

The Construction Sector in Turkey:
A Structural Path Analysis of Employment Linkages

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ABSTRACT

The construction sector in Turkey has been at a rise in the last decade, with annual growth rates between 10-20%. Interrupted by contraction in 2008 and 2009, high growth rates are observed in 2010 and 2011. Employment in construction has constantly risen. The GDP share increased from 5.4 % in 2002 to 6.5 % in 2007. Major driving forces behind are gentrification projects in most city centers, reconstruction in areas hit by earthquakes and floods, infrastructure (residential and commercial buildings as well as urban transport) upgrading for the Istanbul International Financial Center project, and capacity improvements in inter-city highways and railways. These works, including maintenance, are mainly undertaken by central and/or local public authorities or subsidized if the private sector is involved. Besides they also induce private construction activities in the rest of the economy. The linkages in the economy of this injection policy via construction final demand, a major component of investment, are worth studying especially in the ongoing crisis environment. The Structural Path Analysis of employment linkages of the construction sector is modeled. The latest available I-O data is for 2002. Identification of paths, hence principle areas of impacts form the basis for the assessment of implications for the macro economic problems of persistent unemployment.

1. INTRODUCTION

The purpose of this paper is to study the structure and degree of backward employment linkages of the construction sector in Turkey. A Structural Path Analysis (SPA) is undertaken with the latest available 2002 I-O data.

The construction sector in Turkey has been at a rise in the last decade, after the 2001 crisis, with annual growth rates between 6-19%, as shown in Figure 1. Following the sharp contractions in 2008 and 2009, fast recovery is observed in 2010 and 2011. The GDP share of construction increased from 5.4 % in 2002 to 6.5 % in 2007 (See Figure 2). The recovery of employment share was slower in the post 2001 period, as shown in Figure 3, but reached 6.8 % in 2010, the highest value in the 2000s.

Figure 1.

Figure 2.

Figure 3.

Major driving forces behind are gentrification projects in most city centers, public sector housing construction, reconstruction in areas hit by earthquakes and floods, infrastructure (residential and commercial buildings as well as urban transport) upgrading for the Istanbul International Financial Center project, capacity improvements in inter-city highways and railways. These works, including maintenance, are mainly undertaken by central and/or local public authorities or subsidized if the private sector is involved. The Housing Development Administration under the Prime Ministry of Turkey has undertaken production of over 500,000 dwellings, of mostly social housing type, since 2003 as well as public buildings throughout the country.¹ Besides, all of these induce private construction activities in the rest of the economy.

There are two aspects of these developments which invoke input-output analysis of the Turkish construction sector. Firstly, as everywhere construction is a major investment sector, a significant component of the Final Demand. Secondly in the Turkish case, the public sector is the main actor, making construction a significant policy sector of injection especially in the 2000s.

2. THE CONSTRUCTION SECTOR IN THE ECONOMY

The construction sector has been subject to extensive research, not only on engineering aspects but also increasingly on the management, organization and economic aspects.² Song et al. (2006:586) suggest consideration of the role of the government policies during up-swings and down-swings in analyzing the position of the construction sector in the economy, as the government may interfere via construction sector to cool or heat the economy. An extensive elaboration of the macroeconomic aspects of the construction sector is provided by Giang and Pheng (2011) along the lines of our starting point. The construction activity is a driver of growth and development provided that it supports productive capacity in the form of fixed capital formation. This function is significant especially for developing countries as it is a main component in government spending and also in public-led construction specific institutionalization. The caveats would be mis-match of short term and long-term outcomes which might lead to over-expansion, increasing input costs and imports, crowding out of financial capital, as well as environment degradation.

As for the production activity aspect in specific, findings for major developed countries reveal that the input composition of construction changed in time (during 1968-1990) with the emergence of technology and service intensive sectors (Pietroforte and

Gregori, 2003; Gundes, 2011b). de Valence (2010) shows that the construction industry in Australia has evolved from a smaller scale production activity to large scale concentrated assembling activity, resembling manufacturing industry. Hence interactions with the rest of the economic activities are becoming more widespread, services inclusive. This in turn implies that any construction related injection into the economy induces demand for a large variety of economic activities. For example, a cluster map based on simple I-O forward and backward linkages for Indonesia depicts the sequence of these interactions mainly with cement, steel and iron, metals, energy, water, transportation, communication, finance and trade (Budiwibowo et al., 2009).

Depending on the stage of technology of the sector itself and other sectors, as Giang and Pheng (2011) also discuss, construction activity directly and also indirectly provides employment opportunities for the unskilled labor as a remedy for unemployment, where relevant.

