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Regional Input-Output Analysis of A Mega-Event: Possible Impact of EXPO on Izmir Economy

Bir Mega-Olayın Bölgesel Girdi-Çıktı Analizi: EXPO'nun İzmir Ekonomisine Olası Etkisi

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Abstract

Izmir has lost the bid for EXPO 2020. Izmir's expectations were high, but to the best information of the authors, these expectations were never systematically quantified. This article quantifies the expected expenditures related to a mega event in Izmir due to i) additional hotel constructions, and, ii) arrival of foreign visitors. Then, the effects of these additional expenditures on regional economy are examined through a closed regional I-O model, where closure is due to ens dogenized consumption expenditures. The calculations are based on a regional I-O table of İzmir, available from İzmir Regional Development Agency IZKA. It is observed that constructions related to a mega event require considerable recycling imports, due to scrap metal dependency of metal production.

Keywords: EXPO; Mega-Events; Regional Economic Analysis; Input-Output Tables; Impact Analysis

Özet

İzmir'in EXPO 2020'ye ev sahipliği yapamayacağı kesinleşmiştir. İzmir'in beklentileri yüksekti fakat yazarların bildiği kadarıyla bu beklentiler sistematik olarak sayısallaştırılmamıştı. Bu çalışma ilk olarak İzmir'de EXPO gibi bir mega-olay çerçevesindeki ek otel inşaatları, ve, ii) yabancı ziyaretçilerin gelişi, çerçevesin-

de beklenen harcamaları sayısallaştırmaktadır. Daha sonra, bu ek harcamaların bölge ekonomisine etkileri, tüketim harcamaları içselleştirilerek kapatılmış bir bölgesel girdi-çıktı modeliyle incelenmiştir. Hesaplamalar İzmir Kalkınma Ajansı (İZKA)'dan temin edilebilen İzmir bölgesel girdi-çıktı tablosuna dayanmaktadır. Mega-olayın gerektirdiği inşaatların, metal üretiminin yüksek hurda metal bağımlılığından dolayı, önemli geri dönüşüm ithalatı gerektireceği gözlemlenmiştir.

Anahtar Kelimeler: EXPO; Mega-Olay; Bölgesel İktisadi Analiz; Girdi-Çıktı Tabloları; Etki Analizi

Introduction

Large scale international events such as the Olympics, World Cups, and the EXPO are always expected to contribute positively to an economy. With such expectations, Izmir, Turkey, has bid to host EXPO 2020. Turkey's national statistics institute, TURKSTAT, draws the following picture for Izmir: It is the 3rd biggest city of Turkey, accounting for 6.45% of value added created in Turkey in 2010. About 5.3% of Turkey's population lives in Izmir and the region accounts for 5.73% of the Turkey's employment. Izmir is also a major port city; 5/5% of exports and 4.5% of imports in 2012 are through Izmir.

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The bidding process for EXPO 2020 has resulted in late November, 2013, and the result is in favor of Dubai (United Arab Emirates), rather than Izmir. Previous experience implies that after a brief rest, Izmir is likely to try again. Should Izmir host a mega event such as EXPO, regional and national income are expected to rise. New hotels may be constructed and a large number of visitors are expected. Infrastructure investments that are already underway are expected to be completed sooner. With the EXPO 2020 bid theme focused on health, the city hopes to raise its investment profile and improve its health tourism potential.

The expectations regarding hosting a mega event such as EXPO are high in Izmir (EXPO 2020 Izmir Yonlendirme Kurulu, 2013). However, academic literature on expected effects of EXPO on Izmir region's economy is virtually nonexistent. To the best knowledge of authors, a systematic analysis of the expected effect of EXPO 2020 on Izmir economy is not done. The main contribution of this study is to analyze the effects of a mega event such as EXPO on Izmir's economy. Such a regional analysis has been conducted for the first time in Turkey.

A second contribution is that the expected impact of EXPO is explicitly quantified for the first time; there are expectations but the authors are yet to identify a source that presents the expected impact of EXPO explicitly. Another contribution of this analysis is to provide an example of regional research with input-output I-O tables in mega events literature.

