The Financial and Operating Performance of Privatized Firms in Sweden

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DISCUSSION PAPER SERIES

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ABSTRACT

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This paper examines the change in operating and financial performance of Swedish firms that were either partly or fully privatized during the period of 1989-2007. Two different methods are used to empirically investigate the performance of privatized firms. First, accounting data prior to and after the privatization are employed to measure the operating performance of privatized firms. We have found no significant difference in performances under state and private ownerships. Second, a return-based event study is found useful to measure the financial performance of privatized firms, since all the firms in the sample that were privatized have used an initial public offering (IPO). This approach allows comparison to the rest of the IPOs that were launched in the same period. It is found that the cumulative returns for the privatized firms are significantly different to private counterparts. Overall results, however, show that the privatization in Sweden was not as successful as it might have been expected and in comparison with those in other countries.

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1. Introduction

The last 20 years have witnessed privatization programs on a global scale in both developed and developing countries. Different political parties with different ideological backgrounds have strongly pursued the change from state socialism with state-owned enterprises (SOE) to market based capitalism. The OECD (2003) estimated that over the past two decades, more than 100 countries worldwide have adopted privatization policies. Megginson et al. (1996) have emphasised that revenues from privatization through initial public offerings (IPO) have reached US $400 billion since 1979 and are expected to grow with an equal pace. According to Gibbon (1998), $860 billion has been raised by the governments worldwide through selling state owned enterprises since 1987. Roche (1996) predicts that no less than $6 trillion will be raised through privatizations over the next two decades. In 1997 alone, sales of public enterprises reached a total record of $161 billion worldwide.

Many European countries have launched privatization programs since 1980. Among them, Great Britain is referred to as the origin of modern privatization: Margaret Thatcher's government privatized many state-owned enterprises, including British Petroleum in 1979, British Telecom and British Airways. In France, privatization was very dependent on the political situation and the political party in the power. The first privatization started in 1986 with Elf Aquitaine. It was discontinued until 1993 when the socialist government left the office (see Schneider and Hofreither, 1990).

In most industrialised economies, privatization policies have been promoted on the grounds that it improves the efficiency of SOEs, raises large amounts of revenues for the government and promotes general public's share ownership in cases where companies are sold by shares to the public. There is a view that all government intervention in the market place represents some restriction to individual liberty and, hence, is intrinsically undesirable. This withdrawal of state involvement in industry, which came to be known as 'privatization', takes place through a number of policy initiatives. The most common is a change from public to private in the ownership of an enterprise (or part of an enterprise). Alternatively, public enterprise may remain in existence while privatization takes place without transfer of ownership of assets. Falling into this category are liberalization involving deregulation of controls on entry, price, output and profit, as well as the adoption of a commercial approach. According this approach, the provision of a goods or service moves from the public to the private sector, but with ultimate responsibility for providing the service remaining with the government, frequently referred to as "contracting-out".

Positive views of privatization point to a number of benefits resulting from its adoption. Because privatization undermines the role of the unions, it permits a tough labour policy, which deals with the problems caused by inefficient workers, and thereby makes controlling employment levels much easier. It also permits the public sector economy to become familiar with 'the enterprise culture' as well as with the mechanism of the market place, leading to the rationalization of asset portfolios and the strategic reorganization of investment. This in turn leads to improvement of the

company's balance sheets, introducing sensitivity and product quality improvement while providing adequate facilities for merging as required by the economics of international competition. Furthermore, since public managers and politicians may act in favour of each other, issues such as wage levels, investment plans, borrowing requirements and restructuring projects are assumed to be resolved by this internal relationship. Privatization supposedly breaks up this relationship and introduces a more efficient process of decision-making.

A final argument in favour of privatization identifies a number of financial benefits to the policy. Firstly, the sale of public enterprises results in the removal of their capital investment programs from the public sector accounts; consequently, public sector borrowing is reduced. Secondly, it has been argued that private companies have more direct and faster access to the international capital market than public companies do. Thirdly, privatization contributes to the growth of the stock exchange, and can widen the capital market by bringing in many new investors. Fourthly, privatization helps to minimise the commercial risk, and therefore reduces economic problems for the government in different periods, especially when the market is volatile or in recession. It seems, however, that the above principle does not apply to private companies. It should be noted that, the limited evidence from the recent financial crisis shows that the state is invited to intervene in the private market to rescue banking, automobile and real estate markets in crisis to stabilize the financial market and to prevent bankruptcies and subsequent increasing unemployment.

In terms of theoretical literature a large amount have dealt with the consequences of privatizations in terms of efficiency gains, different incentive structures, and increased competitive pressure, only a few empirical studies look at privatization programs either on a national or international scale.

Among the empirical studies on the post-privatization performance several World Bank studies appear as the most comprehensive studies (see Galal et al., 1994; Megginson et al., 1994; Megginson et al., 1996; and Boubakri and Cosset, 1998). The first study analyzes the post-privatization performance of 12 companies from the most regulated industries in Britain, Chile, Malaysia, and Mexico. The World Bank did look at the economic consequences of privatization from an international perspective. The second study compared the pre- and post-privatization financial and operating performance of 61 companies from 18 countries and 32 industries that either experienced a full or partial privatization through public share offerings during the period of 1961-1990. The third study took an international perspective and its focus was more on privatization programs in developed countries. In contrast, the last study focused on the financial and operating performance of newly privatized firms in developing countries. In spite of these differences to the other studies, they also found that the performance of the enterprises showed significant improvements after their privatization.

In this paper we look at the financial and operating performance of privatized firms in Sweden. A large-scale privatization program took place from 1989, when shares of the SSAB, one of Sweden's heavy enterprises within the manufacturing sector, were sold at the Stockholm Stock Exchange. The SSAB was followed by firms like the Celsius AB, AssiDoman AB and Pharmacia AB. Until now, many of the large state owned

enterprises, apart from very few like Nordea Banken AB, are being privatized by selling shares.

We firstly analyzed accounting data of those Swedish enterprises that experienced either a full or partial change in government ownership through an Initial Public Offering. This data is used to evaluate their performances prior to and after the privatization. What we have found does not support the studies cited above. Strong empirical support for improvements in profitability, efficiency, and other financial variables is not found. This can be conclusive that the operating performance of privatized firms has not been very strong. One of the reasons for these empirical findings can be referred to the type of privatization that largely occurred in Sweden. This can be attributed to the fact that, among the ten firms present in the sample, none of those firms experienced full privatization. This might refer to the influence of the state and conclude that it is still strong, and might account for the results.

The second step of analysing, the pre-and-post privatization performance, involves using share prices of the privatized firms and it calculate returns to measure the financial performance on the basis of cumulative excess returns. The cumulative abnormal returns of the privatized firms are compared to those firms that experienced an IPO during the same period. The result shows that the abnormal returns of the privatized firms are significantly different from those of the regular IPO firms.

The rest of this article is organized as follows. In the next section, theories in favour of privatization will briefly be discussed. The third section is devoted to the data and the methodology used for testing the hypothesis to measure the operating and financial performance. Section 4 presents the results for the operating performance of firms. Section 5 evaluates the financial performance of privatized firms on the basis of abnormal returns, and Section 6 concludes the study.