As for Turkey, findings with the 1998 I-O data (97 sectors) indicate that the construction sector was leading in total public (85%) and private (64%) investment, in total investment (70%), final demand (13%), total output (9%) and total intermediate imports (8%). It also ranked high in wages (10%), profits (7%), value added (7%) and exports (5%) (Gunluk-Senesen, 2005). In contrast, both backward and forward linkages of construction were mediocre. Main input suppliers to the construction sector -cement, glass, ceramic- did not have high multipliers, but intermediate import demand generation of the metal industry (iron and steel and other) was significant.³ On the other hand, the shares of the construction sector are lower with the 2002 I-O data (59 sectors): 62 % in total investment (public-private composition not available), 8 % in final demand, 4 % in total intermediate imports, around 5 % in total output, wages, profits, value added, and 2 % in exports. Yet higher shares would be expected with the favorable trends in the 2000s.

We endeavor to understand the structure of the interactions of the Turkish construction sector with the economy in a comparative context with universal trends. Furthermore, we focus on employment generation using Structural Path Analysis, which is a first attempt within the scope of construction sector studies.

3. METHODOLOGY: THE STRUCTURAL PATH ANALYSIS OF THE TURKISH CONSTRUCTION SECTOR

The sectoral output vector (\mathbf{x}) in an economy can be expressed as

$$\mathbf{x} = \mathbf{A}_d \mathbf{x} + \mathbf{y} \quad (1)$$

where y is the sectoral domestic final demand vector and A_d is the direct domestic input coefficients matrix. Solved for the sectoral output vector, Eq. (1) gives

$$x = R[y = (I - A_d)^{-1}y \quad (2)$$

where R is the Leontief inverse. Labour requirements in response to final demand changes are found by multiplying the direct labour coefficients matrix (L) by the sectoral output vector (x):

$$Lx = LRy = Ey \quad (3)$$

where l_{cj} is the labour category c (skill or gender) employed per unit output of sector j and r_{jk} is the output expansion in sector j induced by final demand of sector k ($j, k = 1, \dots, n$; **skill, $c = 1, \dots, C$; gender, $c = 1, 2$**). A typical element of E , e_{ck} , represents the demand for labour category c induced by final demand of sector k (Gunluk-Senesen and Senesen, 2011). Since this study examines the effect of an increase in the final demand of construction (CON) sector only, k represents this sector.

Using the Taylor series expansion fundamental to structural path analysis (Lenzen, 2003, Lenzen, 2007; Wood and Lenzen, 2009; Oshita, 2011), Eq. (3) can be written as

$$LR[y = L(I - A_d)^{-1}y = Lly + LA_d y + LA_d^2 y + LA_d^3 y + LA_d^4 y + \dots \quad (4)$$

where $LA_d^t y$ represents the labor requirements generated by the t^{th} production layer. By following the Taylor expansion given in Eq. (4), the demand structure for labour can be expressed as a tree where each tier represents a different production layer and each node gives the contribution to total labour requirements induced by final demand of y . As the number of nodes in a layer grows exponentially, there are n^{t+1} nodes in each tier. (Peters and Hertwich, 2006).

The contribution generated at the zeroth tier ($t = 0$) is given as,

$$l_{ck} y_k. \quad (5)$$

The n^2 nodes of the first tier can be evaluated as

$$l_{cj} a_{jk} y_k \quad (6)$$

and this expression represents the path $k \rightarrow j$. Similarly, the n^3 nodes of the second tier can be expressed as

$$l_{ci} a_{ij} a_{jk} y_k \quad (7)$$

which represents the path $k \rightarrow j \rightarrow i$.

The pattern described above holds for all levels of tiers. In general, there are an infinite number of paths between a given set of sectors. By computing the contributions of all paths,

SPA enables determining the most important nodes from all tiers (Peters and Hertwich, 2006). Using the second production tier as an example, let i, j , and k represent trade (TRD), mining (MNG), and construction (CON) sectors, respectively. Then, the labour requirement induced in the trade sector in response to a change in the final demand of the construction sector following the path $CON \rightarrow MNG \rightarrow TRD$ can be computed using Eq. (7) as follows:

$$l_{c,TRD} \alpha_{TRD,MNG} \alpha_{MNG,CON} \gamma_{CON}$$

It should be noted that the procedure described in Eqs. (5-7) can be used for obtaining the direct influence, $I_{(k \rightarrow j)_p}^D$, generated along a path. Besides, in order to capture the extent to which direct influence along a path is amplified through the effects of adjacent feedback circuits (i.e. the effect of a sector on itself), Defourny and Thorbecke (1984) suggests computing the total influence, $I_{(k \rightarrow j)_p}^T$, expressed as

$$I_{(k \rightarrow j)_p}^T = I_{(k \rightarrow j)_p}^D M_p \quad (8)$$

where M_p is the path multiplier ($j, k = 1, \dots, n$; **path**, $p = 1, \dots, P$). Note that, if a production path has no adjacent circuits, than the multiplier will be one. Finally, the overall influence $I_{(k \rightarrow j)}^O$ of all the paths between two sectors can be decomposed as follows:

$$I_{(k \rightarrow j)}^O = \sum_{p=1}^P I_{(k \rightarrow j)_p}^T = \sum_{p=1}^P I_{(k \rightarrow j)_p}^D M_p \quad (9)$$

Formal derivation of this decomposition and the details of the computation procedure of total influence, $I_{(k \rightarrow j)_p}^T$, with respect to different path structures can be found in Defourny and Thorbecke (1984).

