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Tax Planning in Norwegian Private Equity-Backed Companies

Do Norwegian PE-backed companies engage in tax planning activities to a larger extent than their peers, and do PE-firms operating in Norway actively look for target companies that hold a potential for tax optimization?

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Abstract

We investigate whether Norwegian PE-backed companies engage in tax planning activities to a larger extent than their peers, and if PE-firms operating in Norway actively look for targets that hold a potential for tax optimization, by utilizing five proxies for tax planning. Our results show that Norwegian PE-backed companies exhibit significantly larger leverage ratios than comparable companies. The PE-backed companies' leverage ratios are on average 100.82 percentage points higher than the ratios of non-PE-backed companies. This indicates that PE-backed companies engage in tax planning activities to a somewhat larger extent than their peers, by generating debt tax shields. We do although see limitations to this result, as we have not included holding company debt of the peer companies in our sample, and as we cast doubt over the relevance of using Leverage Ratio as a proxy for tax planning. In addition to this, none of the four other proxies for tax planning we investigate display significant differences between the tax planning activities performed in PE-backed companies and comparable non-PE-backed companies. This result is very different from the findings in similar studies performed on American and Finnish data, and indicates that Norwegian PE-backed companies are much less tax aggressive than similar foreign companies. Our research also shows that PE-firms operating in Norway do not deliberately seek out target companies that hold a potential for tax optimization, as there exist no differences in the level of tax planning activities in PE-Target companies and comparable non-PE-backed firms.

Keywords: *Private Equity, Tax Planning*

Preface

This thesis is written as part of our MSc in Economics and Business Administration at the Norwegian School of Economics (NHH), and corresponds to one semester of full-time studies.

The idea of writing a master's thesis on the topic of tax planning in private equity-backed companies came from taking Carsten Bienz's course called "Venture Capital, Private Equity and Leveraged Buyouts" and Guttorm Schjelderup and Dirk Schindler's course called "Taxes and Business Strategy" in the spring of 2015. We were both very intrigued by these topics, and believed it would be interesting to combine these two fields of study in one thesis, which it indeed has been.

We thank our supervisor Carsten Bienz for his helpful advise, comments and continuous support throughout this process, and for also giving us access to important data material that has been crucial in order to perform our analyses. Further, we are also very grateful to The Norwegian Tax Authorities (Skatteetaten) for granting us access to data material that has been vital to our thesis. We also wish to thank Audun Solli, research coordinator in The Norwegian Tax Authorities, for answering all our technical questions regarding the material we received from them. We are also grateful to Egil Viddal, senior advisor in The Norwegian Tax Authorities, for willingly and skillfully answering our questions regarding the Norwegian taxation system. In addition to this, we wish to thank our fellow student Petter Alexander Waldenstrøm for helping us understand complex taxation and accounting questions when such arose. We also owe SNF, by Kellis Akselsen, a thank you for granting us access to their databases.

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Introduction

In this thesis, we examine the tax planning activities of Norwegian private equity (PE)-backed companies. The thesis consists of two hypotheses we seek to analyze in order to draw conclusions about the tax planning activities of Norweigan PE-backed companies.

Prior research performed for other countries shows that PE-backed companies tax plan to a much larger extent than comparable companies. In our first hypothesis, we therefore wish to investigate if this is the case for Norwegian PE-backed companies as well. Our study is performed through a method called propensity score matching (PSM), where we compare the level of tax planning activities in PE-backed companies with their PSM-generated peer group, by using five proxies for tax planning. We find that Norwegian PE-backed companies display significantly different values than their peers for only one out of our five proxies for tax planning. This proxy is Leverage Ratio, and Norwegian PE-backed companies' leverage ratios are on average 100.82 percentage points higher than the leverage ratios of non-PE-backed companies.

However, this result might be biased in the PE-backed companies' disfavor, as we have only attached holding company debt to the PE-backed companies, and not to their peers. This questions the level of significance of our result. The relevance of using Leverage Ratio as a proxy for tax planning is also questionable, as Norwegian legislation allows for interest rate deductions to be made. It might thus become difficult to accuse firms of extensive tax planning by having high leverage ratios, when the government encourages firms to generate debt tax shields by allowing it. If we exclude Leverage Ratio from our list of tax planning proxies, none of our remaining proxies display significant differences between the tax planning activities performed in PE-backed companies and their peers. This result is very different from the findings in similar studies performed on American and Finnish data, and indicates that Norwegian PE-backed companies are much less tax aggressive than similar foreign companies.

In our second hypothesis, we investigate whether PE-firms actively seek out target companies that hold a potential for tax optimization. This is also done trough utilizing the propensity score matching method, where we compare the tax planning activities in PE-backed companies prior to their PE-backing (PE-Targets) with comparable non-PE-backed companies. We use the same five proxies for tax planning here as in our first hypothesis,

and find no significant differences between the tax planning activities performed in the PE-Target companies and in the comparable non-PE-backed companies. We thus infer that PE-firms do not deliberately seek out targets that hold a potential for tax optimization.

Structure of the Rest of the Thesis

The rest of the thesis will follow this structure: In Section I we describe previous research and hypothesis development, in Section II we describe the construction of the dataset we base our thesis on, in Section III we review the methodology employed in the study, in Section IV we present the our results and analyze them, and in Section V we conclude our thesis.

SECTION I: Previous Research and Hypothesis Development

Prior research shows that PE-firms create economic value in their portfolio companies through effective governance, financial and operational engineering (Kaplan & Strömberg, 2008). As PE-firms closely monitor and control their portfolio companies, PE-firms' tax practices are likely to influence the tax practices of their portfolio firms. PE-firms also have substantial expertise and resources at their disposal, enhancing their ability to promote effective tax strategies that create economic value in portfolio firms (Badertscher, Katz, & Rego, 2010). With regard to that, we wish to investigate whether PE-firms view tax planning as an additional source of economic value.
In addition to this, Badertscher, Katz, & Rego (2010) document that American PE-backed companies engage in significantly higher levels of tax planning and have lower marginal tax rates than other private firms. Moreover, they document that PE-backed companies pay 14.2 percentage points less income tax per dollar of pre-tax income than non-PE-backed firms, after controlling for net operating loss carry forwards and debt tax shields (Badertscher, Katz, & Rego, 2010). A similar study conducted on Finnish data, concludes that Finnish PE-backed companies on average report a 3.4 percentage points lower income tax per euro of operating income than comparable companies (Alahuhta, 2013).

Because we believe that PE-firms might have the incentives and possibilities to influence their portfolio companies' tax planning activities, and because prior studies in the field have provided evidence of such behavior, we wish to investigate whether Norwegian PE-backed

companies show similar results as in the American and Finnish studies. With this in mind, we develop our first hypothesis:

H1: Norwegian PE-backed companies exhibit systematically higher levels of tax planning than non-PE-backed private companies.

In a study performed on French firms, LeNadant & Perdreau (2012) find a positive correlation between the likelihood of becoming a buyout target and high levels of income taxes. They also find that buyout targets are less indebted than their counterparties. LeNadant and Perdreau (2006) suggest that the higher taxes can partly be explained by their low debt. Kaplan (1989) also finds that tax benefits created through leverage (debt tax shields) are a large source of value creation in LBOs. However, the benefits of such value creation must be balanced against the costs of debt. If the debt level is initially high in the PE-targets, there will be less of a gain to extract from purchasing the company. Of these reasons, we believe that it would be interesting to investigate whether PE-firms also deliberately seek out Norwegian target companies with a potential for greater tax planning. Our second hypothesis is thus:

H2: PE-firms' Norwegian target companies engage in tax planning activities to a smaller extent than their peer companies.

