

WOOD HARVESTING ENTERPRISE: PROFITABILITY, LIQUIDITY AND SOLVENCY

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ABSTRACT

In order to respond to global competition challenges, the wood processing industry is outsourcing the planning of roundwood harvesting. This means that the industry seeks to negotiate with fewer, larger and more diverse harvesting enterprises, which may have smaller subcontractors. This kind of networking development has already occurred in other industries *e.g.* shipyards and the electronics industry. Poor profitability, the liquidity and solvency of the harvesting business and the consequent difficulty in hiring qualified operators make networking a complicated process. Moreover, the asymmetry of negotiation powers between industrial customers and harvesting entrepreneurs perpetuates the low profitability. A study of the harvesting business structure has been conducted to identify the problems and success factors in this industry. Financial data from the period 2001-2007 was studied applying ratio analysis, focusing on the profitability, liquidity and solvency of subgroups as well as the whole industry. Entrepreneurs need managerial skills and appropriate business tools to cope with the growing size of their enterprises. The traditional business model for a capacity supplier tends towards the co-operation business model, which results in enterprise networks with subcontractors. The results of this study show that economic resources for reorganising and developing the business are very limited. A quarter of enterprises make break-even results or losses. Larger enterprises have limited reserves.

Keywords: ratio analysis, management accounting, wood procurement

1 INTRODUCTION

1.1 Key features of the wood harvesting business

Traditionally, industrial roundwood harvesting has been the basic task of forest machine enterprises. Moreover, energy wood harvesting is a significant task and its volumes are increasing. Some entrepreneurs are in charge of producing heat for local power plants. Stand regeneration is also a traditional forest machine entrepreneur task, harrowing (soil preparation) and seeding are already mostly done by entrepreneurs, and even mechanical planting is increasing.

Three international forest industry companies buy two-thirds of the roundwood harvesting services of forest machine entrepreneurs and more than half of the energy wood harvesting services (Finnish Statistical Yearbook of Forestry 2008). Work is generally done under agreements of a few years' duration based on bilateral negotiations. The customer is in charge of deciding the working order of stands in most cases.

According to the Finnish Vehicle Administration (FVA) forest machine register there are about 4,700 harvesters and forwarders capable of effective forest work in Finland (AKE 2008). A rough estimate of the number of enterprises is 2,500. The business is strongly small enterprise based with more than 60% of enterprises owning only one machine. The biggest enterprises own about 30 machines and employ 60 operators. The enterprise identifications found in the FVA databases can be used along with the harvesting enterprises listed in the databases of Statistics Finland to provide a general view of the industry (tab. 1)

Table 1 Number of enterprises, turnover and number of machines by turnover class in 2007

Turnover class 1000 €	Enterprises		Turnover		Machines	
	Amount	%	Million €	%	Amount	%
Below 75	282	17.1	13.5	1.8	339	8.5
75-150	324	19.6	36.0	4.9	418	10.5
150-300	356	21.5	75.8	10.2	609	15.3
300-600	341	20.6	142.5	19.2	864	21.7
Over 600	350	21.2	473.3	63.9	1751	44.0
Total	1653	100	741.1	100	3981	100

In 2007, forest machine entrepreneurs cut and forwarded 57 million cubic metres of roundwood, which represents about 90% of the total roundwood removals (Finnish Statistical Yearbook of Forestry 2008). Compensation for this was about 535 million euros. Entrepreneurs also carried out energy wood harvesting, soil preparation and other tasks valued at about 35 million euros. The total amount of work and its cost by work class covers both timber harvesting and silviculture activities (tab. 2).

Table 2 Work amounts and its cost to forest machine entrepreneurs in 2007 (2006)

Type of work	Volume and unit	Compensation mill. €
Traditional roundwood harvesting	54.7 volume solid mill.m ³	513.0
Residual energy wood harvesting	2.5 volume solid mill. m ³	23.9
Silviculture work	190,672 ha	34.2
Total value of forest machine entrepreneurs' work in 2007		571.1
Total value of forest machine entrepreneurs' work in 2006		493.2

1.2 The changing business environment of wood harvesting

Big industrial customers have outsourced operational supervision to entrepreneurs for the past few years by promoting the growth of forest machine enterprises. It is the entrepreneur's task to decide whether to buy smaller entrepreneurs out or network together. The first generation of forest machine entrepreneurs are retiring, which makes structural change possible. The expansion of business requires knowledge of management and leadership skills, knowledge which is often lacking. Expansion tends to increase the types of service offered to customers. Some can be based on a harvester and forwarder, but stump harvesting and chipping for example, requires new types of machines. In any case, financial reserves are needed for expansion.

Restructuring is difficult because of the persistently low profitability of the business. This also hampers the opportunity to hire highly qualified directors and operators. Capital costs comprise a significant proportion of the total cost because of expensive specialised machinery. Thus seasonal and economic variations hit this business, which serves the heavily export-based forest industry, hard. However, the asymmetry of negotiating power between industry and harvesting entrepreneurs persists (ALAJOUTSIJÄRVI *et al.* 2001), although some seasonal variation can be found.

1.3 Earlier studies on profitability, liquidity and solvency

The Finnish Forestry and Earth Moving Contractors Trade Association represents the main actors in the business and has monitored its members' economic situation for about 30 years. Today they ask members about their balance sheets and request the thoughts of entrepreneurs on the future of their business (Contractors 2008). The banking group Pohjola monitors their forest machine enterprise customers' economic situation annually (TURKULAINEN 2008). MÄKINEN (1988) investigated success and failure factors in his extensive study of forest machine entrepreneurs. For twenty years, the general trend has been that a fifth to a quarter of enterprises incur losses. The best quartile makes a profit, which might however be affected by the general economic situation and fluctuations. Most enterprises have a high debt to cash flow ratio.

VÄKEVÄ & IMPONEN (2001) investigated 777 entrepreneurs who serve as members of the Finnish Forest Industries or the State Forest Service. Beside the previously described generally low profit and high leverage, the study showed minor regional variation in profits; enterprises in Lapland had slightly lower profits than those in most southern parts of Finland. Enterprises with a turnover of less than 83,000€ per year were excluded. Above this level, the profit of the smallest companies varied most, the majority of the negative results appearing in this group. Variation in net result decreased slightly with growing turnover. A study of enterprises with only one harvester-forwarder chain showed that the larger yearly cut volume, the better the profit. A growing proportion of thinning in total work volume decreased the profit share slightly.

1.4 Purpose of this study

A key notion is to understand the situation in the forest machine business and identify its problems and strengths. We also address opportunities and constraints in coping with forest harvesting business restructuring.

2 MATERIAL AND METHODS

The material is based on the forest machine register of the Finnish Vehicle Administration (FVA) (AKE 2008), which contains the enterprise identification data. Statistics Finland (2008) provided the closing of the books material based on the FVA enterprise list. Financial data from the period 2001-2007 for the whole industry was used for a ratio analysis focusing on profitability, liquidity and solvency. Approximately 1,600 enterprises formed the basic data for ratio analysis, but there were usually only a little over 1,000 enterprises with full data available for each analysis.

