

Turkish Labour Migration: Turkey-Germany Migration Corridor

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**Turkish Labour Migration: Turkey-Germany
Migration Corridor**

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AUTHORS.

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1. Introduction

Today about 191 million people, around 3% of world's total population lives outside their countries of origin. Although the share of migrants in total world population was steady only increasing from 2.1% to 3% in almost a century, the migrant share of total population in more developed regions has risen dramatically from 3.4% in 1960 to 9.5% in 2005. By 2005, Europe has been the major destination having the highest number of migrants. In Europe, Turkey is the country with the highest share of its population living abroad, mostly in EU15 countries.

The first phase of Turkish labour migration to Western Europe, especially to Germany, started in the early 1960s when Turkish workers migrated to Western Europe as *Gastarbeiter*. This Turkish labour migration accelerated, following the workforce agreement with Germany and the Association Agreement with the EC. Since then, over a million Turkish workers have migrated to the Western Europe for employment, with almost 70% migrating to Germany. The use of Turkish migrant workers was conceived by the German government as a temporary measure to deal with the chronic labour shortage, providing cheap and flexible labour. However, over time these temporary arrangements developed into permanent ones. The initial phase was followed by the second one, encompassing family reunification, politically motivated migration and (inevitably) illegal labour migration. Hence, the *Gastarbeiter* never went back and in addition more migrants followed; *Gastarbeiter* developed into the *Inlander auslandischer Herkunft*¹.

Despite only recently completing the fifth enlargement process, the EU has already embarked upon negotiations about Turkey's possible accession to the EU, this process has reignited fears in the 'old' EU about a possible influx of Turkish workers into EU27. However, labour migration is already a significant phenomenon for both existing EU members, especially for the EU15 and for Turkey with potential substantial implications for both partners.

Various policy experiments have been designed to analyze the economy wide effects of changes in the flow of skilled and unskilled labour from Turkey to Germany and the flow of migrants' remittances from Germany to Turkey. Due to the past migration patterns and volumes of Turkish worker flows, the analyses focus on labour migration to Germany and the outflow of migrants' remittances from Germany to Turkey. Macroeconomic implications for Turkish economy as well as the German economy are analysed by comparing the results from various policy scenarios with the baseline scenario of no migration and no remittance flows.

¹ Residents of foreign origin

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The analyses are carried out using a 16-region, 23-sector and 5-factor global computable general equilibrium model that is implemented in GAMS (McDonald *et al.* 2005) and is calibrated using GTAP data. Since the GTAP database does not incorporate explicit estimates of inter-regional transactions, because of the parsimonious treatment of the external accounts of regions, this study uses an augmented GTAP database that includes bilateral remittance data from GMig2 database (Walmsley *et al.* 2007).

The results shed light on the relationships between the magnitudes of labour migration and remittances and their macroeconomic effects on both the receiving and sending countries. The initial results indicate that the migration of Turkish labour force from Turkey to EU, especially to Germany, has mixed effects with a positive effect being generated by increases in remittances and a negative effect due to the reduction in the supply of skilled labour; the precise balance between the two is sensitive to both closure rules and the scale of migration and the volume of remittances. From the German perspective the results are also mixed; an increased supply of labour serves to relax a capacity constraint, while simultaneously reducing the price of (unskilled) labour in Germany. The remittances are insufficiently large as to have a substantive negative effect of the German economy, but they do have ‘Dutch disease’ type effects for Turkey.

The rest of this paper is organised as follows. In section 2 labour migration and remittance trends in Europe and particularly in Turkey are reviewed. This is followed by a description of the data set and model used in this study, section 3, and some descriptive statistics. The results are discussed in section 5 and the paper ends with some concluding comments.

2. Labour Migration and Remittances

2.1. Migration Trends

There were some signs of stabilisation in migration flows into EU countries, from 2002 to 2003 but in 2004 they increased again, though not uniformly across the countries. While Spain, UK, Austria, France and Poland reported an increase in migration flows from 2001 to 2004, Denmark, Germany, Hungary and the Netherlands experienced a continuous downturn (OECD, 2007f).

There has been an increase in the number of the stock of foreigners between 1980 and 2001 in most of the European countries such as Austria, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Switzerland and the UK.

Table 1: Foreigners in Selected European Countries, in thousands, 1980 – 2001

Country	1980	1985	1990	1996	2001
Austria	209	309	456	728	711
Belgium	887	847	905	912	847
Denmark	98	117	161	238	267
Finland	13	17	27	74	99
France	3,634	3,670	3,597	3,371	3,193
Germany	4,453	4,379	5,343	7,314	7,336
Ireland	29	45	80	118	182
Italy	183	423	781	1,096	1,363
Luxembourg	95	98	113	143	167
Netherlands	520	553	692	680	690
Norway	82	102	143	158	186
Portugal	42	67	108	173	224
Spain	183	242	279	539	1,109
Sweden	413	389	484	527	476
Switzerland	893	940	1,100	1,338	1,419
United Kingdom	1,739	1,731	1,723	1,934	2,681
Total	13,474	13,926	15,990	19,340	20,948

Source: UN World Economic and Social Survey, 2004

Among the European countries, Germany is the one which has the highest number of migrant stock as well as the highest percentage of the world's migrant stock. In 2007, it had more than 10 millions of international migrant stock, accounting for about 12% of its population. Germany is followed by France with 6.5 millions and 11% and UK with 5 millions and 9% (IOM, 2005, OECD, 2007).

Europe would have experienced a population decline of 4.4 million during 1995-2000 had it not been for migrant inflows. Therefore, the effect of international migration is particularly important for the Western European countries such as Austria, Denmark, Greece, Italy, Luxembourg, Spain and Switzerland, where it has contributed to raising the rate of natural population increase (IOM, 2005).

2.1.2. Turkish Migration Trends

During 1960s, Turkey experienced various political changes; the Menderes regime was overthrown by the army, the new constitution granted Turkish citizens the right to travel abroad, etc. The political changes of 1960s facilitated further migration movements. The Turkish government encouraged the migration of Turkish workers as part of the measures taken under “population planning” and “economic growth” (table 4).

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At first their number was relatively small, mainly involving men aged between 20 and 35, a third of whom was comprising of skilled workers without families. Through the interaction of the Turkish Employment Services (T.E.S.), a total of about 180,000 workers left between 1963 and 1966 for West Germany, Belgium, the Netherlands and Austria. Turkish labour migration accelerated, following the workforce agreement with Germany and the Association Agreement with the EC.

The economic crisis of 1966-67 halted labour migration from Turkey to Western Europe also leading to a forced return to Turkey. However, after 1968, labour migration from Turkey to Western Europe continued to grow, reaching to 525,000 workers, 80% of whom migrated to Germany.

During this period, there was an increase in the proportion of female workers from Turkey; almost a quarter of the Turkish migrant workers were women. After this period, the migration flows were dominated by the migration of the family members of the guest-workers. In 1974, increased family reunification led to one million residents of Turkish nationality living in Germany among which only 600,000 were workers (Rist, 1978; Penninx, 1982).

