

El Salvador

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1. Introduction

This report explains the procedures behind the creation of the first El Salvador input output matrix for GTAP. The main data comes from the IFPRI that developed a SAM for the year 2000, which has been rearranged to achieve the requirements detailed in this CGE project.

2. Source of Data

The data has been taken from the 2000 Social Account Matrix (SAM), created by Carlos Acevedo¹, from the International Food Policy Research Institute (IFPRI), using data provided by the Central Bank, specifically a Input Output Matrix. This SAM includes 45 sectors, while the final demand is classified as follows:

*“Institutions were comprised of households, the government, an enterprise account and the rest of the world. Households were divided into four categories according to degree of urbanization and educational level of the head of household: urban/rural families whose head has/has not completed at least ninth grade. The labor force was divided into skilled and unskilled labor, both disaggregated by whether a person works in the tradables or nontradables sector, whether he/she works in an urban or rural area, and by gender”*²

The data is on activity (industry) by product (commodity) form, valued at producer prices.

3. Adaptation of the IOM for GTAP

Annex 1 contains further information on the different stages to adapt the SAM according to the GTAP specifications

The first exercise involved the generation of a clean input output matrix (see Annex 2), which contains the following information:

- Use Matrix, on a commodity-by-industry format, which also includes investment, private consumption and government spending, the change in stocks and exports
- Vector of imports, excluding rates
- Vector of taxes, which contains tariffs, VAT, and margins (transport and trade are reported together)
- Value added, which considers the capital, labor, production taxes and land factor
- Make matrix, already in diagonal shape in the 2000 SAM

¹ Washington, D.C.: International Food Policy Research Institute (IFPRI) (datasets). 2005

² <http://www.ifpri.org/dataset/el-salvador>

All those matrices were treated with Gempack and Excel to ensure a correct result with the balance, signs and taxes. For this purpose, the Check tools provided by GTAP also were run, with no problems, except for the taxes on capital sector. This is probably, because capital and production taxes, both reported in value added were merged to comply with the 3 main GTAP categories of VA. It's important to say that these checks ran without any error when the production taxes and capital were separated.

Annex 3: contains detailed information on the mappings between the original and GTAP sectors.

3.1 Make Matrix

There was no need to change this matrix, because it was already in diagonal form. For this reason we include it directly in Gempack to support other calculations.

3.2 Value Added to Factors of ORANI-G (Labor, Capital and Land)

There was complete information of land, while capital was merged with production taxes (as mentioned in point 3), while all labor categories were merged into one from its original shape in the IFPRI SAM:

3.3 Trade and Transport Margins

The SAM included only one vector of margins, which included trade and transport. This sector was distributed horizontally in the Trade sector, eliminating this vector and holding the balance in all the sectors.

3.4 Separation of Locally Produced and Imported Goods

The methodology used to separate domestic and import use is the same used in the case of Honduras and Ecuador (based on the Gempack code). However, two sectors required a special treatment, tobacco and maquila that is detailed in 3.6

In the Tobacco sector, with the original Gempack code, the result was negative domestic use, tax free. The solution implied the separation between domestic and imports manually (see Annex 4). The negatives were a result of a relatively high IVA and Imports value.

3.5 Taxes: Building Tax Matrix

This matrix was composed with SAM data and processed with Gempack, except for the tobacco sector, which was negative after its separation (as explained in the last point).

The SAM disaggregation was enough to match VAT, tariffs and margins. This information was used to construct an array of taxes, which is used as a basic input to obtain domestic and import use, duty free.

3.6 Matrix of Use, Including Tax (UP) and No Tax (UF)

The matrix included taxes that were obtained directly from the SAM, for which trade and transport margins were transposed to be added later in trade and transport sectors. After this adjustment, the balance between sales and cost still holds.

The taxes and tariffs matrices were subtracted from Imports and Domestic Use, generating Imports free of tariffs (MUF) and Domestic use, tax free (DUF).

3.7 *Re-exports*

Maquila has an important share of re-exports, for this reason, only the imports used in value added locally were conserved, while the rest of the imports were netted against exports, until this last sector reached 0 (see Annex 5).

GTAP does not support re-exports, so the export vector of imported goods was equal to zero. This held the consistency of the data with respect to the balance between sales and costs.

3.7.1 *Maquila Redistribution*

The maquila consumption of different commodities as inputs was distributed according to a 2000 study, which indicates that 95% of the maquila sector produces wearing apparel, while the other 5% was composed by various activities:

Production	Amount	Mapping	Percentage
Electronic Chips	2	ele	2%
Plastic decoys	1	crp	1%
Wearing apparel	121	wap	95%
Purses	1	lea	1%
Handbags	1	lea	1%
Dental prosthesis	1	ome	1%

Source: <http://www.bcr.gob.sv/uploaded/content/category/771312474.pdf>

The table above was used as a multiplier to distribute intermediate consumption and added value among textiles, leather, etc, as described in the Mapping and Percentage column.

