

The Effect of Private Equity on the Stability of Corporate Capital Structure

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ABSTRACT

The purpose of this study is to investigate whether private equity activities drive the instability of capital structure. By testing the capital structure stability of U.S. firms for both private equity target firms and general listed firms. The result shows that the private equity activities (e.g. Leveraged Buyout and leveraged recapitalization) are correlated with the instability of corporate capital structure. These activities affect the target firm's capital structure as well as other similar firms in the same industry. The result also indicates that there is a positive correlation between the instability and the likelihood that the firm will become private equity target. Moreover, the result from regression shows that the probability of firm will do leveraged recapitalization increase along with the likelihood that the firm will become private equity target.

Keywords: Capital Structure, Leveraged Buyout, Leveraged Recapitalization, Private Equity

INTRODUCTION

How do firms choose their capital structure? The capital structure puzzle remains unsolved since 1996. Although no one can solve this puzzle until now, many researchers believe that firm's optimal capital structure or target leverage exists. There are many empirical studies that try to observe how firm pursue the target leverage, e.g. Fama and French (2002) found that there is a slow speed of leverage adjustment toward target leverage

each year. However, in practice do firms pursue an optimal capital structure? If they do, when they achieve it, the capital structure should tend to be stable for a long period of time. Lemmon, Roberts, and Zender (2009) found relatively high firm fixed effects in panel leverage regressions, and suggested that there is a time invariant effect which drive the variation in leverage ratio. Moreover, they found that high levered firm's leverage tends to remain at the same level for 20 years. However, the most recent paper from

Deangelo and Roll (2015) published the opposite result. They found that leverage cross-sections are not stable over time with differences growing each year. The contrasting result leads to an interesting question. What drives the time variation in capital structure among these firms? One factor that has also played an important role in corporate finance and might be the source of instability is private equity. Private equity is a source of investment capital from institutions and high net worth individuals. The purpose of private equity firm is to invest and acquire equity ownership in companies. Generally, to acquire other company private equity firms have to do financing, which most of the financing is highly leveraged transactions (HLT). These highly leveraged transactions often refer as Leveraged Buyout (LBO) which is the acquisition of a company in which the buyer borrow a lot of money to finance its operation. Sometimes private equity uses leveraged recapitalization as a strategy with the purpose of either repurchasing shares or paying a large dividend. Leveraged recapitalization is also employed as a takeover defense strategy. Generally, firms that become private equity target firms have one thing in common which is its high debt capacity. Hence, to prevent their firms from takeover attempt, Private equity target firms usually do leveraged recapitalization to reduce its debt capacity. All of these transactions, LBO and Leveraged

Recapitalization, directly affect the capital structure of target firms and indirectly affect the firms that have a high chance to become target firms. Thus, Private equity activities might be the determinant of the instability of capital structure. Hence, this study objective is to examine the capital structure stability of U.S. firms for both private equity target firms and general listed firms and answer the research question which is Do private equity activities drive the instability of capital structure? To my knowledge, there is no research recently has been studied about the Private equity activities and The Corporate Capital structure stability. One motivation behind this work is aiming to find the source of capital structure instability which might relate to other important issues in corporate finance.

LITERATURE REVIEW

The stability in corporate capital structure

In 2008 Lemmon, Roberts, and Zender(2008) started their research by collecting data from CRSP-compustat dataset and create two sample groups which are 1. Nonfinancial US firms for the period between 1965 and 2003 2. Subsample of sample1 but selected only firms that have at least 20 years of non-missing Book leverage to eliminate Survivorship bias. They found highly significant firm fixed effects in panel leverage regressions, and

claimed that there is time invariant effect which drives the variation in leverage ratio.

