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Economies of Scale in Two Finnish Forest Industry Mergers

ABSTRACT

Corporate managers and researchers often speak about economies of scale, while there still reigns great confusion about where economies of scale actually exist. Is the whole idea fictitious or can it be measured? In the present paper, two relative measures for the evaluation of economies of scale are suggested, and they are applied to a real case. The actual numerical calculations concern the Finnish forest industry mergers, and the probability of cost advantages attained with these restructurings is discussed.

Keywords: *Economies of Scale, Finnish Forest Industry*

INTRODUCTION

The principle of comparative advantage is a classical argument for free trade. The traditional theory has been criticized, however, because it cannot explain many inconsistencies, such as the behaviour of multinational companies and the possibilities of monopoly profits. Nowadays researchers emphasize the roles of imperfect competition, economies of scale and pro-

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duct differentiation. Specialization has often been mentioned as being in the background of these scale economies, and for specialized products, firms need bigger markets. These tendencies are central points when we think about firms' attitudes to economic integration.

In connection with mergers, strategic or competitive advantages or synergy effects between operations of companies are spoken of. As Holl and Kyriazis (1997, pp. 484–485) say, the major themes of merger research have been to study the effects of mergers and ask if they create value, or to consider what is the source of this added value. Economies of scale and scope, which come from combining of overlapping resources, or increasing monopoly power are said to be behind the operational synergy effects in related mergers, i.e. when merging firms are within same industry (Singh and Montgomery 1987, pp. 379–380). When firms are from unrelated industries as in conclomerate mergers, value creation is also explained with managerial or financial synergy (Sudarsanam et all 1996, pp. 674–675). Often mergers offer new opportunities to companies and their owners, but it is also possible that outlined advantages are not obtained.

Strategy literature deals with merger benefits on a conceptual level and accounting literature seldom tries to quantify strategic elements. When we think about financial statement analysis, merger situations mean clear inconsistencies in a firm's history in the analytical sense, and merger advantages are seldom systematically measured. The aim of this paper is to suggest a possible method for quantifying economies of scale in merger situations. The proposed ratios are based on public information, and the study is written from the viewpoint of the external observer. After the measure have been presented, they are applied to a case of restructuring in Finnish forest industry.

ECONOMIES OF SCALE AS A MERGER MOTIVE

The idea of economies of scale has a long history in Finnish forest firms. Rudolf Walden, the founder of United Paper Mills, stated about the expansion plans of the Myllykoski mill in 1934:

> *Every plant has to be of a certain size until it can be profitable and can bring its best outcome.* (Nordberg 1980, p. 213)[1]

The quotation above mentions a certain size, not necessarily the biggest possible one. In practice, we have seen how the size of paper and pulp mills has continuously increased. Today modern paper machines are over four times bigger than in the 1960's, and Ryti (1988, p. 85) has noted that the most efficient scale of plant increases as a function of time. Evidently, there

1 The original quotations are in Finnish and the translations are the writer's own.

are often remarkable economies of scale at the plant level, but what is the situation at the firm level, and especially in merger events where two firms combine their operations?

Rationalizing of capital and labour resources by changing corporate structure often takes place in the form of mergers. Most managers seem to believe that their firm would be more competitive if it was a little bigger. So these economies of scale are natural goals for horizontal mergers. Brealey and Myers (1991, pp. 820–828) divide merger motives into sensible and dubious ones. Economies of scale, economies of vertical integration, combining complementary resources, unused tax shields, use of surplus funds and eliminating inefficiencies are seen as sensible reasons. Diversification, bootstrap game (chain letter game) or lower financing costs often includes doubtful elements.

The owners and managers of Finnish forest companies have presented interesting claims about economies of scale in the press before and after the Enso-Gutzeit/Veitsiluoto and Repola/Kymmene mergers. From the outsider's viewpoint it is difficult to say what are the person's real opinions and what part is intended as a signal to public audience. However, the following quotations show that there was not perfect consensus about the nature of scale economies between the managers and the owners.

General Manager Vesa Vainio, Merita Bank (Helsingin Sanomat 11.2.1995):

> *"I only pay attention to the fact that there is a certain economy of scale in some branches, and forest industry is one of them. Banking is a second one. And then there are definitely others."*

General Manager Harri Piehl, Kymmene (Kauppalehti Optio 15.6.1995):

> *"Adequate size can also be achieved by concentrating on certain products and to be the leading producer of them."*

Board member and owner L. J. Jouhki, Kymmene (Kauppalehti 13.9.1995):

> *"Economies of scale give better development opportunities. With an adequate market share, sensible control of markets is possible. Selling associations did this work earlier damned well."*

Managing Director Jukka Härmälä, Enso-Gutzeit (Kauppalehti 13.9.1995):

