TAXES AND OTHER DETERMINANTS TO EMISSIONS FROM ROAD FREIGHT TRANSPORT IN SWEDEN

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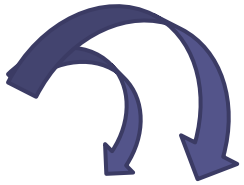
Outline:

1. Motivation for the study
2. Previous studies
3. Analytical task
4. Method
6. Data limitations and constraints
7. Results
8. Preliminary discussion of results

1. Motivation for the study

- Scenario making as a way of projection of emissions development
- A clear view of past elasticities



Project future expected development paths (emissions trajectories)

- Example: emissions from Swedish freight transport by road

- Volume of transport as a proxy for emissions
- GDP as proxy for volume of freight transport by road

IS THESE GOOD MEASURES???

Other explanations: e.g. policy, logistics, technology, foreign competition etc.

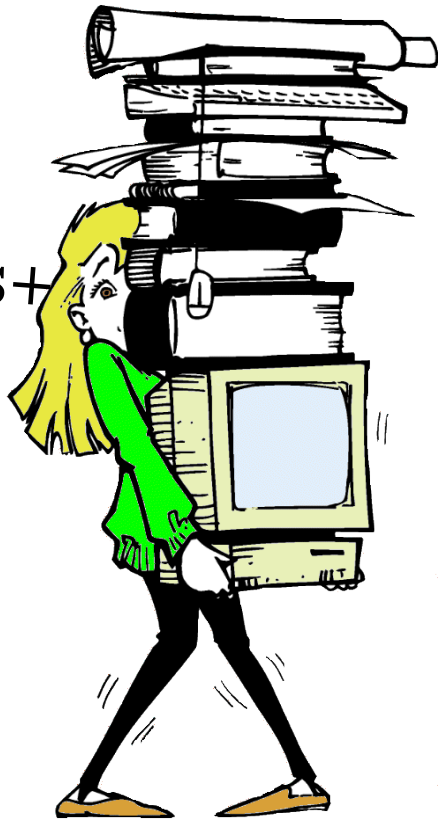
2. Previous studies

- Relationship between emissions and freight transport volume
- Relationship between economic growth and freight transport emissions → not linear (Trafikverket 2013)
- Decoupling between road freight traffic (vehicle kilometers) and economic growth
- Ambiguity concerning the link between transport volume and economic growth (Kveiborg, Fosgerau 2007, Sorrell et al. 2012)
- Scarce use of econometrics (due to data, difficulty, tradition)

3. Analytical task

- To explain the volume of freight transport by road, in Sweden, with the given equation:

Transport Volume(tonkm) =Economic growth+ Fuel prices +Policy instruments+ some other relevant factor



4. Method:

- Test for unit roots → stationarity of variables
- Determination of the number of cointegrating relations
- Fit of a VECM
- Tests for autocorrelation and for the normality of the disturbances
- Impulse Response Function-IRF

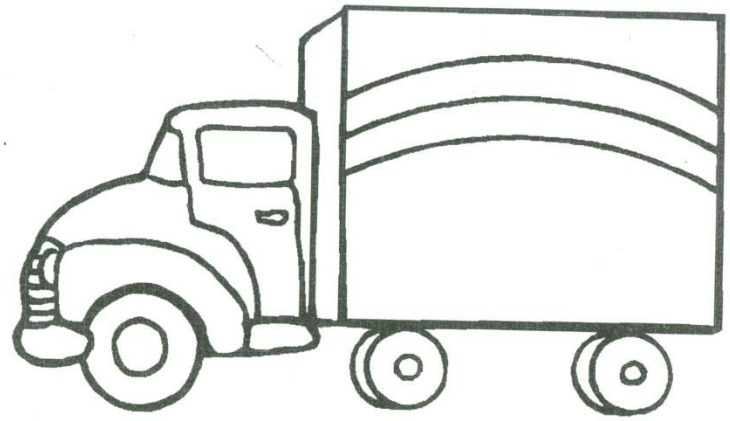
5. Data limitations and constraints

- Conversion of annual to quarterly data
- Only cover lorries registered inside European Union (e.g. not Russian lorries)
- Seasonality

6. Results

Model A [international competition]