Regional I-O analyses of mega events are relatively rare, due to the limited availability of sub-national I-O tables. For Turkey, such an analysis has never been conducted before and is now possible only because 2008 IZKA Izmir Input-Output Table has been prepared by academic staff from Department of Economics, Ege University, with support from IZKA (Izmir Regional Development Agency). Details of the 2008 IZKA Izmir I-O Table are publicly available (Aydogus et.al., 2013). Based on Izmir regional I-O model, two potential effects of the EXPO are investigated in this paper. Firstly, new hotel constructions are expected; their expansionary effects need to be analyzed. Secondly, a large number of visitors are expected during the EXPO 2020. The impact of their tourism expenditures also need to be analyzed.

The underlying 2008 IZKA Izmir I-O Table is available from Izmir Regional Development Agency (IZKA) in 36 sector detail consistent with NACE 1.1 classification. The analysis is conducted through the multipliers calculated from the regional table. Next section briefly reviews the relevant literature. Third section summarizes the I-O model used for the analysis. Section 4 provides calculations on the construction and tourism expenditures expected due to EXPO; then summarizes the results of the I-O analysis. Last section concludes.

Literature Review

The mega events literature attempts to isolate effects of large scale social events such as major sports events (Lee and Taylor, 2005; Gelan, 2003; Fourie and Santana-Gallego, 2011), and exhibitions (Kim and Chon, 2009). Analysis of mega events generally employs three approaches: i) I-O analysis, ii) cost-benefit analysis, and iii) computable general equilibrium modeling (Andersson, Armbrecht and Lundberg, 2008). The application of I-O analysis on mega events is just one implementation of the I-O modeling approach. The origins of input-output research go back to Wassilij Leontief's works that led to a Nobel Prize in 1973. Starting with Leontief and his team at Harvard University, Akhabbar, Antille, Fontela and Pulido (2011) explain how input-output models fared in United States and how the tool of analysis moved to Europe. These models have been used to analyze various topics, among which are quantification of carbon emission effects of production on the environment (Minx, Wiedmann, Wood, Peters, Lenzen, Owen, Scott, Barret, Hubacek, Baiocchi, Paul, Dawkins, Briggs, Guan, Suh and Ackerman, 2009), examination of sectorial energy usage (Lin and Polenske, 1995), identification of key sectors that need to be supported in times of crisis (Luo, 2013), and analysis of interactions between the real and financial sectors (Leung and Secrieru, 2012). Though frequently denoted in terms of *value* units, input-output tables in *quantity* units can also be constructed. Labeled as *monetary* and *physical* tables, they have been used to examine physical aspects of economic activity like waste management (Dietzenbacher, 2005) with notes of caution on the different effects of using current and constant prices (Dietzenbacher and Temurshoev, 2012).

Regarding the use of I-O models to analyze mega events; examples exist, but regional examples are relatively few in number. Kim and Chon (2009) employ a national I-O model to analyze the impact of the exhibition industry in Korea. Lee and Taylor (2005) first estimate the expected number of visitors to the FIFA World Cup 2002 held in Korea; then proceed to examine the effect of this event on Korean economy through multipliers calculated from the economy's I-O table. Collins et.al. (2009) examines the environmental impact of the 2004 World Rally Championship, Wales Rally of Great Britain, on the region. Daniels and Norman (2003) use I-O modeling through IMPLAN 2.0 (Minnesota IMPLAN Group, 1998) software to analyze the effects of seven different sports events in South Carolina, USA. An analysis of EXPO on the Silicon Valley (Bay Area Council Economic Institute and Beacon Economics, 2011) and an investigation of the expected effects of an exposition center on Portland Metropolitan Area (Crossroads Consulting Services, 2011) have been performed. Assessing studies on regional impact of mega events, Lee (2006) lists more examples of research along these lines. Following this lead, impact of a mega event such as EXPO is considered in this article.