> *"I find it a good thing that the concentration of forest companies has proceeded this far. It means that the amount of (investment) decisionmakers will diminish and the risk of overinvestments will decrease."*

Managing Director Niilo Pellonmaa, Veitsiluoto (Kauppalehti 26.9.1995):

> *"I do not defend small size as such. Veitsiluoto nearly fell down with the fine paper machine investment. But now the situation is already different. The company has three pulp mills and five paper machines. After each machine investment the next one is always a proportionally smaller encumbrance.*

Some different attitudes to scale economies and merger gains can be seen here. Those who represent the interests of owners or creditors speak about economies of scale in the fields of finance and marketing. Managers emphasize the role economies of scale in capital investments and production. On the other hand, the role of managers is to defend their own organizations and this can be seen in the comments of Piehl and Pellonmaa. Managers also think about the firms' employees and traditions, and they usually see the problems of increasing operating complexity in a more concrete way than the owners of big companies. The paradox is that the manager must cope with both sides, the owners and his personnel.

ECONOMIES AND DISECONOMIES OF SCALE

What are the main sources of these scale economies? Studies have shown the existence of scale effects in the level of production equipment, plants and whole firms (e.g. Scherer 1980, pp. 81–84 and Hay & Morris 1991, pp. 31–34). At the firm level the economies of scale are typically achieved in the areas of production, marketing, distribution, administration, or research and development. In the context of organization control economists often speak about lower information or transaction costs. The necessity of smaller reserves can also bring significant cost savings. The big firms' ability to operate in different markets stabilizes profit fluctuation and can mean lower cost of capital. If we think of capital investments, finance and risk management of investment projects are also possible sources of certain economies of scale.

Only seldom are the capacities of plant equipment in balance with each other. When the plant operates on low capacity utilization rates, the incompatibility costs increase. Often the main equipment of the plant is the determinative thing as we think of the amount of economies of scale. In some situations, the structural geometry of the equipment determines the sensible size and thus also the costs. Cost engineers know this phenomenon as the 0.6-rule which says that doubling the size increases equipment costs with the half (Tribe M. A. & Albine R. L.W. 1986).

The unit costs of products decrease typically if the run-length of production increases. The specializing of labour uses the learning-curve effect in its whole extent. Greater production quantity often gives possibilities to a more economical use of materials and energy or

better purchase and inventory management. Economies of scale are usually mentioned in connection with mass production, and some writers see it as a means to competitive advantage (Porter 1991). We know that capacity and production quantities can be found quite easily in mass production processes, but even these things are difficult to measure when we work with unique products. The economical effects of joint production have their own economies of scope idea (Tirole 1990, pp. 18–20). Nowadays many firms use flexible manufacturing systems to produce a wide variety of products with the same equipment. Their competitive advantage is based on economies of scope. This is opposite to the tendency of mass production to achieve competitive advantage with economies of scale (Johnson & Kaplan 1991, pp. 216–217). Especially in small countries and in small enterprises, flexibility and adaptability have been seen as a strategic choice (Honko 1984, p. 243).

The average unit costs can decrease in a growing company if there are no restrictive factors. However, changes in the competitive environment, unmanageable rapid growth or organizational problems can eventually lead to increasing costs. High distribution costs, problems of bureaucratization, complexity confusion and vulnerability to risks also explain diseconomies of scale (Hayes & Wheelwright 1984, s. 61–64). When the economies of scale are estimated, it must be noticed that cost advantages often diminish because of competition and technological progress. Sometimes economies of scale are still increasing, but the larger plants seem to grow slower than the smaller plants (Brush & Karnai 1996).

In some industries firms have to take advantage of economies of scale by expanding overseas. Their home markets can be too small if for example the research and development costs of their products are huge. Competing in the world scale is the direction not only for knowledge based, but also for capital intensive industries. Many traditional industries need greater volumes to spread their high overhead costs (Shapiro 1993).

MEASURING COST ADVANTAGE

In this study, we base the cost advantage measurement to cost functions. How to reduce unit costs of production is always an interesting topic for a firm. Total costs (C) are often described with the three degree function (γ_i are coefficients of cost functions and q is production quantity):

(1) $C = \gamma_0 q^3 - \gamma_1 q^2 + \gamma_2 q + \gamma_3$.

We often make a simplification and present the function in the following linear form:

(2) $C = \gamma_4 q + \gamma_5$.

