AN West Bank

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A 2011 IOT for the West Bank economy is put together in the GTAP-format to allow adding it to the global database. It is the first time ever that an IOT for the West Bank is added to the database. This is expected to ignite intensive use of it and other related IOTs to address many under-researched issues with respect to the movement of goods, services and people across the country of this part of the Middle-East. The West Bank IOT is developed using official and recent data sets from Palestine (mainly from the Palestinian Central Bureau of Statistics) and other international sources. The contributed database provides data on 38 sectors together with much detailed data on production factors. The later allow for a well-established classification of the labor accounts according to the format of GTAP database without any further assumptions. Another feature of the IOT is that it is based on a SAM for the West Bank in US$ millions. This reduces the cost of transforming it into the global dollar-based database.

Keywords: West Bank, IOT, Middle-East.

AN.1 Introduction

An Input-Output Table (IOT) provides a complete picture of the flows of goods and services in the economy for a given year. It describes the sale and purchase relationships between producers and consumers within the economy. IOTs have been extensively used to analyze the structure of the economy for countries and regions all around the world, especially within the GTAP setup of model and database. Few IOTs have been developed for Palestine, with the most recent one being for 2006 and was developed by the Palestinian Central Bureau of Statistics. As far as GTAP database is concerned, this IOT is the first to be included for the West Bank, while no table was contributed for the whole Palestine or any part of it (i.e. the West Bank or the Gaza Strip). Therefore, we believe that, the present IOT is a significant contribution as it uses the most recent and reliable sources of data to put together an IOT for the West Bank with as many sectors as the data allow – 38 sectors – and using the most recent available data (2011).

This IOT is based on a Social Accounting Matrix (SAM) developed for the West Bank economy for the year 2011 in US$ millions. A comprehensive documentation of the SAM is available in Agbahey et al. (2016).[56]

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[56]The West Bank 2011-SAM is developed as part of a research project focusing on the analysis of the cross-border economic, trade and labor policies between the West Bank and Israel. The authors acknowledge the funding provided for the project by the German research Foundation (DFG).

AN.2 Data sources

The main data source for the SAM, on which is based the IOT, is the Palestinian Central Bureau of Statistics (PCBS). Other data sources include the Palestinian Monetary Authority (PMA), The Palestinian Ministry of Finance (MoF), The United Nations Commodity Trade Statistics (UN Comtrade) and the International Monetary Funds (IMF). PCBS data include the national accounts, the supply and use table, the balance of payments, the labor force survey data, the expenditure and consumption survey data, the economic survey report, the living standards report and the demographics report. Data on government revenue and expenditure are mostly derived from the annual fiscal statement of the Palestinian Authority published by the MoF. Detailed information on import and export of goods are derived from the UN Comtrade database.

The SAM developed by Agbahey et al. (2016) comprises 83 commodities and 49 activities. It includes three margin accounts, namely wholesale trade, retail trade and transport margins. Furthermore, it encompasses 59 production factor accounts, 111 household groups, one account for government and one account for Non-Private Institutions Serving Households (NPISH). A specificity of this SAM is that it singles out Israel from the rest of the world to allow explicitly capturing the transactions between Israel and the West Bank. Finally, 55 tax accounts are present in the SAM, including tax instruments used by Israel to collect tax on behalf of the Palestinian Authority on goods and services from and via Israel to the West Bank as well as on West Bank labor employed in the Israeli economy.

AN.3 Moving from SAM to IOT

The 2011 West Bank SAM differentiates production activities (industries) from their output (commodities). Industries and commodities in the SAM are linked by a make matrix, in which commodities pay industries for output and a use-matrix, in which industries pay commodities for intermediate demand. The SAM has an industry by commodity setup, whereas the required IOT format for the GTAP database is commodity by commodity. Subsequently, a conversion needs to be applied. Moreover, the IOT format required distinguishes between pre-commoditytax (basic prices) and post-commodity-tax (purchaser prices) usage values, in addition to use of domestic and imported commodities. Such distinction is not considered in the SAM and hence, conversion is also needed for that. Finally, the SAM includes additional accounts that should not appear explicitly in the IOT such as trade and transport margins, multiple (55) tax accounts and the separation of Israel from the rest of the world among others. Subsequently, several adjustments are carried out in this regard to assure consistency with the GTAP-IOT format.

