**THE IMPACT OF EQUITIZATION ON FINANCIAL AND OPERATING PERFORMANCE OF STATE-OWNED ENTERPRISES (SOES)**

**IN VIETNAM: AN APPROACH USING PROPENSITY SCORE MATCHING**

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**Abstract:**

*This paper provides empirical evidence on the impact of equitization on financial and operating performance of state-owned enterprises (SOEs) in Vietnam. The study proposes to use with-without comparison method through average treatment effect to fully assess the impact of equitization on financial and operating performance of SOEs. Using data of 114 SOEs equitized in the period from 2012 to 2014, the results show that equitization does not help equitized SOEs operate more efficiently than non-equitzed SOEs in terms of profitability, operating efficiency, and output. However, equitization can help equitized SOEs operate more efficiently than non – equitized SOEs in terms of profitability, operating capacity and output in some cases, such as in non-listing status or industry group. This research provides implications for Vietnamese government to encourage non-equitized enterprises actively participate in equitization program. The research results also help investors to have appropriate long-term investment strategies in equitized SOEs.*

**Keywords:***Equitization; Privatization; financial performance; Operating performance; Pre-post comparison method; State-owned enterprises.*

1. **Introduction**

According to [Megginson et al. (1994)](#_ENREF_11), privatization is transferring public assets to private sector. Privatization reallocates resources of SOEs through private sector participation. In Vietnam, the state often uses the term ‘equitization’ instead of ‘privatization’ because equitization is the process of transferring assets of SOEs to private sector but the state still holds dominant shares of equitized SOEss affter equitization in some cases.

According to the Vietnamese Steering Committee for Enterprise Renovation and Development (2017), equitization of SOEs was conducted through three stages, the first stage took place from 1992 to 2000 with 558 equitized SOEs. In the next stage (from 2001 to 2007), there were 3,021 enterprises, the third stage lasted from 2008 up to now, but the number of equitized enterprises also declined sharply during this period. From 2016 up to present, the number of equitized enterprises was limited. There were only 55 equitized enterprises in 2016 while the equitization plan for the period of 2016 to 2020 would reach 240 enterprises. The equitized enterprises from 2008 to present were mainly large SOEs and managed by different Ministries. In this stage, the equitization progress has been slow due to a number of main reasons as follows: First, there are many ideas that state-owned enterprises should play the leading role, so reducing the number of state-owned enterprises will reduce this role. Second, after more than 15 years of equitization, the remaining SOEs in the equitization list are medium and largescale ones. The equitization of largescale ones is increasingly complex, especially in the valuation of state-owned assets. Third, some leaders or agents of state-owned enterprises fear that they will lose or reduce their control over SOEs when transforming SOEs from state ownership to private ownership, so they have actively slowed equitization progress and interfered equitization process.The equitization process in Vietnam in recent years has shown slow progress due to various reasons. According to [Odle (1993)](#_ENREF_14), the third privatization stage marks the completion of privatization program, but there are large-scale SOEs in this stage and participation of these SOEs has major impact on the success of privatization program.

However, empirical studies have inconsistent results about the impact of equitization on financial and operating performance of equitized SOEs in Vietnam. Pham (2017) also suggests that equitization may not have positive impact on equitization, especially when compared with non-equitized SOEs in the same period. These results are similar to empirical studies in China, where equitization is less likely to improve financial and operating performance of equitized SOEs ([Jiang et al. 2009](#_ENREF_8)). However, other studies in the developed and developing countries by [Megginson et al. (1994)](#_ENREF_11), [Pohl et al. (1997)](#_ENREF_16), [Frydman et al. (1999)](#_ENREF_5), [Claessens and Djankov (2002)](#_ENREF_2) confirm that privatization helps equitized SOEs improve their financial and operating performance in terms of profitability and operating efficiency after privatization.

Studies in developed and developing countries mostly use pre-post comparison method and do not use with-without comparison method. This is why they do not assess the impact of privatization on financial and operating performance of equitized SOEs compared with performance of non-equitized ones in the same period. Studies in China and Vietnam, in particular studies by [Nhan and Son (2017)](#_ENREF_13), [Hung et al. (2017)](#_ENREF_7), [Loc and Tran (2016)](#_ENREF_10) also use with-without comparison method, but these studies use inappropriate characteristics to define similarity between equitized and non-equitized SOEs. These studies only use establishment year and firm size to figure out similarities between equitized SOEs and non-equitized SOEs in the same period without considering industry characteristic. According to [Porter (1990)](#_ENREF_17), each industry has different operating and regulatory environment, so we can only compare firm performance within one specific industry.

Thus, previous studies mainly used pre-post comparison method (comparing the performance measures of privatized enterprises between pre-post privatization windows) and some applied with-without comparison method (through propensity score matching technique to identify two groups of privatized and non-privatized SOEs with the same characteristics). However, previous studies have certain limitations: (1) When comparing with the non-equitized SOEs in the same period, the authors only used the criteria of establishment year and firm size to determine the propensity score so the comparison is inaccurate since we can not compare between two firms in different industries. (2) Previous studies in Vietnam focused on SOEs equitized in the first and the second stage, so these studies have not considered large-sized SOEs; (3) Previous studies have not performed robustness testing in propensity score matching technique, and they only used one radius matching to set up common support area. Common support area contains propensity scores where equitized SOEs (treatment group) and non-equitized SOEs (control group) have similarities in some characteristics. This is one important requirement to identify treatment group and control group in propensity score matching technique (PSM).

This study solves the above problems when using with-without comparison method through PSM technique with four control variables, including establishment year, equitization year, firm size and industry to identify common support area between equitized SOEs (treatment group) and non-equitized SOEs (control group). Research data include large-scale SOEs in the third equitization stage, specially from 2012 to 2014. Furthermore, the authors also perform robustness testing of PSM technique to evaluate the impact of equitization on financial and operating performance of equitized SOEs more accurately. This study is organized in 5 parts: (1) introduction; (2) review of prior studies; (3) research methodology; (4) research results and (5) conclusions and implications.

1. **Review of prior studies**
   1. **Related theories**

Some theories explain the impact of privatization on firm performance, including public choice theory, property rights theory, and competitive advantage theory.

[Tullock and Buchanan (1972)](#_ENREF_19) proposed the public choice theory to explain the benefits of privatization. This theoretical focus emphasizes on financial and operating performance of SOEs when it explained that SOEs are less efficient because politicians only aim to orientate state-owned enterprises to increase their power without considering financial and operating performance of SOEs. Therefore, the privatization of these enterprises is necessary in order to set up the business objectives of the enterprises through transferring ownership rights to private entities in order to improve financial efficiency and operating performance of equitized enterprises. This theory also assumes that state-owned enterprises aim to maximize budgets, disperse risks, maximize labor and investment rather than maximize profits. William L. Megginson et al. (1994) argue that if state-owned enterprises were privatized, there would be significant increase in profitability, real sales, capital expenditure, operating efficiency and work forces while lowering their debt levels and increase dividend payout. Property rights theory is built on the fundamental advantage of ownership. Private-sector firms are more experienced than state-owned enterprises in decision-making and operate more effectively than SOEs although they operate in same industry environment. For state-owned enterprises, the ownership of corporate stakeholders is simply state ownership, so it is difficult for them to operate effectively. State-owned enterprise managers generally do not benefit from SOEs' operating profits, so they have no motivation to manage them well. According to this theory, public agents of SOEs do not work hard in management and do not need many innovations in managing SOEs.