In this type of function, the fixed costs per unit are minimized, when the production amount is as high as possible. As commonly known, all costs are variable in the long run, and the long

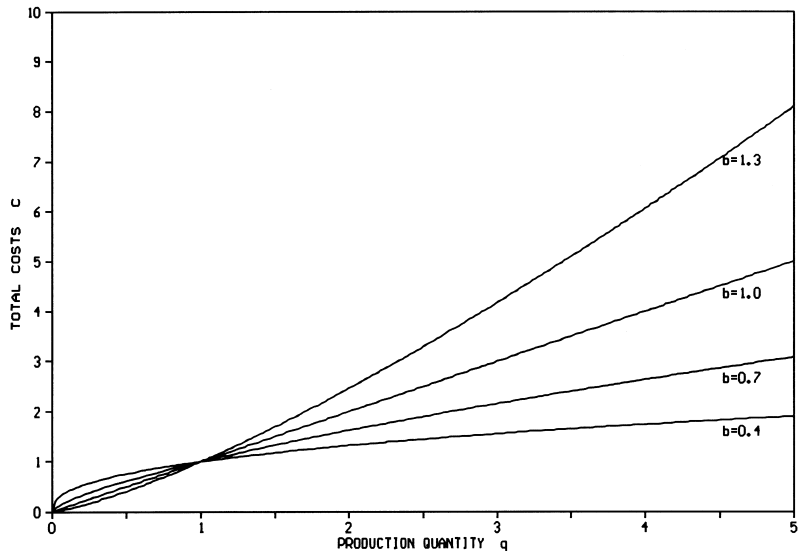

FIGURE 1. Long term cost functions on different scale factors, when $\gamma = 1$.

term cost function is shaped as an envelope curve of the short term cost functions (e.g. Naylor & Vernon 1969, pp. 100–104). The long term costs can be described with the scale-factor *b* (Figure 1):

(3) $C = \gamma q^b$.

When b=1, there are constant returns of scale. If b<1, there are economies of scale and production growth leads to decreasing unit costs. If b>1, we talk about diseconomies of scale. In empirical studies, researchers have noticed the existence of economies of scale in the case of operating and investment costs (Hay & Morris 1991, pp. 31–32). At plant level 84% of the observations showed that the scale factor was lower than 0.9 and the median was 0.73. In Ryti's (1988, p. 84) presentation based on technology and costs in 1979, the scale-factors of paper and pulp mills were about 0.7–0.8. It can be assumed that scale effects in merger situations are smaller than on the plant and machine level and they are difficult to quantify. We have not found examples of scale factors being used in merger situations, and thus no comparable figures for them can be presented.

The effect of economies of scale is measured with two observation points, zero and one. The total costs in these points are $C_0=\gamma q_0{}^b$ and $C_1=\gamma q_1{}^b$, and γ and b are constants on a specific long term cost curve. These costs relate to each other in the following way:

(4) $C_1/\ C_0 = (q_1/q_0)^b$.

Thus it can be written to the scale-factor

$$(5) \quad b = \frac{\ln(C_1/C_0)}{\ln(q_1/q_0).}$$

This is our economies of scale measure, which we will apply in our case example. Naturally, the cost context affects essentially the value of the scale factor. For example in different calculations operating costs, investment costs or total costs can be considered, and these give their own results.

It can be asked, why to measure economies of scale in such a complicated way as presented in equation 5. Can we use a simpler measurement instead without taking logarithms? If it is assumed that all costs are variable and so $C_1=\gamma_1 q_1$ and $C_0=\gamma_0 q_0$,and we mark $e=\gamma_1/\gamma_0$, then

$$(6) \quad e = \frac{(C_1/C_0)}{(q_1/q_0).}$$

It seems that this alternate measure gives essential information about the scale effect when all costs are variable. The values of this ratio are below one, if there are economies of scale, i.e. production quantity increases faster than costs, and the ratio is more than one in the case of diseconomies. It is natural that these two ratios behave differently (Figure 2), and that the logarithmic measure *b* is more sensitive to changes than the linear measure *e*. The *b*-ratio can get big negative or positive values at certain parameters. If the size and the costs change at the same speed, e.g. they double, there are no economies of scale ($b=e=1$). It is also remarkable that if the size increases, but costs are unchanged then $b=0$. It is unlikely that $e=0$, because this requires that $C_1=0$. Both measures are applied in the chapter below.

CASE FOREST MERGERS

In our case example, we apply our measures to two mergers of Finnish forest firms. The first of the mergers happened when Enso-Gutzeit merged with Veitsiluoto and they formed Enso Group, and the second one when UPM-Kymmene was born in the merger of Repola and Kymmene. Both of the arrangements were combination mergers, where a new company was formed from two old ones.