- Period: 2000-2012
- Dependent Variable: Transport Volume (ton-km)
- Independent Variables: International Transport (ton-km), Load factor (% km driven with loaded vehicle), GDP (mil. sek)



6. Results

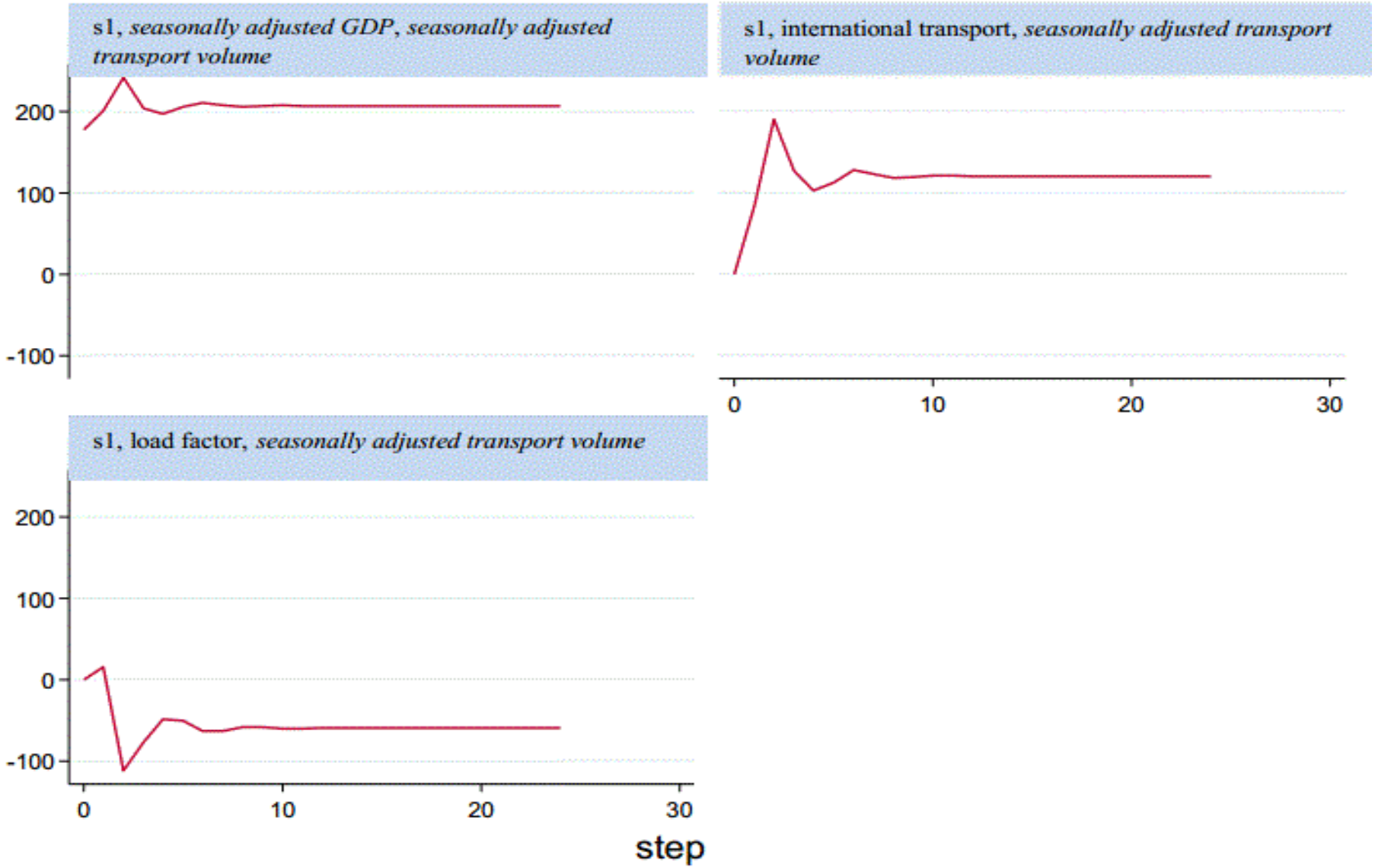
- ADF test- all the variables have unit roots
- Proposed number of lags: 1 lag
- Cointegration rank=1 → long term relationship
- Error correction term=-0.34, statistically significant → speed of adjustment to equilibrium
- No autocorrelation
- Normal distributed disturbances
- Stable model

