SHOULD I STAY OR SHOULD I GO?

Exploring the causal operating performance impact of private equity ownership in family firms

Gustav Axelson[1] and Emil Berg[2]

Bachelor Thesis

[1,2]Stockholm School of Economics

Department of Finance

Tutor: Laurent Bach

Abstract.

Using a unique dataset from Sweden, this paper explores the causal impact of private equity ownership on operating performance in family firms. We study 69 Swedish leveraged buyouts (LBOs) and find evidence that target firms become more profitable and grow much faster compared to a carefully selected control group. The results are statistically significant, economically large and hold when controlling for firm and time fixed effects and pre-trends. We observe higher growth rates for firms selling during the first generation of ownership, but the profitability increase is consistent regardless of the seller's ownership length. In order to compensate for private equity funds' "cherry-picking" abilities and other endogenous aspects of LBOs, we study family characteristics. Specifically, we use the variation in the decision to sell to a private equity fund that comes from the gender of the principal owner's first-born child as an instrumental variable (IV). Although we find indications that the gender of the first-born child has an impact on the likelihood of selling to a private equity fund, our IV estimates are consistent with those obtained using ordinary least squares. Overall, we provide robust evidence of the positive impact private equity ownership can have on family firms.

Keywords: Family firms, Succession, Private Equity, LBO, Instrumental variable

JEL Classification: G32, G34

First and foremost, we would like to thank our tutor Laurent Bach, Assistant Professor at the Department of Finance at the Stockholm School of Economics (SSE), for generous support and helpful comments throughout the thesis writing. We extend a special thanks to Rickard Sandberg, Associate Professor at the Center for Economic Statistics at SSE, for insightful comments on the econometric specifications. We would also like to thank Per Strömberg, Director of the Swedish House of Finance, for valuable guidance around the choice of topic. Finally, we are also very grateful towards Anders Bierke and Magnus Edlund at Altor Equity Partners for sharing their extensive industry expertise. All remaining errors are our own.

[1]22464@student.hhs.se
[2]22473@student.hhs.se

Contents

1. Introduction

Should I stay or should I go? Many owners of family-owned businesses have asked themselves this question when it is time for the next generation to take over the reins. Research shows that the majority of firms around the world are controlled by their founders or their founders' descendants (Faccio and Lang, 2002), yet only 30% of family firms survive the second generation, and only 15% make it through the third generation of family ownership (Ward, 1987).

What actually happens with the 85% of firms that do not stay within the family? Bennedsen et al. (2007) study the effect of CEO transitions on family firms' performance and show that the appointment of an external CEO has a large positive impact on firm performance. Lacking detailed ownership data, Bennedsen et al. (2007) focus on CEO successions only, while acknowledging the possibility that the positive results could in part be driven by changes in the ownership structure around the CEO successions. In this paper, we turn our attention to ownership transitions in family firms in order to examine whether a similar effect will occur when ownership changes to an external party. We test this by studying the impact on operating performance of private equity-backed leveraged buyouts (LBOs) of Swedish family firms against a relevant control group.

The positive effect on operating performance following LBOs is both well documented and widely accepted (Bergström et al., 2007; Boucly et al., 2011; Kaplan, 1989; Smith, 1990; Ward, 1987). As a consequence, the main contribution of this paper is not to reconfirm the validity of these studies. Instead, we seek to bridge the gap between the CEO turnover literature and the literature studying post-LBO performance. Specifically, this paper seeks to shed some light on two important topics that have not been the focus of former studies.

Firstly, the scope of former studies have included private-to-private, divisional and secondary buyouts and thus not focused on aspects unique for family firms. More recently, Boucly et al. (2011) find post-LBO profitability, growth and increase in capital expenditure to be greater for privately held firms than for divisions of conglomerates, public firms, and firms owned by a private equity fund. This is complemented by Bloom and Reenen (2007), who show that private equity-owned firms are significantly better managed than government, family and privately owned firms and may also have less access to capital. We find these novel results promising and seek to test them in a Swedish setting.

To better understand the variations within family firms we also study how the length of family ownership affects post-LBO performance.

Secondly, previous research has largely ignored the fact that LBOs are not random events. Although the winner in a competitive bidding process possibly could be seen as stochastic, this is an unconvincing argument. Not all companies are sold in auction processes and it is likely that informational advantage, industry knowledge or superior analytical ability will cause certain buyers to have an edge (Lerner, 1994). After all, partners at private equity funds are not paid handsome salaries to randomly buy companies. Furthermore, the decision to put a firm up to sale is likely to be influenced by non-random factors such as family characteristics and firm performance (Smart and Waldfogel, 1994). This raises the question of the robustness of performance studies where no attempt to compensate for the endogeneity of LBOs has been made.

This paper uses family characteristics of the principal owners in order to instrument for the endogeneity mentioned, as first proposed by Bennedsen et al. (2007). Our ambition is both to understand how these characteristics affect firm decision-making related to successions and to estimate the unbiased performance impact of family firm LBOs. To the best of our knowledge, this paper is the first attempt to verify the causal effect of post-buyout performance of family firms using an instrumental variable.

We put forward three hypotheses related to our two topics. Our first hypothesis is that Swedish family firms will show profitability and growth improvements post-LBO, as indicated by recent studies in other European countries (Boucly et al., 2011; Goossens et al., 2008). Our second hypothesis is that family characteristics will play a role in family firms' succession decisions. As shown by Bennedsen et al. (2007), this is the case for CEO successions and we argue that the person deciding on ownership succession in a family firm should be in a similar position. Our third hypothesis is that there will be a positive bias in our post-LBO estimates. Private equity investors are among the most sophisticated actors on the market for M&A transactions and their "cherry-picking" abilities should be higher than the average buyer's. This is reflected in the ongoing debate, which suggests that private equity funds may just select superior companies and transfer value from one stakeholder to the other, as discussed by i.a. Tykvová and Borell (2012).

We analyse data on M&A transactions in Sweden during 1999-2010 in order to identify family-owned businesses that have been acquired by private equity funds. Using a comprehensive set of criteria[1] we are able to construct a target group of 69 relevant LBOs. We use accounting data to study operating performance before and after the LBO and compare the targets' development relative to a carefully selected control group containing firms with similar characteristics, using a difference-in-differences (DiD) framework.

Results from our DiD regression suggest that target firms outperform their control firms post-buyout in terms of profitability, with an average ROA increase of 3.9 percentage points. The increase is statistically significant and robust; it holds for firm and year fixed effects as well as controls for firm size[2]. This result supports our first hypothesis and resonates with previous research (see Boucly et al. (2011), Kaplan (1989) and Bergström et al. (2007)). We also study key growth variables to understand the source of the profitability increase. Compared to their control firms, revenue, employment and EBITDA all show significantly higher growth levels: 14%, 30% and 30%, respectively. The asset base also expands and leverage is increased; total assets increases with 26% and equity to assets ratio decreases with 8.0 percentage points. All these effects are statistically significant.

These results are important, as they in some respects contradict older studies of LBOs, e.g. Kaplan (1989), which conclude that profitability increases come from rationalisation and cost savings. Interestingly enough, when grouping our target firms based on the generation in which ownership is transferred, we spot similar tendencies. For the firms sold during the second generation or later, employment growth is slower and the asset base does not grow at all. Despite this, our overall results are more in line with recent studies (Boucly et al., 2011), supporting our first hypothesis that family firms selling to a private equity fund show superior performance post-LBO.

The size of the post-LBO improvements and the fact that our target companies grow faster than their controls also before the transaction may give rise to concerns that we have differences in pre-trends, which could distort the DiD estimates. We control for this by adding the average pre-LBO revenue growth rate as a control variable. Using this control, our results are still significant at the same statistical level with the exception of revenue growth.

[1] See section 2.1 for the full set of criteria for target selection and section 2.4 for control group matching logic.

[2] Firm size is measured as *log(assets)*.

After showing that our DiD results are robust to pre-trends, we move on to investigate if there is a positive endogeneity bias in these estimates, as outlined in our third hypothesis. To investigate this, we use a unique dataset containing census data for CEOs and Board members of Swedish companies. We successfully match family characteristics to the CEO and Chairman of the Board for all but four of our 69 targets and 266 of their corresponding control firms.

As first suggested by Bennedsen et al. (2007) we use the gender of the principal owner's[3] first-born child as an instrument. Our first stage estimate shows a 1.4% decrease in the probability of selling the company to a private equity fund if the first-born child is male, but the change is not statistically significant. Consequently, we fail to confirm our second hypothesis. It does appear that family characteristics play a role in determining the succession route, but the point estimates are not statistically significant in our setup.

