The marginal cost of public funds in the EU

The case of labour taxes versus green taxes

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- **Weak public budgets in EU**

  ➔ need to raise taxes (eventually)

- **Revenues less than expected?**

  Distortionary effects

- **Little evidence on the true cost of tax increases**

- **Little evidence on tax spillovers to other countries**

Full costs of tax increases

(e.g. Feldstein, 1997)

KEY QUESTIONS

1. **MCPF:** What is the additional cost of raising 1 euro of extra tax revenues?
2. **Spillovers:** How much do these tax costs affect other EU countries?

Focus on tax revenues,
not on the benefits of government expenditure

Modelling Strategy

- Marginal increase of:
  - Labour tax (Social security contribution)
  - Energy tax (Energy tax for final consumption)
- .. in one country at the time
- Comparative static
- Increase transferred to RoW
- Key result calculated:

Marginal Cost of Public Funds (MCPF)

Marginal Cost of Public Funds

$$MCPF_{i,k} = \frac{\Delta W_{i,k}}{\Delta R_i}$$

- *Shock: + 0.05 pp on focus tax*
- *Calculate: loss of welfare (equivalent variation) for marginal revenue increase*

Marginal Cost of Public Funds from perspective of Member State:

$$MCPF_{i,k} = \frac{\Delta W_{i,k}}{\Delta R_i}$$

Country *i* tax categ. *k*
Δ t = 0,05 pp

$$EV = IU\left(P_i^0, v\left(P_i^1, Y_i^0\right)\right) - IU\left(P_i^0, v\left(P_i^0, Y_i^0\right)\right)$$

Usually MCF >1 with MCF = 1 + a

- Income effect and Substitution effects
- Behavioural responses: change in the tax bases

Marginal Cost of Public Funds from perspective of European Union:

$$MCPF_{j,k} = \frac{\sum_{j} \Delta W_{j,k}}{\sum_{j} \Delta R_{j}}$$

$$MCPF_{i,j,k} = \frac{\Delta W_{i,k}}{\Delta R_i + \sum_{j,j\neq i} \Delta R_j} + \frac{\sum_{j,j\neq i} \Delta W_{j,k}}{\Delta R_i + \sum_{j,j\neq i} \Delta R_j}$$

~Member States view Cross-country Spillovers

Measuring MCPF: Methodologies

- Econometric estimations
  - E.g. Dahlby and Ferede, ITAX (forthcoming)
- CGE modelling
  - Ballard, Shoven, Whalley, AER (1985)
  - Auriol and Warlters, J. Dev. Econ. (2012)
- Microsimulation modelling
  - Kreiner and Kleven, JPubE (2006)

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- CGE modelling
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  - Auriol and Warlters, J. Dev. Econ. (2012) **Africa: 1.05-1.72**
- Microsimulation modelling
  - Kreiner and Kleven, JPubE (2006) **DE, DK, FR, IT, UK: 0.89-3.51**

CGE model: GEM-E3 EU version

- Multi-regional model
  - 24 EU countries (not MT, LU, CY) & RoW
- Base SAMs from 2005
- Data: EUROSTAT IO-tables & national accounts
- 9 broad tax, transfer or subsidy categories
- 18 Productive sectors
- Cross-country trade (Armington)

CGE model: GEM-E3 EU version

- Imperfect Labour Markets
  - Unemployment benefits (~ unemployment level)
  - Efficiency wages (Shapiro & Stiglitz)
- Leisure fixed (consumption is only welfare measure)
- Labour taxation affects through
  - Product price (consumption)
  - Factor demand (unemployment): big driver for comparing flexibility labour

$$MCPF_{i,k} = \frac{\Delta W_{i,k}}{\Delta R_i}$$

Country *i*
*T*ax category *k*

$\Delta R_i => RoW$

$$MCPF_{i,j,k} = \frac{\Delta W_{i,k}}{\Delta R_i + \sum_{j,j \neq i} \Delta R_j} + \frac{\sum_{j,j \neq i} \Delta W_{j,k}}{\Delta R_i + \sum_{j,j \neq i} \Delta R_j}$$

