Testing convergence between roundwood prices in Finland and Estonia

Anne Toppinen[1]

Jari Viitanen[1]

Pekka Leskinen[1]

Ritva Toivonen[2]

[1]METLA, Joensuu Research Centre
[2]Pellervo Economic Research Institute

Motivation

▸ Enlargement of EU in 2004 brought in the 3 Baltic States

▸ Structural development in forest industry and roundwood markets around the Baltic Sea Area; investments of 6 mill.m3 in sawmilling in NW Russia and the Baltic countries in 2001-

▸ International trade of roundwood (mainly pulpwood) increased by 50% between years 1995 and 2001 in BSA

▸ Increased demand for wood and rising level of wood prices particularly in the Baltic States – catching up with the Nordic countries

▸ Linkages between national roundwood markets in Northern Europe have strengthened, but empirical analysis on market price development needed

Previous studies
on the integration of roundwood markets

▸ Thorsen (1998): Law of One Price holds in spruce sawlog markets of the 4 Nordic countries in the long run

▸ Toppinen & Toivonen (1998) between pine sawlog markets of 4 regions in Finland, some indication also for spruce sawlogs and spruce and pine pulpwood

▸ Several studies comparing between states in the US South; e.g. Bingham et al. (2003), Yin et al. (2002) finding varying degrees of market integration

▸ Preliminary analysis between spruce salog and pulpwood markets in Northern and Central Europe Mäki-Hakola (2002, 2004): higher correlations between log prices, but markets not integrated

Methods and data:

▸ **Theoretical background:** law of the one price (LOP), prices belonging to the integrated market should equal when expressed in common currency, i.e. $p_{1t} = a + p_{2t}$

▸ Pairwise testing for unit roots in time series data with ADF- and KPSS-tests

▸ If prices in two countries are integrated of I(1), also tests for cointegration using Johansen's method

▸ **Data:**
  - delivery prices of pine sawlogs and pulpwood, spruce sawlogs and pulpwood over bark
  - nominal logarithmic prices in Euros
  - period 1994:01-2003:12, from where two first years are later left out due to turbulent price development (N=96)

Roundwood markets of Finland and Estonia (2001)
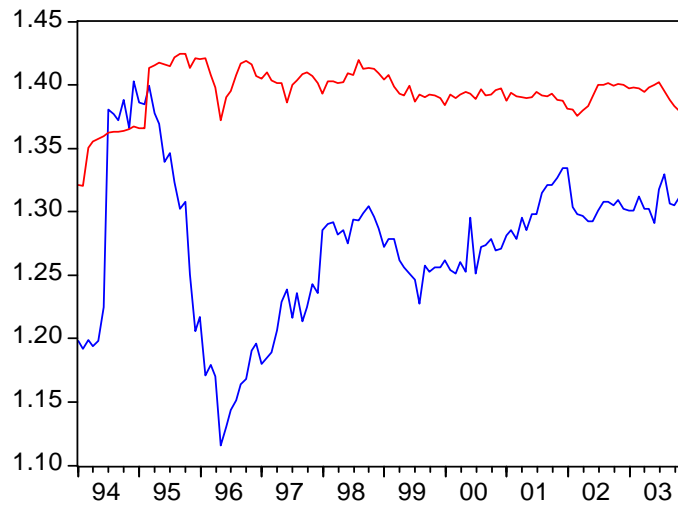
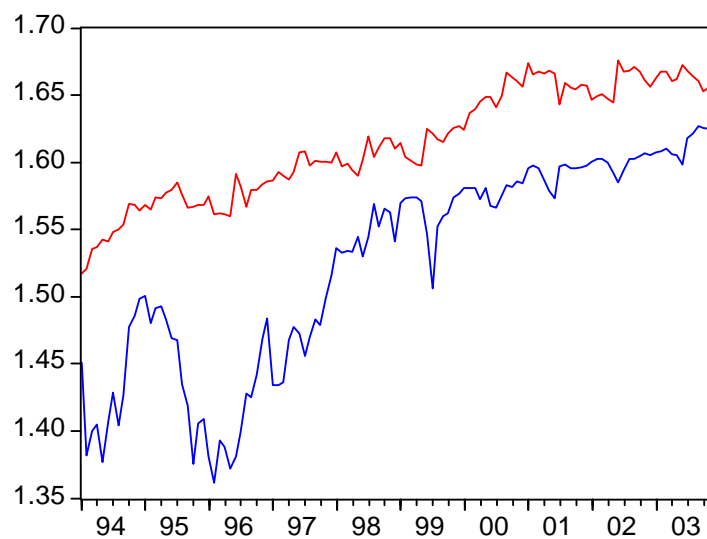|	Finland	Estonia
Forest area, mill ha	21,9 (71% of forest land)	2,1 (49% forest land)
Growing stock, mill.m3	1900	463
Harvests, mill.m3	53,3	10,2
Roundwood exports, mill.m3	0,8	3,7
Roundwood imports, mill.m3	15,6	0,6
Sawnwood production, mill.m3	13,4	1,7
Sawnwood exports, mill.m3	8,1	1,1

Pine sawlog prices in Estonia and Finland, 1994-2003
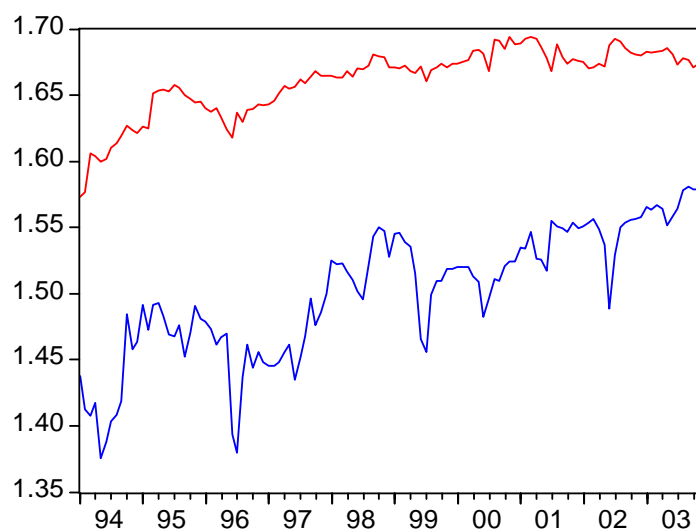
Pine pulpwood prices in Estonia and Finland, 1994-2003