2.1 Profitability points of view

Profitability has been shown to be the best indicator of performance (BROZIK 1984). On the other hand, even the best profitability does not help during financially difficult times. A financing crisis can be fatal, especially during rapid growth, in spite of excellent profitability and business opportunities. Profitability will be analysed studying the structure of profit and the return on capital. The former has traditionally been focused on, but a present-day accounting approach such as the International Financial Reporting Standards (IFRS) of the European Union (EU) favours return on assets (ROA) or return on equity (ROE) (LAITINEN AND LAITINEN 2004).

The EU 4th directive requires that the costs must not be divided into variable and fixed costs. This prohibition has also been incorporated in to the local accounting decree (TERÄNNE 1993). Thus the gross margin on sales, turnover minus variable costs, is not available. However, the empirical evidence from closing of the books material gives an adjusted income statement based on expense categories: operating margin (EBITDA), operating result (EBIT), net result, total result, and result from the fiscal year (CCA 2000). The abbreviations EBITDA and EBIT refer to 'earnings before interest, taxes, depreciation and amortisation' and 'earnings before interest and taxes'. The financing result, which is obtained by adding depreciation and reductions back into the net result, forms a cornerstone of the financing analysis. It is perhaps the most critical information in analysing the ability of an enterprise to cope with (i) the net decrease in long-term external financing, (ii) net investment, (iii) addition of working capital and (iv) the profit-sharing requirement (CCA 2005).

Although the Finnish accounting tradition emphasises the profit and loss statement and net result as its key measure, both the American and the present European IFRS accounting, by contrast, concentrate on property values. Return can be calculated on total capital, invested capital and the enterprise's own capital. The return on assets (ROA) is obtained by dividing the sum of net results, financial expenses and taxes by assets *i.e.* the sum of debt and equity. The return on equity (ROE) can be obtained by dividing net profit by equity.

The return on capital employed (ROCE), ROA, ROE, ROI *etc.* are based both on the contribution delivered by sales and the sales related to the total investment, the relation between which is called the Du Pont return on investment formula (fig. 1).

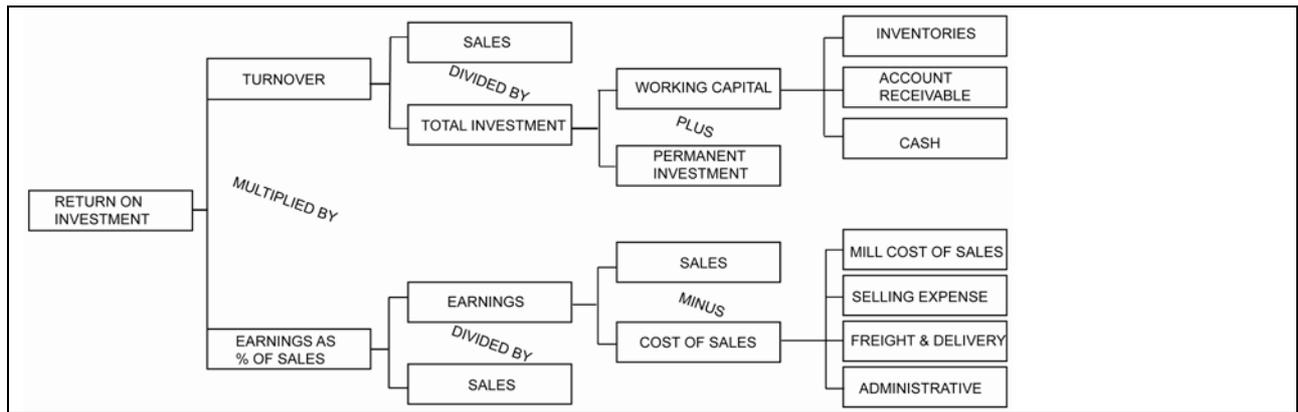


Figure 1. The Du Pont return on investment formula (JOHNSON AND KAPLAN 1987)

The most important indicator of the operational activities of a small and medium sized enterprise (SME) is the return on assets (ROA), where assets are the sum of debt and equity. In SMEs, the equity may be difficult to quantify, if not misleading, so the ROE may be biased. Moreover, ROE can be very misleading because of leverage, which exaggerates the return in both good and bad times.

Although profitability is the starting-point for all considerations, it is linked with other important items, such as financial adequacy and capital structure. Small and medium sized enterprises have been studied in Finland using the growth-profitability-financing approach, the so-called KASKARA model. This model has even been applied to wood harvesting enterprises by KÄRHÄ (2000).

2.2 Financing points of view

Successful financing impacts the profitability, liquidity and solvency of an enterprise. Points of view in finance analysis are financial adequacy and capital structure. In SMEs, financial adequacy is essential and often critical. Capital structure provides only a general picture. More generally, the dynamics of economic processes – flows – are emphasised and static factors – reserves – are primarily only background information. The liquidity ratios could be grouped into dynamic liquidity, such as the financing result percentage, static liquidity, such as the quick ratio, and other ratios such as combined ratios *e.g.* the net working capital percentage. Solvency consists of static solvency, such as the equity ratio and dynamic solvency, such as the loan repayment margin or liability pay-back period (LAITINEN AND LAITINEN 2004).

As the financing result is obtained by adding depreciation and reductions in value to the net profit, it can be considered a basis for studying the financing of an enterprise, which should cover (i) the scheduled amortisation, (ii) investment financed by internally generated funds, (iii) the increase in working capital and (iv) the dividends divided by the share capital. It should exceed zero even over a short time frame, otherwise there is a risk of bankruptcy.

Perhaps the most realistic and basic information depicting the financing situation is the repayment period of debts also called the pay-back period in years, which is the invested external capital divided by financing result (CCA 2005). Note that a special feature of the timber harvesting industry is that the capital is bound to machines and equipment and the debts are used to purchase them.

Even net financing costs can be related to operating profit (CCA 2005). This ratio helps to evaluate the operating profit level required to finance the business. Alternatively, the opportunity of managing financing costs is to estimate the interest coverage ratio, which can be obtained by dividing the sum of operating profit, dividend return, interest return and other financial returns by the financing costs.

When studying financial adequacy, perhaps the most common indicator is the quick ratio, which relates financial assets to short-term liabilities. However, a basis for demonstrating the financing opportunities and threats is the gross investments. The equity financing share of the investment ratio shows how far the financing results covers investment in fixed assets and other investments, as well as the addition of working capital (CCA 2005).

The use of the financing result can be considered a basic equation of financing, the excess part of which is the reserve *e.g.* for enterprise growth: reserve = financing result — instalments of debts — equity investments — distribution of profit for equity — addition of working capital. Here, only instalments of debts and equity are available for subtraction.

Ratios depicting capital structure consider reserves such as amounts of debt and equity. When advances received and cash and marketable securities are subtracted from liabilities, this received net debt is related to turnover to give the net debt ratio results (CCA 2005). This ratio, however, provides a more relevant picture when an enterprise has financial assets. On the other hand, ratios related to turnover are able to depict a general view rather than revealing bottlenecks in the business.