The Model

The analysis is based on a one-region static regional I-O model: 2008 Izmir IZKA Regional Input-Output Model (Aydogus et al, 2013). The model is a basic I-O model and is based on the equilibrium condition that regional production in any sector is equal to the sum of final and intermediate demands. It follows Aydogus (2011) and Haydon et al (2013). For an n sector economy in matrix notation:

$$\mathbf{X} = \mathbf{AX} + \mathbf{C}_0 + \mathbf{Z}_0 + \mathbf{G}_0 + \mathbf{E}_0^D - \mathbf{M}_0^D + \mathbf{N}_0^{TR} \quad (1)$$

Column vector \mathbf{X} is $nx1$ and represents regional production for n sectors. Intermediate uses are summarized by \mathbf{AX} where each element of the nxn matrix \mathbf{A} , a_{ij} , represents input purchase of sector j from sector i . Consumption by households is represented by \mathbf{C}_0 , investment demand is \mathbf{Z}_0 , and government (central and local) expenditure is \mathbf{G}_0 . Each of these elements of final demand is $nx1$ vectors. \mathbf{E}_0^D is exports to other countries and \mathbf{M}_0^D is imports from other countries. \mathbf{N}_0^{TR} is net sales from the region, Izmir in this case, to the rest of the country; i.e. rest of Turkey.

For an open I-O model, the practice is to solve Equation 1 for the equilibrium level of output and determine the effects of final demand shocks on output. Adopting an open model enables calculating direct and indirect effects, where indirect effects are due to secondary shock that occur in other sectors of the region.

Alternative is to close the model by endogenising consumption. Any expansion in economic activity would cause the incomes of the consumers to increase. The increases in income would, in turn, induce additional increases in final consumption demand, which would eventually lead to more income. This circular expansion would eventually subside, but the total expansion in a closed model would be higher than the expansion in an open model. More precisely, in a closed model, in addition to *direct* and *indirect* effects of a final demand shock, *induced* effects can also be calculated.

In order to close the model, a household sector is added to the IO table, increasing matrix sizes to $(n+1) \times (n+1)$ and vector sizes to $(n+1) \times 1$. Row $n+1$ of the intermediate input transactions matrix, \mathbf{AX} , now represents income of the household from various sources. Column $n+1$ is consumption from various sectors. The new sector traces income receipt of the household and expenditures of the household. Assuming that these modifications are imposed on Equation 1, solving Equation 1 yields:

$$\mathbf{X}^* = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{F}_0 \quad (2)$$

where $\mathbf{F}_0 = \mathbf{C}_0 + \mathbf{Z}_0 + \mathbf{G}_0 + \mathbf{E}^D - \mathbf{M}_0^D + \mathbf{N}_0^{TR}$ final demand. Let $(\mathbf{I} - \mathbf{A})^{-1}$ denote the *Leontief inverse*. Then, taking the first difference of Equation 2, the changes in output ($\Delta \mathbf{X}^*$) caused by exogenous shocks to final demand ($\Delta \mathbf{F}_0$) can be calculated:

$$\Delta \mathbf{X}^* = (\mathbf{I} - \mathbf{A})^{-1} \Delta \mathbf{F}_0 \quad (3)$$

Given the changes in output and assumption on linearity, the total impact of changes in final demand on labor demand, labor income, indirect taxes on production, and imports can be calculated. For example, the total change in labor demand will be given by the following equation:

$$\Delta \mathbf{L} = \mathbf{1} \Delta \mathbf{X}^* = \mathbf{1} (\mathbf{I} - \mathbf{A})^{-1} \Delta \mathbf{F}_0 \quad (4)$$

where I is an $n \times n$ diagonal matrix, whose elements on the main diagonal are direct labor coefficients ($l_j = L_j/X_j$), and off-diagonal elements are 0. The essence of Equation 4 is as follows: An increase in equilibrium output would require a change in labor demand. Since any output X is produced by labor demands L , any change in output would trigger a proportional increase in labor demand, where the proportion is the labor coefficient l_j . Similarly, impact on labor income would then be:

$$\Delta W = w \Delta L = w I (I - A)^{-1} \Delta F_0 \quad (5)$$

where w is a $n \times n$ matrix whose diagonal elements are sectorial wage rates ($w_j = W_j/L_j$) and off-diagonal elements are 0. Note that W_j is labor payments by sector j . Following this line of thought further;

$$\Delta T = t \Delta X^* = I (I - A)^{-1} \Delta F_0 \quad (6)$$

would be the implied impact on net taxes, with t denoting a $n \times n$ matrix whose diagonal elements are sectorial net tax rates ($t_j = T_j/X_j$) and off-diagonal elements are 0. Finally, impact on imports can be calculated as:

$$\Delta M = m \Delta X^* = m (I - A)^{-1} \Delta F_0 \quad (7)$$

with the diagonal elements of the $n \times n$ import parameter matrix m calculated as $m_j = M_j/X_j$.