With the oil crisis, Germany and the Netherlands stopped the recruitment of migrant workers, slowing down the labour migration from Turkey to Western Europe to a large extent. Following that, the recruitment of Turkish workers by West Europe, especially Germany and the Netherlands, were confined to small numbers of highly qualified workers such as Turkish teachers.

In mid-1970, there was a flow of labour migration from Turkey, mainly comprising of unskilled labour, towards the Arabic peninsula and then towards Russia after 1990 (table 5) (Martin, 1991; Penninx, 1982, Aydas *et al.* 2002).

Table 2: Turkish Emigration through Turkish Employment Office, 1964-80

Year	Total	Skilled Migrants in %s	European Country	Libya	S. Arab
1964	66,176		66.0		
1965	55,520		51.5		
1966	34,410	25.0	34.4		
1967	8,855	30.4	8.5		
1968	43,204	28.0	43.1		
1969	103,975	24.5	102.9		

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1970	129,575	27.0	127.5		
1971	88,442	35.7	86.3		
1972	85,229	33.7	83.1		
1973	135,820	43.7	131.5		
1974	20,211	34.9	17.1		
1975	4,419	51.2	1.2	1.1	1.6
1976	10,558	73.4	3.2	4.1	-
1977	19,084	72.8	3.3	8.6	4.7
1978	18,852	-	2.4	7.7	5.8
1979	23,630	63.2	1.8	9.8	8.5
1980	28,503	71.0	2.3	15.1	5.6

Source: Penninx (1982)

Meanwhile, as a result of the non-stopping family unification and the high birth rate among Turkish migrants, the total Turkish population in Europe increased to an estimated 2 million, over 800,000 being legally employed. Since then, Germany has been the top country, hosting about 2 millions of Turkish migrants in 2003.

Table 3: Number of Turkish Citizens and Workers, 2003

	Number of citizens	Number of workers
Germany	2.053.600	732.189
France	311.356	76.122
Netherlands	299.909	51.000
Austria	134.229	57.098
Belgium	70.701	25.874
Sweden	38.844	5.800
UK	79.000	44.000
Denmark	35.232	15.596
Italy	10.000	
Finland	3325	
Spain	1000	
Luxembourg	210	60
Switzerland	79.476	33.764
Norway	10.000	6.000
Total	3.127.691	1.047.842

Source: Ministry of Labour and Social Security, 2003

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By the early 2000s, there were more than 3 millions of Turkish citizens in Europe with Germany being the major host, followed by France and the Netherlands. The number of Turkish workers was the highest once again in Germany with around 732,000, followed by France and Austria. Expatriate Turks amounted more than 3.5 millions which is almost 5% of the nation's total population (Icduygu, 2004). Emigration rate of tertiary educated was around 4.6% in 2000 (Ratha and Xu, 2007).

In 2005, stock of Turkish emigrants was about 4.5 million, representing 6% of Turkish population. There was no change in top destinations where those migrants were based, once again the top country was Germany followed by France, Netherlands and Austria (Ratha and Xu, 2007).

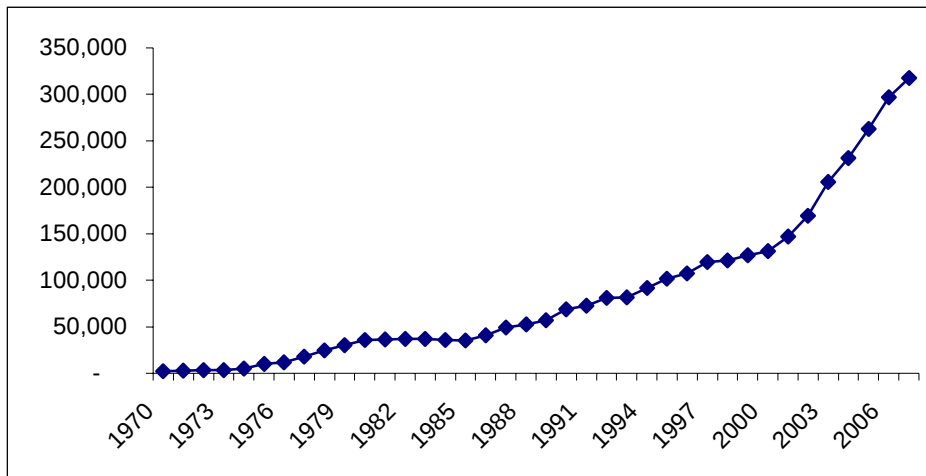
2.2. Remittances

'Remittances are the raison d'être of migration for employment' (Martin, 1991, pp33). Throughout the world, remittances which are the earnings generated and sent back home by the migrant workers, have been an important source of revenue for developing countries, especially for the poor. In 2007, recorded remittances to developing countries are estimated to reach \$240 billion, up from 206\$ billion in 2006 and are almost triple of the level in 2001. On the other hand, worldwide flows of remittances are expected to reach to 318\$ billion, increasing by 87% from 2002 to 2007 (Ratha *et al.* 2007²). Although the rate of growth of the remittance flows to Latin America and the Caribbean (LAC) region, which is the largest recipient of remittances, slowed down due to the slowing down of the US economy and as well as its tighter migration legislations, the growth of remittances to developing countries in general remains robust due to the high growth rates of remittances from Europe and Central Asia. It is argued that new remittance technologies have helped to improve the remittance industry, decreasing the remittance costs as a result of the introduction of phone-based remittances and internet-based remittance instruments.

Remittance inflows to the host countries almost always had an upward trend as shown in figure 6 below. According to World Bank Global Development Report 2005 and Ratha *et al.* (2007) they are approximately eight times the level of 1990's.

² Migration and Development Brief 3, Development Prospects Group, Migration and Remittances Team, 29 November, 2007: Ratha, D., Mohapatra S., Vijayalakshmi, K. M. and Zhimei, Xu.

Figure 1: Total Remittance Inflows of the World, 1970-2007



Source: Ratha et al. 2007.

Towards the end of 1990s, India, Mexico, Turkey, Germany and Egypt were the top remittance receiving countries, Turkey being in the third place in 1998. At the same time, USA and Saudi Arabia were the top countries with the highest remittance outflows. In 2007, top remittance receiving countries were estimated to be India once again but this time followed by China and then Mexico as in almost ten years ago. Total remittances received by these three countries accounted for one-third of total remittances received by all developing countries.