The evidence of instability

Deangelo and Roll (2015) found that leverage cross-sections are not stable over time with differences growing each year. To test the stability of capital structure, first, the authors introduced the instability of capital structure by plotting the book leverage with market leverage across time to see leverage in each year. Second, the authors show how firm-specific, time-series variation in leverage is systematically important by comparing the adjusted-R square between several models which differ in component in Time and firm dummy. The result shown model which included firm-decade interaction effects are highly significant and have the highest adjusted-R square. This result implied that the corporate capital structure is not stable

DATA AND DESCRIPTIVE STATISTIC

The detail of leveraged buyout transactions can be found on Thomson One Banker database. This database contains information on the details of the transaction, such as the target and acquires information (name, industry, SIC, business description, transaction, etc.) There are 9,485 deals which classified as leveraged buyout that were announced between 1990 and 2013 in the

United States. The number of LBO transactions during 1990 to 2013 is shown in Fig.1

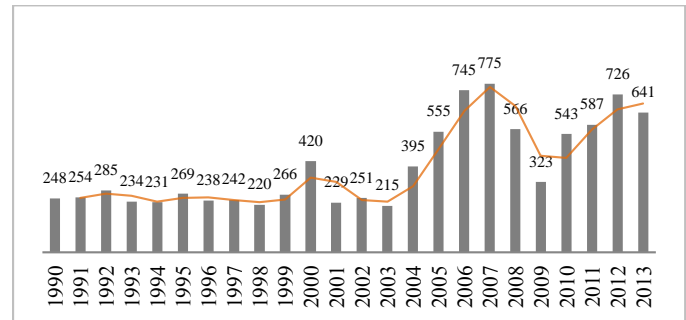


Fig. 1 the number of LBO Transactions between 1990 and 2013

From the list of LBO target firms, I only selected a list of all US firms that appear as targets by private equity in at least one transaction. The result from using this criterion is the Private equity LBO target firm list which contains 3,904 deals. For each of these private equity target firms I extract financial information e.g. total assets, revenue, book debt etc. from the compustat database. Eventually, I get the LBO sample that contains 282 firms and 3,116 firm-year observations. As a common practice in capital structure research, I exclude firms in banking (SIC 6000-6999) and utilities (SIC 4900 to 4949) sectors.

To compare the capital structure, stability between general listed firms and LBO target firm, it's necessary to create another sample that represents the general listed firm. Moreover, to prevent the selection bias problem, I have to do matching as follows. First, each LBO firm is paired with similar

non-LBO firms. By using following criteria 1) non-LBO firms need to have the same activity as the LBO firm at the SIC-4 or SIC-2 digit 2) the revenue of non-LBO firms cannot deviate more than 20% from those of the LBO firm at the end of the fiscal year preceding the deal. 3) Each firm has to have data on compustat more than 10 years. After applying these criteria I get the samples that contain 5,626 and 23,680 Firm-year observations for Matched SIC 4-digit sample and SIC 2-digit respectively. Finally, in order to represent the entire firm (both LBO and non-LBO target firms) I construct the sample from compustat database by using only one criterion that is each Firm in the sample has to have data on compustat more than 20 years. The result is compustat sample that contains 1,623 firms and 37,971 firm-year observations.

Table1 reports summary statistic of each sample. Each financial item was retrieved from compustat database. As a common practice in capital structure research, This study excludes firms in banking and utilities sectors (SIC codes outside the ranges 4900 to 4949 (utilities) and 6000 to 6999 (Financials)). Panel A report the summary statistic of competent sample which is created by selecting only US firm that has data on compustat more than 20 years during the sample time period 1990-2013. While LBO sample is created by selecting firms that classified as an LBO target by Private Equity firms. It contains 45,029 and 3,116 firm-year observations respectively. The rightest column shows the t-statistic and p-value of differences in mean between LBO sample and

compustat sample. The null hypothesis is whether the means of LBO sample is equal to compustat sample. Panel B reports that statistic for both Matched SIC 2-digit and 4-digit samples which are comparison samples of LBO firm. Each LBO Firm is paired with similar non-LBO firms. By using following criteria 1) non-LBO firms need to have the same activity as the LBO firm at the SIC 4-digit for Matched SIC 4-digit sample and SIC 2-digit for Matched SIC 2-digit sample and 2) the revenue of non-LBO firms cannot deviate more than 20% from those of the LBO firm at the end of the fiscal year preceding the deal. 3) Each firm has to have data on compustat more than 10 years. After applying these criteria I get the samples that contain 5,626 and 23,680 Firm-year observations for Matched SIC 4-digit sample and SIC 2-digit respectively. The rightest column of each sample shows the t-statistic and p-value of differences in mean between each sample and LBO sample. The null hypothesis is whether the means of LBO sample equal to Matched SIC 2-digit, Matched SIC 4-digit sample.