When estimating the causal effect on performance in the second stage, our IV estimate indicates a 4.2 percentage points increase in ROA. This is in line with the point estimate obtained using our OLS regression, however we are cautious in drawing conclusions from the IV results due to the statistical insignificance. Notwithstanding, it further supports the robustness of our DiD results and in contradiction to our third hypothesis, we cannot find support for a positive bias.

We show that LBOs are one viable way for a family-owned business to change into higher gears and accelerate growth while staying profitable at the same time. Although our ambition to isolate the causal impact of LBOs and the role family characteristics play in firm succession decisions has not been fully accomplished, our findings complement the existing CEO literature and shows that the findings of Bennedsen et al. (2007) could be valid also in an ownership transition context.

The remainder of this paper is organized as follows. Section 2 describes our data sources and data construction. Section 3 specifies our empirical strategy. Section 4 presents our DiD and IV results. Section 5 concludes.

2. Data and methodology

2.1. **Identifying family firms**

To build our initial dataset of family firms acquired by private equity funds we use Capital IQ. First, we start by filtering the database on all transactions that were closed or effective during the years 1994-2014. Second, we select all transactions classified as LBOs or family

[3]The person who is most likely to affect firm succession decisions. For full definition, see section 2.5.

successions with Sweden as primary geographic location of the target company. Third, we exclude all deals where the seller can be identified as a financial institution, a limited liability company or another legal entity. In order not to rely solely on a single source, we also screen the websites of private equity funds active in the Nordic region and previous research on LBOs in Scandinavia. In total, we start with a dataset of 657 LBOs. While this is not an exhaustive list of all LBOs during this time period, we have no reason to believe it to be systematically biased.

We employ a strict set of criteria when defining companies as family-owned businesses. To qualify, the seller must be a founder, a descendant of the founder or a new family who has owned the company for more than 10 years. The seller must also have had control of more than 50% of the votes or the capital leading up to the transaction. Since this type of information is normally not contained in Capital IQ, we study press releases related to the deals as well as information on the acquirers' web sites to obtain the data needed. In addition, we exclude deals in which the buyer acquires less than 50% of the votes or the capital. This is a common practice for venture, seed and growth capital but we argue that the full effect on company performance can only be measured reliably if control is fully transferred at one point in time. We also require that the buyer is a private equity fund. Consequently, all deals with press releases specifically mentioning "venture capital" are excluded. As a last step, we exclude companies that have previously been owned by private equity funds, since part of the impact of private equity ownership arguably has affected the company's performance already.

2.2. **Collecting accounting data**

In order to link the targets fulfilling our criteria to accounting data, we first use Retriever to get the corporate identity number *(Sw. organisationsnummer)* corresponding to the firm name used in Capital IQ. To make sure that we study the main operating entity in the cases where our target firm belong to a group, we compare employment and revenue figures to identify the entity with most real economic activity. This step is particularly important due to the frequent use of group structures in Swedish companies. Once we have established the relevant entity we use the corporate identity number to obtain accounting data from the Serrano database, which contains financial statements from the Swedish Company Registration Office *(Sw. Bolagsverket)*.

To ensure that pre and post-LBO performance can be measured properly, we require accounting data for at least three years before the transaction and for three years following

it. An exception is made for deals taking place in the outer ranges of our time period, where only one year before and two years after is needed. As the database we use goes back no further than 1998 and the latest available annual reports are from 2012, our sample period is thus restricted to deals taking place 1999-2010. After conducting this review, we end up with a final dataset of 70 targets firms. The firms are listed in Appendix A.

2.3. **Measuring operating performance**

In this paper we are exclusively interested in the value creation that comes from direct improvements in the target company's operations. In order to measure this, we need to define an appropriate measure of operating performance. We use adjusted Return on Assets (ROA), defined as EBITDA[4] adjusted for items that affect comparability divided by total assets.

The choice between different measures of operating performance is discussed in length by Barber and Lyon (1996), who conclude that operating income is preferred to net earnings since it (i) represents the productivity of the operating assets more appropriately and (ii) is independent of financing decisions. (ii) is especially important in the context of this paper, as the capital structure often changes significantly post-LBO. In the choice between EBIT and EBITDA we favour the latter, since it is independent of company accounting policies for amortisation and depreciation. For these reasons, EBITDA is also commonly used by private equity funds to value target firms, which underscore its relevance as a measure of value creation (Bergström et al., 2007). Barber and Lyon (1996) also discuss the importance of scaling the operating income to make it comparable between companies. In the choice of asset base, we prefer total assets to capital employed, since it compares firm performance relative to total assets rather than to a fraction of them. This measure has also been used in previous studies within the area (Bennedsen et al., 2007; Kaplan, 1989).

2.4. **Building the control group**

In order to measure the impact on performance of private equity ownership, we compare our target firms to a selected group of companies that were not acquired by private equity funds. We first retrieve accounting data for all private limited liability companies in Sweden using the Serrano database. We then drop all companies that are marked as

[4]Earnings before interest, taxes, depreciation and amortisation.

"inactive"[5] in the database. Group accounts are used to get an accurate view of firms that are part of groups. However, to avoid inconsistent figures we only use group accounts for firms where this data is available for all relevant years. Lastly, to avoid gaps in the time series, we keep only firms with at least 10 consecutive years of accounting data. Also, all of our target firms but one fulfill this criterion. We cluster all drops of data at the firm level.

We also exclude companies that are part of foreign groups but include subsidiaries and parents of Swedish groups. There is a trade off between being able to match a satisfactory amount of control firms and making sure that they are comparable (Barber and Lyon, 1996). We argue that including them is a sensible choice for three reasons. (i) The fact that 80% of our target firms are part of a group prior to the LBO suggests that most Swedish family firms of this size operate in group structures. (ii) If we exclude all companies that form part of a group structure, around 30% of the control firm universe is lost. (iii) The control firms left would on average be much smaller[6] and thus less comparable to our target firms.

In order to select the most comparable control firms for our targets we look at industry classification, pre-event profitability and size to control both for industry-specific trends and to address the potential issue of mean-reversion in accounting variables (Barber and Lyon, 1996). For each firm in our target group we look at data from the year before the LBO. All companies within the same industry are compared and considered only if ROA and number of employees are within the +/- 50% bracket of the target firm. Industry is here defined as the two-digit SNI industry classification code. If a target firm has more than five control firms, we keep only the five with the smallest distance[7] to the target. To ensure that the same control firm is not accounted for more than once we also limit each control firm to one target. Using this matching logic, we are able to identify control firms for all but one of our target companies, which is consequently excluded from the dataset. We end up with 4.57 control firms per target for a total of 69 target firms and 315 control firms.

[5]Limited liability companies are defined as inactive if none of the following criteria is met: Net sales is above SEK 10,000, other operating income is above SEK 10,000, financial income is above SEK 10,000, financial expenses is below SEK -10,000, the dividend amount is above SEK 10,000 or total assets is above SEK 500,000.

[6]The average independent company in the industries which have at least one target firm has 4 employees and a revenue of SEK 6 million, compared to our target group average of 78 employees and SEK 222 million in revenue.

[7]$Distance = (ROA_{control} - ROA_{target})^2 + (Employees_{control} - Employees_{target})^2$

2.5. **Obtaining family data**

We use a second dataset to obtain information about the family composition of CEOs and Board members of the firms in our sample. The dataset comprises of data from the Swedish National Archives *(Sw. Riksarkivet)* on family composition of Swedish private individuals obtained in 1990. It also includes the Swedish Companies Registration Office's *(Sw. Bolagsverket)* records of officials in Swedish companies from 1996 to 2008. We match this dataset with our initial data by using corporate identity number and are able to identify 6,575 officials for our target and control firms. We then use two different strategies in order to identify the person who plays the main role in succession decisions. For our target firms, we manually identify the principal owner before the LBO takes place by using information in press releases and annual reports. This is successful for all but four of our target firms.

For the control firms, lacking detailed ownership data, we use the following logic to identify the person most likely to be the principal owner. We only consider CEOs and Chairmen of the Board serving before the target firm linked to the control firm was subject to an LBO. We argue that the main owner is likely to have been active in the company for the longest period of time, regardless of CEO or Chairman of the Board designation. Therefore, we compare tenure and keep the most senior official for each control firm. Along the lines of the same reasoning, we keep the official with the earliest start year in cases where more than one official have the same tenure. Finally, if the CEO and the Chairman of the Board have the same tenure and started during the same year, we keep the Chairman of the Board. In order to be consistent, we exclude targets for which we are unable to match the principal owner of any of the corresponding control firms and vice versa. This allows us to obtain family data for 65 target firms and 266 control firms.