3.7.2 *Output (OP) and Imports, Net of Tax (MF)*

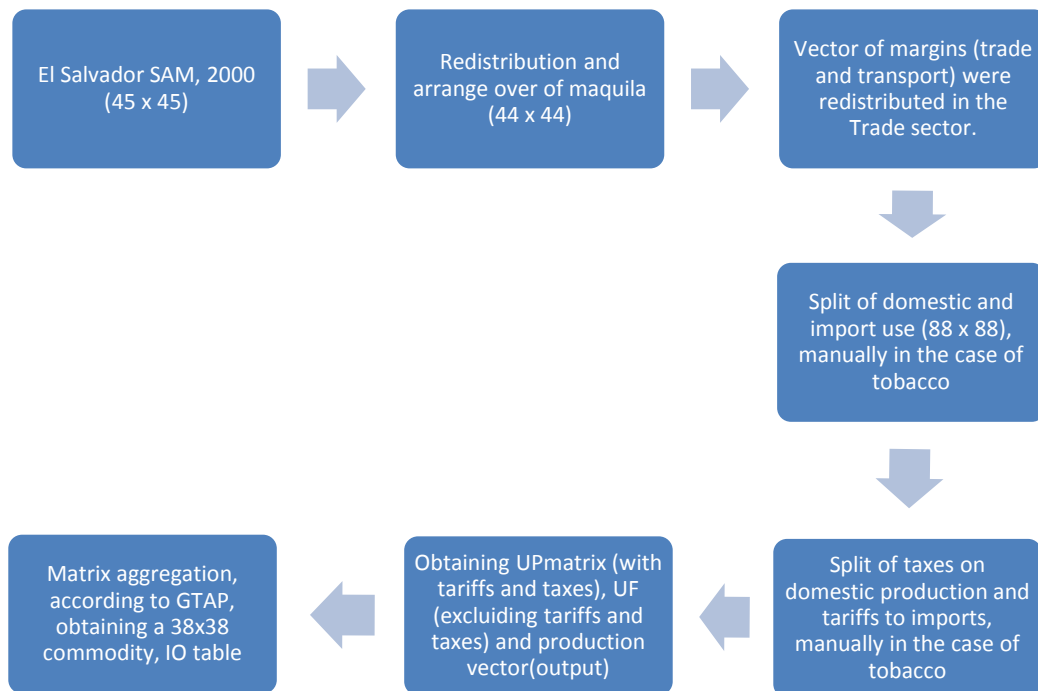
The vector of production (output) of sector i , including indirect taxes, involved the sum of domestic and imported intermediate production, value added and indirect taxes on production. Additionally, the matrix that excludes taxes (MF) has been generated by subtracting the tax vector to the import matrix that originally included taxes.

4. *Separation and Aggregation of Commodities*

The original 45 sectors were merged into 44, to redistribute the consumption and the value added of the maquila. The next step implied the check of mandatory splits, which doesn't hold for omn, which couldn't be split, because there was no data at this point.

The aggregation process was performed through Gempack, obtaining 38 sectors (each industry produced a single commodity) and 3 value added items. The correlation between the 57 GTAP sectors and the aggregation is detailed in Annex 6.

Annex 1: Steps in the construction of the SAM



Annex 2: Input Output Matrix, clean format

[illegible]

Annex 3: mapping between original sectors and GTAP categories

N	Original sector	GTAP_aggregation
1	Coffee	ocr
2	Cotton	pfb
3	Grains	pdr_wht_gro
4	SugarCane	c_b
5	OtherAgric	v_f_osd
6	Livestock	ctl_rmk_wol
7	Poultry	oap
8	Forestry	for
9	Fishing	fsh
10	Mining	coloilgasomn
11	Meat	cmt_omt
12	Dairy	mil
13	ProcFishing	vol_ofd
14	MillingBaker	pcr
15	Sugar	sgr
16	OtherFood	vol_ofd
17	Beverages	b_t
18	TobaccoProd	b_t
19	Textiles	tex
20	WearingApp	wap
21	LeatherProd	lea
22	Wood	lum
23	Paper	ppp
24	PrintingPub	ppp
25	Chemicals	crp
26	PetroleumPrd	p_c
27	RubberPlastc	crp
28	MineralProd	nmm
29	MetalProd	i_s_nfmfmp
30	MachineryEq	ele_ome
31	TransportEq	mvh_otn_omf
32	Electricity	ely_gdt
33	Water	wtr
34	Construction	cns
35	Trade	trd
36	HotelsRest	trd
37	TransportSrv	o_w_atp
38	Communicat	cmn
39	FinancialSrv	ofi_isr
40	RealEstate	obs
41	Dwellings	dwe
42	SocialServ	ros
43	DomesticServ	ros
44	PublicAdmin	osg

Annex 4: Separation of domestic and import use for tobacco

Manual separation (without Gempack) of domestic and import use, with and without taxes

The share of imports is equal to:

$Mshare = \text{Total production} \times \text{Import}$

This share is then used to obtain domestic and import use with taxes

The next step is the generation of domestic and import without taxes:

$$Dwt_i = Dwa_i - IVAD \cdot DShr_i$$

Where:

Dwt_i : is the domestic use, without taxes of commodity i

Dwa_i : is the domestic use, with taxes

IVAD: is the total iva on domestic products

$DShr_i$: is the domestic share of commodity i

The same procedure is applied for imports, using import use and the total IVA on imports.

