Hvordan kan man evaluere de økonomiske effekter af kørselsafgifter
- sammenligning af forskellige modeltilgange

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Why should we focus on HVF and the economic impacts?

- Regulating freight transport through heavy vehicle fees on the agenda in many countries
  - Discussions of the impact on transport provider, transport buyer, the final consumer, international trade etc.
  - Spill-over effects between different sectors

- Overall question: Why should e.g. Denmark introduce HVF?
  - In Germany there is a large number of transit trucks. Probably going from the Eurovignette to HVF is a good idea due to revenues raised from international haulliers
  - Can we expect the same outcome in a small country with only some transit transport ?

- There are many (adverse) effects to keep from each other

The relation between HVF and the (regional) economy

- HVF changes transport costs
  - Immediate impact on transport providers
    - What can and will they do ?
    - Most of cost changes transferred to transport buyer

- What are the impacts on the transport buyer ?
  - Freight transport from the market to the production plant increase price on intermediate inputs
  - Substitution to other intermediate inputs and value added factors (labour and capital)
  - Price increase on output, declining demand
  - Change in size of production (output reductions)

The relation between HVF and the (regional) economy

- The consequences for labour demand are
  - Substitution to value added factors
  - Output more expensive, production level decreases

- In addition transport to the market increases product prices even further
  - Second order effects, demand declines, substitution,...

- International competitive effects
  - Increasing prices on export markets due to
    - Increasing transport costs to the export markets (direct effect)
    - Increasing prices on intermediate inputs with increasing production costs

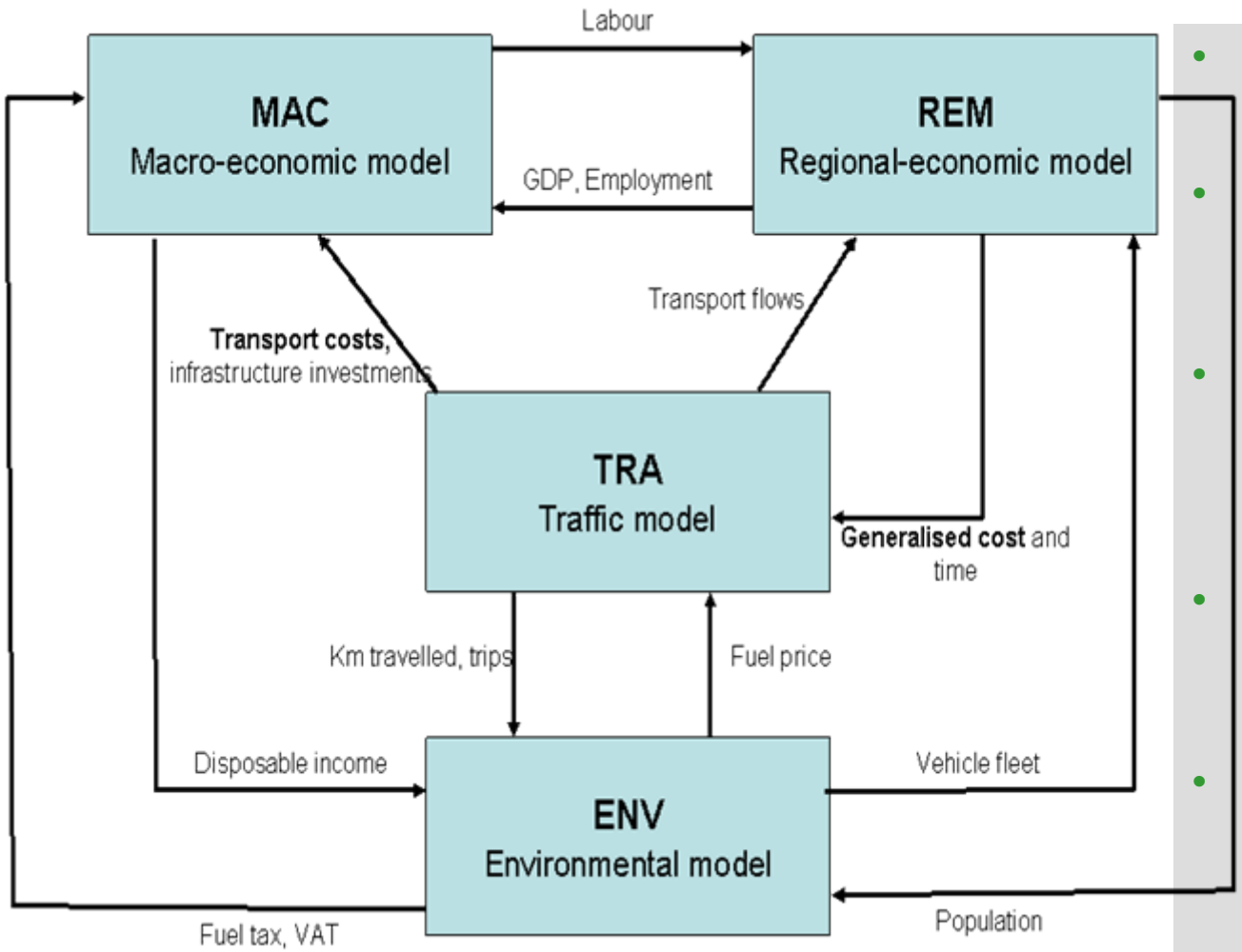
The relation between HVF and the (regional) economy