One potential concern is that the most recent data point in our sample is from the year 1990 and that many owners may have had children in later years. For the purpose of this paper, we argue that this is a non-issue, as children born later than 1990 are unlikely to be appointed as successors in firms of the size we study.

2.6. **Firm characteristics**

Descriptive statistics for our target and control group are reported in Table 1. On average our targets are profitable, medium-sized firms with 78 employees, an ROA of 20% and an employment growth rate of 10%. This compares well with previous studies in France

and Belgium, where the average target of a private-to-private deal had 122 employees (Boucly et al., 2011) and 116 employees (Goossens et al., 2008), respectively. Boucly et al. (2011) also report an average ROA of 25%[8] and an average employment growth of 7%. This implies that Swedish family firm LBOs are not very different from those in other European countries.

As we match on number of employees and ROA, our two groups are similar by construction. The only notable difference we observe is a somewhat higher growth rate for our target group. The lack of discrepancies gives us comfort in the validity of our control group matching logic.

TABLE 1. Descriptive statistics for the target and control groups

Variable	Median	Mean	Std dev	Q1	Q3	Obs
Target group						
Revenue (SEK m)	122.50	222.32	299.31	65.80	242.62	201
Employees	42	78	97	21	103	201
Total assets (SEK m)	74.05	124.51	148.09	43.31	144.03	201
EBITDA (SEK m)	12.43	20.73	28.07	5.64	24.91	201
Revenue growth	0.13	0.26	0.74	0.04	0.24	193
Employment growth	0.04	0.10	0.30	0.00	0.13	188
Total asset growth	0.11	0.21	0.48	0.01	0.27	196
Return on assets	0.20	0.20	0.17	0.10	0.30	201
Equity to assets ratio	0.32	0.35	0.19	0.22	0.49	201
Firm age (years)	16	21	15	11	29	201
Control group						
Revenue (SEK m)	70.06	128.32	168.56	29.52	154.17	930
Employees	44	63	66	19	84	930
Total assets (SEK m)	32.56	65.53	120.98	12.84	73.70	930
EBITDA (SEK m)	5.40	12.63	28.67	1.82	12.80	930
Revenue growth	0.07	0.10	0.54	-0.02	0.19	912
Employment growth	0.02	0.05	0.23	-0.02	0.11	888
Total asset growth	0.06	0.09	0.28	-0.03	0.18	920
Return on assets	0.19	0.19	0.13	0.11	0.26	930
Equity to assets ratio	0.27	0.31	0.20	0.16	0.44	930
Firm age (years)	17	23	19	10	32	930
Observations	1131					

Note: All variables are averages for the three years preceding the transaction. Sample Period: 1999-2010. Return on assets is calculated as adjusted earnings before taxes, depreciation and amortisation (EBITDA) divided by total assets. All other variables are self-explanatory.

To better understand variation within our target firms, we split them into groups: (i) firms that were sold during the first generation of ownership and (ii) firms that were sold

[8]Boucly et al. (2011) define ROA as EBITDA divided by fixed assets plus working capital.

during the second generation or later. Table 2 provides descriptive statistics for these two groups.

TABLE 2. Descriptive statistics for target firms by ownership length

Variable	Median	Mean	Std dev	Q1	Q3	Obs
First generation						
Revenue (SEK m)	113.86	215.14	325.05	58.12	226.70	126
Employees	42	64	70	17	92	126
Total assets (SEK m)	61.23	96.21	104.30	36.63	124.54	126
EBITDA (SEK m)	11.96	18.62	22.37	3.85	23.41	126
Revenue growth	0.15	0.25	0.50	0.07	0.35	121
Employment growth	0.09	0.12	0.30	0.00	0.20	117
Total asset growth	0.18	0.26	0.46	0.04	0.31	123
Return on assets	0.22	0.21	0.18	0.10	0.31	126
Equity to assets ratio	0.32	0.33	0.18	0.20	0.48	126
Firm age (years)	13	14	9	9	19	126
Second generation or later						
Revenue (SEK m)	140.57	234.38	251.84	83.95	254.46	75
Employees	44	103	127	32	116	75
Total assets (SEK m)	85.46	172.05	192.98	54.93	211.84	75
EBITDA (SEK m)	13.01	24.27	35.54	7.87	30.28	75
Revenue growth	0.09	0.29	1.03	0.02	0.17	72
Employment growth	0.04	0.06	0.31	-0.02	0.08	71
Total asset growth	0.06	0.12	0.50	-0.04	0.12	73
Return on assets	0.19	0.18	0.15	0.09	0.28	75
Equity to assets ratio	0.36	0.39	0.20	0.23	0.54	75
Firm age (years)	31	31	17	16	44	75
Observations	201					

Note: All variables are averages for the three years preceding the transaction. Sample Period: 1999-2010. Return on assets is calculated as adjusted earnings before taxes, depreciation and amortisation (EBITDA) divided by total assets. All other variables are self-explanatory.

We note that a relatively large proportion, 62% of our firms, is sold already during the first generation of ownership. As could be expected, there are also differences in the firm characteristics of the two groups. Firms sold during the first generation are on average smaller, grow their employment and assets faster and are more profitable prior to the LBO. The differences could very well be explained by the different maturities of the firms, where firms sold during the first generation are on average 17 years younger.

We are also interested in how deal activity changes over time. As shown in Figure 1, the number of deals in our sample shows a clear peak in the years 2006-2007, followed by a sharp decline in deal activity. This is not too surprising but highlights the cyclical nature of LBOs (Kaplan and Strömberg, 2009). There are also relatively few deals in

the first years of our sample, which may reflect less complete data in Capital IQ during early years (Strömberg, 2007). In addition, lower availability of press releases makes the process of determining whether an LBO meets the criteria for inclusion in our target group or not more difficult.

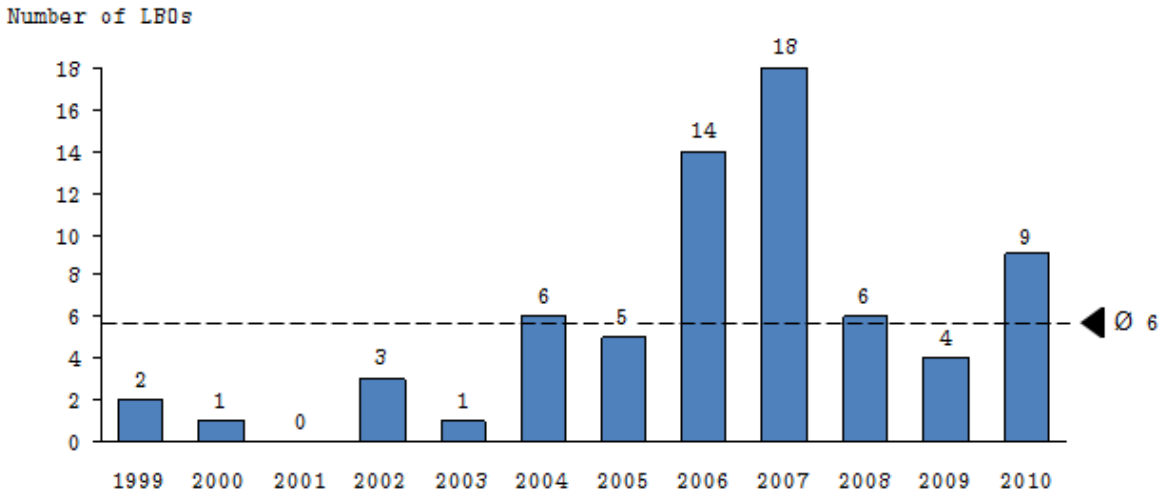

FIGURE 1. LBO activity over time

Note: Number of LBOs per year for the 69 LBOs identified as family firms according to our selection criteria. Sample period: 1999-2010.

2.7. **Family characteristics**

Table 3 explores the relationship between the family characteristics and the choice of succession route. The table shows three family characteristics: the number of children, the ratio of male children to total children (gender ratio) and the gender of the first-born child. We first observe that the likelihood of selling one's business to a private equity fund[9] decreases as the number of children goes up. It goes from 26.5% for owners with one child to 12.2% for owners with three children or more. Having no children at all also increases the likelihood to sell to 26.0%. Additionally, a low gender ratio suggests a higher probability of selling to private equity. Firms where more than 50% of the owners' children are male have 4.3 percentage points lower probability of being sold to a private equity fund compared to firms where the gender ratio is below 50%. This is similar to what previously has been shown by Bennedsen et al. (2007) in the context of CEO appointments.

