School of Business
Economics and Law
GÖTEBORG UNIVERSITY

Investments and Financial Analysis

An investigation of the capital formation in the Swedish Machinery and Metal Industry Segments

Meysam Sadegh

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"In the long-term, the current declining trend in capital formation in Sweden could threaten the upturn in productivity that we have witnessed, and thereby also threaten growth. As things stand today, with large surpluses in the trade balance and current account, Sweden exports capital abroad, despite the fact that there is both the scope and a need for more investments [inside Sweden]"

- Mr. Villy Bergström,
Deputy Governor, Swedish Central Bank
January 18, 2005

Responsibility for claims, findings and conclusions made herein strictly belong to the author of this study

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Meysam Sadegh
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Executive Summary

By constructing capital stocks for two distinct industry segments within the Swedish manufacturing industry, this study explores the overtime development of the physical capital formation in manufacturing capabilities while it key factors affecting investment decisions are discussed.

The research of this study which was based on the 1987-2004 timeframe partially shows that predominant companies with persistent poor EBIT-margins across the 18-years period also tend to reduce capital tied in machinery and equipment simultaneous to rationalizing headcounts. Additionally, as revenues steadily increased in these companies, the effects of increased capital turnover and capital utilization showed insignificant profit improvements. Appropriate explanations could be the lack of cost control, ineffective manufacturing capabilities and squeezed sales margins forcing companies to poor profit margins.

By contrast, companies in both segments that yielded an all time high profitability also continued investing in machinery and equipment as an integral capital asset needed for manufacturing capabilities as well as employing new recruits. Successful companies participating in The Machinery Industry Segment showed not only an ever sustainable and relatively higher EBIT-margins, these companies also improved manufacturing capabilities by perpetual investments in machinery and equipment. On the other hand, successful companies participating in The Metal Industry Segment were found to be relatively more machinery and equipment intensive with a continuously high share of fixed capital tied in machinery and equipment.

Aside from a fraction of companies, the greater majority never recovered from the high pace of machinery investments enjoyed before the 1992 Financial Crisis. Simultaneously, other capital assets such as IT-investments were introduced to increase in significance and contributing to total productivity gains. A post-1992 comparison of the two segments showed an investment willingness upswing in the Metal Segment while the Machinery Segment continued lagging behind.

Whereas a fraction of companies despite of size continue soaring in both industry segments, remaining majority studied tend to suffer from declining profits and growth far below industry average as well as showing restrains in expanding operations in manufacturing capabilities. Whereas the globalized economy continues internationalizing the Swedish manufacturing industry, new rules of competition make domestic survival questionable. This quandary also raises the question of how this development is perceived by the intentional investors' community and whether described profitably levels advocate increased foreign direct investments into the two industry segments. Thus, thorough company level analysis is suggested to frame why some companies never manage to grow strongholds in manufacturing capabilities inside Sweden but instead are forced to shutdown or intensify offshoring activities to combat global competition.

As a final remark in this vein, the ultimate question should not address what the Swedish Manufacturing Industry should do for Sweden but rather what Sweden should do for these companies to retain a strong competitive position domestically and contribute to the Swedish economic prosperity.

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1. Introduction

This chapter primarily introduces the reader to the core quandary of the study by detailing the problem scope and the underlying motives legitimizing this research conduct. Next, the study purpose will be presented based on the problem formulation which in turn will narrow down the problematization work to a distinct area of research.

Whereas economic liberalization and deregulations have intensified the act of globalization, the world construct too is being reshaped into a more interconnected and interdependent hemisphere. As nations become more borderless, lowered economic barriers accelerate flows of trade, capital and intelligence to travel to new corners of the globe. While emerging economies from Asia to Eastern EU and Latin America continue redefining the rules of global competition, advanced western economies envisage new challenges in retaining domestic strongholds as well as redefining strengths, combating weaknesses and exploiting comparative advantages.

Ever since the Swedish economy was introduced to the late 19th century's industrial revolution, its economic structure has systematically transformed from a self-supporting agriculturized nation to a highly industrialized and advanced western economy. Early innovations intensified inventions in a wide array of business areas which also gave rise to the sophistication and commercialization of a manufacturing industry that ultimately formed Sweden's strongest economic wheel.

Particularly, outputs from the manufacturing industry account for over half of Sweden's exports of goods which in turn accounts for nearly 25 percent of the GDP. Moreover, this sector is the immediate employer of 344 000 people that has generated jobs for another 650 000 people[1]. Put together more than one million people out of Sweden's 4.2 million eligible workforce are today in one way or another staffed in different business areas of the Swedish Manufacturing Industry.

As this sector has proven to be a heavy contribute to total national accounts and hence the economic prosperity, Sweden is not only in reliance to sustain durable exports from this sector, but Sweden is depended on retaining a strong industrial foundation from which commercially viable goods could continue being innovated and become internationally tradable. Moreover, the economic prosperity depends on how well abilities, distinctive competencies and capabilities within this sector could be preserved and sophisticated. To maintain and grow a relevant industrial foundation as such continued investments in value adding capabilities become key.

However, recent studies show an ever decreasing investment stocks in the Swedish Manufacturing Industry and as a share of GDP, these stocks have reached lowest levels since early 1980s[2]. In the short run, additional studies show that the scarce number of industry segments that completed investments projects in Sweden between 2002-2004 have no further investments plans in the upcoming two to three years period[3]. Additionally, investments have also change in shape and contents. For example, investments in manufacturing capabilities are more rapidly being complemented by IT-related investments as well as Intellectual Property (IP) and R&D investments which all in all add to total productivity gains.

Subsequent section will discuss the problem formulation of this study and describe ways it could be viewed as well as how this research intends to approach the quandary at stake.

[1] Swedish Bureau of Statistics (SCB) and Teknikföretagen Sources, obtained January 12, 2006
[2] Industrins Investeringar på bottennivå, Linda Svensson, SIF-tidningen, June 20, 2005
[3] The Economic Condition in Sweden Fall Summit, Center for Business and Policy Studies (SNS), November 16, 2005

1.1. Problem formulation

There are diverse methods through which the capital formation of a manufacturing industry and its contribution to total economic growth could be surveyed and analyzed. Although the first ambition of this research has been to describe the progression of the entire Swedish manufacturing industry, the problematization and the research path chosen for this study will be delimited and focus only on assessing a set of companies operating in two distinct segments of the manufacturing industry. While the first ambition of this study will be described extensively to give the reader a completive view of how the problem relates to the entire manufacturing industry, the delimitated focus is primarily chosen to stay in the working time frame of this research as well as creating a solid foundation for future studies in the area. Provided this research path, next step in this vein is to describe the area of investments and capital assets forming a company's manufacturing capability.

For any manufacturing intensive company where most invoiced sales and revenues are generated by manufactured goods, investments made in a specific capital asset that by accounting rules is denoted as "machinery and equipment" represents the integral and most vital capital assets forming a company's manufacturing capability. This type of capital asset could also be denoted as "capital stocks" that is calculated through the yearend value of a company's total tangible assets that in one way or another are related to its manufacturing capability. By crystallizing this particular asset type, the next aim is to understand how the machinery and equipment assets relate to a company's other and performance data.

This formulation is suggested to show how deviations in capital assets in machinery and equipment change relative variables such as revenue growth or headcount changes overtime. For example, the simultaneous change in machinery and capital stocks could be related to changes in revenues, value added or headcounts. Moreover the question to find answers for could be what patterns could be found between profitability, increased production volumes which in turn was enabled by increased investments in machinery and equipment as a mean of a company's expansion of its manufacturing capabilities?

Thus, the interplaying mechanisms between capital stocks in machinery and equipment and a company's financials or overall economic performance is suggested to surface new patterns that could disguise the significance of the investments in machinery and equipment. Since much information as such could be found in the income statement, balance sheet and cash flow analysis of a company's annual report, the usefulness of the database that will be used in this research comes as time series for the two industries are gathered to encompass the 1987-2004 timeframe.

Since this study intends to assess two industries, their comparison based on above descriptions could show why one industry segment may or may not be as capital intensive in its machinery and equipment needs than the other. The comparison could also show different mechanisms between different variables calculated from the two industry segments. As the problematization of this research attempts to explore possible company internal links between investments in machinery and equipment and growth, external economic factors such as supply and demand, global economic outlook and life cycle issues become other areas to consider.

Naturally, when demand increases, expansive investments in manufacturing capability become an integral factor for suppliers to deliver the production accordingly. Contrary, when imbalanced excess of supply meets falling market demands, the question is how unutilized manufacturing capabilities of a company affect the total performance of that company. Thus, the overtime changing economic climate could is suggested to yield yet another factor that may affect why capital stocks in machinery and equipment may deviate overtime. Next, as no machine comes in eternality, the depreciation rate in which a company needs to devalue its manufacturing capability could be measured against the reinvestment rate of ditto. This dilemma may however return a more confusing picture of the linkage

between manufacturing capability investments and growth unless capital stocks in manufacturing capabilities increase at a faster pace then deducted depreciations from ditto. Thus, the question is how technological change in capital assets need for a manufacturing capability may reduce the overall depreciation life cycles forcing companies to speed up the rate of investments made in manufacturing capabilities. This quandary dictates the complexity of the investment divide, i.e. expansive investments versus replenishment of a company's manufacturing capability.

From a business external dimension that could concern investments in machinery and equipment, today's globalized environment continue internationalizing the business making of Swedish companies as well as the Swedish economy as whole. The question is how management decisions in solidifying domestic operations by perpetual investments in machinery and equipment are evaluated against profitable opportunities that may arise overseas.

Therefore, finding ways to describe possible patterns and connections between investments in manufacturing capabilities and growth become the central goals of this research. Reasoning this approach, the question will therefore be how investments in machinery and equipment have changed overtime and how they have contributed to the overall economic growth of theses two industry segments and ultimately, how they are predicted to signify in the future of the two industries. Thus, by constructing capital stocks in machinery and equipment and assets the overtime deviations with other company specific performance data, the ultimate goal of this study is to find the patterns that may affect capital stock changes and how that affects total growth.

Finally, by arranging a number of companies operating in two distinct industry segments by the most successful and least successful performers (for which determinant variables need to be discussed and decided upon), the objective is to analyze why some companies in a specific industry segment tend to lag behind in machinery and equipment investments as well as overall economic performance whereas others show sustainable growth and continued profits. Conclusively and based on chosen problematization approach, the problem formulation of this study and could be articulated as following:

What implications does changing capital formation in machinery and equipment have on a manufacturing company's overall economic performance and what factors may influence on executive decisions to continue investing in manufacturing capabilities in Sweden?

1.2. Study Purpose

Based on the articulated problem formulation and a set of terminologies introduced and elaborated in Section 1, following threefold statement situate the purpose of this study:

1. To construct aggregated capital stocks for manufacturing related capabilities in two particular industry segments operating within the Swedish manufacturing industry and describe the overtime deviations.
2. To analyze these specific capital stocks by employing a set of industry and company specific performance data and explain the long run sustainability of the two segments.
3. To identify key factors affecting the investment willingness in these capabilities and possible links to growth. From a macroeconomic viewpoint, the objective is to identify factors causing overtime deviations in such capital stocks and the possible effects it may have on the Swedish Manufacturing Industry as whole.

2. Literature Review

This section will explore and discuss the topic of investments from a theoretical perspective. As addressed in the purpose of this study, it is important to remind that because of the specific nature of this research which intends to focus on a rather specific area of tangible assets, this section will too focus on exploring the underlying economic theories concerning this specific area of investments. Initially however, a few words should be said about how one could relate to the definition of the Swedish Manufacturing Industry and how its composition could be interpreted.

2.1. Defining the Swedish Manufacturing Industry and ETS

A synonym to the Swedish Manufacturing Industry is The Engineering and Technology Sector (ETS) defined by Teknikföretagen[4]. Other definitions used are "Technology Based Companies", or "Industrial and Technology Intensive Suppliers and Manufactures" et cetera. Since different terminologies are used interchangeably to address the very same industry sector with possible industry segment overlaps or absentees, the priority is to address this industry consistently throughout the research by one endurable definition that follows domestic as well as international classification standards.

In appendix Section B, the categorization of different industries by economic activities and products is presented. Importantly, Appendix Section B describes an industrial standard is made and in which categories the economic activities and products the Swedish Manufacturing Industry falls into. From an international perspective, several system alike have been developed to facilitate domestic institutions in their effort to better comply and harmonize the national economic structure to the global village. For example classification standards have been developed for institutional, judicial and governmental purposes so even such sectors of an economy could reach a borderless harmonization.

Since Sweden's EU-accession in 1995, continuous work has focused on adopting various recommendations on industrial classifications to harmonize the domestic economics to comparable standards within the EU as well as internationally. Through this approach, it is possible to create a cross border comparisons on how industries from different economies progress. Appendix Section B also discovers the full convergence in Teknikföretagen's dataset and the Swedish Manufacturing Industry which in turn follows the national industrial classification standard called SNI. This discovery not only enables the comparison of Teknikföretagen's dataset to those gathered by the Swedish Bureau of Statistics, it the analysis of this study could be used for the prior mentioned cross border analysis.

For simplicity, the Swedish Manufacturing Industry is hereon and after follow Teknikföretagen's connotation "Engineering and Technology Sector" and abbreviated to "ETS". Thus, through an industrial grouping of ETS (which will be presented in Section 4.3), the objective will be enable a cross border analysis and make the research of this study as international comparable as possible.

2.2. Microeconomics of Investments

Primarily, what is an investment? Strictly speaking, investments are the *change* in the capital stock during a period. Consequently, unlike capital, investment is a *flow* term and not a *stock* term (Haavelmo, 1960). This means that while capital is measured at a *point* in time, while investment can only be measured *over a period* of time. As Bohlin (1995) defines an investment, it is a time-shifting activity in which a sacrifice of resource (consumption opportunities) on an average precedes the (expected) accrual of benefits by a specified time period, and in which the resource commitments are not necessarily a one-shot event.

[4] See Appendix Section A

This definition builds upon capital theory. Secondly, what motivates a person or an organization to buy securities, rather than spending their money immediately? For most investors the key measure of benefit derived from a security, i.e. an investment, is its rate of return (Goetzman, 2005). A company making a strategic or tactical investment seeks to identify and exploit synergies between itself and a new venture. The other investment objective is financial, wherein a company is mainly looking for attractive returns whereby ratio analysis proves the investment performance over a period of time (Chesbrough, 2002). Despite the fact that Fisher (1930) does not employ an explicit definition of investment, he is careful to describe it from two points of view, the investor and the investment opportunity, the former being driven by a positive time preference (impatience) and the latter representing productive options, in other words, the subjective versus the objective. Massé (1962) notes in his study that the term investment refers both to the decision to act and to the actual outcome. Massé (ibid) has provided and oft-quoted definition that includes uncertainty together with the linkage of consumption and investment:

> "The most general definition we can suggest for the act of investing is that it constitutes the sacrifice of an immediate and certain satisfaction in exchange for a future expectation whose security lies in the capital invested. The term expectation, which we have purposely left a bit vague for the time being, was chosen precisely because it shows the twofold aspect of the decision to invest: it is on the one hand an arbitrage in time, since the expectation lies in the future, and on the other had a gamble, since expectation and possession are not synonymous"

Conclusively, above statements suggests that an investment regardless of its content consists of six mutually related dimensions. *Opportunity* and *sacrifice* are two dimensions which both could be assessed by a person or an organization in their decision toward whether pursuing an *irreversible* investment option. Subsequently, the *risk* and *rate of return* dimensions are as a mean of the *time horizon*, determinants of the overall success of an investment made. In terms of classification of investments, which is a rather complex and excessively debated topic in the area, the academic literature suggests a number of divisions. From a managerial standpoint Bohlin (ibid), suggest that it may be convenient to subdivide investments into different types of classes in order to apply different investment criteria and decision procedures. Dean (1951) is an early contributor in this area, distinguishing four different classes where the classification is based on differences in measuring investment benefits;

1. *Replacement Investments*. This include both like-for-like investments and obsolescence investments for the plant (the production process), primarily involving cost minimization.

2. *Expansion Investments*. Here the investment is primarily connected with growth of several aspects and revenue increases.

3. *Strategic Investments*. This investment type relates to investments whose overall value is derived from benefits that spread over many phases of company activities and which sometimes stretch into a distant future.

4. *Product-line Investments*. This type includes both completely new products and improvements and improvements of old products, combining features of replacement and expansion.

By contrast, Fredholm (2004) divides investments from a highly structured level in four distinct areas. Primarily, *forced investments* are according to the author derived by legal forces which may change the business environment in which an entity maintains operations. Secondly, *altering competition factors*

require an entity to respond to the environment by fueling its position with new investments which in turn combats the competitive changes. Thirdly, *revenue boosting investments* are those actions that increase overall revenue streams with respect to cost control which brings the final investment area Fredholm suggest being *cost reducing investments*. Suggestively, investment activities in the two latter areas could be considered the most frequent for businesses on a marketplace to compete in.

Clearly, the two authors' representation of investment classifications appears diverse both in scope and scale. Supportably, Dean (ibid) suggests that no classification plan is useful for all purposes. In fact, Dean suggests a classification scheme with 250 types of investments, and notes that many more classes are possible. Piper (1980) provides a survey of investment classifications in which the multitude of classification possibilities emerges clearly without any theoretically sound scheme. Eriksson (1986) is another example in this tribute, providing more than 15 general classes and many subdivisions. In addition, recent years prove that intangible assets such as intellectual property and human capital in wide array of dimensions surface an increasingly important classification area.

However, no universal definition exist for this investment type it typically involves various forms of *soft*, activities such as R&D, employee training and competence enhancing, supplier relationships and market investments such as branding and brand equity. Notably, Fredholm's (ibid) notation of *altering competition factors* also relates to Bohlin's (ibid) *offensive* investments and its counterpart, *defensive*, which suggests a combat between (at least) two opponents, either in war or game. Offensive is then connected with attacking or aggressive behavior, and defensive with holding positions. Out differently offensive investment types are typically connected with being a leader (in the timing of actions), and defensive with being a follower.

The utilization of the offensive/defensive image is not so frequent in the literate. Moreover the contributions differ in terms of the point of departure (markets, technology, strategy, positions risk, etc). Here, a few examples are given. Freeman (1982) connects offensive investment strategy with innovate activities: "an offensive innovation strategy is one designated to achieve technical and markets leadership by being ahead of competitors in the introduction of new products". Davidson (1987) bases his concept ion a marketing perspective: "an offensive approach calls for an attitude of mind which decides independently what is best for a company, rather than waiting for competition to make the first move". Porter (1985) relates the offensive/defensive image to competitive attack or protection of a market position, e.g. niche, segment, strategic group. In addition, an offensive investment need not have the sole aim as stated, only the foremost. Moreover, offensive investments need not to imply that technological leadership is pursued for its own sake or that technological leadership is sought across the whole technological base of the firm. Bohlin (ibid) suggest further that it would be premature to jump to the conclusion that any offensive investment and offensive strategy is connected with pioneering and moving first, since first mover advantage may not always exist.

Relating the offensive or defensive strategies to the problem formulation of this study, it is possible to claim that from a micro economic and interorganizational viewpoint, ETS could be related to the Schumpeterian view on the role of technology in competition and market structure change. Technological change is seen as central driver to entry, exit and sustainability of firms and hence – investments made.

With respect to the purpose of this study, this question may however be tricky for which solid evidence could be established. However, as an attempt it may be relevant to return to this question in the later on analysis section of this research. Having established a common ground for defining an investment and its polemics with the widely defined classification approaches, next relevant topic covers the computational accepts of investments. Since the purpose of this study declares the need for assessing companies' historical investment development in production gaining tangible assets within ETS, the assessment per se will require a number of financial valuation instruments which in basic terms could be named as accounting rules through which such assessments are made possible.

2.3. Macroeconomics of Investments

The importance of physical capital has been wide in the literature. Rostow (1960) and Greschenkron (1963) have both underlined the need for major investments in physical capital during the industrialization process. However, Abramowitz showed as early as in 1956 that physical capital did not play the central role of economic growth that it was previously assumed. He discovered the significance of the so called residual or total factor productivity (TFP), and his results were later corroborated by other researchers.

Abramowitz and David (1973) have also shown that the importance of physical capital decreased after the turn of the last century. Suggestively, this claim should also be complemented with the state of growth an economy is experiencing. As an economy undergoes a transformation state such from an agricultural economy to industrial modernization, the capital intensity should presumably have a higher significance than the labor intensity an agricultural economy used to provide. Following, Schön has in the generalization of the Swedish economy identified recurrent structural phases where the allocation of investments in physical capital varied between transformation and rationalization.

During phases dominated by transformation, such as the one from 1890 to 1910, new sub-branches grew quickly and new process of production was introduced. Thus construction new capital-carving industrial establishments were there need. However, these substantial investments do not automatically lad to major increase in production. On the other hand, the contribution to growth increases from physical capital as well as in labor might be quite substantial during these transformation phases. Indeed, the increasing share of productivity could increase the contribution of growth from TFP to industry as a whole.

During phases characterized by rationalization, such as the ones from 1870 to 1890 and 1910 to 1930, investments in machinery increased in relation to investments in buildings and property. Due to the severe competition, companies wanted to increased productivity without costly investments in new establishments and by increased manpower. This was carried out mainly through mechanization. Consequently, the contribution to growth came as in labor decreases which also lead to rapid addition to growth from TFP. Jörberg (1961) underlines in his early study of capital formation in the Swedish industry the role of physical capital for increased productivity while he also mentions other relevant and contributing factors such as improved organization of workforce and production rationalization.

Furthermore, Holmquist (2003) argues in his dissertation that the falling ratios in the physical capital formation could be explained by the rationalization of an industry. Comparatively modest increases in investments in relation to the increase in production meant significant gains in productivity and consequently a drop in the capital output/output ratio. The continued drop in this ratio might e explained by the increased specialization wit a change of the production process from a production characterized by versatility to production of limited number of goods (ibid).

2.4. Financial Ratios

Accounting rules are designed to provide investors with a fair view of the company's earnings, assets and liabilities. Accountants are continually revising these rules but inevitably no summary set of numbers can hope to capture the financial position of large complex business. When calculating the financial ratios, it is important to look below the surface and understand some of the limitations in the accounting numbers since financial ratios are just a starting point to help understanding and navigating through the complexity of a business structure. According to Brealey et al (2004) financial ratios can be summarized in four groups:

1. Leverage Ratios **2. Efficiency Ratios**
3. Liquidity Ratios **4. Profitability Ratios**

When choosing a ratio, there needs to be some ways in which they could be judged. Historical assessments and cross company analysis are two helpful ways of benchmarking a company's overtime financial standings (ibid). For the purpose of this study, the efficiency ratios as well as profitability ratios come good in hand since they relate to the assessing the changes in the capital stocks which may in turn affect the capital formation. Efficiency ratios are used to judge how efficiently a company or related companies use and capitalize on assets available (ibid).