European Commission

$MCPF_{Labour\ tax} > MCPF_{Energy\ tax}$

Labour

	Labour		
	Country	EU	Spillover effect
EU	1.90	1.97	7.6%
Std. Deviation / average	17.38%	18.99%	97.68%

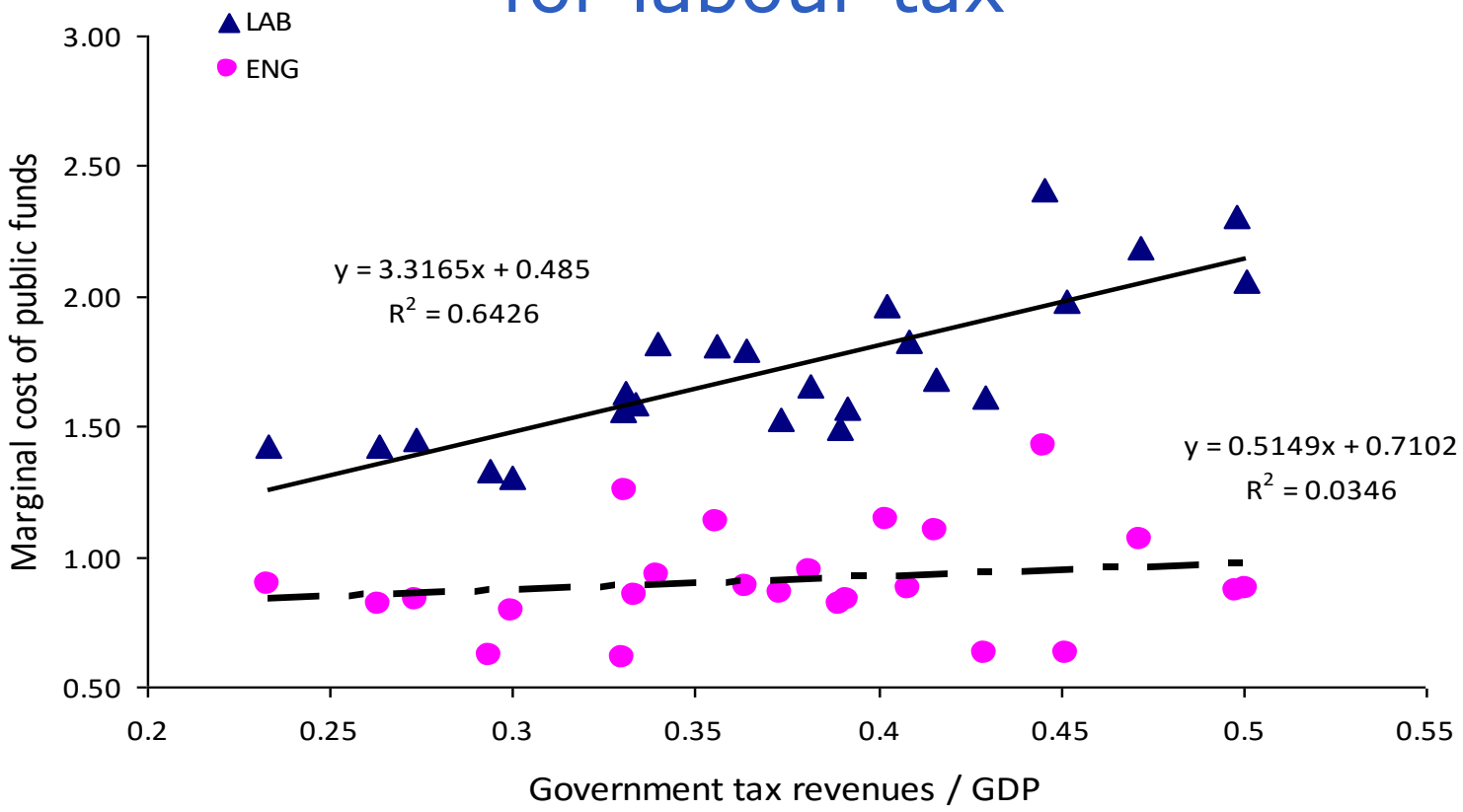
α = 0.90 / 0.97

Energy

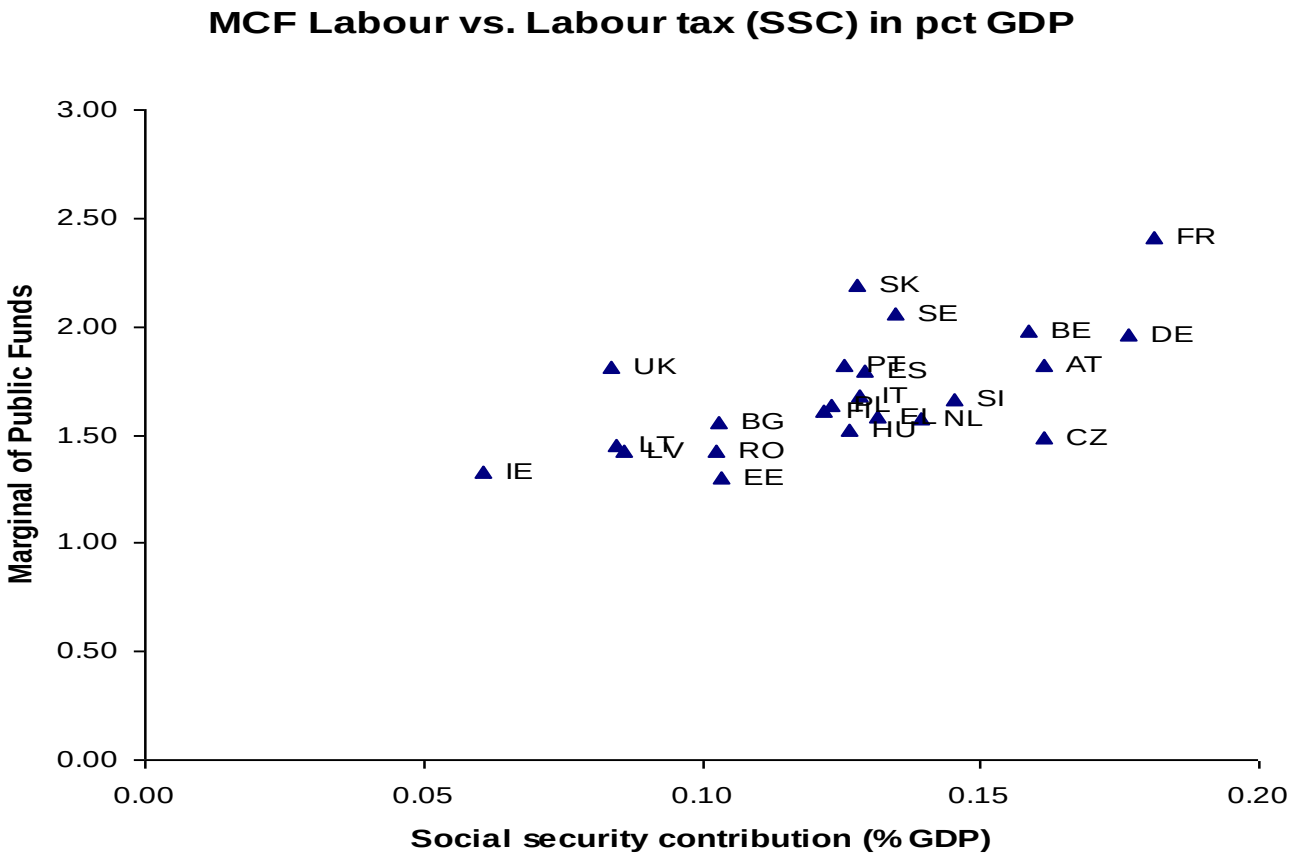
	Energy		
	Country	EU	Spillover effect
EU	1.08	1.17	117.6%
Std. Deviation / average	22.21%	19.02%	64.41%