Theory of competitive advantage is actually derived from explaining competitive advantages at industry level and then developing into competitive advantages at national level. [Porter (1990)](#_ENREF_17) presents this theory and refers to the issue of competition at industry level or national level. According to [Porter (1990)](#_ENREF_17), the competitive nature and resources of competitive advantage vary widely among industries or even in small segments within the same industry. Factors affecting the competitiveness of any industry include human resources, tangible resources, knowledge, finance and architectural resources. As a result, businesses in different competing industries will face different levels of competition and this will affect their financial and operating performance. A study by [Megginson and Netter (2001)](#_ENREF_12) also suggests that there is an increase in the real sales of privatized enterprises and firms in different industries will have different gains after privatization. Therefore, the industry characteristics and competitiveness of each industry will determine financial and operating performance of enterprises after privatization.

**2.2 Empirical studies on the impact of equitization on financial and operating performance of state-owned enterprises (SOEs)**

Essentially, the comparison of the financial and operating performance of privatized SOEs and non-privatized SOEs can not be explained by theories of privatization. Theories such as public choice theory, property rights theory and competitive advantage theory only explain that private ownership has more advantages than state ownership and these theories approve that privatization will help state-owned enterprises improve their financial and operating performance after privatization.

An important study by [Cuervo and Villalonga (2000)](#_ENREF_3) demonstrating that privatization and ownership are not the main determinants of financial and operating performance of SOEs after privatization. The authors argue that the agency theory and public choice theory only explain the average level of improvement in firm performance indicators after privatization rather than explaining the variations in firm performance indicators after privatization. The authors develop one model to explain the variability in financial and operating performance of enterprises after privatization. Empirical results show that privatization and contextual factors (privatization methods, prior-restructuring, deregulation) help to change in governance, ownership structure. After that, the post-privatized enterprises will change their operating goals, incentives, and control. Next, enterprises will change their operational strategies, organizational structure, and organizational culture. As a result, the financial and operating performance of privatized enterprises ultimately change and the variations have to be explained through a process like this. Studies in China also show that some measures of financial and operating performance of privatized enterprises after privatization declined or do not significantly change, such as profitability. This finding is not consistent with studies by some authors in other developed countries, such as [Megginson et al. (1994)](#_ENREF_11), [Boubakri and Cosset (1998)](#_ENREF_1), [Megginson and Netter (2001)](#_ENREF_12), [Pohl et al. (1997)](#_ENREF_16), [Claessens and Djankov (2002)](#_ENREF_2). Privatization in China also has a number of cases where the state still holds a number of shares in enterprises after privatization in some industries and key corporations. This is the similar characteristic in privatization process between China and Vietnam. [Jiang et al. (2009)](#_ENREF_8), [Wei et al. (2003)](#_ENREF_20) also prove that profitability of privatized enterprises declined after privatization and this finding is in contrast to studies by [Megginson et al. (1994)](#_ENREF_11) in developed countries.

In order to compare the performance of enterprises after privatization and non-privatized ones, previous studies have used a with-without comparison method. [Frydman et al. (1999)](#_ENREF_5), [Claessens and Djankov (2002)](#_ENREF_2) and [Pohl et al. (1997)](#_ENREF_16) are propositional authors who use with-without comparison approach to assess the impact of privatization on firm performance in European countries. In particular, [Claessens and Djankov (2002)](#_ENREF_2) argue that privatized firms are more efficient than non-equitized firms. [Nhan and Son (2017)](#_ENREF_13), [Hung et al. (2017)](#_ENREF_7), [Loc and Tran (2016)](#_ENREF_10) also use with-without comparison method between two groups of equitized and non-equitized SOEs for considering differences in their financial and operating performance. In general, international studies and empirical studies in Vietnam have demonstrated that privatized SOEs have better financial and operating performance than non-privatized SOEs, so the author proposes the new hypothesis as follows:

**Hypothesis 1:** *Equitized SOEs will have better financial and operating performance after equitization than non-equitized SOEs in the same period (considering only the post-equitization period)*

According to [Loc and Tran (2016)](#_ENREF_10), the equitization process helps SOEs increase their profitability (pre-tax profit/ total assets and pre-tax profit / sales), reduce leverage, total assets turnover and employment. However, These studies have shown that there is no evidence of increased labor productivity after equitization (if considered in relation to non-equitized firms). This research has some differences compared to the study conducted by [Loc and Tran (2016)](#_ENREF_10) when profit after tax is applied insead of profit before tax. In addition, this study uses the net income efficiency ratio. Thus, the next research hypothesis can be stated as follows:

**H2:** *Equitized SOEs have improvement in financial and operating performance compared with non-equitized SOEs (considering the difference in measures between pre-post equitization windows).*

1. **Research methodology and data**

**3.1 Research methodology**

Previous studies used pre-post comparison, with-without comparison and regression methods. This study mainly uses with-without comparison method. According to [Khandker et al. (2009)](#_ENREF_9), a with-without comparison method is another option when evaluating the effectiveness of a program. This method is used through a technique known as propensity score matching and was first proposed by [Rosenbaum and Rubin (1983)](#_ENREF_18). The advantage of this method is that it eliminates the possibility of selection bias because the selection of two participants in the program has some similarities in characteristics. [Claessens and Djankov (2002)](#_ENREF_2) and [Pohl et al., (1997)](#_ENREF_16) suggest using this method to assess the effects of privatization in European countries. [Claessens and Djankov (2002)](#_ENREF_2) argue that privatized SOEs are also more efficient than non-privatized SOEs in terms of profitability, operating efficiency and output. Loc and Tran (2016), Nhan and Son (2017) continue to use this method to assess the effects of equitization on firm performance. Hung et al. (2017) used this method but compared between equitized SOEs and private firms.

This study uses with-without comparison method but chooses four variables of establishment year, firm size, industry and equitization year to determine the propensity score in order to identify similarities between treatment and control group. In addition, this study also uses a robustness test for consistent result testing ([Khandker et al. 2009](#_ENREF_9)). This study uses direct nearest-neighbor matching (nnmatch) and five nearest-neighbor matching (psmatch) to test robustness of the average treatment effect on the treated. The studies by [Loc and Tran (2016)](#_ENREF_10), [Nhan and Son (2017)](#_ENREF_13), [Hung et al. (2017)](#_ENREF_7) only calculated the average treatment effect on the treated using radius matching (0.001) and this is also one limitation of these studies.

**3.2 Data**

The initial data includes information about firm performance from the Vietnamese General Statistics Office. The initial data includes 114 equitized SOEs in the period of 2012-2014 and 312 non-equitized SOEs in the same period. In this research, the author use firm performance data from 2010 to 2016 to measure financial and operating performance of enterprises. Data are organized in the form of a ‘pseudo’ panel with a two ‘period’ windows (pre-and post-equitization), the performance measures are calculated in average values for 2 years before and after equitization. Previous studies use from 2 to 10 years to be privatization windows. This study use 2 year equitization windows because of data characteristics in Vietnam and data of 2 year equitization windows was also applied by most of empirical studies in Vietnam, such as studies by [Nhan and Son (2017)](#_ENREF_78), [Loc and Tran (2016)](#_ENREF_69), [Hung et al. (2017)](#_ENREF_7).