10. Results

Orthogonalised Impulse Response Function Graph;

- the horizontal axis depicts a time period of 24 quarters;
- the vertical axis depicts the change of the response variable after the shock

Graph 1: Effect on transport volume from a sudden change in GDP (upper left), international transport (upper right), and load factor (bottom)

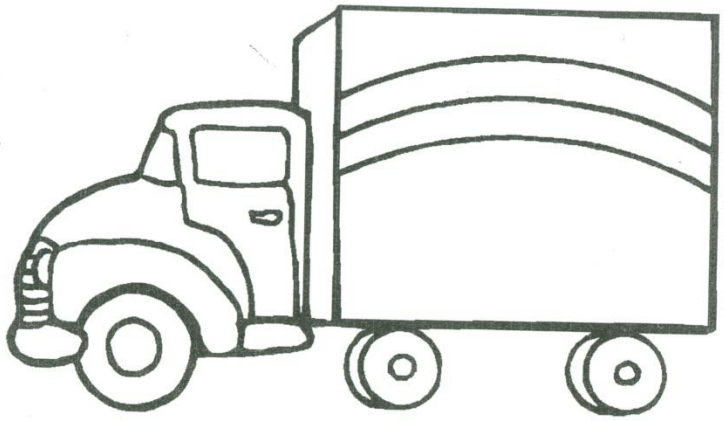


Graphs by irfname, impulse variable, and response variable

6. Results

Model B [potential policy]

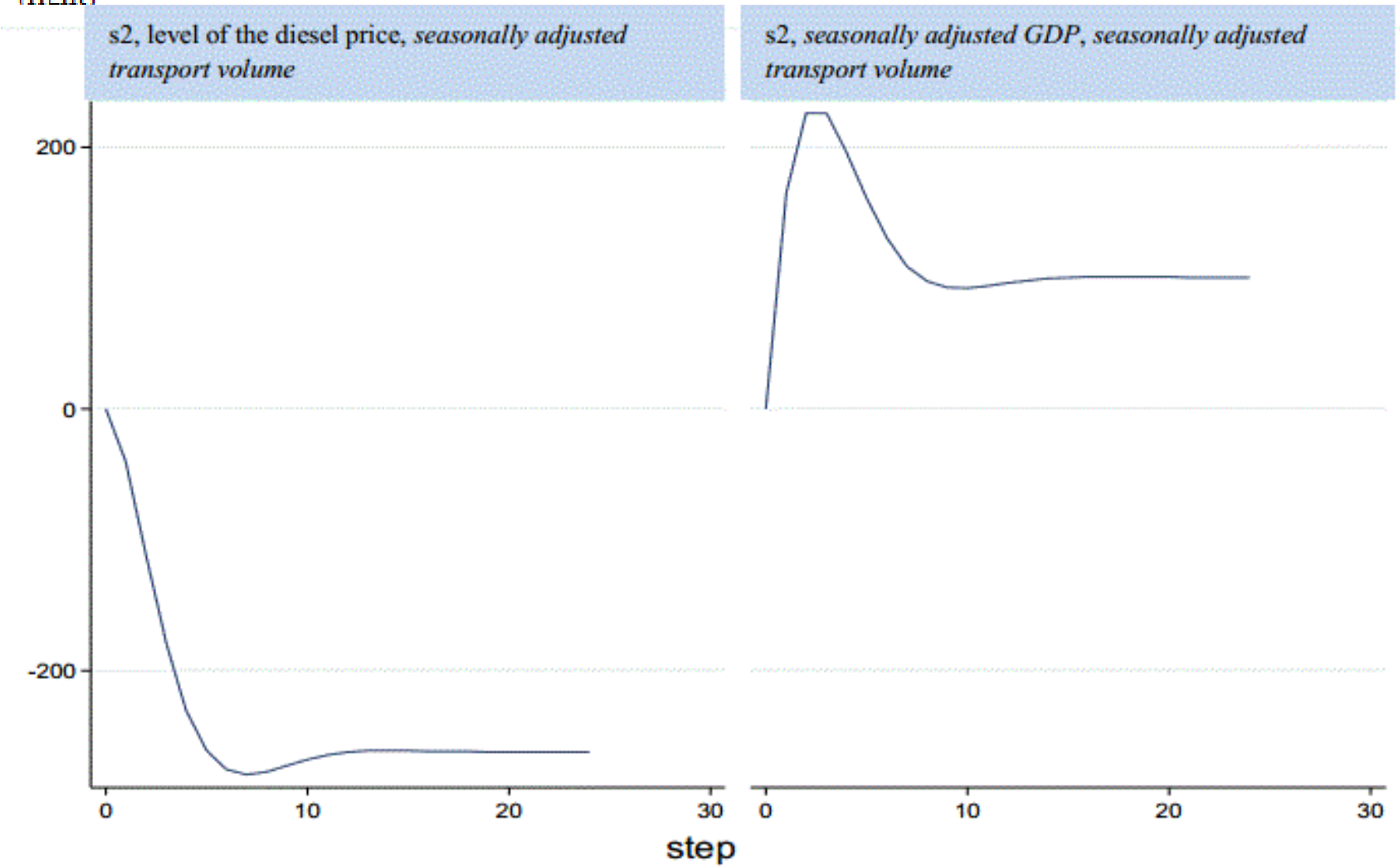
- Period: 2000-2012
- Dependent Variable: Transport Volume (ton-km)
- Independent Variables: GDP (mil. sek), **Level of the diesel prices (sek/l)**