SECTION II: Data and Sample Selection

In this section, we will describe how we construct the dataset used in this thesis. The data we use is delivered from several sources, and below we will describe in detail how we construct the final sample we utilize in our analysis, and from which sources the data are collected. In both of our hypotheses we use the same dataset; the only difference is what we use as dependent variables and the construction of these.

Definition of PE-backed companies

The term PE-backed companies refers in this thesis to companies that are currently owned by PE-firms, and which were initially acquired through a buyout investment. This means that we have excluded PE-backed portfolio companies that are considered to be in the

investment stages "seed" or "venture". We choose to do so because seed and venture investments are fundamentally different from buyouts, and will have much smaller incentives to engage in tax planning activities as such investments will usually not face positive results for several years into the investment horizon (Fenn, Lang, & Prowse, 1995).

Choice of Peer Group

We limit our analysis to focus on Norwegian companies only, and by Norwegian companies we refer to companies that are tax domiciled in Norway. This is done because tax planning in Norwegian PE-backed portfolio companies is, to our knowledge, an unexplored research area. We use Norwegian private limited companies (AS) as our peer group to the PE-backed and PE-target companies. This is because we believe this group of companies will share a greater number of characteristics with PE-backed and PE-target companies than for instance public limited companies, partnerships or sole proprietorships. This limitation is in accordance with Badertscher Katz & Rego's (2010) study, which resembles ours to a certain extent. We will refer to the peers as non-PE-backed companies or peer companies.

Base Set

Data we received from the Norwegian Tax Authorities (Skatteetaten) make up the basis of our dataset. This dataset consists of "Næringsoppgave 2" for the years 2003-2014, an appendix to the Tax Returns Form, which is a statement of the main items on the income statement and balance sheet of a company. "Næringsoppgave 2" is mandatory to report for every Norwegian private limited company (AS), and we thus have the income statements and balance sheets of every Norwegian private limited company for 12 consecutive years, which we will refer to as the base set further on. This dataset initially consists of 350,836 companies and 2,217,483 observations.

Data Quality

We are given access to complete and detailed income statements and balance sheets for all Norwegian private companies from the Norwegian Tax Authorities. Because of this, we believe that the quality of our data material is greater than the quality of the data material used in studies comparable to ours, such as Alahuhta (2013) and Badertscher, Katz, & Rego (2010). Alahuhta's (2013) study is limited by the fact that all taxation related data attributable to the companies is confidential in Finland, and only tax authorities have access

to the data. Of these reasons, Alahuhta (2013) is forced to create estimates of different taxation figures, while we have access to the exact figures from the information provided by the Norwegian Tax Authorities. Badertscher, Katz, & Rego's (2010) data sample consists of private firms that have publicly-traded debt. In the US, private companies are in general not required to file their information with the Security and Exchange Commission (SEC). However, because the debt in the companies Badertscher, Katz, & Rego (2010) are looking at is public, these firms must file financial statements with the SEC, even though their equity is privately held. In order to more precisely identify the specific means of tax planning used by portfolio companies, they have to hand-collect tax footnote information from SEC financial filings. Their sample of hand-collected data includes 76 PE-backed companies and 38 companies that are non-PE-backed. This hand-collected taxation information will be less accurate and extensive than the information we have received from the Norwegian Tax Authorities. The thorough and reliable taxation data we are in possession of will thus represent a strength of our analysis.

Identifying PE-Backed Companies

The next step in the construction of our dataset is to merge the base set with data that can identify the companies that are PE-backed and also the time horizon for which they are PE-backed. This information is collected from the Argentum Center of Private Equity (ACPE) database, which we were given access to by Carsten Bienz. By merging our base set with ACPE-data based on organization numbers, we are able to create dummy variables that indicate PE-ownership. The term PE-backed companies refers to companies that are currently owned by PE-firms, and which were initially acquired through a buyout investment. As a result of this, we drop all portfolio companies that are classified as in the investment stages "seed" or "venture". This leaves us with 161 PE-backed companies.

Inclusion of Holding Company Debt

As a lot of debt related to the PE-backed companies can be kept in holding companies, we want to identify each PE-backed company's holding structure, and attach the holding company's debt to the PE-backed company if possible. This is because we believe that the holding companies might have taken on substantial amounts of debt related to the buyouts of the PE-backed companies. From Carsten Bienz we were given access to a dataset where the holding structures of 134 PE-backed companies were already identified, and further we hand-collect the holding structures for an additional 42 PE-backed companies by looking

them up in The Brønnøysund Register Center (Brønnøysundregistrene). PE-backed companies whose holding company has ownership stakes in other companies as well are excluded, as we in these cases will be unable to identify the debt attached to the specific PE-backed company in question. By attaching the debt from the holding companies we have identified to the PE-backed companies, we believe to have created a more realistic debt structure of the PE-backed companies than without attaching this debt.

A problem that arises with regard to this, however, is the fact that we do not have information on the holding structures of all the companies in our base set. Within the time frame of this thesis, it would not be possible to look up the holding structures of each company in our base set. This can potentially create artificially larger leverage ratios of our PE-backed companies versus the non-PE-backed, which represents a weakness of our analysis.

Industry Classification

When calculating the tax planning proxy Discretionary Permanent Book-Tax-Differences (as described later on in this paper), we find the residual of a regression, which is estimated by industry and year. Because of this, we need industry codes attached to each company in our sample. We also use the industry codes in the propensity score matching method as an observational firm characteristic. The industry codes are collected from the SNF database; a database owned by the Norwegian School of Economics (NHH) and the SNF foundation. This database contains accounting and corporate information for all Norwegian public and private firms. From the SNF database, we use the industry classification system called "Bransjekode 2", which consists of 973 different codes, and assign one code to each company in our sample.

Omitted Observations

Many of the proxies for tax planning, and also the observable firm characteristics used in the propensity score matching, are lagged variables. Our dataset is therefore incomplete for the years 2003 and 2004, as many missing values are generated for these years. Because of this, we choose to leave these years out of our analysis. Observations from these years have although been useful when generating lagged values for later years. Omitting the years 2003 and 2004 from our dataset reduces the number of PE-backed companies to 129. We also

drop observations where variables used in the analysis are missing from our final dataset. This further reduces the number of PE-backed companies to 74.

Some of the observations in our sample are observations of companies that have been exited by PE-firms. These would have been classified as non-PE-backed firms. However, since they might have been affected by their previous PE-backing, we choose to exclude observations of firms that have previously been PE-backed.

After merging our base set with data from ACPE and SNF, in addition to correcting for the PE-backed companies' holding company debt, we have constructed the final datasets to be used in our analysis. In the section below, we will describe the observation and company distributions for both Hypothesis 1 and 2 in greater detail.

Table 1: Yearly Observation Distribution in the Final Dataset for Hypothesis 1

Table 1 reports the observation distribution of PE-Backed and Non-PE-backed companies in Hypothesis 1 for each year. The column "Non-PE-Backed" shows the number observations of companies that are not PE-Backed in our sample for each year. The column "PE-Backed" shows the number of observations of PE-backed companies for each year in our sample. "Total" displays the total number of company observations we have in our sample for each year.

Year	Non-PE-Backed	PE-backed	Total
2005	41,536	8	41,544
2006	52,367	13	52,380
2007	59,520	20	59,540
2008	55,269	30	55,299
2009	57,828	24	57,852
2010	61,264	25	61,289
2011	63,211	31	63,242
2012	65,438	23	65,461
2013	64,197	22	64,219
2014	62,150	24	62,174
Total	582,780	220	583,000

Table 2: Total Observation Distribution in the Final Dataset for Hypothesis 1

Table 2 reports the number of companies and observations used in the analysis of hypothesis 1, specified by whether the company is PE-backed or not. The full sample consists of 160,846 unique firms and 583,000 observations. The column "PE-Backed" specifies the number of PE-backed companies and the number of observations of PE-backed companies in the sample. The column "Non-PE-Backed" specifies the number of non-PE-backed companies and observations of non-PE-backed companies in the sample. "Total" specifies the total number of companies in the sample, consisting of both PE-backed and non-PE-backed companies. The last column is the sum of the first two columns. In this column, the numbers are larger than the "Total" column due to the fact that some of the companies in the sample are non-PE-backed in certain years and PE-backed in other years. One company can thus be classified as PE-backed in one year and non-PE-backed in another, but it will never have two different classifications in the same year.