The equity ratio can be considered as the opposite to the debt ratio. It is, however, a very crude indicator, especially in the case of SMEs which are not limited companies.

3 RESULTS

3.1 Profitability

In the wood-harvesting business, the total operating income tends to equal the turnover, which is used instead of the former. In order to eliminate the size of the enterprise operating margin, operating result, net results and financial result are divided by turnover and the respective percentages are displayed (tab. 3).

Table 3 Key figures of enterprise profitability and their variation in 2007.

Key figures	Lower quartile	Median	Upper quartile
Turnover1000€	140.9	291.9	566.8
Operating margin %	19.2	28.9	39.3
Operating result %	4.1	10.9	20.2
Net results %	0.3	6.3	13.7
Net result 1000 €	0.2	18.7	47.6
Financing results %	14.5	23.8	32.0
Financing results 1000 €	29.8	69.2	131.3

The return inquiry of the Finnish Forestry and Earth Moving Contractors Trade Association (2008) gave the median net result percentage as 2.5% for 2006 and 4.3% for 2007, claiming that a positive net result could be obtained by 65% of the enterprises. Moreover, enterprises with thinning as less than 50% of the total work load achieved a 5.0% median net result, and enterprises with more than 50% thinning only a 3.3% median net result percentage in 2007. More than 50% of the entrepreneurs considered their result satisfactory and more than 20% weakly satisfactory. However, the price level has remained steady according to 55% of enterprises and increased according to 45%. The most important item to be corrected, according to the replies, was the compensation level of 49%. In 2000, the median net result percentage was roughly 7.5% (VÄKEVÄ & IMPONEN 2001).

The net profit percentage, which depicts the profitability development (CCA 2005, KALLUNKI & KYTÖNEN 2007), is a key ratio for profitability. In 2001-2007, its median was roughly 5%, the upper quartile some 12%, but the lower quartile nil. The level of net percentage was low as it was in the wood products industry (Ministry 2009). This is not necessarily the case for big multinational forest industry enterprises. For example, Stora Enso's target is to achieve 13% ROCE (return on capital employed) (Stora Enso 2007). Unfortunately, during the present recession it has become impossible. The net profit share started to decrease in 2003-2004. Moreover, the lower quartile dropped to negative in 2006, which may have been impacted by the decreasing felling amounts. Its trend by turnover class reveals differences between enterprise size groups and especially the weakness of the smallest enterprises (fig. 2).

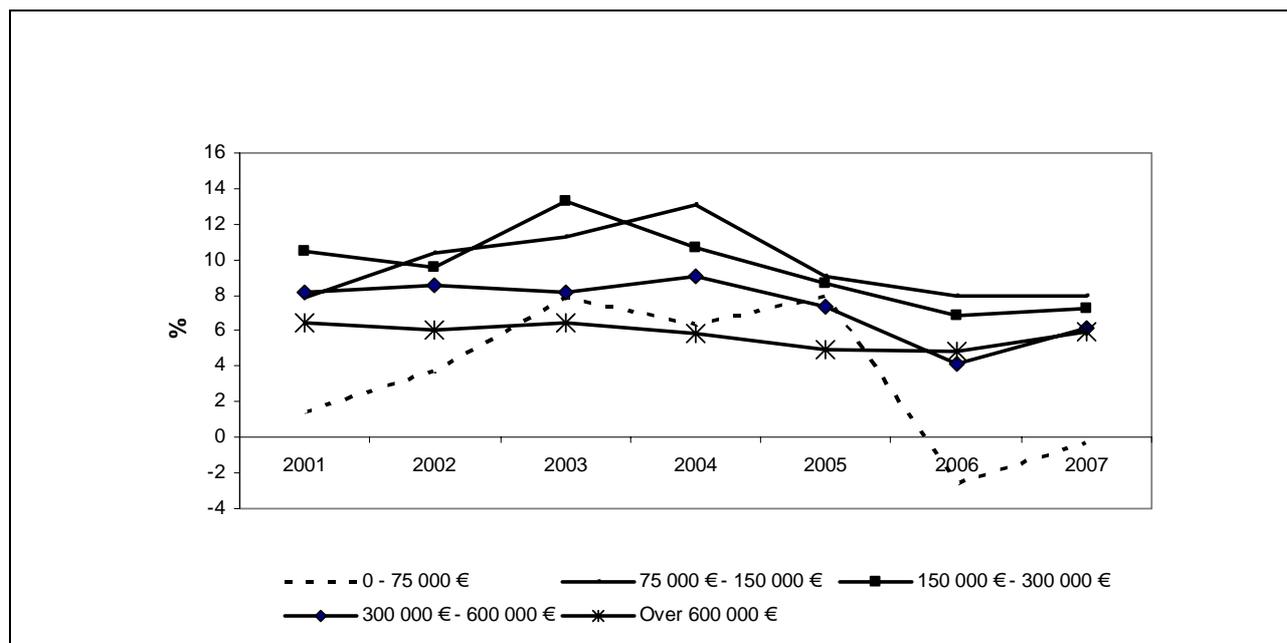


Figure 2 The medians of the net result percentage in different turnover class in 2001-2007

The different returns on assets showed a moderate median contribution, but enterprises below the lower quartile could barely cope with the price of external financing. Moreover, the balance sheet and invested assets are of a size of one to two harvesters, but the equity remains modest (tab. 4).

Table 4. Different returns in 2007

	Lower quartile	Median	Upper quartile
The sum of balance sheet, 1000€	131,9	274,2	515,4
Return on total capital % (ROA)	3.64	10.4	21.4
Invested assets, 1000 €	105,1	215,1	410,1
Return on assets % (ROI)	4.6	13.1	27.0
Equity, 1000 €	-0,43	45,2	137,0
Return on equity % (ROE)	1.5	20.0	50.2

In 2000, the lower, median and upper quartiles of the ROA were 3%, 18% and 35% respectively (VÄKEVÄ & IMPONEN 2001). The ROA measures the return on the total capital – external and internal – and has been clearly decreasing in all years. This can be explained by both the increase in the amount of capital and by the decrease in the return itself. The ROA is considered good if it is over 10%, satisfactory at 5-10% and poor below 5% (CCA 2005). The statistics on the wood-harvesting business delivered by the Pohjola Bank classify return on total capital as good if it exceeds 15%, satisfactory at 9-15% and poor below 9% (VÄKEVÄ & IMPONEN 2001). The differences in ROA by turnover class is shown below, note the difficult situation of the smallest enterprises (fig 2).

