



Violating LOOP?


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CET Functions in CGE Models


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CET and LOOP

- TWO apparent prices in commodity rows – ***QPD and PWE*** (*purchaser prices*)
 - NB: even if *QE* and *QD/QDS* are homogenous the tax rates (*ts* and *te*) can/do differ.
- In model: activities produce **two** differentiated commodities, which are supplied to different markets
- Hence LOOP is apparently not violated – see an extended SAM representation

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The SAM, CET and LOOP

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BUT...CET and LOOP

***There can only be one price in every row,
AND the prices for each and every row are
uniquely determined***

- Actually, only one price in each row – ***PQD and PWE***
- But ***PE and PD*** are not uniquely determined
 - only one column for each **activity**
 - profitable arbitrage if *QE* and *QD* are homogenous
- CET for row aggregation always violates LOOP
 - A trade off LOOP vv ‘realism’
 - Some models do not use CET for exports – ‘homogenous’
 - BUT tax rates can/do differ
 - Does not (apparently) enter the supply side decision on allocation (*QE* vv *QD*)

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***Differential Commodity Taxes by
Agent***

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VAT and LOOP

- TWO apparent prices in commodity rows – PQD and $PQCD [= PQD \cdot (1+tv)]$
 - NB: even if QCD , QGD , $QINVD$ and $QINTD$ are homogenous the tax rates (ts and tv) can/do differ.
- In model, it is assumed that:
 - Activities produce **two** homogenous domestic commodities, which are supplied to different markets
 - Imports are segmented between household and non-household demand as if homogeneous
- Hence LOOP is apparently not violated – see a fuller SAM representation

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VAT and LOOP

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BUT...VAT and LOOP

*There can only be one price in every row,
AND the prices for each and every row are
uniquely determined*

- Only one price in each row
 - PQD and $PQCD \{= PQD \cdot (1+tv)\}$
- But assume the composite commodity consumed by households and non-households is homogenous
 - The cost functions are identical
 - Does not enter the supply side decision on allocation
- Assumes profitable arbitrage is excluded/prohibited
- LOOP is not violated if
 - Arbitrage is prohibited
 - Composite commodities consumed by households and non-households are homogenous

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IOT and SAMs

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Input Output Tables and SAMs

- IOT are valued at basic prices
- In IOT taxes are usually identified only by agent
- Disentangling the taxes is important
- ‘Standard’ IOT cannot provide the information required in adequately specified CGE models

Using a *standard* IOT as the basis for commodity demand in a SAM for a CGE model is **INADEQUATE** and **INCORRECT**

The price system is usually underdefined

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A SAM for a Simple Closed Economy

		Com'ties		Act'ties		Factors		H'hold	Govt	Invest	Total
		c_agric	c_mnfc	a_agric	a_mnfc	Labour	Capital				
Commodities	c_agric			30	50			120	20	15	235
	c_mnfc			50	100			150	60	40	400
Activities	a_agric	215									215
	a_mnfc		375								375
Factors	Labour			60	140						200
	Capital			65	75						140
Household						200	140				340
Government		20	25	10	10			30			95
Saving								40	15		55
Total		235	400	215	375	200	140	340	95	55	

Prices built up from information in the columns, e.g., *PQD*

Define: Purchaser prices = Basic Prices * (1+GST)

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'Standard' Input-Output in a SAM

		Com'ties		Act'ies		Factors		H'hold	Govt	Invest	Total
		c_agric	c_mnfc	a_agric	a_mnfc	Labour	Capital				
Commodities	c_agric			27.4	45.7			109.8	18.3	13.7	215.0
	c_mnfc			46.9	93.8			140.6	56.3	37.5	375.0
Activities	a_agric	215.0									215.0
	a_mnfc		375.0								375.0
Factors	Labour			60	140						200.0
	Capital			65	75						140.0
Household						200	140				340.0
Government				15.7	20.5	0.0	0.0	49.6	5.5	3.8	95.0
Saving								40	15		55.0
Total		215.0	375.0	215.0	375.0	200.0	140.0	340.0	95.0	55.0	

Tax revenues cannot be associated with individual commodities

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Input Output in a SAM for CGE

