

GTAP Regional Input-Output Data for Jamaica, Trinidad & Tobago, Puerto Rico and the Dominican Republic

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Sustainability Division

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1 Introduction

Input-Output (I-O) or Supply-Use Tables for Jamaica, Trinidad & Tobago, Puerto Rico and Dominican Republic were collected by Carlos Ludena over a number of years from various sources. In the interest of including additional countries from Latin America and the Caribbean into the Global Trade Analysis Project (GTAP) database for economic analysis, the Inter-American Development Bank commissioned to include these four Caribbean countries to be included into version 8.2 (and 9) of the GTAP database during the first half of 2013. Summary details of the data sources are shown in Table 1 below. The rest of the document describes the process of inclusion of these countries into the GTAP database.

Table 1: Summary details of data sources for I

Country	Jamaica	Trinidad & Tobago	Puerto Rico	Dominican Republic
Data Year	2007	2000	2002	2005
Format	Supply-Use Table	Supply-Use Table	IO table -- separate Domestic + Imports	Supply-Use Table
No of original commodities	53	89	93	67
No of original industries	53	54	93	37
Units	J\$ Million	\$TT Million	thousands USD\$	Thousands RD\$
Tariff revenue	Yes	Yes	No	No
Import matrix	No	No	Yes	No
Source	Statistical Institute of Jamaica	Inter-American Institute for Cooperation on Agriculture (IICA)	Programa de Planificación Económica y Social, Junta de Planificación de Puerto Rico	Central Bank of Dominican Republic ISSN 1729-5513 (PDF)
XLS source	2007-supply & use tables_1.xls	IICATTSAM temp.xls	Demanda Final y Resumen 2001-02.xls; Matriz de Transacciones Interindustriales 2001-02.xls	su2005.xls make2005.xls labscodes.xls
Notes	AgricSvc allocated to other agric		AgricSvc allocated to other agric; VA split from 1992	
HAR contribution file	jamaica.har	trinidad.har	puertorico.har	dominican.har

(Files used have been archived in a zip at: www.monash.edu.au/policy/archivep.htm#tpmh0124; the zip contains a readme.txt file.)

2 Initial data formats

For Puerto Rico, the initial data was presented as an I-O Table showing usage at producer prices. There was a separate table for imports. Tax data was confined to a single row (which we treated as a production tax). The 2002 table showed only a single value-added row (factors + tax); proportions from an earlier 1992 table were used to split this into capital, labour and tax payments.

For the other three countries (Jamaica, Trinidad & Tobago, Dominican Republic), the initial data was presented as a supply-use table showing usage at purchasers prices, with no separate imports matrix. A supply table showed how imports, margins, and taxes could be subtracted from total demand (dom+imp at purchasers prices) to give output (at basic prices) of commodity. Some tables showed separate categories of Non-competing Imports, which we treated initially as separate commodities. Taking this into account, all 3 tables had more commodities than industries. Make (multiproduction) matrices were supplied, or could be deduced.

3 Stages of processing

3.1 Initial cleaning up

This comprised such operations as:

- creation of english labels
- allocation of Agricultural services to other agricultural sectors
- allocation of non-competing imports to other commodity groups
- removal of re-exports where distinguished or implied (eg, when exports exceed domestic production)
- distributing any FISIM (Financial Intermediation Services Indirectly Measured) to industries GOS.
- allocating margins directly.

The result (except for Puerto Rico) was a commodity*industry USE table showing dom+imp at producer prices. For Puerto Rico we already had separate domestic and import tables, size commodity*commodity at basic prices. Hence the next two steps could be omitted.

3.2 Transformation to commodity-commodity "square" form

Tables for Jamaica, Trinidad & Tobago, and the Dominican Republic showed more commodities than industries, and included or implied Make (multiproduction) matrices. We used the Make matrices to expand the industry columns into corresponding commodity columns, assuming that each commodity was produced using the cost shares of the associated industry (or average of industries). The leftmost column of Tables 2-5 lists these "commodity" sectors.

An implication of the procedure is that if one industry "Cattle" had two outputs "Ctl" and "Rmk" we would end up with two sectors, "Ctl" and "Rmk" with different sales patterns (as in the original data) but the same cost structure (as the original industry "Cattle"). Quite often, other GTAP data (such as the "representative tables") might suggest different cost structures for "Ctl" and "Rmk". If we aggregated together "Ctl" and "Rmk" back into one sector "Cattle" we can allow the GTAP Center to split the two, using their representative table with different cost structures for "Ctl" and "Rmk" -- but we lose from the original data the different sales patterns of "Ctl" and "Rmk". A compromise must be struck, and Tables 2-5 contain instances where the middle set COM is apparently over-aggregated (eg, "Cattle" for Trinidad, see Table 3).

