

The Impact of Equity Carve-outs on the Value Creation of Business Group

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Abstract

The establishment of science and technology innovation board in China, provides a new development platform for equity carve-outs. To explore the impact of equity carve-outs on the value creation of business group, China's A-share listed companies that implemented the equity carve-outs in 2000 ~ 2019 were taken as the samples. In this paper, coarsened exact matching (CEM) method and time-varying difference-in-differences (TDID) model are combined to establish a panel data regression model for empirical analysis. The empirical analysis results show that overall, equity carve-outs plays a positive role in promoting the value creation of business group. It can provide theoretical and data reference for the decision making of parents' carve-outs.

Keywords

Equity Carve-outs; Coarsened Exact Matching (CEM); Time-varying Difference-in-Differences (TDID).

1. Introduction

Equity carve-outs originated in the United States, and have been popular in the United States since the 1980s and 1990s, especially among listed companies. Equity carve-outs are not only popular in the capital markets of developed countries such as the United States, but also in emerging capital markets and asia-pacific capital markets. In China, Tongrentang implemented the equity carve-outs in 2000, and its subsidiaries was successfully listed on the Growth Enterprise Market in Hong Kong, attracting wide attention. China Securities Regulatory Commission (CSRC) announced the news that domestic listed companies are allowed to split their subsidiaries to be listed on growth enterprise market under the condition of meeting the six conditions, and the real meaning of equity carve-outs began. In general, however, the past decade has been marked by strict regulatory controls on equity carve-outs, so there have been few equity carve-outs of A-share listed companies.

In 2019, the launch of the Science and Technology Innovation Board has provided the possibility for China's A-share listed companies to implement the equity carve-outs. "The Implementation Opinions on the Establishment of science and Technology Innovation Board and the Pilot Registration System" pointed out that "the listed companies reaching a certain scale can spin off their independent and qualified subsidiaries to be listed on the science and Technology Innovation Board in accordance with the law"; In December 2019, CSRC officially issued the "Domestic Listing Pilot Rules for Listed Companies to Split their Subsidiaries" (hereinafter referred to as the "Equity Carve-outs Rules"). This major change at the regulatory level once again ignited the enthusiasm of listed companies to implement equity carve-outs.

Different from merger and acquisition, equity carve-outs is a contractile reorganization, which is based on the company's operation and development strategy to restructure the company's equity or assets so as to reduce the scope of business or reduce the size of the company. According to the Equity Carve-outs Rules issued by the CSRC, equity carve-outs refers to the initial public offering (IPO) or reorganization listing of some business or assets of a listed company in the form of its subsidiaries controlled directly or indirectly in the domestic securities market.

And according to the existing academic research, equity carve-outs behavior, usually refers to a way of capital operation, that the parent company or equity participation enterprise (the original holding company), sells the shares of the subsidiary to the public, in this way, the subsidiary can be listed separately as an independent legal entity and publicly issue shares on the securities market. This paper studies based on this definition.

In addition, equity carve-outs can be divided into broad sense and narrow sense. The broad sense of equity carve-outs includes the listed company or the unlisted company to separate some businesses from the parent company and list them separately. The narrow sense of the equity carve-outs refers to the listed company will part of its business or a subsidiary out of the separate public listing. This paper discusses equity carve-outs in the narrow sense, that is, equity carve-outs of listed companies.