2. Theory

There are several different schools of thought in favour of privatization, each of which addresses one particular aspect of this economic adjustment. It is worth emphasising that these schools unlike their recent application date as far back as 1870. Thus, schools of thought on privatization can be divided into two categories based on when they emerged. The first category consists of the Austrian School, the Property Rights School and the Public Choice School. The second category, which refers to recent ideas, is comprised of the Principal-Agent Theory, the New Political Economy, the New Austrian School of Economics and the New Institutional Economics.

The property rights analysis of public ownership leads to the conclusion that public enterprises are less economically efficient than private enterprises. Thus, forms of ownership generate different rewards/penalties. Generally, the more dispersed property rights are, the less motivated their holders will be to use their assets efficiently. Moreover, according to the property rights school, the separation of ownership and management, which is characteristic of the modern corporation, does not lead to any fundamental change in the performance of private enterprise. It acknowledges that

shareholders in a large corporation are not able to monitor management as closely as a manager-owned company, but asserts that there are other factors at work in the modern corporation that compensate for this.

The public choice perspective, like the theory of property rights, holds very strong views about public ownership. The fact that 'public enterprises necessarily perform less efficiently than private enterprises,' Starr (1989: 31) provides an influential economic case for privatization. Privatization allows profit-maximising decision-making to take place. Under public ownership, political motives, which lead to large subsidies and other concessions, are much more important than cost efficiency. Key public officials and ministers may pursue higher goals than operational efficiency leading to a higher cost of production. By contrast, privatization frees an enterprise from the burden of political interference and non-market criteria. Thus it limits politicians' ability to redirect the enterprise's activities in order to promote their personal agenda or to yield short-term political pressures at the expense of market efficiency. This clarifies the objectives of the enterprise and leads to the enhancement of economic performance.

The Austrian school points to the fact that continual changes over time in tastes, techniques, available resources, prices, plans and expectations require that individuals (economic agents) be allowed to arrange their property as they see fit, in order to gain access to more and better knowledge than would be possible with less freedom of action (Moldofsky, 1989). The welfare of economic agents is improved in a competitive market which allows them to learn what consumers want, how much they are willing to pay, what factors and methods of production are available and so on. This process continuously ensures that resources are reallocated to new preferable uses in the best possible way. The competitive market provides an environment in which products will be produced by someone who can do so more cheaply than anybody who does not produce it, and that each product is sold at a lower price, (Hayek, 1984). The competitive market, whose foundation is price and shared economic knowledge, can generally only exist in the context of private ownership. It follows that privatization, via the introduction of competition, will improve efficiency and sensitivity to consumer demand, with a better quality and range of goods and services (Littlechild, 1986).

Principal-agent theory also views critically the state–owned enterprises. It asserts that, in the case of public enterprises, there is no efficient mechanism by which the principals (the public) can control the actions of their agents (government officials); thus, inefficiency is allocated to state enterprises. In general, the agents pursue their own goals in a world of information asymmetries, incomplete contracts and the absence of clear objectives. If the reverse were the case, then the ownership would be a problem and agents could have acted according to contracts. Moreover, because the incentive is weak and unrelated to the profit motive in state enterprises, agents have no enthusiasm to achieve the highest efficiency level (Bos, 1991). In contrast, private ownership sets a precise restriction on the managerial behaviour by linking it to expected future profits. If profits are expected to decline, it will squeeze share prices and increase takeover bids. Large shareholders clearly know the consequences of poor managerial performance; hence they have enough incentive to motivate managerial behaviours. More importantly, because managerial salaries in the private sector are linked to profit,

stock options and bonuses, while in the public sector it is tied to fixed salary scales, the managerial motives will differ leading to different effort and outcomes.

The new political economy sees rent seeking behaviour from government intervention into the market. It also sees these interventions as destroying a perfectly competitive environment. The new institutional economics sees the internal organisation of the firm as separate from its external market relations. It also sees that the economic agent has limited power to obtain all available information and that market transactions are not costless. Non-market institutions cannot act optimally, but individuals can. The neo-Austrian school of economics, unlike the two other schools sees the market economy as a dynamic phenomenon in an uncertain and changing world. Individual economic agents are assumed to be the main source of decision-making; that decision-making is based on all the information and knowledge they are able to obtain.

The most important conclusions that can be extracted from the study of these three newly founded schools of thought are that:

1. The characteristic of the new ownership is much more important than the role played by competition and regulation.

2. Private sector economy and, in this regard, privatization are much more favourable than public sector economy.

3. All the above schools are in favour of privatization and see the adjustments from the public to the private sector as a significant movement for enhancing the economy as a whole.

3. Data and Methodology

The data of public enterprises, which were privatized, partially or fully, as IPOs at the Stockholm Stock Exchange are collected. The time period was chosen between 1989 and 2007. As a consequence of these selection criteria, 10 firms are included in the sample. As can be seen in Table 1, the Swedish government has emphasised to privatize public enterprises of different sizes and operating in different sectors of the economy such as manufacturing, forest industry, pharmaceutical, finance and banking industry, media industry, and services including hotel, and telecommunications. The variation in the initial value of transactions is large and lies in the interval $73.4 and $7,646.4 million (see Table 2).

Insert Table 1 and 2 about here

The following approach is used to measure the operating performance of these firms. Based on accounting data that were collected from business reports, either from the Stockholm Stock Exchange or direct information from those enterprises or DataStream, we have carried out our analysis. These data are then adjusted for inflation. The monetary variables are transformed into fixed prices by using consumer price index. A number of accounting ratios that are appropriate for evaluating the performance of

firms prior to and after the privatization are employed. Those ratios are used for measuring (i) profitability, (ii) operating efficiency, (iii) capital investment, (iv) capital structure, (v) employment level, and (vi) liquidity of firms. Profitability is measured in three different ways as returns on sales, equity and investment. Two operating efficiency measures are obtained as sales per employee and net income efficiency. Capital investment is measured as capital expenditure to sales and to total assets, while capital expenditure is computed as equity ratio and as structure of short-term debt. The ratios are summarised in detail in Table 3.

Insert Table 3 about here

These eleven performance criterion are used to evaluate the financial performance of those privatized firms. An event study is accomplished to evaluate each firm's equity return performances through looking at the shares' abnormal returns. To assess the performance changes of privatized firms the descriptive statistics is discussed in details. To test whether or not a statistically significant change after privatization took place, two tests are carried out: (i) the Wilcoxon test and (ii) the Standard test for differences in the mean performance of the two populations.

The Wilcoxon singed rank test, which is a parameter free test, is especially well-suited for cases with small sample sizes. Two periods are identified; one prior to privatization as one population and after privatization as the second one for carrying out the second test to identify differences in the mean of the two populations. Despite the fact that the assumptions underlying the Wilcoxon test are always satisfied, the proper application of the test for differences in the mean of two populations requires the assumption of normal distributions. Consequently, this test should only be considered as complementary to the parameter free Wilcoxon test.

Abnormal returns generated during the period of the IPO are used as procedure for measuring the financial performance of the firms. What was being considered most was to examine whether or not privatized firms display statistically different cumulative abnormal returns compared to other private IPOs that were undertaken during the same period.