3.3 Other Adjustments

The original Tables for Trinidad & Tobago showed substantial household use of several raw agricultural products -- contrary to GTAP norms. These sales were re-routed through the corresponding processing industries. From this point on the same data manipulation programs were used for all four countries (except that Puerto Rico was omitted from the next step).

3.4 Splitting dom/imp, and basic/tax values from producers values

The supply-use Tables for Jamaica, Trinidad & Tobago, and the Dominican Republic included columns showing imports and taxes could be subtracted from total demand (dom+imp at producer prices) to give output (at basic prices) of each sector. We split each Use cell into 4 parts (dom/imp*basic/tax) in proportion to Use values and in proportion to row totals (dom,imp,basic,tax) from the Supply columns. The distribution is not quite pro rata, because:

- we stipulated that inventory flows must be untaxed
- we stipulated that export flows must be fully domestic
- in some cases several types of commodity tax were distinguished, which might bear differently on different users. For example, we expect that a VAT punishes households most, and exports least.

Because of this, initial estimates had to be scaled a few times, to meet both Use and Supply targets. After this step, we had Use matrices for both domestic and imported goods, each split between basic values and commodity taxes. Basic import values included tariff duty (which survived as a separate vector). Other production costs included capital (including depreciation), labour, and production taxes. We performed no "imputation" to convert "profits" into the "wages" of owner-operators.

3.5 Aggregation to remove unnecessary detail

The original data is presented at various levels of sectoral detail, while in the GTAP database every country has 57 sectors (here called GSEC). The original sectors (here called OSEC) may be related to the GTAP sectors GSEC in any of three ways:

- several OSEC may be contained in one GSEC
- several GSEC may be contained in one OSEC
- some GSEC and OSEC overlap

The solution is to define a 3rd set of sectors (here called COM) with as many sectors as possible¹, subject to the dual requirements that:

- each OSEC sector maps to (is contained within) just one COM.
- each GSEC sector maps to (is contained within) just one COM.

The first mapping allows us to cleanly aggregate original OSEC data to the COM level of aggregation. The GTAP project allows IO contributors to submit data in this form -- as long as they supply the second mapping, relating GSEC to COM.

The *intermapping* OSEC→COM←GSEC is shown for each country in the four Tables 2-5 below. Below, OSEC refers to the original sectors *after* initial rearrangement (for example, after allocation of Agricultural Services to other agricultural sectors).

The GTAP project asks that the mapping GSEC→COM not combine energy, food (except raw fish), and other sectors. Some small problems are highlighted in red, and noted under "Mandatory splits". They mostly relate to tiny sectors.

3.6 Conversion to GTAP contribution format

The final stage was to convert each data table (with COM sectors) into the special format required by GTAP. Final output files conformed to both of GTAP's "old" and "new" special formats. At the same time a number of basic diagnostic checks were performed.

¹ As mentioned earlier, we have in some cases combined sectors where the MAKE matrix did not allow us to distinguish independent cost structures, even though sales patterns are distinguished.

Table 2: Sectoral intermapping for Jamaica

52 OSEC	35 COM	57 GSEC
SugarCane	SugarCane	c_b
Bananas Citrus	BanCitrus	v_f
CoffeeCocoa OtExprtCrops RootCrops CropsNec	OthCrops	pdr wht osd pfb ocr
VegCornPulse	CornEtc	gro
OthAnimals	OthAnimal	ctl rmk wol
PoultryEggs	Poultry	oap
ForestLogs	Forest	frs
Fishing	Fishing	fsh
Bauxite	Bauxite	omn
OtherMining	OthMining	coa oil gas
MeatProducts	MeatPrd	cmt omt
FruitVegProc GrainMills AnimalFeeds Bakery FoodNEC	FoodNEC	vol pcr ofd
Dairy	Dairy	mil
SugarMolasse	Sugar	sgr
Beverages TobaccoPrds	BevTobac	b_t
TextilesWAP	TextWAP	tex wap
ShoesLeather	Shoes	lea
WoodFurniture	WoodPrd	lum
Paper PrintPublish	PaprPrint	ppp
ChemProds	ChemPrd	p_c
RubbrPlasPrd	RubbrPlas	crp
NMetalMinPrd	NMetalMin	nmm
BasicFabMetl	Metals	i_s nfm fmp
MachnEqp	MachnEqp	mvh otn ele ome
OthManufact	OthManuf	omf
ElecWater	ElecWater	ely gdt wtr
Construction	Construc	cns
Trade Repairs Hotels Restaurant	Trade	trd
Transport	Transport	otp wtp atp
Communicatns	Communcat	cmn
FinanceInsur	FinInsur	ofi isr
Dwellings	Dwelling	dwe
RentVehEqp OthBusSrvces	OthBusSvc	obs
GovServices NGEducat NGHealthSoc	GovSvc	osg
RecSport OthCommunSvc	PrvSvc	ros