	PE-Backed	Non-PE-Backed	Total	PE+Non-PE
Firms	74	160,800	160,846	160,874
Observations	220	582,780	583,000	583,000

For hypothesis 1, our final dataset consists of 160,846 companies, where 74 of these are marked as PE-Backed companies. Over the years 2005-2014, we have a total of 583,000 firm-year observations, where 220 of these are PE-Backed company observations.

Dataset for Hypothesis 2

For Hypothesis 2, we extend the final dataset using in Hypothesis 1 by creating a dummy variable indicating whether a company is going to get PE-backed at a later stage or not, called PE-Target. If the company is to get PE-backed at a later stage, it is assigned a dummy value of 1 for the years prior to the PE-backing. At the time when a company actually is PE-backed, this year and the subsequent firm years are deleted from the sample, as we want to compare the companies prior to8 getting PE-backed to valid peers, which we believe a PE-backed company will not be. The observation distribution for each firm year is displayed below.

Table 3: Yearly Observation Distribution in the Final Dataset for Hypothesis 2

Table 3 reports the observation distribution of Non-PE-Targets and PE-Target companies in Hypothesis 2 for each year. The column "Non-PE-Targets" shows the number of observations of companies that are not targets for PE-firms in our sample for each year. The column "PE-Targets" shows the number of observations of PE-Target companies for each year in our sample. "Total" displays the total number of

observations of companies we have in our sample for each year.

Year	Non-PE-Targets	PE-Targets	Total
2005	48,249	28	48,277
2006	59,615	20	59,635
2007	64,886	17	64,903
2008	58,956	9	58,965
2009	60,977	9	60,986
2010	64,277	8	64,285
2011	66,154	5	66,159
2012	68,364	5	68,369
2013	67,012	1	67,013
2014	64,910	0	64,910
Total	623,400	102	623,502

We see that there are zero observed PE-targets for year 2014 and only one observation for year 2013, and we hence omit these years from our analysis of Hypothesis 2.

Table 4: Total Observation Distribution in the Final Dataset for Hypothesis 2

Table 4 reports the number of companies and observations used in the analysis of Hypothesis 2, specified by whether the company is a PE-Target or not. The full sample consists of 149,181 unique firms and 491,579 observations. The column "PE-Target" specifies the number of PE-target companies and the number of observations of PE-Target companies in the sample. The column "Non-PE-Target" specifies the number of companies and observations that are not PE-Targets in the sample. "Total" specifies the total number of companies and observations in the sample, consisting of both PE-target and non-PE-target companies. PE-backed companies are not included among the Non PE-targets, as we believe such an inclusion could possibly bias our analysis.

	PE-Targets	Non PE-Targets	Total
Firms	41	149,140	149,181
Observations	101	491,478	491,579

For Hypothesis 2, our final dataset consists of 149,181 companies, where 41 of these are marked as PE-targets. Over the years 2005-2012, we have a total of 491,579 firm-year observations, where 101 of these are PE-target observations.

Limitations to Our Dataset

When looking at individual years, we have a relatively small number of observations of PE-backed companies and PE-Targets, which might represent a small-sample bias. This applies particularly to the years 2013 and 2014 in Hypothesis 2. These years are therefore excluded from our analysis. Nevertheless, we note that the small-sample bias might still be present, as we continue to have a limited number of observations. We view our small samples as a limitation to our analysis. However, this is not an uncommon phenomenon in the area of private equity-related research. In addition to this, the Norwegian private equity market is small, so the population of PE-backed companies and PE-targets is inherently limited.

Proxies for Tax Planning

Definition of Tax Planning

The term tax planning will in this thesis refer to activities carried out in order to minimize a company's tax bill, but we limit the analysis to only looking at legal activities that are utilized in order to maximize shareholder value. This means that we do not aim at detecting underreporting of income or any other illegal tax related activities. We use five different proxies for tax planning in order to compare the tax planning activities of PE-backed and PE-target companies to comparable companies. These proxies are used in previous research, and we describe them in greater detail in Section II of this thesis.

Description of Our Proxies for Tax Planning

In our analysis, we rely on five proxies of tax planning. Each of the proxies reflects different types of tax planning. We utilize four proxies that reflect book-tax nonconforming tax planning, which are measures that reduce the firm's income tax liability but not its financial income. We also use Leverage Ratio of the firms as a proxy for tax planning, as larger leverage ratios will produce larger tax shields. Below we will describe further what these proxies measure, how we have constructed them and why we have chosen to use them.

Total Book Tax Differences

Like Badertscher, Katz, & Rego (2010), our first proxy for tax planning is an estimate of the difference between a firm's pretax book income and taxable income, scaled with total assets, which we refer to as Total Book Tax Differences. This proxy is formally found by:

$$Total\ Book\ \ Tax\ \ Differences\quad = \frac{\left(Net\ Profits - \frac{Taxes\ Payable + \Delta Deferred\ Taxes}{Statutory\ Tax\ Rate}\right)}{(Total\ Assets)}$$

The taxable income is estimated by dividing the total tax cost by the statutory tax rate. The statutory tax rate for Norwegian companies was 28 percent for all of the years in our sample up until 2013, but as the Norwegian tax rules changed in 2014, the tax rate changed to 27 percent for this year (Bjertnæs, 2015).

There are a number of studies that suggest that book tax differences can be used as a signal of tax planning activity (Badertscher, Katz, & Rego, 2010). Wilson (2009) finds that book-tax differences are positively associated with cases of tax sheltering, while Mills (1998) finds that proposed IRS audit adjustments are positively related to large positive book tax differences. Despite the evidence of book tax differences being associated with tax planning activities, the book-tax difference measure has limitations (Badertscher, Katz, & Rego, 2010). For instance, Manzon & Plesko (2002) identify firm specific characteristics associated with book tax differences that are not necessarily reflective of corporate tax planning.

Discretionary Permanent Book Tax Differences

Our second proxy for tax planning is Frank, Lynch, & Rego's (2009) measure called Discretionary Permanent Book Tax Differences. This proxy captures tax planning activities that directly affect net income through a reduction in total tax expenses. However, the proxy does not capture tax planning activities that generate a deferral of cash taxes paid to the tax authorities (Badertscher, Katz, & Rego, 2010). Larger values of the proxy Discretionary Permanent Tax Differences indicate larger levels of tax planning (McGuire,

Omer, & Wang, 2010). We calculate this proxy as the residual of the following regression, estimated by industry and year, in accordance with Frank, Lynch, & Rego's (2009) research:

$$PERMDIFF_{it} = \beta_0 + \beta INTANG_{it} + \beta_3 \Delta NOL_{it} + \beta_4 LAGPERM_{it} + \varepsilon_{it}$$

$$PERMDIFF = \frac{\left[\left\{BI - \left(\frac{CTE}{STR}\right)\right\} - \left(\frac{DTE}{STR}\right)\right]}{(beginning\ of\ year\ assets)}$$

Table 5: Explanation of the variables in the proxy calculation

BI= Ordinary Result Before Taxes

CTE=Current Year Payable Taxes

STR= Statutory Tax Rate

DTE= Deferred Taxes

ΔNOL=Change Net Operating Loss Carry Forwards

LAGPERM=Lagged Permanent Differences)= PERMDIFF in year t-1

INTANG= Intangible Assets= $\frac{R\&D+(Concessions+Patents\&Licenses)+Goodwill+Deferred\ Tax\ Assets}{Sum\ Assets}$

The left hand side of the regression above reflects the permanent book tax differences. The right hand side controls for items that are unrelated to tax planning, but that lead to permanent differences. The residual is thus intended to reflect the permanent differences caused by tax planning.

