector.

Intersectoral linkages are expected to increase as a country reaches the advanced stages of industrialization (Park, 1989). Input – output tables are useful tools in analysing intersectoral linkages. In a former study (Ruben, 1998), I made an input – output analysis for the sectors of the Turkish economy covering the years 1979, 1985, and 1990. In that study the main purpose was to compare the intersectoral linkages in the import substituting industrialization (ISI) period and the export promotion (EP) period and to study their implications for employment creation. The main result was that the shift from an inward looking industrialization strategy to a relatively more outward oriented one, increased the intersectoral linkages, but it was meanwhile concluded that within the outward oriented period although a good performance was seen in 1985, the same performance was not observed in 1990. The purpose of this study is to extend the analysis for the year 1996¹ and see if the

* Yıldız Technical University, Department of Economics

¹ 1996 is the year for which the last input – output table for Turkey is available.

linkages are strengthened or weakened during the post – 1980 outward oriented period.

The following section will consist of a brief summary of the post 1980 outward oriented policies implemented in Turkey. In the third section linkages between different sectors of the Turkish economy are analysed. The fourth section is a concluding section summarizing the main findings of the paper.

2. A Review of the Post –1980 Economic Policies in Turkey

After a long period of ISI marked with a huge balance of payments crisis in the late 1970s, in January 1980 Turkey adopted a stabilization and structural adjustment policy package based on outward orientation. By this policy, imports were liberalized by gradually lifting restrictions and reducing tariffs, and exports were encouraged by a variety of subsidies, tax rebates and export credits. An incomes policy was adopted to reduce demand. At the same time, the internal terms of trade were altered in favour of industry and against agriculture. The TL was devalued and a crawling peg was adapted with a view toward the eventual liberalization of foreign exchange operations. One of the most important aims of the post – 1980 policies was financial liberalization. Financial liberalization was believed to increase the domestic savings and thus investments. In 1984, citizens were allowed to hold foreign assets, bank loan rates were freed and forward transactions in foreign exchange were allowed in a limited fashion. The Central Bank started to implement open market operations in 1987. In August 1989, several major steps were taken toward full financial liberalization. Turkish nationals were permitted to purchase foreign securities abroad and foreigners were permitted to buy Turkish securities, Turkish banks could extend foreign currency credit to foreign trade companies, Turkish nationals were no longer required to obtain government permission to borrow abroad, and foreigners were allowed to open TL accounts convertible into foreign exchange (Çağatay, 1990). But these measures of financial liberalization were taken in a macroeconomically unstable environment. This caused the inflow of speculative capital and increased the interest payments and transfer expenditures. In 1994, the interest payments to the financial sector began to have the largest share in the budget. The economic crisis of 1994 caused to a decrease in the transfer expenditures, and as a result a transfer occurred from the production sectors to the finance sector. The stabilization package introduced in April 1994 resulted in a sharp decline in output and

employment. Consequently what initially emerged as a financial crisis extended to the real economy (Öniş, 1996:12).

3. The Trend in the Linkages between Sectors

The trend in the linkages among different sectors of the Turkish economy is examined by an input – output analysis.

The input – output tables used in this study are those for the years 1985, 1990, and 1996. The analysis of these three tables permits us to examine the trend in the intersectoral linkages during the post – 1980 economic policies. The examination of the dependency between manufacturing and services, the income induces demand for services and the industry backward linkages are the subjects of what follows.

3.1. *Dependency between manufacturing and services*

The general view in the literature is that as industrialization proceeds, the growth of the manufacturing sector causes increased demand for service inputs into manufacturing. Additionally as industrialization proceeds, per capita incomes rise and rising incomes create a demand for a whole range of consumer services. Service activities such as education, health, tourism, and entertainment are high-income consumption items and have positive income elasticities of demand (Udall, 1976:783).

Tables 1-3 provide a comparison of the sectoral dependency ratios between manufacturing and services in the years 1985, 1990 and 1996. In these tables the sectors are aggregated in agriculture, mining, manufacturing, construction and services.