After the release of the Equity Carve-outs Rules, the concept of equity carve-outs is highly sought after. However, at the beginning of the equity carve-outs in China capital market, some scholars pointed out that the assets reorganization of China's listed companies often reflects the will of the government. Local governments often require listed companies to merge some inferior local enterprises out of consideration of their own interests, which increases the burden of listed companies and reduces their competitiveness (Wang and Hong, 2004). In addition, after the CSRC proposed that main board companies could implement equity carve-outs on growth enterprise market, the concept stocks of equity carve-outs were once hyped by the market, and some listed companies would take advantage of the equity carve-outs in the capital market (Wang and Xue, 2014). The successful implementation of equity carve-outs by Tongrentang opened the empirical research in China. Based on the short-term stock market research and studying the case of Tongrentang, Wang and Cheng (2003) found that equity carve-outs could bring a positive premium effect to the wealth of shareholders of the parent company, but the premium effect of the subsidiary was negative at the initial stage and turned positive at the later stage. Li et al. (2004) further found that competitors of Tongrentang all obtained significantly negative cumulative abnormal return. Zhan et al. (2011) found that firms that implemented equity carve-outs would gain from share returns in the short term. Yu (2011) found that the stock price of listed companies has a significant positive effect before and after the announcement of the board resolution on equity carve-outs.

Combined with the research on long-term business performance and enterprise value, the following results have been obtained: Liu et al. (2012) showed that the overall efficiency of the company was improved after spin-off, thus indicating that equity carve-out is an effective means of value creation; Li et al. (2012), Lin et al. (2015) et al. found that listed parents' carve-outs usually help improve the stock price and performance of parent company and subsidiary company, but not all subsidiaries can be successful after equity carve-outs. Zhang (2013) got the opposite result to the positive announcement period effect of the parent company, but came to the conclusion that the value of the subsidiary was effectively enhanced.

To sum up, foreign theoretical and empirical studies on listed parents' carve-outs have been relatively mature, but most of them focus on short-term market reaction research. Since there are few successful cases of listed parents' carve-outs in China, the research on listed parents' carve-outs in China's A-share market is still in its early stages, and mainly focuses on theoretical review, single case study or small sample comparative study. Therefore, a large sample

empirical study on the impact of listed parents' carve-outs on enterprise value in China is not only conducive to the overall evaluation of the implementation effect of equity carve-outs in the past, but also can provide reference for the implementation of equity carve-outs in the future.

From the perspective of listed parents' carve-outs and the value creation of firms that carve out subsidiaries, the main research contents and purposes of this paper are as follows:

In this paper, the coarsened exact matching (CEM) method and time-varying difference-in-differences (TDID) model are combined to provide evidence of the long-term impact of listed parents' carve-outs on the value creation of business group.

The contribution of this paper is mainly reflected in the empirical research on the value creation of listed parents' carve-outs, which mostly stays in the stage of small-sample case analysis, and each case has different performance in short-term and long-term enterprise value enhancement. In the analysis of large samples, the correctness of the research conclusion needs to be further verified.

In the empirical study, in terms of the method used to study the relationship between listed parents' carve-outs and enterprise value creation, the behavior of listed companies is affected by both macro external factors and enterprise factors. Therefore, the combined method of CEM and TDID is adopted. CEM is conducive to the balanced distribution of confounding factors between the treatment group and the control group, which is similar to the purpose of random allocation intervention in the randomized design. Compared with Propensity Score Matching (PSM), the commonly used PSM methods are often unable to ensure the improvement of balance after matching. CEM can control the influence of confounding factors in the observed data on the policy results to keep the distribution of covariables between the treatment group and the control group as balanced as possible, thus enhancing the comparability between the two groups of data. TDID can effectively control the influence of unobservable macro factors that change over time, and then accurately grasp the impact effect of listed parents' carve-outs, and enrich the research on the impact of equity carve-outs on long-term enterprise value.

2. Theoretical Mechanism and Research Hypotheses

The empirical research on equity carve-outs mostly involves the research on market announcement effect related to listed parents' carve-outs event. Katherine & Abbie (1986) found that the excess return rate of the parent company that implemented equity carve-outs was significantly positive during the announcement period, and proposed that equity carve-outs related earnings might come from (1) the independent listing of the subsidiary, which provided financial support for the projects with positive net present value of the subsidiary. (2) The separation of the subsidiary and the parent company increases the information flow for the subsidiary to enter the market; (3) Restructure the company to promote market-oriented incentives for the management of subsidiaries.