4. THE DATA

The data used in the study come from two sources both published by the Turkish Statistical Institute (TURKSTAT): input-output tables and employment statistics. The most recently available input-output tables are for 2002. They are compiled for 59 sectors in basic prices in compliance with the third revision of the International Standard Industrial Classification of all Economic Activities (ISIC-Rev. 3). The input-output (I-O) data are separately available for domestic and imported intermediate transactions.

The employment data in this paper is produced from two sources: The Household Labour Force Survey (HLFS) and Structural Business Statistics (SBS). The HLFS employment data for 2002 are in a highly aggregated form based on the sector classification

of ISIC-Rev. 2. There are only nine sectors, manufacturing sector being one of them. Employment data for the manufacturing sub-sectors are not provided. The SBS employment data is available for 2003 and covers the sub-sectors of the manufacturing sector only. Firstly, we harmonized the sector classifications of the I-O and HLFS data. Then, we estimated the sectoral breakdown of the HLFS manufacturing employment data by applying the proportionate distributions in the SBS data. Since the employment data thus produced is available for 31 (eight main sectors and 23 manufacturing sub-sectors) sectors, the original I-O table of 59 sectors for domestic transactions was aggregated to 31 sectors for calibration. The details of data derivation are provided in Gunluk-Senesen & Senesen (2011).

The abbreviations for sector names are as follows:

| | | | |
|----------------------|-----------------------|-------------------------|------------------------------------|
| AGR: Agriculture | PPR: Paper | MCH: Machinery | SRM: 2 nd ry raw matrls |
| MNG: Mining | PRN: Printing | OMC: Office machn. | EGW: Elec., gas, water |
| FOD: Food | PTR: Petroleum | EMC: Electrical machn | CON: Construction |
| TOB: Tobacco | CHM: Chemicals | COM: Comm. eqpmt | TRD: Trade |
| TXT: Textiles | R+P:Rubber & plastics | PRC: Precision instrmts | TRN: Transport serv. |
| WER: Wearing apparel | NMT: Non-metals | MTV: Motor vehicles | FNC: Finance |
| LTH: Leather | BMT: Basic metals | OTE: Other trnsprt eqp. | SRV: Other services |
| WOD: Wood | MPR: Metal products | FRN: Furniture | |

5. FINDINGS

One unit (one billion TL in 2002 prices) change in final demand of CON would induce almost 48000 jobs in the whole economy. More than 60% of the jobs created thus are in CON itself. Among other sectors influenced by this change are Trade (TRD) (11.1%), Non-metals (NMT) (4.9%), Metal products (MPR) (4.5%), Agriculture (AGR) (2.9%) and Transport services (TRN) (2.3%). As shown in Figure 4, some service sectors (TRD and TRN) and sectors related to metals and non-metals (NMT, MPR, MNG and BMT) are the leading ones. AGR, having the highest employment share in the Turkish economy is also among them. With less than 2% shares each, Mining (MNG), Basic metals (BMT), Wood products (WOD), Financial institutions (FNC), Rubber & plastics (R+P), Electrical machinery (EMC), Machinery (MCH), Electricity, gas and water (EGW) and Chemicals (CHM) sectors should also be mentioned.

Figure 4

The Structural Path Analysis (SPA) captures almost 90% of induced employment, in paths starting from CON and ending at 15 different sectors of the economy. The shares of

individual sectors in the whole economy display quite a similar pattern as in Figure 4, with miniscule changes in percentage values (see Figure 5). Perhaps the only exception worth mentioning is Agriculture which moved down a few ranks. All findings are presented in Table 1 and summarized in Figure 6.

Figure 5

Table 1

Figure 6

As can be seen in Table 1, the paths unravelled by SPA analysis are of four different types. The first type consists of nine simple paths each of which starts from CON and ends in another sector without interacting with any other sector. The second type consists of four paths. They have a junction right at the beginning point at CON with two routes to the destination sector, one going there directly and another via a third sector. The third type is similar to the second type with the only difference that it has three routes instead of two. Again one route is direct and each of the others via one different sector. The last type is the most complex one. It contains nine alternative routes to reach the destination sector. One goes there directly and eight others via a sector.