Like Frank, Lynch, & Rego (2009), we control for intangible assets since differences between financial accounting and tax accounting rules create differences between taxable and financial income that are unrelated to tax planning. As changes in deferred taxes are connected to amortizations, which in turn are not regarded as tax planning activities, we control for changes in net operating loss carry forwards (Miller & Skinner, 1998). We also control for permanent differences that are persistent through time, and therefore are less likely to reflect tax planning, by including lagged permanent differences in our regression. However, as Frank, Lynch, & Rego (2009) point out, controlling for lagged permanent differences might exclude some tax planning activities if the firm is consistent in its tax planning through time.

In order to adapt the Discretionary Permanent Book-Tax Differences proxy to Norwegian tax rules, we make some modifications to Frank, Lynch, & Rego's (2009) original proxy. For instance, we do not control for state taxes in our proxy. This is because the Norwegian system, as opposed to the US system, does not distinguish between state and federal taxes.

Cash Effective Tax Rate

Our third proxy for tax planning is the Cash Effective Tax Rate, introduced by Dyreng, Hanlon, & Maydew (2008). We calculate this proxy as:

$$\text{Cash Effective Tax Rate} = \frac{Cash\ Taxes\ Paid}{Pretax\ Income - Special\ Items}$$

The proxy reflects the actual taxes paid in one particular year. An advantage of using Cash Effective Tax Rate as a proxy for tax planning is that this measure is not affected by changes in tax contingencies (tax cushion). So regardless of whether a firm records a tax cushion in its financial statements, the lower cash tax payments associated with the contingencies will be reflected in a lower Cash Effective Tax Rate. A limitation of the proxy is that it contains some measurement error, as this measure does not control for nondiscretionary sources of book tax differences, and is biased downward for those firms that consistently manage their pretax book income upward over extended periods of time (Badertscher, Katz, & Rego, 2010).

Similarly to Badertscher, Katz, & Rego (2010), we truncate the Cash Effective Tax Rate to the range 0-1 and set the value missing if the denominator is zero or missing. This is done in order to make the analysis of the proxy meaningful, as negative denominators will bias the analysis in a wrongful way.

Marginal Tax Rate

Our fourth proxy for tax planning is a variety of the proxy Cash Effective Tax Rate, where we use operating profits instead of the ordinary result before taxes as the denominator. This proxy is developed by Alahuhta (2013), and we call it Marginal Tax Rate, as the purpose of

this proxy is to reflect the marginal taxes paid, i.e. the amount of taxes paid on each unit of additional income. The Marginal Tax Rate is calculated as:

$$\text{Marginal Tax Rate}=\frac{Cash\ Taxes\ Paid}{Operating\ Profits}$$

This measure is also truncated to the range 0-1 and set missing if the denominator is zero or missing. The Marginal Tax Rate will capture activities that reduce taxable income without reducing operational cash flow. In addition to this, the proxy will reflect if large interest expenses are paid to related companies, which in turn could serve as a tool for tax planning (Alahuhta, 2013).

Leverage Ratio

Our fifth and last proxy is the leverage ratio of the companies. This is calculated as:

$$Leverage\ Ratio = \frac{Interest\ bearing\ debt}{Total\ Assets}$$

This is not a typical measure of tax planning in the existing literature on the field. Leverage ratio has often been included among other measures in proxies for tax planning, but not as an independent variable. Nevertheless, we choose to include it, as debt gives access to interest tax deductions that are valuable to the firms (Kaplan & Strömberg, 2008). By utilizing Leverage Ratio as a proxy for tax planning, we attempt to capture value creation through the generation of debt tax shields. A debt tax shield is the reduction in income taxes that results from taking an allowable deduction from taxable income (Schjelderup & Schindler, 2015).

Schjedrup & Schindler (2015) defines the debt tax shield as:

$$Debt\ Tax\ Shield = Tax\ Rate * Interest\ Rate * Debt$$

We do, however, question the relevance of using this proxy as a measure of tax planning. Firms do not get tax deductions on dividends and thus not on equity, so the Norwegian tax system favors debt over equity. This creates incentives for firms to lever up in order to generate interest tax deductions. As the Norwegian government allows for tax deductions on interests to be made, it might be difficult to accuse firms of engaging in extensive tax planning, as it is perfectly legal to engage in such activities. This represents a weakness to using Leverage Ratio as a proxy for tax planning.

SECTION III: Econometric Matching Methodology, Propensity Score Matching

We wish to compare Norwegian PE-backed and PE-Target companies to non-PE-backed companies. In order to find firms that are comparable to our PE-backed and PE-Target sample companies, we utilize an econometric matching technique called "propensity score matching" (PSM), which was first developed by Rosenbaum & Rubin (1983) and extended by Heckman & Robb (1986) and Heckman et al. (1997, 1998). We use the statistical software package STATA to perform the propensity score matching.

The PSM technique is applied instead of the alternative approach of employing a multivariate regression model. According to Drucker & Puri (2005), the PSM method employs fewer restrictions than the regression approach. Studies such as Rubin (1997), Conniffe, Gash & O'Connell (2000) have confirmed that propensity score matching methods can allow for a more accurate analysis.

According to Drucker & Puri (2005), the PSM method allows us to match PE-backed and PE-Target companies to non-PE-backed companies based on a one-dimensional propensity score that is a function of the companies' observable characteristics, instead of facing the difficult task of matching directly on multiple dimensions. As a result, we effectively match PE-backed and PE-Target companies to non-PE-backed companies based on many observable characteristics, while not reducing the number of PE-backed and PE-Target companies for which we can find matches. Furthermore, the method takes into account the fact that the characteristic for PE-backed and PE-Target companies may differ significantly from non-PE-backed companies, and ensures that such observed characteristics are not driving the results (Drucker & Puri, 2005).

Propensity Score Matching Procedure

We will describe the propensity score matching procedure for Hypothesis 1 in great detail below. An equivalent explanation applies to Hypothesis 2., and we thus do not include an explanation of the propensity score matching procedure for this hypothesis.

In our analysis, PE is our dependent variable in Hypothesis 1, and we let $PE = 1$ if the company is a PE-backed company, and let $PE = 0$ if the company is a non-PE-backed company. We utilize the five different proxies for tax planning activities Total Book Tax Differences, Discretionary Permanent Differences, Cash Effective Tax Rate, Marginal Tax Rate and Leverage Ratio as described above. In our analysis, we will refer to these proxies as our Y-list. In accordance with Drucker & Puri (2005), the i^{th} PE-backed company has its observed "PE-backed" tax planning activities Y_{1i} and a different level of tax planning activities Y_{0i} that would result if the company were not PE-backed.

Following Heckman & Robb (1986), we assume that all relevant differences between PE-backed companies and non-PE-backed companies are captured by their observable characteristics X. Our list of observable characteristics, our X-list, consists of the characteristics Return on Assets, the logarithm of the beginning of year Total Assets, firm i's Total Sales in year t, the beginning of year Fixed Assets, and the Industry Classification Codes. We have chosen these because we believe they are baseline characteristics for both the treated group of PE-backed companies and the control group of non-PE-backed companies.