On the other hand profitability ratios focus in the earnings of a company or an industry as a whole. Profitability ratios could give valuable insights about the financial progress of ETS. In addition to these ratios, a number of other ratios relevant to the understanding of the capital stocks will be used. The choices of these ratios are however driven by the client of this study rather explicitly described in the financial theoretical literature. Section 5.3 will present these ratios as they will be applied in the analysis work. It should also be noted that the analysis work has also been inspired by the Du Pont schema where some profitability and efficiency measure could be linked in useful ways (Thomas, 1991).

3. Methodology

Having provided a top down description on how investments relate to economic growth and by a brief discussion on the Swedish Manufacturing Industry as ETS, the purpose of this section is to introduce the reader to a number of methodological frameworks relevant to the conduction of this study. While bearing the purpose of this study in mind and in order to create an operational research framework, several possible methodological approaches are suggested:

Primarily, one needs to understand whether the nature a study undertaken is exploratory or descriptive. The former is particularly useful if the researcher lacks a clear idea of the problems that they will meet in the course of the study. The objective with a descriptive study is to learn the who, what, when, where and how of a topic (Emory et al, 1991). Next paradigm is whether this study should undergo an inductive or deductive research process. The former occurs when we observe a fact which then is questioned. In answer to this question we advance to a tentative explanation, a hypothesis. The hypothesis is plausible if it explains the event or condition which prompted the question.

On the other hand, deduction is the process by which we test whether the hypothesis is capable of explaining the fact. Conclusively, deductive reasoning (also known as the Aristotelian Logic) is inference in which conclusion is of lesser or equal generality than the premises, as opposed to inductive reasoning, where conclusion is of greater generality than the premises. Other theories of logic define deductive reasoning as inference where the conclusion is just as certain as the premises, as opposed to inductive reasoning where the conclusion can have less certainty than premises.

Finally, abduction, or abductive reasoning, is the process of reasoning to the best explanation. Charles Sanders Peirce (1982), made important contributions to deductive logic, but he was primarily interested in the logic of science and specifically in what he called abduction. This is the process whereby a hypothesis is generated, so that the surprising fact can be explained. Peirce considered abduction to be at the heart of not only scientific research but of all ordinary human activities.

The term abduction is sometimes used to mean just the generation of hypotheses to explain observations or conclusions, but the former definition is more common both in philosophy and computing. Conclusively, the deductive approach departs from theory, i.e. acknowledged principles and methods on which the further empirical research is based, whereas the inductive approach bases its foundation on empirical data from which conclusions are made and theory is strived to be constructed. The abduction approach combines a premiere inductive study followed by a latter deductive completion (Patel et al, 2003).

In terms of the researcher's ability to manipulate variables, the differentiation is made between experimental and ex post facto design of frameworks (Emory et al, 1991). Whereas in experimental design, the researcher attempts to control and/or manipulate the variables, the ex post facto design leaves no room for controlling the variables. The latter only reports what has happened or what is happening – which in fact implies the purpose as well as the impartiality of the study.

Another methodological approach is of course a qualitative examination of the industry and each of its areas is enable a rigorous interviewing process with experts from the. Although this qualitative approach would return pretentious and case specific highlights for which a quantitative approach could not fully explain, the time consumption as well as the preset research timeline needs a careful consideration. In addition, since the purposes of this study is crystallized to a highly structured level where the intention is to explore and describe the economic health in the manufacturing industry, a qualitative approach may even on an aggregated level not return sufficient insights that could contribute to the explicit purpose of this study.

3.1. Delimitations

This study will through its framework describe how industrial classifications could be applied to the entire ETS as well as probing how the purpose of this study could be applied to the entire ETS. However, the study analysis and forthcoming findings will persistently be delimited to two major comparable industry segments operating inside ETS. Section 4.3 will present the underlying reasons toward this conduct.

As stated in the third sub-purpose (Section 2.1), the objective will be to only surface factors affecting the investment willingness of companies participating in each of the two industry segment. Thus, the intentions will not be to find reasons for why these factors exist but instead extend the meaning of these factors. Furthermore, the company mix will not undergo a statistical assessment where their significance and importance will be tested. Instead, a thorough discussion of the company mix is provided in forthcoming section 2.4 in an ambition to legitimize why the companies are included in this study.

The study is limited as all applications are made on industry segment's operations on the Swedish soil. This means that the analysis and dataset at hand persistently constitute operations of the parent company operations in Sweden including economic activities, investments and invoiced sales to the operations maintained in Sweden. Thus, foreign direct investments made in Sweden is excluded while exports sales generated by manufacturing plants inside Sweden are included. The data purification where parent companies are separated from the global operations is another strength found in the dataset at hand.

While the modeling framework in Section 4.4 presents how the entire manufacturing industry could be decomposed so that machinery and equipment capital stocks could be distinguished, the analysis persistently focuses on two comparable industry segments. Thus out of approximately 1500 companies in the dataset, only 173 companies in two industry segments will undergo the analysis. An explanation of why such small share of companies could be present over such long period is that during the 18 years period, companies tend to merge, be acquired or even file for bankruptcy.

Thus, as the standalone form of this companies disappear, their overtime surveying and analysis to become impracticable. This limitation may also have a significant impact on the study findings which in turn may be difficult to generalize to the two industry segments as a whole. While the following segment discusses the validity and reliability of the dataset at hand, Section 4.3 presents a rather important topic in this vein where the industry segment coverage of the selected 173 companies is discussed.

3.2. Data Validity and Reliability

The method used for collecting the data manifests in Teknikföretagen's statistical department which annually collects financial information from member companies' annual reports. The data amassing is also conducted by Teknikföretagen member requests combined with annual surveys which the member in turn and based on their annual progress file out and resubmit to Teknikföretagen. Since many of these companies sustain global businesses with subsidies and operations around the world, Teknikföretagen's database effectively focuses on gathering financial information from companies' operations held on the Swedish soil.

Notably, Teknikföretagen's decade long monitoring of these companies has gained significant momentum as the database sets the foundation for Teknikföretagen's publication and economic quarterlies about the development in ETS in areas such as trade forecasts and sustainability reports. These official publications are also cited and referred to publicly in the press and media as well as in governmental institutions.

Teknikföretagen's publications are also in line with most reports released by other organizations such as SCB and National Institute of Economic Research (Konjunkturinstitutet, KI). In addition, Teknikföretagen has been able to provide continuous trend analysis being in the interest of the greater public, governments, academic institutions as well as industry analysts providing information to their shareholders. Conclusively, the nature of data applied is rather impermeable in terms reliability and validity as its application and outcomes are compatible to reports publicized through other organizations and other sources of data collection.

Moreover, what makes Teknikföretagen's database unique to this research is its contents of historical data over capital stocks which encompassing the period of 1987-2004. Explicitly, the database contains data for capital stocks in several distinct tangible asset areas which directly relate to production gaining activities in a company. Data over companies' total assets fractioned into current and fixed assets as well as fixed assets divided into machinery and equipments, buildings as well as property are just example available information. In addition, data such as costs and revenue streams, headcounts covering two consecutive decades could enable calculations on different financial performance ratios from company level to entire industry segment level or ETS as a whole. Thus, data reliability and validity to fit the nature of this report could be concluded as following:

> Primarily, the efficacy of this database and selected dataset which will employ the purpose of this study is everlasting. It contains a set of variables which comprise of investments in tangible assets encompassing ETS which mutually could decide on and describe the deviations in the capital stocks as well as other relevant variables. The usefulness of this data could be empowered by the strong commitment and expertise found inside the Teknikföretagen organization as it not only posses the data but it sustains a knowledge network that could provide extraordinary and case-specific explanations data deviations overtime.
>
> Secondly and for the reliability of the dataset, it could be claimed the Teknikföretagen uses a systematic approach toward collecting its data which in turn is based on financial information companies provide to the public and shareholders. The foundation of this study and the models in which the data will e applied are therefore based on the reliability of such data sources which in turn is publicly used. Thus the findings and conclusions of this study will be based on the same source of data.

Thirdly, the validity of such secondary data source relies on the providers of the data. Since validity involves the accountability of the data being measured, it is also crucial to ensure that the data being used does not give rise for systematical errors which at a later stage of the research could endanger the research outcomes. As Djurfeldt (ibid) denotes, *high validity* regardless of topic being researched could be defined as the absence of systematical errors. Since member companies provide the data on a continuous basis, the possible invalidity should rather be directed to possible erroneous in the collection process.

3.3. Methodology Conclusions

Primarily, the abductive approach appears most appropriate to this research conduct. As Patel (2003) suggests, the inductive approach – which departs from the empirical research – could at later stage confluence with the deductive method through which empirical findings could be projected against the present research on the topic. Since this study is equipped with a dataset, the inductive approach is enabled. Next, as the result from the deductive approach is shaped, the illustration of the data could enable a deductive and theoretical inductive approach to confluence and hence producing the abductive approach suggested by Patel (ibid).

Secondly, this study will be hold an ex post facto design of a framework, since the low level metadata in Teknikföretagen's dataset will be aggregated to illustrative levels, the analysis and explanations will depart from that point. This approach leaves no rooms for controlling and manipulation of the metadata variables because the objective is to report what has happened with the investment levels – which in fact implies on the purpose of this study as well the impartiality of this study.

Finally, the research framework will depart in modeling a quantitative examination of the investment levels in ETS's different industry segments. While metadata is aggregated to highly illustrative levels, the result will be subject analysis that will be based on the historical development of that industry segment as well as the cross segment analysis if possible.

4. Designing the Model

An important objective is how the manufacturing industry could restructured so capital stocks in manufacturing related capabilities could be distinguished for analysis. This issue raises a number of unanswered questions about what other data is needed to assist the analysis.

As addressed in the study purpose, two industry segments are chosen to be analyzed. However, to better understand the mechanisms and relationships between companies in each of the two segments, an extended breakdown may contain company size, supplier and buyer companies. For this decomposition, a number of constraints must be set. For example, supplier companies need to be distinguished from companies producing/assembling toward end consumers.

Next, decomposition of companies based on size depends on constraints chosen to define "size". For example, if headcounts as the constraint could divide companies into two generally familiar company groups: Multinational Corporations (MNCs) or Small and Medium Size Enterprises (SMEs). If company revenues, market value or other profitability or growth measures are chosen as constraints, the classification of participating companies may become extravagantly customized and unfamiliar to the greater public. Contrary, it may surface new attitudes on how companies should be arranged which in turn may return distinctive insights about the industry segment.

Since the industrial classification approach described in Appendix B proved that international classification of economic activities could derive regional and national industrial classifications, an important finding is that the dataset in hand could follow the classification standards described in Appendix Section B. Therefore, a suggestion is in this vein is to completely dissolve the entire ETS based on the industry classification standards described in Appendix B.

This classification system is imperative for separating different industry segments within ETS and thereby enabling an analysis of the two segments of interest. In the forthcoming sections, the industrial segmentation of ETS and the extended decomposition will be described and communicated through a modeling mindset. Additionally, Section 4.3 conducts a thorough discussion about why the two industry segments were chosen to undergo the analysis presented in Chapter 5.

4.1. Industrial Segmentation

Rainer et al (2002) argues that the mutually exclusive, collectively exhaustive method is suggested as a strong approach toward breaking down a complex system to manageable nonoverlapping issues while making sure no issues relevant the problem have been overlooked. Since Teknikföretagen's member companies are each denoted under "SNI28-35" described in Appendix Section B, it also sets the foundation for Teknikföretagen's economic research and statistical department. Thus, industrial segmentation is an approach that could be used for categorizing anything from businesses operations to specialized know-how and based on purposes sought.

This applied classification standard not only enables the foundation of a statistical databank to search in, it also opens for the academic community and business professionals or companies to conduct analysis of various forms. This approach could extract new ideas and perspectives on how a complex system really works and what it means to a specific purpose.

Therefore, it should be evident to ensue analogous conduct in this study where the analysis is based on the SNI-classification system. It should be noted that SNI-classes are due to harmonization reasons undergoing continuous revisions. However, following suggestion depicts a simplified decomposition of ETS comprising of eight subordinated classes of SNI 28-35.

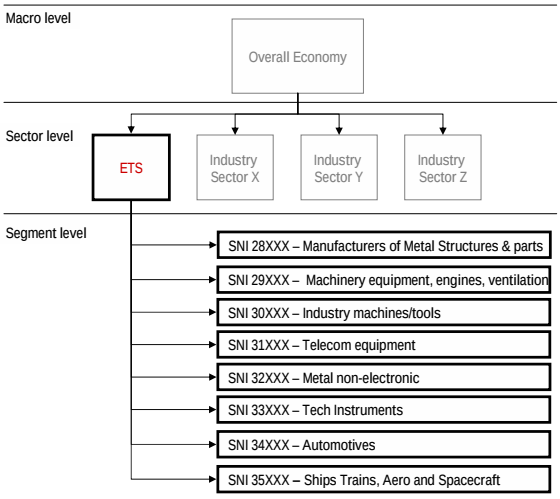

Figure 4.1.1 ETS as an element of the overall economy decomposed according to Appendix Section B

4.2. Initial Data Decomposition

Based on descriptions in Appendix Section B in addition to methodological section 3.1, following model became the initial decomposition approach for how Teknikföretagen's database could be broken down into specific data groups. The extended decomposition lead to a four level data breakdown returning specific information particularly on investments in machinery and equipment based on company groupings such as supplier-buyer relationship.

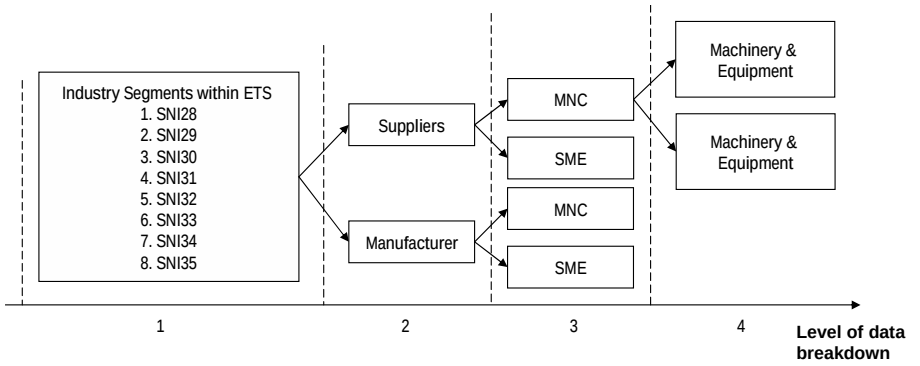

Figure 4.2.1 First data decomposition model focusing on a four level data breakdown approach across ETS

4.3. Decomposing ETS into Metal and Machinery Industry Segments

However, further investigations of Teknikföretagen's dataset showed however insufficiency of data that could enable the first decomposition approach presented in section 3.6. Companies present in each of the eight industry segments differ significantly both in numbers and in available yearend data. Whereas, some companies were present only between 1990-2004, other companies held comprehensive data for the period 1994-2004 which ultimately disabled the full timeline (1987-2004) analysis anticipated in this research.

Despite this rather unfortunate outcome, the domains of the Machinery and Metal Segments (SNI28 and SNI29) appear being the most complete industry segments the dataset could provide at the time. Companies in the two segments operate in similar business areas yet to different levels of the value chain. Also note that the numerical order of the two industry segments could from the SNI-classification be explained by the natural order in which value is added to the goods produced in

companies operating the two industry segments. In terms of data sample significance and its functional application in this research, following paragraphs debrief on why participating companies in the data sample could make good industry coverage and why findings and conclusions drawn from this data sample could be generalized and applied to the two industry segments as a whole.

In 2004, Teknikföretagen's member companies accounted for approximately 330 000 employees out of the total of 650 000 people employed within ETS. Member companies within the Metal and Machinery Segments accounted for approximately 53 000 and 78 000 employees respectively. In total, the share of Metal and Machinery Segment account 20% of as a whole and nearly 40% of people employed at companies that are members of Teknikföretagen.

The dataset used in this study in turn account for around 18 000 headcounts at 78 companies in the Metal Segment and about 27 000 people at 95 companies in the Machinery Segment. It should however be said that the companies participating in the dataset are in terms of weighted economic value and sustainable growth among the most important industrial corporations in their own industry segment. The relative share of employees present in the dataset for both industry segments indicate that following a total of 173 companies over 18 years period could impossibly cover the entire segment's active companies.

Finally, in order to include those companies that do have a significant implication as in weighted economic value and long term sustainability growth, only companies with 30 employees or above have been included in the dataset. Thus, the dataset at hand enables a thorough analysis of the SNI28's Metal Segment as well as SNI29's Machinery Segment separately as well as in correlation to one another. Given these premises, following data breakdown is suggested to enable an analysis of the two described industry segments. In Chapter 4, conduces and extensively development of the below data breakdown where relevant variables and ratios will also be presented and discussed.

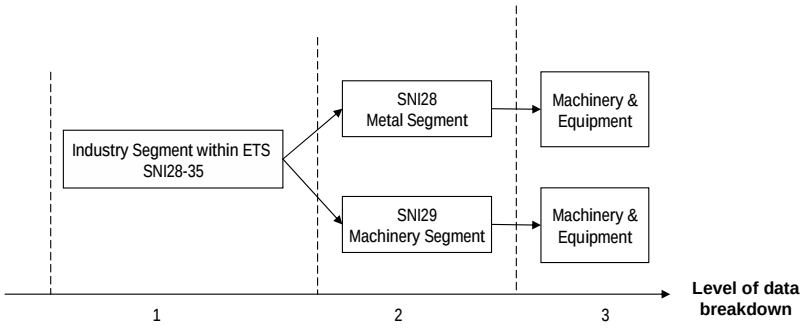

Figure 4.3.1 Second data decomposition model focusing on M&E-investments in the Metal and Machinery Segments

4.4. Designing the Model

Having established the research approach and finally defined and decomposed ETS to the two industry segments subject for analysis, following sections will provide a description of the variables that will be used for the forthcoming model population. Primarily however, it is essential to give a more thorough description of the Swedish Metal and Machinery Segments, the number of companies participating in each segment and explain why these two segments turn out to be more comparable to one another than any other industry segment within ETS.

Secondly, it is imperative to announce the variables and ranking perspectives which will be used to populate the model as well as how they become relevant to the conduct of this study. Finally, it should be noted that since this study comes from a Swedish perspective, i.e. only parent companies held in Sweden are considered, affiliations or firm types without parental incorporation on Swedish soil will be excluded from the research. Since the Metal and Machinery Segments were chosen as key segments for analysis, following tables presents a brief description of the two segments do business:

SNI28: Metal Segment	SNI29: Machinery Segment
Total Participating Companies: 78 Major Economic Activities: This industry segment consists of companies developing and manufacturing of basic metals and fabricated metal products. This includes development and manufacturing of hand tools used in assembly plants, metal parts such as metal interior parts and components, as well as refining tools used in milling, cutting, granulating, lathe operations and surface treatment	Total Participating Companies: 95 Major Economic Activities: Primary development and manufacturing of machinery and equipment which then is assembled in end customer goods comprising of anything from construction equipment to other industrial machines as well as machinery and equipment for house hold appliances.

Table 4.4.1 Nature of the Metal and Machinery Segment

4.5. Data Overview

In the pre-study phase of this research, a set of variables were chosen which alone or in correlation were able to present some interesting facts about how deviations in machinery & equipment affected the overall performance and profits of the companies. These variables are intended to be used for populating the forthcoming model and following descriptions present a go-through of each of the variables.

Below table summarize participating companies in quartile available in Teknikföretagen's database. For these two industry segments, data for 173 companies was captured and used to construct the upper and lower quartiles approach (see Section 4.8). The Metal Segment will comprise of 19 companies in each of its quartiles while the Machinery Segment is represented by 24 companies in each of its quartiles.

SNI28: Metal Segment	SNI29: Machinery Segment
Total Participating Companies: 78 Participating Companies in each quartile: 19	Total Participating Companies: 95 Participating Companies in each quartile: 24

Table 4.5.2 Overview of the two industry segments' data

4.6. Variables Employed

Following section describes each of the variables from which the compounds and ratios will be derived and used in forthcoming model and analysis section of this research. Each variable is described and complemented by financial equations inspired by Brealey et all (2004).

1. Revenues

The Revenue variable is a performance ratio used to show the overall sales of a company. This variable becomes more interesting when it is put in correlation to other variables such as the revenues per employee or investments.

= Volume x Price

2. EBIT

There are several synonyms to EBIT (Earnings Before Interests and Tax) where two widely used are termed as "Operating Profits" or "Operating Earnings" and it is calculated as revenues subtracted from operating expenses. This variable is important to separate for other profit measures since it is closest to the costs associated with a company's manufacturing capabilities. These costs could be cost of goods sold, depreciations, amortizations et cetera.

= Revenues – Expenses

3. EBIT-margin Revenues

Below ratio denotes a company's profit margin in relation to generated revenues. This most common instrument is used for evaluating how much profits are made from a company's operating revenues deducted from its cost. Decreased operating costs as in goods and improved manufacturing capabilities may lead to improved profits and hence profit margins.

$$= \frac{\text{EBIT}}{\text{Revenues}}$$

4. Value Added

There are several meanings connected to the term "Value Added". For example, it could mean the enhancement added to a product by a company before it is offered to customers. Another definition comes as the monetary value of an entity at the end of a time period minus the monetary value of the same entity at the beginning of that same period. In this study, valued added is defined as:

= Revenue – (Total Costs - Total Employee Costs)

5. Employees

Employees reflect the total manpower employed at the parent company. This variable includes all types of fulltime workers and part-time workers. Currently, Teknikföretagen's dataset does not contain a dissolved mix between blue collars and white collars meaning that all ratios used are based on the total workforce each company reported during the yearend collection of data.

= White Collars + Blue Collars

6. Total Assets

Total Assets is generally divided in two major types of capital assets called Fixed Assets and Current Assets. The book value of Total Assets should equal the sum of a company's equity and liabilities stated in the balance sheet. Naturally, a company could also report other asset holdings. For example, large scaled leased capital assets may be reported as fixed assets held by the company. Financial tangible assets such as financial instruments and invoiced receivables as well as intangible assets such as goodwill, research and development costs consist of other varying assets types reported by a company.

Total Assets = Equity + Liabilities

7. Fixed Assets

Fixed assets, also called "Tangible Fixed Assets" comprise partially of the physical capital tied in machinery & equipment related to a company's manufacturing capability and capital invested in buildings, plants as well as properties and land. Together with a company's current assets, the value of fixed assets represents the total assets valued in a company. Current assets on the other hand consist of capital use for purchasing commodities or parts needed in the manufacturing process which also is denoted as capital employed. Fixed assets are described in the following paragraph.

= Total Assets – Current Assets

8. Machinery and Equipment

Finally, the most vital variable to provide this report in its purpose is the nominal value of machinery and equipments which is recorded in the annual cash flow statement of the parent companies. This variable is included in the fixed assets of a company and consists of the yearend value of the capital tied in machinery and equipment which in turn respond to all types of machinery and belonging equipment needed to run and maintain a manufacturing capability the company uses to produces its goods.