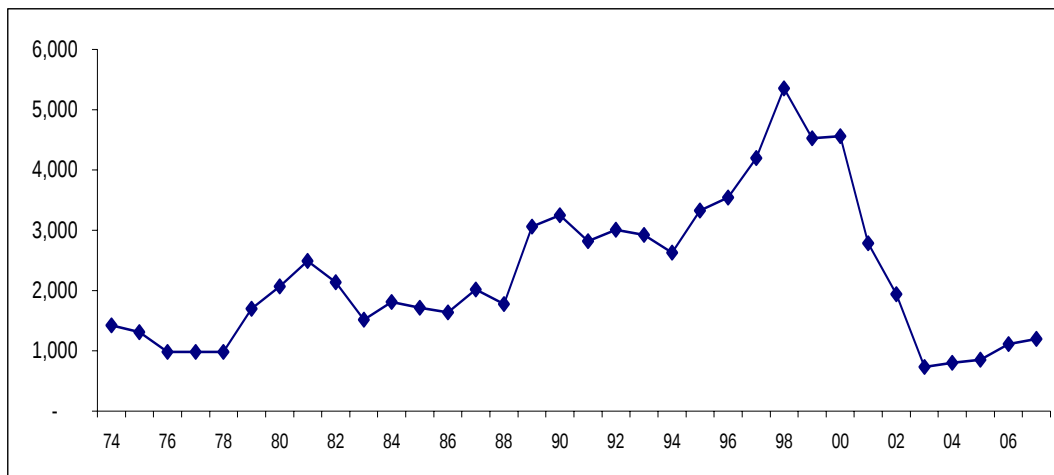
2.2.1. Remittances and Turkey

The enormous amount of remittances sent by Turkish migrant workers has been and still is an important revenue and source of hard currency for the Turkish economy since the early 1960s. Remittances have a significant role for the Turkish economy as it is to a large extent dependent on hard currency of migrants in order to import the inputs and the technology that are crucial in the industrialised sectors, hence also playing an important role in the international trade.

It is argued that the fluctuations in the remittance flows have severe effects on the macroeconomic balances of the labour exporting countries that are heavily dependent on them. Sayan (2003) argues that the remittances sent by the Turkish workers are pro-cyclical with the real GDP in Turkey but countercyclical with the output in Germany.

Hence, there is a strong co-movement between remittances and the output in Turkey which implies that the Turkish workers in Germany follows the latest developments in the Turkish economy and responds to them (Sayan, 2003).

Figure 2: Turkish Remittance Inflows, in \$ millions, 1974-2007



Development Finance Statistics, World Bank, 2007.

Source: Global

The efforts of Turkish national government were always directed towards remittances as they were the best way to finance Turkish foreign debts, payment of interest, repayment of loans, etc as all other forms of financing such as foreign aid and loans come only with heavy conditions.

After 1974, there was a decline in the amount of remittance flows (fig 11) due to the oil crises and the persistent increase in the inflation rates. Hence, a number of policies (such as special interest rates for foreign currency accounts, special exchange rates for remittances, allowing Turks residing abroad to shorten their compulsory military service by paying a fee in foreign currency, etc.) have been implemented by the Turkish government in order to encourage migrants' remittances.

Towards the mid-1979, Turkish government started to devalue the Turkish Lira and to correct a large exchange rate misalignment. However, this attempt was unsuccessful and led to a reduction in the level of remittance flows. During the first part of 1980s, the remittance flows declined as a result of the effects of the military regime and towards the end had an upward trend until the economic crisis of 1994.

Towards the end of 1998s remittances corresponded to 2.3% of the Turkish GDP and 10.6% of its export revenues and were about 6 times the foreign direct investment (FDI) received. In 1999, at the year of the big earthquake, Turkey experienced a downward trend in the remittance flows (FRBB, 2001; Aydas *et al.* 2002, Sayan, 2003). By the end of 1990s, net Turkey-Germany migration fell to 70,000 a year from 400,000 a year in 1980s, decreasing the volume of remittance flows back home. Moreover, in late 1990s a large proportion of migration to Germany was family related. Thus, as the Turkish migrants settled in Germany, they started to send less and less remittances back home. Also during the same period, Turkish government started to see

that exporting workers was not the right way to absorb the growing labour force in Turkey and neither to improve the backward regions. This approach by the government was totally opposite of its 1960s' policies when emigration was considered to be an important mean of development. As a result, since the late 1990s, Turkey has had more immigrants than emigrants.

Now that Turkey is negotiating accession to the EU, the main aim of the Turkish government is the FDI and job creation that a potential EU membership will bring by transforming as an EU member with advanced infrastructure and high wage jobs. Although Portugal and Spain are successful examples in this manner, as the Turkish population is much higher – likely to be the most populated country of the EU by 2015 – in case of a slow pace in job and wage growth, a large influx of Turkish migrant to the EU is expected. Therefore, the future of Turkey regarding labour migration might be similar to Poland rather than Spain and Portugal (Escobar *et al.* 2006).

3. Data and Model

The data for this study are derived from the GTAP database version 6.0, which is benchmarked to the year 2001 (McDougall and Dimanaran, 2005). The form of the database used for this study is a Social Accounting Matrix (SAM) representation of the Global Trade Analysis Project (GTAP) database version 6 (McDonald and Thierfelder, 2004). The GTA project produces the most complete and widely available database for use in global computable general equilibrium (CGE) modelling; indeed the GTAP database has become generally accepted as the preferred database for global trade policy analysis and is used by nearly all the major international institutions and many national governments. Hertel (1997) provides an introduction to both the GTAP database and its companion CGE model. The precise version of the database used as the starting point for this study is a reduced form global SAM representation of the GTAP data (McDonald *et al.* 2007).

The analyses are carried out by using a 23-sector, 5-factor and 16-region global computable general equilibrium model -GLOBE CGE - that is implemented in GAMS (McDonald *et al.* 2005). For this study a method for augmenting the GTAP database using additional GMig2 data on bilateral remittance and number of migrant workers differentiated according to the skill type- as skilled and unskilled - have been implemented as an extension to a global representation of the GTAP database (McDonald and Thierfelder, 2004). Due to the availability of bilateral remittance data there was no need for an additional region called “globe”. For modelling remittances in the absence of bilateral remittance data one can refer to McDonald and Sonmez (2006).

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The accounts in the SAM are detailed below and the aggregation mapping from the GTAP database is provided in the Appendix.

Table 4: SAM and Model Accounts

Sectors		Regions	
gran	Grains	tur	Turkey
ocrp	Other crops	gbr	United kingdom
ctl	Cattle sheep goats horses	fra	France
oanm	Other animals	deu	Germany
ener	Energy products	ita	Italy
afd	Animal food products	reu	Rest of the EU15
ofd	Other food products	neu	New EU countries
tex	Textiles	chn	China
wapp	Wearing apparel and leather	jpn	Japan
min	Minerals	asia	Asia
p_c	Petroleum coal products	nafta	NAFTA
chem	Chemicals rubber plastic products	efta	EFTA countries
wpap	Wood and paper products	rus	Russian federation
met	Metals	nafr	North Africa
emach	Electronic equipment and machinery	rme	Rest of middle east
veh	Vehicles and transport equipment	row	Rest of the world
oman	Other manufacture	Factors	
cns	Construction	land	Land
util	Utilities	unsklab	Unskilled labour
tran	Air water other transport, communication	sklab	Skilled labour
trd	Trade	capital	Capital
obs	Business services necessities	natlres	Natural resources
othserv	Other services		

Source: GTAP Database

3.1. Descriptive Statistics: Turkey vs. Germany

There is a huge economic gap between Turkey and Germany. The German economy is about ten times as big as the Turkish Economy³.