Table 1: Sectoral Dependency Ratios, 1985

	01	02	03	04	05
01 Agriculture	38	9	15	0	2
02 Mining	0	1	15	5	0
03 Manufacturing	42	64	51	76	61
04 Construction	0	0	0	0	0
05 Services	20	26	19	19	38

Source: Ruben, 1998:511

Table 2: Sectoral Dependency Ratios, 1990

	01	02	03	04	05
01 Agriculture	48	3	14	0	4
02 Mining	0	1	9	4	1
03 Manufacturing	28	61	56	69	47
04 Construction	0	0	0	0	0
05 Services	24	35	21	27	48

Source: Ruben, 1998:512

Table 3: Sectoral Dependency Ratios, 1996

	01	02	03	04	05
01 Agriculture	52	1	12	0	4
02 Mining	0	2	10	5	0
03 Manufacturing	25	53	56	65	40
04 Construction	0	0	0	0	1
05 Services	23	44	22	30	55

Source: Calculated from SIS, 1996

As formerly explained in Park (1989) and in Ruben (1998), the sectoral dependency ratio measures the sector's purchase of an input as a percentage of its total intermediate input purchases. The dependency ratio of sector j on sector i can be expressed as:

$$d_{ij} = \frac{X_{ij}}{\sum_{i=1}^n X_{ij}}$$

The results of tables 1 – 3 can be summarized as follows:

- The output of the manufacturing sector is an important input into service sector activities. However, when we compare the three years subsequently we realize that the dependency of the service sector on manufacturing decreased considerably each year. The 61% dependency ratio of 1985 decreased to 47% in 1990 and to 40% in 1996. The sharp decline in 1990 and the further decisive decline in 1996 may be regarded as a loss of strength in the manufacturing sector. The dependency ratio of the construction sector on

manufacturing is found to be significantly high but again declining in all three years. The 76% dependency ratio in 1985 declined to 69% in 1990 and to 65% in 1996. The loss of strength in the manufacturing sector can be observed also in this case.

- It can be observed that the pattern of input purchases between the manufacturing sector and the service sector appear to be asymmetrical. It is found that the manufacturing sector generally purchases a relatively small percentage of its total inputs from the service sector. The dependency ratio of manufacturing on services is found to be 19% in 1985, 21 % in 1990 and 22% in 1996. When these ratios are decomposed in trade and transport on the one hand and other services on the other, it is found that the dependency ratio of manufacturing on trade and transport was 14%, while the dependency ratio of manufacturing on other services was 5% in 1985. In 1990 the dependency ratio of manufacturing on trade and transport increased to 15%, while the dependency ratio on other services increased to 6%. In 1996, the first ratio increased further to 16%, while the second ratio remained stable being 6%. These findings are not in accordance with a similar study of Park (1989:365), who maintains that when a country reaches advanced stages of industrialization the dependency ratio of manufacturing on trade and transport decreases while the dependency ratio on other services increases. In the case of Turkey we can see that the situation is in contrast with the findings of Park (1989), the dependency ratio of manufacturing on trade and transport increased in each year under scrutiny while the dependency ratio on other services remained more or less stable. This fact can also indicate that the post – 1980 policies were not successful sufficiently for industrialization purposes in the long term.
- However, this small share of services into manufacturing may prove to be an important fraction of total intermediate input sales of the service industry in question. For example, the 19% ratio in 1985 represents 52% of the service sector total intermediate input sales. Similarly in 1990, the 21% ratio represents only 39% of the service sector total intermediate input sales, while in 1996 the 22% dependency ratio represents 33% of total intermediate input sales. It can be observed as a result a decisive decline in the total intermediate input sales of the service sector to the manufacturing sector.

- When we observe the intraindustry transactions within the service sector, we find high and increased ratios for each considered year. The dependency ratio of the service sector on itself is found to be 38% in 1985, increased to 48% in 1990 and to 55% in 1996. These high ratios show that many of the service sector activities complement each other in meeting the intermediate demand for differentiated producer services. The increasing ratios indicate that service sector activities grown significantly in the outward oriented period.
- The intraindustry dependency ratios of the manufacturing sector on itself are found to be 51% in 1985, 56% in 1990 and 56% in 1996. These high ratios can be accepted a reflection of the high industrial maturity that exists in the manufacturing sector.
- The dependency ratios of agriculture and mining on manufactured inputs are on a declining trend indicating the loss of weight in the manufacturing sector.

3.2. Income Induced Demand for Services

It was argued formerly that the second major factor that makes the services sector grow faster than industry as industrialization proceeds, is the concept of increasing incomes creating a demand for a whole range of consumer services. The income induced demand for services can be quantified by calculating the sectoral contributions to gross domestic consumption as measured by the ratio of consumer goods in different industries to total private consumption (Park, 1989). If we report the formula as it is defined in Ruben (1998):

$$\sum_{j=1}^n X_{ij} = X_{ip}, \text{ where } p \text{ denotes the private sector, the sector } i^{\text{th}} \text{ contribution to}$$

gross domestic consumption for the years 1985, 1990 and 1996.