Meetings of shareholders of Enso-Gutzeit and Veitsiluoto accepted the merger agreement in September 1995. Already in November 1994, Enso-Gutzeit had acquired 35% of the shares of Veitsiluoto. Repola and Kymmene merger arrangements were accepted at the turn of October and November 1995, and the name of the new company became UPM-Kymmene. Both mergers were marked to trade register on the 1st of May in 1996. Metsäliitto is included in this

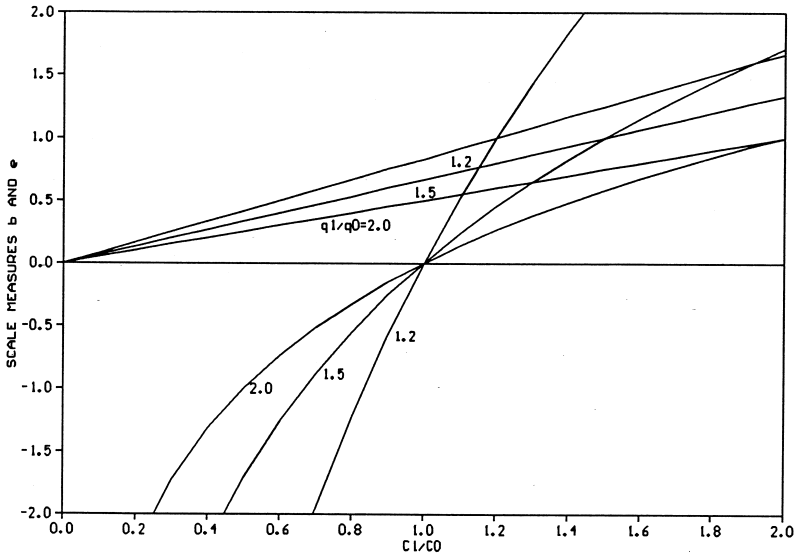

FIGURE 2. Economies of scale measures b (logarithmic) and e (linear) as a function of quantities and costs.

study, because it offers a natural comparison point to the mergers. Metsäliitto's growth within same period has happened with acquisitions, alliances and shared companies, and there have not been such merger arrangements as between the other companies.

It is natural that the ownership structure of the companies is a central point in merger negotiations. In the end of 1995, State of Finland and National Pensions Office together owned 61% of the shares of Veitsiluoto and 70% of the shares of Enso-Gutzeit. This kind of ownership structure made it possible to concentrate the ownership of the state to one big company. The ownership of Repola and Kymmene was much more scattered. Repola had about 45,000 and Kymmene 31,000 of shareowners in 1995. Insurance company Pohjola with its subgroups owned over 19%, Metsä-Serla 9% and Merita Bank 5% of the shares of Repola. Kymmene's biggest owners were insurance company Sampo with its subgroups (8%) and Merita Bank (6%).

In Appendix 1, it is described how the corporate structures have changed from 1994 to 1997. Before the mergers, the Repola-concern operated in areas of forest industry (United Paper Mills) and metal industry (Rauma). Many products of Rauma were related to the forest industry. Kymmene, Enso-Gutzeit, Veitsiluoto and Metsäliitto were forest companies whose main products were different kind of papers, paperboards, sawn goods, plywood and other wood products. After the mergers, the companies have sharpened their profiles towards paper and packing products, and some extraordinary parts have been abandoned. The Rauma-concern has become an associate company of UPM-Kymmene and Enso has sold its forest chem-

istry division. Market orientation and the firms' own market organizations have also strengthened. Metsäliitto has established strategic alliance in printing papers with the forest company of Myllykoski. Roundwood, energy and pulp are today seen more as resources which are divided to their own units. Metsäliitto and UPM-Kymmene share the risk of pulp production with the jointly owned Metsä-Rauma and Metsä-Botnia companies.

The managing directors of the formed companies had certain views on the merger benefits in 1995. Juha Niemelä estimated total benefits to 1–2 billions Finnish marks per annum during the following three years, and said the main sources to be (UPM-Kymmene 1995, pp. 2–3):

- specialization of paper machines
- increasing production efficiency based on knowledge transfer in the concern
- optimization of energy and pulp usage
- increasing cost efficiency of transportation, inventories and purchasing
- efficient capital allocation by better capital investment direction, escaping overlapping and speeding up turnover of working capital.

Jukka Härmälä evaluates the total benefits to 400 millions of Finnish marks per annum, and said that the central advantages will come from (Enso-Gutzeit 1995, pp. 12–13):

- optimization of production structures
- purchasing of raw materials and energy
- usage of international marketing network and
- research and development activities.

As we note, many in literature described sources of scale economies are also mentioned in managing the directors' outlooks. More specialized production structure and optimization of energy and raw materials usage are assumed to be the essential source of scale economies in both companies, but also marketing and capital allocation are mentioned.