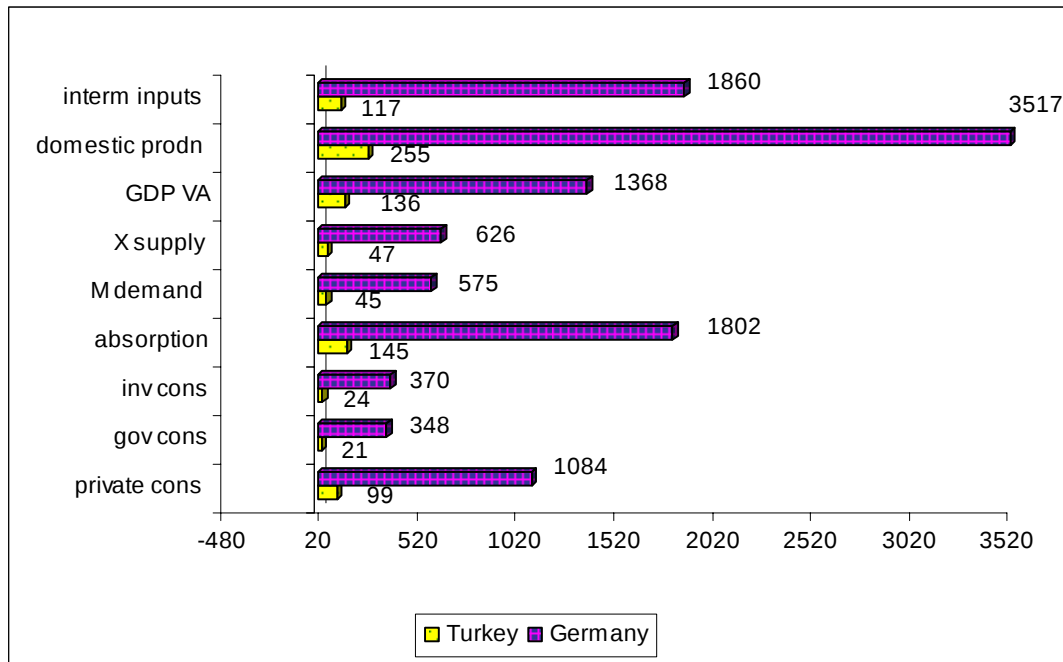
German GDP from value added is around \$1,368bns, while it is about \$136bns in Turkey. Total domestic production in Germany, which is around \$3,515bns, is about fourteen times as large as total domestic production in Turkey which is only \$255bns. In Germany, private consumption, investment and government consumption are \$1,084bns, \$370bns and \$348bns respectively while they are only \$99bns, \$24bns and \$21bns in Turkey. Absorption of Germany economy is around \$1,802bns while it is about \$145bns in Turkey. Large differences are also observed in export supply and import demand as well as intermediate inputs.

³ The base year of the GTAP data used is 2001. 2000/2001 was an important time period in the economic history of Turkey as it is the time when Turkey has experienced a severe financial crisis and recession.

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Since the German economy is much bigger than the Turkish economy, demand for skilled and unskilled labour in Germany is higher than the one in Turkey only with the exception of demand for unskilled labour in agricultural products which is higher in Turkey.

Figure 3: Real Macroeconomic Totals: Turkey vs. Germany (US\$ billions)



Source: GTAP Database, 2007.

Table 5: Demand for Unskilled and Skilled Labour: Turkey vs. Germany

	Unskilled Lab tur	Unskilled Lab deu	Skilled Lab tur	Skilled Lab deu
agripr	7.80	4.75	0.11	0.35
animals	0.86	4.15	0.01	0.30
foodprd	2.10	10.57	0.44	3.54
energyprd	0.24	0.56	0.04	0.24
textiles	1.12	3.44	0.19	0.92
wearapp&leather	1.02	2.97	0.15	0.66
minerals	0.75	6.40	0.13	2.15
petreum&coal	0.08	0.02	0.02	0.03
chems etc	1.02	18.04	0.25	10.59
wood&paper	0.64	13.15	0.13	4.55
metals	1.26	16.49	0.24	5.55
eleceqp&mac	1.38	49.18	0.35	30.13
vehicles&transeqp	1.27	25.61	0.27	10.10
omanu	0.29	6.06	0.05	1.96

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services	27.54	220.12	14.84	176.00
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Source: GTAP Database, 2007.

Price and supply of factors are both higher in Germany as well as the income to factors, when compared to the ones in Turkey. The highest differences in price of factors between Turkish and German economies are observed in skilled labour while the highest difference in supply of factors is observed in unskilled labour. Income to unskilled labour in Germany is eight times larger than the income to unskilled labour in Turkey while income to skilled labour is fourteen times higher.

Table 6: Price and Supply of Factors: Turkey vs. Germany

Price of factors	tur	deu
unsklab	1.0001	1.0015
sklab	0.9996	1.0019
capital	1.0010	1.0027
Supply of factors		
unsklab	47.36	381.51
sklab	17.21	247.07
capital	59.41	719.81
Income to factors		
unsklab	48.02	384.98
sklab	17.29	249.35
capital	59.43	719.90

Source: GTAP Database, 2007.

The number of total Turkish labour force in Turkey is about 33.2 millions, which is comprised of about 3.7 million skilled and 29.5 million unskilled Turkish workers. Total number of workers in Turkey including foreign workers is around 33.8 million with 30 million unskilled and 3.8 million skilled workers. Thus, there are around 500 thousand unskilled foreign workers and 100 thousand skilled foreign workers in Turkey.

Table 7: Number of skilled Turkish labour force in Europe

	Skilled Labour
Germany	63459
UK	10380
Greece	6623
France	5675
Netherlands	4100
Switzerland	2631

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Sweden	1923
Austria	1616
Belgium	1198
Denmark	944

Source: GMig2 Database, 2007.

Germany is the main country of immigration for Turkey; more than 700 thousand of Turkish unskilled workers are in Germany while the number of skilled Turkish workers in Germany is around 64 thousand, making the total number of Turkish workers in Germany about 764 thousand. This represents 2.3% of total Turkish labour force in Turkey, 2.4% of the unskilled and 1.7% of the skilled.

The second highest number of skilled Turkish workers is in the UK, followed by Greece and France.

After Germany, the second highest number of unskilled Turkish workers is in France, followed by the Netherlands and Austria.

However, there is a huge gap between the number of Turkish workers in Germany and in other EU15 countries and Switzerland, the total number of Turkish workers in Germany doubling the total number in the rest of the countries detailed in table 3 and 4.

Table 8: Number of unskilled Turkish labour force in Europe

	Unskilled Labour
Germany	706771
France	92035
Netherlands	88377
Austria	62280
Belgium	34424
Greece	32139
Switzerland	31571
UK	18806
Sweden	15766
Denmark	14550

Source: GMig2 Database, 2007.

Thus, it is with no surprise that Germany is the country with a major source of remittance inflows to Turkey. The value of remittances sent from Germany to Turkey by unskilled Turkish workers is around \$0.36 billions whereas the remittances sent by skilled workers are around \$0.04 billions. After Germany and the rest of the EU15 countries, it is the Turkish unskilled and skilled workers in France who remit the highest with US\$0.03 billions and about US\$0.003

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billions respectively. Remittance inflows to Turkey from Turkish workers in new EU accession countries of Central and Eastern Europe, Malta and Cyprus are not substantial.

