

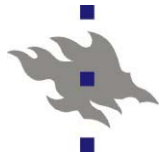


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FOREST SECTOR MODELING IN EUROPE – State of art and future research

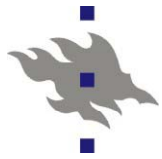
Anne Toppinen & Jari Kuuluvainen
Department of Forest Economics
University of Helsinki

**Forest Sector Modeling Conference,
Seattle 18.11.2008**



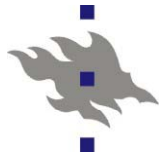
Point of departure

- In the International Forecasting Symposium, Stockholm 1994, professor Joseph Buongiorno concluded the increasing interest in the quantitative methods of econometrics, linear programming and system dynamics in forest sector analysis and forecasting in forest sector and the need to use different methods to complement each other
- Changes European economic integration and in the forest products markets and forest industries since the 1990s would justify a comprehensive survey on the existing economic research on European forest sector, but so far it is missing



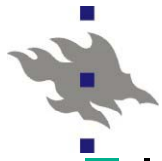
Survey method

- Since the last meeting of this IUFRO group took place in Miyazaki, Japan, October 1998, this review aims at making a synthesis on the published works from **1998 to 2007** in Europe
- Methodologically we focus on two approaches: econometric analysis and the use of forest sector models
- We intentionally exclude some substantial contributions in the related fields, such as in empirical behavioral models of timber supply and forest management decisions of nonindustrial private forest owners because of the recent surveys on the topics (Kuuluvainen et al. 2006, Beach et al. 2005, Amacher et al. 2003)



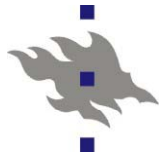
Econometrics and/or FSM?

- Using econometrics we are able to extract quantitative information on the structure and behavior of the industry or market, and the models can be used directly for forecasting and policy analysis.
- The information provided by these studies, however, also essential in constructing numerical forest sector models.
- The usefulness of forest sector models depends on correctly specified production technologies and on the correctness of statistically quantified economic behavioral relationships.



Material

- Initially our focus was to explore studies on European markets that are published in the main European forestry economic journals with a peer review practice, i.e. *Forest Policy and Economics* and *Journal of Forest Economics*, with an addition of general forestry journals such as *Scandinavian Journal of Forest Research*, *Silva Fennica* and *European Journal of Forest Research* in Europe and *Canadian Journal of Forest Research* and *Forest Science* in North America
- However, it became obvious that relevant studies have been also published elsewhere and we therefore also enables a larger set of journals (e.g. *Applied Economics*, *Energy Policy*, *Environmental Science and Policy*). Working papers, conference publications or unpublished dissertations were largely excluded.