In each type some paths have circular routes between two adjacent tiers, beginning and ending at the same sector, and thus creating a multiplier effect. The paths in Table 1 that have multiplier values greater than one are such paths. For these paths direct and total influences are not equal; total is greater than direct influence by an amount equal to the influence created through the multiplier of the circular route.

The first path in Table 1 is associated entirely with CON. This path indicates that a unit change in final demand of CON captures almost 63% of induced employment in the whole economy and 98.2% of it is direct and 1.6% of it is through the multiplier of 1.017, thereby in total capturing the 99.8% of overall employment influence created on CON itself. This implies that quite a large part of job creation power of CON operates in the sector itself without any significant diffusion effects on this path. All the other 14 paths account for about 37% of the employment induced by a change in the final demand of CON sector.

The other simple paths, from 2 to 9 in Table 1, end up at destination sectors NMT, MPR, WOD, EMC, R+P, MCH, CHM and EGW. Their direct influences, multiplier (i.e. total – direct) influences and uncaptured (i.e. overall – total) parts of overall influences are shown in Figure 6.

The CON → NMT (no.2) path captures 92.3% (80.0% direct) of influence created in NMT sector. It accounts for 4.5% of overall influence on the economy. The CON → MPR (no.3) path is similar with high percentage figures for captured (91.4%) and direct (87.2%) influences and share in the overall influence on the whole economy (4.1%). These two destination sectors (NMT and MPR) are on the routes of the second type CON → BMT (no. 10) and CON → MNG (no. 11) as well. It is interesting to note the close connections between the sectors related to metals and non-metal minerals. The mining activities are involved in the same web of relations. These four paths altogether capture 11.4% of overall employment induced by a change in the final demand of CON on the Turkish economy.

The CON → WOD (no. 4) path captures more than 90.0% of influence in WOD (78.0% direct) and 1.4% of influence on the economy. Next are the CON → R+P (no. 6) and CON → CHM (no. 8) paths with a combined 1% and CON → EMC (no. 5) and CON → MCH (no. 7) paths with a combined 0.6% of influence on the economy. The last of simple paths is CON → EGW (no. 9) with a very small, 0.1%, share in the overall influence on the Turkish economy.

The second types of paths are no. 10-13. The CON → BMT (no. 10) path has two routes. The CON → BMT route captures 51.1% and 66.6% of direct and total influences, respectively. The CON → MPR → BMT route influence values are 14.3% and 15.0%, respectively. The total captured share of the two routes in the overall influence on the whole economy is 1.4%.

The CON → MNG (no. 11) path also has two routes. They are CON → MNG and CON → NMT → MNG. Total influences on MNG sector of these routes are 43.3% and 31.0%, respectively, and their combined total effect on the economy is 1.4%.

The two routes of the 12th (CON → AGR) path are CON → WOD → AGR and CON → TRD → AGR. They capture only 1.0% of overall influence on the economy but almost one third of overall influence on AGR.

The last path of the second type is CON → FNC (no. 13) with the routes of CON → FNC and CON → TRD → FNC. Its total influence captured is 0.8% of the overall influence on the Turkish economy and 52.3% of that on FNC. Note that this path is linked with another service sector, namely TRD.

The only case of the third type of paths is CON → TRN (no. 14). Its three routes are CON → TRN, CON → NMT → TRN and CON → TRD → TRN. It captures in total 1.5% of the overall influence on the whole economy and 63.7% of that on TRN sector itself. This path goes through a manufacturing sector and a services sector on its two routes.

The last path, CON → TRD, is the most complex of all. It captures 8.9% of overall influence on the economy. One of its nine different routes is direct and constitutes a huge part of the above figure (6.3%). The combined part of the other eight routes is 2.6%. The total influence captured by this path is 80.4% of overall influences on TRD (73.5% direct and 6.9% through several multipliers). Intermediate sectors on the four routes are related to metals, non-metals and their mining and processing activities (NMT, BMT, MPR and MNG), one route passes through a service sector (TRN) and the intermediate sectors of the remaining three routes are all manufacturing sectors (WOD, EMC and R+P).

6. CONCLUSIONS

The expansion of the construction sector in the 2000s in Turkey and the accompanying rise in employment prompted a further analysis of the influences of this injection, mainly by the public authorities, within the production system. We focused on unravelling the channels, more specifically paths of employment generation of the construction sector. We had to assume the production structure of 2002 prevails in the medium term, since the most recent input-output data available is for 2002.

The favourable recent macro trends notwithstanding, construction does not stand out with its backward employment linkage which ranks 10th among 31 sectors. The backward employment linkage is almost equal to the mean. This mediocre position is partly due to its direct labour coefficient which ranks 8th. The direct labour coefficient is almost equal to the mean of sector linkages and 0.22 standard deviations above the mean. In other words it has about the same value as the upper quartile of the labour coefficients of 31 sectors. Hence, construction activities would not be anticipated to be a policy target for a quick relief of the unemployment pressure. The underlying process is revealed by the structure of production.