Firms that were privatized as IPOs at the Stockholm Stock Exchange are being considered as our broad data set. The time period was chosen between 1989 and 2007. Companies which are declined from the Stockholm Stock Exchange (Pharmacia and Rezidor Hotel Group) are excluded from our sample. The final sample consists of 8 privatized IPOs and 9 private IPOs. The sample chosen for the evaluation of the financial performance and their time of IPO is shown in Table 4.

Insert Table 4 about here

4. Operating Performance of Privatized Firms

Schools of thought, as well as politicians in favour of privatization, have pointed to the productivity growth and the allocative efficiency under private ownership, compared

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with public enterprises under public ownership. Theories such as the property rights theory, the public choice theory, the principal-agent theory, the Austrian school of economics, as well as some new theories like the new political economics, the new institutional economics and the neo-Austrian school of economic generally favour private ownership and view state ownership as inefficient, especially when the market is characterized as competitive. We consider, as the first step, the following hypotheses to test whether or not these expectations are met. As the second step, we look at the change in performance, on average over the last two years before and the first two years after privatization. Table 5 summarises the state of the 11 performance indicators for individual years and average period results before and after privatization.

Insert Table 5a and 5b about here

A. Profitability

It has been claimed that privatization will lead to change in economic prospects and it will allow profit-maximising entrepreneurs to be the main source of economic performance. Operational efficiency is guaranteed, leading to a lower cost of production. Political pressures to redirect the enterprise's activities at the expense of market efficiency will be eliminated. Large subsidies and other special economic considerations will be minimised and the search for ways to reduce costs will no longer be necessary. All these remedies lead to enhanced economic performance. Hence, we expect the profitability to increase after privatization took place. To measure profitability return on sales, return on equity and return on assets are chosen. On average, all of these ratios have improved after privatization for the first year, and for the second year they have declined again to levels below their pre-privatization levels but despite deteriorated condition the period averages suggest small improvement in profitability.

B. Operating Efficiency

Private ownership is believed to improve corporate performance through incentives, and market phenomena are seen as disciplinary mechanisms for allocating resources efficiently. Moreover, the idea that the public sector acts against the public interest and efficiency - while the private sector is controlled by market discipline, the public sector serves the interests of managers or politicians. In the presence of market discipline, the role of the entrepreneurial factor in the market and relaxation of any barriers is believed to improve entrepreneurs' behaviours. Further to this, it is claimed that creating greater competition is assumed to be more important than ownership. As a consequence, we anticipate efficiency to increase after privatization took place. To measure this efficiency is measured by means of two ratios, sales and profit per employee. Sales per employee decreased within the period before and after privatization. As far as profits per employee are concerned, there was a positive change from losses to significant profits after privatization.

C. Capital Investment

Theoretically, one can argue that private firm investment is based on a net present value

principle. From this view point, it may not be the case as far as state-owned enterprises are concerned. National governments, however, have utilised state-owned enterprises as an instrument to accelerate slow growing economies by additional investment spending. As a result of that public firms always had the credit rating as such to borrow almost unlimited funds at prime rates. These would suggest that investment spending is higher under state ownership as well as privatized firms compared with private ones. Hence, we assume that investment spending will increase for privatized firms. To evaluate this hypothesis we use two alternative measures: capital expenditure to sale and capital expenditure to total assets. As Table 5a shows both ratios have increased after privatization has taken place and then decreased again with small net positive effect.

D. Capital Structure

We assume that privatization will lead to reduced level of debt. This is based on the fact that a state-owned enterprise has much more debt capacity than a private firm. Furthermore, the credit rating of public firms is assumed to be higher than for private ones, given no-default risk of government activities. Hence, privatized firms would experience lower ratings and higher costs of debt. The increased costs of debt will result in the firms adjusting their capital structures. The financial performance is measured by means of two financial variables; the equity ratio, which measures equity as percentage of total assets, and a measure for short term debt (short term debt as percentage of total debt). This study shows that the equity ratio increased, and the rate of debt declined after privatization. Short-term debts were declined after privatization and have increased again afterward.

E. Employment

To measure the allocative performance of privatized firms, the employment level prior to and after the privatization is used. The aim is to examine whether or not efficiency gains result from reductions in the labour force. From theoretical view points, as priority is given to minimise the cost in the initial step, in the short run, the level of employments will slump. However, in the long-run as the cost efficiency results in lower production costs, the number of employment will increase. We found that the level of employment has increased in the first year of privatization and it has declined substantially afterward.

F. Liquidity

Liquidity is used as our final measure. It was increased meeting expectations of increased cash flows.

The descriptive statistic results hint at an improvement in the profitability, productivity somehow and allocative performance of enterprises after privatization. The test results are in line with what we could expect from our descriptive statistics reported in Table 5a and 5b. In Table 6, we present the results of the Wilcoxon test of zero median vs non-zero median. We show the test statistics and the corresponding critical values for a significance level of 5%.

We work with the null hypothesis that there is no significant difference between the 11 ratios measuring profitability, efficiency, investment spending, capital structure, employment, and liquidity before and after privatization.

The Wilcoxon test shows that all of those measures for which the null hypothesis, the median is zero, must be rejected and with the exception of liquidity all tests are statistically significant. Hence, from a statistical point of view, profitability, productive as well as allocative efficiency have been improved after privatization.

Insert Table 6 about here

5. Financial Performances of Privatized Firms

5.1 Event Study Methodology

An event study is deployed to evaluate the financial performance of privatized firms compared with the private firms listed in the Stockholm Stock Exchange in the same period. This can be a useful method, since all the privatized firms included in our sample are stock listed companies through an IPO.

The long-run performance of the IPOs is considered on the basis of abnormal returns for the privatized and at the same time their private firm counterparts. For each firm in the sample, the abnormal return is defined as the difference between the actual ex post stock return and the normal return (see McKinley, 1997).

Thus, for firm i and in time period t the abnormal return is obtained as:

$$AR_{it} = R_{it} - E(R_{it}|X_t) \tag{1}$$

where AR_{it} is the abnormal return, R_{it} and $E(R_{it}|X_t)$ are the actual and normal returns for time t, respectively, and X_t represents the conditioning information for the return model.

For measuring the normal return the market model is deployed. The return of any given security is conditioning on the return of the market portfolio. Moreover, a stable linear relation between these two returns is assumed. For any security, the market model states that the actual return of a given security at time t is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2}$$

where R_{mt} is the time t return of the market portfolio, α_i and β_i are market model parameters and ε_{it} is a normally distributed zero mean disturbance term with variance σ_{it}^2, i.e., $\varepsilon_{it} \sim N(0, \sigma_{it}^2)$.

Our sample of firms consists of 10 private firms and 10 state-owned firms that were

privatized during the years 1989 to 2007. For making our approach straightforward, we denote private firms as type 1 firms and the state-owned firms as type 2 firms. Moreover, we will introduce the following indexing of returns to make progress in the measurement and the analysis of abnormal returns.