On this basis, the proposed correlation sub-hypothesis supplements the relationship between the possible source of wealth effect and the positive announcement effect. For example, focusing on the market's response to the quality of corporate cash flow and the management's control and efficiency of cash flow, according to the financing strategy hypothesis verified by Allen (1998), when enterprises use the proceeds of equity carve-outs to repay debts or other financial contingencies, the market will react positively. This is because using the funds obtained from the equity carve-outs for debt repayment represents the reduction of agency costs related to management's control of free cash flow (Lang et al.,1995). According to the investment strategy hypothesis proposed by J. & J. (1985) and Katherine & Abbie (1986), if the funds raised by spin-off listing are retained and used actively (for example, to fund new project construction or upgrade of existing projects), it will also get a good market response. In addition, Comment & Jarrell (1995) put forward the business concentration hypothesis. They believe

that stripping irrelevant businesses can help the management to refocus on the core business and eliminate the overall negative synergistic effect of the company, so it is related to the positive price response.

Finally, the manager incentive hypothesis proposes that if a subsidiary chooses to go public by equity carve-outs because of motivating the management of the subsidiary, the excess return rate during the equity carve-outs announcement period will be higher, and the capital expenditure of the subsidiary will be higher than that of its competitors. The presentation of these hypotheses suggests that the equity carve-outs usually leads to a reduction in agency costs, the improvement of synergistic effect and an improvement in industry competitiveness, so the market reaction associated with the announcement is positive.

Based on the information asymmetry theory, Nanda (1991) proposed that companies release equity carve-outs announcement to convey the signal of undervaluation to external investors. This hypothesis helps explain the positive announcement effect in the market after equity carve-outs announcement. Vjih (2002) further found that the market responded positively to the announcement of equity carve-outs, and enhanced enterprise value by stripping irrelevant businesses, providing new financing, and making new investments.

In addition to the announcement effect in the market, in terms of the long-term development of enterprise groups, equity carve-outs also has its unique charm. For the parent company, in addition to using listed subsidiary of opening up new financing channels, improve the efficiency of the company's professional management, the introduction of strategic investors, and through the appropriate media to establish brand effect, can also through subsidiaries listed abroad to exploit overseas market, introduce advanced management method, management mechanism. For subsidiaries, while raising funds through independent listing, improving corporate governance and focusing on their own strategic development, it can also motivate its management and employees effectively.

Based on the above analysis, it is expected that the concept of equity carve-outs is generally sought after by investors in the A-share market. In the long run, equity carve-outs is not only conducive to the realization of value appreciation of member enterprises themselves, but also conducive to highlighting the overall synergistic effect between member enterprises under the control of the headquarters, that is, equity carve-outs has a positive and far-reaching impact on the value creation of enterprise groups. Accordingly, the following hypotheses are proposed in this paper:

Hypothesis 1: Equity carve-outs can help improve the value creation of business group.

3. Research Design

3.1. Data and Samples

This paper takes 2000 ~ 2019 as the sample range and obtains the sample of A-share listed parents' successfully carve-outs through manual collection. For the enterprises that have splited their subsidiaries to be listed for two or more times, only the record of the first event. There were 42 valid samples in total. Statistical results of the number of parents' carve-outs of A-share listed companies in each year are shown in Table 1.

As can be seen from table 1, after the first parents' carve-outs appeared in 2000, it entered a stagflation stage from 2007 to 2009, and gradually began to recover until 2010. In 2019, the sample of parents' carve-outs showed a sharp increase. The results of the data are closely related to policy changes.

This paper makes an empirical study on the relationship between equity carve-outs and the value of business group by using the method of combining CEM and TDID. The two years before the equity carve-outs events are used as the control period, and the companies that did not go

through the equity carve-outs before 2000 but went through the equity carve-outs after 2000 are selected as the treatment group.