According to the findings with SPA, employment induced by CON is restricted to itself. The path starting and ending with CON, neither goes through any other sector nor CON is encountered as an intermediate sector on any one of the other 14 paths. The change in final demand of CON creates 62.8% of induced employment in Turkish economy on CON → CON path only and 99.8% of it captured by our SPA. The remaining 37.2% of induced employment is due to the other 14 paths.

The rather weak driver role of the Construction sector in generating employment in the rest of the economy might be attributed to significant penetration of intermediate imports. The next stage of this paper will be an attempt to unravel this aspect with SPA.

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Table 1. Captured direct and total influences, multipliers and captured shares in overall influence by paths

| Paths | Captured direct influence (# persons) | Captured total influence (# persons) | Multiplier (direct/total) | Overall influence (# persons) | Captured direct in overall influence (%) | Captured total in overall influence (%) | Captured sector total in economy overall (%) |
|-------------|---------------------------------------|--------------------------------------|---------------------------|-------------------------------|--|---|--|
| 1 CON→CON | 29531,5 | 30033,1 | 1,0170 | 30084,1 | 98,2 | 99,8 | 62,7 |
| 2 CON→NMT | 1875,4 | 2164,1 | 1,1539 | 2344,8 | 80,0 | 92,3 | 4,5 |
| 3 CON→MPR | 1886,8 | 1976,5 | 1,0475 | 2163,4 | 87,2 | 91,4 | 4,1 |
| 4 CON→WOD | 586,7 | 683,3 | 1,1646 | 752,7 | 78,0 | 90,8 | 1,4 |
| 5 CON→EMC | 298,0 | 298,0 | 1 | 377,5 | 78,9 | 78,9 | 0,6 |
| 6 CON→R+P | 245,3 | 245,3 | 1 | 400,3 | 61,3 | 61,3 | 0,5 |
| 7 CON→MCH | 212,3 | 212,3 | 1 | 336,2 | 63,1 | 63,1 | 0,4 |
| 8 CON→CHM | 65,0 | 65,0 | 1 | 201,2 | 32,3 | 32,3 | 0,1 |
| 9 CON→EGW | 56,2 | 56,2 | 1 | 229,8 | 24,5 | 24,5 | 0,1 |
| 10 CON→BMT | 532,2 | 664,3 | | 814,5 | 65,3 | 81,6 | 1,4 |
| CON→MPR→BMT | 116,4 | 121,9 | 1,0474 | | 14,3 | 15,0 | 0,3 |
| CON→BMT | 415,8 | 542,4 | 1,3044 | | 51,1 | 66,6 | 1,1 |
| 11 CON→MNG | 654,6 | 693,1 | | 932,3 | 70,2 | 74,3 | 1,4 |
| CON→NMT→MNG | 250,7 | 289,2 | 1,1537 | | 26,9 | 31,0 | 0,6 |
| CON→MNG | 403,9 | 403,9 | 1 | | 43,3 | 43,3 | 0,8 |
| 12 CON→AGR | 408,9 | 457,4 | | 1375,9 | 29,7 | 33,2 | 1,0 |
| CON→WOD→AGR | 226,8 | 264,2 | 1,1650 | | 16,5 | 19,2 | 0,6 |
| CON→TRD→AGR | 182,1 | 193,1 | 1,0606 | | 13,2 | 14,0 | 0,4 |
| 13 CON→FNC | 359,3 | 362,4 | | 692,4 | 51,9 | 52,3 | 0,8 |
| CON→TRD→FNC | 51,5 | 54,5 | 1,0599 | | 7,4 | 7,9 | 0,1 |
| CON→FNC | 307,9 | 307,9 | 1 | | 44,5 | 44,5 | 0,6 |
| 14 CON→TRN | 561,0 | 694,8 | | 1090,5 | 51,4 | 63,7 | 1,5 |
| CON→NMT→TRN | 62,5 | 87,3 | 1,3958 | | 5,7 | 8,0 | 0,2 |
| CON→TRD→TRN | 49,1 | 63,0 | 1,2822 | | 4,5 | 5,8 | 0,1 |
| CON→TRN | 449,4 | 544,6 | 1,2118 | | 41,2 | 49,9 | 1,1 |
| 15 CON→TRD | 3917,0 | 4282,8 | | 5328,3 | 73,5 | 80,4 | 8,9 |
| CON→MNG→TRD | 53,0 | 53,0 | 1 | | 1,0 | 1,0 | 0,1 |
| CON→WOD→TRD | 67,2 | 82,9 | 1,2338 | | 1,3 | 1,6 | 0,2 |
| CON→R+P→TRD | 48,0 | 48,0 | 1 | | 0,9 | 0,9 | 0,1 |
| CON→BMT→TRD | 165,3 | 221,0 | 1,3370 | | 3,1 | 4,1 | 0,5 |
| CON→MPR→TRD | 215,6 | 239,3 | 1,1098 | | 4,0 | 4,5 | 0,5 |
| CON→NMT→TRD | 318,2 | 388,6 | 1,2212 | | 6,0 | 7,3 | 0,8 |
| CON→EMC→TRD | 78,8 | 78,8 | 1 | | 1,5 | 1,5 | 0,2 |
| CON→TRN→TRD | 104,7 | 134,2 | 1,2825 | | 2,0 | 2,5 | 0,3 |
| CON→TRD | 2866,2 | 3037,0 | 1,0596 | | 53,8 | 57,0 | 6,3 |
| CON→Economy | | 42888,6 | | 47912,2 | | | 89,5 |