In accordance with Drucker & Puri (2005) we let $(Y_0, Y_1) \perp \mathrm{PE}|\ \mathrm{X}$ denote the statistical independence of (Y_0, Y_1) and PE conditional on X. Rosenbaum & Rubin (1983) establish that when $(Y_0, \square_1) \perp \mathrm{PE}|\ \mathrm{X}$ and $0 < P(PE = 1|\mathrm{X}) < 1$ (which are referred to as the strong ignorability conditions), then $(Y_0, Y_1) \perp \mathrm{PE}|\mathrm{P}(\mathrm{PE} = 1|\mathrm{X})$. While it is often difficult to match on high dimension X, this result allows us to match based on the one-dimensional $P(PE = 1|\mathrm{X})$ alone. The propensity score, $P(PE = 1|\mathrm{X})$ can be estimated using probit or logit models (Drucker & Puri, 2005). In both H1 and H2 we utilize a logit model. Heckman et al. (1998) extend this result by showing that the strong ignorability conditions are overly restrictive for the estimation of $E(Y_1 - Y_0|\mathrm{PE} = 1, \mathrm{X})$. Instead, a weaker mean

independence condition E(Y_0 | D = 1, P(PE = 1 | X)) = E(Y_0 | PE = 0, P(PE = 1 | X)) is all that is required (Drucker & Puri, 2005).

To implement econometric matching, we compute propensity scores for each of the PE-backed companies and the non-PE-backed companies. There may be companies that have propensity scores that are outside of the common support of PE-backed and non-PE-backed company propensity scores. Using companies that fall outside of the common support can substantially bias the results (Drucker & Puri, 2005). As a result, we remove all companies that are outside of the common propensity score support.

We use one class of propensity score matching estimators: the nearest neighbor matching. In accordance with Drucker & Puri's (2005) work, we let Y_{1i} be the tax planning activities of a PE-backed company, Y_{0j} be the tax planning activities of a non-PE-backed company, and let $\bar{Y}_{oi}^{z}$ represent the weighted average of tax planning activities of the non-PE-backed companies, using estimator z that is matched with Y_{1i}. We compute the sample average of tax planning activities differences, $Y_{1i} - \bar{Y}_{oi}^{z}$. For each PE-backed company, the nearest neighbor-matching estimator chooses the n non-PE-backed companies with closest propensity scores to the PE-backed company propensity score. The estimator computes the arithmetic average of the tax planning activites of these n non-PE-backed companies. For each Y_{1i}, we match $\bar{Y}_{0i}^{NN} = \frac{1}{n}\sum_{j\in N(i)} Y_{0j}$, where $N(i)$ is the set of non-PE-backed companies that are nearest neighbors (Drucker & Puri, 2005). We set n=5 for both hypothesis 1 and 2.

We run the propensity score matching method for each individual year from 2005-2014. To aggregate the results, we apply Fama & MacBeth's (1973) procedure as described in Cochrane (2005) to find the aggregated averages and variance of the Y-list variables:

$$Aggregated\ average\text{: } \hat{\lambda} = \left(\frac{1}{\square}\right)\sum_{t=1}^{T} \widehat{\lambda_t},$$

$$Aggregated\ variance\text{: } \sigma^2(\hat{\lambda}) = \left(\frac{1}{T^2}\right)\sum_{t=1}^{T}(\hat{\lambda}_t - \hat{\lambda})^2$$

In this way we can calculate the aggregated t-values of our five Y-list variables.

To determine whether econometric matching is a viable method of evaluation, Heckman et al. (1997, 1998) identify four features of the data and establish matching techniques that can substantially reduce bias: (i) participants and controls have the same distributions of unobserved attributes; (ii) participants have the same distributions of observed attributes; (iii) outcomes and characteristics are measured in the same way for both groups; and, (iv) participants and controls are from the same economic environment (Drucker & Puri, 2005). Items (iii) and (iv) are met very well in our study, because the tax planning activities are measured in the same way for both PE-backed and non-PE-backed companies, and the non-PE-backed company sample is from the same time period as the PE-backed company sample. To satisfy condition (ii), we use company characteristics to match PE-backed companies to non-PE-backed companies. Feature (i) cannot be achieved in a non-experimental evaluation (Drucker & Puri, 2005). However, Heckman et al. (1997) note that feature (i) is only a small part of bias in their experimental study. Thus, the method of matching non-PE-backed companies to PE-backed companies can produce a viable estimate of the difference between non-PE-backed and PE-backed tax planning activities.

SECTION IV: Analysis of Our Results

In this section we will present the results for Hypotheses 1 and 2 and analyze them. The results are found by utilizing the propensity score matching method in STATA.

Hypothesis 1

In Hypothesis 1 we wish to investigate whether PE-backed portfolio companies engage in tax planning activities to a larger extent than their peer companies. We aggregate the results from the performed propensity score matching for the years 2005-2014.

Table 6, Aggregated Propensity Score Matching Results for Hypothesis 1:

The table below shows the Aggregated Average Effect of the Treatment on the Treated (Aggr ATT) and the t-values of our five proxies for tax planning for Hypothesis 1. These values are found by aggregating the results from the propensity score matching method by using the Fama-MacBeth procedure, as described in Section III. The Aggr ATT displays the average aggregated differences between the PE-backed companies and their peers, aggregated for the years 2005-2014. The detailed calculations made to generate these numbers are

found in Table 10 and 11 in the Appendix.

Proxies	Aggr ATT	T-values
Total Book Tax Differences	-0.0089	-1.5028
Discretionary Permanent Differences	-77.1103	-0.6504
Cash Effective Tax Rate	0.0050	0.9905
Marginal Tax Rate	0.0013	0.2375
Leverage Ratio	1.0082	9.3641***

From Table 6 above, we observe that only the proxy Leverage Ratio is significant at a five percent significance level, with a t-value of 9.3641. From the Aggr ATT column, we see that the leverage ratios in the PE-backed companies are on average 100.82 percentage points higher than the leverage ratios of comparable non-PE-backed companies. Considering the fact that we look at buyouts and know that such transactions often are characterized by high leverage, this result is not unexpected. For this proxy we therefore infer that there exists a difference in the level of tax planning activities between PE-backed companies and their peers, and that this difference points to a larger extent of tax planning activities in PE-backed versus non-PE-backed companies.

However, the fact that we have attached holding company debt to the PE-backed companies, and not to the companies in the peer group, constitutes a potentially severe weakness to this result. Within the time frame of this thesis, we are unable to look up the holding structures for all of the companies in our sample of non-PE-backed companies. We thus have no information about the potential debt that belongs to the non-PE-backed companies, which in theory could change our results if attached to the non-PE-backed companies. In order to get a slight idea whether such debt exists or not, we manually look up the holding structures of each of the PE-backed companies' peers that were assigned through the propensity score matching method. Through this manual screening, we find that 18% of the peer companies are owned by holding companies. It thus becomes evident that a potential of unattached holding debt in the peer companies exists, which casts doubt over the level of significance for the tax planning proxy Leverage Ratio.

The four remaining proxies Total Book Tax Differences, Discretionary Book Tax Differences, Marginal Tax Rate and Cash Effective Tax Rate are not significant, which means that we find no evidence of PE-backed companies engaging in largers level of tax planning than non-PE-backed companies, measured by these proxies. In addition to this, we question the relevance of using Leverage Ratio as a tax planning proxy. The generation

of debt tax shields through interest tax deductions is a completely legal practice in Norway. It might thus be difficult to accuse PE-backed companies of tax planning to a larger extent than their peers, when this practice is encouraged by the Norwegian Tax Authorities by allowing it. If we therefore exclude the proxy Leverage Ratio from our list of proxies, we end up with no significant proxies for tax planning.