DATA

Our data consist of income statement and balance sheet information of the companies before and after merger arrangements. The calculations were made in 1994 and 1997, and this choice is based on nearly similar capacity utilization rates. The capacity utilization rate of Finnish forest industry was 94 percent in 1994 and 92 percent in 1997. Thus, the comparison years were good years to the companies. Accounting period 1994 was also the last when the merger arrangements were not publicly known and year 1997 was the first entire period after the mer-

gers when the companies operated with their new organizations. We have also done some preliminary calculations using the figures of United Paper Mills, which was the most profitable part of Repola company before the merger. However, measuring of whole benefits requires that the use of figures of the main groups, not their subgroups.

Because the products of the companies are different, we have used net sales as the firms' capacity measure. Net sales describe the firms' practical capacity, not the theoretical one. Both quantities and prices affect net sales, and changes of prices give a possible reason for criticism, but net sales as a capacity measure is the best operational solution we can find. In merger situations and in long-term studies the accounting practices of firms often change, and this can cause some unreliability in detailed analysis. However, it is assumed that cost groups are comparable enough. The total costs are taken from the companies' income statements and grouped in the following way (compare with Yritystutkimusneuvottelukunta 1995):

Net sales
– Material expenses
– External services
– Personnel expenses
– Other expenses
– Capital expenses

Net income before extraordinary items.

Net sales also include other ordinary income, and the material expenses are corrected with the change of raw material inventory. Depreciations, financial expenses and taxes form the group of capital expenses. All other items before extraordinary items are summed up to other expenses (Appendix 2). Because capital is a critical factor in forest industry, changes in the main items of assets are also compared to changes of net sales. Our groups are fixed assets, current assets, total assets, debt and equity. Fixed assets include intangible and tangible fixed assets, other long-term investments and possible valuation items. Obligatory reserves are summed to liabilities. Equity is so-called broad equity and it includes shareholders' equity, voluntary reserves, minority interest and deferred tax liability.

When the cost structures of companies in 1997 are looked at, it is noticed that material costs are nearly 50% from turnover, and it is a pitfall that it cannot be divided into smaller parts. Personnel expenses are about 15% and capital expenses about 11% from turnover. Costs of external services and other costs vary, but their sum is nearly 20%. Net incomes vary between 3% and 9%. If we compare the net incomes in 1994 and 1997, it seems that the managers' estimate about merger benefits of 1–2 billion Finnish marks in Repola and Kymmene merger was realistic, but that Enso has not achieved savings of 400 MFmk.

RESULTS

Economies of scale measures *b* and *e* are calculated for different cost groups and for total costs as described in equations 5 and 6. These results are presented in Figures 3 and 4. The economies and diseconomies of scale are separated with hurdle value 1.0. When the figures are compared, it is seen that usually both measures give us the same kind of information despite of different scales. Some numbers can be confusing, for example in capital costs the *b*-ratio of UPM-Kymmene is 0.13, but the *e*-ratio is 0.92. The difference is understandable when we look at Figure 2. If costs and size do not change much, i.e. C_1/C_0 and q_1/q_0 are near one, then *b*-ratio is near zero, but *e*-ratio is near one. Our analysis is based on both figures 3 and 4.

Two criteria are set to clear economies of scale in merger situations. First, the figures must be below hurdle value and secondly also below the values of the comparison numbers of Metsäliitto. When we look at the total costs, UPM-Kymmene has achieved some economies of scale with both measures (*b*=0.64 and *e*=0.97). In cases of Enso and Metsäliitto, there are not any economies of scale in total costs. In different cost items, UPM-Kymmene has achieved remarkable economies of scale in personnel and other costs and minor scale economies in external services and capital costs. With Enso, there are scale economies in capital and other costs. The use of materials, which is the biggest cost group, has been uneconomical in all companies, and it seems that possible advantages that come from specializing of paper ma-

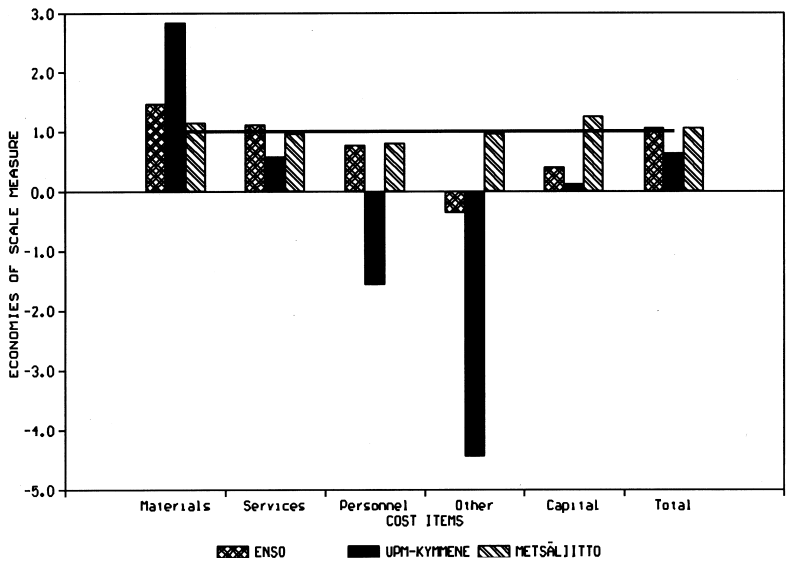

FIGURE 3. Measuring economies of scale with b.