Table 9: Remittances received by Turkey from EU countries (in billions of US\$)

	Unskilled Labour	Skilled Labour
UK	0.02	0.01
France	0.03	0.003
Germany	0.36	0.04
Italy	0.002	0.0004
Rest of EU15	0.12	0.01
New 12 EU countries	0.003	0.001

Source: GMig2 Database, 2007.

Remittances sent by unskilled foreign workers in Turkey to Germany are about US\$0.10 billions and by skilled foreign workers are about US\$0.06 billions. After Germany, the value of remittances sent by unskilled and skilled foreign workers in Turkey are highest to rest of EU15 and to France.

Table 10: Remittances received by EU countries from Turkey (in billions of US\$)

	Unskilled Labour	Skilled Labour
UK	0.01	0.01
France	0.02	0.03
Germany	0.10	0.06
Italy	0.0004	0.0004
Rest of EU15	0.08	0.04
New 12 EU countries	0.01	0.004

Source: GMig2 Database, 2007.

3.2. Globe CGE Model

This model is a member of the class of computable general equilibrium (CGE) models that are descendants of the approach to CGE modelling described by Dervis *et al.*, (1982). The implementation of this model, using the GAMS (General Algebraic Modeling System) software, is a direct descendant and development of the single country models devised in the late 1980s and early 1990s, particularly the model reported by Robinson *et al.*, (1990), and the multi-country model developed to analyse NAFTA (see Lewis *et al.*, 1995, for a later application).

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The model is a SAM based CGE model, wherein the SAM serves to identify the agents in the economy and provides the database with which the model is calibrated. Since the model is SAM based it contains the important assumption of the law of one price, i.e., prices are common across the rows of the SAM. The SAM also serves an important organisational role since the groups of agents identified by the SAM structure are also used to define sub-matrices of the SAM for which behavioural relationships need to be defined. As such the modelling approach has been influenced by Pyatt's 'SAM Approach to Modeling' (Pyatt, 1987).

3.2.1. Trade

Trade is modelled using a treatment derived from the Armington 'insight'; namely domestically produced and consumed commodities are assumed to be imperfect substitutes for both imports and exports. Import demand is modelled via a series of nested constant elasticity of substitution (CES) functions; imported commodities from different source regions are assumed to be imperfect substitutes for each other and are aggregated to form composite import commodities that are assumed to be imperfect substitutes for their counterpart domestic commodities. The composite imported commodities and their counterpart domestic commodities are then combined to produce composite consumption commodities. These are the commodities demanded by domestic agents as intermediate inputs and for final demand by households, the government, and for investment.

Export supply is modelled via a series of nested constant elasticity of transformation (CET) functions; the composite export commodities are assumed to be imperfect 'substitutes' for domestically consumed commodities, while the exported commodities from a source region to different destination regions are assumed to be imperfect 'substitutes' for each other. The composite exported commodities and their counterpart domestic commodities are then combined to produce composite production commodities. The properties of models using the Armington 'insight' are well known (see de Melo and Robinson, 1989; Deverajan *et al.*, 1990), but it is worth noting here that this model differs from the GTAP model through the use of CET functions for export supply; this ensures that domestic producers adjust their export supply decision in response to changes in the relative prices of exports and domestic commodities, which help to moderate the magnitude of the terms of trade effects in this class of model. Homogeneity can be imposed for all or any subset of commodities and regions.

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3.2.2. Production

The production structure is a two stage nest. Intermediate inputs are used in fixed proportions per unit of output – Leontief technology. Primary inputs are combined as imperfect substitutes, according to a CES function, to produce value added.

3.2.3. Final Consumption

Final demand by the government and for investment is modelled under the assumption that the relative quantities of each commodity demanded by these two institutions are fixed – this reflects the absence of a clear theory that defines an appropriate behavioural response by these agents to changes in relative prices. For the household there is however a well developed behavioural theory; hence the model contains the assumption that households are utility maximisers who respond to changes in relative prices and their incomes. In this version of the model the utility functions for the private households are assumed to be Stone-Geary, which yields linear expenditure systems that allow for subsistence consumption, and reduce to Cobb-Douglas utility functions where minimum levels of consumption are not specified.

4. Policy Experiments and Model Closure

4.1. Policy Experiments

The first policy scenario analyses the economic impacts of a modest decrease in skilled Turkish labour force in Turkey as it is assumed that 1% of skilled Turkish workers will migrate to Germany as a result of a possible Turkish EU accession. As a result of this migration, remittance shares of Turkish labour in Germany will change due to the change in the composition of the labour force in Germany. In addition, that 1% of the skilled migrant Turkish labour is re-priced in German labour markets as a result of the normalisation process, which is necessary as physical quantities of skilled Turkish workers are migrating to Germany, whereas the supply of labour in Germany is measured in value terms. The impact of migration of 1% of unskilled Turkish workers to Germany and the change in remittance shares caused by that migration is simulated in policy scenario two. The third policy scenario gives the combined effect of the first two scenarios.

Since 2.4% of unskilled Turkish labour force and 1.7% of the skilled are already in Germany, in the forth scenario it is assumed that with Turkey's EU accession, another 2.4% of unskilled Turkish labour force and 1.7% of the skilled will leave Turkey and migrate to Germany, doubling the number of skilled and unskilled Turkish workers in Germany. In the fifth

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experiment same changes are simulated for the migration of unskilled labour and the sixth policy scenario gives the combined effect.

The last three policy scenarios are designed to analyse the economic implications of an extreme case in which 5% of the skilled and unskilled Turkish labour force leaves Turkey and migrates to Germany, changing the remittance shares as well as the price of skilled and unskilled Turkish labour in German labour markets.

4.2 Model Closure

The model closures adopted for this study are detailed below:

- the exchanges rates are flexible;
- the shares of investment expenditures in final demand are fixed. Household savings are flexible to adjust.
- the tax rate adjusters are fixed except the uniform adjustment to direct tax on households, shares of final demand is fixed, internal balance is fixed;
- all factors are fully employed and mobile except the unemployed unskilled labour in Turkey, North Africa countries, Russian Federation, Asia and the rest of the world⁴ where surplus unskilled labour is assumed; and
- the regional numéraires are the region specific consumer price indices and the regions in the global numéraire are separately identified OECD countries⁵.