We find that the number of children and the gender ratio of the owners' children seem to influence the choice of how to conduct a succession. However, it is difficult to determine

[9]Measured as the probability of being a target firm.

TABLE 3. Descriptive statistics for the principal owners' families

	Total	Target group		Control group	
	Number	Number	Share	Number	Share
Number of children					
0	100	26	0.260	74	0.740
1	34	9	0.265	25	0.735
2	115	20	0.174	95	0.826
3 or more	82	10	0.122	72	0.878
Difference (3 or more) minus (1)			**-0.143**		
Gender ratio (male/children)					
$< 50\%$	83	15	0.181	68	0.819
$= 50\%$	61	12	0.197	49	0.803
$> 50\%$	87	12	0.138	75	0.862
Difference (>50 percent) minus (<50 percent)			**-0.043**		
Gender of first-born child					
Male	131	21	0.160	110	0.840
Female	100	18	.0180	82	0.820
Difference male minus female			**-0.020**		
Observations	331	65		266	

Note: The table presents family characteristics for the principal owners' of target and control firms. All figures are based on data from the Swedish National Archives and dated 1990. *Number of children* is the number of children the principal owner had in 1990. *Gender ratio* is a ratio calculated as the number of male children divided by the total number of children. *Gender of first-born child* is the gender of the principal owner's first-born child. See text for full description of how to identify the principal owners.

causality. As suggested by Bennedsen et al. (2007) we turn our attention to a family characteristic that could possible overcome this issue; the gender of the first-born child. It is likely to be random, since the technology to detect the gender of an unborn child was not available during the years in which the majority of the children in our sample were born. In any case, we are not aware of a "missing women" problem in Sweden (Davies, 1992). Table 3 also shows that the probability of selling to a private equity fund decreases with 2.0 percentage points if the first-born child is male. Concluding that this is a family trait that may be both exogenous and affect firm succession decisions, we move on to specify the empirical strategy for determining the impact of these successions.

3. Empirical strategy

3.1. **Difference-in-differences regression**

A simple way to evaluate the operating performance impact of LBOs would be to track target firm performance over time and study the change in the years just before and after the LBO. While this ensures that the estimates are not affected by heterogeneity among firms, it offers no way to control for industry or time specific shocks that may also have an impact on firm performance. To compensate for these issues, we employ a difference-in-differences (DiD) setup.

A DiD setup can be used to estimate the impact of a certain treatment on a treatment group in comparison to a control group that does not receive the treatment. The DiD has been used in several studies within the area (Bennedsen et al., 2007; Boucly et al., 2011; Kaplan, 1989) and offers a powerful framework for comparing performance against a selected benchmark. This is especially useful in a setting where targets vary across industries and the treatment of interest is spread across time (Bertrand et al., 2004). We use the following specification as our main DiD regression:

$$Y_{it} = \alpha_i + \alpha_t + \beta_1 post_{it} + \delta_1 post_{it} * LBO_i + \beta_2 log(assets)_{it} + \varepsilon_{it} \quad (1)$$

where i is firm index and t is time index. For target firms, $post_{it}$ is a variable equal to 0 for the three years preceding an LBO and 1 for the three years afterwards. For control firms, $post_{it}$ is equal to 0 for the three years before its corresponding target firm has undergone an LBO and 1 for the three years afterwards. LBO_i is a variable equal to 1 if the firm is a target firm and 0 otherwise. $log(assets)_{it}$ is the logarithm of total assets, used as a control variable for firm size. δ_1 is the DiD estimate of interest. We use firm and year fixed effects and cluster standard errors at the firm level since the treatment occurs at firm level, as suggested by Bertrand et al. (2004).

The identifying assumption of the DiD requires that the differences between treatment and control firms are constant over time if it were not for the treatment received. Another way to describe this is that the trends for both groups before the treatment must be parallel. We ensure that this criterion is met by controlling for pre-trends in our regression setup and adjust it accordingly:

$$Y_{it} = \alpha_i + \alpha_t + \beta_1 post_{it} + \delta_1 post_{it} * LBO_i + \beta_2 log(assets)_{it} + \beta_3 post_{it} * GR_i + \varepsilon_{it} \quad (2)$$

where GR_i is a variable equal to the mean revenue growth in the three years preceding the LBO. We include it as an interaction term with $post_{it}$ to reflect the impact of pre-LBO growth also after the LBO.

Furthermore, the DiD estimate is only unbiased if the factor which determines whether a company receives the treatment or not is random. Just as Bennedsen et al. (2007) find it challenging that CEO succession decisions are uncorrelated with firm performance, we argue that ownership transitions are not randomly assigned either.

3.2. **Instrumental variable regression**

As a complement to our DiD, we use an instrumental variable (IV) which allows us to circumvent the problem with non-random treatment. The main advantage of an IV lies in its ability to let us be explicit about the source of variation that affects the dependent variable. If we are able to identify a component of the family structure that does affect the choice of selling the business to private equity, but at the same time does not have an impact on company performance, this would meet the two criteria of a valid instrument. We use the gender of the first-born child as an instrument, arguing that it meets these two criteria[10]. In order to implement the IV, we first perform the following first stage regression:

$$LBO_i = \alpha_t + \pi_1 malefirst_i + \pi_2 post_{it} + \pi_3 log(assets)_{it} + \varepsilon_{it} \tag{3}$$

where $malefirst_i$ is a variable equal to 1 if the gender of the first-born child is male and 0 if it is female. Standard errors are clustered at the firm level.

We continue by exploring the effect of the gender of the first-born child on firm performance in the second stage. Since we have the interaction term $post_{it} * LBO_i$ as our DiD variable of interest, we need to find a suitable instrument for this term. As suggested by Wooldridge (2002), we use $post_{it} * \widehat{LBO_i}$ as an instrument, where $\widehat{LBO_i}$ represent the fitted values obtained from the first stage regression in Equation (3). The second stage then becomes:

$$Y_{it} = \alpha_i + \alpha_t + \beta_1 post_{it} + \delta_1 post_{it} * \widehat{LBO_i} + \beta_2 log(assets)_{it} + \varepsilon_{it} \tag{4}$$

where all variables are defined as stated previously. We are interested in the estimate of δ_1, which shows the direct effect of gender of the first-born child on firm performance.

[10]This can be formalised as $Cov(malefirst_i, \varepsilon_{it}) = 0$ and $Cov(malefirst_i, LBO_i) \neq 0$, where ε_{it} refers to Equation (1).

Also the IV setup is adjusted to accommodate controls for pre-trends:

$$(5) \quad Y_{it} = \alpha_i + \alpha_t + \beta_1 post_{it} + \delta_1 post_{it} * \widehat{LBO_i} + \beta_2 log(assets)_{it} + \beta_3 post_{it} * GR_i + \varepsilon_{it}$$

Still, a general problem with IV regression is that the results are only applicable to the parts of the sample that are affected by the instrument. In our scenario, this implies that the IV estimate only reflects the subset of target firms where the gender of the principal owner's first-born child is female, and the control firms where the gender of the first-born child is male. If the effect of selling to private equity varies across the sample, the IV regression only estimates the average effect on the firms that are affected by the instrument as set out above (Imbens and Angrist, 1994).

4. Results

4.1. **Difference-in-differences results**

4.1.1. *Profitability*

We now turn to study the evolution in our main variable of interest: ROA. We begin by calculating the yearly change in ROA for each of our target companies less the median change in ROA for their respective control firms (excess ROA). We do this for the five years before and after the LBO to illustrate the long-term development.