Figure 1. Gross value added in Construction sector, %, 1998 prices

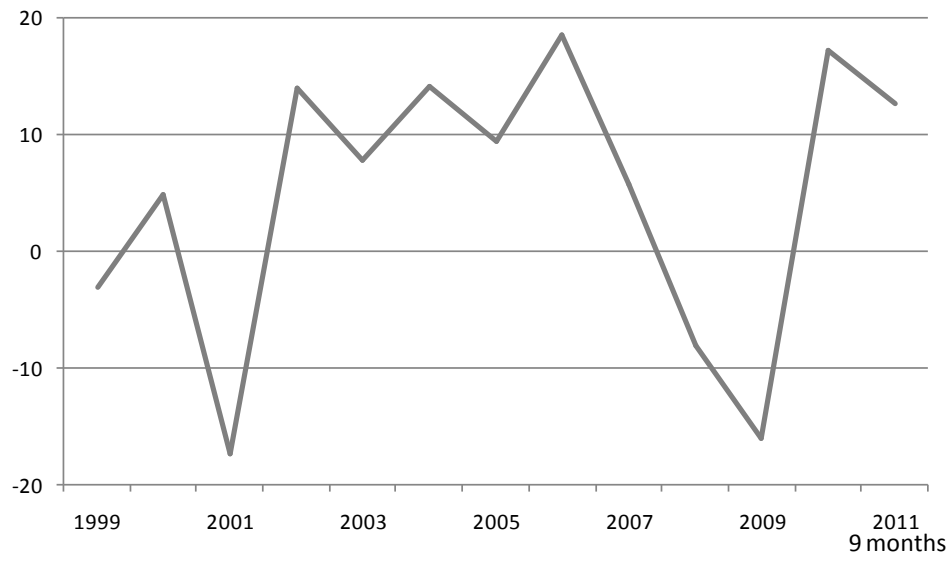


Figure 2. GDP share of Construction sector, %, 1998 prices

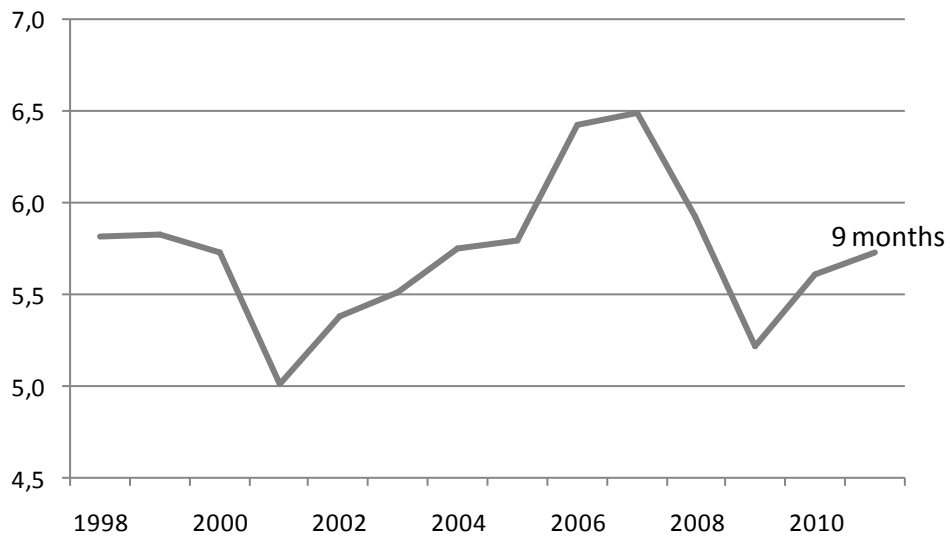


Figure 3. Share of Construction sector in employment, %