For Hypothesis 1, we do not find evidence of PE-backed companies engaging in different levels of tax planning when looking at four out of five proxies for tax planning, given a significance level of five percent. However, the significance of our fifth proxy, Leverage Ratio, indicates that PE-backed companies tax plan by using leverage, and in this way gain debt tax shields, to a larger extent than their peers. We do although see limitations to this result, as we have not included holding company debt of the peer companies in our sample, and as we cast doubt over the relevance of Leverage Ratio as a proxy for tax planning.

Hypothesis 2

In hypothesis 2, we investigate whether PE-firms actively seek out target companies that engage in tax planning activities to a smaller extent than their peers, hence, if the targets have a potential for tax optimization. We aggregate the results from the performed propensity score matching for the years 2005-2012.

Table 7, Aggregated Propensity Score Matching Results for Hypothesis 2

Table 7 below shows the Aggregated Average Effect of the Treatment on the Treated (Aggr ATT) and the t-values of our five proxies for tax planning for Hypothesis 2. . These values are found by aggregating the results from the propensity score matching method by using the Fama-MacBeth procedure, as described in Section III. The Aggr ATT displays the average aggregated differences between the PE-Target companies and their peers, aggregated for the years 2005-2012. The detailed calculations made to generate these numbers are found in Table 12 and 13 in the Appendix.

Proxies	Aggr ATT	T-values
Total Book Tax Differences	0.0209	1.0522
Discretionary Permanent Differences	98.1990	1.0854
Cash Effective Tax Rate	0.0098	0.4105
Marginal Tax Rate	0.0212	1.5490
Leverage Ratio	0.0856	1.4321

From table 7 above, we see that none of our proxies for tax planning are significant on either a five or a ten percent significance level. We thus find no evidence of PE-firms actively seeking out targets with a potential for tax planning from our research, as there exist no differences in the level of tax planning activities between PE-target companies and comparable companies that are not going to get PE-backed.

Limitations to the Propensity Score Matching Results

From the propensity score matching diagnostics found in Table 8 and 9 in the Appendix, we note that the success of the matching for both Hypothesis 1 and 2 is somewhat varying for the different observable firm characteristics we have chosen. This constitutes a limitation to our results, as the quality of the matching is suboptimal for some of the observable company characteristics we have chosen.

SECTION V: Conclusion

In this thesis, we have investigated the hypotheses of 1) whether PE-backed portfolio companies engage in tax planning activities to a larger extent than their peers, and 2) if PE-firms actively seek out targets that have a potential for greater tax planning.

When investigating Hypothesis 1, we find that PE-backed companies display significantly higher leverage ratios than non-PE-backed companies. Assuming a five percent significance level, PE-backed portfolio companies' leverage ratios are on average 100.82 percentage points higher than the ratios of non-PE-backed companies. However, this result might be biased in the PE-backed portfolio companies' disfavor, as we have only attached holding company debt to the PE-backed companies, and not to their peers. This questions the level of significance of our result. In addition to this, we question the relevance of using Leverage Ratio as a tax planning proxy. It might be difficult to accuse PE-backed companies of engaging in tax planning activities to a larger extent than their peers, when this practice is encouraged by the Norwegian Tax Authorities by allowing it. If we exclude the proxy Leverage Ratio from our list of proxies, we end up with no significant proxies for tax planning.

From these findings, we conclude that PE-backed companies to a larger extent than their peers tax plan by using leverage, in order to generate tax shields. This is although a

conditional conclusion, due to the questionable relevance of Leverage Ratio as a proxy and as we have not attached holding company debt to the peer companies. We find no indications of PE-backed companies utilizing other tools of tax planning than leverage to a larger extent than non-PE-backed companies. Kaplan (1989) finds that tax benefits are a large source of wealth in LBOs, and our results with regards to leverage ratio are thus consistent with Kaplan's (1989) findings.

When investigating whether PE-firms actively seek out target companies that hold a potential for tax optimization, we find that there exist no significant differences in the levels of tax planning between Norwegian PE-Targets and comparable companies. We thus conclude that PE-firms operating in Norway do not actively seek out target companies in which they can optimize tax planning.

Our results are interesting in the way that they are not as expected. Prior to performing this analysis, we believed that Norwegian PE-firms might view tax planning as an additional source of income. In addition to this, research from the US and Finland showed that PE-backed companies in these countries tax plan to a far greater extent than their peers. Contrary to Badertscher, Katz & Rego's (2010) study on American data and Alahuhta's (2013) study on Finnish data, we do not find evidence of extensive tax planning in Norwegian PE-backed companies. We thus conclude that PE-firms operating in Norway and their Norwegian PE-backed companies exhibit much less aggressive tax planning practices than PE-backed companies in the US and Finland.

Works Cited

Alahuhta, V. (2013). *Do Finnish Private Equity Companies Engage in Tax Planning Activities More Than Their Peers?* Retrieved from Department of Finance, Aalto University, School of Business: http://epub.lib.aalto.fi/en/ethesis/pdf/13487/hse_ethesis_13487.pdf

Wilson, R. (2009). An Examination of Corporate Tax Shelter Participants. *The Accounting Review* .

Badertscher, B., Katz, S., & Rego, S. (2010). *The Impact of Private Equity Ownership On Porfolio Firms' Corporate Tax Planning.* Retrieved from Harvard Business School, Faculty Publications: http://www.hbs.edu/faculty/Publication%20Files/10-004.pdf

Bjertnæs, G. M. (2015). *Velferdseffekter av redusert selskapsbeskatning i Norge* . Statistisk Sentralbyrå. Oslo: Statistics Norway.

Cochrane, H. J. (2005). *Asset Pricing, Revised Edition.* Princeton, New Jersey, USA: Princeton University Press.

Conniffe, D., Gash, V., & O'Connell, P. (2000). Evaluating State Programmes: "Natural Experiments" and Propensity Scores. *The Economic and Social Review* .

Dyreng, S., Hanlon, M., & Maydew, E. (2008). Long-Run Corporate Tax Avoidance. *The Accounting Review* .

Drucker, S., & Puri, M. (2005). On the Benefits of Concurrent Lending and Underwriting. *Journal of Finance* .

Fama, E., & MacBeth, J. D. (1973). Risk, Return and Equilibrium. *The Journal of Political Economy* .

Fenn, G. W., Lang, N., & Prowse, S. (1995, December). The Economics of the Private Equity Market . *The Federal Reserve Bulletin* .

Frank, M., Lynch, L., & Rego, S. (2009). Tax reporting aggressiveness and its relation to aggressive financial reporting. *The Accounting Review* .

Hanlon, M. (2003). What can we infer about a firm's taxable income from its financial statements? *National Tax Journal* .

Heckman, J., & Robb, R. (1986). Alternative Method for Solving the Problem of Selection Bias in Evaluating the Impact of Treatments on Outcomes . *Springer-Verlag* .

Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme. *Review of Economic Studies* .

Kaplan, S. (1989). The Effects of Management Buyouts on Operating and Value. *Journal of Financial Economics* .

Kaplan, S., & Strömberg, P. (2008). Leveraged Buyouts and Private Equity. *Journal of Economic Perspectives* .

LeNadant, A.-L., & Perdreau, F. (2012, January). *Do Private Equity Firms Foster Innovation? Evidence from French LBOs.* Retrieved from Université de Rennes: http://crem.univ-rennes1.fr/wp/2012/201209.pdf

Manzon, G., & Plesko, G. (2002). The Relation Between Financial and Tax Reporting Measures of Income. *Tax Law Review* .

McGuire, S. T., Omer, T. C., & Wang, D. (2010, January 25). *Tippie College of Business.* Retrieved November 19, 2015, from Tippie College of Business: https://tippie.uiowa.edu/accounting/mcgladrey/pdf/mcguire.pdf

Miller, G. S., & Skinner, D. J. (1998, April). Determinants of the Valuation Allowance for Deferred Tax Assets under SFAS No. 109 . *The Accounting Review , 73* (2), pp. 213-233.