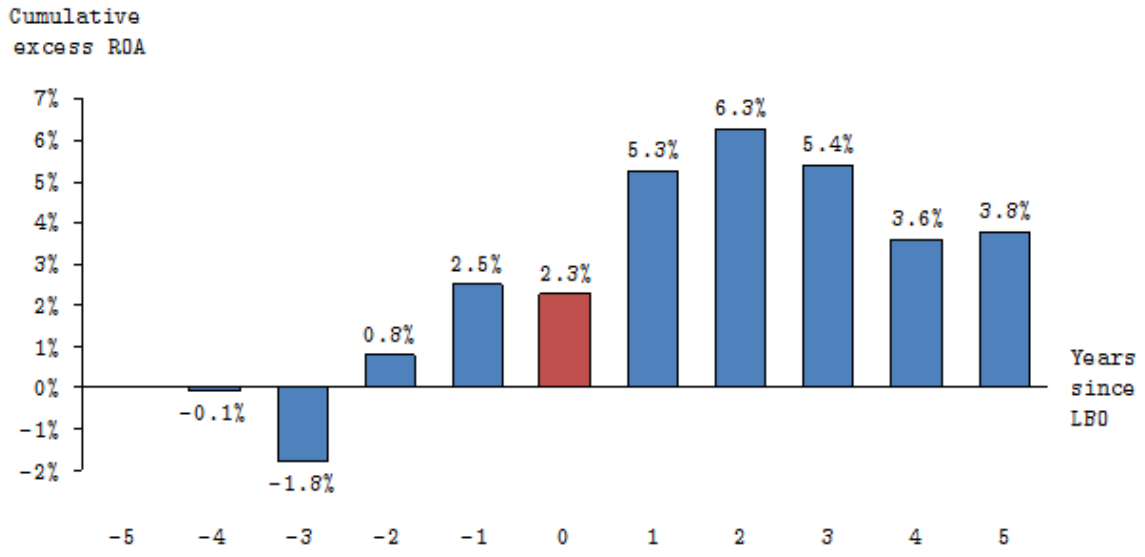

Figure 2. Mean-adjusted increase in profitability around the LBO

Note: For each target, let t be the number of years since the LBO. We first compute the yearly change in ROA for each LBO target in our sample for t = -5 to t = 5. We then compute the median yearly change for its control firms during the same period. Finally, we calculate the difference between the ROA change of the target and the median ROA change of its control firms (excess ROA). The figure plots the cumulative average excess ROA from t = -5 and across all targets in our sample.

Figure 2 plots the average of these changes for our entire target group, indicating an average increase in ROA of 3.0 percentage points in the year directly following the LBO. The figure suggests that a large structural change takes place at the time of the LBO and has a lasting effect during the years that follow. We also observe that the excess ROA is relatively volatile and increases also prior to the LBO, but shows no consistent pattern with decreases in two out of five years.

A formal difference-in-differences regression is also carried out using Equation (1). Results for our dependent variables ROA and log(EBITDA) are presented in Table 4 as models (1) and (2), respectively. The regression estimates confirms the visual analysis. Our target companies show an average increase in ROA of 3.9 percentage points and an EBITDA increase of 30%. The increase in ROA is also large in comparison with the mean pre-LBO ROA of 20% and the standard deviation of 16%. These results are in line with previous research (see Boucly et al. (2011), Kaplan (1989), Bergström et al. (2007)) and supports our first hypothesis.

Table 4. Difference-in-differences regression results

	(1) ROA	(2) log(EBITDA)	(3) log(revenue)	(4) log(empl)	(5) log(Assets)	(6) E/A
$post_{it} * LBO_i$	0.039**	0.30***	0.14**	0.30***	0.26***	-0.080***
	(0.016)	(0.100)	(0.059)	(0.087)	(0.078)	(0.027)
$post_{it}$	-0.039***	-0.37***	-0.090**	-0.055**	-0.060**	-0.0094
	(0.012)	(0.087)	(0.039)	(0.026)	(0.030)	(0.010)
log(assets)	0.035*	0.90***	0.81***	0.61***		-0.045**
	(0.018)	(0.086)	(0.12)	(0.069)		(0.022)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2235	2069	2212	2161	2235	2235

Note: Results for all target and control firms in our sample. Sample period: 1999-2010. All regressions include firm and year fixed effects. $post_{it}$ is a variable equal to 1 for the 3 years following the LBO and 0 for the 3 years preceding the LBO. LBO_i is a variable equal to 1 if the observation is an LBO target and 0 if it is a control firm. Return on assets (ROA) is calculated as adjusted EBITDA divided by total assets. Log(empl) is the logarithm of employment. Other variables are self-explanatory. Error terms are clustered at firm level. Robust standard errors are used.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

4.1.2. *Growth*

The profitability increase is accompanied with significant increases in both revenue and employment. Figures 3 and 4 provide visual evidence of this. The effect is especially

strong for employment, which increases with 22% in the year directly following the LBO. The growth in revenue is 12% in the year following the LBO, but the years preceding the LBO show equally large increases. This raises concerns that there could be strong pre-trends, causing our DiD estimates to be positively biased.

To complement the visual analysis, we estimate Equation (1) using log(revenue) and log(employment) as dependent variables. The results are shown as models (3) and (4) in Table 4. The regression shows an increase of 14% and 30%, which are statistically significant at 5% and 1% levels. These results are important, as they contradict older studies of LBOs, e.g. Kaplan (1989) who concludes that the profitability increase mainly comes from rationalization and cost savings. Instead, they provide additional support to the idea that private equity funds can create jobs and help companies grow as suggested by Boucly et al. (2011).

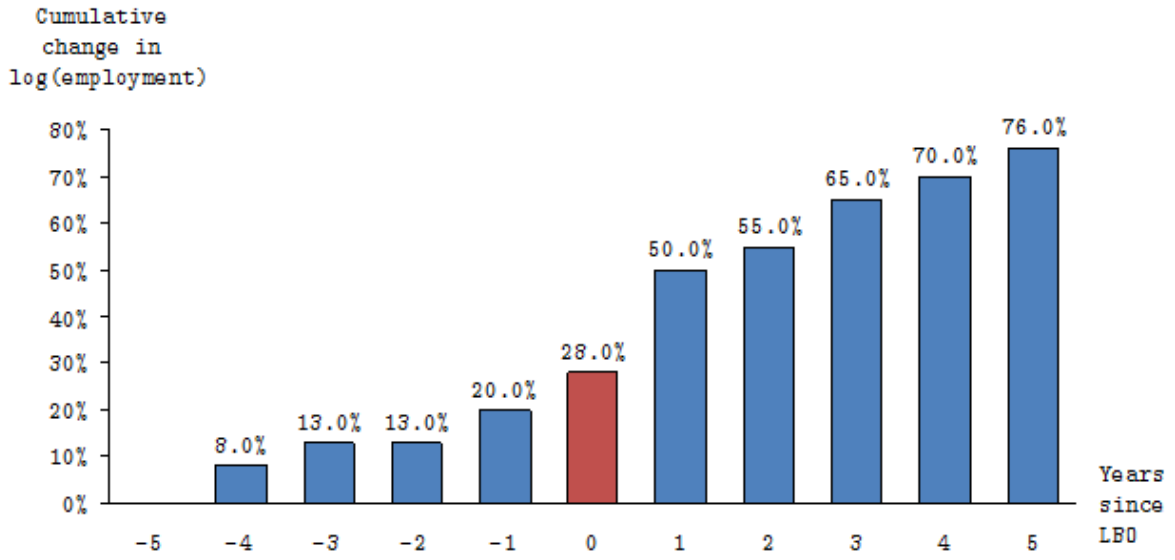

FIGURE 3. Mean-adjusted change in employment around the LBO

Note: For each target, let t be the number of years since the LBO. We first compute the yearly growth in employment for each LBO target in our sample for t = -5 to t = 5. We then compute the median yearly growth for its control firms during the same period. Finally, we calculate the difference between the growth in employment of the target and the median growth in employment of its control firms (excess employment growth). The figure plots the cumulative average excess employment growth from t = -5 and across all targets in our sample.

4.1.3. *Capital structure*

As expected, the LBO also has implications for the capital structure of our target family firms. Estimating Equation (1) using log(assets) and equity to assets ratio, we observe an increase of 26% and a decrease of 8 percentage points respectively. These results are

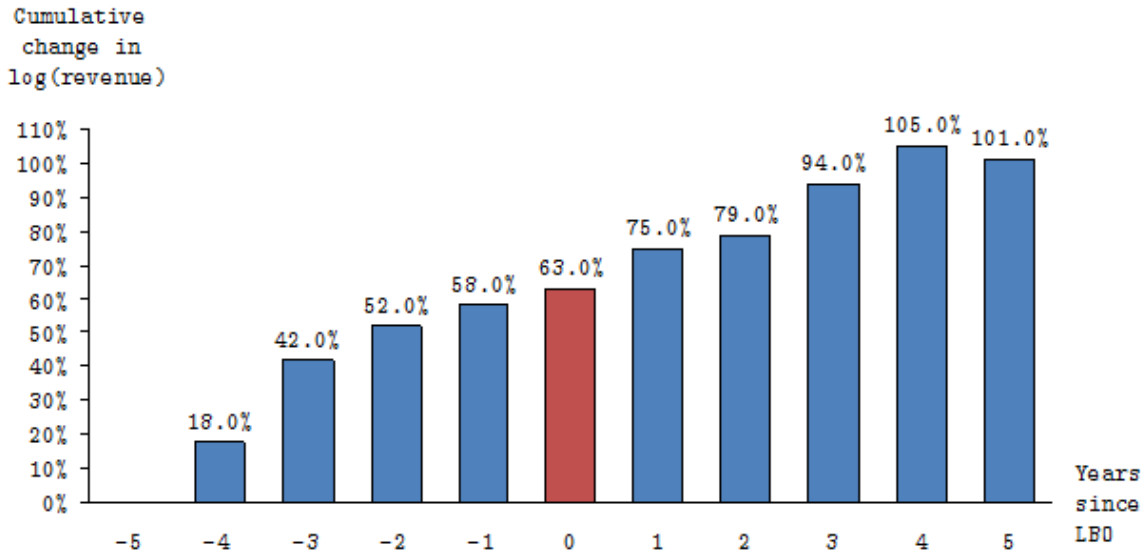

FIGURE 4. Mean-adjusted change in revenue around the LBO

Note: For each target, let t be the number of years since the LBO. We first compute the yearly growth in revenue for each LBO target in our sample for t = -5 to t = 5. We then compute the median yearly change for its control firms during the same period. Finally, we calculate the difference between the growth in revenue of the target and the median growth in revenue of its control firms (excess revenue growth). The figure plots the cumulative average excess revenue growth from t = -5 and across all targets in our sample.

shown in Table 4 as models (5) and (6). The fact that assets increase sharply after the LBO gives us comfort that firms do not stop investing post-buyout.