Panel A	Compustat Sample			LBO Sample			P-value
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	
Total	5361.89	350.45	24409.8	705.27	211.56	2073.17	0.0000
Assets	350.12	17.23	1878.41	46.26	11.99	129.79	0.0000
Cash	2	3	41	6	9	1335.65	0.0000
Invested capital	3094.67	39.59	13636.5	479.89	50.63	1335.65	0.0000
Income tax	130.93	0.03	836.97	13.95	3.03	64.39	0.0000
EBITDA	685.67	42.36	2936.32	92.17	77.15	291.95	0.0000
Log(sale)	2.52	2.58	1.11	2.35	2.82	0.7	0.0000
Tangible Assets	4514.65	301.6	21526.7	537.96	452.95	1493.52	0.0000
Free cash flow	184.89	5.25	1520.66	19.75	1.81	245.97	0.0000
Book Leverage	0.28	0.2	1.28	0.28	0.42	0.32	0.1283
Cash ratio	0.11	0.06	0.14	0.11	0.16	0.14	0.0957
ROIC	0.08	0.12	5.16	0.29	0.21	12.46	0.3174
Effective tax rate	-0.02	0.02	8.98	0.02	0.04	0.05	0.6980
FCFR	-	0.03	55.79	-	0.01	17.55	0.0144

<i>N</i>	37,971	3,116
<i>Number of firms</i>	1,623	282

Panel B	Compustat Sample			LBO Sample			p-value
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	
Total Assets	850.36	182.66	2854.91	0.6611	682.67	174.62	2281.41
Cash	84.16	15.1	266.94	0.1154	63.82	16.09	170.61
Invested capital	547.71	34.15	1691.99	0.9346	424.44	39.01	1229.59
Income tax	15.77	0	81.47	0.1304	10.93	0	77.1
EBITDA	100.96	16.18	334.27	0.1159	76.31	15.17	283.2
Log(sale)	2.21	2.23	0.79	0.8543	2.15	2.13	0.73
Tangible Assets	652.3	152.72	2276.04	0.1691	534	146.95	1778.77
Free cash flow	20.43	2.4	263.65	0.9157	6.13	1.17	228.58
Book Leverage	0.22	0.13	0.37	0.0000	0.21	0.1	0.28
Cash ratio	0.15	0.09	0.16	0.1387	0.16	0.1	0.17
ROIC	0.07	0.1	3.57	0.327	0.11	0.08	3.73
Effective tax rate	0.03	0.01	2.41	0.3182	0.08	0.01	4.93
FCFR	-0.81	0.02	2.8	0.453	-0.47	0.01	32.71
<i>N</i>	23,680			5,626			
<i>Number of firms</i>	1,305			319			

The definition of each variable is presented in Table 2. It can be seen from the Table I that the LBO sample, Matched 2 digits and Matched 4 digits sample have very similar characteristics in many varying E.g. Free cash flow, Total assets, ROIC, Invested Capital except Book leverage. However, these numbers look very contrast with compustat sample. The difference between compustat sample and other samples can be seen in most ratio variables the reason for such a difference are.

TABLE 2: Variables Definition

Table 2 shows the definition of each variable that was used in this study. There are 6 main variables as follow

Variable	Definition
Book leverage	The ratio of total book debt to total book assets (Debt/TA)
ROIC	Return On Invested Capital equal to (operating income before taxes <i>plus</i> interest expenses) <i>divided</i> by “Invested Capital”
Effective tax rate	The ratio of Income tax divided by total revenue
Cash ratio	The ratio of net cash divided by total assets
Tangibility	The ratio of Tangible assets divided by total assets
Free cash Flow	Income Before Extraordinary Items <i>plus</i> Depreciation and Amortization <i>less</i> Cash Dividends <i>less</i> Non-Equity and Minority Interest Dividends Paid <i>less</i> Equity Dividends Paid <i>less</i> Capital Expenditures or Additions to Fixed Assets.
Free cash flow to revenue (FCFR)	The ratio of free cash flow divided by total revenue

* All items that were used as an input of each ratio was retrieved from compustat directly.