α = 0.08 / 0.17

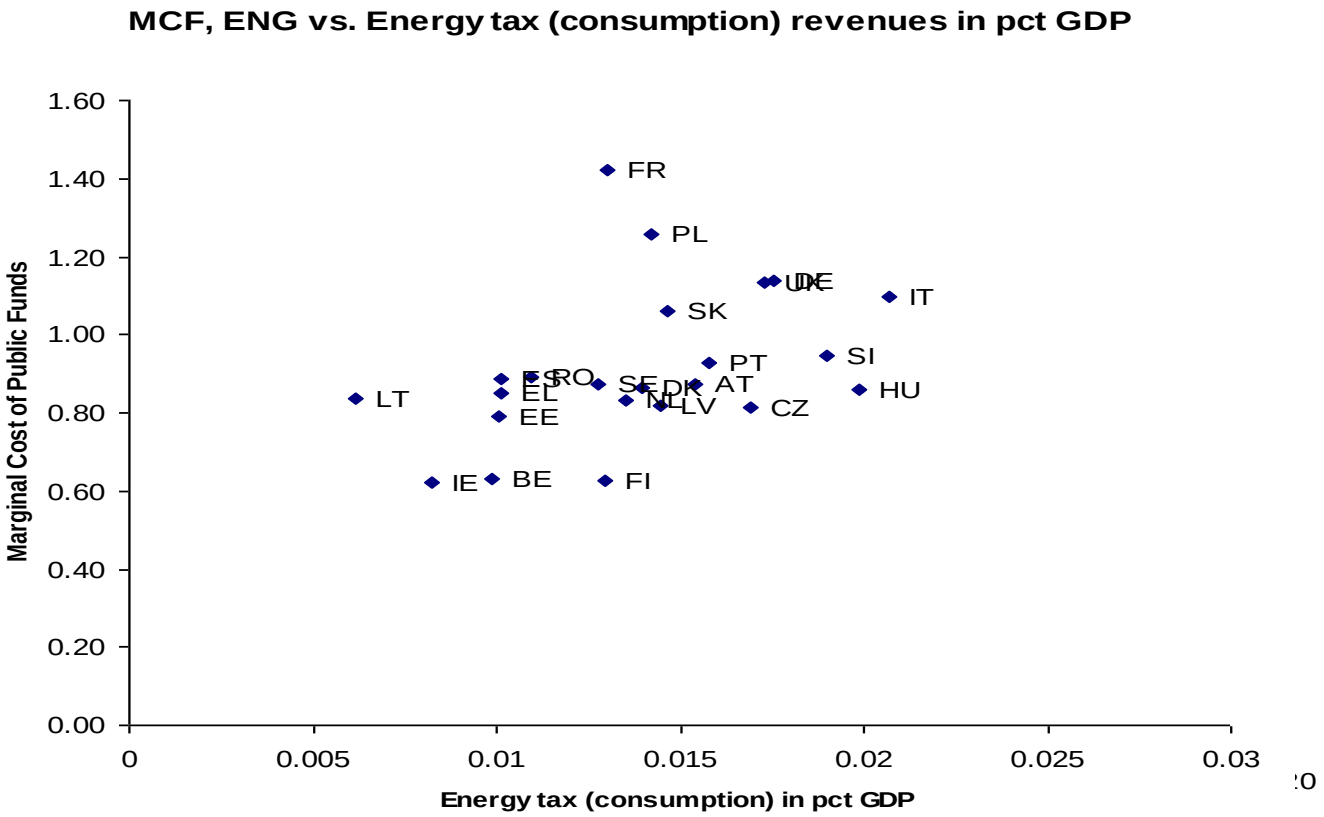
Higher overall tax burden ➔ Higher MCPF for labour tax