Spruce sawlog prices in Estonia and Finland, 1994-2003

Spruce pulpwood prices in Estonia and Finland, 1994-2003
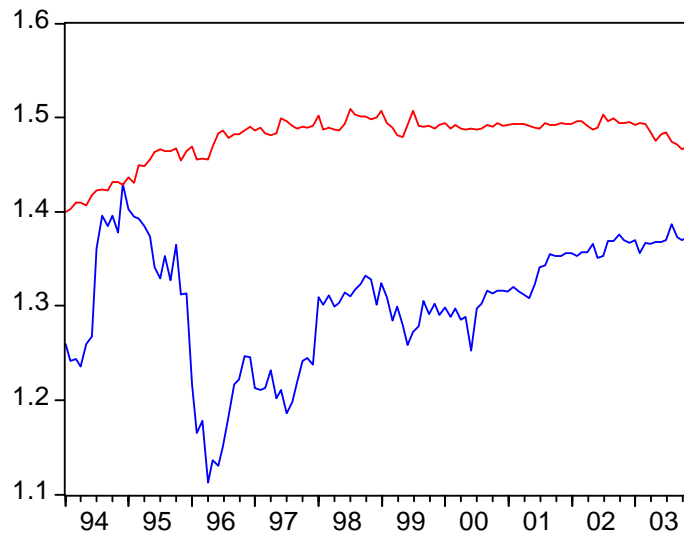
Results for ADF and KPSS-stationarity tests

Country	Assortment		Constant/Trend	Lags	ADF	KPSS	ADF	KPSS
					Levels		First differences	
Finland	Sawlog	Pine	C	1	-1.771	0.905**	-12.946**	0.134
		Spruce	C	2	-1.537	1.228**	-10.078**	0.177
	Pulpwood	Pine	C,T	2	-4.570**	0.063	-4.971**	0.041
		Spruce	C	2	-2.225	0.235	-2.425*	0.402
Estonia	Sawlog	Pine	C,T	2	-3.443	0.109	-9.064**	0.139
		Spruce	C,T	2	-1.704	0.286**	-8.909**	0.249
	Pulpwood	Pine	C,T	1	-2.160	0.148*	-5.815**	0.051
		Spruce	C,T	3	-5.952**	0.142	-5.393**	0.094

The asterisks * and ** denote that the null hypothesis is rejected at 5% and 1% level, respectively. In ADF the null hypothesis is that the time series is nonstationary, while KPSS tests stationarity as a null hypothesis.

Cointegration analysis between sawlog prices

| Variable	Hypothesis	Eigenvalue	Test Statistics		Critical Values (5%)	
			λ_{Trace}	λ_{Max}	λ_{Trace}	λ_{Max}
Pine	r = 0	0.17	17.31	20.97	15.7	20.0
	r < 1	0.04	3.67	3.67	9.2	9.2
Spruce	r = 0	0.12	11.93	14.67	14.1	15.4
	r < 1	0.03	2.74	2.74	3.8	3.8

Conclusions

▸ Time series properties differed between wood assortments and according to ADF and KPSS-tests cointegration analysis was applicaple for only pine and spruce sawlogs in Finland and Estonia

▸ Cointegration was found between pine sawlog prices only

▸ Note, test results on VARs were weak and sensitive to the number of lags used in VAR, residuals suffered from non-normality and heteroscedasticity

▸ Price convergence was analysed here using trend extrapolation (trends were significant explanators for price development). Again, results were different between wood assortments indicating possible convergence within 2-3 years in pine and spruce pulpwood and spruce sawlogs

▸ Further analysis on the factors explaining price convergence?

Price convergence in spruce sawlogs?
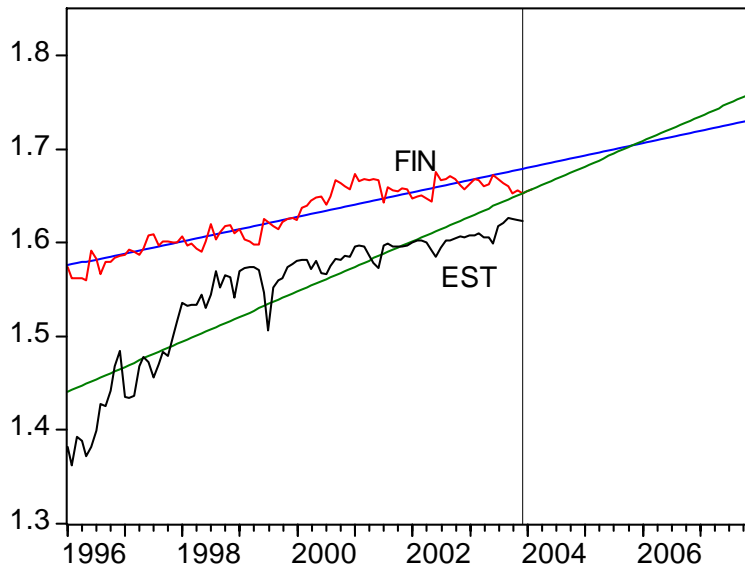
Price convergence in spruce pulpwood?