Annex 5: Treatment of Maquila

Mathematically we have:

$$GVP = IM + VA \quad (1)$$

$$X - IM = VA \quad (2)$$

Were:

GVP=gross value of maquila production

IM=imported inputs

VA=value added (electricity

From relation (1), we subtract IM from relation (2), obtaining the amount of M that is no re-exported. This is possible, because the condition $X = GVP$ holds.

Therefore, the change in Imports is reflected in this table:

Before		After	
Exports	Imports	Exports	Imports
13.588.750	10.086.125	3.502.625	0

Once solved the maquila re-exports issue, we proceeded with the distribution of the intermediate consumption of this sector, which uses the following inputs:

Commodity	Maquila
32 Electricity	220,014
33 Water	4,774
37 TransportSrv	275,661
38 Communicat	2,185
40 RealEstate	378,526

Maquila Inputs (value added):

Input	Value
1 Labor	1,048,586
2 Capital	1,572,879
3 Land	0
4 ProdTax	0

The commodities used by this sector were redistributed, as explained in 3.3 and 3.6, based on the reported production of maquila (mainly wearing apparel). The result over wearing apparel is exposed above as an example (95% of maquila is dedicated to the production of this sector):

Before		After	
Sector	Wearing Apparel	Sector	Wearing Apparel

2 Cotton	13179	2 Cotton	13179
5 OtherAgric	8924	5 OtherAgric	8924
8 Forestry	198	8 Forestry	198
10 Mining	35.5	10 Mining	35.5
19 Textiles	585882	19 Textiles	585882
20 WearingApp	3802	20 WearingApp	3802
21 LeatherProd	3546	21 LeatherProd	3546
22 Wood	3293	22 Wood	3293
23 Paper	11347	23 Paper	11347
24 PrintingPub	5727	24 PrintingPub	5727
25 Chemicals	6142	25 Chemicals	6142
26 PetroleumPrd	16624	26 PetroleumPrd	16624
27 RubberPlastc	2309	27 RubberPlastc	2309
28 MineralProd	407	28 MineralProd	407
29 MetalProd	17638	29 MetalProd	17638
30 MachineryEq	2383	30 MachineryEq	2383
31 TransportEq	26679	31 TransportEq	26679
32 Electricity	19194	32 Electricity	228813.6
33 Water	484	33 Water	5032.457
34 Construction	2532	34 Construction	2532
35 Trade	0	35 Trade	736194
36 HotelsRest	2773	36 HotelsRest	2773
37 TransportSrv	27309	37 TransportSrv	289946.6
38 Communicat	3653	38 Communicat	5734.772
39 FinancialSrv	13188.5	39 FinancialSrv	13188.5
40 RealEstate	44632	40 RealEstate	405274.9
42 SocialServ	9448	42 SocialServ	9448
45 Maquila	0	Maquila	(redistributed)
1 Labor	672526.4	1-Labor	1671573
2 Capital	38780.6	2 -Capital	1652022
3 Land	0	3-ProdTax	103363
4 ProdTax	103363	1-Labor	1671573
Total	1645999	Total	5834011

Annex 6: GTAP, commodity aggregation

N	GTAP	Aggregation	N	GTAP	Aggregation
1	pdr	pdr_wht_gro	30	lum	lum
2	wht	pdr_wht_gro	31	ppp	ppp
3	gro	pdr_wht_gro	32	p_c	p_c
4	v_f	v_f_osd	33	crp	crp
5	osd	v_f_osd	34	nmm	nmm
6	c_b	c_b	35	i_s	i_s_nfmfmp
7	pfb	pfb	36	nfm	i_s_nfmfmp
8	ocr	ocr	37	fmp	i_s_nfmfmp
9	ctl	ctl_rmk_wol	38	mvh	mvh_otn_omf
10	oap	oap	39	otn	mvh_otn_omf
11	rmk	ctl_rmk_wol	40	ele	ele_ome
12	wol	ctl_rmk_wol	41	ome	ele_ome
13	for	for	42	omf	mvh_otn_omf
14	fsh	fsh	43	ely	ely_gdt
15	col	coloilgasomn	44	gdt	ely_gdt
16	oil	coloilgasomn	45	wtr	wtr
17	gas	coloilgasomn	46	cns	cns
18	omn	coloilgasomn	47	trd	trd
19	cmt	cmt_omt	48	otp	o_w_atp
20	omt	cmt_omt	49	wtp	o_w_atp
21	vol	vol_ofd	50	atp	o_w_atp
22	mil	mil	51	cmn	cmn
23	pcr	pcr	52	ofi	ofi_isr
24	sgr	sgr	53	isr	ofi_isr
25	ofd	vol_ofd	54	obs	obs
26	b_t	b_t	55	ros	ros
27	tex	tex	56	osg	osg
28	wap	wap	57	dwe	dwe
29	lea	lea			

References

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