4.1.4. *Ownership length*

Based on our results so far, it is clear that target firms outperform their controls after ownership has changed to private equity. We now use our breakdown of target firms by generation to see if the length of family ownership explains part of firm performance following the LBO. Once again using Equation (1), we produce the DiD estimates for the two groups. First, Table 5 shows the regression results for firms who were sold during the first generation of ownership and during the second generation or later.

We can conclude that firms selling during the first generation see a larger relative growth than firms selling during later generations. EBITDA, employment and assets all show considerably higher growth rates relative to their control firms. Interestingly, ROA increases about as much for both groups, 3.8 and 4.2 percentage points, respectively. This can be explained by the fact that the firms selling in the first generation experience a rapid expansion in assets that the firms selling during the second generation or later do not; assets increase with 41% versus 0%, respectively. Somewhat unexpected, however, is that revenue growth relative to control firms are instead higher for businesses sold during

TABLE 5. Difference-in-differences regression results for firms by length of ownership

First generation	(1) ROA	(2) log(EBITDA)	(3) log(revenue)	(4) log(empl)	(5) log(Assets)	(6) E/A
$post_{it} * LBO_i$	0.038*	0.39***	0.12	0.37***	0.41***	-0.028
	(0.021)	(0.13)	(0.090)	(0.13)	(0.097)	(0.031)
$post_{it}$	-0.037**	-0.24**	-0.070	-0.055	-0.057	-0.018
	(0.016)	(0.12)	(0.043)	(0.034)	(0.041)	(0.014)
log(assets)	0.031	0.72***	0.72***	0.59***		-0.051*
	(0.022)	(0.084)	(0.14)	(0.070)		(0.026)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1437	1322	1419	1371	1437	1437

Later generation	(1) ROA	(2) log(EBITDA)	(3) log(revenue)	(4) log(empl)	(5) log(Assets)	(6) E/A
$post_{it} * LBO_i$	0.042	0.28*	0.22*	0.20**	-0.0021	-0.16***
	(0.026)	(0.16)	(0.12)	(0.081)	(0.11)	(0.047)
$post_{it}$	-0.048**	-0.56***	-0.13	-0.068	-0.031	0.0066
	(0.020)	(0.13)	(0.083)	(0.043)	(0.043)	(0.015)
log(assets)	0.045	1.30***	1.03***	0.57***		-0.046
	(0.033)	(0.19)	(0.28)	(0.17)		(0.038)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	798	747	793	790	798	798

Note: Results for target and control firms grouped by length of ownership. Sample period: 1999-2010. All regressions include firm and year fixed effects. $post_{it}$ is a variable equal to 1 for the 3 years following the LBO and 0 for the 3 years preceding the LBO. LBO_i is a variable equal to 1 if the observation is an LBO target and 0 if it is a control firm. Return on assets (ROA) is calculated as adjusted EBITDA divided by total assets. Log(empl) is the logarithm of employment. Other variables are self-explanatory. Error terms are clustered at firm level. Robust standard errors are used.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

the second generation or later. It is worth noting that due to the limited sample size, that is a result of splitting the target group, some of these changes are not statistically significant.

The results imply that private equity funds' use different strategies to increase profitability of their portfolio companies' post-LBO. These strategies may depend on firm size and maturity and can also explain why previous studies have shown different results when it comes to the source of private equity performance improvements post-LBO.

An alternative interpretation is that firms in an earlier stage of development are more credit-constrained (Bloom and Reenen, 2007; Boucly et al., 2011) and that the ownership change gives them access to the credit needed to reach their full growth potential.

One concern is that these results could be driven by differences, not in the target firms but in the control firms of the respective groups. Appendix B shows descriptive statistics for the control firms of both groups and ensures us that they too are adequately matched on firm age. The aforementioned performance improvements should thus not be driven by differences in firm maturity.

4.1.5. *Robustness checks*

As previously mentioned, and as indicated in Figure 4, we are concerned that pre-trends may distort the DiD estimates.

TABLE 6. Difference-in-differences regression results with controls for pre-trends

	(1) ROA	(2) log(EBITDA)	(3) log(revenue)	(4) log(empl)	(5) log(Assets)	(6) E/A
$post_{it} * LBO_i$	0.039**	0.31***	0.10	0.25***	0.19***	-0.081***
	(0.017)	(0.11)	(0.063)	(0.080)	(0.072)	(0.029)
$post_{it}$	-0.039***	-0.38***	-0.12***	-0.10***	-0.078**	-0.0091
	(0.013)	(0.087)	(0.041)	(0.031)	(0.035)	(0.011)
log(assets)	0.037*	0.91***	0.80***	0.60***		-0.051**
	(0.019)	(0.085)	(0.12)	(0.060)		(0.022)
$post_{it} * GR_i$	-0.0032	-0.094	0.29**	0.39**	0.25	-0.024
	(0.019)	(0.096)	(0.14)	(0.19)	(0.16)	(0.030)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2186	2030	2173	2125	2186	2186

Note: Results for all target and control firms in our sample. Sample period: 1999-2010. All regressions include firm and year fixed effects. $post_{it}$ is a variable equal to 1 for the 3 years following the LBO and 0 for the 3 years preceding the LBO. LBO_i is a variable equal to 1 if the observation is an LBO target and 0 if it is a control firm. Return on assets (ROA) is calculated as adjusted EBITDA divided by total assets. Log(empl) is the logarithm of employment. Other variables are self-explanatory. GR_i is the mean revenue growth for the 3 years preceding the LBO. Other variables are self-explanatory. Error terms are clustered at firm level. Robust standard errors are used.

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

We therefore estimate Equation (2), which includes a control variable for pre-LBO revenue growth, and show results in Table 6. The main difference from the results using Equation (1) is that revenue growth post-LBO is no longer statistically significant, albeit

with a positive point estimate of 10%. All other variables remain significant at their previous levels, which reassure us of the robustness of our main results.

4.2. **IV results**

4.2.1. *First stage*

Even though our results are robust to pre-trends, it is important to remember that selling to a private equity fund is most likely not a random event. Private equity funds screen many possible target firms before deciding on which ones to invest in and family firms' decision to sell is also likely to be influenced by family characteristics and other non-random variables. In order to explore the causal effect of LBOs on firm performance, we therefore instrument the succession decision using the variation that comes from the gender of the first-born child of the principal owner.

Table 7 shows the first stage relationship between the gender of the first-born child of the owner and firm succession decisions using Equation (3). As was already apparent in our descriptive statistics, the gender of the first-born child does have an impact; firms are on average 1.4 percentage points less likely to sell to a private equity fund when the first-born child is male. The impact is similar to what earlier studies have observed for CEO succession decisions (Bennedsen et al., 2007), but it is smaller and not statistically significant on conventional levels. Despite this, the results still indicate some support for our second hypothesis.

One could argue that the impact from the gender of the first-born child instead comes from having a male child, something families can affect by having more children. Model (2) shows the first stage results when including a male child indicator together with the gender of the first-born child. This results in the point estimate falling further for our main instrument. Results from our alternative instruments, number of children and gender ratio, are reported in models (3) and (4) for reference. None of them are significant and as previously discussed, it is difficult to argue that any of them are randomly assigned. We therefore focus on gender of the first-born child going forward, despite the statistical insignificance. Model (5) is identical to model (1) apart from a pre-LBO revenue growth control variable, resulting in a somewhat higher coefficient for our instrument.