The entire transformation procedure of the SAM into a GTAP-IOT is automatized and coded in GAMS. The code was originally developed by McDonald and Lakatos (2009) in collaboration with the GTAP database team and it considers the instructions provided in the GTAP contributor guide (Huff et al., 2000). The code is also used to transform the trade and transport margins from explicit accounts in the SAM to implicit components of trade and transport commodities.

AN.4 Special treatments and adjustments

Mapping and aggregation

From a technical perspective, adjustments are carried out to transform the SAM into an IOT for GTAP database include: (1) aggregating the 83 commodities of the SAM into 38 sectors in the IOT (see Table 1); (2) aggregating the 111 household groups into one household account; (3) mapping the 55 tax accounts into eight (Table 2); (4) merging the two foreign accounts (Israel and rest of the world) into one account for the rest of the world; (5) including the three factors of production (labor[57], capital and land) of the SAM directly in the IOT; and (6) enterprise, NPISH, government, saving-investment and stock change accounts are directly included without further aggregation. Accordingly, the final 2011-IOT for the West Bank that is submitted to the global database includes 38 sectors, among which ten are agricultural and food processing sectors, and three are energy sectors. The mapping between the IOT sectors and the GTAP standard classification is depicted in Table 1.

The Zero-sectors

Six sectors in the GTAP standard classification are not included in the 2011-SAM. These are: wool and silk-worn cocoons (wol), fish (fsh), coal (col), oil (oil), gas (gas) and dwellings (dwe). For these six sectors, zero sectors are included in the IOT as suggested by Horridge et al. (2008)

Mandatory splits

The GTAP requires the submitted IOTs to separate agriculture and food processing, and energy from other sectors (Huff et al., 2000). This condition is fully satisfied.

Adjustment of negative value for capital usage

The SAM includes a negative capital compensation for the financial sector, which is associated with imputed banking charges. As GTAP database requires the values of all factor usage to be non-negative, the procedure in the problem area of the GTAP Database contributor's web-site (https://www.gtap.agecon.purdue.edu/databases/contribute/bankingsect.asp) and applied to the SAM before its conversion to the IOT.[58]

[57] the distinction of skilled and unskilled categories of labor is supplied separately to the GTAP database team

[58] The entire procedure of the common problem on negative capital usage, which is described in the problem area of the GTAP Database contributor's website, is automatized in GAMS. The authors are ready to share the code for doing so with the GTAP database team as well as interested researchers using GAMS.

Adjustment for Re-exports

The 2011 SAM for the West Bank provides data on re-exports for three commodities, namely, forestry products, petroleum and coal products, basic metal products and electronic equipment. For these commodities, the value of re-exports is removed by deducting it from the value of imports. This implies applying the assumption that they are not imported since no value is added to them before re-exporting.

Treatment of taxes

Eight tax accounts are included in the IOT originating from 55 tax accounts in the SAM. The process of transforming these accounts into the IOT merges two excise tax accounts (collected domestically or by Israel) into one tax account namely sales tax. Similar approach is applied for merging tariffs and value added tax collected domestically and those collected by Israel to result in one import tax and one value added tax respectively. The 45 factor use taxes are merged in one factor use tax. Production tax, direct tax, property tax and factor income tax are directly included.