- Private households will be affected
  - Prices on commodities increase
    - Decreasing disposable income
  - Employment changes
    - Changes in disposable income
- Revenues for the government
  - The use of revenue is very important
  - e.g. compensations/subsidies or tax deductions
- Tax deductions
  - Increasing disposable income
  - Incentives to increase labour supply
  - Increasing demand for commodities

Some model approaches

- System dynamics models
- I/O based models
- CGE and SCGE models

System dynamics models (ASTRA)



- Linking of separate submodels
- Central element is transport module (TRA)
- Generalised costs (incl. HVF) calculated in TRA and fed into REM
- Trade flows calculated using costs
- HVF also directly leads to changes in macro-economic performance within regions and sectors

I/O models (LINE)

$\mathbf{X_0}$	$\mathbf{f_0}$	$\mathbf{x_0}$
$\mathbf{v_0'}$		$\mathbf{v_0'e}$
$\mathbf{x_0'}$	$\mathbf{e'f_0}$	

Fixed output coefficients $b_{ij}=x_{ij}/x_j$ in matrix B

- **The effect on industry output can be calculated using the Ghosh price multiplier** $(I-B)^{-1}$
- **Changes in output prices calculated**
- **Changes in output not calculated**

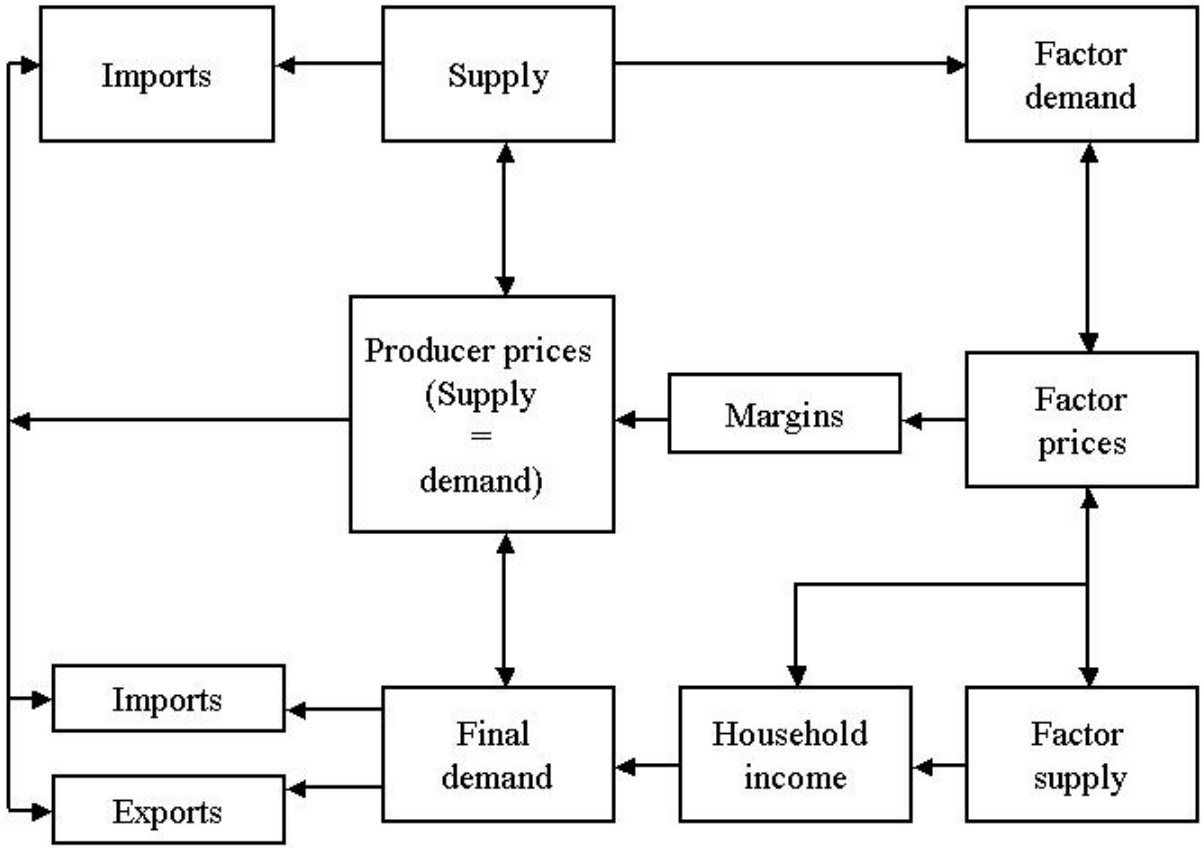
Fixed input coefficients $b_{ij}=x_{ij}/x_j$ in matrix B