**3.3 Variables and testable predictions**

There are many financial and operating performance measures of privatized enterprises but [William L. Megginson et al. (1994)](#_ENREF_71) develop seven measures based on empirical findings, including (1) profitability (including ROE, ROA and ROS); (2) operational efficiency (Sales efficiency, net Income efficiency); (3) capital investment (Capital expenditures to sales, capital expenditures to assets); (4) output (real sales); (5) employment (total employment); (6) financial leverage (Long-term debt to equity, debt to assets); (7) payment (dividends to sales, dividend payout). [Boubakri and Cosset (1998)](#_ENREF_14), [D'Souza and Megginson (1999)](#_ENREF_29) also apply the above measures of privatized SOEs after privatization in the context of developing countries. [Nhan and Son (2017)](#_ENREF_78) apply five measures proposed by [William L. Megginson et al. (1994)](#_ENREF_71), including profitability (ROS, ROE, ROA), operating efficiency (sales Efficiency, net income efficiency), output (real sales), employment (total employees) and leverage. [Loc and Tran (2016)](#_ENREF_69) use the following measures, such as profitability (Income before tax to total asset ratio, Income before tax to sales ratio, Income before tax to equity ratio), Total asset turnover (net sales/total assets), labor productivity (total sales/total employment), debt ratio (total debt/total assets) and total employment. The authors argue that post-equitization enterprises will receive tax incentives in the first year after equitization, so using ROA, ROE and ROS will not accurately reflect financial and operating performance after equitization. However, this research will use earning after tax for calculating ROA, ROE and ROS because many international empirical studies have used earning after tax instead of earning before tax. This research uses the same measure with most of previous studies to compare findings better. It is also difficult to measure tax incentives of post-equitization enterprises because Vietnamese government have different support for them.

Based on the above empirical results and hypothesis development, the author proposes some variable measurement and testable prediction as follows:

# Table 1

# Testable predictions

|  |  |  |
| --- | --- | --- |
| **Variables** | **Proxies** | **Predicted relationship** |
| P(1) Profitability | Return on Sales (ROS) = Net Income/Sales | ROSA > ROSB |
| Return on Assets (ROA) = Net Income / Total Assets | ROAA > ROAB |
| Return on Equity (ROE) = Net Income/ Equity | ROEA > ROEB |
| P(2) Operating  efficiency | Sales Efficiency (SALEF) =Sales/ Number of employees | SALEFFA> SALEFFB |
| Net Income Efficiency (NIEFF) = Net Income/ Number of employees | NIEFFA > NIEFFB |
| Total assets turnover (TAS) = total sales/ total assets | TASA > TASB |
| P(3) Output | Real Sales (SAL) = Nominal Sales/ Consumer Price Index | SALA > SALB |
| P(4) Employment | Total Employment (EMPL) = Total Number of employees | EMPLA < EMPLB |
| P(5) Leverage | Debt to Assets (LV) = Total Debt/ Total Assets | LEVA < LEVB |

*Source:* [*Megginson et al. (1994)*](#_ENREF_11)*,* [*Nhan and Son (2017)*](#_ENREF_13)

[Loc and Tran (2016)](#_ENREF_10), [Nhan and Son (2017)](#_ENREF_13) also applied a combination of PSM and DID to assess the impact of equitization on firm performance (these authors used earning before tax instead of earning after tax to calculate profitability).

Table 2

DID analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Two-year pre-equitization average of the measure** | **Two-year post-equitization average of the measure** | **Pre- and post-equitization difference** | **Pre- and post-equitization difference between treatment group and control group** |
| Treatment group (equitized SOEs) | MA(0) | MA(1) | dA = MA(1) –MA(0) | DID = dA - dB |
| Control group  (non-equitized SOEs) | MB(0) | MB(1) | dB = MB(1) – MB(0) |

*Source:* [*Loc and Tran (2016)*](#_ENREF_10)

# Table 3

# Testable predictions

|  |  |  |
| --- | --- | --- |
| **Variables** | **Proxies** | **Predicted relationship** |
| P(1) Profitability | Return on Sales (ROS) = Net Income/ Sales | ROSdA > ROSdB |
| Return on Assets (ROA) = Net Income / Total Assets | ROAdA > ROAdB |
| Return on Equity (ROE) = Net Income/ Equity | ROEdA > ROEdB |
| P(2) Operating  efficiency | Sales Efficiency (SALEF) = Sales/ Number of employees | SALEFFdA> SALEFFdB |
| Net Income Efficiency (NIEFF) = Net Income/ Number of employees | NIEFFdA > NIEFFdB |
| Total assets turnover (TAS) = total sales/ total assets | TASdA > TASdB |
| P(3) Output | Real Sales (SAL) = Nominal Sales/ Consumer Price Index | SALdA > SALdB |
| P(4) Employment | Total Employment (EMPL) = Total Number of employees | EMPLdA < EMPLdB |
| P(5) Leverage | Debt to Assets (LV) = Total Debt/ Total Assets | LEVdA < LEVdB |

*Source:* [*Loc and Tran (2016)*](#_ENREF_10)

The authors calculate 2 years average values of measures in pre-post equitization windows. Most empirical studies in Vietnam used 2 years equitization windows to increase sample size and 2 years average values can be also used for different statistical tests.

The index symbols A and B in the predicted relationship column stand for measures of equitized SOEs after equitization and non-equitized SOEs in the same period, respectively.

This study also uses with-without comparison method through the combination of PSM and DID techniques. There are three steps for this method and the first step is to define the common support area between treatment and control group. The second step is to calculate pre- and post-equitization difference between treatment group and control group (DID technique) and the third steps is used to assess average treatment effects of equalization on performance of the two groups.

1. **Empirical results**

**4.1 Descriptive statistics**

The initial data includes 114 equitized SOEs in the period of 2012-2014 and 312 non-equitized SOEs in the same period. According to Khandker et al. (2009), the number of non-participants in the control group should be larger than the number of participants in the treatment group and this will help to identify common support area easily.

Table 4

Number of non-equitized SOEs and equitized SOEs

|  |  |  |  |
| --- | --- | --- | --- |
| **No. of enterprises** | **Frequency** | **Percetage (%)** | **Cumulative percentage (%)** |
| Before applying PSM | | | |
| Non-equitized SOEs | 312 | 73.24 | 73.24 |
| Equitized SOEs | 114 | 26.76 | 100.00 |
| Total | 426 | 100.00 |  |
| After applying PSM | | | |
| Non-equitized SOEs | 296 | 72.20 | 72.20 |
| Equitized SOEs | 114 | 27.80 | 100.00 |
| Total | 410 | 100 |  |

*Souce: Author’s data analysis*

Using criteria of firm size, establishment year, equitization year and industry to identify common support area, the authors eliminated 16 observations (16 non-participating enterprises) so that the balancing property is satisfied. At this time, the number of non-equitized SOEs is 296 (72.20%) and the number of equitized SOEs is 114 (27.8%).

Table 5

Equitization year

|  |  |  |  |
| --- | --- | --- | --- |
| **Equitization year** | **No. of enterprises** | **Percetage (%)** | **Cumulative percentage (%)** |
| 2012 | 41 | 10.00 | 10.00 |
| 2013 | 193 | 47.07 | 57.07 |
| 2014 | 176 | 42.93 | 100.00 |
| Total | 410 | 100.00 |  |

*Souce: Author’s data analysis*

According to the number of SOEs by year, Most SOEs are chosen in 2013 (47.07%), followed by the number of SOEs in 2014 with 176 enterprises (accounting for 42.93%). This result comes from the fact that the number of equitized SOEs in 2012 is only 9, so the number of non-equitized enterprises selected in this period is less than other periods.