Table 4: Sectoral Contributions to Gross Domestic Consumption (%)

	1985	1990	1996
01 Agriculture	19	20	17
02 Mining	1	1	2
03 Manufacturing	40	37	37
04 Construction	0	0	0
05 Services	40	42	44

Source: Ruben, 1998: 515 and calculated from SIS 1996

The results are as follows: in 1985 the share of manufacturing and services in total private consumption was about the same. It was argued in Ruben (1998:515) that after this point the share of services is expected to overtake the share of manufacturing, and that as expected the share of manufacturing decreased to 37%, while the share of services increased to 42% in 1990. However, it is continued in Ruben (1998:515) that when the services sector is decomposed in trade and transport on the one hand and services on the other, it is seen that the share of trade and transport sector which is associated with negative income elasticity of demand increased to 32% in 1990 compared to 29% in 1985, while the other services sector which is associated with positive income elasticity of demand decreased to 9% in 1990 compared to 11% in 1985. The results for 1996 are even worse. Trade and transport increased further to 36%, while other services decreased further to 8%. This continuous decline demonstrates that a successful and sustainable economic development was not achieved with the post 1980 policies.

3.3. *Industry Backward Linkages*

Industry backward linkages or output multipliers are defined as the direct and indirect domestic output effects of a unit change in the final demand for the sector's output and they can be quantified empirically through the use of the Leontief inverse matrix of an input – output table since they are simply the column sums of the Leontief inverse matrix (Leroy, 1976: 328 –30). It is a general view that it gives us also total employment requirements per unit of final output. As it is explained in Ruben (1998:517), if we denote a single element of the Leontief inverse matrix with l_{ij} , we can show the multiplier effect of sector j as:

$$M_j = \sum_{i=1}^n l_{ij}$$

Table 5 provides the direct and indirect backward linkages for the 12 sectors of the Turkish economy for the years 1985, 1990 and 1996. The values for 1985 and 1990 were calculated in Ruben (1998:517). The findings of Ruben (1998) for backward linkages can be summarized as follows: In 1985 the sector with the highest direct and indirect backward linkages is found to be the metallic and non-metallic mineral products sector. The output multipliers of the machinery and transport equipments sector and the chemical sectors are between the highest values. In 1990 almost all

sectors decreased their output multipliers. The multiplier effects in light manufacturing are found to be very weak in 1990. Also the multiplier effects of capital goods industries (machinery and transport equipments) is found to be smaller in 1990. Regarding the resource based industries, the output multipliers of chemical industry and metallic and non-metallic mineral products are smaller than the 1985 ratios.

When analysing the output multipliers for 1996, we find that the values for the chemical, metallic and non-metallic mineral products and machinery and transport equipments realized a further decline. On the other hand most light industry products such as food, textile and lumber and wooden products increased their industry backward linkages. Since these industries are relatively more labour intensive than the medium and heavy industries, it is more probable that the increase in their backward linkages can be reflected also as a generation of employment.

Table 5: Industry direct and indirect backward linkages

	1985	1990	1996
01 Agriculture	1.622	1.519	1.647
02 Mining	1.487	1.426	1.365
03 Food	2.513	1.906	2.126
04 Textile	2.311	2.102	2.316
05 Lumber and wooden products	2.230	2.310	2.341
06 Pulp, paper, printing	2.249	2.729	1.988
07 Chemical	2.285	2.249	1.842
08 metallic and non metallic minerals	3.027	2.296	2.224
09 Machinery and transport equipments	2.340	2.293	2.066
10 Other manufacturing	1.859	1.801	1.706
11 Construction	2.318	2.182	2.072
12 Services	1.494	1.478	1.571

Source: Ruben, 1998 and calculated from the SIS, 1996

It is argued in Ruben (1998:520) that to assess the impact of industry on the service sector it would be useful to compare the strength of backward linkages of different industries with the service sector. Table 6 serves this purpose.

Even if by the passage from an ISI strategy to an outward oriented one the linkages with the service sector increased, in 1990 most manufacturing subsectors decreased their backward linkages with the service sector (Ruben 1998: 520). The sectors which increased their backward linkages with the service sector in 1990 are lumber and wooden products, pulp, paper and printing and machinery and transport equipments sectors. In 1996, it can be observed that the backward linkages with services increased for some sectors, remained stable for some other sectors, and decreased only for one sector. The food, the textile and the metallic and non – metallic minerals sector increased their backward linkages with the service sector, generating output and probably employment increases in the service sector.

