Danmarks Statistik
MODELGRUPPEN

Dawit Sisay Temere

Arbejdspapir

05 January 2017

Re-estimation of export equations:
October-2016 model version

Resumé:

The paper presents re-estimation results for the export equations in the model version *October-2016*. The estimation period covers 1970 to 2013. The estimated parameters do not differ in a significant way from estimates in the previous model version *October-2015.*

DSI05jan16

Keywords: Export equations, re-estimation

Modelgruppepapirer er interne arbejdspapirer. De konklusioner, der drages i papirerne, er ikke endelige og kan være ændret inden opstillingen af nye modelversioner. Det henstilles derfor, at der kun citeres fra modelgruppepapirerne efter aftale med Danmarks Statistik.

1. Background

The current model version is based on a new national accounts data from November 2016. For total exports of goods and services, the national accounts provide data for the periods 1966 to 2013. Exports of goods in ADAM are disaggregated into four groups – agricultures, raw materials, energy and manufactures – and for the disaggregated groups data is available from the national accounts for the periods 2005 to 2013 in current prices and for the periods 2008 to 2013 in pervious prices. The disaggregated data are extended back ward to 1966 using RAS-technique, the method is described in the working paper *DSI02oct14.* In simple language, the import-export subcomponents in the input-output table in the previous model version are proportionally adjusted to the new national accounts data for total goods and services from November 2016. The data for export market and market price indices for the latest estimation period is updated using detailed SITC data from the OECD *International Trade by Commodity Statistics* database and the OECD *national accounts statistics* for total goods, see the working paper *DSI01may13*.

The paper is kept brief as there is no significant change in the estimated results compared to previous model versions, for a detail discussion of the export relations refer to ADAM book (Danmarks Statistik, 2013). The following section provides a brief review of the estimation equations and presents the estimation results.

2. Export equation

The Armington (1969) model is used for modelling exports. The long term relation can be given as:

$$\frac{fE<i>}{fEe<i>} = \left(\frac{pe<i>}{pee<i>}\right)^{\beta_1} \qquad (1)$$

Where *i* is the estimated export groups: agriculture, *01*, materials, *2+4*, manufactures, *59*, and tourism, *t*; *fE* is Danish exports in volume, *fEe* is export market volume index, *pe* is Danish export prices, *pee* is market price and β_1 is the long-term price elasticity. For estimation, the long term relation (1) is written in logs and transformed to an error correction form, for example, the equation for manufactures is written as:

$$Dlog(fE59) = \alpha_1 Dlog(fEe59) + \alpha_2 Dlog\left(\frac{pe59}{pee59}\right) + \alpha_3 Dif(dum91) - \gamma\left[\log\left(\frac{fE59_{-1}}{fEe59_{-1}}\right) + \beta_1 \log\left(\frac{pe59_{-1}}{pee59_{-1}}\right) - \beta_2 dum91_{-1}\right] \qquad (2)$$

A shift dummy *dum91,* that is zero before 1991 and 1 afterwards*,* is included to capture the effect of the German re-unification on Danish exports. Estimation of the export equation (2) is subject to simultaneity bias. For instance, export prices and volumes can increase due to a shift in the demand curve. In this case, the export price increase is not associated with a decrease in Danish exports. Bias could also arise due to measurement error in splitting values of exports into price and quantity. To reduce this problem, the export equations are simultaneously estimated together with an equation for export prices. The price equations are not used in ADAM. They are only used for estimation purpose.

3. Estimation result

Table 1 presents the estimated export relations. The estimated parameters are not significantly different from estimates in earlier model versions. The estimated short term demand elasticities are less than 1 reflecting that Danish market share is countercyclical to developments in the market. Danish firms win market shares during economic downturn and lose during economic upturns. The long term demand elasticities are restricted to 1, so that it is a model of market share. The estimated short term price elasticities are numerically smaller than the long term price elasticities. This is because a change in prices takes time before it fully affects volumes. The shift dummy for Garman re-unification is found to be significant only in the long term relation for manufactures.

Table 1. Estimated export relations

Variable		*i*=01 agriculture	*i*=2+4 material	*i*=59 manufacture	*i*=t tourism
Dlog(fE)					
Dlog(fEe)	α_1	0.560	0.681	0.557	1.00
		[0.242]	[0.136]	[0.061]	-
Dlog(pe/pee)	α_2	-0.594	-0.471	-0.797	-0.653
		[0.144]	[0.093]	[0.084]	[0.215]
log($fE/\widehat{fE}$)$_{-1}$	γ	0.15	0.15	0.15	0.20
		-	-	-	-
log(pe/pee)$_{-1}$	β_1	-2.270	-1.755	-2.016	-2.007
		[0.483]	[0.467]	[0.161]	[0.656]
dum91	β_2	-	-	0.285	-
				-	-
Dif(*dum91*)	α_3	-	-	-	-
			-	-	-

Note: $\log(\widehat{fE})_{-1} = \log(fEe) - \beta_1 \cdot \log(pe/pee) + \beta_1 \cdot dum91$
N=1972-2013, standard errors are given in square bracket. Restriction is imposed in the error correction coefficients within the bounds of the confidence interval from the unrestricted estimation. Similarly, the shift dummy in the long term relation for manufactures is restricted to 0.285 which is equal to the unrestricted estimate 0.151 plus twice the standard error 067. The restriction is motivated by the finding in Nielsen (1999), where it is shown that the Danish market share in Germany grew by approximately 50% between 1990 and 1993, hence the unrestricted coefficient of 0.151 can be considered too low. The battery of misspecification tests (not reported) show the models have desirable properties.

Reference

Armington, P. S. (1969). "A Theory of Demand for Products Distinguished by Place of Production", International Monetary Fund Staff Papers, Vol. 16, pp. 159 – 178.

Danmarks Statistik (2013). ADAM: A Model of the Danish Economy, Danmarks Statistik.

Nielsen, H.B. (1999). Market Shares of Manufactured Exports and Competitiveness. Monetary Review 2nd quarter. Danmarks Nationalbank.

Sisay. D. (2013). Export Market and Market Price Indices for ADAM. Working paper. ADAM. Statistics Denmark. (*DSI01may13*)

Sisay. D. (2014). Input-Output Table: RAS balancing of import-export subcomponents. Working paper. ADAM. Statistics Denmark. (*DSI02oct14*)