(1) Effective tax rate

The interest expenses are tax deductible. Given the fact than LBO transactions are always referred as a highly leveraged transaction or high debt financing. Thus, it’s not surprising that the tax benefits are a large source of wealth in LBOs (Kaplan, 1989). Marais, Schipper and Smith (1989) present evidence that tax savings are correlated with the LBO premium. Hence, followed the Tax-savings hypothesis, the Effective tax rate of

firms in LBO sample is greater than compustat sample.

(2) Tangibility and Cash ratio

When compared between firm with substantial tangible assets and another one that have fewer assets. Firm with substantial tangible assets are favored because In the case of Bankruptcy, The more tangible assets, the more guarantees that the creditor will not lose all assets. Hence, Assets that can easily transferable when there is a financial difficulty also increases a firm's attraction to become an LBO target. Hence, LBO sample should have greater tangibility and cash ratio than compustat sample

(3) Leverage

A high borrowing capacity will be a key factor in the success of the LBO transactions. A company with no debt and high free cash flow is a great candidate for an LBO target firm given the fact that Private equity can buy the company with senior debt and use the free cash flows of the company to pay the principal and interest due. This characteristic is also shown in LBO sample, matched 4digit and matched 2digit samples which have quite lower leverage when compared with compustat sample.

(4) ROIC and Log (sale)

Desbrières et Schatt (2002) showed that LBO target firms tend to have more profitability

when compared to its peers. They find that acquired firms are more profitable than industry average prior to the LBO transaction. This result is also consistent with the LBO sample in my study that have higher ROIC when compared with Compustat sample.

(5) Free cash flow

In 1976 Jensen and Mecking introduced the Free Cash Flow Hypothesis, which shows that When there is a large Free cash flow manager will have an incentive to waste organizational resources on negative NPV projects, rather than pay out the excess cash to shareholders. There are many evidences show that firm with high likelihood to become an LBO target will have free cash flow more than general firm. For instance, Tim Opler and Sheridan Titman (1993), find that firms that initiate LBOs can be characterized as having a combination of unfavorable investment opportunities (lowTobin'sq) and relatively high cash flow. This characteristic is also shown in my sample. FCFR from LBO sample, matched 4digit and matched 2digit samples have higher FCFR with significance level than compustat sample.

METHODOLOGY, RESULT AND DISCUSSION

The Evidence of Instability

According to Deangelo and Roll (2015), they construct two different models that can

measure time-series variation in leverage as these following models

$$Debt/TA_{it} = \beta_0 + Firm\ dummies + Year\ dummies + \varepsilon_{it} \quad (1)$$

$$Debt/TA_{it} = \beta_0 + Firm \times Quinquennial\ dummies + Year\ dummies + \varepsilon_{it} \quad (2)$$

The dependent variable is the ratio of total book debt to total assets (Debt/TA) it or Book leverage where firms are indexed by i and years are indexed by t. The difference between model (1) and model (2) is that the model (2) includes interaction effects for a given firm which are assumed to be constant within each quinquennial (5 years). In other word, it means that the model (2) allows firm fixed effects to vary across 5 years. Hence, if the firm capital structure is stable, Model (1) should be the more suitable model to explain the time-series variation in leverage. However, if the firm capital structure is not stable over time, Model (2) should be the more suitable model. To measure the goodness of fit of each model, I run Model (1) and Model (2) to obtain Adjusted-R² of each model. The results of regression are shown in table 3.

