Firm Growth, Firm Size and the Diversification Discount

Joost Impink*

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Abstract

I examine growth and size properties of diversified firms and find that the diversification discount is driven by high-growth and large diversified firms, which trade at lower prices relative to their focused counterparts. I triangulate my results with past stock returns and IPO pricing. I find that high-growth diversified firms are priced at a discount at the time of the IPO, while I find a negative incremental stock return for large diversified firms. The results in this paper have important implications for the design of future diversification-related studies as I find that firm growth is correlated with the diversification profile as well as excess value. Thus, growth needs to be controlled for in order to prevent an omitted correlated variables bias.

Keywords: *Diversification discount, firm growth, firm size, IPO pricing.*

*University of Florida, Warrington College of Business Administration, Fisher School of Accounting, 336 Gerson, Gainesville, Florida 32611, USA, email: joost@ufl.edu

Introduction

In this paper I examine the relation between firm growth, firm size and diversification, and explore the implications of this relation for the diversification discount. The diversification discount, the discount at which diversified firms trade relative to focused firms, has been studied extensively (Lang and Stulz, 1994; Berger and Ofek, 1995; Servaes, 1996; Rajan et al., 2000; Campa and Kedia, 2002; Mackey and Barney, 2006; He, 2009; Hund et al., 2010; Mitton and Vorkink, 2010). Overall, the findings of these papers suggest that diversified firms are trading at a discount of about 10-15% compared with focused firms.

In diversification-related research, it is common practice to include controls for firm growth and firm size, but few studies have actually investigated the interactions of diversification with these variables. Young firms face more uncertainty than older firms (Evans, 1987; Zhang, 2006), while managing a growth firm is more difficult than managing a mature firm, as indicated by higher management compensation for growth firms (Gaver and Gaver, 1993). About one third of IPO firms do not survive (Jain and Kini, 1999), while Hensler et al. (1997) find that IPO firms' survival increases in firm size. The effect of diversification may differ for low growth versus high growth firms. On the one hand, diversification for high growth firms may reduce uncertainty and increase the firm's chances of survival. On the other hand, managing multiple high growth segments may exacerbate the risks and complexities that come with firm growth and negatively affect firm value.

Similarly, diversification-related agency costs may vary by firm size. Barclay and Smith (1995) find lower information asymmetry for mature firms compared with smaller firms, whereas Jensen (1986) suggests agency problems increase with free cash flows, which are higher for mature firms compared with smaller firms. If agency costs drive the diversification discount, then these papers suggest opposing associations between firm size and the diversification discount.

The interaction effect of diversification with firm growth as well as firm size has received little attention in the literature. Exceptions include Shyu and Chen (2009), who partition Taiwanese firms into growth firms and mature firms and find that diversified growth firms are trading at a discount while this is not the case for mature diversified firms. In addition, He (2009) reports a U-shaped pattern of the diversification discount for sample size quartiles.

In this study I examine growth and size properties of diversified firms to determine if certain firms drive the diversification discount. I examine the excess value for all firms with segment data (full sample) as well as a propensity score matched sample where I minimize differences in firm growth and firm size between focused firms and diversified firms. In addition, I create additional measures of excess value that are adjusted for growth. Since excess value is nonlinear in growth, these measures should better control for differences in firm growth compared with the Berger and Ofek (1995) measures of excess value. Furthermore, I triangulate my results using stock return and IPO pricing. Finally, I show the impact of differences in firm growth for the change in excess value, as well as differences between diversifying firms versus diversified firms.

I first confirm that firm growth and firm size are correlated with the diversification profile. Focused firms tend to be young, small and high growth compared with diversified firms, which are older, larger and have lower growth. I continue by examining which diversified firms are trading at a discount and find that the discount is driven by high growth diversified firms and large diversified firms. I find these results for both the full sample as well as the propensity score matched sample. In addition, I repeat the analyses for portfolios based on the Life Cycle Proxy based on Dickinson (2011). I find that high growth diversified firms within 'Introduction' and 'Growth' portfolios, but not in 'Mature', are trading at a discount, which confirms my findings.