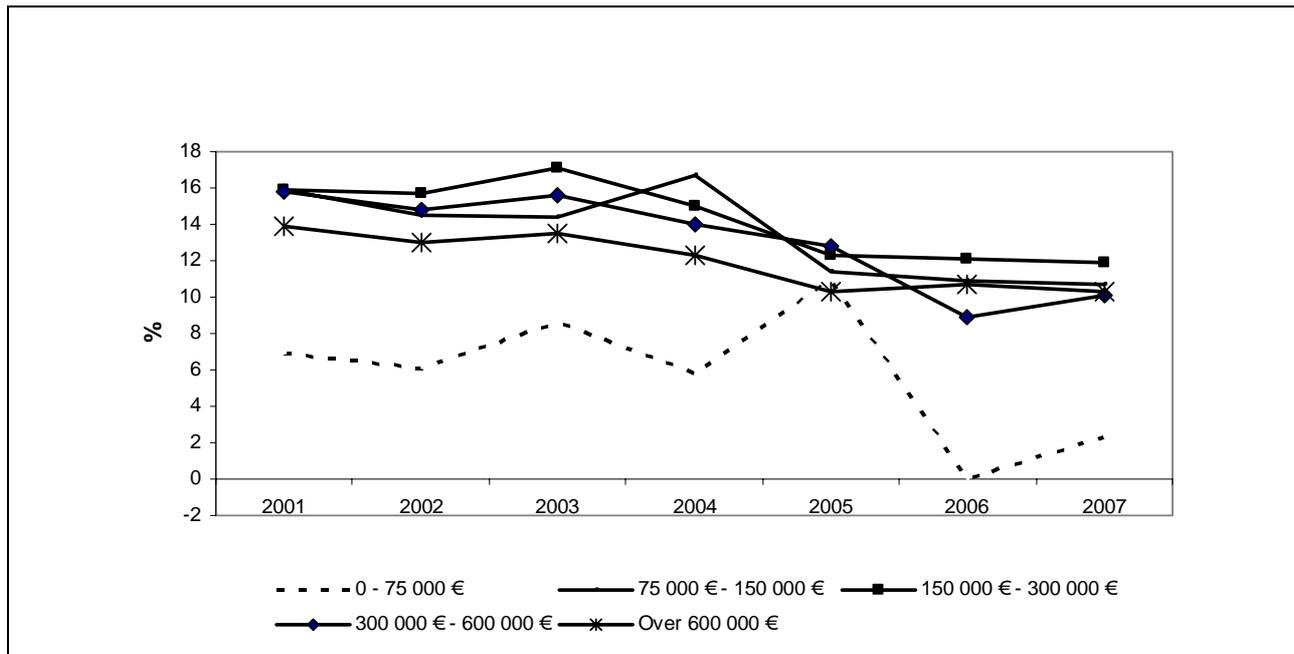


Figure 3 The medians of the return on assets (ROA) in different turnover class in 2001-2007

However, when capital only is seen as the investment, the return on equity (ROE) is used. Its median was nearly 20%, the upper quartile over 40%, but the lower quartile persisted near the zero level. The negative lower quartile of the ROE suggests that capital will be consumed and many enterprises will have to close down. The ROE by turnover class also emphasises the distinction between the smallest enterprises and the others (fig. 4).

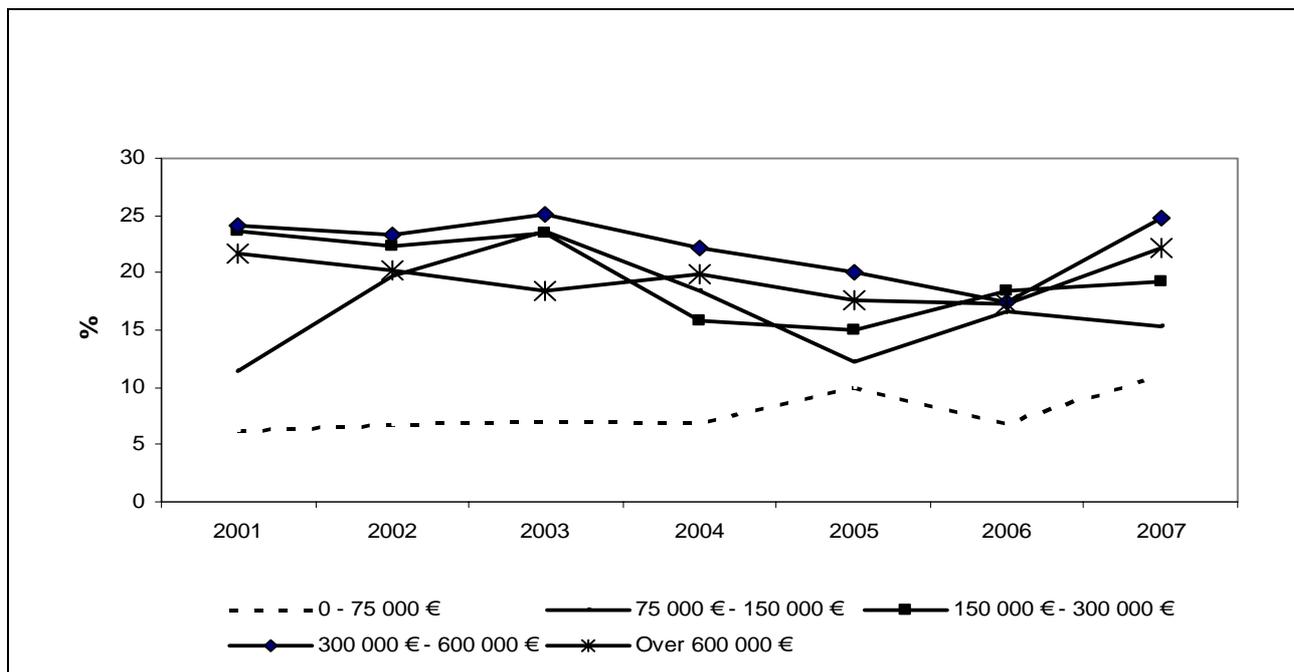


Figure 4. The median of the return on equity (ROE) by turnover class in 2001-2007.

In general, ROE can be misleading because of leverage, which is exaggerated both in good and bad times. Moreover, capital is a slippery concept in many SMEs. However, ROE shows the development opportunities of the enterprise clearly. All turnover ratios represent the DuPont approach, such as the asset turnover, turnover divided by total assets, shown in Figure 1. Its median, lower and upper quartiles were surprisingly stable, remaining at the 1.1, 0.8 and 1.4 levels respectively. Its trend by turnover class was also stable and did not reveal any success or failure factors either. The small enterprise group performed least well, slightly below one, and the biggest enterprise group best, roughly at the 1.4 level, but all groups were very stable in all years.

3.2 Financing

Perhaps the most meaningful figure depicting financing is the repayment period of debts, the median of which was very stable at 2.5 years. The lower quartile slightly exceeded a year and even the upper one was at four years. The machines will typically be used for two to five years. However, firms above the upper quartile may face some risk in pay-back commitments. According to SALMI (2006), a repayment period not exceeding four is considered good. The medians in different turnover classes show some distinction in opportunities provided (fig. 5).