Table 6

Descriptive statistics of certain variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Observations** | **Mean** | **Std** | **Min** | **Max** |
| ROS | 410 | 0.623 | 30.775 | -277.789 | 556.542 |
| ROE | 410 | 0.063 | 0.210 | -1.582 | 1.235 |
| ROA | 410 | 0.023 | 0.099 | -0.992 | 0.704 |
| SALEF | 410 | 1,602.705 | 5,263.764 | 7.316 | 76,937.54 |
| NIEFF | 410 | 135.240 | 1,697.372 | -3,296.3 | 33,170.57 |
| TAS | 410 | 1.219 | 1.841 | 0.002 | 22.041 |
| SAL | 410 | 287,937.9 | 1,335,102 | 41.260 | 1.72x107 |
| EMPL | 410 | 634.788 | 1,635.713 | 5 | 22,991 |
| LV | 410 | 0.534 | 0.464 | 0.005 | 3.331 |

*Notes: The unit of employment (EMPL) is in number of employees, the unit of real sales (SAL) is in millions VND and other measures are calculated in proportion.*

*Souce: Author’s data analysis*

Descriptive statistics show that SOEs generally have a large difference in performance, sale efficiency and employment have the highest standard deviation, this shows that SOEs have different firm size in terms of employment and real sales. SOEs have high average real sales of nearly 288 billion VND and an average number of employees of 635 indicating that SOEs in this sample are large-scale ones. This is also the practical contribution of this study because previous studies in Vietnam mainly focus on small and medium-sized SOEs (SOEs equitized in the first and second stages). In addition, the statistical results show that the financial performance of SOEs is not high. This can be explained through net profit of SOEs with negative values in some cases, leading to negative ROS, ROE, and ROA. SOEs also have a difference in financial and operating performance through high standard deviation and the maximum value of these measures.

**4.2 The impact of equitization on financial and operating performance of equitized SOEs (considering post-equitization period only)**

In this case, the authors use the PSM method to assess the impact of equitization on financial and operating performance of equitized SOEs (considering post-equitization period only) by different classification criteria, including general assessment, establishment year, non-listing status, industry group and equitization year. This is also the contribution of this study compared with previous studies in Vietnam that only assess the impact of equitization on firm performance over a one year or one period in general, such as the studies by Loc and Tran (2016), Nhan and Son (2017). Furthermore, not many international empirical studies used comparative with-without comparison method with the PSM technique, such as studies by [Megginson et al. (1994)](#_ENREF_11), [Boubakri and Cosset (1998)](#_ENREF_1), [D'Souza and Megginson (1999)](#_ENREF_4), [Harper (2001)](#_ENREF_6).

Table 7

General estimated results with PSM

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROS | -.553 | -0.34  (0.731) | -1.396 | -0.55  (0.582) |
| ROE | .008 | 0.40  (0.686) | -.002 | -0.11  (0.909) |
| ROA | .014 | 1.46  (0.144) | .008 | 1.04  (0.297) |
| SALEF | -343.0075 | -0.79  (0.427) | -456.519 | -1.12  (0.263) |
| NIEFF | -41.000 | -0.45  (0.651) | -85.932 | -0.62  (0.536) |
| TAS | -.361 | -2.01\*\*  (0.044) | -.351 | -2.05\*\*  (0.040) |
| SAL | -282505 | -3.16\*\*\*  (0.002) | -272104.5 | -3.18\*\*\*  (0.001) |
| EMPL | -178.724 | -1.98\*\*  (0.047) | -243.945 | -2.76\*\*\*  (0.006) |
| LV | -.075 | -1.63  (0.103) | -.0680 | -1.68\*  (0.093) |
| Sample size | 410 (296 non-eqtuizied SOEs and 114 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

The authors also assess the impact of equitization on financial and operating performance by firm size. To classify large and small and medium enterprises, the authors based on criteria in the current decree no. 56/2009/ND-CP issued on June 30rst, 2006 in Vietnam.

Table 8

Estimated results with PSM based on firm size

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Small and medium-sized SOEs** | | | | **Large SOEs** | | | |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROS | -3.703 | -0.95  (0.344) | -3.755 | -0.97  (0.331) | .035 | 0.62  (0.536) | .046 | 0.56  (0.573) |
| ROE | .022 | 0.63  (0.526) | .004 | 0.15  (0.880) | -.009 | -0.43  (0.666) | -.011 | -0.42  (0.678) |
| ROA | .005 | 0.37  (0.712) | .000 | 0.02  (0.984) | .003 | 0.23  (0.815) | .001 | 0.08  (0.933) |
| SALEF | -185.880 | -1.83\*  (0.067) | -267.718 | -2.47\*\*  (0.013) | -345.009 | -0.43  (0.668) | -377.259 | -0.61  (0.542) |
| NIEFF | -34.919 | -1.18  (0.239) | -43.791 | -1.33  (0.185) | -128.932 | -0.41  (0.681) | -200.511 | -0.92  (0.357) |
| TAS | -.316 | -1.50  (0.133) | -.462 | -2.05\*\*  (0.040) | -.391 | -1.67\*  (0.095) | -.0754 | -0.16  (0.875) |
| SAL | -1844.598 | -1.17  (0.241) | -2396.664 | -1.48  (0.140) | -242037.5 | -1.82\*  (0.069) | -214816.6 | -2.02\*\*  (0.044) |
| EMPL | -2.243 | -0.21  (0.832) | -2.149 | -0.29  (0.772) | -86.975 | -1.13  (0.259) | -39.969 | -0.49  (0.623) |
| LV | -.005 | -0.07  (0.945) | .056 | 0.75  (0.451) | -.072 | -1.60  (0.109) | -.0565 | -1.24  (0.215) |
| Sample size | 142 (105 non-eqtuizied SOEs and 37 equitized SOEs) | | | | 238 (162 non-eqtuizied SOEs and 76 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

The number of valid small and medium-sized SOEs is 142 (37 belongs to treatment group and 105 belongs to control group). In addition, there are 238 valid large enterprises (76 equitized SOEs and 162 non-equitized SOEs).

Table 9

Estimated results with PSM based on non-listing status

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROS | -.620573 | -0.35  (0.730) | -1.268997 | -0.47  (0.638) |
| ROE | -.0079103 | -0.41  (0.680) | -.0067743 | -0.32  (0.752) |
| ROA | .0089459 | 0.94  (0.347) | .0110271 | 1.24  (0.215) |
| SALEF | -654.774 | -1.93\*  (0.053) | -764.495 | -2.48  (0.013 |
| NIEFF | -108.931 | -1.18  (0.239) | -111.434 | -1.19  (0.234) |
| TAS | -.359 | -2.62  (0.009) | -.377 | -3.05  (0.002) |
| SAL | -223698.8 | -3.24  (0.001) | -213881.3 | -3.11  (0.002) |
| EMPL | -141.6209 | -1.63  (0.103) | -173.844 | -1.78\*  (0.075) |
| LV | -.0760646 | -1.41  (0.158) | -.0665825 | -1.40  (0.162) |
| Sample size | 368 (294 non-eqtuizied SOEs and 74 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

For unlisted enterprises within one year of equitization, their financial and operating performance is much lower than non-equitized firms in the same period.