TABLE 3: Explanatory power of Firm main effect and firm-time interaction effects

According to Deangelo and Roll (2015), Dependent variable is the ratio of debt to total assets (Debt/TA)_{it} where firms are indexed by i and years are indexed by t. I run the regression and compared the results from two different models which are Model (1) which each firm has

a dummy variable that remains constant over time and the Model (2) that allow firm fixed effect to vary across quinquennial (5 years). Panel A reports results for Compustat sample. Panel B reports results for Matched LBO firm samples both 2digits and 4 digits. Panel C repeated regression in both Panel A and Panel B again but include other control variables that often classified as Determinants of Firm's Financial Leverage e.g. *Log (sales)*, *EBITDA (profitability)*, and *Asset tangibility*. The rightest column reports the t-statistic to compare Adjusted-R² between model (1) and (2)

	Adjusted-R ² for Model with		
	Firm Dummies	Firm-quinquennial dummies	t-statistic comparison between Model (1) and (2)
Panel A: Compustat universe			
Compustat sample	0.2034	0.7066	7.57***
Panel B: Matched LBO			
Matched 2 digits	0.3549	0.5634	4.62***
Matched 4 digits	0.5709	0.7372	8.95***
Panel C: Regression with other control variables			
Compustat sample	0.2060	0.7049	7.76***
Matched 2 digits	0.3569	0.5653	4.21***
Matched 4 digits	0.5720	0.7416	9.24***

The results indicated that firm-quinquennial interaction effects are greatly significant. In

panel A report results from compustat sample. There is a statistically significant increase in Adjusted-R² more than 0.5 from 0.2034 to 0.7066 when include firm-quinquennial interaction effects. This result also consistent with other samples, e.g. In Panel B shows that for both matched 4 digits and matched 2 digits, The Adjusted-R² increase from 0.5709 to 0.7372 and 0.3549 to 0.5634 respectively when include firm-decade interaction effects. These results still hold even I add other control variables that often classified as Determinants of Firm's Financial Leverage as in Rajan and Zingales (1995) into the model, e.g. Log (sales), EBITDA (profitability), and Asset tangibility.

All of these results implied that explanatory power from Model (2) which allows firm fixed effects to vary across 5 years is better than model (1) which mean that the corporate capital structure is not stable as many researchers believe.

This result is consistent with Deangelo and Roll (2015) who stated that leverage cross-sections are not stable over time with differences growing each year. They also suggested that firm-specific, time-series variation in leverage is systematically important, as previous studies have reported for cross-firm variation. Hence, the question that remains open is what drives the instability of capital structure. The next step of my study is to identify the source of

instability and answer the research question which is Do private equity activities drive the instability of capital structure?

Identify the Source of Instability

To find out that the private equity activities drive the instability of capital structure, it's necessary to find the correlation between private activities and the instability of capital structure. After running the regression of Model (1), not only the Adjusted-R² that will receive but also the residual (ϵ) which represent the "Excess leverage". The higher excess leverage suggests that corporate the capital structure decision is likely related to private equity activities. I can use this residual (ϵ) as a representative of instability. The only thing that's left is the representation of private equity activities so I have to construct another model that can represent the private equity activities which is following the model

$$\Pr(\text{LBO}_{i,t} = 1 | X_{i,t}) = \Phi(\beta X_{i,t} + E_{i,t}) \quad (3)$$

Model (3) is a probit model that identifies the likelihood of a firm being the target of private equity in a particular year. Where the dependent variable is $\text{LBO}_{i,t}$ Which is a dummy variable that takes the value of 1 if private equity transaction (e.g. LBO) is made in year t otherwise its value will equal to zero. The matrix $X_{i,t}$ contains firm-specific variables that the literature has identified as determinants of the likelihood that a firm is an private equity target, namely firm size

(measured by revenue), the leverage, the level of income taxes, the firm's profitability (measured by ROIC), liquidity (proxied by cash divided by total assets). The definition of each variable is shown in Table 2 in the previous section.

The predicted value from the regression model (3) is called the propensity score. Its interpretation is that it measures the probability, as predicted by the model, that a firm becomes a private equity LBO target in a given year. In other words, firms with similar propensity scores share similar characteristics, which lead to being a private equity target.