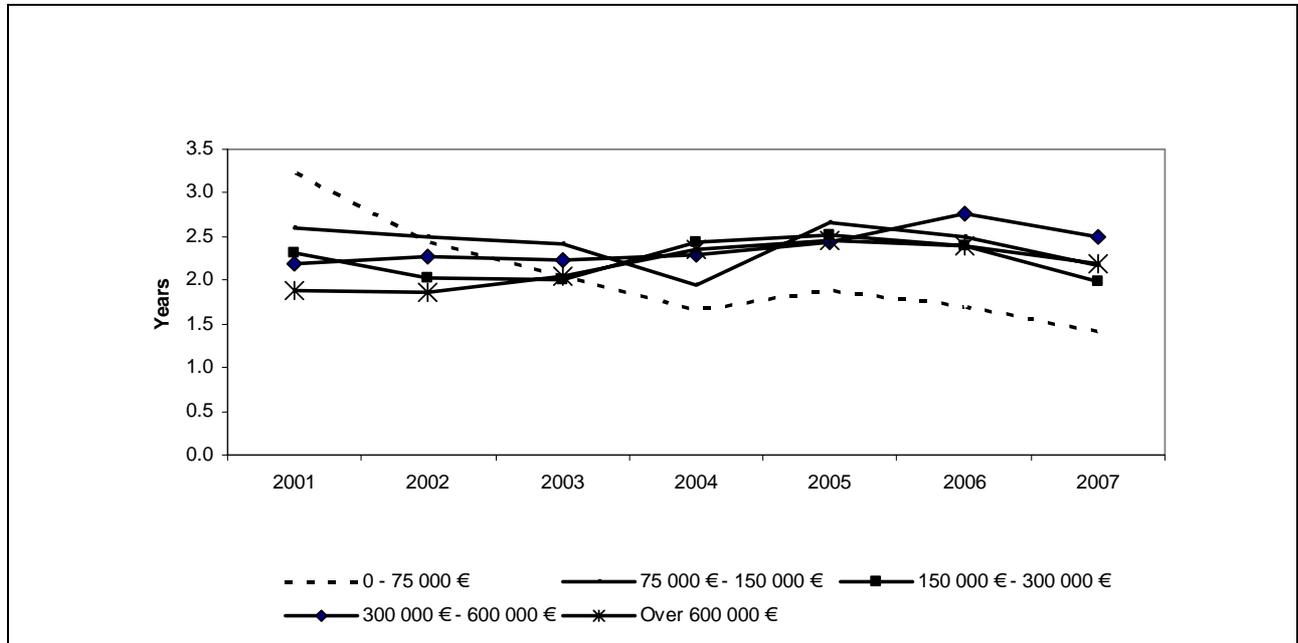


Figure 5. The development of the median repayment period by turnover class in 2001-2007

A theoretical pay-back period is obtained if we imagine that the enterprise is using the whole of its operating profit for debt repayments. This is in practice a lower limit for the pay-back period. Its median persisted at slightly over 1.5 years, the lower quartile being only some 0.5 years and the upper one roughly three years in 2001-2006, but in 2007 all three lengthened by about half a year. The medians of these theoretical pay-back periods by turnover class reveal surprisingly modest differences between the smallest enterprises and the others (fig. 6).

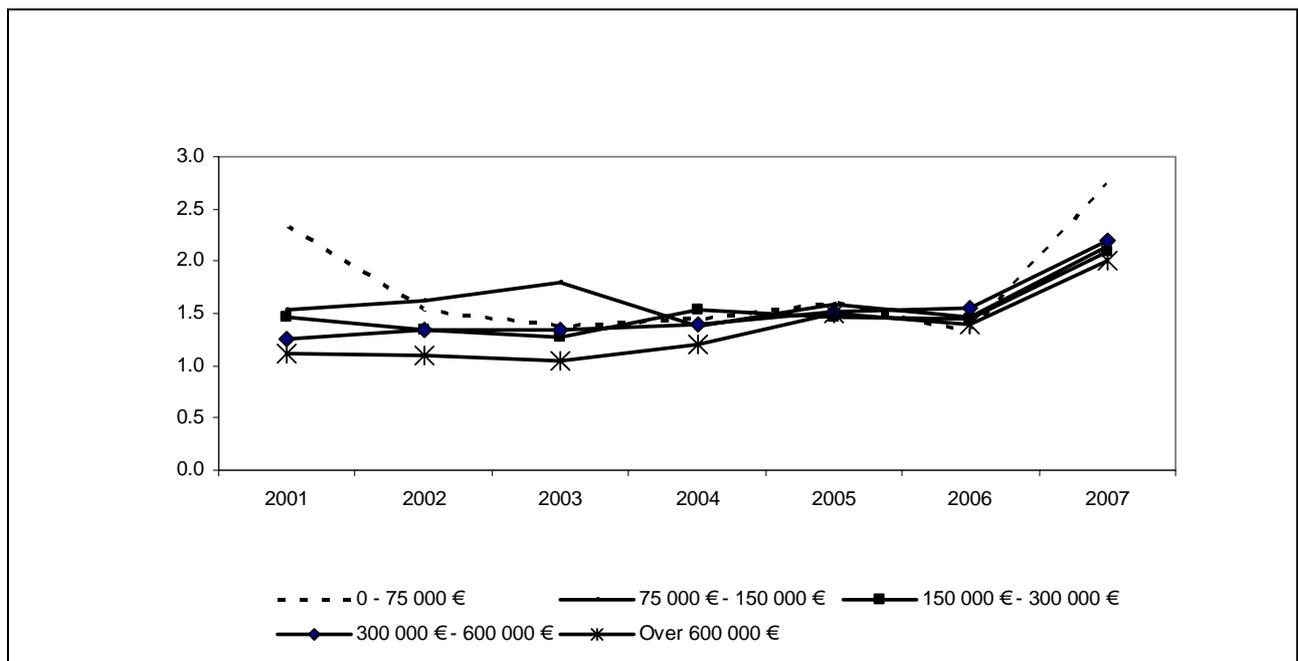


Figure 6. The external financing related to the operating profit by turnover class in 2001-2007

Alternatively, the opportunity to take care of financing costs is measured by the interest coverage ratio, the sum of operating profit, dividend return, interest return and other financial returns divided by financing costs. The interest coverage rate measures the sufficiency of the operating profit and financing return to cover the financing costs. An interest coverage rate of eight can be considered good, three to eight satisfactory and below three weak (CCA 2000). The median and upper quartile were clearly above eight, but the lower quartile was only satisfactory.

The quick ratio relates financial assets to short-term debts. A level exceeding one is good, 0.5 to one satisfactory and below 0.5 weak (CCA 2005). Even its median has recently approached the weak level (fig. 7).