6. Results

- ADF test- all the variables have unit roots
- Proposed number of lags: 2 lags
- Cointegration Rank=1 → long term relationship
- Error correction term =-0.89, statistically significant → speed of adjustment to equilibrium
- No autocorrelation
- Non normal distributed disturbances !
- Stable model

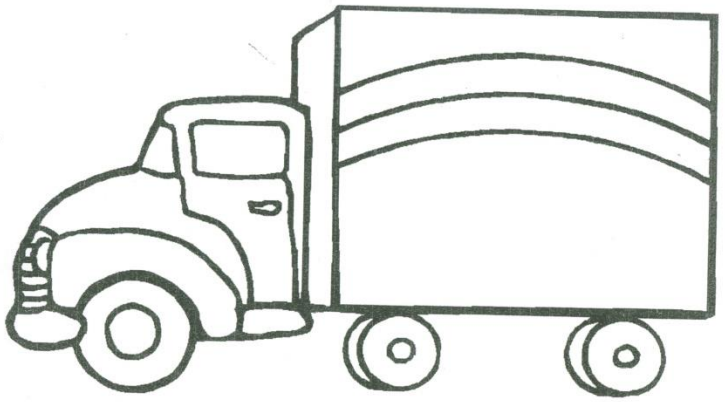
Graph 2: Effect on transport volume from a sudden change in the level of the diesel price (left) and GDP (right)



6. Results

Model C [policy]