The last step is to find the correlation between private activity transaction and the instability of capital structure. Let $\rho(\epsilon, \text{propensity score})$ denote the correlation between the residual (ϵ) and propensity score from Model (3). The higher correlation suggests that the corporate capital structure decision is likely related to private equity activities.

However, by calculating the correlation between the residual (ϵ) and propensity directly, it can be viewed as an unconditional methodology. The unconditional term refers to the fact that this method still doesn't take the effect of industry, year and firm into account. The different industry might affect this correlation in the different way as well as the time and firm. Hence, To prevent and correct this problem, This study also develops

other models that can capture the correlation between private activity transaction and the instability of capital structure as follows Model (4) is the regression with robust standard errors which I regress excess leverage on propensity score with both industries (2-digit SIC) and year fixed effects.

$$\text{Excess Leverage}_{it} = \beta_0 + \beta_1 \text{Propensity score}_{it} + \text{Year dummies} + \text{Industry dummies} + \epsilon_{it} \quad (4)$$

$$\text{Excess Leverage}_{it} = \beta_0 + \beta_1 \text{Propensity score}_{it} + \text{Year dummies} + \text{firm dummies} + \epsilon_{it} \quad (5)$$

While the model (5) is the same as the model (4) the only difference is that in this model excess leverage is regressed on both firm and year fixed effects. These two models can be viewed as a conditional method which refers to the fact that this method already take the effect of industry, year and firm into account.

Table 4 shows the result from probit regression of all samples which include compustat Sample, Matched SIC-4 digit sample and Matched SIC-2 digit sample.

Table 4 reports the Log likelihood statistic from three multivariate probit regressions. The dependent variable is a dummy variable that takes the value of 1 if Leveraged Buyout is made in year t. The independent variables are firm-specific variables that the literature has identified as determinants of the likelihood that a firm is a Leveraged buyout target, namely firm size (measured by Revenue), Leverage, the level of income taxes, the firm's profitability (measured

by ROIC), liquidity (proxies by cash divided by assets).

TABLE 4: Analysis the source of instability

Variables	Compustat sample	Matched SIC-2 digit	Matched SIC-4 digit
Leverage	-0.00117 (-0.10)	0.134*** (3.71)	0.158* (2.54)
Cash ratio	-0.135 (-1.12)	-0.480*** (-3.79)	-0.293* (-1.99)
ROIC	0.000247 (0.09)	-0.00179 (-0.41)	-0.00345 (-0.58)
Log(sale)	-0.0885*** (-5.80)	0.0561* (2.54)	0.0823** (3.21)
Effective tax rate	-0.000746 (-0.72)	-0.0253** (-2.71)	-0.0211* (-2.19)
Tangibility	-0.696*** (-8.50)	-0.182* (-2.20)	-0.315** (-3.29)
FCFR	0.00107 (1.59)	0.00524* (2.39)	0.00409 (1.68)
N	45151	30761	12727
Number of firms	2239	1305	319

The result of the correlation between the residual (ϵ) and propensity score from Model (3) and the result of regressions from model (4) and model (5) is

According to the results of Compustat sample, the only significant variable predicting the likelihood of LBO is Log (sale) and Tangibility which has both negative coefficient significantly. This result shows that LBO targets are more likely to have a less revenue and tangible asset in their balance sheet more than general firm. This result seem

contrast to the normal characteristics of the firm that have a likelihood to become LBO target firm. One explanation behind this result is that there might be some selection bias in the compustat sample. The Compustat sample is created by selecting only firm that has year on Compustat more than 20 years Hence, It means that every firm in this sample seems to be the successful firm that survive in the long run. So it's not surprising that on average the Compustat sample will have higher revenue, tangible assets more than LBO target firms and make the result of the probit regression to be negative. The second and third column reports the result for Matched SIC-4 digit sample and Matched SIC-2 digit sample respectively. It seems that the profitability (Log (sale)) is still the main motive to make the firm have a higher likelihood to become an LBO target.

Table 5 shows the correlation between the residual (ϵ) and propensity score from three different methods. The higher correlation suggests that The corporate capital structure decision is likely related to private equity activities. The result shows that all samples show the statistically significant positive correlation, especially, for both Matched SIC 2 digit and Matched SIC 4 digit sample that show the high correlation which are 0.4830 and 0.3050 respectively with a p value less than 0.0001.