Table 10

Estimated results with PSM based on industry group

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Industry group 1** | | | | **Industry group 2** | | | | **Industry group 3** | | | |
| Variable | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) |
| ROS | .016 | 0.83  (0.404) | .017 | 0.82  (0.410) | -.011 | -0.16  (0.869) | .025 | 0.35  (0.725) | -2.456 | -0.35  (0.729) | -1.978 | -0.26  (0.793) |
| ROE | -.005 | -0.18  (0.860) | -.009 | -0.34  (0.731) | .0126 | 0.44  (0.660) | .0212 | 0.80  (0.421) | .009 | 0.25  (0.805) | -.006 | -0.21  (0.837) |
| ROA | .007 | 0.52  (0.601) | .007 | 0.55  (0.585) | .003 | 0.20  (0.843) | .011 | 0.81  (0.421) | .033 | 1.35  (0.177) | .024 | 1.02  (0.308) |
| SALEF | -635.139 | -0.71  (0.478) | -264.556 | -0.41  (0.685) | 324.116 | 0.47  (0.641) | -439.321 | -0.82  (0.415) | -1208.097 | -1.89\*  (0.059) | -1372.487 | -2.01\*\*  (0.044) |
| NIEFF | 59.667 | 0.67  (0.504) | 77.522 | 0.82  (0.411) | -2.386 | -0.05  (0.959) | 3.003 | 0.10  (0.916) | -378.331 | -1.04  (0.297) | -490.411 | -1.05  (0.295) |
| TAS | -.389 | -1.86\*  (0.063) | -.243 | -1.61  (0.107) | .167 | 0.38  (0.702) | -.052 | -0.21  (0.831) | -.712 | -1.94\*  (0.053) | -.877 | -2.60\*\*\*  (0.009) |
| SAL | -348608.2 | -1.69\*  (0.091) | -276304 | -1.79\*  (0.073) | -38211.33 | -0.86  (0.389) | -58907.24 | -1.89\*  (0.059) | -110953.7 | -1.92\*  (0.055) | -153028.5 | -2.26\*\*  (0.024) |
| EMPL | -130.139 | -1.33  (0.184) | -143.041 | -2.50\*\*  (0.012) | -84.37308 | -1.14  (0.254) | -55.908 | -0.49  (0.624) | -2.554 | -0.02  (0.982) | -144.654 | -1.86\*  (0.063) |
| LV | -.0669 | -1.19  (0.235) | -.115 | -1.73\*  (0.084) | -.131 | -1.82\*  (0.069) | -.196 | -2.26\*\*  (0.024) | -.051 | -0.53  (0.596) | -.076 | -1.24  (0.216) |
| Sample size | 176 (127 non-eqtuizied SOEs and 49 equitized SOEs) | | | | 130 (81 non-eqtuizied SOEs and 49 equitized SOEs) | | | | 93 (77 non-eqtuizied SOEs and 16 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

The authors classify SOEs into three industry groups. The first group includes SOEs from the first industry to the third industry, the second group includes SOEs from the fourth industry to the sixth industry and the third group includes SOEs from the seventh industry to the twelfth industry. SOEs in each group have similar operating environment. According to the Decision no. 10/2007/QĐ-TTg issued on Jan, 23th 2007 in Vietnam, there are 21 different industries. However, the authors realize that there are SOEs with the first 12 industries in the sample, therefore the authors group these firms into three industry groups. The first group includes agriculture, mining and manufacturing industries, the second group includes power, water supply and construction industries and the third group includes transportation, retailing, hospitality, telecommunication, banking, insurance and real estate industries.

Table 11

Estimated results with PSM based on equitization years

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **2012** | | | | **2013** | | | | **2014** | | | |
| Variable | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) |
| ROS | 6.149 | 0.89  (0.375) | 6.088 | 1.14  (0.256) | .035 | 1.22  (0.221) | .010 | 0.42  (0.672) | -3.103 | -0.99  (0.322) | -6.271 | -0.99  (0.320) |
| ROE | .070 | 2.15\*\*  (0.031) | .056 | 1.61  (0.107) | .019 | 0.58  (0.565) | .017 | 0.60  (0.547) | -.039 | -2.21\*\*  (0.027) | -.0367 | -2.14\*\*  (0.032) |
| ROA | .052 | 3.18\*\*\*  (0.001) | .053 | 2.86\*\*\*  (0.004) | .0182 | 1.28  (0.202) | .005 | 0.44  (0.659) | -.00687 | -0.52  (0.601) | -.003 | -0.25  (0.803) |
| SALEF | 537.339 | 0.64  (0.519) | 62.776 | 0.09  (0.928) | -659.694 | -0.89  (0.372) | -276.766 | -0.47  (0.639) | -137.828 | -0.21  (0.830) | -511.612 | -0.98  (0.32) |
| NIEFF | 205.815 | 1.87\*  (0.062) | 201.516 | 1.58  (0.114) | 6.402 | 0.08  (0.937) | 5.507 | 0.08  (0.934) | -191.607 | -1.01  (0.314) | -246.265 | -1.10  (0.272 |
| TAS | .242 | 0.59  (0.553) | .0177 | 0.06  (0.956) | -.549 | -1.64  (0.102) | -.124 | -0.20  (0.845) | -.273 | -1.56  (0.118) | -.172 | -1.03  (0.304) |
| SAL | 11456.83 | 0.34  (0.737) | -15666.87 | -0.54  (0.592) | -301 | -1.94\*  (0.052) | -233814.9 | -2.04\*\*  (0.041) | -345912 | -2.84\*\*\*  (0.005) | -292231.2 | -2.45\*\*  (0.014) |
| EMPL | -133.039 | -1.55  (0.120) | -221.582 | -1.98\*\*  (0.047) | -189.246 | -1.25  (0.211) | -301.331 | -1.93\*  (0.054) | -204.568 | -1.81\*  (0.071) | -183.024 | -1.63  (0.102) |
| LV | -.165 | -1.50  (0.135) | -.244 | -2.18\*\*  (0.029) | -.078 | -1.14  (0.253) | .0264 | 0.47  (0.637) | -.051 | -0.71  (0.478) | -.104 | -1.29  (0.197) |
| Sample size | 51 (42 non-eqtuizied SOEs and 9 equitized SOEs) | | | | 193 (146 non-eqtuizied SOEs and 47 equitized SOEs) | | | | 177 (119 non-eqtuizied SOEs and 58 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

In the case of applying the PSM technique for equitization years, the authors use only three characteristics to determine propensity score, including establishment year, firm size and industry (as each year is studied separately). The impact of equitization on post-equitization financial and operating performance of equitized SOEs are as follows:

**Profitability**

The results show that there is no evidence that the overall post-equitization profitability of equitized SOEs is improved (in relation with non-equitized SOEs). This finding is in contrast to previous studies by Megginson et al. (1994). However, in terms of equitization year, the equitization process helps SOEs equitized in 2012 to improve their ROA compared to non-participating SOEs (the average improvement is 52.5%). However, SOEs equitized in 2014 have a lower ROE than non-participating firms (3.8%).

**Operating efficiency**

The overall performance of equitized SOEs has not improved after equitization and total asset turnover of equitized SOEs is lower than non-equitized firms in the same period (35.6% in average). This ratio shows that the ability of equitized SOEs to generate revenue on assets in the post-equitization period is lower than that of non-equitized SOEs in the same period. This shows that equitized SOEs do not perform as well as non-equitized firms after equitization as they face new challenges in the competitive business environment, changes in ownership structure and regulation, etc ([Jiang et al. 2009](#_ENREF_8); [Pham, 2017](#_ENREF_15); [Wei et al. 2003](#_ENREF_20)). Considering the small and medium-sized enterprises, the sale efficiency of equitized SOEs is much lower than that of the non-participating SOEs (453,598 million VND/employee in average).

Considering the non-listing status, non-listed equitized SOEs will have lower operating efficiency than that of non-eqtuized SOEs. This is a very interesting finding that equitized SOEs in Vietnam are not able to operate more efficiently than non-equitized SOEs in the same period if they are not listed (sale efficiency is lower than 709,635 million VND/employee on average and total asset turnover is lower than 36.8% on average).

On an industry group basis, SOEs equitized in the third industry group are significantly less efficient than non-participating firms in terms of sale efficiency (1290,292 million VND/employee on average). In addition, the total asset turnover of equitized SOEs in the third industry is lower than that of non-participating firms (79.5% on average).