5. Results

The first scenario analyses the impact of a 1% reduction in skilled Turkish labour force in Turkey and a 1% increase in skilled Turkish labour in Germany together with a change in the share of remittances sent by skilled Turkish labour from Germany to Turkey (figure 3). As a result of this first scenario, real GDP from value added declines by 0.14%. The major reason behind this decrease is the economic effect of the reduction in the number of skilled labour which is relatively scarce in Turkey. The impact on GDP of outflow of this skilled Turkish labour overweighs the impact of inflow of extra remittances sent from Germany to Turkey by it. The impact of the second scenario, analysing the impact of a 1% reduction in unskilled Turkish labour force in Turkey and a 1% increase in unskilled Turkish labour in Germany together with a change

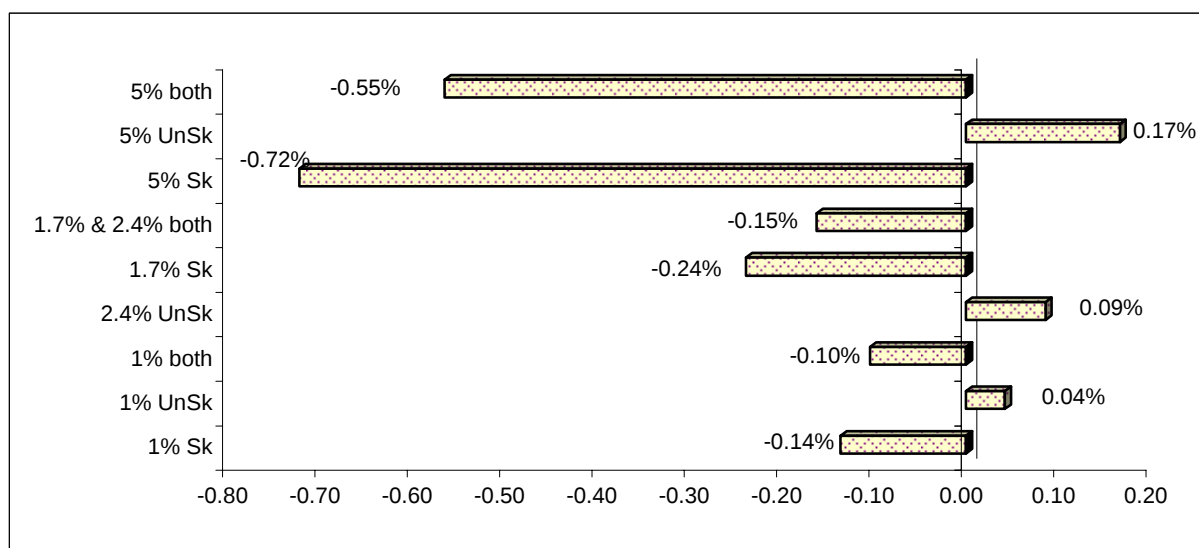
⁴ The average unemployment rates higher than 9% are in the regions of Turkey (9%), new EU12 (10%), Russian Federation (9%) and the North African countries (16%) of Algeria, Egypt, Morocco and Tunisia

⁵ Japan, the USA, France, Germany, the UK, Italy

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in the share of remittances sent by skilled Turkish labour from Germany to Turkey, is a 0.04% increase in Turkish real GDP. The main reason behind this positive change is the employment of extra unskilled Turkish labour from the pool of unskilled workers in Turkey in order to replace the unskilled Turkish labour which has migrated to Germany. Thus, the combined impact as simulated in third scenario is a 0.10% reduction in real GDP due to the fact that the negative impact on GDP caused by the outflow of 1% of skilled Turkish labour outweighs the positive impact of the outflow of 1% of the unskilled.

Figure 4: Percentage Changes in Real GDP of Turkey



Source: Own Simulations

In the first and second scenarios, when 1% of Turkish skilled and unskilled labour force migrate to Germany and when the change in GDP is adjusted for the decrease in labour force, i.e. when adjusted for population, the effect on GDP per capita is an increase of 0.86% as a result of the first scenario and an increase of 1.04% as a result of the second scenario. Therefore, the combined effect of the first and the second scenario, which is given by the third scenario, is an increase of about 1.90% in Turkish real GDP per capita.

Although the magnitude of the change caused by the rest of the scenarios is different, the direction of the change is exactly the same; the combined effect is a reduction in real Turkish GDP since the negative impact caused by the outflow of skilled Turkish labour force outweighs the positive impact of outflow of the unskilled. However, as soon as the results are adjusted for population, the combined effect is always positive, i.e. results with an increase in real Turkish GDP per capita.

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The real GDP from value added is made up of the sum of all indirect tax revenues which are import, export, sales and factor use taxes together with indirect taxes on production, plus the product of the price of factors in Turkey and sectoral proportion for factor prices as well as the demand for factor by activity.

Table 11: Percentage Change in Price of Factors in Turkey

	Skilled Labour	Capital	Land	Nat Res
1% Sk	0.78	-0.03	-0.26	-0.44
1% UnSk	0.12	0.07	0.55	-0.19
1.7% Sk	1.32	-0.07	-0.5	-0.73
2.4% UnSk	0.26	0.14	1.18	-0.41
5% Sk	3.94	-0.25	-1.67	-2.11
5% UnSk	0.5	0.27	2.33	-0.79

Source: Own Simulations

Price of factors decreases for all factors except skilled labour when the skilled Turkish labour in Turkey is reduced by 1% and the skilled Turkish labour in Germany is increased by 1%, together with an increase in remittances sent to Turkey from Germany. On the other hand, price of factors increases for all factors except natural resources when unskilled labour in Turkey is reduced by 1% and unskilled Turkish labour in Germany increases by 1% together with an increase in remittances sent to Turkey from Germany (table 7). The combined effect is an increase of 0.90% in price of skilled labour, a small increase of 0.04% in price of capital, an increase of 0.29% in price of land and a decrease of 0.64% in price of natural resources. Since both the skilled and unskilled Turkish labour force is reduced by 1% in Turkey and the volume of capital is unchanged, capital to labour ratio increases, increasing the productivity of labour as well as its price.

1.7% of the skilled Turkish labour force and 2.4% of unskilled are already in Germany, the forth and fifth scenarios analyse the impact on factor prices if with Turkey's EU accession, another 1.7% of the skilled Turkish labour force and 2.4% of unskilled leave Turkey and migrate to Germany, doubling the number of skilled and unskilled Turkish workers in Germany. The direction of the change in factor prices is same with the first two scenarios, although the magnitude of the change is bigger. The combined effect is an increase of 1.58% in price of skilled labour, an increase of 0.07% in price of capital, an increase of 0.68% in price of land and a decrease of 1.14% in price of natural resources.

In the extreme case in which 5% of the skilled and unskilled Turkish labour force leave Turkey and migrate to Germany, changing the remittance shares, the combined effect is an increase of 4.44% in price of skilled labour, a small increase of 0.02% in price of capital, an increase of 0.66% in price of land and a decrease of 2.90% in price of natural resources.

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As the percentage of skilled labour emigrating increase, price of skilled labour increases but the price of capital, land and natural resources falls. On the other hand, when the percentage of unskilled Turkish labour migrating to Germany increase, price of skilled labour, capital and land increase while price of natural resources falls.

The change in demand for land by all sectors is negligible as a result of all scenarios but there is an increase in demand for natural resources by other crops as a result of the first scenario and the demand increases further with the second scenario. However, demand for natural resources by energy products sector decreases with the first scenario and decreases even further with the second scenario.

As a result of the first scenario, the general change in demand for unskilled labour by almost all sectors is negative. It is only the demand for unskilled labour by some of the service sectors such as construction, trade and business services that increases. With the second scenario, on the other hand, the change in demand for unskilled labour by chemicals sector is negligible but the demand for agricultural products such as other crops, grains, animals as well as food products, wood and paper and other manufactures increase together with the demand by all service sectors.