= Fixed Assets – (Lands + Properties)

4.7. Two Ranking Perspectives

Next, two ranking perspective are suggested in which the variables for companies in each segment to be ordered. The underlying motivation for the two ranking perspectives is described as following:

1. EBIT-margin Ranking Perspective

The first ranking perspective was based on the 18 years average EBIT-margin of companies present in each of the two industry segments. The calculation was carried through as the aggregated 18 year average EBIT-value of the companies in each of the two industry segments was divided by the average revenues generated during the same period. The approach could tell more about how profitable companies grow their manufacturing capabilities.

$$= \frac{\text{Average EBIT 1987 through 2004}}{\text{Average Revenues 1987 through 2004}}$$

2. Machinery and Equipment Stock Value Ranking Perspective

Second ranking perspective was based on the 3-years average of the nominal value in machinery and equipment captured from the first- and last three years of the period. The 3-years average is calculated as the 1987-1989 average of the machinery and equipment stock divided by the 2002-2004 average. The calculation generates a ratio that showing average change in the stock value growth of capital tied in machinery & equipment and it will hereon and after be denoted as the "M&E-stock value ranking perspective".

$$= \frac{\text{Average M\&E-stock value of 2002 through 2004}}{\text{Average M\&E-stock value of 1987 through 1989}}$$

4.8. Quartile Perspective

Following, the produce of the two proposed ranking perspectives will be associated with a quartile perspective. These quartiles represent the 25% of the highest and lowest performing companies in each industry segment derived by each of the two ranking perspective. For example, one objective of this approach is study how a high-performer quartile may end up having similar values in a specific variable or ratio as found in a low-performer quartile. In addition, the quartile perspective also allows seeing an actual deviation in the upper and lower quartiles in one segment as well as it allows a comparison with another segment.

Additionally, Appendix Section D consist of eight unique tables showing the 2004 key variables for the upper and lower quartiles of the two industry segments based on the two ranking perspectives. Note that for the EBIT-ranking perspective (Tables 9.D1-9.D.4), the M&E-stock value growth rate is shown in the last column of the two tables to indicate how companies arranged by best performing EBIT-margins have increased their average M&E-stock during the 1987-2004 period. Equally, the last column of the second ranking perspective (Tables 9.D.5-9.D.8) indicates the EBIT-margins of companies sorted by highest average M&E-stock. This is done to show the ranking discrepancy of the EBIT-margins and M&E-stock value growth.

4.9. Weighted and UnWeighted Perspective

It should also be noted that when data results from compounds are shown described, the calculation follow a weighted approach. This means that above suggested ranking perspectives order companies based on the aggregated sum of variables and ratios. This approach could also create a discriminating over representation of dominant companies. By other hand, an unweighted approach calculates the average value of a variable sought by dividing the value at hand with the number of participating companies. Thus, the cumulative (weighted) data used to calculate a particular compound or ratio may differ from the results that average (unweighted) approach may yield and ultimately, these two approaches could return different analysis results. Reasoning the weighted approach in this study, the calculations outcome of the outcomes lie closer to the reality than the calculated average may return.

4.10. Modeling Results

Diagram 4.10.1 illustrates the approach for how the analysis process. The approach begins with the compound and ratio analysis based on the two ranking perspectives. In turn, the two ranking perspectives divide companies into the upper and lower quarters denoted as quartiles. These quartiles represent the 25% of the highest and lowest performance yielded by each of the two ranking perspectives. Next, these quartiles are divided into the Metal and Machinery Segments so that they could undergo the compound and ratio analysis.

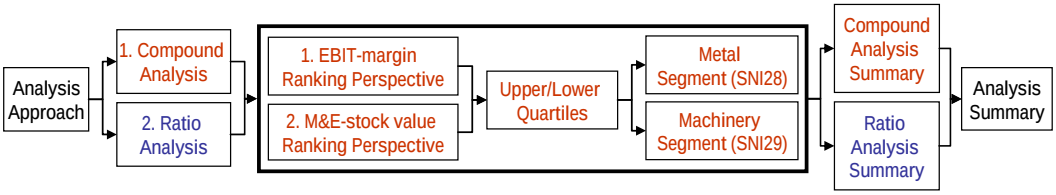

Diagram 4.10.1 The analysis process of compounds and ratios by two ranking perspectives

Based on above descriptions on the variables, the quartile approach as well as the ranking perspectives, figures 4.10.2 summarizes the finalized modeling development while table 4.10.3 summarizes how the operational framework of this study relates to the methodologies presented. Notably, the finalized model below also reminds about the initial data decomposition approach (figure 4.2.1) as they both have a four level breakdown yet based on a considerably different set of constraints.

The objective with this model is to enable the upper and lower quartiles for each of the two industry segments to be employed by described data variables. Next step is to convey extensive number of illustration to responding focus group members for insights and thoughts that may enrich the analysis work.

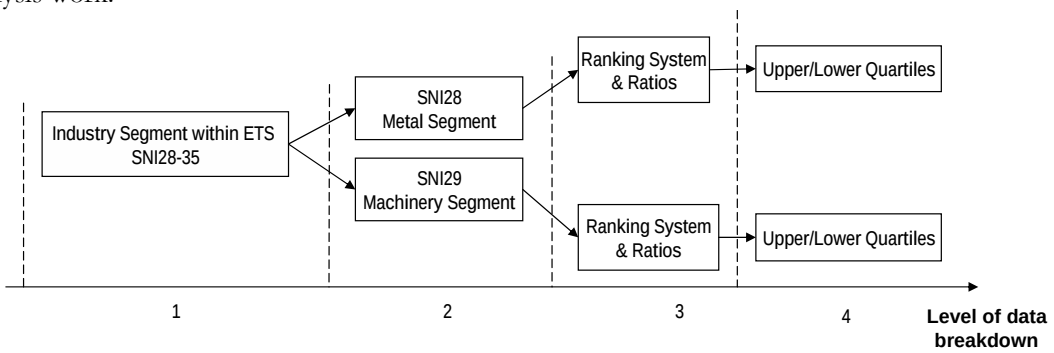

Figure 4.10.2 Finalized modeling proposition with persistent focus on SNI28 and SNI29 and ready for data population

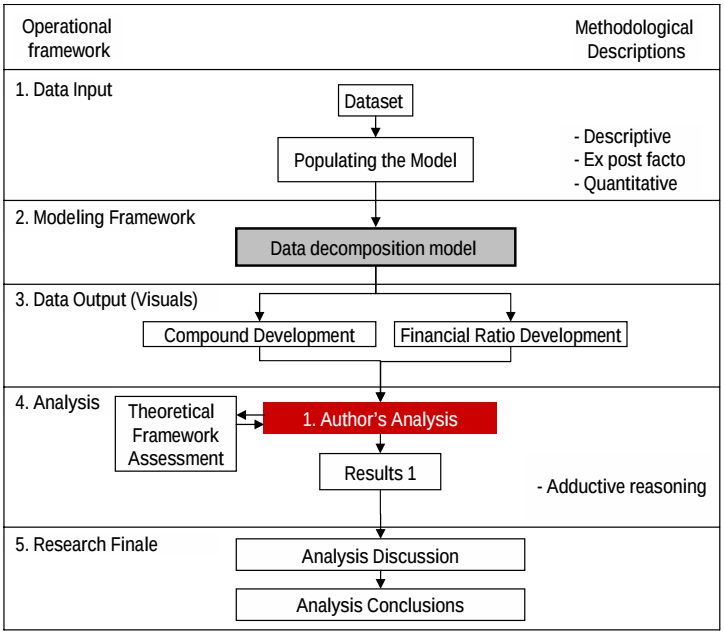

Table 4.10.3 Completed table detailing the study research approach and developed model

5. Analysis

This chapter intends is to populate the model based on contents presented in Modeling Results in Sections 4.10. Thus, presented variables will be illustrated in compounds for the companies in upper and lower quartiles and the two ranking perspectives. This approach will produce a set of diagrams and figures on which an analysis will be applied.

5.1. Compound Analysis

Following figures are based on the aggregated compounds where upper and lower quartiles of each industry segment are present. In addition, the dashed compounds represent the total value for participating companies in each of the two segments. These compounds return valuable insights on how the two industry segments have developed overtime. Note that monetary compounds (such as revenues, various assets types as well as the value added compound) are presented in nominal values meaning that yearend interests and inflation rates are not considered.

In the forthcoming ratio analysis in section 5.2, these variables become less relevant since ratios per definition cancel out variables as such, i.e. interests and inflation rates are terminated as they exist both in the numerator and the denominator of the division formula. Also, note that in the visualization of the diagrams, the y-axis values for each of the two diagrams in comparison may contain different scales. Finally, it should be remembered that SNI28 denoted as Metal Industry Segment and SNI29 is denoted as Machinery Industry Segment may be used interchangeably.

5.1.1. EBIT-margin Ranking Perspective by Quartiles

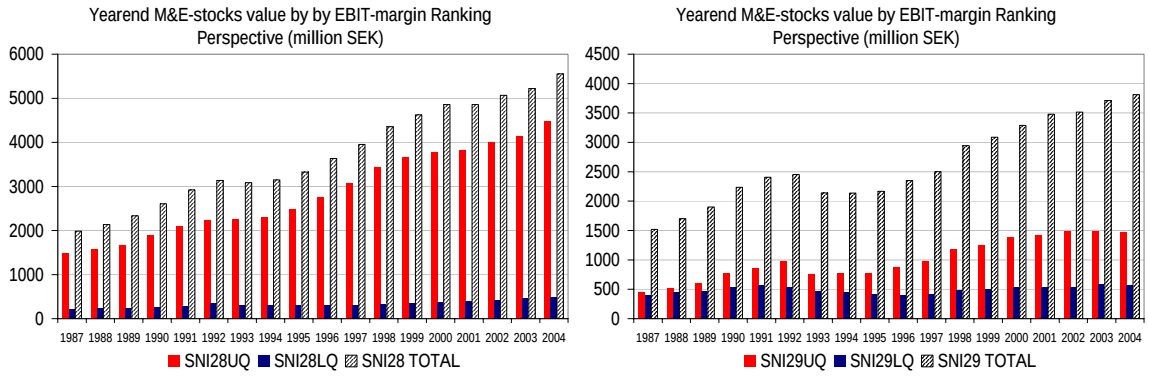

Diagram 5.1.1.1 Machinery & Equipment stock value by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

Primarily, companies with highest EBIT-margins in both industries' upper quartiles also tend to tie continuous physical capital in machinery and equipment. The Metal Segment appears having by far more capital tied in machinery and equipment than the Machinery Segment. One major contributor to this discrepancy is due The Dominant Company[5] which was included in the Metal Segment company mix in the first ranking perspective.

Removing The Dominant Company from the compound yielded a 1:2 ratio between the upper and lower quartiles of the Metal Segment, meaning that upper quartiles in both industry segments holding highest EBIT-margins still tied more capital in machinery and equipment than the lower quartiles ever did.

[5] To protect Teknikföretagen's member companies from public exposure at in the nature of a study as such, the company will hereon and after be referred to as "The Dominant Company"

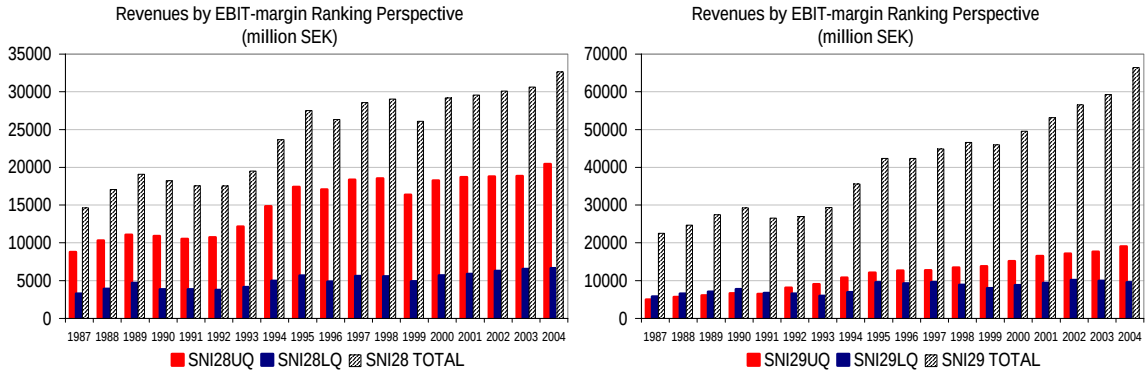

Diagram 5.1.1.2 Generated Revenues by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

An interesting discovery in the Machinery Segment is the lower quartile's rather high revenue generation which in 2004 accounted for nearly 50% of revenues generated in the upper quartile of that same industry segment. Despite this trend, the lower quartile companies were among the lowest EBIT-margin performers in both industry segments.

This development could depend on many different factors. High revenues with low EBIT-margins could for example come as a result of higher cost of goods sold, ineffective cost structure as well as poor manufacturing processes. Additional analysis showed higher capital turnover in the lower quartile companies of in the Machinery Segment and the Metal Segment meaning a relatively higher capital utilization that migrates throughout these companies but less is transformed profits. Another interesting finding is that the upper quartiles in both Machinery and Metal Segment reached equivalent revenue volumes (2004).

However, the Metal Segment begun at a higher revenue base while the Machinery Segment has sustained a higher CAGR (+7.7% compared to +4.8% in the Machinery Segment) during the period. An indication here is that during the period, the company mix in the Machinery Segment's upper quartile had a significantly higher revenue growth than the Metal Segment.

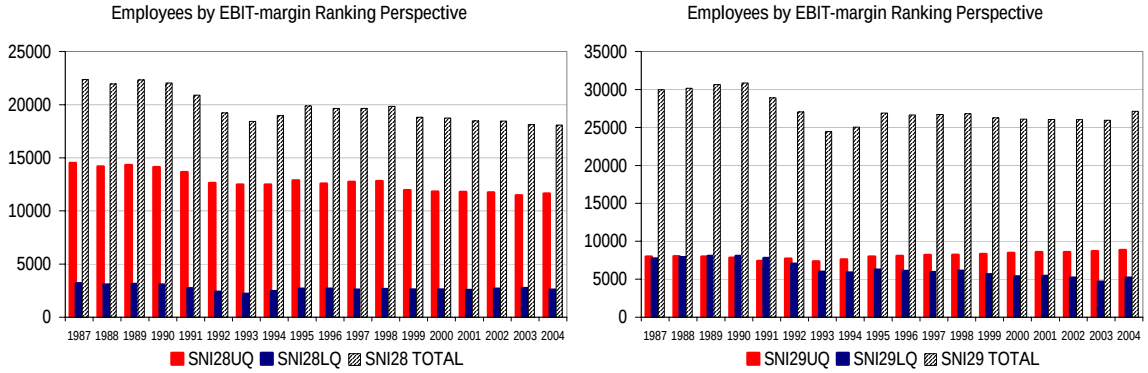

Diagram 5.1.1.3 Headcount Development by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

The only quartile in two industry segments with a positive manpower growth during the period was the Machinery Segment's upper quartile with the scarce CAGR of +0.6%. Companies in the lower quartile of that same industry segment rationalized headcounts by -2.2% annually while the Metal Segment's lower quartile reduced its manpower by -1.1% per year. The distinguishable deviation in the Metal Segment's upper quartile comes again as a result of The Dominant Company's participation in the company mix.

The failing manpower development is however not a new trend particularly in recent years. Generally, in developed economies, labor costs account for one of largest elements of the cost structure in a company. The effects of globalized competition which in turn open doors for many companies to exploit new opportunities overseas while combating newly introduced challenges in the home grounds also force companies to look inward rethinking how to rightsize the operations.

Consequently, the outsourcing trend of peripheral activities to focus more on core expertise, material sourcing from new geographical locations or an intensified automation of existing manufacturing capabilities all contribute to the effects of jobless growth. However, as economic changes are cyclical, downwards trends too tend to shift to upswings. In this specific case, product life cycles, market demands as in invoiced sales and changes in capacity utilization all affect the future need for manpower in the two industry segments.

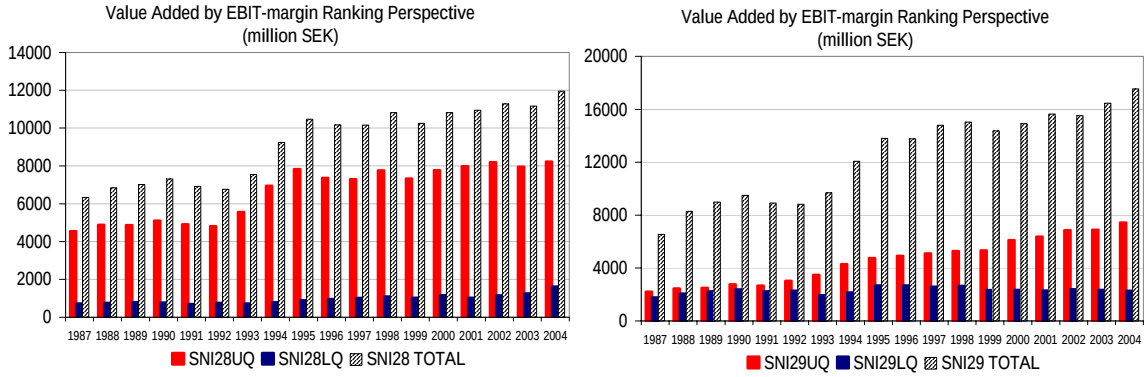

Diagram 5.1.1.4 Value Added by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

In terms of value added, the Machinery Segment's upper quartile showed a significantly stronger annual growth (+7%) during the period while corresponding quartile in the Metal Segment grew relatively slower sustaining a +3.4% in CAGR. Thus, the Machinery Segment showed drastic improvements in adding value to the upper quartile company mix particularly when comparing to compounds from the beginning of the period.

In 1987, the upper quartile of the Machinery Segment had 2.2 bn SEK in company mix added value while the lower quartile hit 1.8 bn SEK. This could be compared to 2004 compounds where the upper quartile held 7.4 bn SEK compared to 2.3 bn SEK in the lower quartile.

Continuing with the lower quartiles, the Metal Segment appears to have had an all-time low value added compound while recent years indicate an upswing. The first 9-years CAGR for the Metal Segment's lower quartile was +1% while latter 9-years period indicated a +6.9% increase of value added and finally, the total period CAGR leveled at an annual average growth rate of +4.6%.

Mirroring the Machinery Segment's lower quartile, corresponding data was +2.1%, -1.8% and +1.4%. So far, the EBIT-margin ranking perspective has shown that consistent companies participating in the Machinery Segment's upper quartile have relatively had the best 18-years performance in EBIT-margins, machinery and equipment stock value increase as well as revenue generation, headcount growth and adding value to the company operations.

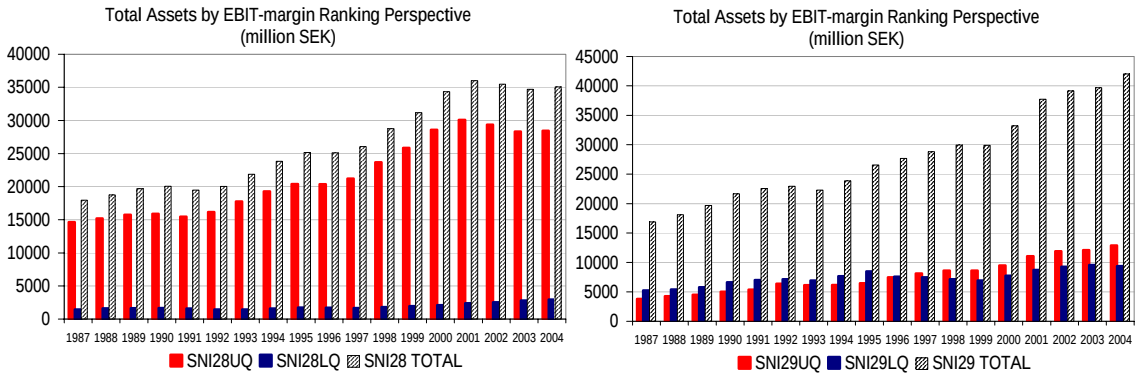

Diagram 5.1.1.5 Total Assets Value by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

Clearly, The Dominant Company is the heavy contributor to the large discrepancy of total assets in the Metal Segment. Once The Dominant Company is removed, the upper quartile holds an average of 2.6 times higher total asset compounds compared to that same industry segment's lower quartile. In 2004 and with The Dominant Company removed, the Metal Segment's upper quartile held 6.4 bn SEK tied total assets while the lower quartile only tied 2.9 bn SEK.

Following, the average ratio for the Machinery Segment's one time higher. What makes the Machinery Segment interesting is that the lower quartile on an average basis tied nearly as much capital in total assets as the upper quartile. Despite this composition, the participating company mix still ended up having the poorest EBIT-margin average during the entire 18-years period.

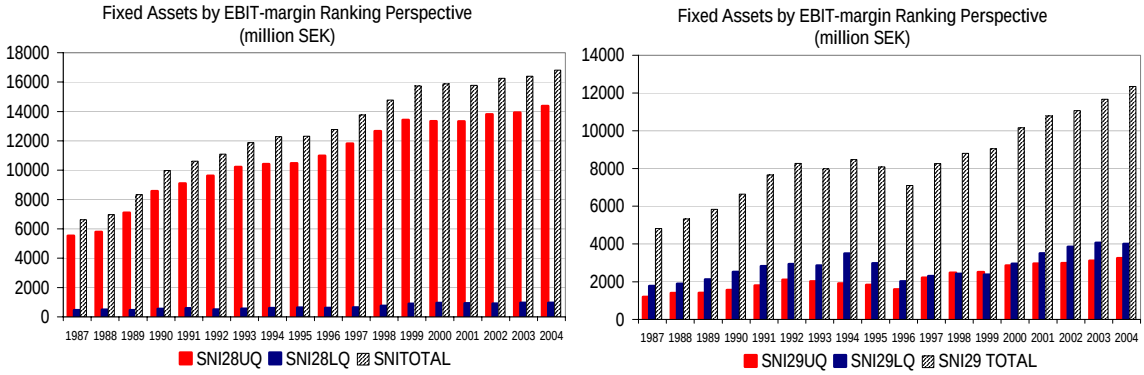

Diagram 5.1.1.6 Fixed Assets Value by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

Following, the Machinery Segment's fixed assets in the lower quartile appear being considerably higher than the upper quartile. Since machinery and equipment is a tangible asset within the fixed assets of company, this diagram could be compared to diagram 5.1.1.1 indicating that the Machinery Segment's upper quartiles had significantly more capital tied in machinery and equipment than the company mix in the lower quartile. As other fixed asset types consist of buildings and properties, a conclusion here is that the lower quartile of the Machinery Segment has comparably more capital in other assets than machinery and equipment. In 2004, the Machinery Segment's lower quartile had 15% of fixed assets tied in machinery and equipment while the upper quartile had 46% of fixed assets tied in machinery and equipment.

5.1.2. M&E-stock value Ranking Perspective by Quartiles

It should be mentioned in this section that companies in all four quartiles in this ranking perspective also returned an all-time positive 18-years average EBIT-margin. Additionally, The Dominant Company that caused significant discrepancies in the analysis based the EBIT-margin ranking perspective, did not participate in M&E-stock value ranking. This could be explained by the fact that

since the Dominant Company sustained majority shares of the compounds presented in the EBIT-margin ranking perspective, machinery and equipment changes sought through the M&E-value stock ranking perspective turned out to be fractionized. Thus, the Dominant Company would not qualify to be included in the company mix represented in the Metal Segment.