Note: Bauxite is the overwhelming mineral product of Jamaica. To avoid distinguishing just one mining sector, the other mineral products have been allocated to GTAP's Coal-Oil-Gas group. Mandatory splits: It is thought Jamaica's gdt sector is zero or tiny.

Table 3: Sectoral intermapping for Trinidad

97 OSEC	43 COM	57 GSEC
Poultry Eggs PigsAndHogs	OthAnimal	oap
BeefCattle FreshMilk	Cattle	ctl rmk
Cocoa Coffee RootCrops OthAgricPrd	OthAgric	osd pfb ocr wol
CitrusFruit	Citrus	v_f
Rice	Rice	pdr
SugarCane	SugarCane	c_b
WoodRough	Forest	frs
FishFresh CrustMollusc	Fishing	fish
CrudePetrolm NaturalGas	OilNatGas	oil gas
DrillingSvc SandAsphalt	OthMining	coa omn
SugarEtc	Sugar	sgr
MeatPrd	MeatPrd	cmt
PoultryPrd	Poultry	omt
MilkAndCream	Dairy	mil
FruitVeg ProcFish Flour AnimalFeed FlourEtc BakeryPrd OthFood	OthFoods	pcr ofd
OilAndFats	OilsFats	vol
AlcoholicBev SoftDrinks Tobacco	BevTobac	b_t
ClothingShoe	WAPShoe	wap lea
Printing PulpPaperEtc	PPP	ppp
Furniture ElectApparat AppliancFixt PlasticEtc NCOfficeEqp	OthManuf	ele omf
Wood	WoodPrd	lum
CementBricks Concrete GlasswarePot	NMtlMin	nmm
Pharmaceutic FertInsectcd OthChemicals Paints PlasticsCnst	CRP	crp
RubbrLeather NCPlastic	MVPFabMetal	fmp mvh otn
MVP MetalStruct	IronSteel	i_s
PigIron OthIronSteel NCIronScrap	PetrolRef	p_c
RefPetrolPrd LNG IndustlGases ProcessedGas Petrochemicl	Textile	tex
WovenKnitted NCTextiles	Electrcty	ely
Electricity	Water	wtr
Water	Construct	cns
Construction	Trade	trd
DistPetrlPrd RetailWholsl FoodSvc Accomodation	DistNatGas	gdt
DistNatGas	Transport	otp wtp atp
Taxi BusSvc Airlines PortAirport Trucking CarRental OthTranspSvc	Communcat	cmn
Communicaton	Finance	ofi
FinancialSvc	Insurance	isr
Insurance	OthBusSvc	obs
BusinessSvc RentalEqp Advertising OthBusSvc RealEstate	Dwelling	dwe
ImputedRent	GovSvc	osg
Government Education HealthWelfre	PrivSvc	ros
PersonalSvc	Grains	wht gro
NCGrains	MachinEqp	ome
NCIndustMach NCInstrument	NFMetals	nfm
NCNFMetals		

Note: the "NC": sectors were originally non-competing import rows. Mandatory splits: It is thought Trinidad produces no coal.