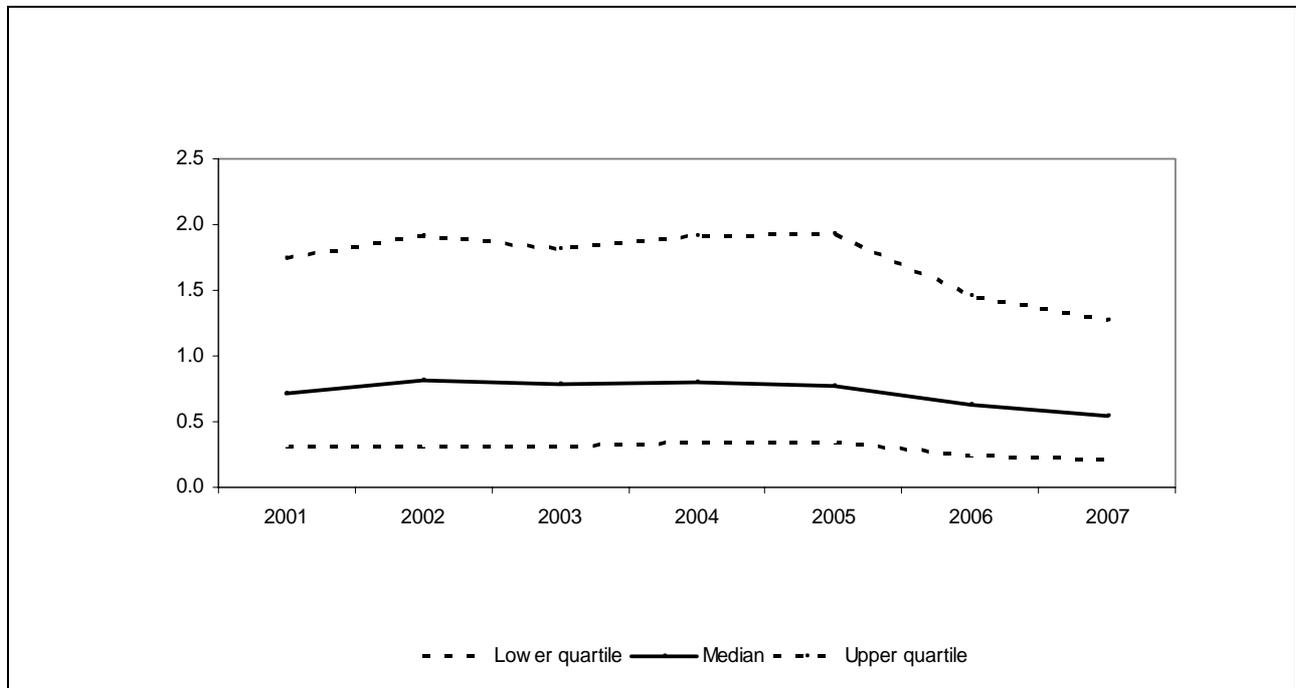


Figure 7. Lower quartile, median and upper quartile of quick ratio in 2001-2007

The investments can be a source of both success and failure. They were relatively stable in 2001-2006. They jumped in 2007, the median by 10,000€ to 40,000€, the lower quartile from zero to 5,000€, and the upper quartile from 120,000€ to 140,000€. In 2000, the net investment was zero, 35,000€ and 100,000€ respectively (VÄKEVÄ & IMPONEN 2001). However, the relation between investment and turnover stayed at a median of 15% (fig. 8).

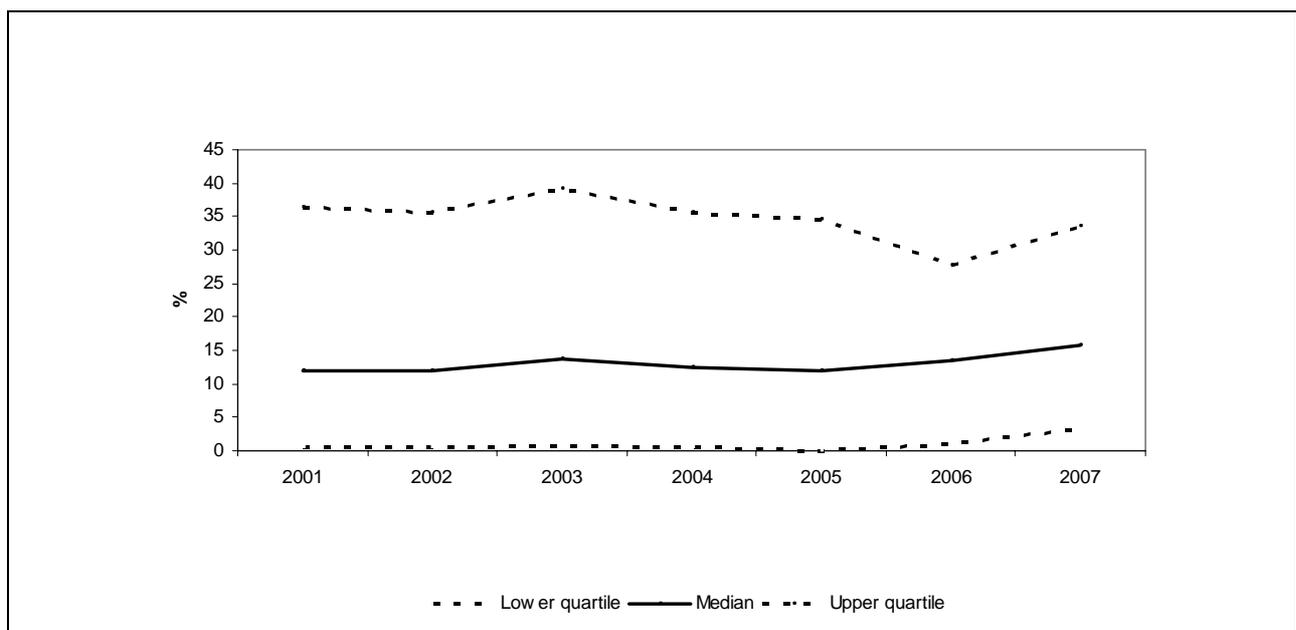


Figure 8. The lower quartile, median and upper quartile of gross investment related to turnover in 2001-2007

In 2000, the upper quartile, median and lower quartile were 33%, 10% and 0% respectively. An average median level for investment percentage may be some 10-15% (cf. VÄKEVÄ & IMPONEN 2001). The equity financing share of investment relates the financing result to investment. When investment is negligible, this ratio explodes at the aggregate level, the median was at the 100% level and even the lower quartile was about 50%. By turnover class, the equity financing share of investment by turnover class only exposes the weak position of the smallest group (fig. 9).