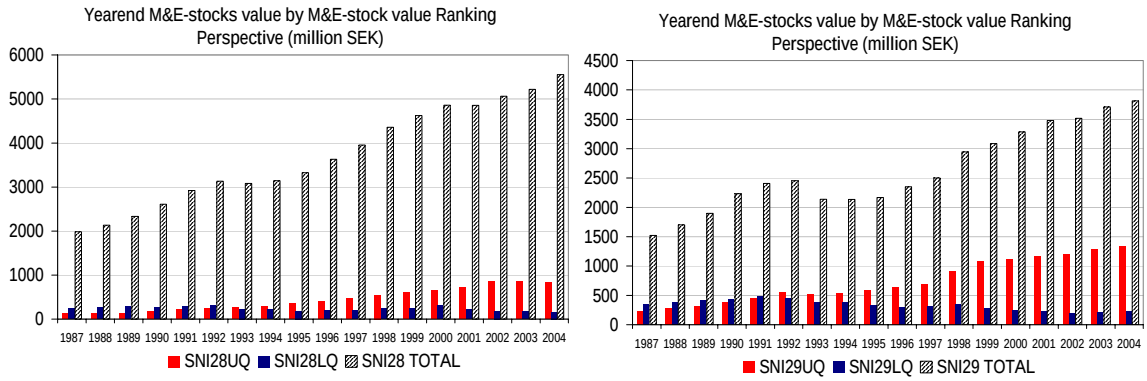

Diagram 5.1.2.1 Machinery & Equipment stock value by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

Upper quartiles in both industry segments reported relatively higher increases in machinery and equipment stocks than decreases found in lower quartiles of the segments. In Metal Segment's upper quartile, the machinery and equipment stock had increased +51 times during the period while corresponding companies in the lower quartiles increased experienced a scarce change of +0.3 times.

Equivalent data for the Machinery Segment was +32 times in the upper quartile and +0.1 times in the lower quartile. Based on the company mix included in this ranking perspective, the Metal Segment appears consisting of companies with higher magnitude in the machinery and equipment stocks those in participating the Machinery Segment's both upper and lower quartiles.

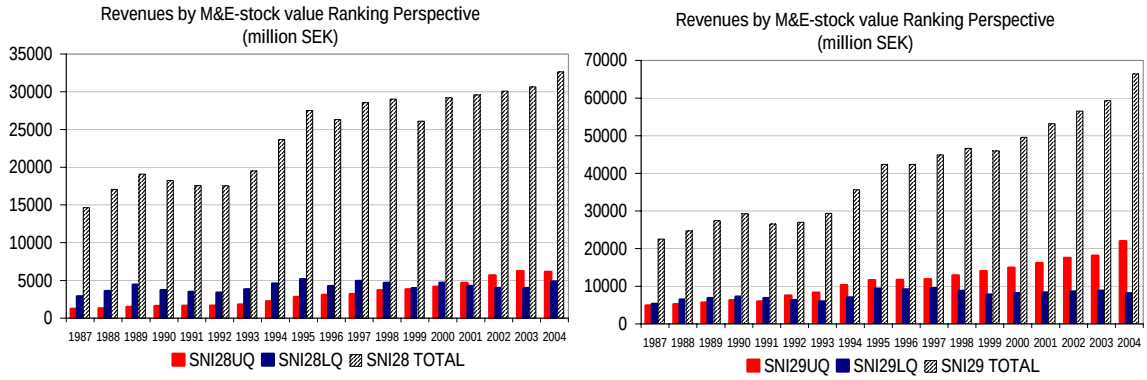

Diagram 5.1.2.2 Generated Revenues by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

Analyzing both industry segments' upper quartiles, increased revenues also contributed to increased value in the machinery and equipment stocks. The company mix representing the Metal Segment's upper quartile increased revenues by +9.5% annually while lower quartile reached a +3% annual average. Similarly, the Machinery Segment's upper quartile reported a +8.7% CAGR while the lower quartile had even lower revenue growth than corresponding quartile in the Metal Segment ending at +2.3% per year.

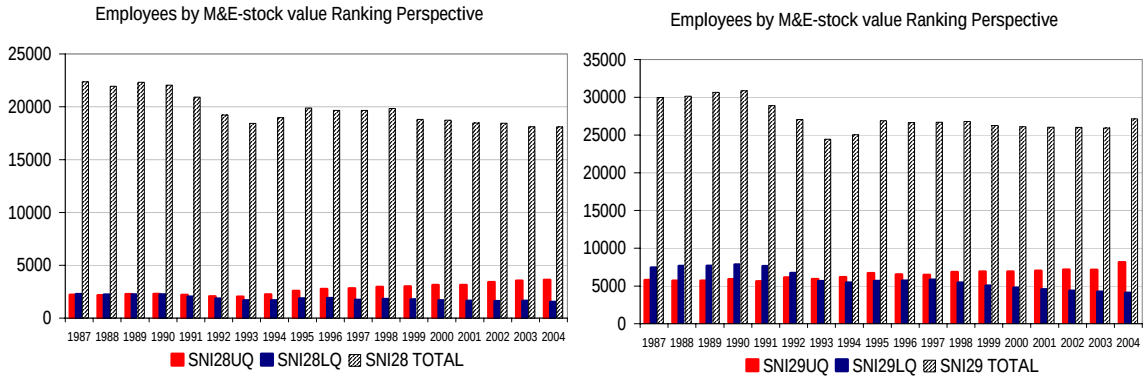

Diagram 5.1.2.3 Headcount Development by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

An instant pattern found in the headcount development diagram came when participating companies in the upper quartiles of the Metal Segment and the Machinery Segment were studied. Companies showed increased value in machinery and equipment simultaneous to increasing headcounts. While machinery and equipment value for the upper quartiles in both industry segments had an annual average growth of +10.6%, companies also hired +2.4% more people each year.

Although current ranking perspective only considers companies with highest and lowest rates in which machinery and equipment stocks changed, the average 18-years EBIT-margin for the Metal Segment's upper quartile averaged +7.9% while the Machinery Segment returned +9.1% annually. Contrary, companies in the two industry segments' lower quartiles both decreased value in the machinery and equipment with an average of -2.2% respectively and annually.

Simultaneously, headcounts for the Metal Segment's lower quartiles dropped from a total of 2267 to 1529 employees, (-2.2% annually). Corresponding data for the Machinery Segment was 7427 employees to 4103 yielding an annual headcount decrease by -3.2%. Finally, the 18-years average EBIT-margins for the Metal Segment and the Machinery Segment lower quartile's were +3.5% and +3.8% respectively.

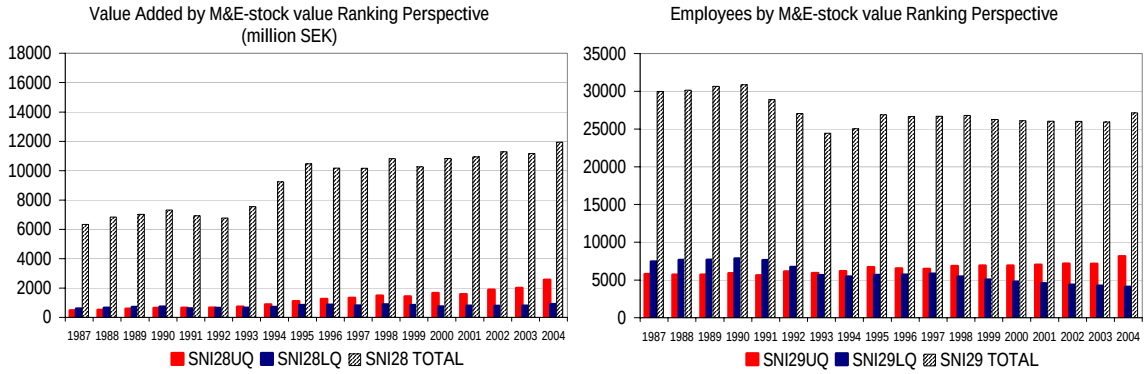

Diagram 5.1.2.4 Value Added by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

Patterns in the value added diagrams also show how evident increased compound values in machinery and equipment also tend to contribute to increased revenue generation, headcounts as well as added value to the company operations. In 1987, participating companies in the Metal Segment's upper quartile generated 0.5 SEK in added value. This compound rose by +9.9% annually which by 2004 resulted in 4 bn SEK in added value. The Machinery Segment rose from 1.4 bn SEK to 5.9 bn SEK equaling a slightly lower annual increase of +8.9%.

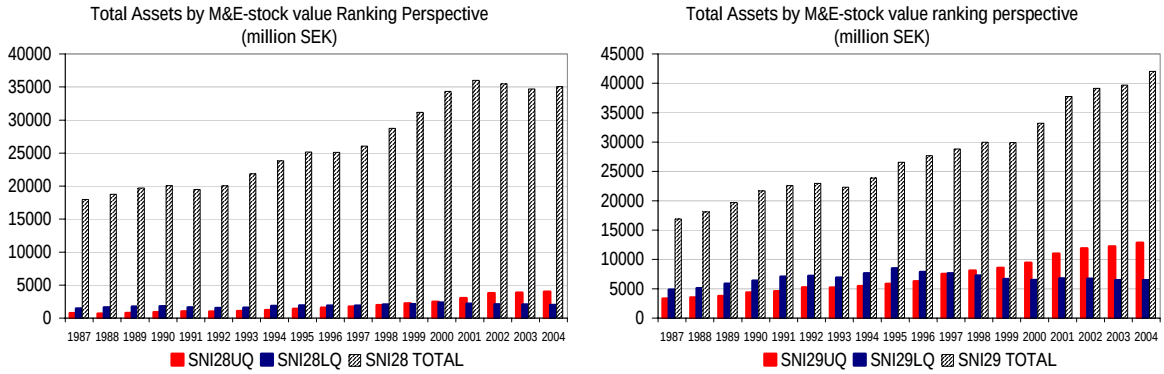

Diagram 5.1.2.5 Total Assets Value by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

What makes above diagram noticeable is that in the beginning of the period, the lower quartiles in both industry segments had relatively more capital tied in total assets than in upper quartiles. Total assets held by the Metal Segment's upper quartile enjoyed an annual increase of by +9.8% and +7.8% for the Machinery Segment's corresponding quartile. Contrary, the two segments' lower quartiles experienced a midterm upswing while total compounds gradually decreased by the end of the period. At the end of the period the two quartiles held nearly half as much total assets tied in their operations than the two upper quartiles had.

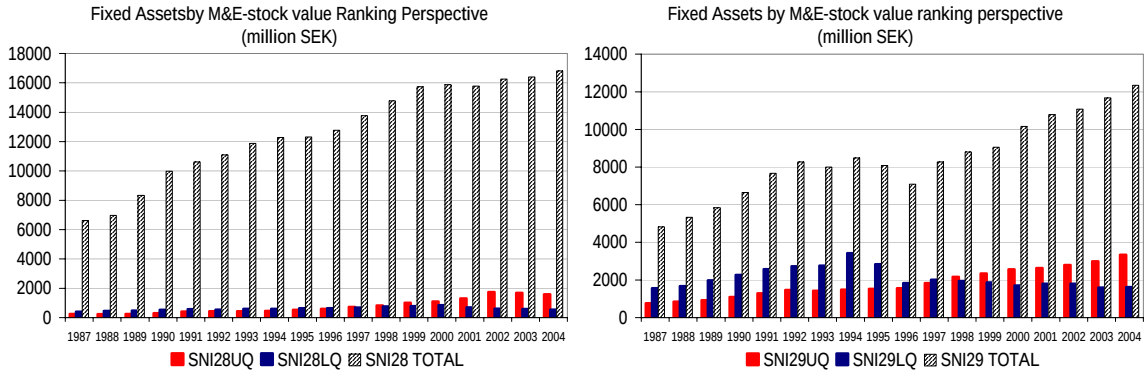

Diagram 5.1.2.6 Fixed Assets Value by M&E-value stock Ranking Perspective - SNI28/SNI29 by Quartiles

In 1987 and for the Metal Segment's upper quartile, the machinery and equipment share of fixed asset went from 49% to 52 % in 2004. Equivalent data for the Machinery Segment was 31% in 1987 and 40% in 2004. Although this ratio rose at a higher pace for the Machinery Segment, the Metal Segment appear being more capital intensive in terms of machinery and equipment stock share of fixed asset.

For the two segments' lower quartiles, the Metal Segment had in 1987 about 60% of fixed assets tied in machinery and equipment while this share was by 2004 halved to 29%. Same pattern could be found in the Machinery Segment's lower quartile as corresponding ratio was 22% in 1987 and 14% in 2004. Comparably, the Metal Segment's both upper and lower quartiles appear more capital intensive in terms of machinery and equipment share of fixed asset than the Machinery Segment's both quartiles.

However, as fixed assets in the lower quartiles of the Metal Segment and the Machinery Segment rose by +1.6% and +0.2% respectively, machinery and equipment stock in both quartiles decreased annually by -2.2%. Furthermore, while fixed assets slowly increased in both industry segments' lower quartiles, machinery and equipment stock decreased.

An indication here is that participating companies in the two lower quartiles are tying less capital in manufacturing capabilities and instead focusing on increased investments in other fixed assets such as buildings and properties. Another explanation is that current assets could increase a higher pace than fixed assets and/or machinery and equipment stocks as a whole. This pattern is rather evident in the lower quartiles and particularly in the Metal Segment which in an 18-years period halved its machinery and equipment share of fixed assets.

5.1.3. Compound Analysis Summary

Based on the first ranking perspective, participating companies in the Machinery Segment's upper quartile outperformed remaining three quartiles in a diverse number of compounds presented. The average EBIT-margin reached +14.2% while participating companies in the Metal Segment's upper quartiles yielded +11.6% annually. The Machinery Segment increased headcounts by +0.6% per year while the Metal Segment's upper quartile rationalized manpower by -1.2% annually. In addition, the Machinery Segment's upper quartile also increased the added value compound, revenues, machinery and equipment stock value at a significantly higher pace than the other three quartiles analyzed.

Based on the second ranking perspective as the participating company mix also was different, the Machinery Segment's upper quartile had again the highest EBIT-margin ending at annual +9% while the Metal Segment's upper quartile ended at +7.9% annually. However, while participating companies in the Machinery Segment's upper quartile increased headcounts by +1.9% per year, corresponding quartile in the Metal Segment recruited +2.8% employees per year. In fact the Metal Segment's upper quartile showed except for the average EBIT-margin relatively better values revenues, value added compound as well as machinery and equipment stocks than Machinery Segment's upper quartile.

Clearly, companies with highest EBIT-margins in both industry segments also tend to make continuous investments in machinery and equipment. Despite the heavy contribution of The Dominant Company to the Metal Segment's machinery and equipment stocks, its removal yielded a 1:2 ratio between the upper and lower quartiles of that segment. This means that upper quartile of the Metal Segment still is a heavy investor of machinery and equipments regardless of the Dominant Company.

For the Machinery Segment and based on the second ranking perspectives, the most active company investing in machinery and equipment had increased its machinery and equipment stock by +51 times. Comparing the two ranking perspectives, the company mix present in the first ranking perspective's upper quartile had by 2004 exceeded 1.4 bn SEK in machinery and investments. This development could be mirrored to the second ranking perspective where the aggregated compound of the machinery and equipment stock reached nearly 1.3 bn SEK. This means that the Machinery Segment has managed to reach nearly similar levels of investments in both ranking perspectives.

Despite increased revenue generation for the Machinery Segment's lower quartile (+4% per year), the company mix therein still constituted for the poorest EBIT-margin performance at all times. With current data at hand, it is still difficult to speculate why revenue growth in this particular quartile does not lead an improved EBIT-margin. From business economics perspective, the EBIT-margins stagnation despite of increased revenues could be explained by an array of diverse factors. The lack of cost control in different operation areas especially within the manufacturing process could add to the total costs. Thus, the cost of goods sold may increase hitting hard on the sales margins and hence, the EBIT-margin.

Another reason could be the low bargaining power of in a competitive environment. In addition, increased capital turnover in this segment show on higher capital utilization meaning that more capital is floating throughout the companies but less is transformed to profits and hence EBIT-

margins will suffer. It should also be kept in mind that from the EBIT-margin ranking perspective, this specific quartile increased its machinery and equipment stocks with scarce levels from 400 million SEK to 600 million SEK or 1.9% annually during the entire 18-years period.

Thus, sluggish modernization of manufacturing capabilities could also contribute to higher labor intensive processing (increased cots of goods sold) which evidently could have been substituted by automated process. Buyers may gain sustainable leverage by negotiating deals with several sellers forcing producers to reduce prices.

Considering the fixed assets compounds, the Machinery Segment's lower quartile had the most dramatic increase. However when investigating the machinery and equipment share of fixed assets in this quartile, it turned out that in 2004 only 16% comprised of machinery and equipment. This ratio could be compared to the same segment's upper quartile where tied capital in machinery and equipment consisted of 46%. From both ranking perspectives however, the Metal Segment's upper quartile appear to be relatively more machinery and equipment intensive than the Machinery Segment.

This could be compared to two segments' lower quartiles where fixed assets rose steadily while machinery and equipment stocks dropped by -2.2% annually. An indication here is that the lower quartiles are increasing their fixed assets in other tangible assets unrelated to the manufacturing capabilities. This may also indicate why consistent companies in these quartiles in both segments from both ranking perspectives belong to the poor performers at all times. This pattern is more evident in Metal Segment's lower quartile which during the 18-years period halved its machinery and equipment stock while fixed assets rose by +1.6% annually. Summarizing the compound analysis yields following findings:

- Comparing the two ranking perspectives, the first perspective appear to have a considerably greater coverage over total companies present in both industry segments than the second perspective does. This explains that conclusions drawn from the first ranking perspective may have higher relevance when generalized to two industry segments as a whole.

- The Machinery Segment's upper quartile had from first ranking perspectives retuned the best 18-years performance in EBIT-margin, recruiting, machinery and equipment stock growth as well as revenue generation and adding value to the operations.

- From the second ranking perspective however, the Metal Segment's upper quartile hade the highest annual growth rate in employees, revenues, machinery and equipment growth as well as in the value added compound. In addition, the M&E-stock change, i.e. the average 3-years change between the first and last three years of the period, yielded a +6.6 times increase.

- From the second ranking perspective, decreasing stocks in machinery and equipment also lead to decreasing headcounts for all participating companies in the lower quartiles. For the Machinery Segment, headcounts fell by -3.2% annually while machinery and equipment stocks also fell by -2.2 annually. Corresponding lower quartile in the Metal Segment reported an annual decreasing both in machinery and equipment stocks and headcount by -2.2%.

- Increased revenues combined with stagnated investments in machinery and equipment for both ranking perspectives reveal that companies tend to end up in the lower quartiles in both industry segments. Participating companies by both ranking perspectives in both industry segments' lower quartiles also reduced capital tied in machinery and investments as share of fixed assets. Meanwhile, the fixed asset stocks rose. This could be explained by greater capital tied in other fixed assets as land and properties.

- Machinery Segment's upper quartile had nearly twice as fast revenue generation than the Metal Segment's corresponding quartile. This could be explained by stronger demand for the Machinery Segment's products leading to greater invoiced sales and exports.

- In relation to total compound values and considering the first ranking perspectives, it is evident that The Dominant Company also the upper quartiles of the Metal Segment.

5.2. Ratio Analysis

Following sections focus on explaining a set of important ratios which partially are derived from variables presented in Chapter 4 and partially from other variables obtained in the modeling framework. The initial objective is to survey and analyze overtime deviations in each industry segments' upper and lower quartiles based below described ratios.

1. Return on Capital Employed (ROCE)

This ratio is calculated though having the EBIT compound divided by total assets subtracted by current liabilities. It indicates the efficiency and profitability of a company's capital investments particularly the capital that is employed in value adding activities. ROCE could also be calculated by dividing EBIT with total equity and long-term liabilities of a company. The denominator should consist of the type of capital that in one way or another is connected to the company WACC-ratio[6].

$$= \frac{\textbf{EBIT}}{\textbf{(Total Assets – Current Liabilities)}}$$

2. Value Added Rate

The value added rate is obtained by dividing the valued added compound with the revenue compound. An increasing valued added rate indicates a higher pace in the value adding activities compared to generated revenues. This situation occurs when a company is able to reduce all its possible costs that are unrelated to labor costs. By example, it could concern productivity gains and higher utilization of existing manufacturing capabilities or even increased sales margins. Other factors concern decreased cost of goods sold, i.e. new production enhancing technologies that could optimize different processes of manufacturing capabilities or improved management of materials inflow as well as goods outflow.

$$= \frac{\textbf{[Revenue – (Total Costs – Total Employee Costs)]}}{\textbf{Revenues}}$$

[6] WACC constitutes for Weighted Average Cost of Capital (also denoted as OCC = Opportunity Cost of Capital)

3. Value Added per Employee

This ratio calculates the added value to a company's operations based on employee efforts. Through this measure, one could obtain the overtime deviation of how company headcounts have contributed to the operations.

$$= \frac{\text{Value Added}}{\text{Revenue}}$$

4. Machinery and Equipment share of Capital Employed

Since machinery and equipment is considered as an element of working capital, it is relevant to understand the relationship between machinery and investments as employable capital that could contribute to the overall operation output.

$$= \frac{\text{Fixed Assets} - (\text{Lands} + \text{Properties})}{\text{ROCE}}$$

5. Machinery and Equipment share of Fixed Assets

Through this ratio, the machinery and equipment share of fixed assets is allocated. This ratio is interesting since it shows how other fixed assets such as buildings and property shares of fixed assets have changed compared to the machinery and equipment stocks.

$$= \frac{\text{Machinery and Equipment}}{\text{Fixed Assets}}$$

Having briefly described the ratios, following two figures illustrate the overtime EBIT-margin development for participating companies in upper and lower quartiles in both industry segments. The dashed line indicates the EBIT-margin of total number of companies participating in each of the two segments while the black line represents the average EBIT-margin for Teknikföretagen's total member companies across ETS[7].