AN.5 Tables

Table 8.83: Mapping between the sectors of the West Bank SAM, GTAP and IOT

SAM			GTAP			IOT	
No.	Code	Description	No.	Code	Description	No.	Code
1	caocrop	Cereals, other crops	1	pdr	Paddy rice	1	pdr_ocr
			2	wht	Wheat		
			3	gro	Cereal grains nec		
			6	c_b	Sugar cane, sugar beet		
			7	pfb	Plant-based fibers		
			8	ocr	Crops nec		
2	cafruit	”Fruits, nuts, beverages and spice crops, and flowers”	4	v_f	Vegetables, fruit, nuts	2	v_f
3	caveg	”Vegetables, horticultural specialties”					
4	caoliv	Olives	5	osd	Oil seeds	3	osd
5	caanim	Animals	9	ctl	Bovine cattle, sheep and goats, horses	4	ctl_coap
			10	oap	Animal products nec		
6	camilk	Milk	11	rmk	Raw milk	5	rmk
		zero sector	12	wol	Wool, silk-worm cocoons	6	wol
7	caforest	Forestry products	13	for	Forestry	7	for
	zero sector		14	fsh	Fishing	8	fsh
	zero sector		15	col	Coal	9	col

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SAM			GTAP			IOT	
No.	Code	Description	No.	Code	Description	No.	Code
	zero sector		16	oil	Oil	10	oil
	zero sector		17	gas	Gas	11	gas
8	cbstone	Stone, sand, clay	18	omn	Minerals nec	12	omn
9	cbomine	Other ores, minerals					
10	ccMeat	Meat, meat products	19	cmt	Bovine cattle, sheep and goat, horse meat products	13	cmt_omt
			20	omt	Meat products nec		
11	ccolivoil	Olive oil	21	vol	Vegetable oils and fats	14	vol
12	ccoilfat	Oils, fats					
13	ccdairy	Dairy products	22	mil	Dairy products	15	mil
14	ccstarch	Grain mills, starches	23	pcr	Processed rice	16	pcr_ofd
15	ccsugar_choco	Sugar, cocoa, chocolate	24	sgr	Sugar		
16	ccbake	Bakery products	25	ofd	Food products nec		
17	ccfruit_vg	Processed fruits, vegetables					
18	ccfish	Fish, fish products					
19	ccanimfeed	Prepared animal feeds					
20	ccbev	Beverages	26	b_t	Beverages and tobacco products	17	b_t
21	cctob	Tobacco products					
22	cctextile	Textiles	27	tex	Textiles	18	tex
23	cccloth	Wearing apparel, furs	28	wap	Wearing apparel	19	wap
24	ccLeather	Leather	29	lea	Leather products	20	lea
25	ccleathpr	Leather products, processed					
26	ccWood	Wood, wood products	30	lum	Wood products	21	lum
27	ccPaper	Paper, paper products	31	ppp	Paper products, publishing	22	ppp
28	ccpublish	Publishing, printing					
29	ccCoke	Coke, petroleum products	32	p_c	Petroleum, coal products	23	p_c
30	ccpharm	Pharmaceuticals	33	crp	Chemical, rubber, plastic products	24	crp
31	ccsoap	Soaps, detergents, perfumes					
32	ccochemi	Other chemical products					
33	ccrubber	Rubbers, plastics					
34	ccStone	Cement, lime and plaster	34	nmm	Mineral products nec	25	nmm
35	ccCement	Articles of concrete, cement					
36	ccconcrete	Stone, stone products					
37	ccnonmetal	Other non-metallic mineral products					
38	ccmetal	Basic metals	35	i_s	Ferrous metals	26	i-s_nfm
			36	nfm	Metals nec		
39	ccfabmet	Fabricated metals	37	fmp	Metal products	27	fmp