**Output**

The post-equitization real sales of equitized firms is also not better than non-equitized firms in the same period. The results of this study are also contrary to previous studies. This result also explains why equitized SOEs have lower total asset turnover than non-participating firms. The equitization process in Vietnam is similar to privatization process in China, where the state still holds shares in some equitized firms after equitization and controls these firms. In some cases, while these enterprises operate in a competitive environment, the ability to improve sales is very difficult (lower than that of control group of 277,304.75 million VND on average). Another reason is that the actual real sales of equitized SOEs and non-equitized SOEs (in terms of large-scale firm size) is significantly different (treatment group have lower real sales than control group of 228,427.05 million VND on average).

Equitized SOEs in the first and third industry group have lower real sales than non-participating SOEs (312,456.1 million VND and 820,619.35 million VND respectively).

Considering the equitization years, SOEs equitized in 2013 and 2014 have lower real sales than non-equitized SOEs in the same period. This is also contrary to previous studies in other countries by [Pohl et al. (1997)](#_ENREF_16), [Claessens and Djankov (2002)](#_ENREF_2).

**Employment**

A significant change in the post-equitization period is that equitized SOEs are engaged in reducing the number of employees compared to non-participating SOEs (212 employees on average). After equitization, equitized firms have a change in ownership structure, with the participation of private ownership, so they will cut unnecessary employment expense.

**Leverage**

In general, there is no significant change in the leverage of equitized SOEs compared to non-participating SOEs. As presented, the state still dominate equitized SOEs in the post-equitization period in some cases, so they operate similarly to the non-participating SOEs in general. However, there is a difference in the leverage by industry group. Specifically, SOEs equitized in the second industry group have a lower leverage than non-participating firms. This also coincides with previous studies that privatization helps firms reduce leverage because of the opportunity to issue more shares rather than use debt.

**General Conclusions**

Considering only post-equitization financial and operating performance, equitization does not help equitized SOEs to improve their profitability, operating efficiency, real sales, labor and leverage compared with non-equitized SOEs. This conclusion is in contrast to previous studies by Frydman et al. (1997), Claessens and Djankov (2002) and Pohl (1997). Considering the impact of equitization on firm performance by firm size, non-listing status, industry group and equitization year, the results are similar to the general analysis, which means that equitization does not help equitized SOEs to improving financial and operating performance of equitized SOEs. To explain this phenomenon, the authors found that the equitized enterprises in this period were mostly large-scale ones operating in multi-industry environment and complicated ownership structure, so they could not operate efficiently in the post-equitization period compared with non-equitized SOEs. In addition, the state still hold shares and control these equitized SOEs in some cases and this is similar to the case of China. [Cuervo and Villalonga (2000)](#_ENREF_3) explain that privatization is only an event to change in firm ownership structure, which is not a determinant affecting firm performance of equitized SOEs.

**4.3 The impact of equitization on pre-post equitization financial and operating performance of equitized SOEs compared with non-equitized SOEs in the same period**

In this case, the authors use the PSM technique combined with the DID technique to assess the equitization effect (in relation to the non-equitized firms in the same period). Similarly, the authors assess the effect of equitization on the pre-post equitization difference in financial and operating performance of treatment group compared with control group based on different classification criteria, such as general evaluation, firm size, non-listing status, industry group and equitization year.

Table 12

General estimated results with PSM-DID

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROSd | -.516 | -0.32  (0.749) | -1.377 | -0.54  (0.587) |
| ROEd | .075 | 1.43  (0.151) | .090 | 1.54  (0.123) |
| ROAd | .035 | 1.93\*  (0.054) | .019 | 1.51  (0.130) |
| SALEFd | -1926.267 | -1.87\*  (0.061) | -678.477 | -1.37  (0.170) |
| NIEFFd | -228.797 | -2.18\*\*  (0.029) | -163.451 | -1.90\*  (0.057) |
| TASd | -.0461 | -0.25  (0.800) | .0900 | 0.49  (0.624) |
| SALd | -125328.1 | -2.11\*\*  (0.035) | -136089 | -2.09\*\*  (0.037) |
| EMPLd | 72.236 | 0.82  (0.413) | 16.528 | 0.19  (0.847) |
| LVd | -.106 | -2.65\*\*\*  (0.008) | -.094 | -2.90\*\*\*  (0.004) |
| Sample size | 410 (296 non-eqtuizied SOEs and 114 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

Using the PSM technique, the authors select 410 enterprises, including 296 non-equitized ones and 114 equitized ones in the same period.

Table 13

Estimated results with PSM-DID based on firm size

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Small and medium-sized SOEs** | | | | **Large SOEs** | | | |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROS | -3.645 | -0.93  (0.351) | -3.662 | -0.94  (0.349) | .071 | 1.08  (0.280) | .0727 | 1.34  (0.181) |
| ROE | .055 | 1.48  (0.140) | .005 | 0.12  (0.905) | .029 | 0.62  (0.538) | .0725 | 0.88  (0.377) |
| ROA | .0296 | 2.22\*\*  (0.026) | .020 | 1.14  (0.254) | .013 | 0.97  (0.333) | .007 | 0.55  (0.583) |
| SALEF | -113.125 | -1.47  (0.142) | -122.798 | -1.55  (0.120) | -2064.978 | -1.60  (0.109) | -1195.924 | -1.00  (0.316) |
| NIEFF | -17.989 | -0.65  (0.517) | -30.829 | -0.93  (0.350) | -278.471 | -2.35\*\*  (0.019) | -320.326 | -2.09\*\*  (0.037) |
| TAS | -.204 | -1.01  (0.312) | -.197 | -0.88  (0.378) | .049 | 0.24  (0.814) | .291 | 0.73  (0.464) |
| SAL | -1499.341 | -1.28  (0.200) | -1811.49 | -1.04  (0.300) | -72568.16 | -1.28  (0.199) | -154694.2 | -1.01  (0.312) |
| EMPL | 32.137 | 0.80  (0.421) | 33.156 | 0.67  (0.500) | .295 | 0.00  (0.996) | -86.613 | -1.32  (0.186) |
| LV | -.116 | -2.33\*\*  (0.020) | -.072 | -1.23  (0.220) | -.088 | -1.85\*  (0.064) | -.084 | -1.95\*  (0.051) |
| Sample size | 142 (105 non-eqtuizied SOEs and 37 equitized SOEs) | | | | 238 (162 non-eqtuizied SOEs and 76 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

When classifying sample by firm size, the authors classify the sample into two groups of large-scale and medium and small-sized enterprises.

Table 14

Estimated results with PSM-DID based on non-listing status

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **ATE (nnmatch)** | **z-statistic for ATE (nnmatch)** | **ATE (psmatch)** | **z-statistic for ATE (psmatch)** |
| ROS | -.557 | -0.31  (0.756) | -1.304 | -0.46  (0.648) |
| ROE | .130 | 2.15\*\*  (0.032) | .131 | 1.86\*  (0.063) |
| ROA | .044 | 2.26\*\*  (0.024) | .041 | 2.65\*\*\*  (0.008) |
| SALEF | -267.605 | -0.90  (0.366) | -229.211 | -0.91  (0.365) |
| NIEFF | -63.435 | -1.49  (0.137) | -67.453 | -1.35  (0.177) |
| TAS | -.116 | -0.90  (0.369) | -.048 | -0.41  (0.680) |
| SAL | -46167.12 | -2.21\*\*  (0.027) | -49082.07 | -2.35\*\*  (0.019) |
| EMPL | 67.691 | 0.86  (0.387) | 28.315 | 0.36  (0.720) |
| LV | -.124 | -2.89\*\*\*  (0.004) | -.086 | -2.14\*\*  (0.033) |
| Sample size | 368 (294 non-eqtuizied SOEs and 74 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

For unlisted SOEs after equitization, the number of non-equitized enterprises is 368 and there are 74 equitized SOEs.