The time period t ($t=1, 2, ..., T$) is divided into three sub-periods: estimation window, event window and post-event window where the sub-periods thresholds are marked by T_0, T_1, T_2 and T_3. Defining $t=0$ as the IPO date, the estimation window of length $L_1=T_1-T_0$ is from T_0+1 through T_1, the event window of length $L_2=T_2-T_1$ from T_1+1 through T_2, and the length $L_3=T_3-T_2$ ranging from T_2+1 through T_3 constitutes the post-estimation window.

L_1 and L_2 are assumed to be the length of the estimation window and the post-estimation window, respectively. Three different estimation window lengths of 200, 400, and 750 days for both types of firms are used, i.e., $L_1=200, 400, 750$, to estimate the market model parameters of the normal return for a given stock in the sample. The estimation of our regression parameters is based on the Swedish Traded Index (STX) which serves as the comparative market index. The ordinary least squares (OLS) regression method is selected to estimate the market model parameters. For firm i, for instance, the OLS estimators for the estimation window are:

$$\hat{\beta}_i = \frac{\sum_{t=T_0+1}^{T_1}(R_{it} - \hat{\mu}_i)(R_{mt} - \hat{\mu}_m)}{\sum_{t=T_0+1}^{T_1}(R_{mt} - \hat{\mu}_m)^2} \tag{3}$$

$$\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_m \tag{4}$$

Where $\quad \hat{\mu}_i = \dfrac{1}{L_1}\sum_{t=T_0+1}^{T_1} R_{it}$ and $\hat{\mu}_m = \dfrac{1}{L_1}\sum_{t=T_0+1}^{T_1} R_{mt}$

Estimating these two parameters, $\hat{\alpha}_i$ and $\hat{\beta}_i$, for each firm, gives opportunity to calculate sample abnormal returns for dates $t=T_1+1$, ..., T_2 over a post-estimation window of 1000 days (i.e., $L_2=1000$) according to:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \tag{5}$$

To compare the post IPO performance of these two types of firms, the aggregate of the individual securities' abnormal returns over each of the two types of firms is used. For a sample size of N_j individual firms of type j (j = 1, 2), the sample average abnormal return for type j firms at period T is given by:

$$\overline{AR_t^j} = \frac{1}{N_j}\sum AR_{jt} \tag{6}$$

where j = 1, 2. The average abnormal returns of each of the two types of firms, over

the post-estimation window, are used to find aggregate abnormal returns. For any interval T_1+1 to $T_2 \leq T_2$ in the post-estimation window, the average cumulative abnormal return for type j firms is simply the sum of the included average abnormal returns, i.e.:

$$\overline{CAR^j}(T_1+1, T_2) = \sum_{t=T+1}^{T_2} \overline{AR_t^j} \qquad (7)$$

5.2 Results from the Empirical Study

Figure 1 show the cumulative abnormal returns averaged across the corresponding sample size of firms in each of the two types that result from the estimation of the market model parameters over the three different estimation window lengths L_1.

Insert Figure 1 about here

The results illustrate that type 1 (private) firms go one better than type 2 (state-owned) firms. For all three estimation windows, the plot in Figure 1 shows that for both types the average sample cumulative abnormal return is fluctuating over time. To substantiate these results several test statistics based on the standard errors and average abnormal returns of the sample reported in different tables are carried out.

The first test takes account of, the null hypothesis, H_0 that the sample abnormal average return is equal to zero, i.e., under H_0 the distribution of the sample abnormal return averaged across all firms in the sample of type j at a given observation in the post estimation window is:

$$\overline{AR_t^j} \sim N(0, \sigma^2) \qquad (8)$$

Using the sample mean μ, the standard error s, and the sample size n, of the aggregated abnormal returns reported in Table 7 and 8, H_0 can be tested using the following test statistic:

$$T = \sqrt{n}\mu / s \qquad (9)$$

Insert Table 7 and 8 here

For a critical value of $\alpha=5\%$ or 0.05, H_0 can be rejected whenever $|T|>1.96$. For the average abnormal returns based on the market model parameters that were estimated using the 200 days estimation period ($L_1=200$), the test statistic yields -0.4385 and 9.5152 for the type 1 and type 2 firms, respectively. Similarly, based on the 400 days estimation window ($L_1=400$) we obtain test statistic values of 0.5832 and -14.8252 for type 1 and type 2 firms, respectively. Hence, for both estimation procedures, the 200 and 400 days estimation window, the null hypothesis that the sample abnormal average return is equal to zero can be rejected for only, type 2 firms at a confidence level of 5%. However, for the average abnormal return calculations based on the 750 days estimation window ($L_1=750$),we obtain test statistic values of -3.1074 and -6.0964 for the type 1 and type 2 firms, respectively, and consequently can reject the null hypothesis for both types.

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Second test involves the null hypothesis that the mean sample abnormal return for both types of firms is equal. The averaged abnormal returns of the sample mean across type 1 and type 2 firms are denoted by μ_1 and μ_2. The null hypothesis is: H_0: $\mu_1 = \mu_2$. Using this test statistic:

$$T = (\mu_1 - \mu_2) / \sqrt{(s_1^2 / n_1) + (s_2^2 / n_2)} \qquad (10)$$

The H_0 can be rejected at a confidence level of $\alpha = 0.05$ whenever $|T| > 1.96$. For the three estimation windows, i.e., $L_1 = 200$, 400 and 750, we obtain test statistic values of -0.8688, 08680, and -0.0307, respectively. Thus, we cannot reject the null hypothesis of equal means of the two types of firms and conclude that the sample average mean of abnormal returns of type 1 (private) firms is significantly higher than the one of type 2 (state-owned) firms.

Finally, the average cumulative abnormal returns (CAR) from $T_1 + 1$ to T_2 that is over the entire post-estimation window are tested for the two null hypotheses above. Under the first null hypothesis, that the average cumulative abnormal return is equal to zero:

$$\overline{CAR^j}(T_1 + 1, T_2) \sim N(0, \sigma_c^2) \qquad (11)$$

where σ_c^2 is the variance of the average cumulative returns. Using the appropriate test statistic values for $L_1 = 200$, of 1.4333 and 7.2934 for type 1 and type 2 firms, respectively are found. Similarly, based on the 400 days estimation window, $L_1 = 400$, test statistic values of -8.9810 and 2.3185 for type 1 and type 2 firms, respectively are obtained. Finally, for the 750 days estimation window, $L_1 = 750$, test statistic values of -14.1804 and -16.4760 for the type 1 and type 2 firms, respectively are found. Hence, for all estimation procedures the 200, 400 and 750 days estimation window, apart from $L_1 = 200$ for type 1, the null hypothesis has to be rejected for type 1 as well as type 2 firms at a confidence level of 5%.

The second test involves whether CAR^1 ($T_1 + 1$, T_2) is significantly different from CAR^2 ($T_1 + 1$, T_2). Under the second null hypothesis the cumulative abnormal return over the entire post-estimation window is the same for type 1 as well as type 2 firms. For the three estimation windows, i.e., $L_1 = 200$, 400 and 750, we obtain test statistic values of 118.4070, -42.390, and -20.3063, respectively. Thus, for $L_1 = 200$, $L_1 = 400$ and $L_1 = 750$ we reject the null hypothesis and conclude that the sample average cumulative abnormal return of type 1 (private) firms is significantly higher than the one of type 2 (state-owned) firms.