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SAM			GTAP			IOT	
No.	Code	Description	No.	Code	Description	No.	Code
40	ccvehicle	Vehicle spare parts	38	mvh	Motor vehicles and parts	28	mvh
41	cccar	Cars and lorries					
42	cctranspequip	Other transport equipment	39	otn	Transport equipment nec	29	otn
43	ccoffice	Office, accounting and computing machinery	40	ele	Electronic equipment	30	ele
44	ccradio	Radio, television and communication equipment					
45	ccmachine	Machinery, equipment	41	ome	Machinery and equipment nec	31	ome
46	ccelectmach	Electrical machinery					
47	ccmedical	”Medical and precision instruments”					
48	ccFurniture	Furniture	42	omf	Manufactures nec	32	omf
49	ccomanuf	Other manufacturing					
50	cdelectricity	Electricity, gas	43	ely	Electricity	33	ely_gdt
			44	gdt	Gas manufacture, distribution		
51	cewater	Water	45	wtr	Water	34	wtr
52	cfconst	Construction	46	cns	Construction	35	cns
53	cgmaintveh	Maintenance and repair of motor vehicles	47	trd	Trade	36	trd
54	cgfuel	Retail sale of automotive fuel					
55	cgvehicle	Sale of motor vehicles and parts					
56	cgwhfood	Wholesale of food, beverages, tobacco					
57	cgwhconstmat	Wholesale of construction materials					
58	cgowhole	Other wholesale					
59	cgrtfood	Retail sale of food, beverages, tobacco					
60	cgrtcloth	Retail sale of textiles, clothing, footwear, leather goods					
61	cgrthhappl	Retail sale of household appliances					
62	cgrphhgd	Repair of personal and household goods					
63	cgoretail	Other retail sale					
64	chhotel	Hotels					
65	chresto	Restaurants					
66	ciroad	Freight transport by road	48	otp	Transport nec	37	otp
67	ciland	Passenger land transport					

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SAM			GTAP			IOT	
No.	Code	Description	No.	Code	Description	No.	Code
68	ciotransp	Other transport, storage, travel agencies	49	wtp	Water transport	38	wtp_atp
			50	atp	Air transport		
69	cipost	National post activities	51	cmn	Communication	39	cmn
70	cicomm	Remaining communication					
71	cjfinance	Finance	52	ofi	Financial services nec	40	ofi_isr
			53	isr	Insurance		
72	ckrental	Imputed rentals of buildings	54	obs	Business services nec	41	obs
73	ckbuild	Other rentals of buildings					
74	ckrestate	”Other real estate, renting, business activities”					
75	ckbusiness	Other business activities					
76	corecreation	Recreational, cultural and sporting	55	ros	Recreational and other services	42	ros
77	coservice	Other services					
78	cphh	”Private households with employed persons”					
79	cladmin	”Public administration, defense; compulsory social security”	56	osg	Public administration and defense, education, health	43	osg
80	cmeduc	Education					
81	cnhealth	Health, social work					
82	comembr	Membership organizations					
		zero sector	57	dwe	Dwellings	44	dwe

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Table 8.84: Mapping between final demand and tax accounts in the SAM and in the IOT

SAM		IOT	
Code	Description	Code	Description
flab	Labor groups (57)	flab	Labor groups
fcap	Capital	fcap	Capital
fland	Land	fland	Land
hh	Households (111)	hholds	Households
npish	Non-profit institutions serving households	npish	Non-profit institutions serving households
ent	Enterprise	ent	Enterprise
govt	Government	govt	Government
indtax	Production tax	prodtax	Production tax
ectax_d	Excise tax domestic	saltax	Sales tax
ectax_i	Excise tax Israel		
imptax_d	Import tax domestic	imptax	Import tax
imptax_i	Import tax Israel		
vat_d	VAT domestic	vat	Value Added Tax
vat_i	VAT Israel		
ftax	Factor use tax (45)	ftax	Tax on workforce and payroll
facttax	Factor income tax	facttax	Factor income tax
dirtax	Direct tax	dtax	Direct tax
proptax	Property tax	proptax	Property tax
kap	Investment saving	i-s	Investment saving
dstoc	Stock change	dstoc	Stock change
israel	Israel	row	Rest of the world
row	Rest of the world		