The implementation of such a model requires the coefficient matrix A for the economy under consideration. For the Izmir region, such a table is available from Izmir Regional Development Agency, İZKA. The table

is one of the outputs of İZKA's preparatory research projects related to 2014-2023 Izmir Region Plan. The 2008 İZKA Izmir I-O Table is available from İZKA's website. Also, the change in final demand in Izmir caused by a mega-event needs to be calculated. Details of the calculation of the change in final demand and results obtained from the analysis are presented in the next section.

Results

The input-output analysis relies on changes in final demand. In order to examine the effect of hotel construction expenditures and tourism expenditures triggered by EXPO in Izmir, the magnitudes of these expenditures need to be calculated. Then, the effects of these final demand changes on Izmir region are analyzed through multipliers. Results are presented in 2012 Turkish Liras; conversion to US Dollars can be done through 1 TL = 0.55 US\$ (CBRT-EDDS, 2013).

Regarding the construction of new hotels in preparation for a mega event like EXPO; the number of existing hotel beds in Izmir is 39,704 in 2012 (Ministry of Culture and Tourism, 2013). During the application for EXPO 2020, unofficial predictions implied an additional capacity of 15,000 beds to be constructed in Izmir in preparation for EXPO. This capacity increase is assumed to take place in the form of 3 star 100 room hotels, implying the construction of 60 new hotels. Interviews with the construction sector representatives imply that the additional capacity of 15,000 beds will be constructed at a cost of 344 million TLs.

Table 1. Direct Impacts of EXPO Related Construction and Tourism Expenditures (million TL in 2012 prices or people/year for employment effects)

	Direct Impact on Production	Direct Impact on Labor Demand	Direct Impact on Labor Income	Direct Impact on Net Taxes	Direct Impact on Imports
Construction Sector	344	3123	57	16	0
Hotels and Restaurants Sector	670	5843	45	20	23
Sum-Total	1014	8966	102	36	23

Source: Authors' own calculations. 1 TL = 0.55 US\$ for 2012.

This figure is taken as an increase in final demand of the construction sector. In other words, the expected direct expenditure related to new hotel construction is about 344 million TL, or about 189 million US\$.

Regarding tourism expenditures; it is assumed that the additional 15,000 bed capacity will be fully utilized for 180 days, the entire duration of the EXPO. This implies 2.7 million overnight stays. Each overnight stay is assumed to be done by a visitor from abroad. According to TURKSTAT Tourism Statistics (TURKSTAT, 2013), personal expenditures of visitors from abroad per overnight stay is US\$138 in 2012 in Turkey, or 248 TL using exchange rate data from Central Bank's Electronic Data Delivery System (CBRT-EDDS, 2013). This implies a total of 670 million TL additional tourism expenditure due to EXPO in Izmir. This is the expected final demand increase in "hotels and restaurants" sector. In other words, the expected direct expenditure related to expanding tourism is about 670 million TLs, or about 368 million US\$.

Expected direct impacts of new hotel construction expenditures and expanding tourism expenditures on construction, and hotels and restaurants sectors' production, labor demand, labor income, net taxes on production, and imports are summarized in Table 1. Note that direct impacts on labor demand, labor income, net taxes, and imports of the construction expenditures and tourism expenditures are calculated by using relevant direct coefficients from I-O table. Since direct impacts are considered at this point, impacts on production are equal to the expected increases in direct expenditures. With a higher increase in expenditures, hotels and restaurants sector creates higher increases in labor demand and net taxes. But construction creates more labor income.