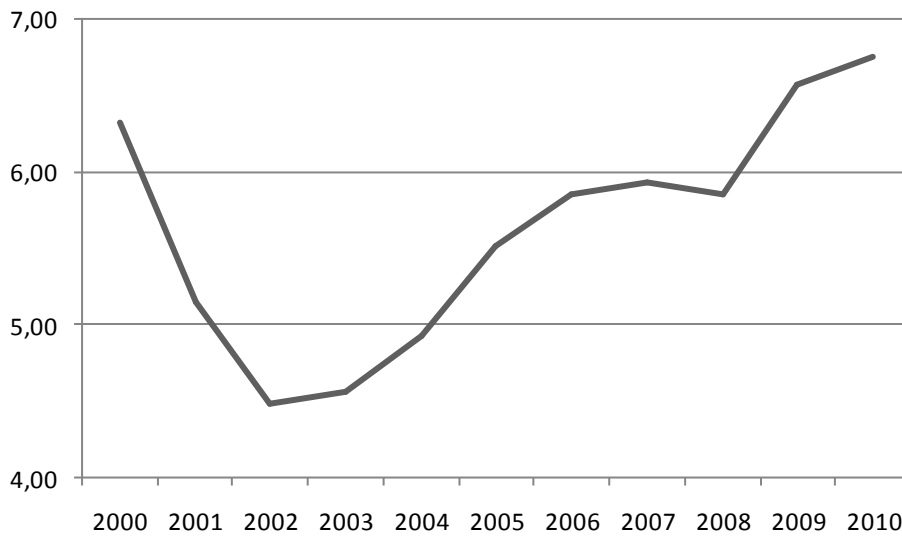


Figure 4. Percentage of employment induced in major sectors by a unit change in final demand of Construction sector (Eq. 3)

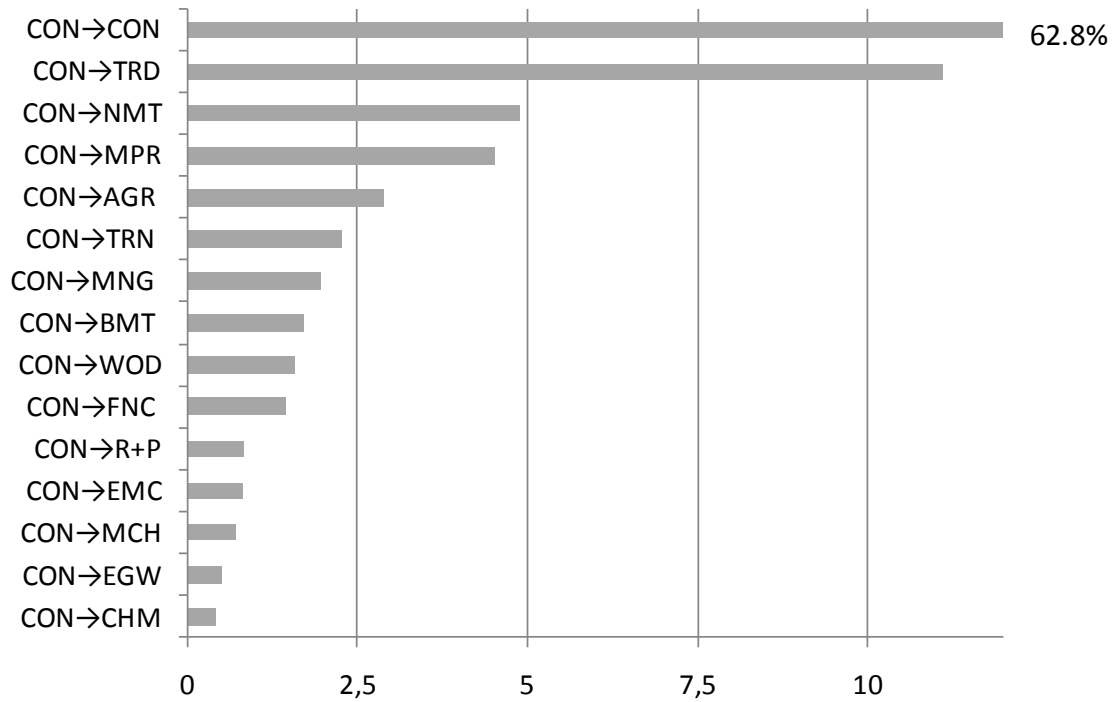


Figure 5. Captured share of sectoral total in overall influence in the whole economy (%) SPA