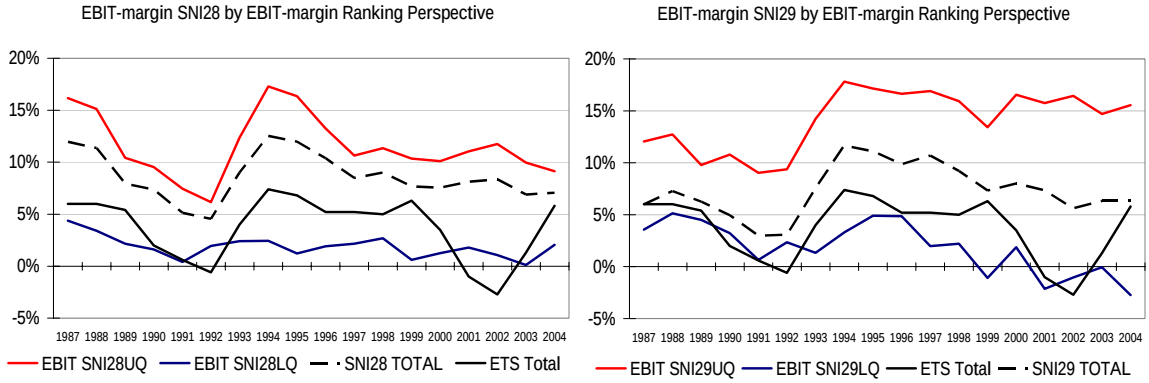

Figure 5.2.1 EBIT-margins by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

[7] Teknikföretagen Sources, obtained January 2006

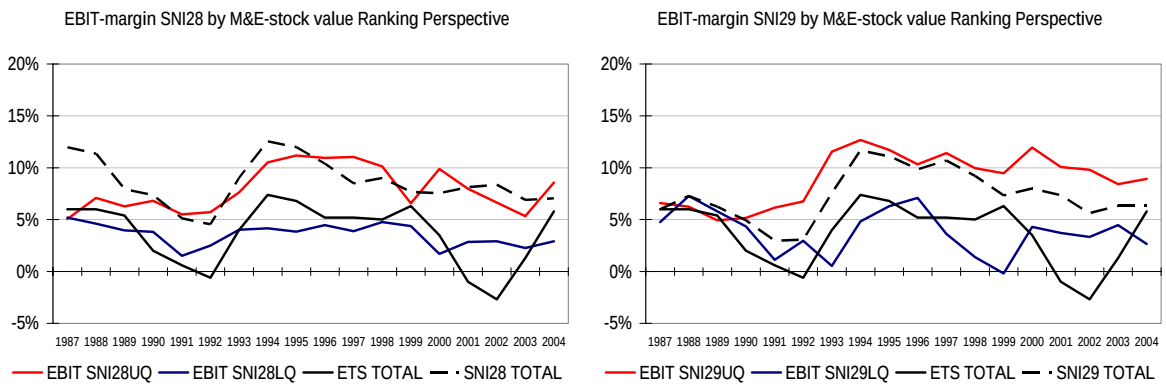

Figure 5.2.2 EBIT-margins by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

Despite the fact that the two ranking perspectives returned different EBIT-margin rates, the M&E-stock value ranking perspective shows that neither quartile experienced a negative EBIT-margin during the 18-years period. However, the company mix of Machinery Segment's lower quartile has in recent years shown an ever decreasing EBIT-margin which also follows ETS's total EBIT-margin development. In both ranking perspectives however, the Machinery Segment's upper quartile enjoyed the endurably highest EBIT-margin of kind which was also followed by the Metal Segment's upper quartile.

5.2.1. EBIT-margin Ranking Perspective by Quartiles

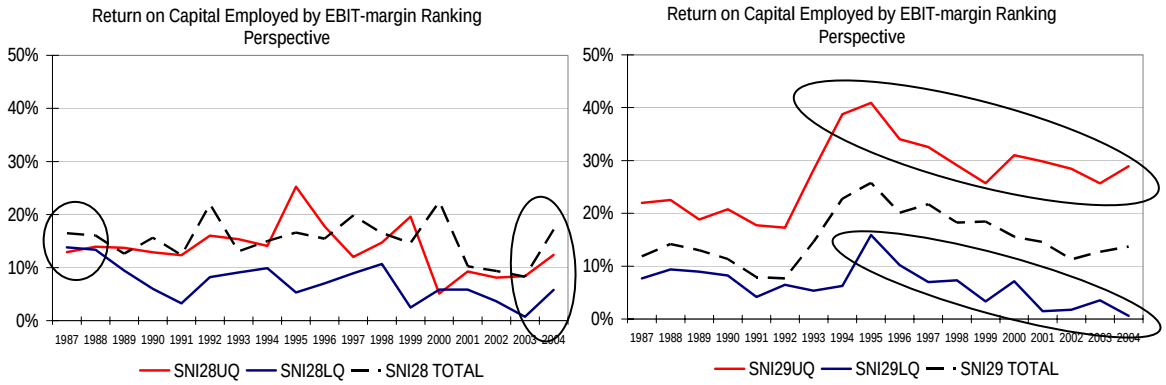

Figure 5.2.1.1 ROCE by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

Clearly, during 1987-2004 the upper quartile of the Machinery Segment had the highest return on capital employed than any other quartile. The upswing starting in 1992 also indicates the segment's recovery from the Swedish financial crisis which by early 1990's became one of the worst economic depressions in the Swedish history.

While the deviation between in the upper and lower quartiles of the Metal Segment was less, the actual return on capital employed was also sparse. Also, by 2004 yearend, the lower quartile of the Machinery Segment appeared to be the only quartile with an enduringly declining ROCE-ratio development.

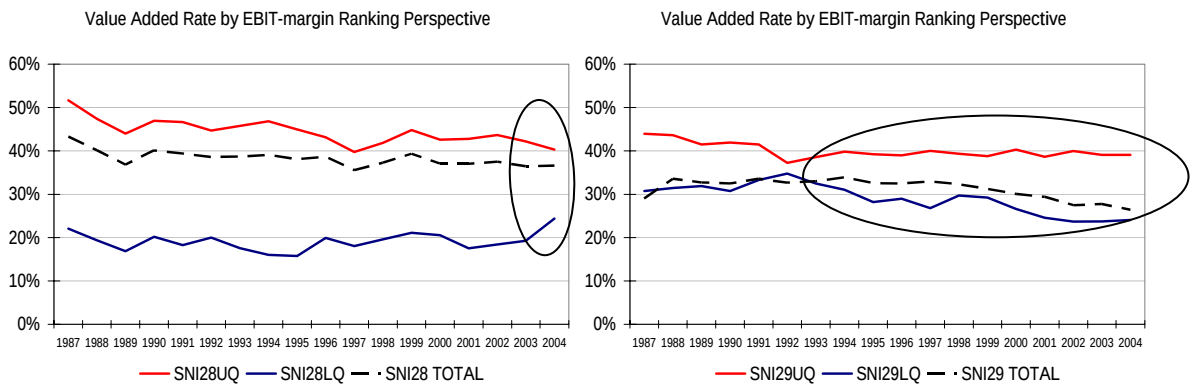

Figure 5.2.1.2 Value Added Rate by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

For both industry segments and despite the greater discrepancy between Metal Segment's upper and lower quartiles, the value added rate appears floating with no dramatic deviations overtime. Noteworthy is however the decrease of value added rate in Machinery Segment's lower quartile which in 1992 had peaked to 35% while exiting the period with gradual decline to 24% value added rate.

Between 2003 and 2004, Metal Segment's lower quartile experienced an upswing from 19% to 24%. Also, note the counter-progressing development in Metal Segment's both quartiles in the end of the period. Considering the elapsed period, the period-end development might as well be a smaller fluctuation as the 18-years period proven to other fluctuations. All in all, these developments indicate that the value added compounds of the companies in each quartile have increased in parity to generated revenue compounds.

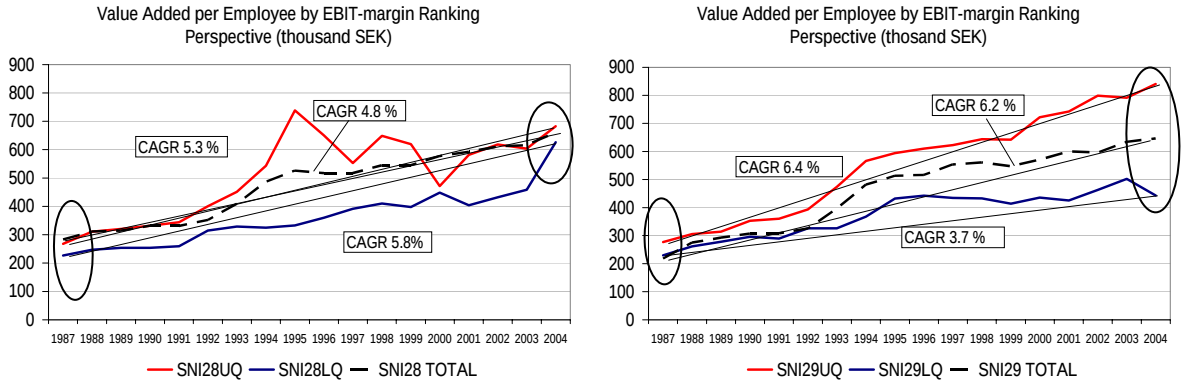

Figure 5.2.1.3 Value Added per Employee by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

An evident pattern following the value added per employee ratio is that all four quartiles started at nearly the same level in 1987 to gradually begin floating apart. Companies belonging to the upper quartiles of both industry segments showed relatively more rapid growth in this ratio. In recent years however, lower quartile of the Metal Segment showed on boosts which in 2004 could nearly confluence with the upper quartile. The trend for the Machinery Segment appears however to be the opposite as the lower quartile lagged behind considerably. In 2004, the Machinery Segment's upper quartile enjoyed 841 000 SEK in value added per employee while the lower quartile in the same segment fell from 502 000 SEK in 2003 to 443 000 SEK in value added per employee. The Metal Segment's upper quartile had in 2004 reached 683 000 SEK in valued added per employee while the lower quartile reached 626 000 SEK value added per employee. One should keep in mind that this increasing development is heavily due to the manpower rationalizations in the industry and particularly when participating companies are ranked through the EBIT-margin ranking perspective.

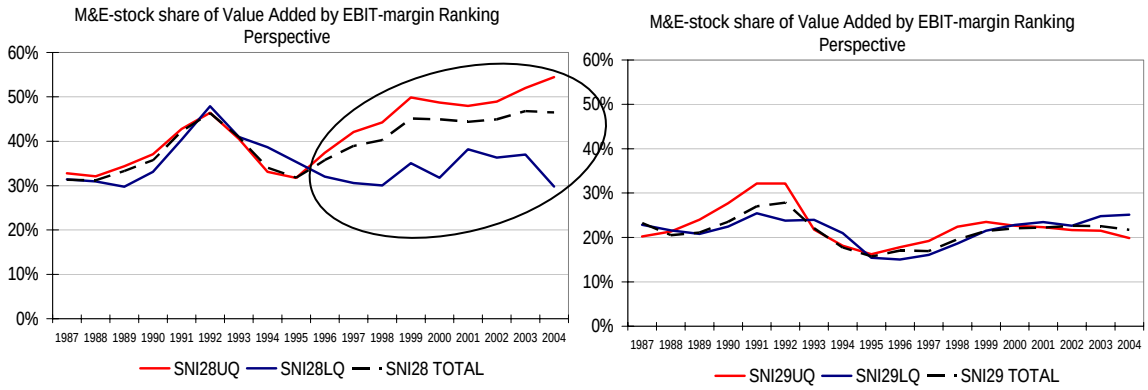

Figure 5.2.1.4 M&E-stock share of Added Value by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

In this diagram, the Machinery Segment seems relatively less depended on allocating investments in machinery and investments for generating value added benefits to its quartiles. Comparably, the Metal Segment appears keeping a higher reliance on this ratio. During the second half of the period, the Metal Segment's upper and lower quartiles tended to apart from one another.

Diagrams 5.2.1.1 and 5.2.1.4 explains this development by the increasing machinery and equipment stocks for the upper quartile while the value added rate grew at a relatively lower pace. These developments were however the opposite for the Metal Segment's lower quartiles. It is alp evident that for the Machinery Segment's both quartiles follow the entire industry segment's total values.

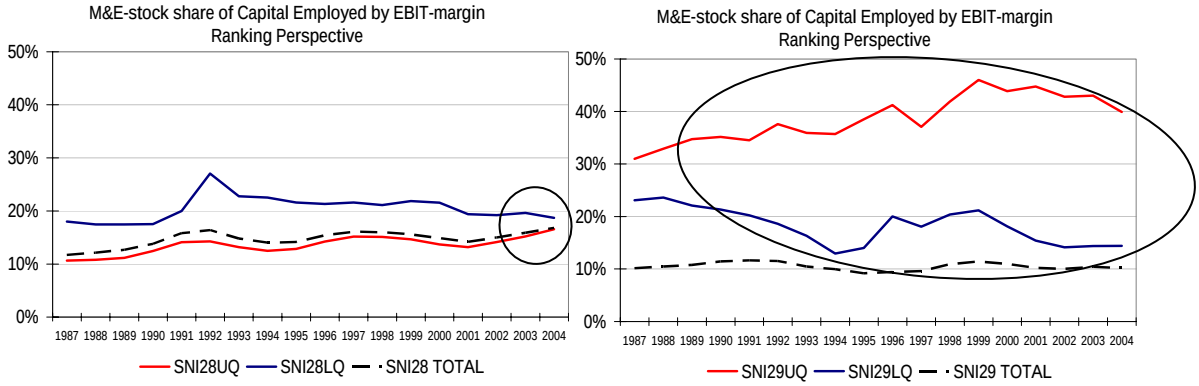

Figure 5.2.1.5 M&E-stock value of Capital Employed by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

Compared to the upper quartile of Metal Segment, the lower quartile allocated more machinery and investment stocks in the total capital employed. Comparing the two segments, Metal Segment tends to employ other asset types than machinery and investments in its ongoing operations. The upper and lower quartiles of Machinery Segment however show a growing alienation from one another.

Comparing 1987 ratios to the 2004 ratios, Machinery Segment's upper quartile had a 31% allocation of machinery and equipment stock in employable capital whereas the lower quartile had 23% allocation share. The 2004 data fore corresponding ratios were 40% and 14% while Metal Segment's 2004 ratios were 16% for the lower quartile and 19% for the upper quartile.

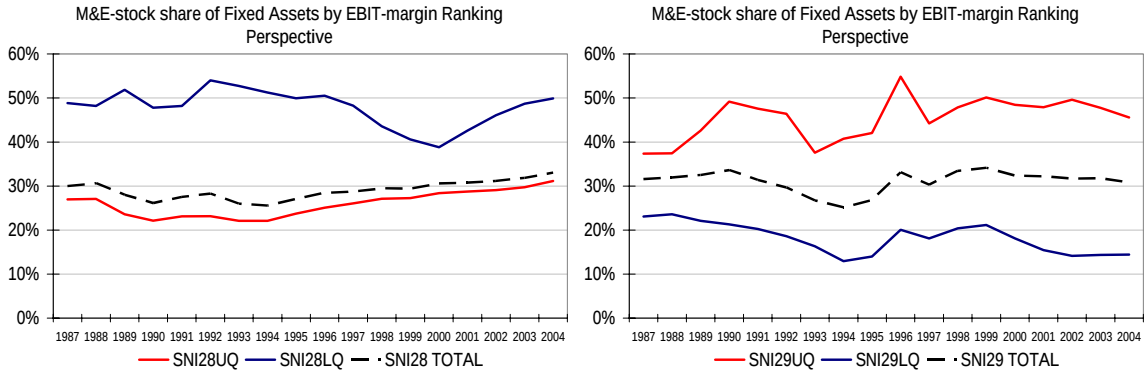

Figure 5.2.1.6 M&E-stock share of Fixed Assets by EBIT-margin Ranking Perspective - SNI28/SNI29 by Quartiles

As this particular ratio was discussed in the compound analysis Section 5.2, above diagram shows the overtime ratio of machinery and equipment share of fixed assets. The lower quartile of Metal Segment appears having relatively higher capital tied in machinery and equipment than the upper quartile in the same quartile.

This discrepancy is again due to the presence of The Dominating Company in the Metal Segment. Since The Dominant Company is one of Sweden's largest corporations, it is also likely that this company has relatively much higher capital tied in more versatile areas than the other less dominating companies. Removal of The Dominant Company from Metal Segment's upper quartile yielded an average of 39% allocation of machinery and equipment stocks in fixed assets making the two quartiles more comparable.

Except for the lower quartile of the machinery segment, the two segments seem to keep about 40-50% of fixed assets tied in machinery and equipment stocks. This finding and based on the first ranking perspectives again confirms the machinery and equipment intensity of the two segments as they both need heavy manufacturing capabilities in the ongoing operations.

5.2.2. M&E-stock value Ranking Perspective by Quartiles

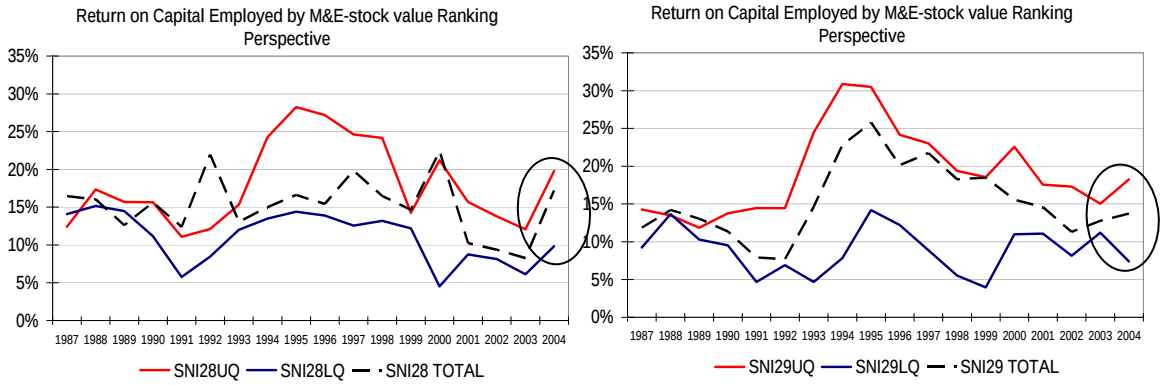

Figure 5.2.2.1 ROCE by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

Considering upper quartiles of both the Metal and Machinery Segments, they appear having similar ROCE-trend lines. For the Machinery segment in particular and when the two ranking perspectives are compared, it is evident that the M&E-stock value ranking perspective does not have same company mix as the EBIT-margin ranking perspective since both quartiles in the latter ranking perspective tend to have a higher average EBIT-margins.

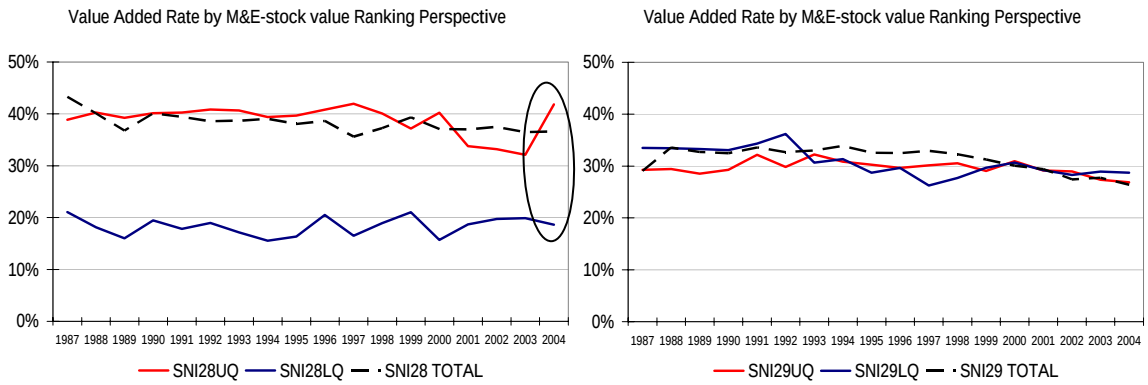

Figure 5.2.2.2 Value Added Rate by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

Except for the last years' development in the Metal Segment's upper quartile, above figure both imply a rather insignificant development of the value added rate reminding of the similar descriptions provided for figure 5.2.1.2. This development could also be seen in the total ratio value for both industry Segments.

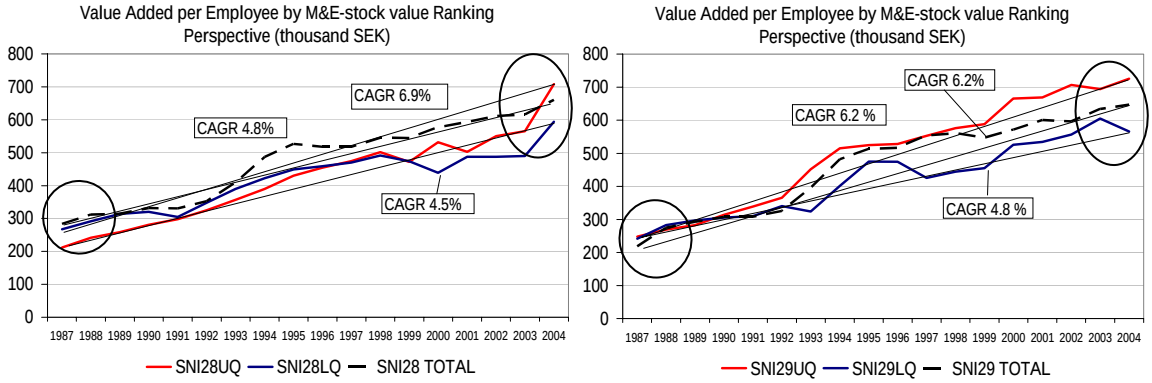

Figure 5.2.2.3 Value Added per Employee by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

Similar to diagram 5.2.1.3, Metal Segment's lower quartile development increasingly depend on the overtime manpower rationalization (-2.2%) and value adding gains (+2.3%) that contributed to the higher value added per employee ratio. For the Metal Segment's upper quartiles however, the increased value added ratio depended on increased value added compound (+9.9%) at a higher pace than headcounts (+2.2%). Comparing the company mix present in the ranking perspective, similarities are found in the ratios of the 1987-values as well as the overtime development.

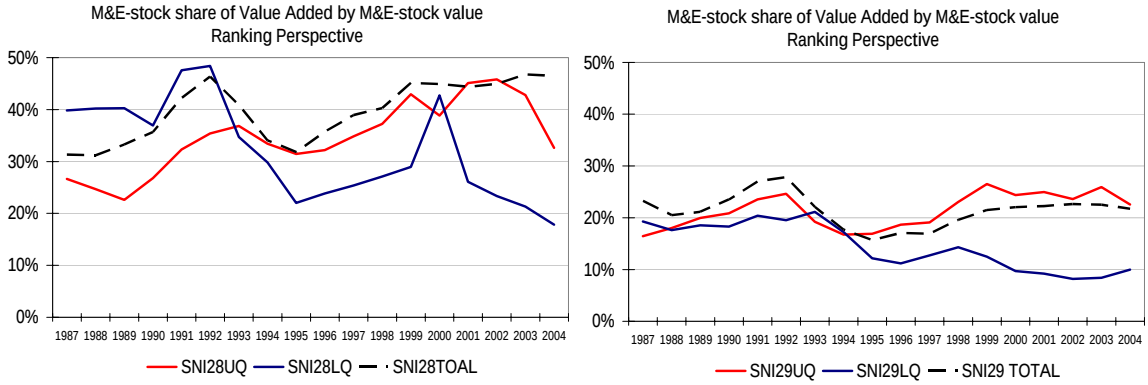

Figure 5.2.2.4 M&E-stock share of Added Value by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

This diagram reminds of the presented corresponding diagram 5.2.1.4 which was based on the EBIT-margin ranking perspective. The Machinery Segment tends to rely less on allocating machinery and equipment investments to create value adding benefits for the participating company operations. The Metal Segment on the other hand tends to have a higher ratio magnitude as well as having a higher average reliance on machinery and equipment stocks for value creation. However, when considering the compound values based on the second ranking perspective in diagram 5.1.2.4, one could see that to total y-axis of the value added value was 3 bn SEK whereas corresponding value for the Machinery Segment was 7 bn SEK. Since the value added compound becomes the denominator in this ratio, diagram 5.2.2.4 explains how the two ratios in each segment differ with such significance.