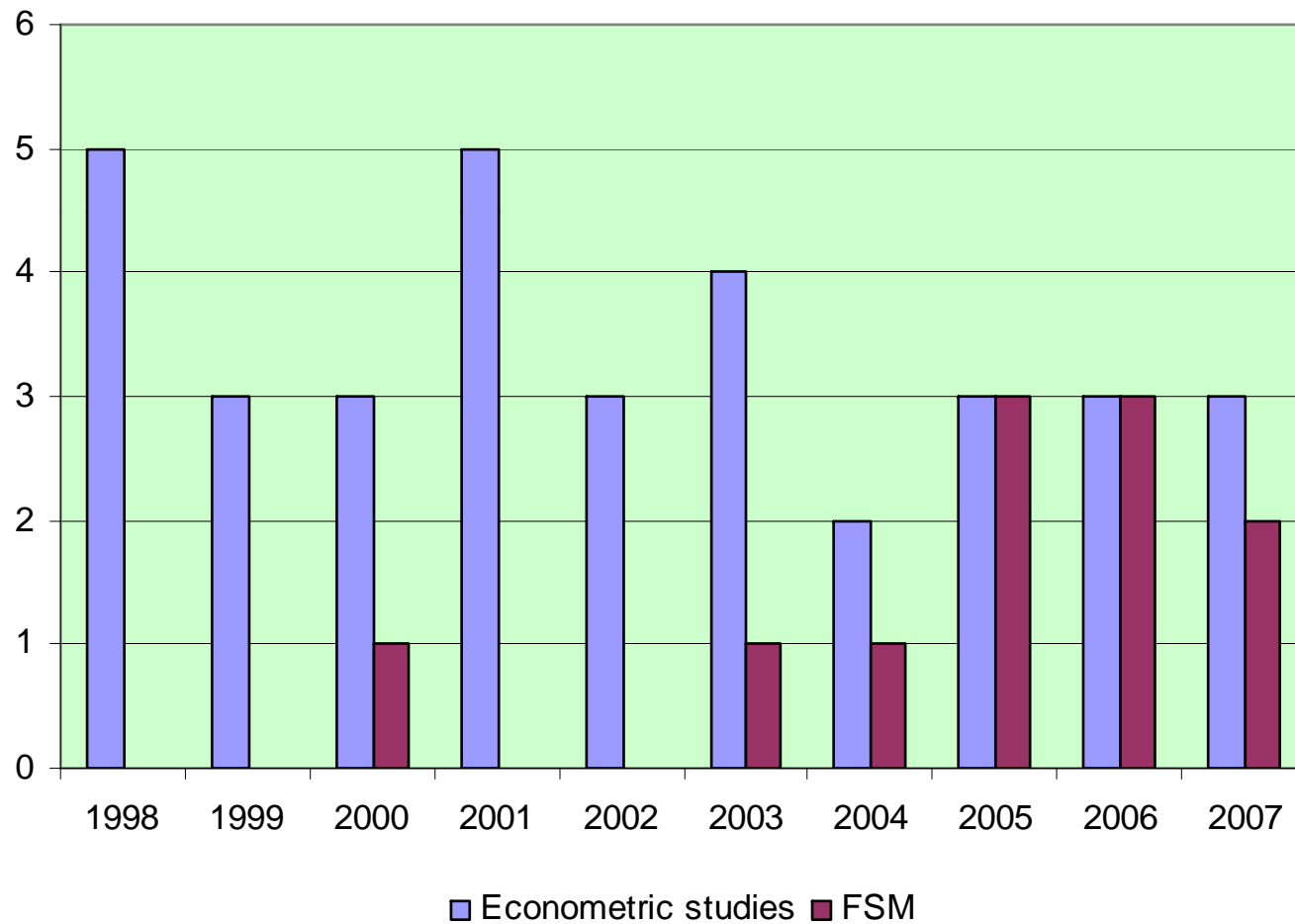


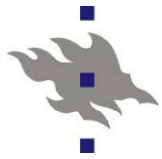
Results of literature survey

- 45 studies could be found published in 1998-2007 that focused sufficiently on European markets
- Of them, 34 were using econometrics and 11 were applications of FSM – a slightly unexpected ratio
- The main activity period in publication of econometric studies was around the end of century whereas publication of FSM has started to grow after 2002



Breakdown of published studies by years in 1998-2007 - main increase of FSM papers in the last 3 years and a decrease of econometrics





Where have these studies been published?

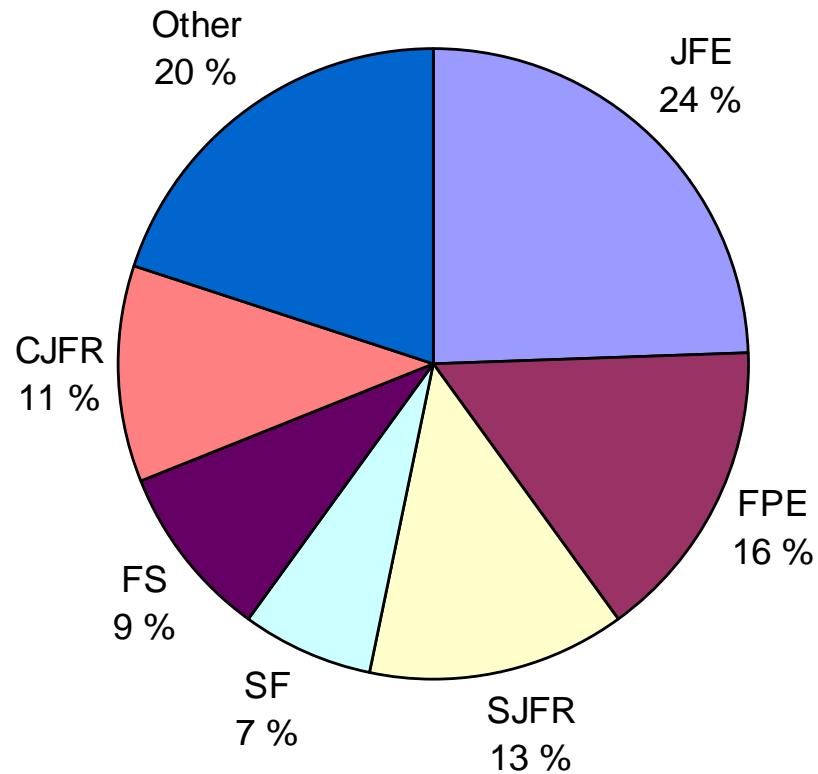
■ Econometric studies (34):

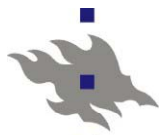
- 65 % published in European journals (JFE, FPE, SF, SJFR, EJFR), 24 % published in FS or CJFR and 12 % published elsewhere

■ FSM (11):