Table 12: Percentage Change in Demand for Factors by Sectors in Turkey

	UnSk Labour		Sk Labour		Capital		NatRes	
	<u>1% Sk</u>	<u>1% UnSk</u>	<u>1% Sk</u>	<u>1% UnSk</u>	<u>1% Sk</u>	<u>1% UnSk</u>	<u>1% Sk</u>	<u>1% UnSk</u>
ocrops	-0.06	0.14	-0.24	0.11	-0.05	0.12	0.05	0.18
energyprd	-0.21	-0.22	-0.37	-0.25	-0.21	-0.24	-0.12	-0.19
afood	-0.04	0.23	-0.91	0.10	-0.01	0.15		
ofood	-0.03	0.22	-0.90	0.08	0.00	0.14		
textiles	-0.25	-0.28	-1.22	-0.43	-0.21	-0.37		
wearingapp	-0.25	-0.29	-1.23	-0.44	-0.21	-0.38		
chemicals	-0.10	0.00	-1.07	-0.16	-0.06	-0.09		
wood&paper	-0.07	0.08	-1.04	-0.07	-0.03	-0.01		
metals	-0.12	-0.17	-1.09	-0.33	-0.08	-0.26		
elec&mac	-0.08	-0.08	-1.06	-0.24	-0.04	-0.17		
vehicles&trans								
eqp	-0.10	-0.13	-1.07	-0.28	-0.06	-0.22		
omanu	-0.03	0.15	-1.00	0.00	0.01	0.06		

Source: Own Simulations

As a result of the first scenario, the change in demand for skilled labour by all sectors is negative. With the second scenario, demand for skilled labour by agricultural products such as grains, other crops and animals as well as food products increase whereas the demand by almost all of the rest of the sectors decrease.

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A similar picture is obtained for the change in demand for capital as a result of the first scenario, i.e. demand for capital by almost all sectors with the exception of other manufactures and some of the service sectors such as construction, trade and business services decreases. With the second scenario, demand for capital by agricultural products such as grains, other crops and animals and most of the service sectors increases as well as the demand by food products, petroleum and coal products and other manufactures, while the demand by the rest of the sectors decreases.

Table 13: Percentage Change in Tax Revenue in Turkey

	1% Sk	1% UnSk	1.7% Sk	2.4% UnSk	5% Sk	5% UnSk
Import tariff	-0.07	0.13	-0.14	0.26	-0.46	0.51
Export	-0.2	-0.35	-0.34	-0.84	-1.05	-1.71
Indirect	-0.11	0.04	-0.2	0.09	-0.61	0.17
Factor use	-0.04	0.07	-0.09	0.14	-0.3	0.27
Sales	-0.15	0.03	-0.25	0.07	-0.77	0.13
Hhold income	-0.14	0.04	-0.24	0.1	-0.72	0.2
Factor income	-0.03	0.26	-0.08	0.58	-0.28	1.15

Source: Own Simulations

All tax revenues fall as a result of the first scenario. Export tax revenue continues to fall with the second scenario as well. Apart from the export tax revenue, all tax revenues increase as a result of the second scenario. The combined effect, simulated by the third scenario is that the import tariff revenue increases by 0.06%. The results from the rest of the scenarios are similar, import tariff revenue increases by 0.13% when 1% of Turkish unskilled labour migrates to Germany, increasing the share of remittances sent from Germany to Turkey and it decreases by 0.07%, when it is the skilled labour which moves to Germany.

In comparison to unskilled labour, skilled labour is scarce in Turkey. Moreover, the share of remittances sent by unskilled Turkish workers in Germany is higher than the one sent by skilled Turkish workers since the number of unskilled Turkish workers in Germany is higher than the skilled. As a result, the amount of additional foreign funds generated in the form of remittance inflows by unskilled Turkish workers is higher and thus, the demand for imports increases, increasing the import tariff revenue when it is the unskilled labour migrating. When it is the skilled Turkish labour migrating to Germany, on the other hand, import tariff revenue decreases since the movement of 1% of skilled Turkish labour out of Turkey does not generate as much remittances as the unskilled. Since remittances are an important source of foreign currency, a relatively lower inflow of remittances causes a negative impact on import demand.

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Export tax revenue decrease as a result of all scenarios, the main reason for this decrease is due to the shift of the resources from the export sector to the import sector, reducing the volume of exports and increasing the volume of imports.

The change in rest of tax revenues is similar to the impact on import tariff revenues, with the movement of unskilled labour; they all increase, whereas with the movement of skilled, they all tend to decrease.

When adjusted for the fall in population, all per capita tax revenues increase, the highest one becomes the per capita tax revenue from factor income, followed by per capita tax revenue from import tariffs.

Combination of all those changes in price of factors, demand for factors by sectors and the value of tax revenues, decreases the real Turkish GDP from value added when 1% of skilled Turkish labour migrates to Germany, also changing the remittance shares and increases the real Turkish GDP from value added slightly when it is the unskilled migrating. When the 1% reduction in Turkish unskilled and 1% reduction in Turkish skilled labour force is considered and it is adjusted for the decrease in total labour force, then the combined effect is about 1.90% increase in Turkish GDP per capita.

A similar pattern is observed for the rest of the macro variables. Total domestic production, absorption, private and government consumption all increase with the movement of unskilled Turkish labour force from Turkey to Germany but decrease with the movement of the skilled, resulting with a positive combined impact in case of the change in absorption and private consumption only. However, in all cases per capita changes are all positive.

Table 14: Percentage Changes in Turkish Real Macro Totals

	1% Sk	1% Un Sk	1.7% Sk	2.4% Un Sk	5% Sk	5% Un Sk
Real GDP	-0.14	0.04	-0.24	0.09	-0.72	0.17
Total domestic production	-0.12	0.04	-0.21	0.06	-0.65	0.12
Absorption	-0.06	0.2	-0.13	0.44	-0.42	0.87
Private consumption	-0.05	0.26	-0.11	0.57	-0.4	1.12
Government consumption	-0.19	0.15	-0.34	0.34	-1.04	0.68

Source: Own Simulations

6. Concluding Comments

7. References

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8. Technical Appendix

Table 15: Aggregation: Commodities

Category	Name	Descr	Mapping	Description
int_c	pdr	Paddy rice	agr	agricultural products
int_c	wht	Wheat	agr	agricultural products
int_c	gro	Cereal grains nec	agr	agricultural products
int_c	osd	Oil seeds	agr	agricultural products
int_c	c_b	Sugar cane sugar beet	agr	agricultural products
int_c	pfb	Plant-based fibers	agr	agricultural products
int_c	ocr	Crops nec	agr	agricultural products
int_c	vol	Vegetable oils and fats	agr	agricultural products
int_c	ctl	Cattle sheep goats horses	anm	animal products
int_c	oap	Animal products nec	anm	animal products
int_c	rmk	Raw milk	anm	animal products
int_c	wol	Wool silk-worm cocoons	anm	animal products
int_c	cmt	Meat: cattle sheep goats horse	anm	animal products
int_c	omt	Meat products nec	anm	animal products
int_c	mil	Dairy products	anm	animal products
int_c	pcr	Processed rice	anm	animal products
int_c	ofd	Food products nec	anm	animal products
int_c	cns	Construction	cns	construction
int_c	crp	Chemical rubber plastic prods	crp	chemical rubber plastic products
int_c	ele	Electronic equipment	ele	electronic equipment
int_c	ely	Electricity	ely	electricity
int_c	i_s	Ferrous metals	i_s	ferrous metals
int_c	coa	Coal	min	minerals etc
int_c	oil	Oil	min	minerals etc
int_c	gas	Gas	min	minerals etc
int_c	omn	Minerals nec	min	minerals etc
int_c	nmm	Mineral products nec	min	minerals etc
int_c	wtr	Water	mrgr	margins
int_c	wtp	Sea transport	mrgr	margins
int_c	atp	Air transport	mrgr	margins
int_c	mvh	Motor vehicles and parts	mvh	motor vehicles and parts
int_c	obs	Business services nec	obs	business services nec
int_c	ofi	Financial services nec	ofi	financial services nec
int_c	ome	Machinery and equipment nec	ome	machinery and equipment nec
int_c	osg	PubAdmin Defence Health Educat	osg	pubadm defense health education
int_c	otp	Transport nec	otp	transport nec
int_c	frs	Forestry	oth	Other
int_c	fsh	Fishing	oth	Other
int_c	b_t	Beverages and tobacco products	oth	Other