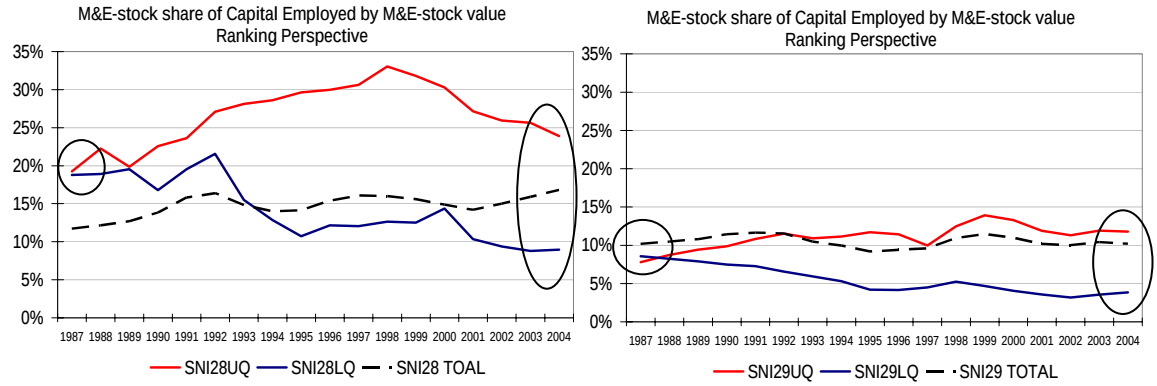

Figure 5.2.2.5 M&E-stock share of Capital Employed by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

Compared to the EBIT-margin ranking perspective, current ranking perspective in above diagram tells a completely opposite story for how much machinery and equipment stocks the two industry segments allocate as the share of capital employed (refer to diagram 5.2.1.5). While each industry segments had nearly equal ratio values in the period initiation, the trend line shows an alienation with a relatively different gaps developed for the upper and lower quartiles in each business segment.

However, the gap developed for the Metal Segment is significantly larger than the one in the Machinery Segment. These developments are mainly due to the fact that capital employed rose dramatically for the lower quartiles in both segments while machinery and equipment values stagnated. Contrary, the machinery and investment stock grew at faster pace for the upper quartiles in both segments that capital employed did.

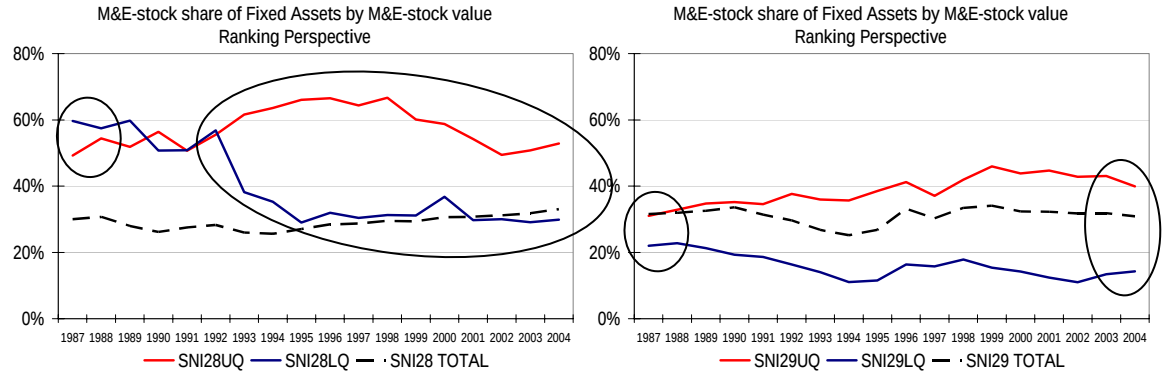

Figure 5.2.2.6 M&E-stock share of Fixed Assets by M&E-value stock ranking perspective - SNI28/SNI29 by Quartiles

The major fall in the Metal Segment's lower quartile in 1992 and beyond depend on that the value of the machinery and equipment stocks dropped by over 1 bn that very year. Preassembly, this even occurred as a company divested parts of its machinery and equipment inventive operations. This could also explain why that specific company is participating in the lower quartile in the M&E-stock ranking perspective.

5.2.3. Ratio Analysis Summary

For ROCE-ratios by both ranking perspectives, the Machinery Segment's upper quartile experienced the highest ROCE-rate than any other quartile. Additionally, when solely viewing the second ranking perspective, the Metal Segment's upper quartile also enjoyed a higher ROCE-rate. From both ranking perspectives, the only company grouping that reported a downward development in the ROCE-rate was the lower quartile of the Machinery Segment. It should however be noted that this particular development which came effective between 2003 and 2004 may depend on the differing company mix that was present in the two ranking perspectives[8]. Thus, it would be difficult to generalize this trend to the entire Machinery Segment since the total ROCE-ratio indicated on an upswing during that period also resembling upper quartile's performance during that period.

Next, all quartiles had based on both ranking perspectives increased the added value compound in parity with the revenue compound. However, considering the value added rate in the upper and lower quartiles of the two industry segments and from the EBIT-margin ranking perspective, upper quartiles in both industry segments showed a higher value added rate than the lower quartiles. This trend is similar in the second ranking perspective except for the Machinery Segment where the value added rate for the two quartiles overlap each other nearly at all times during the period.

In terms of value added rate per employee, an interesting discovery is that all four quartiles in the two segments and from the two ranking perspectives entered the 18-years period with nearly similar ratios. By the end of the period, this pattern however changed in two different directions for both industry segments. For the case the Metal Segment, the two quartiles alienated from where the upper quartile enjoyed a relatively greater upswing. In the end of the time series however, the lower quartile was after a period of steady increases about to confluence with the upper quartile again (Figure 5.2.1.3). This development is however more evident in the first ranking perspective while the two quartiles in the second ranking perspective alienated from one another early and developed in parity ever since (Figure 5.2.2.3)

For the Machinery Segment, the two ranking perspectives show similar alienation of the upper and lower quartiles, where the first ranking perspective show a relatively greater gap between the two quartiles. In 2004, the lower quartile of the Machinery Segment indicated a downward trend in both ranking perspectives. It could be explained by an upswing in headcounts between 2003 and 2004 while value added compound slightly fell during the very same period. It should also be noted that the healthy performance of the value added rate came as a consequence of massive headcount rationalization took place during the period. Nonetheless, companies also improved value added compounds through productivity gains and other factors contributing to reduced costs of goods sold, material management and goods outflow.

While Machinery Segment seems less depended on allocating machinery and equipment stock to enjoy value added benefits, the Metal segment appear having a higher reliance on even increasing this ratio. During the second half of 18-years period, the Metal Segment's upper and lower quartiles tended to apart in this ratio meaning that the lower quartile had nearly half as much machinery and equipment stocks as it had generated value added benefits. Based on the analysis summary presented above, following key conclusions could be made:

The company mix in Machinery Segment's upper quartile broke both the decreasing manpower trend and balanced valued added compounds. This quartile accounted for highest increase in manpower compound simultaneous to improving its added value compounds. These findings also mirror conclusions drawn from the Compound Analysis Section 5.2. Compared to the Machinery Segment, the Metal Segment tends to rely more on machinery and equipment stocks to enjoy value added benefits.

[8] Company deviations could also be found in Appendix Section D

The lower quartiles of both industry segments tend to have around 40-60% of the fixed assets tied in machinery and equipment stocks. This could be compared to the two segments' upper quartiles where the ratio has fluctuated between 10-30% at all times.

Based on the second ranking perspective, the lower quartile of the Metal Segment entered the period by having more capital tied in machinery and equipment the upper quartile (60% versus 50%). This pattern took however a rapid turn and by 1995, the company mix in this particular quartile had dropped their machinery and equipment share of fixed asset to below 30%.

Rapid growth in value added rates come as a consequence faster pace of increased value added compounds and headcount rationalizations. This development is more relevant to apply to upper quartiles of both industry segments while value added rates in lower quartiles increasingly depended on headcount rationalization.

5.3. Analysis Summary

By the systematic approach of analyzing the compounds as well as the ratios and finalizing each section with the most profound findings possible, following section will conclude the analysis chapter of this study with a particular emphasis on theoretical framework introduced in Chapter 2. Initially however, following tables summarize selected key variables from the two industry segments' ordered by 18-years average EBIT-margin performance.

In table 5.3.1 it is evident that the company mix present in the Machinery Segment's upper quartile yielded the highest average EBIT-margin while having a scarce but positive annual manpower growth rate. This quartile also managed to endure a continuously increasing value in its machinery and equipment stocks by 2.8 times between 1987-2004.

1. Quartile and Total Performances By EBIT-margin Ranking Perspective (1987-2004)

Industry Segment and Quartile	Average EBIT-margin*	18-years CAGR				
		Revenue	Employees	M&E-stock value growth	Value Added	M&E-stock value change**
Machinery Segement Upper Quartile	14.2%	7,7%	0,6%	6,9%	7,0%	2,8
Metal Segment Upper Quartile	11.6%	4,8%	-1,2%	6,4%	3,4%	2,6
Metal Segment Lower Quartile	1.9%	4,0%	-1,1%	4,3%	4,6%	1,9
Machinery Segment Lower Quartile	1.8%	2,8%	-2,2%	1,9%	1,4%	2,0
Metal Segment TOTAL VALUES***	8.6%	4,6%	-1,2%	5,9%	3,6%	2,5
Machinery TOTAL VALUES****	7.3%	6,2%	0.6%	5,2%	5,6%	2,2

*) Teknkföretagen 18-year EBIT average = 3,7% per year

**) Based on 1987-1989 average of machinery and equipment divided by the 2002-2004 average of ditto

***) Based on total compound and ratio values of 78 companies operating in the Metal Segement of ETS

****) Based on total compound and ratio values of 95 companies operating the Machinery Segement of ETS

Table 5.3.1 Key results based on the EBIT-margin Ranking Perspective

Considering the company mix produced by second ranking perspective, it is evident that companies with highest machinery and equipment stock growth also tend to have the highest manpower growth. In Table 5.3.1, upper quartiles in the Metal Segment and Machinery Segment showed the highest average rate of machinery and equipment stock growth while both quartiles also indicated to have the highest recruiting rate as well as revenues and value added compounds than any other quartiles regardless ranking perspective. This development could be compared to the lower quartiles of both industry segments failing to increase manpower while machinery and stock values also experienced considerable declines on an annual basis.

2. Quartile and Total Performances By M&E-stock value Ranking Perspective (1987-2004)

Industry Segment and Quartile	Average EBIT-margin*	18-years CAGR				
		Revenue	Employees	M&E-stock value growth	Value Added	M&E-stock value change**
Machinery Segement (SNI29) Upper Quartile	9.0%	8,7%	1,9%	10,1%	8,2%	4,6
Metal Segment Upper Quartile	7,9%	9,5%	2.8%	11.1%	9.9%	6,6
Machinery Segment Lower Quartile	3.8%	2,3%	-3,2%	-2,2%	1,4%	0,6
Metal Segment Lower Quartile	3,5%	3.0%	-2,2%	-2,2%	2,3%	0,7
Metal Segment TOTAL VALUES***	8,6%	4,6%	-1,2%	5,9%	3,6%	2,5
Machinery TOTAL VALUES****	7,3%	6,2%	-0,6%	5,2%	5,6%	2,2

*) Teknkföretagen 18-year EBIT average = 3,7% per year

**) Based on 1987-1989 average of machinery and equipment divided by the 2002-2004 average of ditto

***) Based on total compound and ratio values of 78 companies operating in the Metal Segement of ETS

****) Based on total compound and ratio values of 95 companies operating the Machinery Segement of ETS

Table 5.3.2 Key results based on the M&&-stock value Ranking Perspective

In table 5.3.2, it is also evident that manpower declines in the Metal and Machinery segments' lower quartiles may have a connection with decreasing machinery and equipment stocks as well as stagnating EBIT-margins. With the risk of patterns presented may be coincidental, a suggestion for future studies to partially conduct a one-by-one analysis of the lower quartile companies which also should be based on corporate strategic analysis.

5.3.1. Microeconomics Analysis Summary

As far as the theoretical frameworks presented, machinery and equipment stocks could be considered as an important capital assets and component needed for versatile processes of a manufacturing capability. The analyses in prior sections in this chapter show significant increases of this capital stock in some quartiles of the two industry segments while others have proved poor performers at all times.

Thus, growing machinery and equipment compounds could in many respects be related to Dean's (1951) early investments classification differences and benefits. Primarily, Replacement Investments could here be referred to as obsolescence investments. Since companies must due to official accounting regulations undertake a specific amount of annual depreciations, replacement investments come as an integral effect of fulfilling the needs for renewal of machinery and equipment features in a company.

Secondly, investment increases also refer to Dean's (ibid) Expansive Investments which in turn connect an operation with growth of several aspects as well as revenue increases. For Machinery Segment's upper quartile in both ranking perspectives, positive changes in machinery and equipment stocks proved effective since increases were also experienced in headcounts; value added compounds, revenues as well as EBIT-margins.

For Dean's third investment classifications giving beneficial value to a company, Strategic Investments are in the context of this rather evident. Dean argues that this investment classification could be spread over many phases of company activities which sometimes stretch into a distant future. For the latter claim and considering the timeline of this study, it should be appropriate to suggest that investment projects particularly in machinery and investments are per definition strategic and in agreement with Dean's proposition, the longer life expectancies of machinery and equipment tend to benefit to companies produce of commercially viable goods.

Furthermore, the beneficial value to a company stated by Dean's claims for Strategic Investments could here be referred to as expected returns on investment that a new manufacturing capability may create in the longer horizon. Thus, perceived value or benefits could be enjoyed once breakeven of a new manufacturing capability investment is reached. For a number of industry quartiles, this study

shows a consecutively positive change of machinery and equipment stocks. An underlying factor could be that participating companies actually conceive significant value in the longer term. Conclusively, perpetual investments to uphold a positive change in the machinery and equipments stocks (at higher rate than deprecations are made) could be reasoned to fit in Dean's third perspective on benefits with investments.

For Dean's fourth investment distinction, Product-line Investments are needed both for new products and improvements of old products as well as features that come along for new investments. Clearly, Teknikföretagen's member companies all undergo a common innovative ground where new inventions substitute old. Thus selected product development projects and prototyping work would eventually lead to an ultimate commercialization. In this process, Product-line Investments denoted by Dean could be claimed as an investments type complementing manufacturing capability needs for commercializing of new product volumes while upholding current or old volumes. However, this investment type should in particular be further investigated by a company-level analysis where one could truly frame the investment distribution for current and new product-lines.

5.3.2. The 1992 Swedish Financial Crisis Effects

Next, by dividing the research timeline (1987-2004) in three consecutive 6-years periods (1987-1992, 1993-1998 and 1999-2004) a shorter investigation on revenue generation and changes in the machinery and equipment stocks was made with an emphasis on the Swedish Financial Crisis in 1992. The objective was to analyze machinery and equipment stock changes as well as revenues before and after the crisis.

Inevitably, neither of the two industry segments have since 1992 been able to recover from the annual machinery and investment growth rates enjoyed prior to the crisis. On the other hand, both segments experienced augmenting revenues in aggregated compounds. One explanation to the growing revenues could be that due to heavy devaluation of the Swedish Krona, export sales became significantly cheaper for overseas buyers. Thus, overseas buyers could enjoy Swedish export at relatively lower prices than prior to 1992.

1. The 1992 Financial Swedish Crisis Effects on Revenues and Machinery and Equipment growth rates*

TOTAL VALUES		6-years CAGRs 1987-1992	1993-1998	1999-2004	18yrs CAGR
Metal Segment (SNI28)	Revenue growth rate	3,6%	6,9%	3,8%	4,6%
	M&E-stock value growth rate	7,9%	5,9%	3,1%	5,9%
Machinery Segment (SNI29)	Revenue growth rate	3,0%	8,0%	6,3%	6,2%
	M&E-stock value growth rate	8,3%	5,5%	3,6%	5,2%

*) Based on total values of the 173 companies participating in the Metal and Machinery Segments

Table 5.3.2.1 Effects of 1992 Swedish Financial Crisis on Revenues and Machinery and Equipment Growth Rates

Following tables indicate the performance categorized by ranking perspectives and quartiles. While all other company groupings resulted in dramatic CAGR-declines in machinery and equipment stock, participating companies in Metal Segment's upper quartile ordered by the M&E-stock value ranking perspective (Table 5.1.2.1) managed to increase machinery and equipment stocks from an annual +11.3% to +12.9% between the two second 6-years period while annual +5.3% revenue growth exploded to +13% per year and six years ahead.

2. The 1992 Financial Swedish Crisis Effects on Revenues and Machinery and Equipment growth rates*
EBIT-margin Ranking Perspective

		6-years CAGRs			
		1987-1992	1993-1998	1999-2004	18yrs CAGR
Metal Segment (SNI28)	Revenue growth rate	3,4%	7,3%	3,8%	4,8%
Upper Quartile	M&E-stock value growth rate	6,9%	7,3%	3,4%	6,3%
Metal Segment (SNI28)	Revenue growth rate	2,3%	5,1%	5,2%	4,0%
Lower Quartile	M&E-stock value growth rate	8,0%	1,6%	4,9%	4,0%
Machinery Segment (SNI29)	Revenue growth rate	8,4%	6,8%	5,6%	7,7%
Upper Quartile	M&E-stock value growth rate	13,9%	7,7%	2,8%	6,9%
Machinery Segment (SNI29)	Revenue growth rate	2,2%	6,9%	3,0%	2,8%
Lower Quartile	M&E-stock value growth rate	2,5%	0,9%	2,3%	1,9%

Table 5.3.2.2 Effects of 1992 Swedish Financial Crisis on Revenues and Machinery and Equipment Growth Rates by EBIT-margin Ranking Perspective

3. The 1992 Financial Swedish Crisis Effects on Revenues and Machinery and Equipment growth rates*
M&E-stock value Ranking Perspective

		6-years CAGRs			
		1987-1992	1993-1998	1999-2004	18yrs CAGR
Metal Segment (SNI28)	Revenue growth rate	5,3%	13,0%	8,2%	9,5%
Upper Quartile	M&E-stock value growth rate	11,3%	12,9%	5,5%	11,1%
Metal Segment (SNI28)	Revenue growth rate	2,7%	3,4%	3,5%	3,0%
Lower Quartile	M&E-stock value growth rate	4,2%	0,8%	-6,4%	-2,2%
Machinery Segment (SNI29)	Revenue growth rate	7,4%	7,6%	7,8%	8,7%
Upper Quartile	M&E-stock value growth rate	15,3%	10,0%	3,6%	10,1%
Machinery Segment (SNI29)	Revenue growth rate	2,9%	6,6%	0,7%	2,3%
Lower Quartile	M&E-stock value growth rate	4,4%	-1,8%	-3,5%	-2,2%

Table 5.3.2.3 Effects of 1992 Swedish Financial Crisis on Revenues and Machinery and Equipment Growth Rates by M&E-stock value Ranking Perspective

Conclusively and except for this particular quartile, no other quartile has hitherto been able to experience the rapid CAGR in machinery and equipment stocks as enjoyed prior to the 1992. An indication here is that the Swedish Financial Crisis hit considerably hard on the machinery and equipment investments in companies operating in both industry segments.

5.3.3. Investment Willingness

Another paradigm imperative in the analysis summary is the introduction of different calculation aspects used for investigating the investment willingness from the company level and from aggregated industry segment level. Thus, a discussion to put forward here is various argumentative methods for how yearend investments in machinery and equipment could be calculated from information obtained in company annual reports. Primarily, one approach is to subtract the nominal value of machinery and equipment between two consecutive years.

While this deduction distinguishes the yearend change in capital stocks tied in machinery and equipment, the subtraction of the first year's machinery and equipment depreciation costs surface the actual investments made. Another approach is to generate a ratio based on annual investments divided by depreciation costs (Kinnander et al, 2006). The higher ratio obtained the higher pace in which companies make investments in machinery and equipment.

A third and final approach also presented by Kinnander (ibid) is to divide capital stocks of machinery and equipment by annual revenues. In reality, this ratio shows how manufacturing companies for which predominant outputs are generated by manufacturing capabilities, reinvest in such capabilities relative revenues. Thus, the higher ratio obtained through this divide, the more willing are companies to reinvest in machinery and equipments. Applying this calculation method to the dataset available, following figures illustrate the investment willingness for each industry segment based on the two ranking perspectives by quartiles:

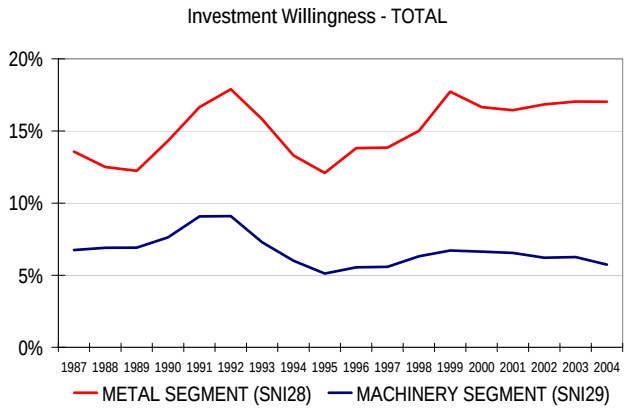

Figure 5.3.3.1 Investment Willingness – Total Values by Participating Companies in Metal and Machinery Segment

Considering the prior discussion on the Swedish Financial Crisis and by having both revenue and machinery and equipment stocks as two incorporated elements needed for calculating the investment willingness, above figure clearly shows the post-1992 period's rapid decline in investment willingness. Following, the Metal Segment seems to foresee a gradual stimulation as investment willingness increased. By contrast, Machinery Segment proves to continue suffering from Financial Crisis as well as recent years indicate on gradual decline in investment willingness.