Table 15

Estimated results with PSM-DID based on industry group

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Industry group 1** | | | | **Industry group 2** | | | | **Industry group 3** | | | |
| Variable | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) |
| ROS | .111 | 1.08  (0.282) | .041 | 0.50  (0.614) | .013 | 0.09  (0.932) | .033 | 0.32  (0.746) | -2.465 | -0.35  (0.728) | -3.227 | -0.43  (0.664) |
| ROE | .06709330.88 | 0.88  (0.380) | .018 | 0.34  (0.737) | .050 | 1.47  (0.142) | .049 | 1.57  (0.117) | .447 | 2.00\*\*  (0.046) | .298 | 2.53\*\*  (0.011) |
| ROA | -.005 | -0.32  (0.749) | -.014 | -1.09  (0.277) | .020 | 1.29  (0.198) | .022 | 1.34  (0.179) | .159 | 2.10\*\*  (0.035) | .099 | 10.03\*\*\*  (0.000) |
| SALEF | -2240.259 | -1.84\*  (0.066) | -1751.37 | -1.50  (0.134) | 808.025 | 1.45  (0.146) | 660.989 | 1.71\*  (0.088) | -822.094 | -1.81\*  (0.070) | -660.162 | -1.53  (0.126) |
| NIEFF | -248.484 | -1.57  (0.117) | -270.928 | -1.94\*  (0.052) | 15.030 | 0.36  (0.721) | 10.760 | 0.30  (0.765) | -141.059 | -0.88  (0.379) | -44.731 | -0.33  (0.740) |
| TAS | -.374 | -2.11\*\*  (0.035) | -.235 | -1.77\*  (0.076) | .588 | 1.06  (0.289) | .453 | 1.53  (0.126) | -.395 | -0.93  (0.355) | -.375 | -1.15  (0.249) |
| SAL | -186443.5 | -1.34  (0.180) | -190955.5 | -1.87\*  (0.061) | 16593 | 0.47  (0.635) | 37821.65 | 1.25  (0.212) | -53533.77 | -1.39  (0.165) | -79392.14 | -1.67  (0.094) |
| EMPL | 5.999 | 0.10  (0.924) | 26.266 | 0.44  (0.662) | -82.954 | -1.14  (0.256) | -153.725 | -1.99\*\*  (0.047) | 202.704 | 1.65\*  (0.098) | 136.782 | 2.12\*\*  (0.034) |
| LV | -.064 | -1.88\*  (0.060) | -.085 | -1.81\*  (0.070) | -.200 | -2.20\*\*  (0.027) | -.173 | -1.87\*  (0.061) | -.059 | -0.86  (0.387) | -.063 | -1.08  (0.282) |
| Sample size | 176 (127 non-eqtuizied SOEs and 49 equitized SOEs) | | | | 130 (81 non-eqtuizied SOEs and 49 equitized SOEs) | | | | 93 (77 non-eqtuizied SOEs and 16 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

Similarly, enterprises are also classified by industry groups and by three years of 2012, 2013 and 2014.

Table 16

Estimated results with PSM-DID based on equitization year

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **2012** | | | | **2013** | | | | **2014** | | | |
| Variable | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) | ATE (nnmatch) | z-statistic for ATE (nnmatch) | ATE (psmatch) | z-statistic for ATE (psmatch) |
| ROS | 6.527 | 0.94  (0.346) | 6.271 | 1.17  (0.243) | .113 | 0.95  (0.344) | .107 | 1.25  (0.211) | -3.178 | -1.01  (0.310) | -6.348 | -1.01  (0.313) |
| ROE | .007 | 0.07  (0.947) | .001 | 0.01  (0.994) | .104 | 1.11  (0.268) | .059 | 0.98  (0.328) | .0787 | 1.17  (0.242) | .086 | 1.10  (0.270) |
| ROA | -.003 | -0.06  (0.949) | .021 | 0.44  (0.658) | .073 | 2.11\*\*  (0.035) | .044 | 1.92\*  (0.055) | -.002 | -0.10  (0.921) | .001 | 0.07  (0.941) |
| SALEF | -2163.662 | -1.37  (0.171) | -890.821 | -1.22  (0.221) | -1989.943 | -1.21  (0.228) | -577.029 | -0.52  (0.604) | -739.485 | -2.16\*\*  (0.031) | -752.411 | -2.07\*\*  (0.038) |
| NIEFF | 52.149 | 0.32  (0.745) | 138.740 | 1.08  (0.281) | -261.806 | -2.10\*\*  (0.036) | -150.758 | -1.91\*  (0.056) | -183.027 | -1.29  (0.195) | -200.174 | -1.58  (0.114) |
| TAS | -.011 | -0.04  (0.969) | -.130 | -0.57  (0.570) | .197 | 0.58  (0.562) | .818 | 1.36  (0.174) | -.284 | -1.79\*  (0.073) | -.221 | -1.73\*  (0.083) |
| SAL | 20448.05 | 1.23  (0.218) | 6256.26 | 0.47  (0.640) | -108209.6 | -0.84  (0.401) | -114112.9 | -1.08  (0.282) | -135333.8 | -3.36\*\*\*  (0.001) | -122622.3 | -3.00\*\*\*  (0.003) |
| EMPL | 230.863 | 1.55  (0.122) | 130.309 | 1.08  (0.282) | 58.817 | 0.49  (0.621) | -54.263 | -0.46  (0.642) | 38.627 | 0.29  (0.774) | 34.910 | 0.23  (0.818) |
| LV | -.122 | -1.07  (0.285) | -.171 | -1.20  (0.230) | -.137 | -2.01\*\*  (0.044) | -.054 | -1.06  (0.291) | -.082 | -2.04\*\*  (0.041) | -.112 | -2.43\*\*  (0.015) |
| Sample size | 51 (42 non-eqtuizied SOEs and 9 equitized SOEs) | | | | 193 (146 non-eqtuizied SOEs and 47 equitized SOEs) | | | | 177 (119 non-eqtuizied SOEs and 58 equitized SOEs) | | | |

Note: \*\*\*, \*\*, and \* denote significance levels of 1%, 5%, and 10% respectively.

*Souce: Author’s data analysis*

The results of equitization impact assessment on the pre-post equitization difference in financial and operating performance of treatment group compared to control group are as follows:

**Profitability**

In general, there is no evidence that equitization helps equitized SOEs improve their profitability after equitization compared to non-participating firms. However, a notable result is that unlisted equitized SOEs have a significant improvement in profitability compared to non-participating firms (the ROA is 13% higher than that of control group on average, ROE is 4.3% higher than that of control group on average).

Considering enterprises belonging to the third industry group, equitized SOEs have higher improvement in profitability compared to non-equitized firms (profitability is 12.9% higher than that of control group on average, ROE is 37.2% higher than that of control group on average). Considering equitization year, SOEs equitized in 2013 have higher profitability than that of non-equitized SOEs (5.8% on average).