Changes in supply driven output calculated

No relation between demand and supply side effects

DANMARKS TRANSPORTFORSKNING

(S)CGE models



- Theory based model
- Fewer details
- Modelling market imperfections
- Endogenous production of transport

DANMARKS TRANSPORTFORSKNING

Case studies

- Comparison of
  - I/O approach from Germany
  - I/O-SCGE approach from Denmark
  - SCGE approach from Norway

- Can illustrate common features and highlight important shortcommings and differences

The German 'MAUT' and the German economy

- I/O based approach
  - Ghosh forward price multiplier (average increases of 0.11 per cent, but ranging from 0.07 to 0.18 per cent)
- Arbitrary HVF levels (€ 0.127)
- Exogenous changes in transport costs
  - Behavioural effects in transport sector, cost increase of 4.2 per cent
- Labour market effects
  - Leontief multiplier to calculate revenue effects
  - 45.000 jobs created – no calculation of job losses due to price increases

DANMARKS TRANSPORTFORSKNING

How will the Norwegian economy react to road pricing ?

- PINGO/NEMO SCGE model

- Marginal external cost pricing in long run
  - Initial mode shift towards sea transport
  - Long run efficiency improvements in road based transport lead to an increase
  - Lower income from transport taxes due to improved fuel efficiency

- Negative welfare effects (household utility)
  - Commodity price increases
  - Even revenue redistribution does not lead to positive effects
  - Producers surplus positive and negative depending on sector
  - Welfare effects small compared to revenues

National and international HVF and the Danish regional economy

- A linearised SCGE model (I/O adapted)

- Exogenous transport costs and arbitrary HVF
  - Two scenarios, national and international HVF similar to German level
  - Average transport costs changes are 6 and 14 per cent

- Large effects on export prices (0.22 and 0.58 percent) and exports (-0.25 and -0.68 per cent)
  - large regional differences

- Negative employment effect

- Disposable income decline in international scenario

- Disposable income decline and rise due to use of revenue through income taxes

Modelsammenligning - sammenfatning

	I/O - Germany	SCGE – I/O Denmark	SCGE - Norway
Transport costs	Exogenous	Exogenous	Endogenous *
Possible differentiation	Potentially very large (transport model)	Rather large (transport model)	Limited *
Cost changes	Arbitrary (0.127 € /KM)	Arbitrary (0.15 € /km)	MCP (0.176 to 1.045 €/km)
Behavioural effects	Not included – fixed I/O coefficients	Substitution of input factors, intermediates ”Market equilibrium”	Substitution of input factors, intermediates Market equilibrium
Employment	Only through revenue use (0.13 %)	Endogenous (–0.07 % and –0.10 %)	Partly endogenous
Commodity prices			0.33 %
Transport costs	4.2 %	6 - 14 %	N/A
Income/Welfare	N/A	-0.04 % (foreign), 0.19 % DK	CS and externalities falls

Konklusion

- Der er stor interesse for viden om økonomiske konsekvenser af kørselsafgifter
- Forskellige analyser og typer af værktøjer kan bidrage til at øge viden
- Her har vi særligt fokus på de forskellige muligheder for analyser via modeller
- Afvejning af detaljer overfor et egentligt teoretisk fundament
- Vigtigt at beskrive agenternes tilpasning til de(n) nye situation
- SCGE modeller bedst egnet til denne type af analyser

- Men resultaterne er forholdsvis ens på trods af forskelligheder i modeltilgang samt analyseområde