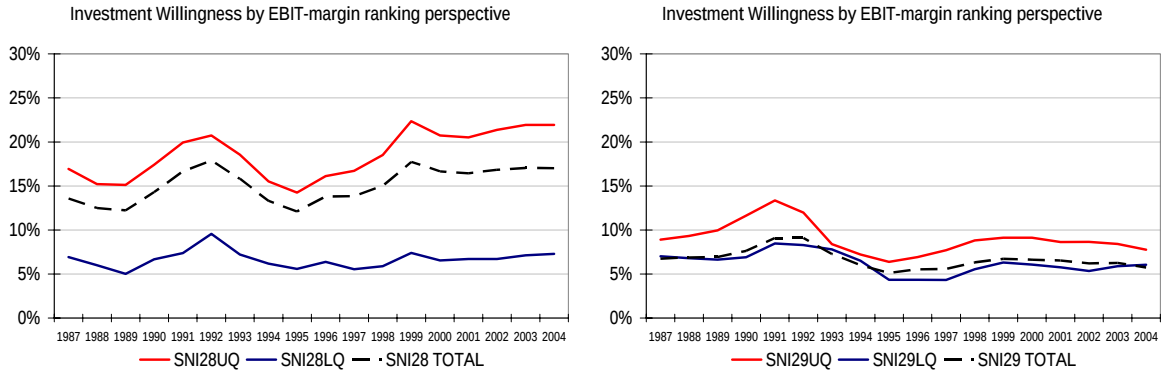

Figure 5.3.3.2 Investment Willingness by EBIT-margin Ranking Perspective

Developments illustrated in figures 5.3.3.2 and 5.3.3.3 should be evident when considering the investment willingness based on the two ranking perspectives. Except for the Metal Segment's upper and lower quartiles ordered by the first ranking perspective, all other quartiles indicated on gradual declines in investment willingness which is particularly evident during 2002-2004.

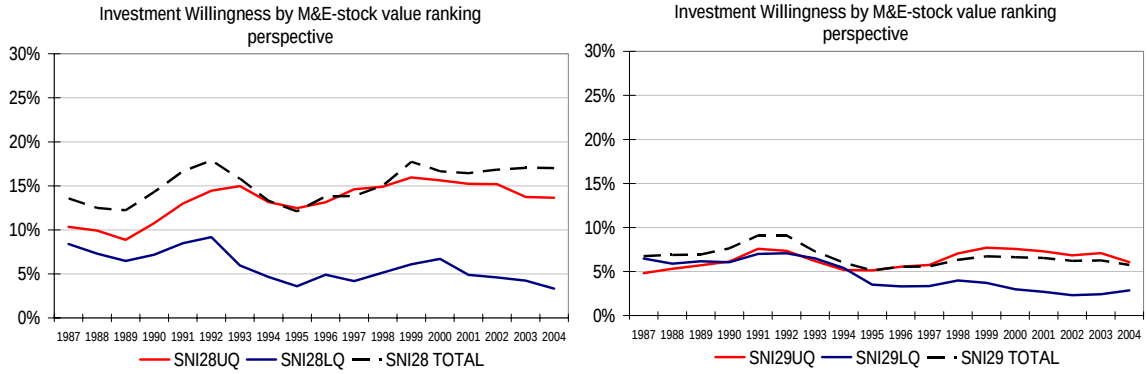

Figure 5.3.3.3 Investment Willingness by M&E-stock value Ranking Perspective

5.3.4. Macroeconomic Analysis Summary

Next, considering the macro economics of investments, Rostow (1956) and Greschenkron (1963) claims on the centrality of continuous investments in physical capital for increased production growth as well as profitability could be related to upper quartiles of participating companies in both segments and both ranking perspectives. Evidently, these companies have increased machinery and equipment stocks perpetually while enjoying higher value added compounds, manpower demand, revenues as well as value added ratios.

Thus, successful companies in the two industry segment could be claimed to continue investing and increasing their capital stocks in machinery and equipment. These companies also tend to recruit on a steadier basis while enjoying EBIT-margin significantly above ETS average as well total EBIT-margins from calculated for both industry segments. One should however remember that this progress comes as a natural result from the economic position of these companies as they are truly all time successful performers of the Metal and Machinery Industry Sectors.

The major declines and poor performance which also tend to have augmented during the past years should be directed to participating companies operating in the lower quartiles. Not only have they decreased in machinery and equipment stock value, but these companies also suffer from declining EBIT-margins as well as headcount and capital rationalization. As prior discussed, the relationship between increased revenues and stagnated profits could be explained by lacking cost control. While lower quartile companies tend to rationalize machinery and investments stocks, fixed assets increase. The question is really is why these companies are headed in such directions?

As Schön (1994), described the physical value of capital in a generalization of the Swedish economy, the author identified recurrent structural phases where allocation of investments in physical capital varied between the phases of transformation and rationalization. An indication could therefore be that the lower quartile companies currently are facing a period of rationalization. The arriving paradox is however why these companies would face such periods while the very same industry segment consists of extremely affluent companies which during the same period have proved incomparable success.

Furthermore, Holmquist (2003) confirms in his dissertation that the falling ratios in the physical capital formation could be explained by the rationalization of an industry. From analysis made in prior sections, poor performing lower quartile companies predictably showed rationalization both in capital stocks and headcounts. As indicated in tables 5.2.1.1 and 5.2.1.3, decreasing CAGR across both ranking perspectives for lower quartile companies tend to assure Holmquist's claims. Thus, modest increases in machinery and equipment investments in relation to production increases could mean significant productivity gains and consequently, a drop in the capital output/output ratio.

6. Discussion

Although the approach in this study has been evolutionary and descriptive, its findings and problem triangulation toward analyzing the physical capital formation in machinery and equipment as well as factors affecting this process is only one roadmap toward comprehending the economic importance of ETS to Sweden.

Thus, other methodological approaches to find answers for the purposes of this study are possible. For instance by shifting focus toward non-economic parameters such as attitudes and how the Swedish economy is perceived by the international community9, other perhaps more implicit factors could generate answers for the economic development of the two industries at stake.

[9] See A.T. Kearney's annual Investment Confidence Index Reports

While majority of Teknikföretagen's largest corporations retain 95-99% of their operations overseas, it is evident that the small fraction of domestic operations heavily contribute to economic wellbeing of Sweden. Also the world global supply and demand interplay may have a significant affect on how the two industry segments develop their domestic manufacturing capabilities in accordance to demand. Thus, fluctuations in demands as such could affect investments in machinery and equipment.

Another aspect of this discussion is not the actual share of fixed assets that constitutes of machinery and equipment stocks. The overtime capacity utilization of manufacturing capabilities, average renewal cycles of such capabilities, commodity prices, product life cycles as well as competitive forces are suggested to return useful insights about the economic significance of the manufacturing industry a s whole. Finally, the actual debt to equity ratio as well as leasing activities may affect companies' overall outlook of how physical capital tied in machinery and equipment may deviate overtime.

In terms of investment that could contribute to the total factor production and productivity gains, it should be emphasized that other investment type strongly connected to manufacturing, such as R&D and IT-facilitation all in all contribute to how companies could continue solidifying a strong operative ground in Sweden. In fact, studies indicate that IT-investments as a factor of production growth have during the past ten years had higher influence on total productivity than any other capital asset (Hagén et al, 2005).

Thus, the interplay between different investment types and underlying motives that contribute or restrain decisions upon an investment all affect how manufacturing capabilities could sustain and continue growing. Following illustration also suggest that today's and tomorrow' composition of a manufacturing capability includes several more investment types than yesterday.

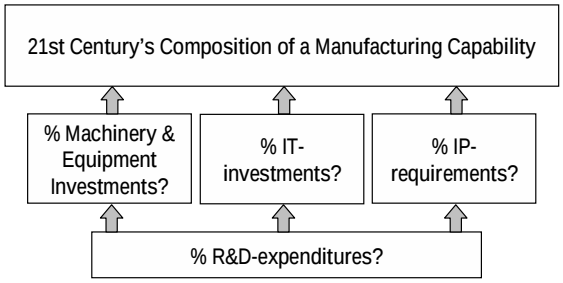

Figure 6.1 21st Century's Composition of a Manufacturing Capability

Other factors could concern insufficient bargaining power of low performer companies. By negotiating deals with several sellers, buyers could sustain significant leverage and push down sales prices which in turn could hit hard on profit margins. A more speculative factor is also that depreciation and appreciation rates of the capital assets could play a central role in the declining development for the lower quartile companies.

In terms of determinants of growth, investments in machinery and equipment as a mean for increased manufacturing capabilities should be considered as one major contributor to GDP. However, despite the fact of Sweden being a manufacturing intensive economy, the discussion should also reflect other areas being heavy contributors to GDP. One recent example is the ICT-related investment and the growing service based economy which in recent years also ha been particularly fuelled by DotCom to become an important contributor to GDP-growth. However, as over 50% of the Swedish of exports of goods is generated from productions from the entire ETS, its relevance, safeguarding and continued sustainability is inevitable.

7. Conclusions

Throughout this study, the emphasis has been on investigating factors affecting machinery and equipment investments in two of the largest and most comparable industry segments of the Swedish Engineering and Technology Sector, (ETS). By constructing capital stocks for physical capital tied in these two industry segments, the primary objective was to analyze the overtime deviation of machinery and equipments investments. Secondly, factors affecting investment willingness in the industry segments were set to be explored.

One conclusive pattern found is that declining capital stocks in machinery and equipment partially indicated on declining headcounts. This pattern was most evident for companies having the lowest 18-years EBIT-margin performance as well as companies that had the poorest or moderate growth rates in their machinery and equipment stocks across both industry segments.

The 1992 Swedish Financial Crisis tells that only a fraction of companies present in the Metal Segments experienced the same or higher levels of machinery and equipments investments than prior to 1992. This development was also proven by analyzing the investment willingness of participating companies as most participating companies in both industry segments experienced dramatic declines in machinery and equipment investments. Conclusively, this study shows that neither industry segments have hitherto been able to recover from effects the Swedish Financial Crisis had on the capital formation in the machinery and equipment. This trend could also be confirmed by recently published occasional paper by Hagman et al (2006).

As prior discussed, the relationship between increased revenues and stagnated profits is suggested to occur due to lacking cost control. Rationalization of capital and manpower could also be considered as an intermediate phase between rationalization and transformation. Another aspect that may affect the poor performing companies could be the company management's perception on how machinery capabilities should be renewed.

But the paradox arises when the very same industry segment contains highly successful companies. Evidently, these companies have increased the machinery and equipment stocks perpetually while enjoying higher value added compounds, manpower, revenues as well as value added ratios. A conclusion here is that successful companies continue keeping their strongholds by safeguarding their strategic positions and investments in machinery and equipment. Another factor affecting these investments is how globalized operations of a company is, i.e. the share of manufacturing operations outside of Sweden.

The more internationalized companies become in trade and operations, the more they need to engage in global competition by prioritizing where to invest in manufacturing capabilities. Comparing companies with a global nature and companies with local operations and business, the competitive landscape as well as the corporate strategy of the two companies may differ substantially. Thus, these factors may affect the actual perception and centrality of how machinery and equipment may give rise to valuable benefits as indicated in the successful companies. From an industry level perspective however, these factor may not become as evident as they could on company levels.

Finally, management of publicly traded companies with shareholder obligations may follow stronger profitability objectives in their strategy than privately or family held companies. The latter may also explain why some companies have consistently been poor performers during the entire 18 years period. Conclusively, although some relevant indication could be found from the industry level analysis, a thorough analysis should however be conducted from company level which persistently focuses on the business strategic and company specific aspects of operations. This approach could ultimately trace why poor performing companies stay poor and whether they experience a transformation or a rationalization lifecycle and why.

8. Suggestions for Future Studies

While some difficulties became evident along the road, many doors were opened for the future study on this topic. As dictated in the Discussion Chapter 6, there are many methods toward assessing and forecasting the current and future development of the Swedish Manufacturing Industry. The model presented in this study revealed that provided a complete dataset that is in compliance with international standards (described in Appendix Section B), an industry level analysis could show the overall capital formation inside ETS and the possible connections to other key data.

However, to truly surface those factors affecting investment decisions for machinery end equipment as well as other capital assets relevant to a company's manufacturing capability, a company level analysis with data decomposed with respect to the supplier-buyer interplay as well as company size is suggested. Through this conduct, it may be possible to understand how buyer investment decisions inflict on the supplier companies. In addition, the company size dimension may reveal the intensity of the manufacturing capability based on company manpower. Yet, this approach becomes interesting two comparable companies have similar profitability and value added values.

The debt to ratio aspect and particularly the value added relationship to a company's machinery and equipment stock value could also provide insights on factors affecting investment decisions. For example, for a manufacturing intensive company where most sales are generated by manufactured goods sold, the machinery and equipment stocks divided by the value added ratio could indicate on the needed amount of machinery and equipment for value added generation. Once this ratio is put into company-by-company comparison, it is made possible to elaborate amidst discrepancies while profits or other ratios may mirror in two compared companies. In addition, another question in this vein is what companies truly do with their earnings? In recent years, companies have more than often showed an increased level of dividend paid to shareholders. Thus, the question raised is why companies foresee higher dividends payments over reinvestments?

From an international point of view, an interesting exploration could also be how domestic profits are spent on operations overseas. As the globalized economy open doors for opportunities elsewhere, one may ask whether manufacturing capability expansions take place closer to customers in other geographical regions. More precisely, the question is which processes within the companies' value chain are expanded elsewhere than in Sweden and why? Could such overseas expansions depend on lower energy prices, intensified competition or basically because comparative advantages are found overseas? Ultimately, how would such chain of events in the long runt affect the innovation, inventions and sustainable growth of the companies on the Swedish soil?

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10. Appendices

Section A - Teknikföretagen

The Association of Swedish Engineering Industries (Teknikföretagen) which is the major client of this study that requested a thorough analysis based on prior described study purpose. This non-profit organization is the trade and employers organization for Sweden's most important companies. It provides economic and legal services to the executive levels of its member companies which in turn encompasses issues at all organizational levels.

Additionally, Teknikföretagen advises its members in union related issues as well as corporate (and social) responsibility and governance. Among Teknikföretagen's vision, the most profound message conveys its influential role as a lobbying institution that is strongly committed to the improvement of the domestic business climate and Sweden's global competitiveness.

Teknikföretagen is the owner of a unique database which covers decades of financial information on its largest 1400 member companies. In total however, Teknikföretagen members comprise of nearly 3200 parent companies with diverse operations mainly in development, manufacturing and sales of products within the engineering and technology area. The produce of these companies is partially directed to private consumers market and predominantly sold to the globalized business-to-business marketplace.

For several decades, these companies have together accounted of greater shares of Sweden's export and increased in dominancy. In 2004, exports from Teknikföretagen's member companies accounted for one fifth of Sweden's GDP[10]. Put together, Teknikföretagen's members are perceived as Sweden's most important industrial corporations which together contribute to the economic prosperity of Sweden.

More information on Teknikföretagen could be found at www.teknikforetagen.se

[10] Swedish Bureau of Statistics and Teknikföretagen, 2006

Section B.1 - Economic Classification Standards

Rainer (2005) claims in his work that economic classification can be broadly divided in two categories. Primarily, the classification of **economic activities** cover all economic activities – from agriculture to services – and are used to classify economic entities such as enterprises, parent companies and corresponding functional subsidies.

Such classifications form the basis for complied statistics on output of the economic activities, i.e. the production factors entering into the production process (input: labor, raw material and supplies, energy etc.), capital formation or financial transactions. Secondly, the outputs from economic activities are termed products and generally divided into goods and services. They are classified in **product classifications**, wherein goods classifications have traditionally been far more important than classifications of services. Product classifications are therefore used for statistics on very many aspects of the production and use of products and on their price dimension.

Statistical classification, also called nomenclatures belong to the basic instruments without which statistical data cannot be compiled. They are, however, more than just an essential prerequisite: they are also an important factor in the quality of statistical information. Statistical classifications must therefore be revised from time to time. Although this is particularly evident in the case of economic classifications, it does not apply only to them. Changing economic structures generate new activities and products which overtake existing activities and products in importance. Such change is thus a constant challenge for the compilation of statistical classifications.

The intervals between revisions must not be too long, since the pertinence of the classification diminishes with time, nor must they be too short, since otherwise the comparability of the data over time is adversely affected (ibid). Any revision of a classification, particularly if it also includes structural changes, is bound to lead to breaks in the time series. In order to produce internationally comparable statistics, it is of course necessary not only to use uniform statistical definitions but also to harmonize the classifications used. One of the main tasks of international statistical bodies is therefore to compile the necessary classifications or to revise existing ones.

Product classifications, especially those used in foreign trade, already have a very long tradition. They were also the first to be internationally harmonized, a process which began decades ago. The same cannot be said, however, for the other central economic classifications. It was not until the 1970s that a comprehensive program was launched at international level to harmonize such classifications, the aim being to create an integrated system of classifications of activities and products.

On the basis of a report by one of the groups of experts commissioned by the United Nations, the Statistical Commission adopted in 1976 a work program to harmonize the economic classifications at global level. For this purpose, a joint working party of the United Nations Statistical Office and the Statistical Office of the European Communities was set up, in which the United Nations Regional Economic Commission, the Council for Mutual Economic Assistance, a number of other international organizations, and representatives of National Statistical Institutes also took part.

The task of this working party was to draw up the Integrated System of Classifications of Activities and Products (ISCAP). ISCAP was used as a basis for revision and harmonization. It was clear that the objective of integration could only be achieved by restructuring the classifications in question. Once the ISCAP system had been completed in the mid-1980s, the outcome of this work at UN level was the following two central classifications:

1. **ISIC Rev.3**: International Standard Classification of all Economic Activities
2. **CPC:** Central Product Classification

and the European counterparts of the above are:

1. **NACE Rev.1:** Statistical Classification of Economic Activities in the European Community (Nomenclature statistique des activitiés économique dans la Communauté Européenne)

2. **CPA:** Classification of Products by Activity.

The European central economic classifications are fully harmonized with the global ones. Under the relevant European regulations, this also applies to the national classifications of the Member States of the European Union and, under the EEA Treaty, to the EFTA-EEA countries. In Europe the requirement for harmonization between the central economic classifications and any special survey classifications also applies. The central economic classifications thus form only the core of an international, European and national group of classifications.

Following chart illustrates the top-down classification methods used for economic activities and products. Notably, PRODCOM and its related structure is the EU-level connotation for commodity classification whose descriptions is beyond the scope of this study.

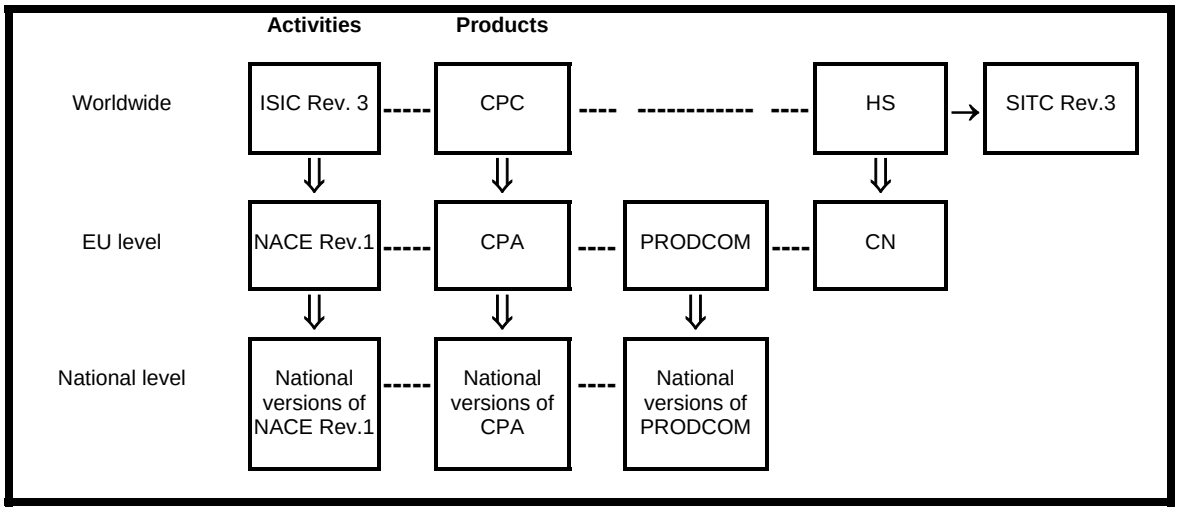

Table 10.B.1 Overview of Economic Activities and Product Classifications based on international and domestic instances

Section B.2 - Swedish Standard Industrial Classification (SNI)

Since a company's diverse operations also determine its economic activities, it is of a germane interest for this research as well as an appropriate prerequisite for the purpose of this study to explore how the classification of the Swedish economy is undertaken, how such classification respond to the EU and international standards and ultimately, whether Teknikföretagen's definition of ETS is in agreement with ditto.

Similar to Rainer's (ibid) claims on the broad twofold economic classification, the total output from the Swedish economy is also divided into economic activities and a product classification. The Swedish Bureau of Statistics (SCB) which is the foremost responsible domestic organization in the area of economic classifications applies a specific range of nomenclatures called Swedish Standard Industrial Classification (SNI) to distinguish various economic activities undertaken by companies in Sweden as well as those products defined as goods and serviced produced which are produced by a distinct economic activity.

From a highly aggregated structure, the SNI-classification is divided in seventeen sections (A-Q) where each section responds to a specific activity area within the economy. While sections C and D are denoted with a two-letter connotation, e.g. CA, CB and DA, DB, remaining letters are directly linked to a numerical chronology ranging from 01 to 99.

This numeration represents the two first levels of the five-level structure of the SNI-classification. This hierarchical approach with letter and numerical connotation are strictly linked to the NACE Rev 1 classification which in turn is justified by the international ISIC Rev3. Following excerpts from SCB illustrates two randomly chosen section of the SNI-classification. The letter 'X' denotes the remaining three out of the five-level classification breakdown of SNI's economic activities.

B	**Fishing**
05	**Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing**
050	**Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing**
0501	**Fishing**
05011	Trawling, in sea water
05012	Other sea water fishing
05013	Fresh water fishing

Table 10.B.2.1 The B-section comprises of *Fishing* and is illustrated to its detailed to is fifth level (05XXX-classfication)

DJ	**Manufacture of basic metals and fabricated metal products**
27	**Manufacture of basic metals**
271	**Manufacture of basic iron and steel and of ferro-alloys**
2710	**Manufacture of basic iron and steel and of ferro-alloys**
28	**Manufacture of fabricated metal products, except machinery and equipment**
281	**Manufacture of structural metal products**
2811	**Manufacture of metal structures and parts of structures**

Table 10.B.2.2 The DJ-section which comprise of the 27XXX and 28XXX-classifcation comprise of *manufacturing of basic metals and beyond*

As presented in tables 10.B.2.1 and 10.B.2.2, each section of the SNI-classification is primarily denoted with the letters A through Q and then broken into several layers of specifications to ultimately return a detailed overview of the entire classifications hierarchy. Since the SNI-classification only represents the economic activities in the Swedish economy, the classification of products (represented in goods and services) is derived from economic activities.