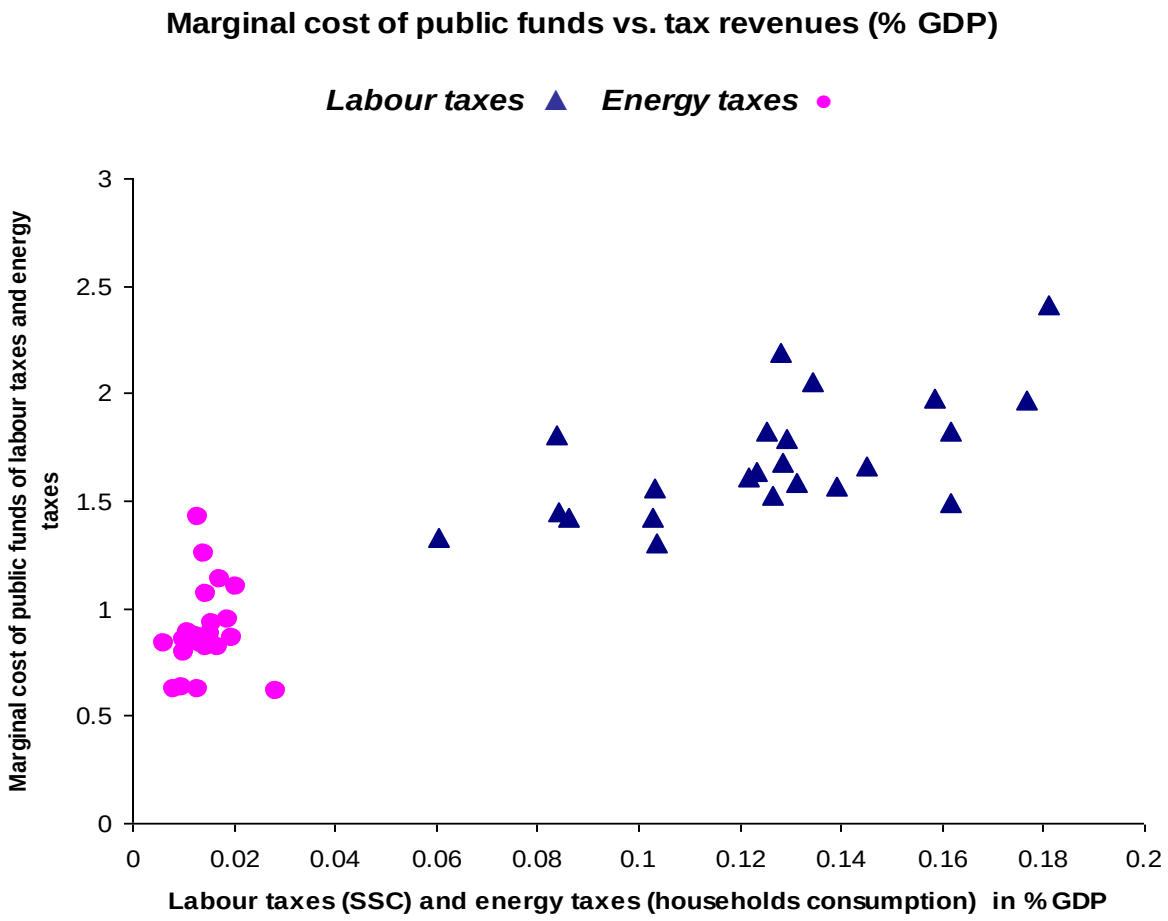
Higher **labour** tax burden ➔ Higher $MCPF_{Labour}$



Higher **energy** tax burden ➔ Higher $MCPF_{Energy}$



Labour & energy taxes together



European Commission

$Spillover_{Labour\ tax} < Spillover_{Energy\ tax}$

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MCPF & spillovers for labour tax