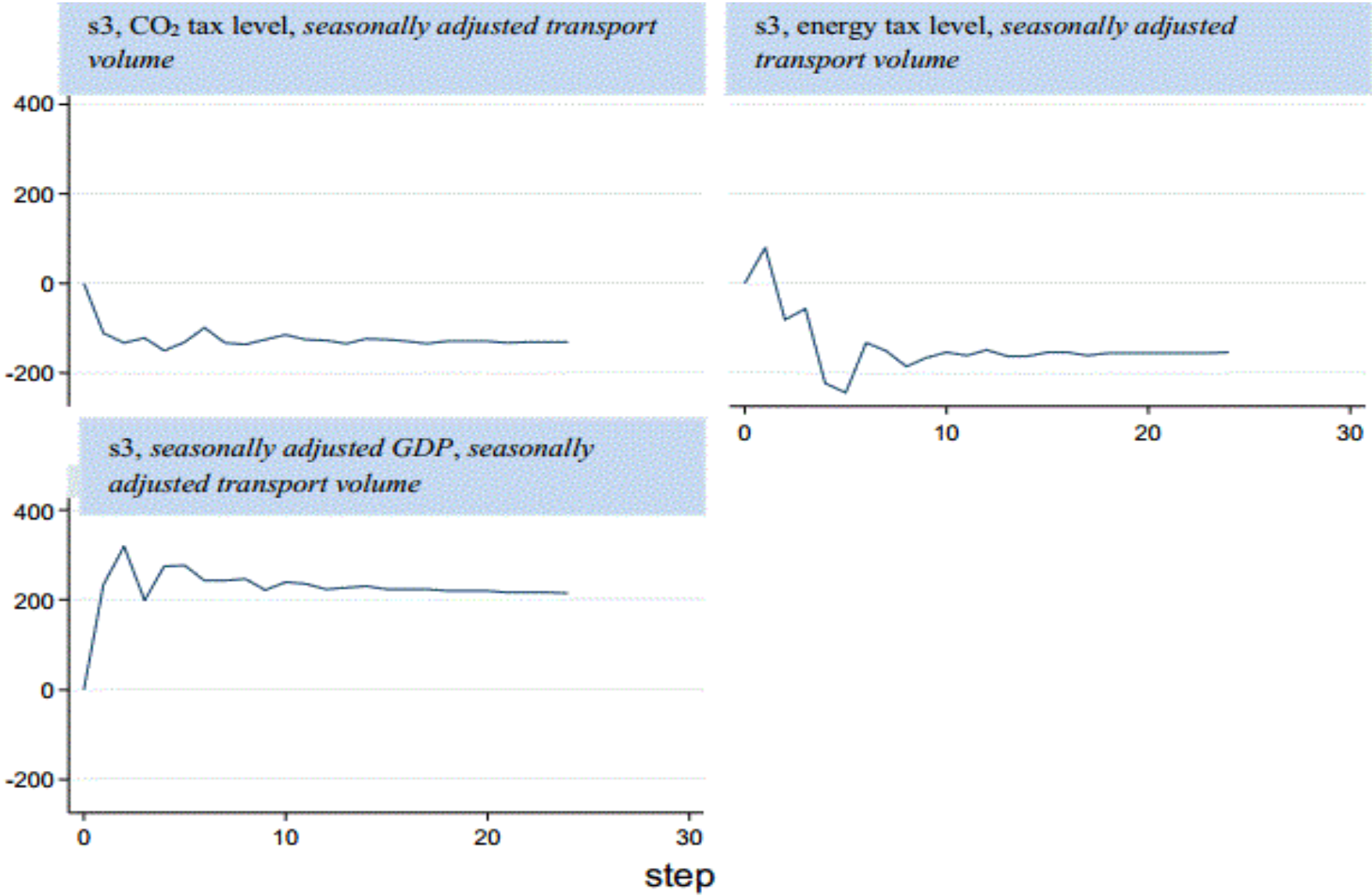
- Period: 2000-2012
- Dependent Variable: Transport Volume (ton-km)
- Independent Variables: GDP (seasonally adjusted), **CO2 tax level (sek/l), Energy tax level(sek/l),**



6. Results

- ADF test- all the variables have unit roots
- Proposed number of lags: 4 lags
- Cointegration rank=1 → long term relationship
- Error correction term =-0.44, statistically significant → speed of adjustment to equilibrium
- No autocorrelation
- Non normal distributed disturbances !
- Stable model

Graph 3: Effect on transport volume from a sudden change in CO_2 tax level (upper left), energy tax level (upper right), and GDP (bottom)



7. Preliminary discussion of results

- Varying models & results
  → not robust to interpret(competition, potential policy, policy)
- Explorative analysis

- GDP shows a consistent effect on transport volume through models
- No support for that taxes are sufficient as a policy instrument to reduce CO_2 in road freight transport in Sweden

- Heterogeneous sector

- Need for more detailed data about the sector!

THANK YOU!

Your comments are valuable for us

- Kveiborg O., Fosgerau M.,2007, “Decomposing the decoupling of Danish road freight traffic growth and economic growth”, Transport Policy, vol. 14,no. 1,pp.39-48,
- Sorrell S., Lehtonen M., Stapleton L., Pujol J., Champion T., 2012, “Decoupling of road freight energy use from economic growth in the United Kingdom”, Energy Policy, Volume 41, Issue C, pp. 84-97. http://econpapers.repec.org/article/eeeenepol/v_3a41_3ay_3a2012_3ai_3ac_3ap_3a84-97.htm
- Pålsson H., Larsson F. E., Abbasi M., Olander L.O., Wandel S., Smidfelt Rosqvist L., Lundquist Hiselius L., Stelling P., 2013,“Mot koldioxidsnåla godstransporter Tillväxtdynamiskt perspektiv på logistik och godstransporter fram till 2050” ,Trafikverket, 2013:120