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Our analysis so far is build up on the assumption that the zero mean disturbance term, ε_{it}, from the market model, used to measure the normal return, is normally distributed with constant variance σ_{it}^2, i.e., $\varepsilon_{it} \sim N(0, \sigma_{it}^2)$. This assumption may not hold since volatility is a commonly observed feature of return series. To overcome this problem we consider heteroskedasticity effects into account. A new model known as Generalized Autoregressive Conditional Heteroskedasticity GARCH (1, 1) process is introduced to replace the unconditional variance $\sigma_{i\varepsilon}^2$ by a conditional variance h_{iT}. The time variation is introduced by formulating the disturbance term of the market model as:

$$\varepsilon_{it} = v_{it} \sqrt{h_{it}} \tag{12}$$

where $v_{it} \sim N(0, 1)$ and

$$h_{it} = w_{i0} + w_{i1}\varepsilon_{it-1}^2 + \lambda_{i1}h_{it-1}. \tag{13}$$

As the last approach of this section, the results obtained from extending the model to time varying variance of the disturbance term is presented briefly. Figure 2 shows the resulting average cumulative abnormal returns for the three different estimation window lengths L_1. It indicates that type 1 (private) firms performed somehow better than type 2 (state-owned) firms. For all three estimation windows, the plot in Figure 2 shows that the average sample cumulative abnormal return is increasing more rapidly for type 1 firms.

Insert Figure 2 about here

Insert Tables 13 and 14 about here

The test statistics carried out on the basis of the standard errors and average abnormal returns of the sample are reported in Table 15 and 16. The test of the null hypothesis that the sample abnormal average return of type 1 firms equals zero yields values of -1.2059, -4.9331, and -0.3686 for L_1=200, 400 and 750, respectively. Thus, still using a confidence level of α=0.05, we can reject this null hypothesis for type 1 firms at L_1=400 estimation window lengths. The null hypothesis for L_1=200 and L_1=750 cannot be rejected. For type 2 firms the same test statistic yields 9.5152, -14.8252, and -6.0964, implying that we can reject the null hypothesis for L_1=200, L_1=400 and L_1=750.

The average cumulative abnormal returns from T_1+1 to T_2 that is over the entire post-estimation window are tested for the two null hypotheses as above, but this time for the GARCH (1, 1) process. Under the first null hypothesis the average cumulative abnormal return of the GARCH (1, 1) is equal to zero. Test statistic values for L_1=200 of -1.4333 and 3.3704 for type 1 and type 2 firms, respectively are found. Similarly, based on the 400 days estimation window, L_1=400, test statistic values of 4.4490 and -2.3021 for type 1 and type 2 firms, respectively are obtained. Finally, for the 750 days estimation window, L_1=750, test statistic values of 2.9434 and 3.2699 for the type 1 and type 2 firms, respectively are found. Hence, for all estimation procedures the 200, 400 and 750 days

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estimation window, apart from $L_1=200$ for type 1, the null hypothesis can be rejected for type 1 as well as type 2 firms at a confidence level of 5%.

Insert Tables 15 and 16 about here

Second test, as is carried out for the case of unconditional variance, involves the null hypothesis that the mean sample abnormal return for both types of firms is equal. For the three estimation windows, i.e., $L_1=200$, 400 and 750, we obtain test statistic values of -0.0834, 0.2918, and 0.0219, respectively. Thus, we cannot reject the null hypothesis of equal means of the two types of firms and conclude that the sample average mean of abnormal returns of type 1 (private) firms is significantly higher than the one of type 2 (state-owned) firms.

Further, by testing the null hypothesis that the mean sample of GARCH cumulative abnormal return for both types of firms is equal, we obtain values of -60.8889, -26.5821, and 3.8198, providing strong evidence of an outperformance of type 1 firms.

Insert Tables 17 and 18 about here

6. Conclusions

In this paper, empirical studies looking at the comparative performance of public and private sectors and privatization performance came under consideration through the use of a case study of Sweden. Financial performance of both private and state-owned enterprises is investigated through looking at results since the outbreak of the intensive privatization programmes in Sweden at the end of the 1980s. There are numerous studies, looking at different aspects of the relationship between public and private sector, and using different methods with different criteria. The results of those studies showed a mixed picture; some indicating the superiority of the private sector over the public, and some the reverse. Most of these studies used the conventional way of measuring corporate performance, as suggested by the neoclassical approach.

This study focused on the change in the productive and allocative efficiency of privatized firms in Sweden over the period 1989-2007. The accounting data is deployed to analyse the consequences of privatization by means of an event study, calculating several financial ratios for the period of two years prior and the period of two years after privatization. Results of descriptive statistics and test results are presented in different tables. The descriptive statistics indicate improvements in performance of firm with regards to profitability, efficiency, capital structure and liquidity. This is supported by the tests employed. However, it is also found that there are statistical results, not significantly, supporting the general hypotheses that productive and allocative efficiency increased somehow after privatization.

The pre-and-post privatization performance is being tested using another method known as 'event study' involving using share prices of the private and privatized firms and calculating returns to measure the financial performance on the basis of cumulative excess returns. The cumulative abnormal returns of the privatized firms are compared to those firms that experienced an IPO during the same period. The result including a

conditional method of heteroskedasticity known as GARCH (1, 1) shows that the abnormal returns of the privatized firms are significantly different from those of the regular IPO firms. These results are along the lines of some international studies briefly presented in the introduction.

Comparing the international results to the results we have found in this study, it can be concluded that the overall results of this study is in the line with only some of those studies. The Swedish enterprises did change after privatization similar to that in other countries, but not significantly. We offer two reasons for this: the fact is that the privatization program in Sweden hardly involved full privatization, and the state influence was still strong after partial privatization.