Countries with large spillovers			
	MCF	**EU**	**Spillover**
Belgium	***1.98***	***2.29***	***31.64%***
Ireland	***1.33***	***1.41***	***22.29%***
Netherlands	***1.57***	***1.69***	***20.67%***
Denmark	***2.31***	***2.56***	***18.93%***
Estonia	***1.30***	***1.36***	***18.90%***
Countries with low spillovers			
Italy	***1.68***	***1.68***	***-0.47%***
Poland	***1.63***	***1.63***	***-0.92%***
Romania	***1.43***	***1.42***	***-1.87%***

Labour tax : Welfare & tax revenues spillovers

Welfare

$$\frac{\Delta W_i}{\sum \Delta W_i}$$

Tax Rev.

$$\frac{\Delta R_i}{\sum \Delta R_i}$$

Countries causing large spillover effects			
	Welfare	**Tax Rev.**	**Signs**
Germany	***20.05%***	***21.87%***	***<0 , <0***
France	***19.40%***	***19.69%***	***<0 , <0***
UK	***18.69%***	***22.88%***	***<0 , <0***

Countries with low spillover effects			
	Welfare	**Tax Rev.**	**Signs**
Latvia	***0.20%***	***0.17%***	***<0 , <0***
Lithuania	***0.23%***	***0.14%***	***<0 , <0***
Bulgaria	***0.10%***	***0.07%***	***<0 , <0***

Is there a case for tax shifting?

Country	Tax shifting, country level
Denmark	-1.45
Belgium	-1.35
Sweden	-1.19
Slovakia	-1.13
France	-0.99
Finland	-0.98
Austria	-0.95
Bulgaria	-0.94
Spain	-0.9
Portugal	-0.89
Germany	-0.82
EU (GDP Weighted)	-0.82
Greece	-0.74
Netherlands	-0.74
Ireland	-0.71
Slovenia	-0.71
Czech rep.	-0.68
United Kingdom	-0.68
Hungary	-0.67
Lithuania	-0.61
Latvia	-0.6
Italy	-0.58
Romania	-0.54
Estonia	-0.51
Poland	-0.37

country	Tax shifting, EU level
Denmark	-1.63
Belgium	-1.42
Sweden	-1.2
Slovakia	-1.05
Finland	-0.96
France	-0.96
Bulgaria	-0.95
Portugal	-0.87
Spain	-0.86
Austria	-0.84
Germany	-0.8
EU (GDP Weighted)	-0.8
Netherlands	-0.72
Greece	-0.7
United Kingdom	-0.69
Slovenia	-0.68
Latvia	-0.65
Czech rep.	-0.63
Hungary	-0.57
Italy	-0.54
Lithuania	-0.54
Ireland	-0.53
Romania	-0.47
Estonia	-0.44
Poland	-0.36

Result 2: The incidence of labour market rigidities is higher for labour taxes and non-negligible for energy taxes

Labour

EU-results			
	MCF	*Less flexible Labour market*	*More flexible Labour market*
EU	*1.90*	**2.54**	**1.64**
% change		*+33.59%*	*-13.63%*

Energy

EU-results			
	MCF	*Less flexible Labour market*	*More flexible Labour market*
EU	1.08	1.13	1.04
% change		+4.62%	-3.27%

Result 2: The incidence of labour market rigidities is higher for labour taxes and non-negligible for energy taxes

Labour

EU-results			
	MCF	*Less flexible Labour market*	*More flexible Labour market*
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Caveats and extensions

- Terms of trade effects and tax elasticities
- Impact of tax changes on income inequalities
- Other tax categories such as VAT
- Need to simulate simultaneous tax increase of all Member States
- Focus is only on the cost side of tax raising; not on the possible benefits of public expenditures
- Direct Application: use of MCPF in cost-benefit analysis of public expenditures and investments