Table 1. Annual sample statistical table

Year	Sample size	Year	Sample size
2000	2	2010	1
2001	1	2011	1
2002	2	2012	1
2003	1	2013	2
2004	1	2014	7
2005	1	2015	5
2006	1	2016	2
2007	0	2017	5
2008	0	2018	2
2009	0	2019	7
Sum		42	

At the same time, CEM method is used in this paper to maintain the same industry and ownership nature of the enterprise. Due to the different year of the equity carve-outs, year by year matching is conducted according to the *Size* (Firm size), *Roa* (Net interest rate on assets), *Lev* (Asset-liability ratio), *Growth* (Increase rate of business revenue) and Tobin's Q of the listed company in the year before the equity carve-outs. The samples with missing data of key variables in the year of listing were deleted from the treatment group.

Finally, from 2003 to 2018, there were 28 companies in the treatment group and 84 companies in the control group, with a total of 1355 observed values. The financial data used in this paper comes from the consolidated statement data in the database of CSMAR (China Stock Market Accounting Research), and the statistical analysis software used is STATA15.0.

3.2. Model setting and variable definitions

In order to identify the impact of parents' carve-outs on the value of business group, this paper establishes the following measurement model based on the TDID model to test H1:

$$\text{Tobin's Q} = \beta_0 + \beta_1 \text{treated} \times \text{time} + \beta_i X + \varepsilon \quad (1)$$

Tobin's Q is not easy to be manipulated and can reflect the long-term performance and expected future cash flow earnings of business groups. Therefore, this paper adopts Tobin's Q as the explained variable to measure the value creation of the business groups, which is expressed by symbol *TBQ* in the following.

Treated is a binary treatment variable, which is a key explanatory variable reflecting whether the equity carve-outs is completed or not. *Time* is the time variable before and after the equity carve-outs, when an enterprise is in the year of equity carve-outs and the year after equity carve-outs, the value is 1; otherwise, it is 0. Interaction item *treated*×*time* represents the treatment effect of the company's implementation of equity carve-outs. In this paper, the research window of baseline regression is (-2, 2), and the research window is shortened to (-1, 1) for robustness test. According to hypothesis 1, the expected coefficient of *treated*×*time* was significantly positive.

According to previous research literatures, the control variables in the model include corporate size (*Size*), which is defined as the logarithm of total asset. Net interest rate on assets (*Roa*), defined as the ratio of earnings before interest and taxes to the average balance of total assets at the end and beginning of the year; Financial leverage (*Lev*), equal to proportion of year-end total indebtedness in total asset; *Growth* refers to the annual growth rate of operating revenue. Ownership concentration (*TOP1*) is defined as proportion of the shares held by the largest shareholder in the total shares.

There is also the ratio of independent directors (*Inde*), which is defined as the ratio of year-end number of independent directors to the total number of directors in the board. The years of being listed (*Age*) is equal to the difference between the current year and the year being listed. In addition, industry (*IND*) and year dummy variables (*Year*) are set.

4. Empirical Analysis

4.1. Descriptive statistics

Group descriptive statistics of main variables were conducted based on whether the equity carve-outs was carried out or not, as shown in Table 2. The mean and median values of enterprise value (*TBQ*) in the treatment group were higher than those in the control group. *Gov* is the dummy variable of enterprise nature, the value of state-owned enterprises is 1, the value of non-state-owned enterprises is 0, the mean values of the two groups are greater than 0.5, reflecting the balance between the matching results and the treatment group. The mean corporate size (*Size*) of treatment group was smaller than that of control group. The control group had higher financial leverage (*Lev*). There was little difference between the two groups of net interest rate on assets (*Roa*); The control group had better growth performance (*Growth*) and higher equity concentration (*TOP1*). The ratio of independent directors (*Inde*) and the years of being listed (*Age*) between the two groups had little difference.