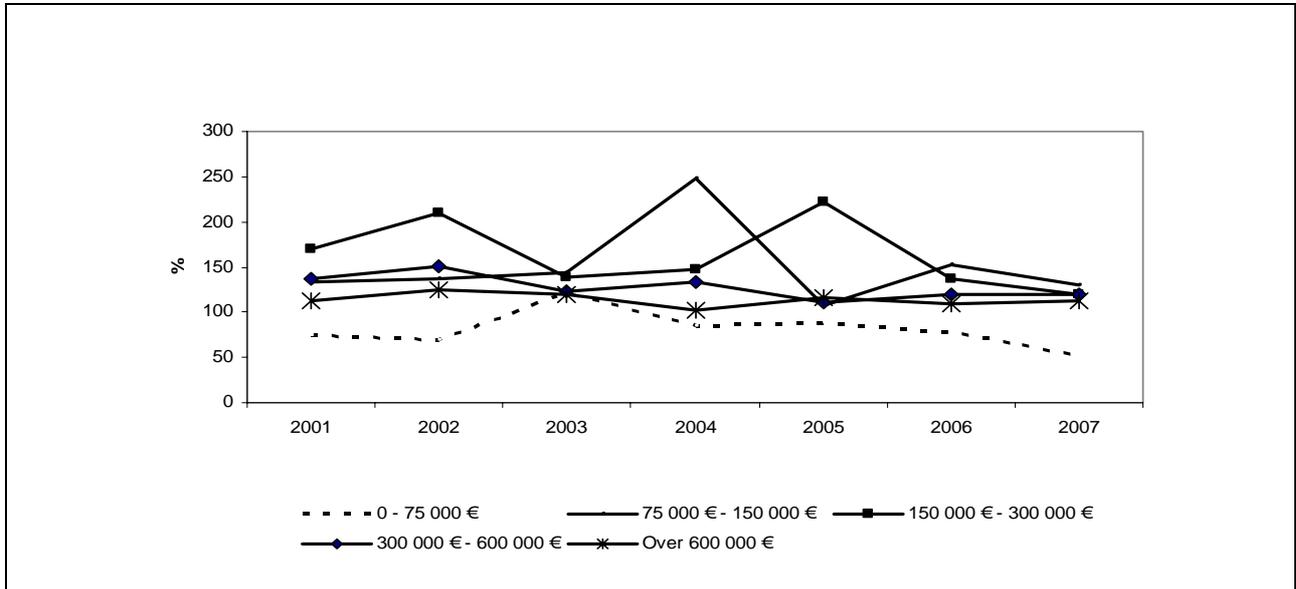


Figure 9. The median of the equity financing share of investment percentage by turnover class in 2001-2007

The most revealing ratio depicting the opportunities of management to develop the enterprise is the reserve in which instalments of debts and financing of investment have been deducted from the financing result. This genuinely describes the real financial situation of the management in improving and extending the competitive edge of the enterprise. Its lower quartile was negative, but the median and upper quartile some 20,000€ and roughly 50,000€. The opportunities of lower quartile enterprises do not look promising. Its medians by machine number class showed differences and variations (fig. 10a)

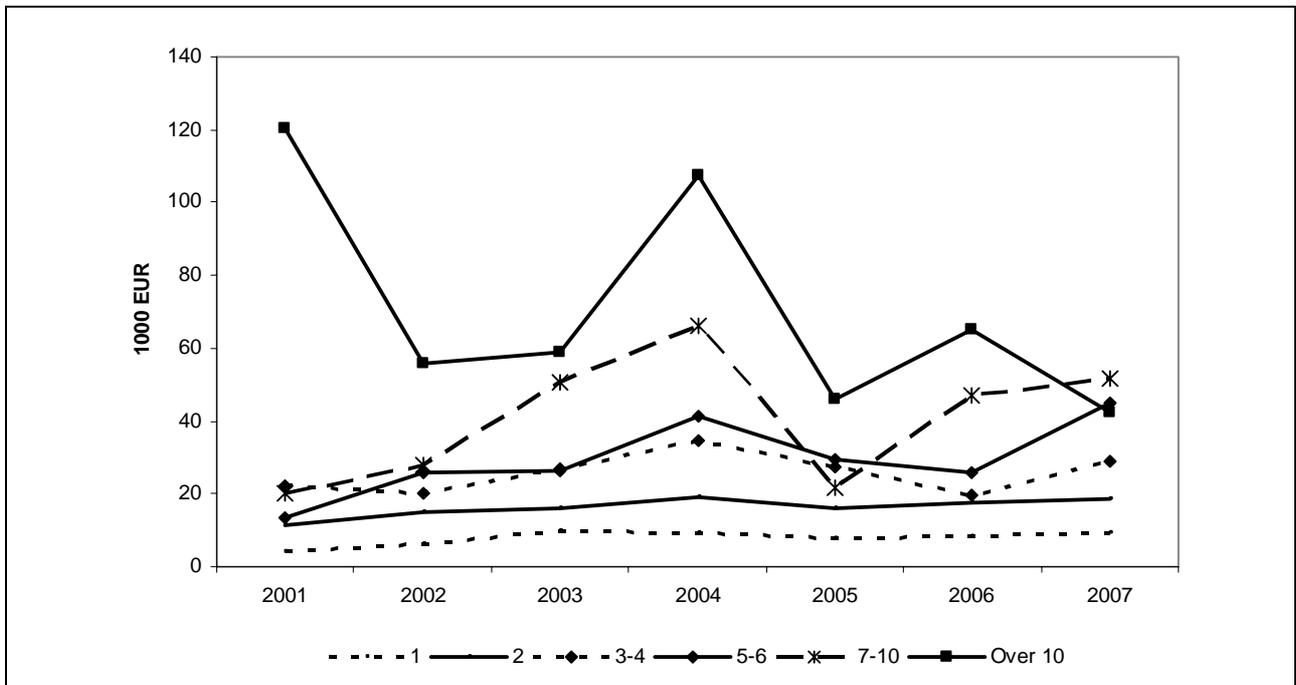


Figure 10a Median reserves by machine number class in 2001-2007.

The reserves by turnover class show surprisingly clear differences between turnover classes in opportunities to develop the enterprise (fig. 10b).