TABLE 5: The correlation between the excess leverage and propensity score

Table 5 reports the correlation between the residual (ϵ) with is a represent of an excess leverage and propensity score by using three different method First, This study calculate correlation directly while the other two methods use the regression method which are model (4) and Model (5) where the model (4) is the regression with robust standard errors which I regress excess leverage on propensity score with both industries (2-digit SIC) and year fixed effects While the model (5) is the same as the model (4) the only difference is that in this model excess leverage is regressed on both firm and year fixed effects. Panel A reports the result from the first method while Panel B reports the result from model (4) and Panel C reports the result from model (5)

		Coef.	Std. t	P> t	[95% Conf.]	Interval
Compustat sample	Propensity scores	0.951	0.032	0.935	-	2.976
Matched SIC 2 digit	Propensity scores	24.2	9.2	0.001		42.73
Matched SIC 4 digit	Propensity scores	6.807	4.37	0.000		11.67

Moreover, These results also consistent with the result of the regression model (4) and Model (5) which show the same positive coefficient sign, especially for both Matched SIC 2 digit and Matched SIC 4 digit which have the high positive value with a p value less than 0.01

LEVERAGED RECAPITALIZATION AND LEVERAGED BUYOUT

As I mentioned in previous part Leveraged Recapitalization is also used as a takeover defense strategy. Hence, the goal of this section is to find whether Firms tend to do Leveraged Recapitalization if they face with the threat that their firm might become LBO targets.

So to analyze this issue I have to create another sample called “Leveraged Recapitalization sample”. Thomson Reuters LPC is used to retrieve the information of companies that involved with leveraged loans which have a purpose of Recapitalization, Dividend recapitalization and Stock

	Correlation between the residual (ϵ) and propensity score	P> t
Compustat sample	0.0727	0.0000
Matched SIC 2 digit	0.4830	0.0000
Matched SIC 4 digit	0.3050	0.0000

		Coef.	Std. Err.	P> t	[95% Conf.]	Interval
Compustat sample	Propensity scores	1.820	2.187	0.405	-2.468	6.109
Matched SIC 2 digit	Propensity scores	61.116	9.383	0.000	42.707	79.525
Matched SIC 4 digit	Propensity scores	20.707	6.747	0.002	7.433	33.982

repurchase between 1990 and 2012. compustat database is also used to retrieve financial information. There are 1,781 loans, 773 firms and 11,405 firm-year observations in the Leveraged Recapitalization sample Next, I have to construct another model that can explain the relationship between Leveraged Recapitalization and Leveraged Buyout. The model was shown below

$$PR(RECAP_{i,t}|H_{i,t}) = \Phi(\beta_0 H_{i,t} + \beta_1 ActualLBO \quad (6)$$

or LBOlikelihood + U_{i,t})

Model (6) is a probit model. The dependent variable is a dummy variable that takes the value of 1 if Leveraged Recapitalization is made in year t. for the independent variables, The matrix $H_{i,t}$ contains the firm-specific variables that are identified as determinants of likelihood that firm will do Leveraged recapitalization which is very similar to the variables in the model (2) e.g. Leverage, Tangibility, Profitability.

Another Independent variable ActualLBO is dummy that will take a value of 1 for the firms that pass all following criteria 1. Firms are in the same Industry (Both SIC-2digit and SIC4-digit) as Leveraged recap firms 2. There is an LBO happen in this industry one year before the leveraged recap event. The last independent variable is LBOlikelihood which the result from model (3) is. Its interpretation is that if the likelihood of doing Leveraged Recap increases when the firm is facing with

a high chance of being LBO targets, the coefficient should have a statistically significant positive sign. The results of probit regression are shown in Table 6