Table 2. Descriptive statistics

variable	treatment group				control group			
	mean	p50	sd	N	mean	p50	sd	N
TBQ	1.550	1.272	0.740	351	1.428	1.183	0.661	1004
Gov	0.533	1.000	0.500	351	0.688	1.000	0.463	1004
Size	10.260	10.070	0.899	351	10.360	10.210	0.859	1004
Lev	0.568	0.548	0.180	351	0.610	0.627	0.202	1004
ROA	0.060	0.051	0.050	351	0.058	0.054	0.114	1004
Growth	0.260	0.122	0.611	351	0.687	0.111	5.544	1004
TOP1	33.760	32.500	15.080	351	40.110	38.330	17.500	1004
Inde	0.376	0.357	0.068	351	0.368	0.353	0.054	1004
Age	11.020	11.000	6.263	351	11.290	11.000	6.058	1004

Table 3. Annual trend of the mean values of main indicators in the treatment group

Variable	-2	-1	0	1	2	N
	mean	mean	mean	mean	mean	
TBQ	1.673	1.618	1.902	1.860	1.690	18
Gov	0.556	0.556	0.556	0.556	0.556	18
Size	10.109	10.160	10.251	10.322	10.377	18
Lev	0.550	0.555	0.547	0.568	0.578	18
ROA	0.059	0.066	0.059	0.059	0.046	18
Growth	0.354	0.493	0.350	0.288	0.371	18
TOP1	32.273	32.416	29.872	29.035	30.155	18
Inde	0.377	0.381	0.387	0.395	0.393	18
Age	9.111	10.000	11.111	12.111	13.167	18

In order to have a more intuitive understanding of the indicators changes of the treated components before and after the parents' carve-outs, dummy variables of the year of parents' carve-outs were set. The year of the parents' carve-outs was recorded as 0, and the year before parents' carve-outs was recorded as -1, and so on, the balanced panel data of the treatment group in the year of (-2, 2) was obtained. 18 samples were included in the equity carve-outs (the remaining 10 samples were deleted due to missing values in the data within five years

before and after the equity carve-outs). The mean and median values of the main variables calculated are shown in Table 3 and Table 4 respectively. It can be seen that the mean value and median value of enterprise value (TBQ) both showed a changing trend of first increasing and then decreasing.

Table 4. Annual trend of median values of main indicators in the treatment group

Variable	-2	-1	0	1	2	N
	p50	p50	p50	p50	p50	
TBQ	1.470	1.544	1.637	1.644	1.271	18
Gov	1.000	1.000	1.000	1.000	1.000	18
Size	9.883	9.950	10.158	10.204	10.247	18
Lev	0.552	0.531	0.538	0.547	0.524	18
ROA	0.053	0.060	0.059	0.045	0.043	18
Growth	0.121	0.195	0.218	0.199	0.194	18
TOP1	34.227	31.933	31.191	30.271	29.697	18
Inde	0.333	0.345	0.345	0.345	0.360	18
Age	9.000	9.500	11.000	12.000	13.000	18

4.2. Correlation analysis

The correlation analysis results among the main variables are shown in Table 5. There is a significant negative correlation between corporate size (*Size*), financial leverage (*Lev*), ownership concentration (*TOP1*), years of being listed (*Age*) and enterprise value (*TBQ*). There is a significant positive correlation between net interest rate on assets (*Roa*), the ratio of independent directors (*Inde*) and Tobin's Q (*TBQ*), too.

Table 5. Correlation coefficient matrix of main variables

	TBQ	Size	Lev	ROA	Growth	TOP1	Inde	Age
TBQ	1							
Size	-0.3848*	1						
Lev	-0.3813*	0.5784*	1					
ROA	0.1478*	-0.0965*	-0.5264*	1				
Growth	-0.0047	-0.021	-0.0358	0.0181	1			
TOP1	-0.2044*	0.1475*	0.0763*	0.0355	0.0255	1		
Inde	0.1141*	0.0387	-0.0694	-0.0318	-0.0208	0.0944*	1	
Age	-0.0830*	0.05	0.0848*	-0.0514	0.0371	-0.1160*	0.0539	1