I use past stock return and IPO pricing to triangulate results. Firms that trade at a discount should also have lower preceding stock return, or have a lower IPO price, or both, as the stock price is the sum of the IPO price and cumulative dividend-adjusted stock returns. I find that the excess value is more than 30% lower for diversified IPO firms compared with focused IPO firms[1], while I find that large diversified firms have lower stock return and lower operating cash flows. Furthermore, I show that the appropriate benchmark for the change in excess value is not zero. Instead, 'difference-in-differences' is a more appropriate design to test for changes in excess value.

This paper makes the following contributions. First, I document that the diversification discount is driven by high growth and large diversified firms. This is relevant for the design of future studies as the underlying drivers of the discount such as agency costs should be most prominent for these firms. Follow up studies should concentrate on differences between high growth (large) focused and high growth (large) diversified firms.

Second, this paper sheds light on the 'diversification puzzle'. Lamont and Polk (2001) and Mitton and Vorkink (2010) examine why diversified firms have higher stock return compared with focused firms, while the diversification discount suggests diversified firms should underperform. The finding that diversified firms have a large discount priced at the time of the IPO relative to focused firms offers a straightforward explanation for this phenomenon.

Finally, this paper shows that the change in excess value for focused as well as diversified firms is negative on average, which is driven by growth deceleration. This has important implactions for the design of studies that examine the change in excess value in order to prevent a correlated omitted variables problem. I also find evidence of a systematic difference between diversified and *diversifying* firms, as the latter are

[1]The difference in the median excess value is 30.7% and 45.1% for the sales and assets-based measure of excess value, respectively, using the sum-of-segments approach of Berger and Ofek (1995). When adjusting the excess value measure for firm growth, the difference reduces to 18.3% and 13.8%, respectively.

younger and have higher excess values compared with the former.

The paper proceeds as follows: section 1 discusses prior literature on the diversification discount. Section 2 discusses sample selection and the construction of the main variables. Section 3 presents empirical results, while section 4 contains additional analyses where I examine the discount for portfolios based on the Life Cycle Proxy of Dickinson (2011), and additional analyses examining performance and IPO pricing. Section 5 discusses the findings while section 6 contains concluding remarks.

1 Literature Review

The diversification discount of diversified firms vis-à-vis focused firms has been well documented (Lang and Stulz, 1994; Berger and Ofek, 1995; Servaes, 1996; Rajan et al., 2000; Martin and Sayrak, 2003). The common approach in these papers is that diversified firms are compared with stand-alone firms using COMPUSTAT segment data, where stand-alone firms operate in a single segment, and diversified firms operate in multiple segments. Several authors have shown that it is not diversification per se that causes the discount, but rather, discounted firms choose to diversify. They find that the discount disappears or even becomes a premium when self-selection is taken into account (Campa and Kedia, 2002; Hyland, 2003; Villalonga, 2004b; He, 2009). In addition, Graham et al. (2002) show that an acquisition will result in a discount for the acquiring firm if the target firm is trading at a discount, even if the target firm is purchased at fair value. On the other hand, Santalo and Becerra (2008) provide evidence that diversified firms operating in industries with few focused firms have a diversification premium.

The approach introduced by Berger and Ofek (1995) to compute a firm's excess value is widely used in this line of research. Berger and Ofek (1995) measure excess value as the natural log of the firm's actual value divided by its imputed value. The imputed value is constructed using the sum-of-segments approach: each segment is valued using a valuation metric - either sales or assets-based - using the median single-segment firm operating in the same industry as the segment as a benchmark.

The excess value can be analyzed on a levels basis 'as-is' (Berger and Ofek, 1995) or controlling for self selection using the Heckman/2SLS procedure (Campa and Kedia, 2002; He, 2009) or propensity score matching (Villalonga, 2004b). Alternatively, the firm itself has been used as its own control using the change in excess value (Graham et al., 2002; Stowe and Xing, 2006), or 'difference-in-differences' (Villalonga, 2004b; Hund et al., 2010).