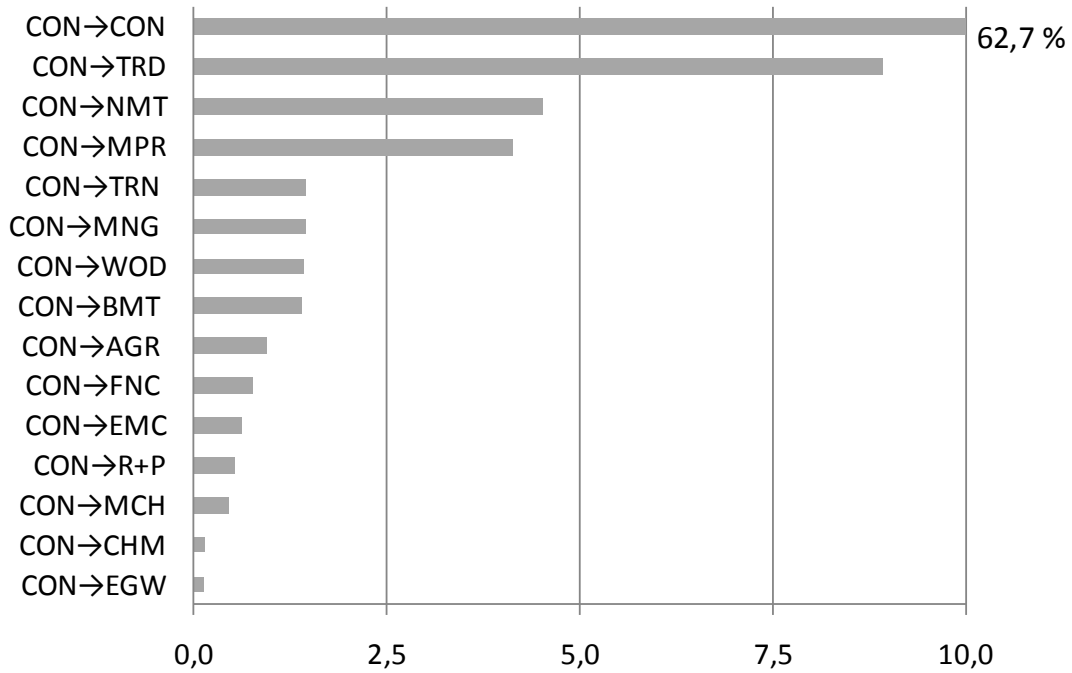
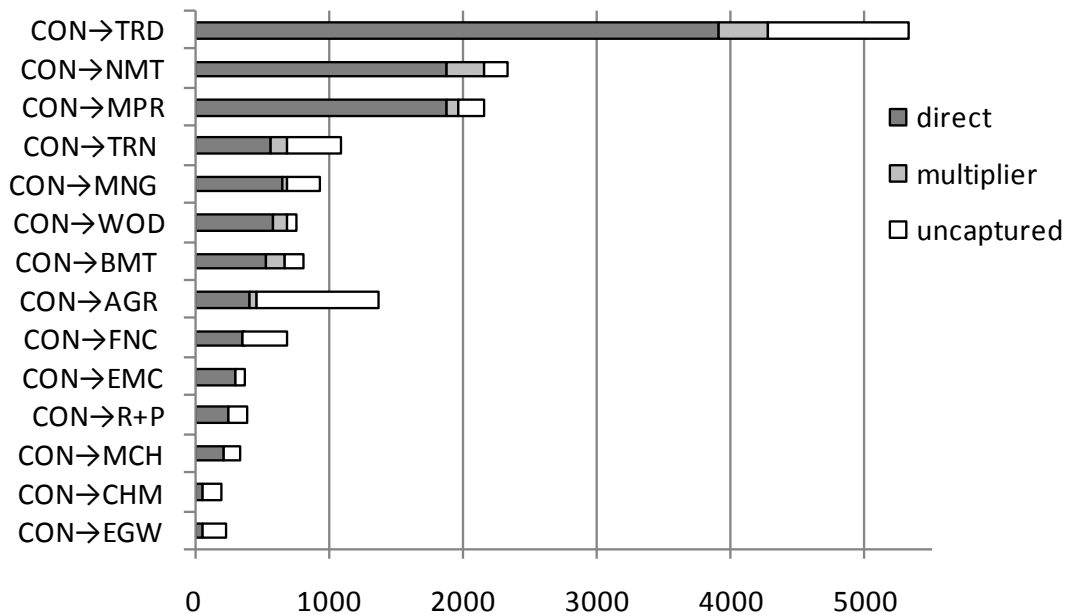


Figure 6. Direct, multiplier (i.e. total – direct) and uncaptured (i.e. overall – total) parts of influences of each path, ordered by the size of total captured influence (# jobs)



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ENDNOTES:

¹ www.toki.gov.tr; April 15, 2012.

² e.g. see *Construction Management and Economics* by Taylor & Francis Ltd. Though not many, articles using input-output analysis of the construction sector involves simple linkages for various countries.

³ Bon et al. (1999) and Gundes (2011a) studied the dynamics of the Turkish construction sector based on simple I-O linkages for 1973-1990 and 1973-2002, respectively. Since the 1998 I-O data was the first one compiled in basic prices, hence the only one comparable to the most recent available I-O data for 2002, we will not elaborate more on their findings. Besides, we focus on unraveling the structure of backward linkages in 2002.