Additionally, SCB's critique on the SNI-classification system come in the challenge for codifying a company in SNI-classes as it performs several cross-disciplinary activities within one parent company. Primarily, SCB is in intensive dialogues with the companies to validate their primary economic activities against distinct SNI-codes. Secondly, SCB's revision work includes identifying brand new economic activities driven by innovation and product development which in turn would need new codifications as well as classifications in compliance with regional and international industrial standards. All in all, the twofold classification system introduced by SCB could be concluded as following:

Primary, a company may have several SNI-codes as it carries out several economic activities within the same corporate domain. Therefore, the responding multi-level SNI-classification structure for each economic activity could be addressed and described relative to the level of detail sought. Effective January 1, 2003, SNI 2002 is a five-level classification structure for economic activities undertaken by companies in Sweden and it is the latest revision of the SNI 1992 classification standard which in turn is based on EU's NACE Rev.1. Whereas the initial four layers of SNI 2002 structure fully comply with NACE Rev.1, the fifth layer was developed mainly to supplement domestic requirements in distinguishing economic activities (Agrell et al, 2003).

Secondly, the classification of goods and services is determined by the production origin of theirs, i.e. the economic activity which produced the goods or services. The Swedish Standard Classification of Products by Activity (SPIN) is the standard for codifying all goods and services produced under a distinct economic activity. SPIN 2002 is based on EU's CPA 2002 which in turn is based on the international CPC standard. Before Sweden's SPIN 2002 adopted the CPA revision, there only existed one product classification structure for goods denoted as SNI 69 combined with an unofficial "Prod-SNI" classification which in turn was inspired by the SNI 1992 economic activity classification. Below chart exemplifies the SNI 2002 structure on economic activities and its correlation to NACE Rev. 1.1:

NACE Rev. 1.1	SNI2002	5-level	Description
28.4			
	28.40		Forging, pressing, stamping and roll forming of metal; powder metallurgy
		28.400	Forging, pressing, stamping and roll forming of metal; powder metallurgy
28.5			
	28.50		Treatment and coating of metals; general mechanical engineering
		28.500	Treatment and coating of metals; general mechanical engineering
		28.510	Treatment and coating of metals
		28.520	General mechanical engineering
28.6			
	28.60		Manufacture of cutlery, tools and general hardware
		28.610	Manufacture of cutlery
		28.620	Manufacture of tools
		28.621	Manufacture of shaping tools
		28.622	Manufacture of cutting tools
		…	
		28.629	Manufacture of other tools

Table 10.B.2.3 NACE Rev. 1.1 correlation to SNI2002 and the fifth level data breakdown

Described classification methods suggest a systematic approach of the *hows* and *whats* of an economic system. The method enables a mutually exclusive multi-level breakdown of an economic system made of activities and products whose standards and derived from one another and they comply with similar structures applied other regions.

In order not to drain down in details that may lie outside the scope of this study, the SNI-classification will hereon and after only be considered on a two-digit breakdown level. By example in figure 2.3.3, focus will only be on the SNI 28-level than those niche firms operating in for example SNI 28.510. This simplification is not only relevant to stay focused on finding answers for the purpose of this study, but according to Teknikföretagen, most companies try keeping the two-digit SNI-classification level when presenting their economic activities and major business area to the public.

Section B.3 - ETS in SNI

Considering the prior definition of ETS, one way of extracting its contents in terms of business areas and economic activities is to review the official industry groupings available. In the general statistical classification presented by SCB, ETS could be represented by the DJ through DM sections of the SNI-classification systems which in turn consists of the SNI 28-3 domain (please also see Appendix Section B). This domain represents economic activities such as development, manufacturing and sales of products and services within the technology and engineering.

The business areas in which these economic activities take place are primarily characterized by telecommunications equipment industry, consumer goods, electronics, non-metal tools and equipment used in manufacturing as well as automotive parts manufacturers and parts assemblers operating in all levels of the value chain. Since each Swedish company is denoted by a two-digit SNI-classification (which is declared by Swedish Companies Registrations Office, Bolagsverket), Teknikföretagen could easily follow the SNI-classification in use as it the codification is applied to the member companies in Teknikföretagen's database.

This important finding implies that the definition of ETS (regardless of it being an industry grouping made by Teknikföretagen) comprise of companies in a set of industry segments clearly represented in a classification structure compatible with international standards. Thus, the definition of ETS could as well be an international connotation of an industry grouping represented by SNI 28-35. Thus, ETS may also prove useful as its formation enable other economies following the ISIC-tree to conduct cross border comparisons and benchmarking of their domestic ETS performance and other economies or regions. This finding will also add to the reliability of data which intends to be used in the analysis of this study.

Conclusively, ETS could hereby be claimed as an appropriately represented set of industry segments grouped as an industry sector which ultimately is compatible with international classification standards. The ETS-fit in SNI 2002 and beyond further strengthens the methodological framework of this study since international, regional or cross-country comparison of the investment levels in machinery and equipment could be made possible[11].

(Notably, since the lower levels of the classification structure (particularly the fifth level) have at times been domestically tailored, it may also hinder a seamless cross border grouping of the segments. As declared earlier, the suggestion is to conduct the industry groupings at highest classification levels possible so that comprehensive cross border analysis is made possible).

[11] Suggestions made require availability of similar datasets and structures to be employed in this study

Section C - Swedish Industrial Classification and its ETS compliance

Code	Activity
DJ	**MANUFACTURE OF BASIC METALS AND FABRICATED METAL PRODUCTS**
27100	Manufacture of basic iron and steel and of ferro-alloys
27210	Manufacture of cast iron tubes
27220	Manufacture of steel tubes
27310	Cold drawing
27320	Cold rolling of narrow strips
27330	Cold forming or folding
27340	Wire drawing
27410	Precious metals production
27420	Aluminium production
27430	Lead, zinc and tin production
27440	Copper production
27450	Other non-ferrous metal production
27510	Casting of iron
27520	Casting of steel
27530	Casting of light metals
27540	Casting of other non-ferrous metals
28110	Manufacture of metal structures and parts of structures
28120	Manufacture of builders' carpentry and joinery of metal
28210	Manufacture of tanks, reservoirs and containers of metal
28220	Manufacture of central heating radiators and boilers
28300	Manufacture of steam generators, except central heating hot water boilers
28400	Forging, pressing, stamping and roll forming of metal; powder metallurgy
28510	Treatment and coating of metals
28520	General mechanical engineering
28610	Manufacture of cutlery
28621	Manufacture of shaping tools
28622	Manufacture of cutting tools
28629	Manufacture of other tools
28630	Manufacture of locks and hinges
28710	Manufacture of steel drums and similar containers
28720	Manufacture of light metal packaging
28730	Manufacture of wire products
28740	Manufacture of fasteners, screw machine products, chain and springs
28751	Manufacture of sinks, sanitary ware etc. of metal for construction purposes
28759	Manufacture of various other fabricated metal products n.e.c.
DK	**MANUFACTURE OF MACHINERY AND EQUIPMENT N.E.C.**
29110	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
29120	Manufacture of pumps and compressors
29130	Manufacture of taps and valves
29140	Manufacture of bearings, gears, gearing and driving elements
29210	Manufacture of furnaces and furnace burners
29220	Manufacture of lifting and handling equipment
29230	Manufacture of non-domestic cooling and ventilation equipment
29240	Manufacture of other general purpose machinery n.e.c.
29310	Manufacture of agricultural tractors
29320	Manufacture of other agricultural and forestry machinery
29410	Manufacture of portable hand held power tools
29420	Manufacture of other metalworking machine tools
29430	Manufacture of other machine tools n.e.c.
29510	Manufacture of machinery for metallurgy
29520	Manufacture of machinery for mining, quarrying and construction
29530	Manufacture of machinery for food, beverage and tobacco processing
29540	Manufacture of machinery for textile, apparel and leather production
29550	Manufacture of machinery for paper and paperboard production
29561	Manufacture of machinery for plastic and rubber processing
29569	Manufacture of various other special purpose machinery n.e.c.
29600	Manufacture of weapons and ammunition
29711	Manufacture of refrigerators, freezers, washing machines and dishwashers
29719	Manufacture of other electric domestic appliances
29720	Manufacture of non-electric domestic appliances
DL	**MANUFACTURE OF ELECTRICAL AND OPTICAL EQUIPMENT**
30010	Manufacture of office machinery
30020	Manufacture of computers and other information processing equipment
31100	Manufacture of electric motors, generators and transformers
31200	Manufacture of electricity distribution and control apparatus
31300	Manufacture of insulated wire and cable
31400	Manufacture of accumulators, primary cells and primary batteries
31501	Manufacture of lamps and lighting fittings
31502	Manufacture of light bulbs and fluorescent tubes
31610	Manufacture of electrical equipment for engines and vehicles n.e.c.
31620	Manufacture of other electrical equipment n.e.c.
32100	Manufacture of electronic valves and tubes and other electronic components
32200	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
32300	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
33101	Manufacture of medical and surgical equipment and ortopaedic appliances except artificial teeth, dentures etc.
33102	Manufacture of artificial teeth, dentures, dental plates etc.
33200	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
33300	Manufacture of industrial process control equipment
33400	Manufacture of optical instruments and photographic equipment
33500	Manufacture of watches and clocks
DM	**MANUFACTURE OF TRANSPORT EQUIPMENT**
34100	Manufacture of motor vehicles
34200	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
34300	Manufacture of parts and accessories for motor vehicles and their engines
35110	Building and repairing of ships
35120	Building and repairing of pleasure and sporting boats
35200	Manufacture of railway and tramway locomotives and rolling stock
35300	Manufacture of aircraft and spacecraft
35410	Manufacture of motorcycles
35420	Manufacture of bicycles
35430	Manufacture of invalid carriages
35500	Manufacture of other transport equipment n.e.c.
DN	**MANUFACTURING N.E.C.**
36110	Manufacture of chairs and seats
36120	Manufacture of other office and shop furniture
36130	Manufacture of other kitchen furniture
36140	Manufacture of other furniture
36150	Manufacture of mattresses
36210	Striking of coins
36220	Manufacture of jewellery and related articles n.e.c.
36300	Manufacture of musical instruments
36400	Manufacture of sports goods
36500	Manufacture of games and toys
36610	Manufacture of imitation jewellery
36620	Manufacture of brooms and brushes
36630	Other manufacturing n.e.c.
37100	Recycling of metal waste and scrap
37200	Recycling of non-metal waste and scrap
E	**ELECTRICITY, GAS AND WATER SUPPLY**
40110	Production of electricity
40120	Transmission of electricity
40131	Distribution of electricity
40132	Trade of electricity
40210	Manufacture of gas
40220	Distribution and trade of gaseous fuels through mains
40300	Steam and hot water supply
41001	Collection, purification and distribution of groundwater
41002	Collection, purification and distribution of surface water
F	**CONSTRUCTION**
45110	Demolition and wrecking of buildings; earth moving
45120	Test drilling and boring
45211	General construction of buildings
45212	General construction of civil engineering works
45221	Erection of sheet-metal roof covering
45229	Erection of other roof covering and frames
45230	Construction of motorways, roads, airfields and sport facilities
45240	Construction of water projects
45250	Other construction work involving special trades
45310	Installation of electrical wiring and fittings
45320	Insulation work activities

Table 10.C.1 Excerpt from Swedish Bureau of Statistics on DJ-F Sections of Economic Activities (2006)

Section D - 2004 key data for the upper and lower company quartiles*

Based on two industry segments and the two ranking perspectives:

SNI28 Upper Quartlie

2004 Data of Upper Quartlie Comapnies Based on EBIT-Margin Ranking (million SEK or as defined)

18yr avg EBIT-margin	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	M&E-growth rate
24,5%					15%	60%	1,2
19,4%					63%	88%	3,2
17,9%	338	699	243	442	59%	29%	1,5
16,7%	363	522	189	306	27%	45%	1,4
14,9%					31%	58%	2,8
13,8%	73	109	43	219	42%	6%	0,5
13,3%	181	253	114	476	59%	10%	1,6
13,2%	303	370	231	534	58%	40%	50,9
12,4%	111	177	83	151	50%	41%	0,9
12,0%	105	137	68	125	50%	36%	1,9
11,7%	309	562	207	435	69%	26%	6,4
11,5%	134	200	75	359	59%	14%	2,5
11,2%	624	1 033	409	570	35%	80%	15,4
11,2%	50	44	28	26	42%	69%	2,8
11,1%	54	76	35	57	36%	44%	7,4
10,8%	77	109	45	125	37%	64%	2,8
10,7%					51%	29%	2,7
10,6%	177	327	134	196	48%	61%	2,7
10,6%	606	1 371	657	1 546	15%	52%	1,4

Table 9.D.1 SNI28 Upper Quartiles arranged by the EBIT-margin ranking perspective

SNI28 Lower Quartlie

2004 Data of Lower Quartlie Comapnies Based on EBIT-Margin Ranking (million SEK or as defined)

18yr avg EBIT-margin	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	M&E-growth rate
-3,6%					36%	70%	2,2
-2,8%					23%	12%	0,3
-0,4%	105	107	52	76	36%	60%	1,0
0,3%	142	198	18	239	15%	81%	2,4
1,5%	101	206	54	119	20%	18%	1,3
1,9%	111	2 889	93	539	21%	39%	0,6
2,2%	48	44	13	43	35%	85%	5,0
2,3%	51	75	28	37	32%	28%	1,4
2,4%	87	79	31	41	46%	78%	2,3
2,5%	160	161	76	110	60%	53%	2,7
2,9%	39	40	18	27	52%	48%	2,1
3,0%	653	1 560	746	839	21%	29%	31,1
3,0%	96	138	54	176	69%	10%	1,8
3,0%	90	137	41	64	42%	44%	1,5
3,4%	101	100	34	58	66%	75%	2,4
3,4%	43	50	18	29	22%	35%	0,4
3,5%	225	335	124	201	50%	80%	6,2
3,8%	98	110	39	48	22%	49%	1,0
4,0%	123	97	50	79	36%	72%	1,8

Table 9.D.2 SNI28 Lower Quartiles arranged by the EBIT-margin ranking perspective

*) For confidentially reasons and to inhibit the explicit exposure of some companies in the academic nature presented in this report, information belonging to some companies has been excluded

SNI29 Upper Quartile

2004 Data of Lower Quartlie Comapnies Based on EBIT-Margin Ranking (million SEK or as defined)

18yr avg EBIT-margin	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	M&E-growth rate
31,2%					23%	58%	2,2
21,8%	140	206	95	253	23%	50%	4,1
18,3%	81	150	67	73	33%	48%	1,5
18,2%					16%	48%	5,5
17,3%	159	322	90	371	17%	44%	4,3
14,5%	57	61	28	72	42%	23%	9,7
14,5%	437	628	329	383	35%	69%	2,1
14,4%	30	39	22	33	8%	61%	0,9
13,8%	530	1 406	415	962	20%	48%	4,6
12,5%	872	1 551	645	807	31%	36%	5,3
12,5%	526	1 227	361	577	28%	82%	2,7
10,9%	124	117	59	86	28%	73%	1,3
10,3%	15	111	23	73	3%	16%	0,4
10,1%	19	36	10	11	30%	100%	0,2
9,9%	81	172	64	89	35%	93%	24,6
9,7%	95	133	52	119	74%	42%	1,3
8,6%	76	78	31	40	36%	39%	28,8
8,5%	47	147	42	55	6%	77%	0,2
8,3%	40	116	26	36	6%	100%	0,4
8,2%					25%	29%	2,2
8,1%	488	824	285	413	34%	85%	3,1
8,0%	163	199	105	94	32%	62%	1,4
7,9%	165	388	143	340	30%	16%	1,1
7,9%	383	615	150	272	38%	24%	3,7

Table 9.D.3 SNI29 Upper Quartiles arranged by the EBIT-margin ranking perspective

SNI29 Lower Quartlie

2004 Data of Lower Quartlie Comapnies Based on EBIT-Margin Ranking (million SEK or as defined)

18yr avg EBIT-margin	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	M&E-growth rate
-0,8%	190	219	93	145	5%	32%	0,2
-0,3%	31	43	9	37	26%	20%	1,1
-0,2%	28	65	12	15	1%	100%	1,3
-0,1%	31	35	12	24	30%	96%	0,7
0,0%	58	177	4	174	45%	7%	5,3
0,0%					24%	11%	8,0
0,2%	27	44	9	24	7%	100%	31,8
0,3%	427	1 346	260	1 030	28%	24%	3,0
0,8%	189	264	83	129	35%	71%	1,1
1,0%					20%	22%	0,7
1,2%	146	154	63	149	27%	43%	0,6
1,4%	397	743	195	514	13%	82%	2,0
1,5%	129	260	54	142	43%	16%	1,4
1,6%	22	36	7	816	30%	3%	1,7
1,6%	27	17	10	13	36%	6%	0,1
1,9%	35	93	18	33	21%	28%	0,6
2,0%	273	436	152	347	73%	26%	1,9
2,0%	143	190	71	89	3%	72%	0,5
2,4%	32	23	13	20	45%	40%	2,6
2,8%	63	69	29	42	29%	18%	1,2
2,9%	66	66	27	33	12%	17%	0,5
2,9%	206	254	89	1 632	78%	2%	1,9
3,2%	405	819	177	493	20%	85%	2,4
3,2%	771	1 905	441	1 134	75%	7%	0,8

Table 9.D.4 SNI29 Lower Quartiles arranged by the EBIT-margin ranking perspective

SNI28 Upper Quartlie
2004 Data for Upper Quartlie Comapnies Based on M&E-stock value Ranking (million SEK or as defined)

M&E-growth rate	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	18yr avg EBIT-margin
50,9	303	370	231	534	58%	40%	13,2%
31,1	653	1 560	746	839	21%	29%	3,0%
15,4	624	1 033	409	570	35%	80%	11,2%
10,3	250	309	145	249	52%	24%	8,3%
7,4	54	76	35	57	36%	44%	11,1%
6,4	309	562	207	435	69%	26%	11,7%
6,2	225	335	124	201	50%	80%	3,5%
6,1	111	159	62	126	35%	67%	9,3%
5,5	135	249	70	118	68%	30%	4,7%
5,5	29	25	14	28	87%	65%	6,4%
5,0	190	318	93	148	55%	96%	5,6%
5,0	48	44	13	43	35%	85%	2,2%
4,8	50	51	24	64	20%	52%	5,5%
3,5	49	39	24	32	37%	78%	8,9%
3,5	101	95	48	76	52%	67%	4,7%
3,5	124	224	71	101	29%	73%	7,0%
3,3	85	156	45	78	25%	56%	4,8%
3,2	65	275	57	86	17%	45%	4,8%
3,2	221	255	148	216	63%	88%	19,4%

Table 9.D.5 SNI28 Upper Quartiles arranged by the M&E-stock value ranking perspective

SNI28 Lower Quartlie
2004 Data of Lower Quartlie Comapnies Based on M&E-stock value Ranking (million SEK or as defined)

M&E-growth rate	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	18yr avg EBIT-margin
0,3	26	16	12	9	49%	6%	-2,8%
0,4	82	123	48	43	22%	13%	4,5%
0,4	43	50	18	29	10%	3%	3,4%
0,4	270	423	154	123	3%	3%	5,9%
0,5	73	109	43	219	36%	2%	13,8%
0,5	51	95	25	81	16%	2%	4,6%
0,5	84	140	115	152	53%	10%	7,0%
0,5	29	26	11	26	26%	3%	4,4%
0,5	130	203	74	191	15%	5%	5,8%
0,5	26	28	12	29	35%	6%	7,5%
0,6	111	2 889	93	539	20%	8%	1,9%
0,7	43	43	19	75	70%	7%	4,2%
0,7	74	68	31	57	12%	8%	6,0%
0,7	29	15	12	18	8%	4%	5,8%
0,8	33	26	13	14	39%	30%	4,2%
0,9	111	177	83	151	47%	19%	12,4%
1,0	98	110	39	48	21%	10%	3,8%
1,0	105	107	52	76	37%	22%	-0,4%
1,1	111	220	54	90	20%	11%	5,3%

Table 9.D.6 SNI28 Lower Quartiles arranged by the M&E-stock value ranking perspective

SNI29 Upper Quartlie

2004 Data for Upper Quartlie Comapnies Based on M&E-stock value Ranking (million SEK or as defined)

M&E-growth rate	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	18yr avg EBIT-margin
31,8	27	44	9	24	7%	100%	0,2%
28,8	76	78	31	40	36%	39%	8,6%
24,6	81	172	64	89	35%	93%	9,9%
9,7	57	61	28	72	42%	23%	14,5%
8,2	60	43	30	40	61%	52%	7,6%
8,0	899	1 042	221	349	24%	11%	0,0%
5,8	67	87	37	50	24%	76%	3,4%
5,5					16%	48%	18,2%
5,5	102	180	80	158	65%	88%	5,1%
5,4	35	37	15	17	41%	35%	4,5%
5,3	872	1 551	645	807	31%	36%	12,5%
5,3	58	177	4	174	45%	7%	0,0%
4,6	530	1 406	415	962	20%	48%	13,8%
4,4	166	237	98	151	31%	57%	7,1%
4,3	159	322	90	371	17%	44%	17,3%
4,3	722	6 741	967	2 559	11%	26%	4,0%
4,3	110	111	49	81	49%	54%	4,3%
4,1	140	206	95	253	23%	50%	21,8%
3,7	383	615	150	272	38%	24%	7,9%
3,6	156	172	51	101	35%	79%	3,4%
3,3	162	503	83	333	51%	24%	4,1%
3,1	488	824	285	413	34%	85%	8,1%
3,0	427	1 346	260	1 030	28%	24%	0,3%
3,0	110	318	59	267	34%	8%	3,3%

Table 9.D.7 SNI29 Upper Quartiles arranged by the M&E-stock value ranking perspective

SNI29 Lower Quartlie

2004 Data of Lower Quartlie Comapnies Based on M&E-stock value Ranking (million SEK or as defined)

M&E-growth rate	Employees	Revenus	Value Added	Total Assets	% Fixed Assets	% M&E-Stock	18yr avg EBIT-margin
0,1	103	245	50	97	32%	0%	5,4%
0,1	27	17	10	13	36%	6%	1,6%
0,2	19	36	10	11	30%	100%	10,1%
0,2	47	147	42	55	6%	77%	8,5%
0,2	190	219	93	145	5%	32%	-0,8%
0,3	613	683	352	455	2%	25%	4,7%
0,3	18	94	15	31	1%	100%	7,7%
0,4	40	116	26	36	6%	100%	8,3%
0,4	249	500	158	310	2%	56%	5,2%
0,4	15	111	23	73	3%	16%	10,3%
0,4	139	326	140	310	29%	25%	3,3%
0,5	66	66	27	33	12%	17%	2,9%
0,5	143	190	71	89	3%	72%	2,0%
0,5	143	109	86	248	20%	19%	7,6%
0,5	35	48	8	36	29%	23%	5,3%
0,5	151	263	83	220	6%	22%	3,7%
0,6	61	80	29	41	5%	100%	3,6%
0,6	146	154	63	149	27%	43%	1,2%
0,6	35	93	18	33	21%	28%	1,9%
0,7	31	35	12	24	30%	96%	-0,1%
0,7	590	1 245	249	1 994	20%	22%	1,0%
0,8	152	189	67	186	22%	28%	7,8%
0,8	319	1 212	249	738	28%	3%	7,2%
0,8	771	1 905	441	1 134	75%	7%	3,2%

Table 9.D.8 SNI29 Lower Quartiles arranged by the M&E-stock value ranking perspective