Mills, L. (1998). Book-Tax Differences and Internal Revenue Service Adjustments. *Journal of Accounting Research* .

Schjelderup, G., & Schindler, D. (2015). Lecture 1, FIE441: Taxes and Business Strategy. Bergen, Norway.

Rubin, D. (1997). Estimating Causal Effects from Large Data Sets Using Propensity Scores. *Annals of Internal Medicine* .

Rosenbaum, P., & Rubin, D. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects . *Biometrika* .

Appendix

Matching Diagnostics for Hypothesis 1 and 2

Table 8: Observable Firm Characteristics for Hypothesis 1

The table reports the matching diagnostics of our performed propensity score matching for Hypothesis 1. The matching is performed for the individual years 2005-2014.

	Year	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
Beginning of Year	2005	2.0031	0.3732	5.3700	0.0000	1.2716	2.7346
Total Assets (logarithm)	2006	1.4378	0.2529	5.6800	0.0000	0.9421	1.9335
	2007	1.5036	0.1988	7.5600	0.0000	1.1138	1.8933
	2008	1.4409	0.1530	9.4200	0.0000	1.1410	1.7409
	2009	1.3014	0.1557	8.3600	0.0000	0.9962	1.6066
	2010	1.4460	0.1723	8.3900	0.0000	1.1083	1.7837
	2011	1.1189	0.1283	8.7200	0.0000	0.8675	1.3703
	2012	1.2435	0.1601	7.7700	0.0000	0.9297	1.5574
	2013	1.2385	0.1641	7.5500	0.0000	0.9169	1.5600
	2014	1.3003	0.1589	8.1800	0.0000	0.9888	1.6118
Total Sales	2005	0.0000	0.0000	-0.6600	0.5120	0.0000	0.0000
	2006	0.0000	0.0000	-0.8700	0.3820	0.0000	0.0000
	2007	0.0000	0.0000	-0.9900	0.3210	0.0000	0.0000
	2008	0.0000	0.0000	-1.2300	0.2190	0.0000	0.0000
	2009	0.0000	0.0000	-0.7700	0.4410	0.0000	0.0000
	2010	0.0000	0.0000	-0.6900	0.4890	0.0000	0.0000
	2011	0.0000	0.0000	-0.2600	0.7930	0.0000	0.0000
	2012	0.0000	0.0000	-0.9300	0.3500	0.0000	0.0000
	2013	0.0000	0.0000	-0.7300	0.4650	0.0000	0.0000
	2014	0.0000	0.0000	-0.1900	0.8490	0.0000	0.0000
Beginning of Year	2005	0.0000	0.0000	-1.9800	0.0470	0.0000	0.0000
Fixed Assets	2006	0.0000	0.0000	-1.8500	0.0640	0.0000	0.0000
	2007	0.0000	0.0000	-2.2700	0.0230	0.0000	0.0000
	2008	0.0000	0.0000	-2.4900	0.0130	0.0000	0.0000
	2009	0.0000	0.0000	-2.1100	0.0350	0.0000	0.0000

	2010	0.0000	0.0000	-2.3700	0.0180	0.0000	0.0000
	2011	0.0000	0.0000	-1.9700	0.0480	0.0000	0.0000
	2012	0.0000	0.0000	-1.9200	0.0540	0.0000	0.0000
	2013	0.0000	0.0000	-1.8100	0.0700	0.0000	0.0000
	2014	0.0000	0.0000	-2.3300	0.0200	0.0000	0.0000
Industry Classification	2005	0.0000	0.0000	0.6100	0.5420	0.0000	0.0000
Codes	2006	0.0000	0.0000	-0.5200	0.6000	0.0000	0.0000
	2007	0.0000	0.0000	0.4200	0.6760	0.0000	0.0000
	2008	0.0000	0.0000	-0.2600	0.7950	0.0000	0.0000
	2009	0.0000	0.0000	0.1800	0.8570	0.0000	0.0000
	2010	0.0000	0.0000	1.7000	0.0890	0.0000	0.0000
	2011	0.0000	0.0000	-0.0500	0.9560	0.0000	0.0000
	2012	0.0000	0.0000	-1.3400	0.1800	0.0000	0.0000
	2013	0.0000	0.0000	-1.1900	0.2350	0.0000	0.0000
	2014	0.0000	0.0000	0.3400	0.7330	0.0000	0.0000
Constant	2005	-43.3175	7.0195	-6.1700	0.0000	-57.0754	-29.5596
	2006	-31.6338	4.6160	-6.8500	0.0000	-40.6810	-22.5865
	2007	-33.6128	3.7267	-9.0200	0.0000	-40.9170	-26.3086
	2008	-31.9868	2.9559	-10.8200	0.0000	-37.7802	-26.1934
	2009	-30.1327	3.0419	-9.9100	0.0000	-36.0948	-24.1707
	2010	-33.9629	3.3833	-10.0400	0.0000	-40.5939	-27.3318
	2011	-26.4005	2.4674	-10.7000	0.0000	-31.2365	-21.5646
	2012	-28.3318	3.0470	-9.3000	0.0000	-34.3038	-22.3599
	2013	-28.4710	3.1418	-9.0600	0.0000	-34.6287	-22.3132
	2014	-30.1970	3.0641	-9.8600	0.0000	-36.2026	-24.1915

Table 9: Observable Firm Characteristics for Hypothesis 2

The table reports the matching diagnostics of our performed propensity score matching for Hypothesis 2. The matching is performed for the individual years 2005-2012.

	Year	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
Return on Assets	2005	0.0041	0.0118	0.3500	0.7250	-0.0189	0.0272
	2006	0.0001	0.0011	0.0600	0.9500	-0.0020	0.0021
	2007	0.0000	0.0005	0.0200	0.9870	-0.0009	0.0010
	2008	0.0006	0.0041	0.1500	0.8850	-0.0074	0.0085
	2009	0.0000	0.0002	0.0700	0.9440	-0.0004	0.0004
	2010	-5.5430	5.7540	-0.9600	0.3350	-16.8206	5.7347
	2011	0.0001	0.0036	0.0200	0.9860	-0.0070	0.0071
	2012	0.0001	0.0017	0.0300	0.9730	-0.0033	0.0035
Beginning of Year	2005	1.0615	0.1461	7.2700	0.0000	0.7752	1.3479
Total Assets (logarithm)	2006	1.0312	0.1737	5.9400	0.0000	0.6907	1.3718
	2007	1.1428	0.1876	6.0900	0.0000	0.7750	1.5105
	2008	1.2628	0.2542	4.9700	0.0000	0.7647	1.7609
	2009	0.8170	0.1962	4.1600	0.0000	0.4324	1.2016
	2010	0.8738	0.2413	3.6200	0.0000	0.4009	1.3467
	2011	1.1111	0.3759	2.9600	0.0030	0.3743	1.8479
	2012	1.0350	0.3264	3.1700	0.0020	0.3953	1.6747
Total Sales	2005	0.0000	0.0000	-0.4400	0.6600	0.0000	0.0000
	2006	0.0000	0.0000	-0.5900	0.5580	0.0000	0.0000
	2007	0.0000	0.0000	-0.7700	0.4400	0.0000	0.0000
	2008	0.0000	0.0000	-0.6400	0.5210	0.0000	0.0000
	2009	0.0000	0.0000	-0.1400	0.8860	0.0000	0.0000
	2010	0.0000	0.0000	-0.5200	0.6030	0.0000	0.0000
	2011	0.0000	0.0000	-0.5200	0.6010	0.0000	0.0000
	2012	0.0000	0.0000	-0.4600	0.6440	0.0000	0.0000
Beginning of Year	2005	0.0000	0.0000	-1.7700	0.0770	0.0000	0.0000
Fixed Assets	2006	0.0000	0.0000	-1.4400	0.1510	0.0000	0.0000
	2007	0.0000	0.0000	-1.5100	0.1320	0.0000	0.0000
	2008	0.0000	0.0000	-1.3700	0.1710	0.0000	0.0000
	2009	0.0000	0.0000	-0.6100	0.5420	0.0000	0.0000
	2010	0.0000	0.0000	-0.6800	0.4990	0.0000	0.0000
	2011	0.0000	0.0000	-0.8000	0.4210	0.0000	0.0000
	2012	0.0000	0.0000	-0.7000	0.4840	0.0000	0.0000
Industry Classification	2005	0.0000	0.0000	0.2500	0.8050	0.0000	0.0000
Codes	2006	0.0000	0.0000	0.7900	0.4310	0.0000	0.0000
	2007	0.0000	0.0000	1.2400	0.2140	0.0000	0.0000
	2008	0.0000	0.0000	-0.5000	0.6200	0.0000	0.0000
	2009	0.0000	0.0000	-0.2600	0.7920	0.0000	0.0000
	2010	0.0000	0.0000	-0.5100	0.6070	0.0000	0.0000
	2011	0.0000	0.0000	-1.4700	0.1410	-0.0001	0.0000