Summary

- MCPF can measure *full* cost of tax increase
- One euro extra tax revenue
  - From **labour** tax ➔ **90 ¢** loss to the economy
  - From **energy** tax ➔ **8 ¢** loss to the economy
- Spillovers matter
  - even for taxes on immobile factors & consumption goods
- Labour market rigidities matter
  - not only for labour taxes

- **Bovenberg and De Mooij (1994, 1998, etc.)**

$$\mathrm{D}\beta = \theta_L \omega_L \mathrm{D}L + \theta_K \omega_K \mathrm{D}K + \theta_E \omega_E \mathrm{D}E$$

θ = Initial level of tax rate

ω = Weight of Factor

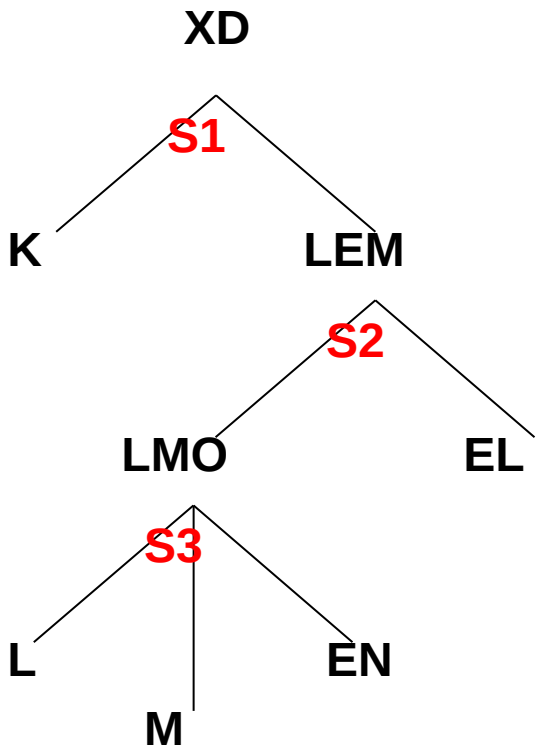
K,L,E = Production factors

- **Terms of trade effects and specialisation effects (Andersen, Sorensen, 2012)**