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Appendix A: Graphs and Tables
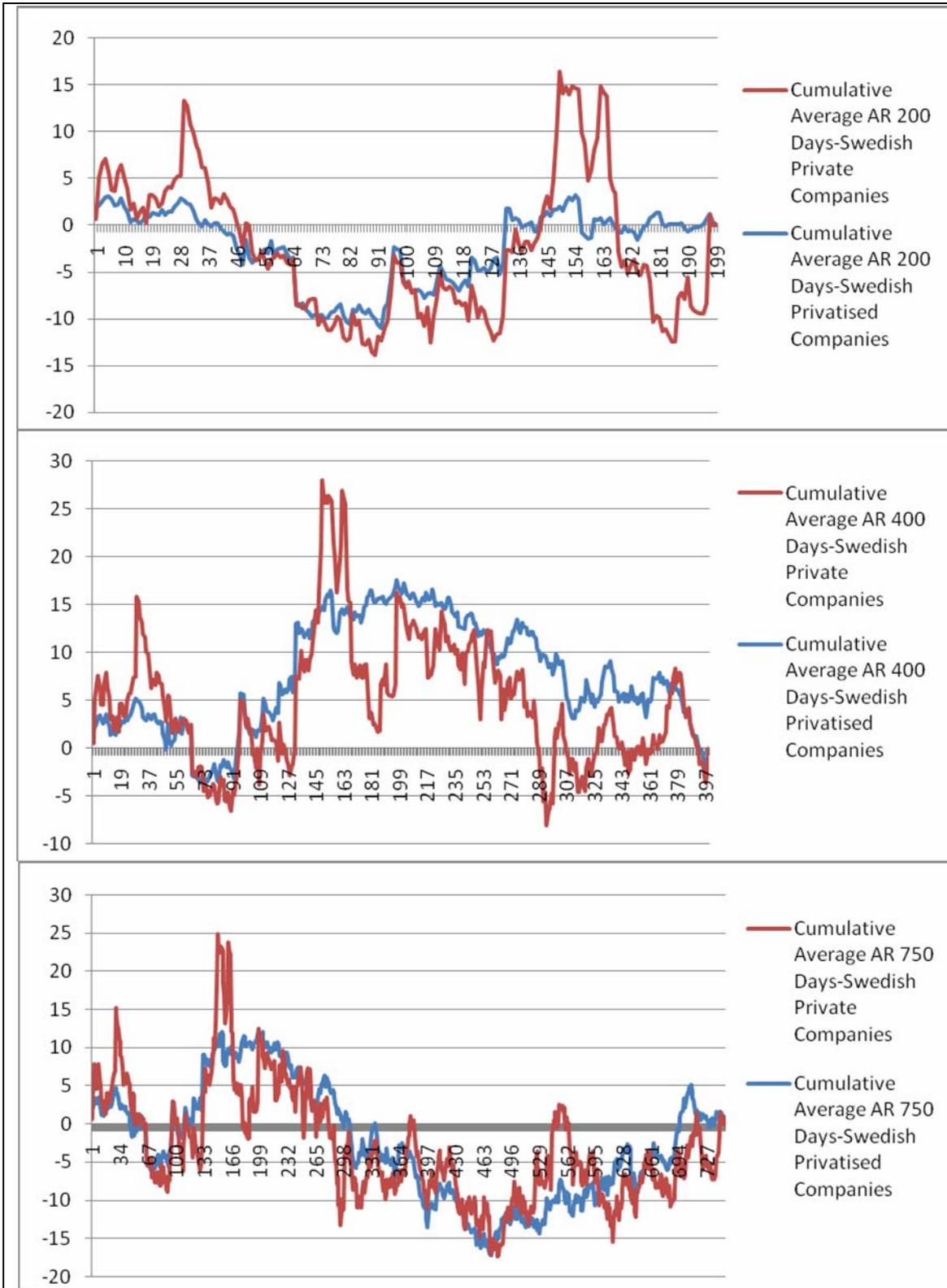
Figure 1: Average cumulative abnormal returns (ACAR) for different estimation periods of 200, 400 and 750 days.
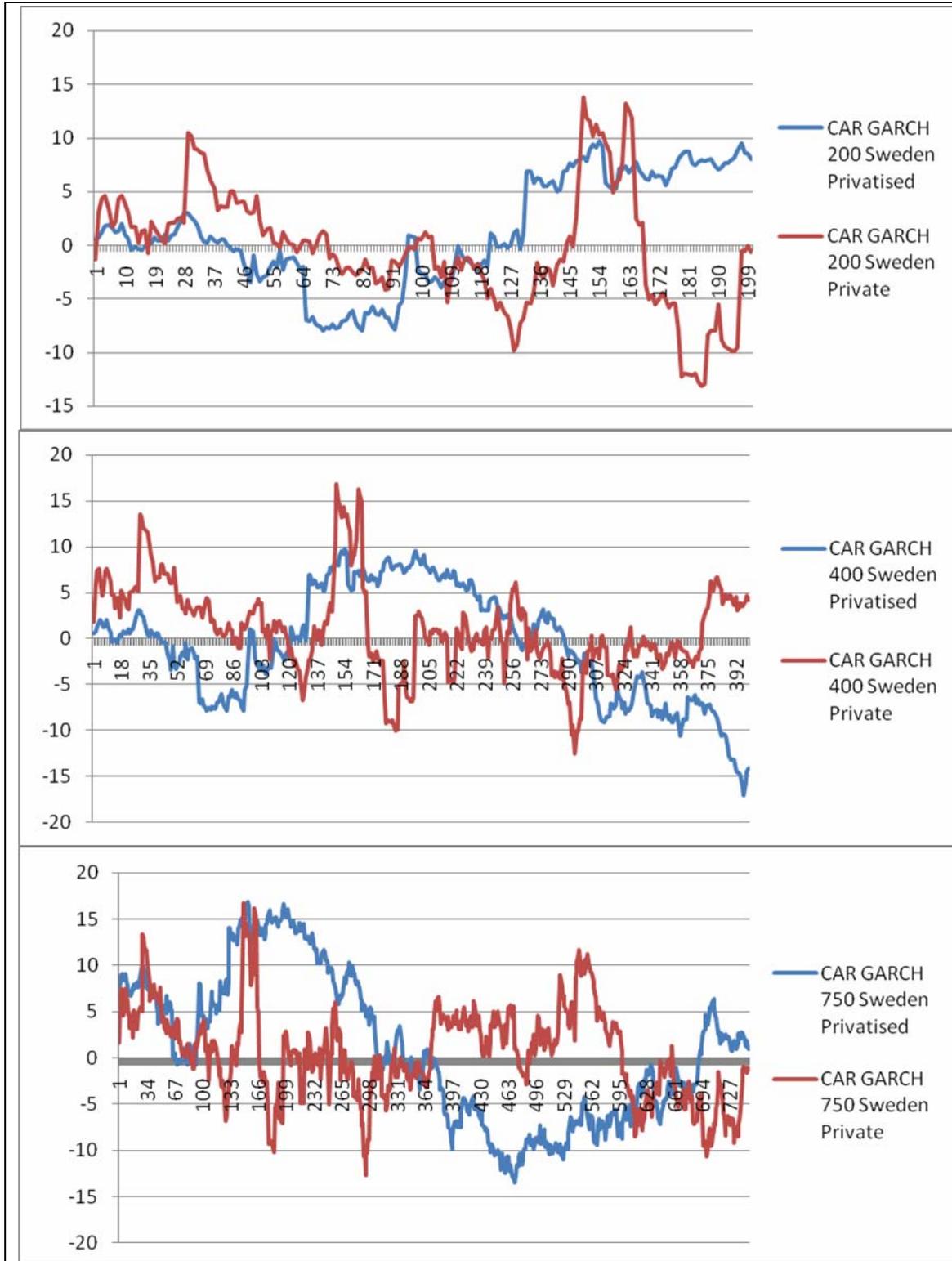
Figure 2: GARCH Average cumulative abnormal returns (ACAR) for different estimation periods of 200, 400 and 750 days.

Table 1: State owned sample firms used to evaluate the operation performance.