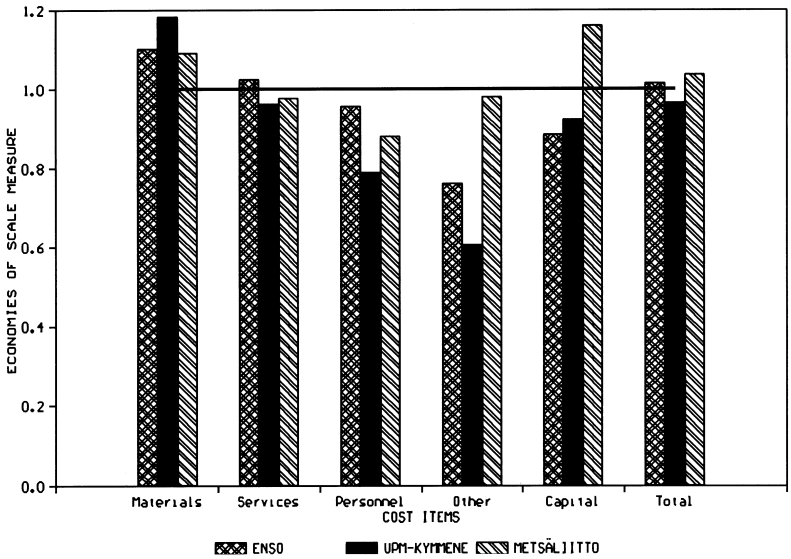

FIGURE 4. Measuring economies of scale with e.

chines and optimization of energy and pulp use are not yet realized. Another affecting factor to these diseconomies is that the prices of logs and pulpwood have risen during the studying period. It must be noticed that the structuring is a long process and some cost savings may come out later.

In the field of scale economies, as in many other areas, there is no such thing as a free lunch. Typically when some costs decrease, others will increase. The idea is to try to turn the costs to a more favourable direction. In this study we have measured the effect of economies of scale with the total costs and turnovers of companies. Of course, this is closely connected to the question of how the firms' return on assets and capital turnover change as a consequence of the mergers. Enso and Metsäliitto have increased their capital turnover most from the year 1994 to 1997 (Appendix 2). Only UPM-Kymmene has raised its net income percentage, and mainly this has lead to a better return on assets and the highest return on equity. As we have stated above, decrease of certain costs is in the background of the improvement.

Changes of main asset groups are also measured with our ratios (Figure 5). If the criteria are the same as before, only Enso has achieved scale economies due to merger in total assets and in the amount of debt. Enso and UPM-Kymmene have decreased their current assets, which shows that it is possible to achieve merger benefits as a form of lower working capital. The growth of fixed assets in Enso and Metsäliitto has been slower than the addition of net sales, and this is a mark of restrained capital investments. The growth of equity has been faster than

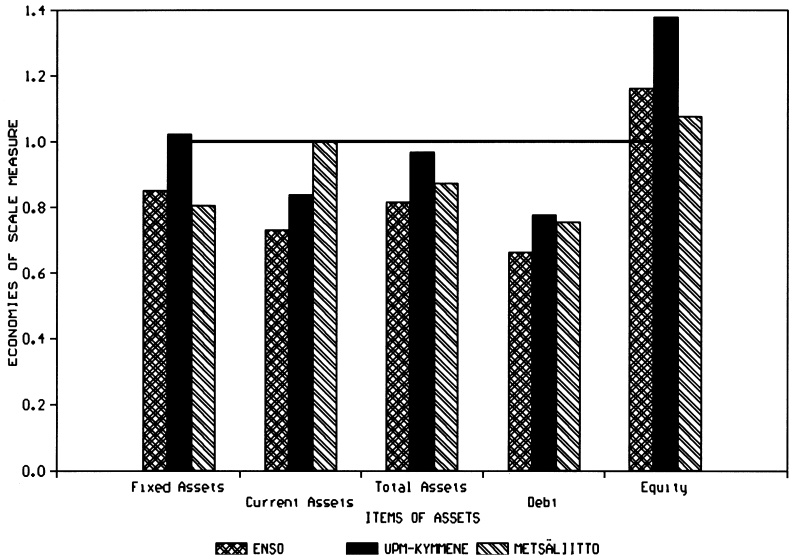

FIGURE 5. Measuring scale economies of assets with e.

the growth of net sales, and the companies have increased their equity ratios nearly to 45% during the studying period.