		Com'ties		Act'ies		Factors		H'hold	GST		Govt	Invest	Total
		c_agric	c_mnfc	a_agric	a_mnfc	Labour	Capital		c_agric	c_mnfc			
Commodities	c_agric			27.4	45.7			109.8			18.3	13.7	215.0
	c_mnfc			46.9	93.8			140.6			56.3	37.5	375.0
Activities	a_agric	215.0											215.0
	a_mnfc		375.0										375.0
Factors	Labour			60.0	140.0								200.0
	Capital			65.0	75.0								140.0
Household						200.0	140.0						340.0
GST	c_agric			2.6	4.3			10.2			1.7	1.3	20.0
	c_mnfc			3.1	6.3			9.4			3.8	2.5	25.0
Government				10.0	10.0			30.0	20.0	25.0			95.0
Saving								40.0			15.0		55.0
Total		215.0	375.0	215.0	375.0	200.0	140.0	340.0	20.0	25.0	95.0	55.0	
GST	c_agric			0.0930	0.0930			0.0930			0.0930	0.0930	
	c_mnfc			0.0667	0.0667			0.0667			0.0667	0.0667	

Tax revenues linked with individual commodities

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IOT SAM with Different Tax Rates

		Com'ties		Act'ties		Factors		H'hold	GST		Govt	Invest	Total
		c_agric	c_mnfc	a_agric	a_mnfc	Labour	Capital		c_agric	c_mnfc			
Commodities	c_agric			27.4	45.7			109.8			18.3	13.7	215.0
	c_mnfc			46.9	93.8			140.6			56.3	37.5	375.0
Activities	a_agric	215.0											215.0
	a_mnfc		375.0										375.0
Factors	Labour			60.0	140.0								200.0
	Capital			65.0	75.0								140.0
Household						200.0	140.0						340.0
Taxes	c_agric			2.6	4.3			15.2			1.7	1.3	25.0
	c_mnfc			3.1	6.3			12.4			3.8	2.5	28.0
Government				10.0	10.0	0.0	0.0	22.0	25.0	28.0			95.0
Saving								40.0	0.0	0.0	15.0		55.0
Total		215.0	375.0	215.0	375.0	200.0	140.0	340.0	25.0	28.0	95.0	55.0	
GST	c_agric			0.0930	0.0930			0.1384			0.0930	0.0930	
	c_mnfc			0.0667	0.0667			0.0882			0.0667	0.0667	

Tax revenues linked with individual commodities
BUT different rates by agents

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IOT SAM with Different Tax Instruments

		Com'ties		Act'ties		Factors		H'hold	GST		Excise		Govt	Invest	Total
		c_agric	c_mnfc	a_agric	a_mnfc	Labour	Capital		c_agric	c_mnfc	c_agric	c_mnfc			
Commodities	c_agric			27.4	45.7			109.8					18.3	13.7	215.0
	c_mnfc			46.9	93.8			140.6					56.3	37.5	375.0
Activities	a_agric	215.0													215.0
	a_mnfc		375.0												375.0
Factors	Labour			60.0	140.0										200.0
	Capital			65.0	75.0										140.0
Household						200.0	140.0								340.0
GST	c_agric			2.6	4.3			10.2					1.7	1.3	20.0
	c_mnfc			3.1	6.3			9.4					3.8	2.5	25.0
Excise	c_agric							5.0							5.0
	c_mnfc							3.0							3.0
Government				10.0	10.0	0.0	0.0	22.0	20.0	25.0	5.0	3.0			95.0
Saving								40.0	0.0	0.0			15.0		55.0
Total		215.0	375.0	215.0	375.0	200.0	140.0	340.0	20.0	25.0	5.0	3.0	95.0	55.0	
GST	c_agric			0.0930	0.0930			0.0929					0.0930	0.0930	
(ad valorem)	c_mnfc			0.0667	0.0667			0.0668					0.0667	0.0667	
Excise	c_agric							0.0455							
(specific)	c_mnfc							0.0213							

Tax revenues linked with individual commodities
SAME rates by agents; different instruments

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Use of IOT in a SAM for CGE

- Requires
 - Identification of purchasing agent specific differences between Purchaser and Basic prices
 - Commodity taxes (illustrated)
 - Trade & transport margins (see STAGE)
 - Commodity taxes
 - Multiple instruments should be identified
 - Different instruments may have different bases (*ad valorem* vv specific).
 - Diagonal supply/make matrix
 - Specification of technologies for commodity production
 - Adjustment of activity transactions
 - (This problem is sidestepped in this illustration)
 - Large amount of extra data
 - Rarely published

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ANARRES

Violating LOOP?

The End

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