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int_c	lea	Leather products	oth	Other
int_c	lum	Wood products	oth	Other
int_c	ppp	Paper products publishing	oth	Other
int_c	gdt	Gas manufacture distribution	oth	Other
int_c	nfm	Metals nec	oth	Other
int_c	fmp	Metal products	oth	Other
int_c	otn	Transport equipment nec	oth	Other
int_c	omf	Manufactures nec	oth	Other
int_c	cmn	Communication	oth	Other
int_c	isr	Insurance	oth	Other
int_c	ros	Recreation and other services	oth	Other
int_c	dwe	Dwellings	oth	Other
int_c	p_c	Petroleum coal products	p_c	petroleum coal products
int_c	sgr	Sugar	sgr	Sugar
int_c	tex	Textiles	tex	Textiles
int_c	trd	Trade	trd	Trade
int_c	v_f	Vegetables fruit nuts	v_f	Vegetables fruits nuts
int_c	wap	Wearing apparel	wap	Wearing apparel

Table 16: Aggregation: Regions

Category	Name	Descr	Mapping	Description
int_k	aus	Australia	aus	Australia
int_k	aut	Austria	aut	Austria
int_k	bel	Belgium	bel	Belgium
int_k	che	Switzerland	che	Switzerland
int_k	deu	Germany	deu	Germany
int_k	dnk	Denmark	dnk	Denmark
int_k	fra	France	fra	France
int_k	gbr	United Kingdom	gbr	United Kingdom
int_k	ita	Italy	ita	Italy
int_k	nld	Netherlands	nld	Netherlands
int_k	nzl	New Zealand	rest	Rest of the World
int_k	xoc	Rest of Oceania	rest	Rest of the World
int_k	chn	China	rest	Rest of the World
int_k	hkg	Hong Kong	rest	Rest of the World
int_k	jpn	Japan	rest	Rest of the World
int_k	kor	Korea	rest	Rest of the World
int_k	tw	Taiwan	rest	Rest of the World
int_k	xea	Rest of East Asia	rest	Rest of the World
int_k	idn	Indonesia	rest	Rest of the World
int_k	mys	Malaysia	rest	Rest of the World
int_k	phl	Philippines	rest	Rest of the World
int_k	sgp	Singapore	rest	Rest of the World
int_k	tha	Thailand	rest	Rest of the World
int_k	vn	Vietnam	rest	Rest of the World
int_k	xse	Rest of Southeast Asia	rest	Rest of the World
int_k	b	Bangladesh	rest	Rest of the World

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int_k	ind	India	rest	Rest of the World
int_k	lka	Sri Lanka	rest	Rest of the World
int_k	xsa	Rest of South Asia	rest	Rest of the World
int_k	can	Canada	rest	Rest of the World
int_k	mex	Mexico	rest	Rest of the World
int_k	xna	Rest of North America	rest	Rest of the World
int_k	col	Colombia	rest	Rest of the World
int_k	per	Peru	rest	Rest of the World
int_k	ven	Venezuela	rest	Rest of the World
int_k	xap	Rest of Andean Pact	rest	Rest of the World
int_k	arg	Argentina	rest	Rest of the World
int_k	bra	Brazil	rest	Rest of the World
int_k	chl	Chile	rest	Rest of the World
int_k	ury	Uruguay	rest	Rest of the World
int_k	xsm	Rest of South America	rest	Rest of the World
int_k	xca	Central America	rest	Rest of the World
int_k	xfa	Rest of FTAA	rest	Rest of the World
int_k	xcb	Rest of the Caribbean	rest	Rest of the World
int_k	fin	Finland	rest	Rest of the World
int_k	grc	Greece	rest	Rest of the World
int_k	irl	Ireland	rest	Rest of the World
int_k	lux	Luxembourg	rest	Rest of the World
int_k	prt	Portugal	rest	Rest of the World
int_k	esp	Spain	rest	Rest of the World
int_k	xef	Rest of EFTA	rest	Rest of the World
int_k	xer	Rest of Europe	rest	Rest of the World
int_k	alb	Albania	rest	Rest of the World
int_k	bgr	Bulgaria	rest	Rest of the World
int_k	hrv	Croatia	rest	Rest of the World
int_k	cyp	Cyprus	rest	Rest of the World
int_k	cze	Czech Republic	rest	Rest of the World
int_k	hun	Hungary	rest	Rest of the World
int_k	mlt	Malta	rest	Rest of the World
int_k	pol	Poland	rest	Rest of the World
int_k	rom	Romania	rest	Rest of the World
int_k	svk	Slovakia	rest	Rest of the World
int_k	svn	Slovenia	rest	Rest of the World
int_k	est	Estonia	rest	Rest of the World
int_k	lva	Latvia	rest	Rest of the World
int_k	ltu	Lithuania	rest	Rest of the World
int_k	xsu	Rest of Former Soviet Union	rest	Rest of the World
int_k	xme	Rest of Middle East	rest	Rest of the World
int_k	mar	Morocco	rest	Rest of the World
int_k	tun	Tunisia	rest	Rest of the World
int_k	xnf	Rest of North Africa	rest	Rest of the World
int_k	bwa	Botswana	rest	Rest of the World
int_k	zaf	South Africa	rest	Rest of the World

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int_k	xsc	Rest of South African CU	rest	Rest of the World
int_k	mwi	Malawi	rest	Rest of the World
int_k	moz	Mozambique	rest	Rest of the World
int_k	tza	Tanzania	rest	Rest of the World
int_k	zmb	Zambia	rest	Rest of the World
int_k	zwe	Zimbabwe	rest	Rest of the World
int_k	xsd	Rest of SADC	rest	Rest of the World
int_k	mdg	Madagascar	rest	Rest of the World
int_k	uga	Uganda	rest	Rest of the World
int_k	xss	Rest of Sub-Saharan Africa	rest	Rest of the World
int_k	rus	Russian Federation	rus	Russian Federation
int_k	swe	Sweden	swe	Sweden
int_k	tur	Turkey	tur	Turkey
int_k	usa	United States	usa	United States
int_k	glo	Globe	glo	Globe