Table 4: Sectoral intermapping for Puerto Rico

92 OSEC	38 COM	57 GSEC
SugarCane OtherAgric	Agric	pdr wht gro v_f osd c_b pfb ocr ctl oap rmk wol frs fsh
Mining	Mining	coa oil gas omn
Construction BldMaint	Construct	cns
MeatPrd	MeatPrd	cmt omt
MilkPrd	MilkPrd	mil
FruitVegPrd	FruVegPrd	vol
GrainMill	GrainMill	pcr
Bakery MiscFood FishPrd	OthFood	ofd
SugarSweets	Sugar	sgr
AlcoBev SoftDrinks Tobacco	BevTobac	b_t
TextileMill	Textile	tex
Apparel	Clothing	wap
Lumber	Lumber	lum
PaperAllied PrintPublish	PPP	ppp
BasicChem DrugsPharma OthChemical RubbrPlastic	ChemPrd	crp
PetrolRefin OthPetroleum	PetrolRef	p_c
LeatherPrd	Leather	lea
OthNMM	OthNMM	nmm
PrimaryMetal	PrimMetal	i_s nfm
FabricMetal	FabMetal	fmp
NonElecMachn	NEleMachn	ome
ElecMachiner	ElecMachn	ele
TransportEqp	TranspEqp	mvh otn
ScientifInst MiscManuf	OthManuf	omf
LocalBusTaxi Buses RoadFreight TransportSVC TravelAgents	OthTrans	otp
WaterTrnsprt	WatrTrans	wtp
AirTransport	AirTrans	atp
Telephone RadioTVBrcst	Comms	cmn
EleclrrigSVC	Elect	ely
GasSantrySVC	GasDist	gdt
WaterSewage	Water	wtr
Trade TouristHotel OtherHotels AutoRepair	Trade	trd
CommBanks MortgageBanks SavingAssoc CreditUnions LoanBrokers PersCredit CondLoans OtherCredit	Finance	ofi
LifeAccMedIn OthInsurance InsuranceSVC	Insurance	isr
RealEstate	RealEstat	dwe
Laundry PhotoStud BeautyBarber FuneralSVC OtherPersSVC AutoLeasing AutoParking Films FilmTheaters Theatres HorseRace OthRecSVC LegalSVC DomesticSVC	PrivSvc	ros
Advertising OthBusinSVC EngArchSVC AccountngSVC	BusSvc	obs
Doctors Dentists Hospitals MedDentalLab OthHealthSVC EducSVC NonProfits Commonwealth MunicipalGov FederalGov	GovSvc	osg

Note: Original sector SugarCane is a zero-size dummy sector. Original data distinguished only "Agriculture".
Mandatory splits: Forestry and Fishing are part of "Agriculture".

Table 5: Sectoral intermapping for Dominican Republic

69 OSEC	30 COM	57 GSEC
Cereals	Cereals	pdr wht gro
TradExprtCrp	SugarCane	c_b
Oilseeds TextFibers Legumes TubersEtc Vegetables Fruits OtherCrops	OthAgric	v_f osd pfb ocr
LiveStock OthAnimalPrd Forestry Fishing	AnimlForFish	ctl oap rmk wol frs fsh
Coal	Coal	coa
CrudeOil	CrudeOil	oil gas
MetalOres StoneSndClay Salt OthMinerals	OthMinerl	omn
ProcMeatFish OilsFats Dairy	AnimlFoods	cmt omt vol mil
GrainMills Bakery OthFoodProds	OthFoods	pcr ofd
Sugar	Sugar	sgr
AlcoBeverage NonAlcoBev TobaccoPrd	BevTobcco	b_t
TextWAP	TextWAP	tex wap
LeathShoes	LeathShoe	lea
WoodPrd PulpPaper PrintPublish	WoodPPP	lum ppp
CokeRefPetrl	RefPetrl	p_c
ChemicalPrd RubberPrd PlasticPrd	ChmRbrPls	crp
ONMetlMinPrd	ONMetlMin	nmm
BasicIronStl	BasIrnStl	i_s
NonFerrMetal Scrap	OthMetals	nfm
FabMetalPrd GenMachinery SpcMachinery HholdApplnce OfficeEqp MachnElecEqp CommunicEqp MedSciEqp TranspEquip FurnOthManuf	FabMtlPrd	fmp mvh otn ele ome omf
ElecWater	ElecWater	ely gdt wtr
Construction	Constrctn	cns
TradeSvc Hotels	TradeHotl	trd
Transport	Transport	otp wtp atp
Communicat	Communcat	cmn
FinancInsrnc	FinInsrnc	ofi isr
Dwellings	Dwellings	dwe
ORealEstate LegalSvc BusinessSvc	OthBusSvc	obs
GovrnmntSvc EducationSvc HealthSvc	GovmntSvc	osg
RecSportSvc OtherSvc DomesticSvc	OthPrvSvc	ros

Mandatory splits: It is thought the gdt sector is zero or tiny.