DISCUSSION

Clearly this measurement gives only preliminary estimates. However, it is in balance with common sense. It may be said that structural arrangements after mergers make it impossible to measure any advantages. We think that the correct and incorrect restructuring decisions also show on the level of numbers, and thus it is sensible to calculate some estimates. If it is wanted to find out the most efficient size of a firm, the all firms' unit cost curves have to be seen simultaneously, i.e. analytical cost curves have to be used. As Baumol and Blinder (1991, pp. 504–506) have stated it is sometimes possible to make mistakes if only the firms' own historical cost curves are looked at. In this study we do not say anything about the best possible size of a firm, but consider scale economies in the context of mergers. The measurement of the firms' performance is done in approximately similar years. The evaluation of scale economies in the merged companies is based on hurdle value and the use of a comparison company.

Evidently economies of scale and diseconomies of scale exist. In practice, economies of scale and scope effects are not easy to separate from each other, but some of these advantages can be attained by restructuring. However, the critique towards bigger units is not without

ground. There are always great measurement difficulties when we try to observe advantages in different corporations and in differing situations. Measurement is always difficult in a continuously changing environment, and sensible observation points are hard to find. Despite the simplifications we have made, our calculations show that with the Finnish forest industry mergers some economies of scale have been obtained. It is shown that the Repola and Kymmene merger has lead to greater advantages than the Enso-Gutzeit and Veitsiluoto merger during the period 1994–1997. These results are preliminary and some more advantages can be seen when all organizational changes and changes in production structures are done.

CONCLUSIONS

The aim of this study was to discuss the nature of economies of scale and suggest measures for scale economies in merger situations. Two measures were developed and they are applied to Finnish forest industry restructuring. Income statement and balance sheet based calculations were made before and after mergers in 1994 and 1997. Our cases show that the suitability of both measures is moderate. Both measures give same types of results, but their scales are different. Clearly further research is needed to verify the applicapability of the ratios in different situations and in various industries.

The basic question is what are the opportunities that the merger gives to develop a firm's cost and also asset structures. The results show that both mergers, Repola/Kymmene and Enso/Veitsiluoto, have offered possibilities to attain economies of scale in areas of capital and other costs. In the UPM-Kymmene case, savings in external services and personnel costs are likely. There are also some marks that management of working capital is improved. No economies of scale in material costs are verified. This shows that the effects of optimization of production structures, which is considered a central source of merger benefits, are not yet visible.

It seems that the main expansion trend in Finnish forest industries is changing from vertical integration and optimization of wood usage to horizontal integration and globalization. The biggest companies try to catch economies of scale by being remarkable producers in the whole world. If this trend continues, the importance of acquisitions, mergers and alliances to Finnish firms will be greater than ever before. ■

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APPENDIX 1: BUSINESS AREAS OF COMPANIES

Repola (1994)	**Kymmene (1994)**	**UPM-Kymmene (1997)**
United Paper Mills		
Magazine papers	Magazine papers	Magazine papers
Newsprint papers		Newsprint papers
	Fine papers	Fine papers
Packing	Packing	Packing materials
Timber	Timber and plates	Timber
		Plywood
Special products		Special products
Resources*		Resources
Rauma**		

Enso-Gutzeit (1994)	**Veitsiluoto (1994)**	**Enso (1997)**
Printing papers	Paper industry	Printing papers
Graphic papers		Fine papers
Packing boards		Packing boards
Industry papers and boards		
Basic industry***	Pulp industry	Basic industry
	Mechanical forest industry	
	Forest chemistry	

Metsäliitto (1994)	**Metsäliitto (1997)**
Metsä-Serla	Metsä-Serla
Magazine papers	Marketing group
Fine papers	Paper group
Paper board	Packing group
Fluting	
Tissue	Tissue group
Pulp	Pulp group
Sawmills	
Chemistry	
Metsä-Botnia****	Metsä-Timber*****
Finnforest	Finnforest
Metsäliitto osuuskunta	Metsäliitto osuuskunta

* Resources include roundwood, pulp and energy.

** Business areas of the Rauma-concern are forest harvesters, fibre technology, industry valves, rock breakers and special products.

*** Basic industry includes wood, pulp, energy and sawmills.

**** Metsä-Botnia produces pulp.

***** Metsä-Timber produces sawn goods, Finnforest's products are plywood and other wood products and Metsäliitto osuuskunta organizes roundwood deliveries.