TABLE 6: Likelihood of the firm doing Leveraged Recapitalization

	SIC-2 digit condition			SIC-4 digit condition		
	column(1)	column(2)	column(3)	column(4)	column(5)	column(6)
Leverage	- 0.000 00181 (- 0.08)	- 0.000 00109 (- 0.06)	- 0.000 00118 (- 0.06)	- 0.000 00181 (- 0.08)	- 0.000 00180 (- 0.08)	- 0.000 00118 (- 0.06)
Cash ratio	- 0.002 95* (- 2.27)	- 0.003 68** (- 2.79)	- 0.000 389 (- 0.29)	- 0.002 95* (- 2.27)	- 0.003 21* (- 2.45)	- 0.000 389 (- 0.29)
ROIC	- 0.000 00025 2 (- 0.04)	- 0.000 00027 2 (- 0.04)	- 0.000 00012 9 (0.02)	- 0.000 00025 2 (- 0.04)	- 0.000 00025 2 (- 0.04)	- 0.000 00012 9 (0.02)
Log(sale)	0.000 877** * (5.01)	0.000 970** * (5.47)	- 0.000 0650 (- 0.26)	0.000 877** * (5.01)	0.000 897** * (5.11)	- 0.000 0650 (- 0.26)
Effective tax rate	0.000 00342 (0.07)	0.000 00355 (0.08)	0.000 00805 (0.22)	0.000 00342 (0.07)	0.000 00377 (0.08)	0.000 00805 (0.22)
Tangibility	- 0.001 93 (- 1.90)	- 0.001 80 (- 1.77)	- 0.001 16 (- 1.13)	- 0.001 93 (- 1.90)	- 0.001 90 (- 1.87)	- 0.001 16 (- 1.13)
FCFR	- 0.000 00037 8 (- 0.41)	- 0.000 00044 1 (- 0.50)	- 0.000 00029 3 (- 0.31)	- 0.000 00037 8 (- 0.41)	- 0.000 00039 0 (- 0.43)	- 0.000 00029 3 (- 0.31)
ActualLBO		0.002 04*** (5.03)			0.002 01* (2.43)	
LBOlikelihood			0.877 *** (6.38)			0.877 *** (6.38)
N	14784 1	14784 1	14784 1	14784 1	14784 1	14784 1

The result from Table 6 shows the statistically significant positive coefficient sign of propensity scores in every regression. These results implied that when firm face with high probability to become LBO targets, there is a higher chance that firm will do leveraged recapitalization. This result also consistent when look at the coefficient on LBO condition which also have the positive sign.

Overall, the results from all previous Tables implied that the corporate capital structure is not stable over time and the related private equity activities both Leveraged Buyout and Leveraged recapitalization are one source of the instability. The instability that happened from these activities is not affected, only Target firms, but also other listed firm because by facing with a high chance of becoming Target firms, to prevent their firms from Takeover. Management of firms usually decides to do leveraged recapitalization as a takeover defense strategy to reduce its debt capacity. All of these transactions, LBO and Leveraged Recapitalization, directly affect the capital structure.

CONCLUSION

The purpose of this study is to investigate whether private equity activities drive the instability of capital structure. By testing the Capital structure stability of U.S. private equity target firm. From available information

of Leveraged Buyout deal, Leveraged Recapitalization and financial information on Thomson one, LPC and compustat. I find that there is a time-series variation in leverage. Moreover, I find that the explanatory power from Model which allows firm fixed effects to vary across 5 years is much better than the model that assume fixed effect are constant over time. I also find positive correlation between the capital structure instability and the likelihood that the firm will become an LBO target which can be suggests that corporate The capital structure decision is likely related to private equity activities

Interestingly, private equity activities seem to relate to the instability of corporate capital structure. Not only to the target firms, but also the general listed firm. One possible explanation for this result is that generally, when firms face with a high probability that their firms will become target firms. The management might decide to do a takeover defense strategy. The common strategy that firm normally used is “Leveraged Recapitalization”. This explanation is also consistent with my study with the positive coefficient between the likelihood that a firm will do the leveraged recapitalization and the LBO condition, propensity score.

Although This study cannot identify that private equity activities are the direct determinant of corporate capital structure, stability but the result definitely confirmed

that there is an association between private equity activities and instability of corporate capital structure.

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