Note: *means the significance at the levels of 1%

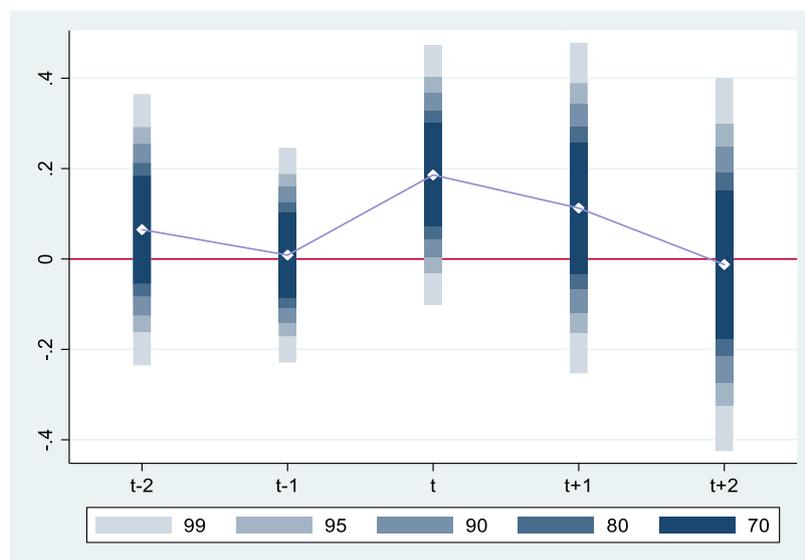


Fig. 1 Parallel trend regression diagram

4.3. Regression analysis

An important assumption for the use of the TDID model is that "parallel trends" need to be satisfied, that is, the two groups of samples must be comparable before shocks or policies occur, because the performance of the control group is assumed to be the counterfactual of the treatment group. FIG. 1 shows the multi-period dynamic effect of the value of business group before and after equity carve-outs. The regression coefficient of Tobin's Q (*TBQ*) and *treat* fluctuates near 0 before parents' carve-outs, is significantly positive in the year of parents' carve-outs, and then gradually falls back to near 0. Therefore, parents' carve-outs is likely to have a positive improvement effect on the value of business group at the beginning of implementation, but the positive effect weakens with the increase of time.

Table 6. Equity carve-outs and the value of business group

	(-1,1) TBQ	(-2,2) TBQ
_D_F2		0.065 (0.114)
_D_F1	0.080 (0.076)	0.009 (0.091)
treat	0.185** (0.085)	0.186* (0.110)
_D_L1	-0.048 (0.117)	0.113 (0.139)
_D_L2		-0.012 (0.157)
Control Variables	Yes	Yes
_cons	8.452*** (1.588)	12.801*** (1.831)
N	1355	1355
R2	0.473	0.486

Note: ***, **, and * means the significance at the levels of 1%, 5%, and 10%, respectively; the bracketed numbers are robust standard errors.

The regression results showed that when the window period was (-1, 1), the coefficient of *treat* was significantly positive at the level of 5%. This shows that the value of business group was greatly enhanced both in the year of the parents' carve-outs and in the year following. When the window was extended to (-2, 2), the coefficient of *treat* was also significantly positive at the 10% level. The above results indicate that parents' carve-outs can significantly enhance the improvement of the value of business group.

5. Conclusions

In the process of equity carve-outs, investors favor the concept of equity carve-outs and information asymmetry is alleviated, which is conducive to the acquisition of positive announcement effect of parent company and the increase of stock value. Independent listing of subsidiaries, but also for their own strategic development investment to access to capital. In particular, the parent company can focus on its own core business development, and the improvement of the subsidiary's own governance system and incentive system improves the overall synergistic effect among the members of the enterprise group. Based on this, this paper proposes that parents' carve-outs can improve the overall value creation of business groups, which is verified by data and enriches the long-term enterprise value impact study of equity carve-outs.

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