- 64 % published in European journals (JFE, FPE, SF, SJFR, EJFR), 0 in NA journals and 36 % in other journals
- In addition a lot of related research is included in the background for policy work for example in Finland in updating the National Forestry Programme (Uusivuori et al. 2008 in Metla Working paper 75), or earlier in the update of EFSOS by UNECE in Geneve (Baudin and Kangas 2003)

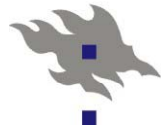
- Breakdown of publications by Journals:
■ 60 % in European journals





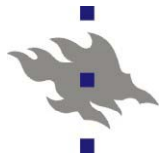
General trends in econometric studies

- Main activity has been centered around price analysis and market integration issues around the turn of the century, some studies on examining demand and price elasticities inspired by the new time series econometrics of Johansen (1996).
- With the increase of international trade of roundwood in Europe, substitution in global trade has been examined (Uusivuori and Kuuluvainen 2001) with some modest attempts have been made to understand determination of wood imports (Tilli et al. 2001) and the related price dynamics between main importers and exporters Finland and Russia (Mutanen and Toppinen 2007).
- During the past 10 years, the research interest in aggregate market level analysis has decreased in Europe. One of the few studies estimating timber market supply and demand is Mutanen and Toppinen (2005), who considered Finnish sawlog market under changing forest taxation system during 1986-2004.



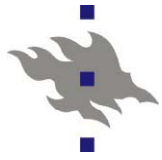
■ Main themes found in econometric studies on Europe

- modeling of product demand and supply (e.g. Kangas & Niskanen 2003, Hänninen 1998, Toppinen 1998), and production technology and factor demand (Andrade 2000, Lundmark 2003, 2004)
- price analysis and testing of market integration (e.g. Thorsen 1998, Toppinen and Toivonen 1998, Nyrod 2002, Stordal and Nyrod 2003), see also edited volume of Abildtrup et al. (1999)
- market demand and price forecasting (examples Brännlund et al. 1999, Hetemäki et al. 2004, Hetemäki & Mikkola 2005)
- modeling industry location (Lundmark 2001a & b, 2003), Bergman and Johansson 2002, Uusivuori & Laaksonen-Craig 2001)



Main topic areas of forest sector modeling applications

- the effects on the future development of forest sector of assumptions concerning GDP growth, forest growth and e.g., technological changes (Tromborg et al. 2000, Solberg et al. 2003)
- the effects of forest conservation (Kallio et al. 2006, Hänninen & Kallio 2007) have been found to be only moderate at European level and felt at the country level (in Finland) mainly in sawmill industry
- and most recently: effects of forest bio-energy (Bolkesjö et al. 2006, Tromborg et al. 2006 and 2007) finding relatively modest impacts of increased bioenergy use on forest industries

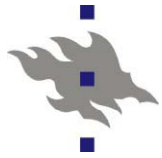


Examples of unexplored topics: developing markets of bioenergy

- Markets for energy wood have been advancing in Europe in the past decade, but econometric studies on wood energy demand and supply, as well as the effect on the forest sector markets induced by this increase has been limited to practically one country, Sweden (PhD study of Matias Ankarhem)
- estimation of supply elasticities or impacts on roundwood markets are needed but will be difficult in the changing forest policies and bio-energy markets still under development

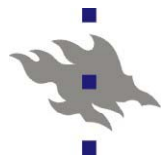
■ **Some conclusions on previous studies**

- The bulk of the published research in Europe have concentrated on two Scandinavian countries; Norway and Finland, and have been mainly products of the related PhD projects
- Forecasting the short-term market development has not been very successful and from the practical and policy point of view, maybe the information on market structures and competition provided by the new time series econometrics methods has been most useful. Towards present date, the use of time series econometrics in forestry sector has become rare in Europe in general, and there are important fields with little or no research (e.g. linkages between different market levels or multi-country market studies).
- On the methodological side, cointegration analysis acknowledging nonlinearities in data and cointegration relationships might bring new information on the forest products and timber market integration in Europe (Prestemon et al. 2008).



Forest sector modelling in Europe

- Activities have been centered in the Nordic countries (extensions of Kallio et al. 1987 Global Trade Model, EFI-GTM or SFGTM)
- Building of EUFASOM model at IIASA will provide further elaborations on the land use issues similar to what has been going on in the NA already some time



In the future?

- It is important to know which economic factors affect the location of the capacity expanding investments. In the future, forest industry location decisions should therefore be studied from the global perspective but using preferably micro-level data.
- It is equally important to measure and explain technical advancement and the factors affecting it, in order to make the long-term partial equilibrium models useful in scenario and policy analysis.
- While challenges in short term forecasting are mainly statistical, related to ever faster transmission of random shocks through the world economy, large scale partial equilibrium models on forest sector are faced with increased product dynamics and global structural changes in the industry.
- And the need to strengthen research capacities regarding economics of forest sector markets in Europe is evident



Thank you!