Table 6: Backward linkages with the service sector

	1985	1990	1996
01 Agriculture	0.128	0.132	0.160
02 Mining	0.119	0.127	0.142
03 Food	0.287	0.199	0.283
04 Textile	0.314	0.213	0.249
05 Lumber and wooden products	0.245	0.262	0.260
06 Pulp, paper, printing	0.312	0.364	0.320
07 Chemical	0.288	0.218	0.216
08 metallic and non metallic minerals	0.346	0.281	0.328
09 Machinery and transport equipments	0.271	0.314	0.314
10 Other manufacturing	0.177	0.170	0.164
11 Construction	0.251	0.292	0.323
12 Services	1.153	1.185	1.243

Source: Ruben, 1998 and calculated from the SIS, 1996

The pulp, paper and printing sector is the only sector decreasing its backward linkages with the service sector. The chemical sector, the machinery and transport equipment sector, and the lumber and wooden sector maintained stable their backward linkages with the service sector. On the other hand it is worth mentioning that the agriculture, the mining, the construction and the services sectors increased their backward linkages with services in each year under consideration. This fact together with the result that the services sector increased its industry backward

linkages in each considered year means that the services sector developed considerably in the outward oriented period.

The loss of strength in 1990 was explained in Ruben (1998) by a variety of factors, the most important of them being the high degree of protection in the export sector, the import boom after 1985 and the excessive financial liberalization in a macroeconomically unstable environment.

For the results attained for the year 1996, we can observe two facts. The first is that the manufacturing sector continued to loose strength during this period. The underlined reasons for 1990 are increasingly valid for 1996. For example the imports of intermediary goods increased from 60% in 1990 to 65% in 1996. The export – import compensation ratio that was 70.2% in 1985, and 58.1% in 1990, decreased further to 53.2% in 1996. In this way, the increase in imports can deteriorate domestic interindustry linkages. The financial liberalization in a macroeconomically unstable environment continued to have its worst effects. The financial sector emerged as a major gainer in terms of high interest earnings during this period. The share of foreign direct investment decreased from 29.5% for 1984 – 1989, to 23.2% under full liberalization (Ersel, 1996: 49). This was compensated for by the increase in portfolio investments. As implied in Öniş (1996: 10), the striking pattern by 1993 was that almost the whole of the central government's budgetary expenditures were being allocated to current expenditures, interest payments on domestic and external debt and transfer payments, leaving very little in turn for public investment considered by many as a key contributor to long term economic growth. The stabilization package introduced in April 1994 resulted in a sharp decline in output and employment, weakening the interindustry linkages. It is argued in Kepenek and Yentürk (2001: 365) that the financial liberalization adopted by Turkey in 1989 have had negative effects for the manufacturing industry since public investments declined, private investments in manufacturing declined due to high interest rates, and high inflation created important instability.

The second result is that the services sector developed itself during this period since the majority of sectors increased their backward linkages with the service sector. However, this development is mostly seen in trade, transport and communication which have generally low income elasticities of demand.

4. CONCLUSION

This paper's main purpose is to extend the analysis of Ruben (1998) in which the final year analysed is 1990, to cover the year 1996 and to discuss the longer-term results of the post-1980 policies.

There are two main findings of the paper. The first one is that the manufacturing sector lost strength during the post-1980 policies, especially after 1985. The dependency ratio of services on manufacturing decreased significantly from 61% in 1985 to 40% in 1996. The dependency ratio of construction on manufacturing decreased from 76% in 1985 to 65% in 1996. The services sector intermediate input sales to the manufacturing sector decreased from 52% in 1985 to 33% in 1996. It is also realized that the industry backward linkages of the chemical, metallic and non metallic mineral products, and machinery and transport equipments sectors' decreased in 1996, giving rise both to the weakening of intersectoral linkages and to the employment creation effects. On the other hand most light industry products such as food, textile and wooden products increased their industry backward linkages compared to 1990. However, their backward linkages are not higher than those for the year 1985.

The second finding of the paper is that the services sector taken as a whole is developed during the post- 1980 period since the dependency ratio of the services sector on itself increased from 38% in 1985 to 55% in 1996. Additionally the services sector increased its industry backward linkages in each examined year and most of the sectors increased their backward linkages with the services sector. However, when the services sector is decomposed in trade and transport on the one hand and other services on the other, it is found that it is the "trade and transport" part of the services which is developed, while "other services" part is not developed sufficiently. These two findings suggest us that the post-1980 policies were not successful sufficiently for industrialization purposes. The continuous increase in imports, the complete financial liberalization in a macroeconomically unstable environment and the consequent monetization of the economy and the crisis of 1994 are seen as the main reasons for the weakening of intersectoral linkages.

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