Firms Involved in Privatization	Year of Privatization	SIC-Code	Industry
SSAB SVENSKT STAL AB	1989-08-16	3312	Manufacturing
CELSIUS AB	1993-06-14	3812	Manufacturing
ASSIDOMAN ABP	1994-03-11	2673	Manufacturing
PHARMACIA AB	1994-06-15	2833	Manufacturing
STADSHYPOTEK AB	1994-10-28	6162	Finance & Real Estate Industry
NORDEA BANK	1995-10-23	6000	Finance & Real Estate Industry
ENATOR AB	1998-03-09	7379	Services Industry
TELIASONERA AB	2000-06-13	4813	Telecommunications
ENIRO AB	2000-10-31	7389	Services Industry
REZIDOR HOTEL GROUP	2005-03-14	7011	Services Industry

Table 2: State-owned sample firms and their initial value of transaction.

Firms Involved in Privatization	Value of Transaction in US$ million
SSAB SVENSKT STAL AB	103.39
CELSIUS AB	95.60
ASSIDOMAN ABP	969.70
PHARMACIA AB	1249.50
STADSHYPOTEK AB	477.80
NORDEA BANK	1001.70
ENATOR AB	170.70
TELIASONERA AB	7646.40
ENIRO AB	650.83
REZIDOR HOTEL GROUP	73.44

Table 3: Type and definition of different performance ratios.

Profitability:	Definition
Return on sales	net income / sales
Return on equity	net income / equity
Return on investment	net income / total assets
Operating Efficiency:	
Sales per employee	sales / total number of employees
Net income efficiency	net income / total number of employees
Capital Investment:	
Capital expenditure to sale	capital expenditure / sales
Capital expenditure to total assets	capital expenditure / total assets
Capital Structure:	
Equity ratio	equity / total capital
Structure of short-term debts	short-term debt / total debt
Employment:	
Number of employees	number of employees
Liquidity:	
Liquidity	current assets / short-term debt

Table 4: Sample of IPO firms used for the event study to evaluate their financial performance.

Privatized Firms	Year of IPO
SSAB SVENSKT STAL AB	1989-08-16
CELSIUS AB	1993-06-14
ASSIDOMAN AB	1994-03-11
STADSHYPOTEK AB	1994-10-28
NORDEA BANK	1995-10-23
ENATOR AB	1998-03-09
TELIASONERA AB	2000-06-13
ENIRO AB	2000-10-31
Private Firms	Year of IPO
ARK TRAVEL	1999-12-29
BILLERUD	2001-11-20
CASTELLUM	1997-05-23
CELLPOINT CONNECT	2004-06-03
GLOCALNET (BER)	2002-04-09
HOGANAS	1994-04-07
ROTTNEROS	1991-10-02
SKANDITEK INDRI.FRV	1990-04-24
SWEDBANK	1995-06-09

Table 5a: Consequences of privatization.

TYPE of performance indicator \ year	-2	-1	1	2
Profitability:				
Return on sales	-5.83	-5.65	-4.95	-6.22
Return on equity	-5.82	-5.62	-4.86	-6.16
Return on assets	-5.82	-5.69	-4.98	-6.25
Operating Efficiency:				
Sales per employee	5613.45	5542.75	4777.44	4190.94
Net income efficiency	-46.17	89.62	262.59	307.11
Capital Investment:				
Capital expenditure to sale	-5.75	-5.66	-4.99	-6.21
Capital expenditure to total assets	-5.77	-5.67	-5.00	-6.23
Capital Structure:				
Equity ratio	-5.26	-5.12	-4.40	-5.79
Structure of short-term debts	-5.51	-5.32	-4.67	-6.00
Employment:				
Number of employees	11315.16	10633.58	10854.35	7721.52
Liquidity:				
Liquidity	54.03	-2.80	9.13	9.43

Table 5b: Consequences of privatization.

TYPE of performance\ period	DESCRIPTION	Average Before Privatization	Average After Privatization
Profitability:			
Return on sales	net income / sales	-5.7381	-5.5861
Return on equity	net income / equity	-5.7223	-5.5143
Return on assets	net income / total assets	-5.7557	-5.6148
Operating Efficiency:			
Sales per employee	sales/total number of employees	5578.0980	4484.1878
Net income efficiency	net income /tot nr of employees	21.7271	284.8498
Capital Investment:			
Capital expenditure to sale	capital expenditure/ sales	-5.7058	-5.5999
Capital exp. to total assets	capital expenditure/ total assets	-5.7201	-5.6152
Capital Structure:			
Equity ratio	equity / total capital	-5.1895	-5.0969
Structure of short-term debts	short-term debt / total debt	-5.4147	-5.3353
Employment:			
Number of employees	number of employees	10974.3700	9287.9340
Liquidity:			

Liquidity	Current assets / short-term debt	25.6161	9.2827

Table 6: Wilcoxon Signed Rank Test of median = 0.0000 versus median not = 0.0000.

	N	Wilcoxon Statistic	Prob	Estimated Median
Return on sales	40	6.0	0.000	-5.291
Return on equity	40	6.0	0.000	-5.334
Return on assets	40	6.0	0.000	-5.309
Sales per employee	40	785.0	0.000	1246.000
Net income efficiency	40	703.0	0.000	80.540
Capital expenditure to sale	40	6.0	0.000	-5.282
Capital exp. to total as	40	6.0	0.000	-5.282
Equity ratio	40	25.0	0.000	-4.832
Structure of short-term debts	40	14.0	0.000	-5.121
Number of employees	40	811.0	0.000	8863.000
Liquidity	40	327.0	0.267	-1.151

Table 7: Descriptive Statistics for private firms from Sweden.

Descriptive Statistics:				
Variable and period	Mean	SE Mean	Std Dev	Median
AAR 200 Days-Swedish Private	-0.0040	0.1290	1.8300	-0.0720
CAAR 200 Days-Swedish Private	-0.5570	0.3890	5.496 0	-0.6140
AAR 400 Days-Swedish Private	0.0024	0.0823	1.6459	-0.0633
CAAR 400 Days-Swedish Private	-2.1680	0.2410	4.8280	-2.5410
AAR 750 Days-Swedish Private	-0.0059	0.0520	1.4245	-0.0720
CAAR 750 Days-Swedish Private	-2.5630	0.1810	4.9500	-2.5040

Note: AAR stands for average abnormal returns and CAAR for cumulative average abnormal returns.

Table 8: Descriptive Statistics for state-owned privatized firms from Sweden.

Descriptive Statistics:				
Variable and period	Mean	SE Mean	Std Dev	Median
AAR 200 Days-Swedish Privatized	0.0473	0.0703	0.9943	0.0088
CAAR 200 Days-Swedish Privatized	2.6400	0.3620	5.1190	1.9920
AAR 400 Days-Swedish Privatized	-0.0318	0.0429	0.8586	-0.0514
CAAR 400 Days-Swedish Privatized	0.6720	0.3080	6.1510	1.1520
AAR 750 Days-Swedish Privatized	-0.0065	0.0292	0.7992	-0.0261
CAAR 750 Days-Swedish Privatized	-4.8170	0.2920	8.0070	-5.7240

Note: AAR stands for average abnormal returns and CAAR for cumulative average abnormal returns.

Table 9: Calculated AAR t-tests for three estimated windows 200, 400 and 750 of type 1 and 2 firms.