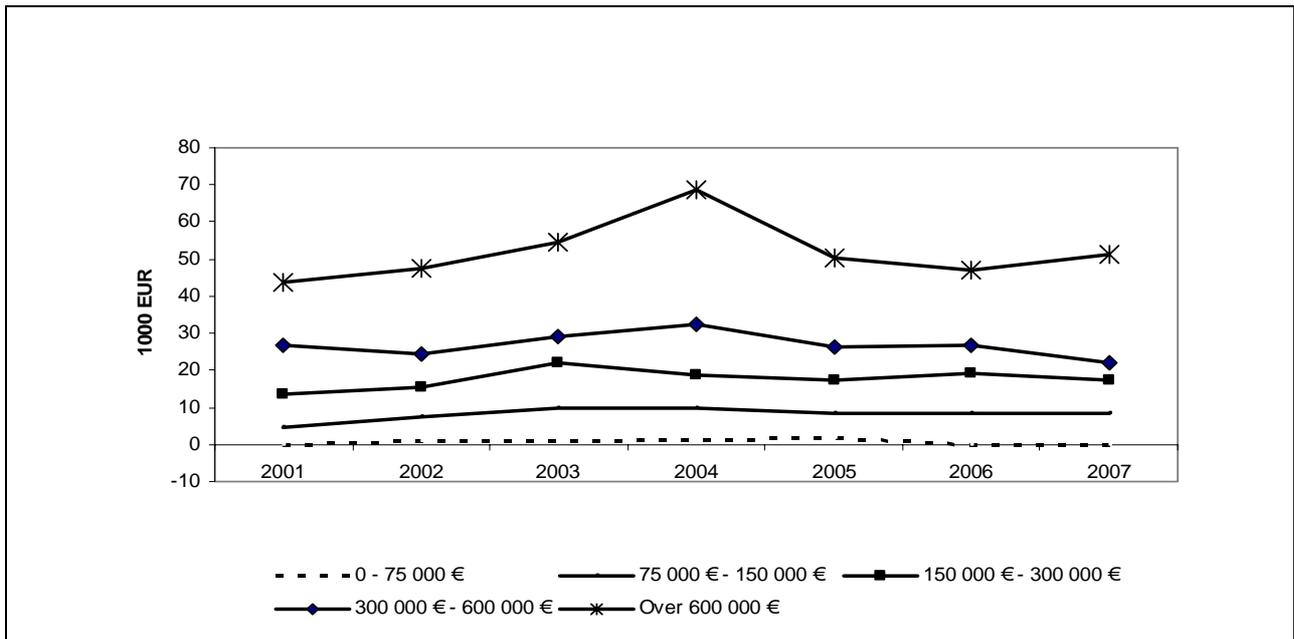


Figure 10b The median of the reserve by turnover class in 2001-2007

The basis of capital structure can be considered the net debt ratio, which relates liabilities to net sales. At the aggregate level, median was roughly 50%, the upper quartile nearly 100%, but the lower quartile only about 20%. In 2000, the upper, median and lower quartiles of net debt ratio were nearly 95%, 65% and nearly 40% respectively (VÄKEVÄ & IMPONEN 2001). Net debt ratio by turnover class again shows the poor position of the smallest enterprises and best achievement of the biggest ones (figure 11).

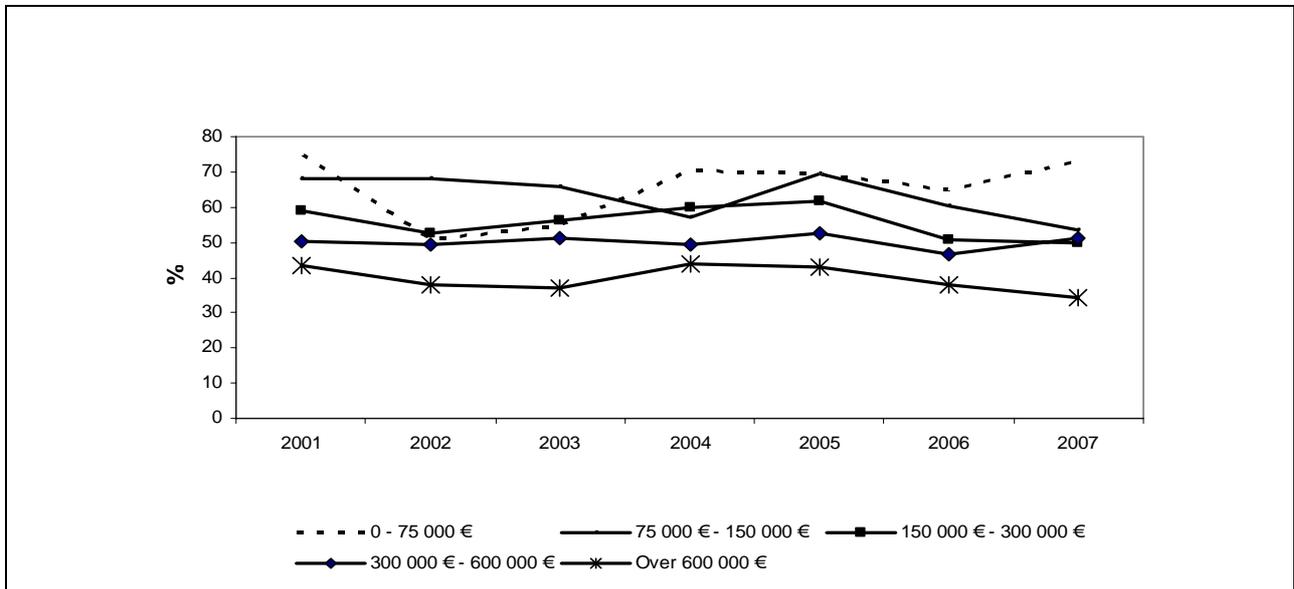


Figure 11 The median of the net debt ratio by enterprise turnover class in 2001-2007

The equity ratio, which relates shareholder equity to the balance sheet total, was surprisingly stable in all years, the median being some 20%, upper quartile 50% and the lower quartile zero. The results were better in 2000, the same figures being 28%, 55% and 5% respectively (VÄKEVÄ & IMPONEN 2001). Equity ratios exceeding 40% are considered good, 20-40% satisfactory and below 20% weak (CCA 2005), which means that most enterprises are weak.

4 CONCLUSION AND PROSPECTS

The forest machine business in Finland has long shown low profitability (MÄKINEN 1988, VÄKEVÄ & IMPONEN 2001). In the 1970s and 1980s, the technique was developing rapidly. Today there is slight overcapacity, and the negotiation power of small entrepreneurs is weak against big international customers (ALAJOUTSIJÄRVI *et al.* 2001). Profitability was even decreasing towards the end of the study period 2001-2007, the median net result percentage being round 6%. The median return on assets (ROA) was also decreasing to the 10% level. However, enterprises with a turnover of less than 75,000€ have already produced a negative median result and roughly zero ROA for two years.

Small enterprise size and a simple form of business date from the beginning of the industry when horses were replaced by forwarders. Nowadays businesses require harvesters and forwarders, which are very complex and built in short series and thus expensive. The median annual investment has been only 40,000€ representing only 15% of turnover. This suggests that machinery is seldom renewed because of low profitability. The lower quartile stayed at nil, but the upper quartile at 140,000€, representing only 35% of turnover. The median debts were roughly 50% of turnover but the smallest enterprises needed a median of about 80%. Even the upper quartile pay-back period was about four years, which is still reasonable considering the usual two to five year life cycle of a new machine. Many profitability and financing ratios such as asset turnover, quick ratio and interest coverage were surprisingly stable and did not reveal novel ideas.

The median financial reserve left over for enterprise development after the impact of investment and debt payment was only 20,000€ the lower quartile being negative and the upper quartile some 50,000€. The median reserve exceeded 50,000€ in the largest enterprises and were next to nothing in the two smallest turnover classes. The medians were 5-10,000€ in enterprises with one or two machines, about 30,000€ with three or four machines and roughly 40,000€ with five or more machines. Two-thirds of enterprises are still one machine enterprises, producing altogether less than one-third of turnover. A harvester purchase price might easily triple their turnover, which emphasises the importance of choosing the right time to change machine. Moreover, increasing thinning in the work load diminishes profitability (VÄKEVÄ & IMPONEN 2001), but the smallest enterprises cannot necessarily pick the best regeneration fellings.

Statistical analysis of the closings of the books data from some 1600 enterprises showed that many of the base variables and the ratios based on them were not normally distributed, some of them suffering from both strong skewness and kurtosis. This requires a thorough analysis of the variables in order to apply statistical methods. However, the material was used in the spirit of data analysis to reveal new ideas and invariances.

The enterprise database provides an excellent opportunity, even with its limitations, to open up a host of new research directions, such as an analysis of optimal investment and financing policy, which is one of the critical dilemmas of wood harvesting enterprises.

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