**Operating efficiency**

When considering the profitability, non-equitized SOEs have better operating efficiency than equitized SOEs (196.24 million VND/employee on average). The reason is that SOEs equitized in 2013 do not improve much in terms of net income efficiency compared to non-participating firms (206,282 million VND/employee on average). This result is contrary to previous studies by Loc and Tran (2016), Nhan and Son (2017). Considering large-scale enterprises, the net income efficiency of the participating firms can not be improved comparing with the non-participating firms (299,398 million VND/employee on average). Total asset turnover of the participating firms in the first industry group also can not be improved comparing with the non-participating firms (the difference is 30.4% on average). This is because SOEs equitized in 2014 do not improve total asset turnover compared with non-participating firms (the difference is 25.2% on average).

**Output**

The improvement in the real sales of the participating firms is even lower than that of the non-participating firms (130,708.55 million VND on average). Improvement in real sales of unlisted SOEs is also lower than non-participating firms (47,624.595 million VND on average). This is due to the fact that SOEs equitized in 2014 have a lower improvement in real sales compared to the non-participating firms (about 128,978.05 million VND on average).

**Employment**

The results show that equitized SOEs in the third industry group have an increase in labor force after equitization compared to non-participating SOEs (170 employees on average). This is in contrast with previous studies. This is because firms in service industry (third industry group) increase employees to provide more services to customers.

**Leverage**

In general, leverage of treatment group is lower than that of the control group, which is quite similar to the previous empirical studies (10% on average). The results also show that equitized firms use lower leverage than non-participating firms in the same period. This is because large-scale SOEs in the treatment group have lower leverage than SOEs in the control group (8.6% on average). In addition, unlisted SOEs have lower leverage than non-participating firms (10.5% on average).

**General conclusions**

The equitized SOEs do not improve their profitability, operating efficiency and real sales compared to the non-participating SOEs, there is also no evidence for a reduction in the number of employees of equitized SOEs after equitization. This conclusion is in contrast to previous studies by [Loc and Tran (2016)](#_ENREF_10), [Nhan and Son (2017)](#_ENREF_13), but there is similarity with the results of studies by [Jiang et al. (2009)](#_ENREF_8), [Wei et al. (2003)](#_ENREF_20). This is because equitized SOEs in the early post-equitization period in Vietnam are still controlled by the State in some cases, as well as the equitized enterprises in the period 2012-2014 are mainly large-scale ones with slow change of operating objectives, monitoring mechanism and weak competitiveness after equitization. In addition, equitized SOEs could not solve problems in pre-equitization period, so they still suffer these problems even in the pos-equitization period. According to Jiang et al. (2009), some pre-equitization difficulties of equitized SOEs should include financial debt, irrecoverable debt, redundant workers. After equitization, it is more difficult for joint-stock enterprises to access capital than state-owned enterprises because there are no more incentives compared to pre-equitization period, the State no longer has preferential policies for joint-stock enterprises. Especially, managers from joint-stock companies were mostly transferred from state-owned enterprises with the same management style while equitized SOEs have to face many changes in competition, market and technology. Because of the above reasons, equitized enterprises are difficult to operate well after equitization compared to non-equitized enterprises if considered in the short term.

In addition, equitized firms have reduced leverage compared to non-participating firms. According to [Loc and Tran (2016)](#_ENREF_10), equitized SOEs are less likely to use debt after equitization, instead increasing equity through issuing stocks after equitization. Although equitized have not improved significantly in terms of profitability, operating efficiency and output compared to non-participating firms in the short run, it is clear that there is a fundamental change in the ownership structure of equitized SOEs to positively participate in a more competitive environment, and appropriate control over their performance so that they can operate more efficiently than non-equitized firms in the long term. The results also show that unlisted firms have higher ROA than non-equitized firms, or SOEs equitized in 2013 have higher ROA and ROE than non-equitized firms. Therefore, the results of this study contribute to the practical aspects compared with previous empirical studies in Vietnam because this study considers the impact of equitization on financial and operating performance of equitized SOEs (in relation to non-equitized SOEs in the same period) and the equitization impact is considered based on non-listing status, firm size, equitization year and industry group. As a result, investors can make appropriate investment decisions. Enterprises can look at their business characteristics to forecast their ability to improve financial and operating performance after equitization or policy-makers can consider appropriate regulations.

**4.4 Robustness test**

In previous studies, [Nhan and Son (2017)](#_ENREF_13), [Loc and Tran (2016)](#_ENREF_10), [Hung et al. (2017)](#_ENREF_7) have only used the caliper or radius matching (0.01) and these previous studies have not checked robustness of average treatment effect. However, according to [Khandker et al. (2009)](#_ENREF_9), there are several ways to check robustness of the findings. (1) One approach is to estimate the propensity score equation and then use the different matching methods comparing the results. The findings with different matching techniques must be consistent. (2) Another way to check robustness is to apply direct nearest-neighbor matching instead of estimating the propensity score equation first, after that researchers can use neighboring matching method (N=5). If both methods give similar results, then the findings are assumed to be more reliable. Thus, the author have chosen the second way (2) to check robustness of average treatment effect and given more accurate results. The author has performed robustness test from table 7 to table 16. Each table has two columns showing two different methods, including direct nnmatch (nearest-neighbor matching) and psmatch (neighboring matching).

1. **Summary and implications**

In general, the results of the two methods are quite similar with general conclusion is that the equitized SOEs do not improve their profitability, operating efficiency and output after equitization. From the research results, the authors propose some policy implications as follows:

1. Vietnamese government should have appropriate policies to support equitized enterprises, especially in the first years of post-equitization period. Research results show that equitized enterprises have not improved their financial and operating performance in the first two years due to difficulties such as new entry into the competitive environment, ownership structure change, lacking competitive ability compared with private enterprises in the same industry. In the short run, equitized firms are less efficient than non-participating firms, but the number of employees and leverage of equitized SOEs are lower than that of non-equitized SOEs after equitization. Equitized SOEs tend to reduce level of debt and issue more stocks which help to reduce financial risk after equitization. Equitization does not always help businesses operate more efficiently and the impact of equitization on firm performance depends on equitization year, non-listing status, firm size or industry groups.
2. Non-equitized enterprises should actively participate in equitization when they have enough conditions, and they should have clear operational and strategic plans after equitization because equitization does not always help equitized SOEs to operate more efficiently compared with non-equitized SOEs after equitization. According to [Cuervo and Villalonga (2000)](#_ENREF_3), equitization is only a remarkable event when equitized SOEs change their ownership structure, while other factors such as operating objectives, control mechanisms, new strategies affect firm performance after privatization.
3. Although equitized SOEs do not improve their performance in terms of profitability, operating efficiency and output compared to non-participating SOEs in general, they can improve their performance in terms of profitability, operating efficiency and output after equitization if we consider subsamples based on equitization year, non-listing status, firm size and industry groups. For example, unlisted equitized SOEs have higher ROA than non-equitized SOEs, or SOEs equitized in 2013 have higher ROA and ROE than non-equitized SOEs. These new findings help investors to have appropriate long-term investment strategies because equitized firms are not always effective after equitization, especially in the short term.

This study uses two different approaches to assessing the impact of equitization on financial and operating performance of enterprises in treatment group and control group. Robustness testing is also performed to assure reliable results. The results of the study show that equitization does not always help equitized SOEs to operate more efficiently after equitization compared with non-equitized ones and this impact depends on equitization year, non-listing status, firm size and industry group, which reveal that related theories have certain limitations since they do not consider these characteristics to explain the impact of privatization or equitization on firm performance in general. Previous related theories have not explained whether there is an improvement in financial and operating performance of equitized SOEs compared to non-equitized SOEs or not.

This study does not explain how equitization affects financial and operating performance of equitized SOEs compared to non-equitized SOE in the long run and how different equitization periods affect financial and operating performance of equitized SOEs. Based on limitations of this study, the author suggest further research to overcome these limitations.

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