Type 1: Private firms

T (AAR 200 Private) = $\sqrt{200}$ (-0.0040/0.1290) = -0.4385

T (AAR 400 Private) = $\sqrt{400}$ (0.0024/0.0823) = 0.5832

T (AAR 750 Private) = $\sqrt{750}$ (-0.0059/0.0520) =-3.1074

Type 2: State-owned firms

T (AAR 200 Privatized) = $\sqrt{200}$ (0.0473/0.0703) = 9.5152

T (AAR 400 Privatized) = $\sqrt{400}$ (-0.0318/0.0429) =- 14.8252

T (AAR 750 Privatized) = $\sqrt{750}$ (-0.0065/0.0292) =-6.0964

Note: AAR stands for average abnormal returns. $T = \sqrt{n}\,\mu\,/\,s$

Table 10: Test of equality of mean average abnormal returns (AAR).

AAR 200	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-0.0040-0.0470)/(0.1290-0.0700)=-0.8688
AAR 400	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-0.0024-(-0.0318))/(0.0823-0.0429)=0.8680
AAR 750	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-0.0059-(-0.0066))/(0.0520-0.0292)=-0.0307

Table 11: Calculated CAAR t-tests for three estimated windows 200, 400 and 750 of type 1 and 2 firms.

Type 1: private firms
T (CAAR 200 Private) = $\sqrt{200}$ (-0.5570/5.4960) =- 1.4333
T (CAAR 400 Private) = $\sqrt{400}$ (-2.1680/4.8280) = -8.9810
T (CAAR 750 Private) = $\sqrt{750}$ (-2.5630/4.9500) = -14.1804
Type 2: state-owned firms
T (CAAR 200 Privatized) = $\sqrt{200}$ (2.6400/5.1190) = 7.2934
T (CAAR 400 Privatized) = $\sqrt{400}$ (0.6720/6.1510) = 2.3185
T (CAAR 750 Privatized) = $\sqrt{750}$ (-4.8170/8.0070) = -16.4760

Notes: CAAR stands for cumulative average abnormal returns. $T = \sqrt{n}\,\mu\,/\,s$

Table 12: Test for equality of mean abnormal returns (CAR)

CAR 200	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-0.5570-2.6400)/(0.3890-0.3620)=-118.4070
CAR 400	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-2.1680-0.6720)/(0.2410-0.3080)=-42.3900
CAR 750	$T = \mu_1 - \mu_2 / \sqrt{s_1^2 / n_1 + s_2^2 / n_2}$	T=(-2.5630-(-4.8170))/(0.1810-0.2920)=-20.3063

Table 13: Descriptive Statistics GARCH for private firms from Sweden.

Descriptive Statistics: GARCH					
Variable and period		Mean	SE Mean	Std Dev	Median
AR GARCH 200 Sweden	Private	0.0110	0.1290	1.8300	-0.0570
AR GARCH 400 Sweden	Private	-0.0203	0.0823	1.6459	-0.0860
AR GARCH 750 Sweden	Private	-0.0070	0.0520	1.4245	-0.0731
CAR GARCH 200 Sweden	Private	-0.4240	0.3890	5.4960	-0.4810
CAR GARCH 400 Sweden	Private	1.0730	0.2410	4.8280	0.7010
CAR GARCH 750 Sweden	Private	0.5320	0.1810	4.9500	0.5910

Notes: AR stands for average abnormal returns, CAR for cumulative average abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity.

Table 14: Descriptive Statistics GARCH for privatized firms from Sweden.

Descriptive Statistics: GARCH					
Variable and period		Mean	SE Mean	Std Dev	Median
AR GARCH200 Sweden Privatized		0.0159	0.0703	0.9943	-0.0226
AR GARCH400 Sweden Privatized		-0.0318	0.0429	0.8586	-0.0514
AR GARCH750 Sweden Privatized		-0.0065	0.0292	0.7992	-0.0261
CAR GARCH 200 Sweden Privatized		1.2200	0.3620	5.1190	0.5720
CAR GARCH 400 Sweden Privatized		-0.7080	0.3080	6.1510	-0.2280
CAR GARCH 750 Sweden Privatized		0.9560	0.2920	8.0070	0.0490

Notes: AR stands for average abnormal returns, CAR for cumulative average abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity.

Table 15: Calculated T tests for three estimated windows 200, 400 and 750 GARCH of type 1and 2 firms.

Type 1. Private firms
T (AAR GARCH 200 Private) = $\sqrt{200}$ (-0.0110/0.1290) = -1.2059
T (AAR GARCH 400 Private) = $\sqrt{400}$ (-0.0203/0.0823) = -4.9331
T (AAR GARCH 750 Private) = $\sqrt{750}$ (-0.0070/0.0520) =-0.3686
Type 2: State-owned firms
T (AAR GARCH 200 Privatized) = $\sqrt{200}$ (0.0159/0.0703) = 9.5152
T (AAR GARCH 400 Privatized) = $\sqrt{400}$ (-0.0318/0.0429) =- 14.8252
T (AAR GARCH 750 Privatized) = $\sqrt{750}$ (-0.0065/0.0292) =-6.0964

Notes: AAR stands for average abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity. $T = \sqrt{n}\,\mu\,/\,s$

Table 16: Calculated T tests for three estimated windows 200, 400 and 750 GARCH of type 1 and 2 firms.

Type 1: Private firms
T (CAAR GARCH 200 Private) = $\sqrt{200}$ (-0.4240/5.4960) =- 1.4333
T (CAAR GARCH 400 Private) = $\sqrt{400}$ (1.0730/4.8280) =4.4449
T (CAAR GARCH 750 Private) = $\sqrt{750}$ (0.5320/4.9500) = 2.9434
Type 2: State-owned firms
T (CAAR GARCH 200 Privatized) = $\sqrt{200}$ (1.220/5.1190) = 3.3704
T (CAAR GARCH 400 Privatized) = $\sqrt{400}$ (-0.7080/6.1510) = -2.3021
T (CAAR GARCH 750 Privatized) = $\sqrt{750}$ (0.9560/8.007) = 3.2699

Notes: CAAR stands for cumulative average abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity.

Table 17: Mean AR equality test (GARCH)

AR GARCH 200	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(0.0110-0.0159)/(0.1290-0.0703)=-0.0834
AR GARCH 400	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(-0.0203-(-0.0318))/(0.0823-0.0429)=0.2918
AR GARCH 750	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(-0.0070-(-0.0065))/(0.0520-0.0292)=-0.0219

Notes: AR stands for abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity

Table 18: Mean CAR equality test (GARCH)

CAR GARCH 200	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(-0.4240-1.2200)/(0.3890-0.3620)=-60.8889
CAR GARCH 400	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(1.0730-(-0.7080))/(0.2410-0.3080)=-26.5821
CAR GARCH 750	$T = \mu_1 - \mu_2 / \sqrt{s_1^2/n_1 + s_2^2/n_2}$	T=(0.5320-0.9560)/(0.1810-0.2920)=3.8198

Notes: AR stands for abnormal returns and GARCH for generalized autoregressive conditional heteroskedasticity