As a rule of thumb, first stage F-statistics of less than 10 indicates the presence of weak instruments (Staiger and Stock, 1997), which is to be put in relation to our F-statistics of 2.33 in model (1). There are several reasons that could explain the relatively weak instrument. Firstly, ownership successions are in many aspects not as straightforward

TABLE 7. First stage IV regression results

	Dependent variable: LBO_i				
	(1)	(2)	(3)	(4)	(5)
$malefirst_i$	-0.014	-0.0083			-0.022
	(0.047)	(0.058)			(0.046)
has_boy_i		-0.012			
		(0.070)			
$male\_children_i$			-0.038		
			(0.025)		
$gender\_ratio_i$				0.012	
				(0.070)	
$post_{it}$	-0.028	-0.028	-0.0086	-0.028	-0.056
	(0.037)	(0.037)	(0.033)	(0.037)	(0.040)
log(assets)	0.089***	0.089***	0.088***	0.089***	0.085***
	(0.016)	(0.015)	(0.014)	(0.016)	(0.016)
$post_{it} * GR_i$					0.38***
					(0.066)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No
F-statistics	2.33	2.27	2.84	2.33	6.69
Observations	1331	1331	1922	1331	1292

Note: Results for all target and control firms for which family data is available. Sample period: 1999-2010. The dependent variable LBO_i is a variable equal to 1 if the observation is an LBO target and 0 if it is a control firm. $malefirst_i$ is a variable equal to one if the firstborn child of the principal owner is male and zero if she is female. has_boy_i is a variable equal to one if the principal owner has at least one male child and 0 otherwise. $male\_children_i$ is the number of the principal owner's male children. $gender\_ratio_i$ is the ratio of male children to total children. GR_i is a control variable for pre-LBO growth, as defined in Table 6. Other variables are self-explanatory. Error terms are clustered at firm level. Robust standard errors are used.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

as CEO successions. In many cases, there is more than one owner and it is not certain which person's family characteristics to study. Secondly, we use ownership information from press releases to reliably identify the person most likely to influence this decision for our target firms, something we cannot do for our control firms. Although we have an, in our view, sound way of plausibly identifying this person, this is no substitute for ownership data.

TABLE 8. Comparison of OLS and IV results

	Dependent variable: ROA						
	OLS		IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$post_{it} * LBO_i$	0.038**	0.038**	0.042	0.039	0.059	0.037	0.057
	(0.016)	(0.017)	(0.043)	(0.043)	(0.038)	(0.043)	(0.046)
$post_{it}$	-0.036***	-0.036***	-0.024	-0.024	-0.039***	-0.024	-0.027*
	(0.012)	(0.012)	(0.016)	(0.016)	(0.014)	(0.016)	(0.016)
log(assets)	0.013	0.014	0.034***	0.034***	0.014*	0.034***	0.037***
	(0.016)	(0.018)	(0.0088)	(0.0088)	(0.0083)	(0.0088)	(0.0091)
$post_{it} * GR_i$		-0.0085					-0.014
		(0.015)					(0.029)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument							
$malefirst_i$			✓	✓			✓
has_boy_i				✓			
$male\_children_i$					✓		
$gender\_ratio_i$						✓	
Observations	1956	1907	1331	1331	1922	1331	1292

Note: Results for all target and control firms for which family data is available. Sample period: 1999-2010. Models (1)-(2) are OLS estimates obtained using Equation (1) and (2). Models (3)-(7) are estimated using predicted values, obtained from a first stage regression of LBO_i on the exogenous regressors and the instrument of choice. The dependent variable ROA is calculated as adjusted EBITDA divided by total assets. $malefirst_i$ is a variable equal to one if the firstborn child of the principal owner is male and zero if she is female. has_boy_i is a variable equal to one if the principal owner has at least one male child and 0 otherwise. $male\_children_i$ is the number of the principal owner's male children. $gender\_ratio_i$ is the ratio of male children to total children. GR_i is a control variable for pre-LBO growth, as defined in Table 6. Other variables are self-explanatory. Error terms are clustered at firm level.

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

4.2.2. *Second stage*

We use Equation (4) and (5) to estimate the second stage of our IV regression. The results are presented in Table 8. Models (1)-(2) are DiD estimates for the firms where we have family characteristics, models (3)-(7) are our five different IV regressions reported in the same order as in Table 7.

Our IV estimates using gender of the first-born child with and without the pre-LBO growth control show a 4.2 and 5.7 percentage points increase in ROA, respectively. The

results are statistically insignificant but in line with the point estimates obtained using our OLS regression. If anything, these estimates indicate a bias in the opposite direction than put forward in our third hypothesis. Although we are cautious in drawing any conclusions from these results, it further supports the robustness of our difference-in-differences estimates.

In contradiction to our third hypothesis, we cannot find support for a selection bias resulting in an overestimated performance impact of private equity ownership. One reason for this could be that family firms are more reluctant to sell businesses that have the most positive future outlook. The fact that the best companies are simply not up for sale could very well compensate for any information advantage, network effects and superior negotiating skills that private equity funds have, and that caused us to hypothesise that there would be a bias in the first place.

5. Conclusions

In this paper we set out to do two things:

First, we sought to improve the understanding of how family firms are affected when ownership is transferred to private equity funds. Our results were encouraging; regardless of industry, maturity and size, family firms in Sweden seem to benefit from such a transition both in terms of profitability and growth. There were some indications that the way in which these performance improvements are accomplished differ depending on the maturity of the firm acquired. Firms parting from their owner already in the first generation experience continuous growth, while firms where the family stays until the second generation or later seem to undergo more of an operational overhaul to improve profitability and manage the asset base more efficiently. For owners facing an upcoming succession, this is valuable information when considering options for an external sale of the business.

Second, in trying to isolate the causal effect of the ownership change, we have shown that family characteristics may play a role in firms' succession decisions. We used the gender of the principal owner's first-born child as an instrument and found that the presence of a male first-born child may decrease the likelihood of selling to a private equity fund. However, we did not find any systematic biases in the aforementioned results obtained using OLS estimates. This may imply that private equity funds' 'cherry picking' ability is offset by the family firm owners' unwillingness to put high performing companies up for sale.

Our results complement the earlier CEO literature and shows that the implications from Bennedsen et al. (2007) are valid also in a setting of family firm ownership transitions. Although we cannot reject the validity of our OLS results, future research is encouraged to continue to search for valid instruments to be able to estimate the unbiased causal effect of post-LBO performance.

References

Barber, B. M. and Lyon, J. D. (1996), 'Detecting abnormal operating performance: The empirical power and specification of test statistics', *Journal of Financial Economics* **41**(3), 359–399.

Bennedsen, M., Nielsen, K. M., Perez-Gonzalez, F. and Wolfenzon, D. (2007), 'Inside the family firm: The role of families in succession decisions and performance', *Quarterly Journal of Economics* **122**(2), 647–691.

Bergström, C., Grubb, M. and Jonsson, S. (2007), 'The operating impact of buyouts in sweden: A study of value creation', *Journal of Private Equity* **11**(1), 22–39.

Bertrand, M., Duflo, E. and Mullainathan, S. (2004), 'How much should we trust differences-in-differences estimates?', *The Quarterly Journal of Economics* **119**(1), 249–275.

Bloom, N. and Reenen, J. V. (2007), 'Measuring and explaining management practices across firms and countries', *Quarterly Journal of Economics* **122**(4), 1351–1408.

Boucly, Q., Sraer, D. and Thesmar, D. (2011), 'Growth lbos', *Journal of Financial Economics* **102**(2), 432–453.

Davies, P. D. (1992), 'Missing women.', *BMJ* **304**(6831), 916–917.

Faccio, M. and Lang, L. H. P. (2002), 'The ultimate ownership of western european corporations', *Journal of Financial Economics* **65**(3), 365–395.

Goossens, L., Manigart, S. and Meuleman, M. (2008), 'The change in ownership after a buyout: Impact on performance', *Journal of Private Equity* **12**(1), 31–41.

Imbens, G. W. and Angrist, J. D. (1994), 'Identification and estimation of local average treatment effects', *Econometrica (1986-1998)* **62**(2), 467.

Kaplan, S. (1989), 'The effects of management buyouts on operating performance and value', *Journal of Financial Economics* **24**(2), 217–254.

Kaplan, S. N. and Strömberg, P. (2009), 'Leveraged buyouts and private equity', *Journal of Economic Perspectives* **23**(1), 121–146.

Lerner, J. (1994), 'The syndication of venture capital investments', *Financial Management* **23**(3), 16.