Next, given these direct impacts in the construction and tourism sectors, *total impacts* (= direct+ indirect + induced) on regional production, labor demand, labor income, and imports in the Izmir economy are calculated for 36 sectors by using the regional I-O model presented in the previous section. That is; given changes in final demand, ΔF_j , and the coefficient matrix **A** obtained from the 2008 İZKA İzmir I-O Table, the algebra implied by Equations 3 to 7 is imp-

lemented. Equation 3 yields the impact on production, Equation 4 impact on labor demand, Equation 5 impact on labor income, Equation 6 impact on net taxes and Equation 7 impact on imports. Parameters required for these calculations are direct labor coefficient matrix **I** for Equation 4, sectoral wage rates matrix **w** for Equation 5, net tax rates matrix **t** for Equation 6 and import rates **m** for Equation 7. All of these can be calculated from 2008 İZKA İzmir I-O Table, for the table includes production, employment, labor payment, net taxes and imports for 36 sectors, facilitating the calculation of impact of changes in final demand. Results for 36 sectors are provided in Appendix Tables 1 and 2 for the construction and tourism expenditures respectively and aggregated results are given below in Table 2.

Table 2 shows that the sum-total production impact of the introduced two final demand shocks amounts to 2.3 billion TLs. Two-third of the total production increase is due to the tourism related expenditures of foreign visitors. Tourism causes higher income generation as well; however, the income generation due to tourism seems relatively less compared to construction. For a production increase of 769 million TL, construction creates 101 million TL additional labor income: a ratio of $101/769=0.13$. The same ratio is 0.095 for tourism; construction leads to higher labor income effects.

Construction is also observed to create higher level of imports. This is due to the high import requirement of metal production in Izmir. Metal production uses scrap metal. In Izmir, scrap metal is imported in the form of scrap ships. These ships are brought to Izmir, dismantled and recycled; then used as inputs to metal production. Construction has a high metal requirement in the Izmir region and in Turkey; cement is applied on metal skeletons to construct buildings. Therefore, construction related demand shock causes a high increase in imports.

One of the major advantages of employing a regional I-O model is that detailed sectorial results can be obtained. Total impacts of construction and tourism expenditures on production, labor demand, labor income, net taxes, and imports for 36 sectors are presented in Appendix Tables 1 and 2.

Table 2. Total Impact of EXPO Related Construction and Tourism Expenditures (million TL in 2012 prices or people/year for employment effects)

	Total Impact on Production	Total Impact on Labor Demand	Total Impact on Labor Income	Total Impact on Net Tax	Total Impact on Imports
Construction Expenditure	769	5 867	101	35	260
Tourism expenditures	1 543	11 258	148	66	148
Sum-Total	2 312	17 125	250	101	409
Change (%)	1.20%	1.20%	1.13%	1.04%	2.15%

Source: Authors' own calculations. 1 TL = 0.55 US\$ for 2012.

Regarding the construction of new hotels; highest production impact is on the construction sector itself. The metal input requirement of construction is reflected in the production increase displayed by the “manufacture of basic metals” sector. Greatest increase in labor demand is observed in “construction”, followed by “wholesale and retail trade”. Related increase in labor income is observed in “construction” and “other services”, followed by “wholesale and retail trade”. Created tax revenue is expected to be largest in “construction” sector; this is followed by “mining; extraction of petroleum and natural gas”.

Highest import effect is on recycling. This is due to the interaction between recycling and metal production. In Izmir, metal production is through scrap metal. Most of the scrap metal is obtained in form of imported old ships that are dismantled in Izmir. Dismantled ships are then used for metal production. Therefore; as construction sector expands, more metal production becomes necessary. This triggers imports of scrap metal accounted under the recycling sector.

As for hotels and restaurants; in addition to service related sectors, considerable production effect in “electricity, gas, steam and hot water production and distribution” sector is observed, most likely due to the power and water requirements of hotels. Highest increases in labor demand are in “hotels and restaurants”, trade, and services sectors. Agriculture and “manufacture of food products and beverages” also require more labor to meet the expanding demand in the region. However, these sectors do not appear to create matching increases in labor income; leading

sector in this regard is “hotels and restaurants”, followed by services and trade.