	2012	0.0000	0.0000	-1.5000	0.1320	-0.0001	0.0000
Constant	2005	-24.6361	2.5857	-9.5300	0.0000	-29.7039	-19.5683
	2006	-25.1708	3.1123	-8.0900	0.0000	-31.2707	-19.0709
	2007	-28.0172	3.4345	-8.1600	0.0000	-34.7486	-21.2857
	2008	-29.0804	4.6179	-6.3000	0.0000	-38.1313	-20.0295
	2009	-21.9859	3.7356	-5.8900	0.0000	-29.3075	-14.6644
	2010	-22.3700	4.5217	-4.9500	0.0000	-31.2324	-13.5075
	2011	-26.4023	6.7602	-3.9100	0.0000	-39.6521	-13.1525
	2012	-25.2344	6.0341	-4.1800	0.0000	-37.0611	-13.4077

Detailed Propensity Score Matching Output

HYPOTHESIS 1:

Table 10: ATT Differences for Each Year, Hypothesis 1

Table X shows the differences in the average effect of the treatment on the treated (ATT) between PE-backed companies and their non-PE-backed peers, for each year and each proxy for tax planning. These results are collected from the propensity score matching procedure performed for each year in our sample.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Book Tax Diff.	-0.0433	-0.0182	0.0013	0.0213	0.0012	-0.0028	0.0050	-0.0059	-0.0385	-0.0090
Discretionary Perm. Diff.	-1017.3632	-2.8180	544.8617	174.4527	-272.8697	-165.3412	0.3663	-20.6212	-8.2302	-3.5399
Cash Eff. Tax Rate	0.0111	-0.0132	-0.0103	-0.0127	0.0400	-0.0041	-0.0029	0.0129	0.0153	0.0139
Marginal Tax Rate	-0.0068	-0.0310	-0.0149	0.0040	0.0196	-0.0076	-0.0117	0.0131	0.0188	0.0302
Leverage Ratio	0.7006	0.5324	0.8809	1.2162	1.5667	1.2625	0.7954	0.8520	0.7512	1.5244

Table 11: Aggregated Variables for Hypothesis 1

Table X shows the Aggregated Variance of the differences in the average effect of the treatment on the treated (Aggr Var ATT Diff), the aggregated differences in the average effect of the treatment on the treated (Aggr ATT Diff), The aggregated differences in the Standard Deviation of the average effect of the treatment of the treated (Aggr S.E. ATT Diff) between the PE-Backed companies and their peers, and lastly, the t-value for each of our proxies for tax planning. The Aggr Var ATT Diff is found by $\sigma^2(\hat{\lambda}) = \left(\frac{1}{T^2}\right)\sum_{t=1}^{T}(\hat{\lambda}_t - \hat{\lambda})^2$ for each tax planning proxy, while the Aggr. S.E. ATT is found by taking the square root of the Aggr. Var ATT Diff. The Aggr. ATT Diff is the average ATT difference between PE-Target companies and their peers, found by calculating $\hat{\lambda} = \left(\frac{1}{T}\right)\sum_{t=1}^{T}\hat{\lambda_t}$, by using the numbers in table X above. The t-value is then found by $t - value = \frac{Aggr\ ATT\ Diff}{Aggr\ S.E.ATT\ Diff}$.

	Aggr Var ATT Diff	Aggr ATT Diff	Aggr S.E ATT Diff	T-value
Total Book Tax Differences	0.0000	-0.0089	0.0059	-1.5028
Discretionary Permanent Differences	14051.8517	-77.1103	118.5405	-0.6505
Cash Effective Tax Rate	0.0000	0.0050	0.0050	0.9906
Marginal Tax Rate	0.0000	0.0014	0.0057	0.2376
Leverage Ratio	0.0116	1.0082	0.1077	9.3642

HYPOTHESIS 2:

Table 12: ATT Differences for Each Year, Hypothesis 2

Table X shows the differences in the average effect of the treatment on the treated (ATT) between PE-Target companies and their non-PE-backed peers, for each year and each proxy for tax planning. These results are collected from the propensity score matching procedure performed for each year in our sample for hypothesis 2.

Year	2005	2006	2007	2008	2009	2010	2011	2012
Book Tax Diff.	0.0063	-0.0251	-0.0201	0.0868	-0.0504	-0.0167	0.0927	0.0940
Discretionary Perm. Diff	753.6528	10.2778	154.3006	-32.1277	-10.1108	-88.7132	-1.4618	-0.2253
Cash Eff. Tax Rate	0.0130	-0.0241	-0.0050	-0.1013	0.0452	0.1567	-0.0009	-0.0047
Marginal Tax Rate	0.0348	0.0209	0.0309	-0.0471	0.0339	0.0933	0.0239	-0.0206
Leverage Ratio	0.0788	-0.0276	0.0909	-0.0687	0.3619	-0.1920	0.1888	0.2529

Table 13: Aggregated Variables for Hypothesis 2

Table X shows the Aggregated Variances of the differences in the average effect of the treatment on the treated (Aggr Var ATT Diff), the aggregated differences in the average effect of the treatment on the treated (Aggr ATT Diff), the aggregated differences in the Standard Deviation of the average effect of the treatment of the treated (Aggr S.E. ATT Diff) between the PE-Target companies and their peers, and lastly, the t-value for each of our proxies for tax planning. The Aggr Var ATT Diff is found by $\sigma^2(\hat{\lambda}) = \left(\frac{1}{T^2}\right)\sum_{t=1}^{T}(\hat{\lambda}_t - \hat{\lambda})^2$ for each tax planning proxy, while the Aggr. S.E. ATT is found by taking the square root of the Aggr. Var ATT Diff. The Aggr. ATT Diff is the average ATT difference between PE-Target companies and their peers, found by calculating $\hat{\lambda} = \left(\frac{1}{T}\right)\sum_{t=1}^{T}\widehat{\lambda_t}$, by using the numbers in table X above. The t-value is then found by $t - value = \frac{Aggr\ ATT\ Diff}{Aggr\ S.E.ATT\ Diff}$.

	Aggr Var ATT	Average ATT	Aggr S.E ATT	T-value
Book Tax Diff.	0.0004	0.0209	0.0199	1.0522
Discretionary Perm. Diff	8183.8920	98.1990	90.4649	1.0855
Cash Eff. Tax Rate	0.0006	0.0099	0.0240	0.4105
Marginal Tax Rate	0.0002	0.0213	0.0137	1.5490
Leverage Ratio	0.0036	0.0856	0.0598	1.4322