APPENDIX 2: CALCULATIONS

MFmk

	1994 Enso-Gutzeit		Veitsiluoto		Repola		Kymmene	
Net Sales	17982	100%	6217	100%	28929	100%	19513	100%
Material Expenses	7606	42%	2598	42%	11524	40%	8691	45%
External Services	2977	17%	943	15%	1877	6%	1866	10%
Personnel Expenses	3083	17%	916	15%	5531	19%	3470	18%
Other Expenses	723	4%	448	7%	5128	18%	1724	9%
Capital Expenses	2088	12%	988	16%	3214	11%	2766	14%
Total Costs	16477	92%	5893	95%	27274	94%	18517	95%
Net Income	1505	8%	324	5%	1655	6%	996	5%

	1994 EG+Veitsiluoto		1997 Enso		b	e
Net Sales	24199	100%	29645	100%	1.00	1.00
Material Expenses	10204	42%	13741	46%	1.47	1.10
External Services	3920	16%	4915	17%	1.11	1.02
Personnel Expenses	3999	17%	4679	16%	0.77	0.96
Other Expenses	1171	5%	1091	4%	–0.35	0.76
Capital Expenses	3076	13%	3340	11%	0.41	0.89
Total Costs	22370	92%	27766	94%	1.06	1.01
Net Income	1829	8%	1879	6%		
Capital Turnover*	0.58		0.71			
Return on Assets**	8%		7%			
Return on Equity***	13%		6%			

	1994 Repola+Kymmene		1997 UPM-Kymmene		b	e
Net Sales	48442	100%	53129	100%	1.00	1.00
Material Expenses	20215	42%	26237	49%	2.82	1.18
External Services	3743	8%	3950	7%	0.58	0.96
Personnel Expenses	9001	19%	7790	15%	–1.56	0.79
Other Expenses	6852	14%	4548	9%	–4.44	0.61
Capital Expenses	5980	12%	6051	11%	0.13	0.92
Total Costs	45791	95%	48576	91%	0.64	0.97
Net Income	2651	5%	4553	9%		
Capital Turnover	0.76		0.78			
Return on Assets	9%		11%			
Return on Equity	13%		15%			

* Capital Turnover = Net Sales/Total Assets
** Return on Assets = (Net Income+Financial Expenses+Taxes)/Total Assets
*** Return on Equity = Net Income/Equity

	1994 Metsäliitto		1997		b	e
Net Sales	14553	100%	26699	100%	1.00	1.00
Material Expenses	6671	46%	13349	50%	1.14	1.09
External Services	524	4%	939	4%	0.96	0.98
Personnel Expenses	2510	17%	4065	15%	0.79	0.88
Other Expenses	2315	16%	4164	16%	0.97	0.98
Capital Expenses	1561	11%	3324	12%	1.25	1.16
Total Costs	13581	93%	25841	97%	1.06	1.04
Net Income	972	7%	858	3%		
Capital Turnover	0.73		0.83			
Return on Assets	8%		8%			
Return on Equity	13%		6%			

	1994 Enso-Gutzeit		Veitsiluoto		Repola		Kymmene	
Fixed Assets	21921	75%	7772	63%	24332	70%	20980	72%
Current Assets	7387	25%	4621	37%	10390	30%	8213	28%
Total Assets	29308	100%	12393	100%	34722	100%	29193	100%
Debt	19546	67%	9203	74%	23485	68%	20027	69%
Equity	9762	33%	3190	26%	11237	32%	9166	31%

	1994 EG+Veitsiluoto		1997 Enso		b	e
Fixed Assets	29693	71%	30959	74%	0.21	0.85
Current Assets	12008	29%	10741	26%	–0.55	0.73
Total Assets	41701	100%	41700	100%	–0.00	0.82
Debt	28749	69%	23286	56%	–1.04	0.66
Equity	12952	31%	18414	44%	1.73	1.16

	1994 Repola+Kymmene		1997 UPM-Kymmene		b	e
Fixed Assets	45312	71%	50719	75%	1.22	1.02
Current Assets	18680	29%	17085	25%	–0.92	0.84
Total Assets	63915	100%	67804	100%	0.64	0.97
Debt	43512	68%	37005	55%	–1.75	0.78
Equity	20403	32%	30799	45%	4.46	1.38

	1994 Metsäliitto		1997		b	e
Fixed Assets	13126	66%	19400	61%	0.64	0.81
Current Assets	6889	34%	12662	39%	1.00	1.00
Total Assets	20015	100%	32062	100%	0.78	0.87
Debt	12634	63%	17489	55%	0.54	0.75
Equity	7381	37%	14573	45%	1.12	1.08