Highest increase in tax creation is in the “hotels and restaurants” sector. “Agriculture, hunting and forestry” and “land, water, air and pipeline transportation and communication” sectors also create relatively more tax. High recycling import requirement is observed once more.

Conclusion

This study examines the impact of a mega event like the EXPO in Izmir region of Turkey. Three contributions are made: i) a regional I-O analysis of a mega event in Izmir, or for any region of Turkey, is conducted for the first time; ii) final demand effects of a mega event in Izmir are quantified; iii) a closed regional I-O model is exemplified.

In addition to the sectorial quantified results of the mega event, it is observed that Izmir has a very high recycling import dependency. Any metal demand related final demand shock to the region would trigger high imports. This implies a need for recycling policy at not only the regional level but also the national level.

One of the long term benefits of a mega event in Izmir would be an improvement in infrastructure. But there are also downsides. Any excess supply created during the preparation phase needs to be eliminated after the mega event; otherwise, the region may experience considerable recession. This implies that preparations for a mega event have to include plans for the post-event era as well.

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Appendix

Appendix Table 1. Impact of Hotel Constructions (million TL in 2012 prices or people/year for employment effects)

		Impact on Production	Impact on Labor Demand	Impact on Labor Income	Impact on Net Tax	Impact on Imports
1	Agriculture, hunting and forestry	2.0	0.2	24	0.3	0.2
2	Fishing	0.0	0.0	0	0.0	0.0
3	Mining and quarrying	30.3	3.9	107	4.4	1.7
4	Manufacture of food products and beverages	0.8	0.1	5	0.0	0.1
5	Manufacture of tobacco products	0.0	0.0	0	0.0	0.0
6	Manufacture of textiles and textile products	0.3	0.0	3	0.0	0.1
7	Manufacture of wearing apparel; dressing and dyeing of fur	0.4	0.1	7	0.0	0.0
8	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.1	0.0	1	0.0	0.1
9	Manufacture of wood and products of wood and cork (except furniture); articles of straw and plaiting materials	4.7	0.3	74	0.2	1.0
10	Manufacture of pulp, paper and paper products	2.9	0.3	16	0.1	1.2
11	Manufacture of printed matter and recorded media	1.7	0.2	14	0.0	0.1
12	Manufacture of coke, refined petroleum products and nuclear fuels	23.1	0.3	8	1.0	12.9
13	Manufacture of chemicals, chemical products	16.7	1.4	46	0.8	5.9
14	Manufacture of rubber and plastic products	10.1	0.8	58	0.3	1.5
15	Manufacture of other non-metallic mineral products	24.8	2.7	264	1.4	2.7
16	Manufacture of basic metals	66.4	2.9	112	0.9	9.7
17	Manufacture of fabricated metal products, except machinery and equipment	22.9	2.0	382	0.6	3.5
18	Manufacture of machinery and equipment n.e.c.	0.2	0.0	2	0.0	0.1
19	Manufacture of office machinery and computers	0.0	0.0	0	0.0	0.1
20	Manufacture of electrical machinery and apparatus n.e.c.	10.4	1.0	57	0.1	3.4
21	Manufacture of radio, television and communication equipment and apparatus	0.0	0.0	0	0.0	0.1
22	Manufacture of medical, precision and optical instruments, watches and clocks	0.3	0.0	6	0.0	0.6
23	Manufacture of motor vehicles, trailers and semi-trailers	1.1	0.1	4	0.0	0.4
24	Manufacture of other transport equipment	0.2	0.0	3	0.0	0.4
25	Manufacture of furniture; other manufactured goods n.e.c.	0.6	0.1	15	0.0	0.0
26	Recycling	16.5	0.6	89	0.0	213.2
27	Electrical energy, gas, steam and hot water	12.3	1.1	14	0.2	0.0
28	Collected and purified water, distribution services of water	4.5	0.4	7	0.0	0.0
29	Construction	348.6	57.7	3165	16.6	0.0
30	Wholesale and retail trade	64.3	8.6	833	2.1	0.4
31	Hotels and restaurants	3.8	0.3	33	0.1	0.1
32	Transport, storage and communication	38.7	2.7	99	4.0	0.0
33	Financial intermediation	9.5	2.3	35	0.5	0.2
34	Education services	1.1	0.7	17	0.0	0.0
35	Health and social work services	0.7	0.2	10	0.0	0.0
36	Other services	48.7	10.5	354	1.1	0.8
	TOTAL	768.7	101.3	5867	34.9	260.3

Source: Authors' calculations based on 2008 IZKA Izmir Input-Output Table. 1 TL = 0.55 US\$ for 2012.