Smart, S. B. and Waldfogel, J. (1994), 'Measuring the effect of restructuring on corporate performance: the case of management buyouts', *Review of Economics Statistics* **76**(3), 503.

Smith, A. J. (1990), 'Corporate ownership structure and performance: The case of management buyouts', *Journal of Financial Economics* **27**(1), 143–164.

Staiger, D. and Stock, J. H. (1997), 'Instrumental variables regression with weak instruments', *Econometrica* **65**(3), 557–586.

Strömberg, P. (2007), 'The new demography of private equity', *The global impact of private equity report* pp. 3–26.

Tykvová, T. and Borell, M. (2012), 'Do private equity owners increase risk of financial distress and bankruptcy?', *Journal of Corporate Finance* **18**(1), 138–150.

Ward, J. L. (1987), *Keeping the Family Business Healthy: How to Plan for Continuing Growth, Profitability and Family Leadership*, Palgrave Macmillan, San Francisco.

Wooldridge, J. M. (2002), *Econometric analysis of cross section and panel data*, MIT Press, Cambridge, Mass.

Appendix

A. List of target firms

Table A. List of target companies (1/2)

Target company	**LBO**	**Buyer**	**Sold during first generation**
AB Reservdelar	2006	Springlake Invest	0
Actic	2007	FSN Capital	1
Annas Pepparkakor	2005	Accent Equity Partners	0
Appelberg Publishing Group	2002	Bure Equity	1
Aspen	2007	Valedo	1
Baggium Vård & Behandling	2010	FSN Capital	1
Baluba	2009	CapMan	1
Bergteamet	2009	Accent Equity Partners	1
Bindomatic	2008	Valedo	1
Byggmax	2005	Altor Equity Partner	1
Corroventa Avfuktning	2007	Volati	1
Crem International	2007	Accent Equity Partners	1
Crendo Fastighetsförvaltning	2007	Next Wave Capital Partners	1
CTEK	2008	FSN Capital	1
Driconeq	2007	Axcel	1
Dustin	2006	Altor Equity Partner	1
EFG European Furniture Group	2007	Herkules Capital	0
Elfa	2006	IK Investment Partners	1
EpiServer	2007	Amadeus Capital Partners	1
Espresso House	2006	Palamon Capital Partners	1
Euroflorist	2004	Accent Equity Partners	1
Fiskarhedenvillan	2007	Polaris Private Equity	1
Fruktbudet i Stockholm	2007	Springlake Invest	0
HL Display	2010	Ratos	0
Inflight Service	2005	CapMan	1
Inredningsglas	2007	Accent Equity Partners	1
Jarowskij Enterprises	2002	Amplico Kapital	1
Karlssons Varuhus	2006	Amplico Kapital	1
Kasthall Mattor & Golv	2010	Karnell	0
Kellfri	2010	Volati	0
KGH Customs Services	2007	Procuritas	1
Lundhags Skomakarna	2007	EQT	0
Metallfabriken Ljunghall	2003	CapMan	0
Miroi	2010	Via Venture Partners	1
Modul-System	1999	Segulah	1
MPT Sweden	2009	CapMan	0
MySafety	2007	Litorina	1
North Trade	2006	Procuritas	1
OBH Nordica	2010	Triton	1
Olmed Ortopediska	2009	Volati	1
Oscar Jacobson	2008	Valedo	0

Note: Sample Period: 1999-2010. List of all target companies for which accounting data is available.

TABLE B. List of target companies (2/2)

Target company	**LBO**	**Buyer**	**Sold during first generation**
Pahlén	2007	Litorina	1
Pallco	2006	Ledstiernan	0
Pelly Industri	2006	Litorina	0
Permobil	2006	Nordic Capital	1
Perstorp	2000	IK Investment Partners	0
Perten	2010	Valedo	0
PIAB	2006	Altor Equity Partner	0
Q-Matic	2004	3i	1
QleanAir Scandinavia	2007	Credelity Capital	1
R.O.O.M.	2005	Amplico Kapital	1
Resta	2007	Litorina	1
RH Form	2006	Ratos	1
San Sac	2008	Priveq Investment	0
Sandberg & söner	2008	Volati	0
SCAN COIN	2010	Segulah	0
Semantix Språkcentrum	2006	Accent Equity Partners	1
Silva Sweden	2004	Amplico Kapital	0
SKV Service	2004	Segulah	1
Sveico	2005	Volati	0
Sydtotal	2007	Priveq Investment	1
Teknikmagasinet	2004	3i	1
Tesab	2006	Accent Equity Partners	0
Thule	1999	EQT	0
Tornum	2004	Volati	0
Tylö	2008	AAC Capital Partners	0
Unfors RaySafe	2006	Sjätte AP-fonden	1
Wernersson Ost	2004	Accent Equity Partners	0
Xdin	2002	Bure Equity	1
Yrkesakademin	2010	Fagerberg & Dellby	1

Note: Sample Period: 1999-2010. List of all target companies for which accounting data is available.

B. Descriptive statistics for target and control groups by ownership length

Table C. Descriptive statistics for target and control firms sold during the first generation

Variable	Median	Mean	Std dev	Q1	Q3	Obs
Target group						
Revenue (SEK m)	113.86	215.14	325.05	58.12	226.70	126
Employees	42	64	70	17	92	126
Total assets (SEK m)	61.23	96.21	104.30	36.63	124.54	126
EBITDA (SEK m)	11.96	18.62	22.37	3.85	23.41	126
Revenue growth	0.15	0.25	0.50	0.07	0.35	121
Employment growth	0.09	0.12	0.30	0.00	0.20	117
Total asset growth	0.18	0.26	0.46	0.04	0.31	123
Return on assets	0.22	0.21	0.18	0.10	0.31	126
Equity to assets ratio	0.32	0.33	0.18	0.20	0.48	126
Firm age (years)	13	14	9	9	19	126
Control group						
Revenue (SEK m)	59.45	117.71	161.92	22.46	132.84	596
Employees	45	59	61	14	79	596
Total assets (SEK m)	26.29	52.34	71.68	10.44	62.85	596
EBITDA (SEK m)	4.42	9.83	15.16	1.45	11.64	596
Revenue growth	0.07	0.12	0.65	-0.01	0.20	582
Employment growth	0.02	0.06	0.25	-0.01	0.12	559
Total asset growth	0.07	0.11	0.32	-0.03	0.19	590
Return on assets	0.19	0.19	0.14	0.11	0.26	596
Equity to assets ratio	0.27	0.31	0.21	0.16	0.44	596
Firm age (years)	16	20	17	9	26	596
Observations	722					

Note: All variables are averages for the three years preceding the transaction. Sample Period: 1999-2010. Return on assets is calculated as adjusted earnings before taxes, depreciation and amortisation (EBITDA) divided by total assets. All other variables are self-explanatory.

TABLE D. Descriptive statistics for target and control firms sold during the second generation or later

Variable	Median	Mean	Std dev	Q1	Q3	Obs
Target group						
Revenue (SEK m)	140.57	234.38	251.84	83.95	254.46	75
Employees	44	103	127	32	116	75
Total assets (SEK m)	85.46	172.05	192.98	54.93	211.84	75
EBITDA (SEK m)	13.01	24.27	35.54	7.87	30.28	75
Revenue growth	0.09	0.29	1.03	0.02	0.17	72
Employment growth	0.04	0.06	0.31	-0.02	0.08	71
Total asset growth	0.06	0.12	0.50	-0.04	0.12	73
ROA	0.19	0.18	0.15	0.09	0.28	75
Equity to assets ratio	0.36	0.39	0.20	0.23	0.54	75
Firm age (years)	31	31	17	16	44	75
Control group						
Revenue (SEK m)	100.97	147.25	178.50	50.71	177.62	334
Employees	44	71	73	29	93	334
Total assets (SEK m)	42.63	89.08	175.46	20.46	98.15	334
EBITDA (SEK m)	6.65	17.63	42.94	3.04	14.03	334
Revenue growth	0.07	0.08	0.22	-0.02	0.17	330
Employment growth	0.02	0.04	0.19	-0.03	0.09	329
Total asset growth	0.05	0.07	0.21	-0.04	0.15	330
Return on assets	0.18	0.19	0.12	0.11	0.25	334
Equity to assets ratio	0.28	0.31	0.18	0.17	0.43	334
Firm age (years)	20	28	21	13	43	334
Observations	409					

Note: All variables are averages for the three years preceding the transaction. Sample Period: 1999-2010. Return on assets is calculated as adjusted earnings before taxes, depreciation and amortisation (EBITDA) divided by total assets. All other variables are self-explanatory.