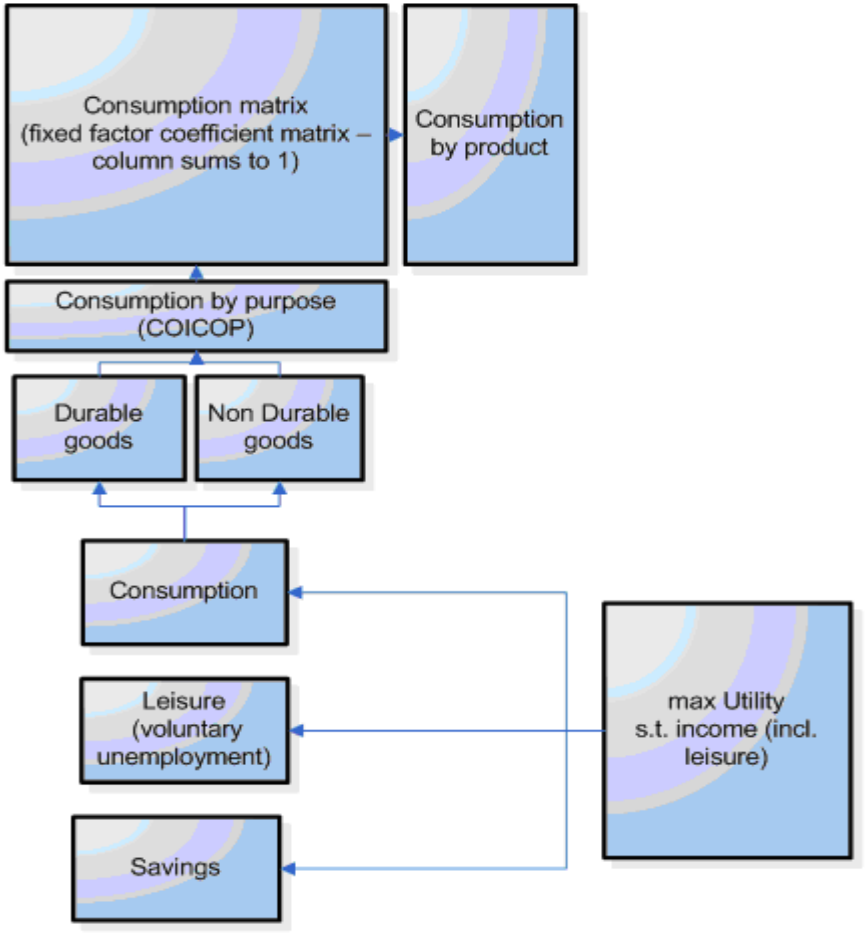
Social Accounting Matrix in GEM-E3

Intermediate demand (at producer prices)	Household Consumption by product	Government Consumption by product	Investment by product	Change in stocks	Exports	Total Demand
Value Added	**Institutional transfers:** - Payments of primary factors to agents according owenership - Current taxes on income, wealth, etc. - Property income - Social contributions - Capital transfers - Income transfers from/to abroad - Other current transfers					
Taxes						
Imports						
Total Supply						

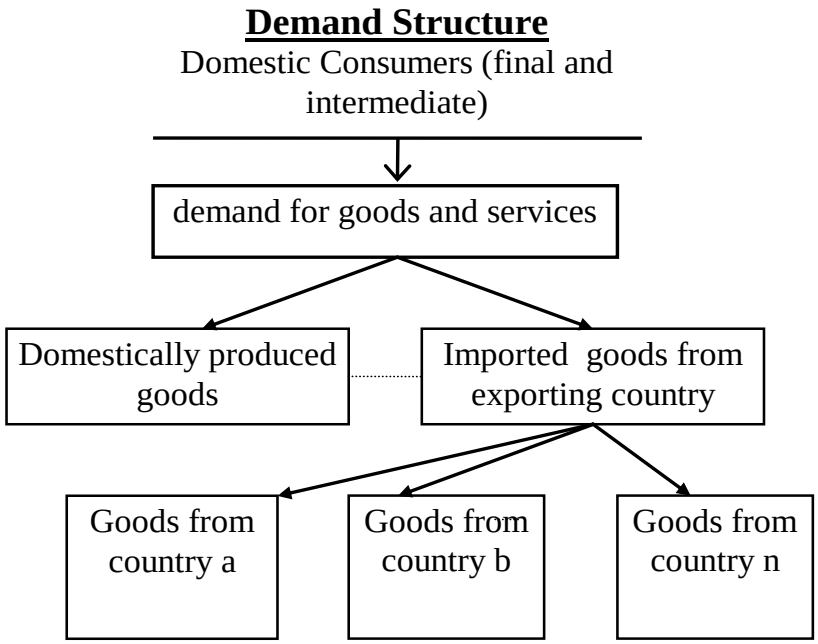
Firm behaviour in GEM-E3



Consumption structure in GEM-E3



Domestic demand and trade flows



Do trade assumptions play role?

- **Armington elasticities**

Labour

EU-results			
	Bench mark	*Armington First Level*	*Armington Second Level*
High σ	7.6%	> 7.2%	> 6.4%
Low σ	7.6%	< 8.1%	< 9.5%

Energy

EU-results			
	Bench mark	*Armington First Level*	*Armington Second Level*
High σ	*117.6%*	*> 95.4%*	*> 78.0%*
Low σ	*117.6%*	*< 150.3%*	*< 238.2%*

Role of labour market rigidities

- Change in taxes affect prices and real wages
- … but with imperfect labour market the change in prices and wages is not necessarily one to one (Boeters and Savard, 2011)
- Caveat: in practice labour tax *progressivity* may play a role as well (not considered here)