Appendix Table 2. Impact of Tourism Expenditures (million TL in 2012 prices or people/year for employment effects)

		Impact on Production	Impact on Labor Demand	Impact on Labor Income	Impact on Net Tax	Impact on Imports
1	Agriculture, hunting and forestry	68.8	5.2	835	11.6	7.7
2	Fishing	3.6	0.3	37	0.1	0.0
3	Mining and quarrying	43.7	5.6	155	6.4	2.4
4	Manufacture of food products and beverages	43.9	3.7	281	2.2	4.0
5	Manufacture of tobacco products	0.0	0.0	0	0.0	0.0
6	Manufacture of textiles and textile products	0.8	0.1	9	0.1	0.2
7	Manufacture of wearing apparel; dressing and dyeing of fur	1.1	0.1	19	0.1	0.1
8	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.3	0.0	3	0.0	0.1
9	Manufacture of wood and products of wood and cork (except furniture); articles of straw and plaiting materials	0.7	0.1	11	0.0	0.2
10	Manufacture of pulp, paper and paper products	4.8	0.5	26	0.1	1.9
11	Manufacture of printed matter and recorded media	7.2	0.8	62	0.0	0.3
12	Manufacture of coke, refined petroleum products and nuclear fuels	34.4	0.4	13	1.5	19.2
13	Manufacture of chemicals, chemical products	37.3	3.1	103	1.7	13.1
14	Manufacture of rubber and plastic products	9.2	0.7	53	0.3	1.4
15	Manufacture of other non-metallic mineral products	5.6	0.6	60	0.3	0.6
16	Manufacture of basic metals	17.4	0.8	29	0.2	2.5
17	Manufacture of fabricated metal products, except machinery and equipment	5.4	0.5	89	0.1	0.8
18	Manufacture of machinery and equipment n.e.c.	0.2	0.0	2	0.0	0.1
19	Manufacture of office machinery and computers	0.1	0.0	0	0.0	0.3
20	Manufacture of electrical machinery and apparatus n.e.c.	5.8	0.6	32	0.1	1.9
21	Manufacture of radio, television and communication equipment and apparatus	0.1	0.0	0	0.0	0.1
22	Manufacture of medical, precision and optical instruments, watches and clocks	0.6	0.1	10	0.0	1.1
23	Manufacture of motor vehicles, trailers and semi-trailers	2.4	0.1	8	0.0	0.8
24	Manufacture of other transport equipment	0.7	0.1	8	0.0	1.3
25	Manufacture of furniture; other manufactured goods n.e.c.	5.7	0.6	131	0.1	0.3
26	Recycling	4.7	0.2	26	0.0	61.2
27	Electrical energy, gas, steam and hot water	112.8	10.0	133	1.4	0.0
28	Collected and purified water, distribution services of water	45.1	4.4	73	0.3	0.0
29	Construction	4.7	0.8	42	0.2	0.0
30	Wholesale and retail trade	120.4	16.1	1560	4.0	0.8
31	Hotels and restaurants	677.8	45.3	5910	20.4	22.9
32	Transport, storage and communication	96.2	6.7	245	9.9	0.0
33	Financial intermediation	17.7	4.3	65	1.0	0.3
34	Education services	3.0	1.9	46	0.1	0.0
35	Health and social work services	1.3	0.4	19	0.0	0.0
36	Other services	159.7	34.3	1162	3.5	2.6
	TOTAL	1543.02	148.27	11258	65.79	148.17

Source: Authors' calculations based on 2008 IZKA Izmir Input-Output Table. 1 TL = 0.55 US\$ for 2012.