Firm growth is an important determinant of firm value (Myers, 1977). There are indications that focused firms have more growth opportunities compared with diversified firms. Mackey and Barney (2006) report that diversified firms are more likely to pay dividend, while Marinelli (2010) reports that single-segment firms might be considered 'growth stocks'. Finally, Hund et al. (2010) report that multiple-segment firms are older.

There is a strong positive relation between firm size and the measures of excess value, which is widely documented. This is consistent with firm size being a risk factor, where small firms are deemed more risky and are therefore trading at lower prices (Fama and French, 1992).

When examining excess value on a levels basis, it is common practice to control for firm growth and firm size by including capital expenditures and total assets, respectively. Since stock price is non-linear in growth, growth may potentially still impact the diversification discount. However, using a growth-adjusted measure of excess value, Stowe and Xing (2006) show that firm growth does not explain the discount.

Previous research on the properties of diversified firms that are trading at a discount is rather limited. In other words, there is little known about what is driving the discount other than 'diversification'. Having a better understanding of the properties of discounted firms could help design follow up studies to find (further) evidence on possible differences in corporate governance structures, agency costs, and profitability.

Various papers have examined the differences between young or high growth firms and old or mature firms. Zhang (2006) uses firm age as one of the proxies for uncertainty and finds results consistent with an inverse relation, that is, young firms face more uncertainty than older firms. This is consistent with the finding of Evans (1987), who documents that as firms age, the probability that the firm will fail, as well as firm growth - measured as the change in employment size - and firm growth variance drops. Furthermore, about one third of the IPO firms fail or are acquired within five years after the IPO (Jain and Kini, 1999). Hensler et al. (1997) examine differences between IPO firms and find that the survival time of the IPO firm increases with firm size and the firm age at time of the IPO. Managing a growth firm requires a higher quality manager than managing a cash cow firm, as evidenced by the results of Gaver and Gaver (1993) who report that growth firms pay more cash compensation as well as stock option compensation compared with non-growth firms. Does diversification help or hinder operating a high growth firm? On the one hand, diversification for high growth firms may reduce uncertainty and increase the firm's chances of survival. On the other hand, managing multiple high growth segments may exacerbate firm complexity and negatively affect firm value.

Similarly, diversification-related agency costs may vary by firm size. Aron (1988) models the relation between firm size and diversification. Her model predicts that the benefits of diversification are increasing in firm size, suggesting that smaller firms may have a larger discount. In addition, Barclay and Smith (1995) find that large firms issue a significantly higher proportion of long-term debt while smaller firms rely more on short-term bank debt. This is consistent with the notion that firms with potentially large information asymmetries issue more short-term debt. If the costs of diversification are driven by agency costs, then this would imply that diversification is more likely to destroy value for small firms than for large firms. On the contrary, Jensen (1986) argues that agency problems are more likely for firms with high free cash flows, that is, large mature firms.

In summary, based on these articles, it is difficult to predict the direction of the interaction effects (if any) of firm growth as well as firm size with diversification. Previous literature that has partitioned the sample on these dimensions is limited. Shyu and Chen (2009) examine Taiwanese firms and partition these in ‘Growth’ and ‘Mature’ portfolios. They find that the discount is mainly present for diversified firms in the growth portfolio while mature diversified firms do not trade at a discount. He (2009) examines the differences in the discount pre-1998 and post-1997, based on SFAS131 which became effective for fiscal years ending after December 15, 1997. His results reveal a U-shaped relation between size quartiles and excess value, where the excess value is most negative for quartiles 2 and 3.[2]

In this study I do not attempt to answer the question if diversification itself causes the discount. Instead, I attempt to document the size and growth properties of diversified firms that drive the diversification discount.

2 Data and Main Variables

2.1 Sample Selection

My sample consists of all firms with available segments data in COMPUSTAT and COMPUSTAT segment files with end of year from December 1998 to 2009.[3] I closely follow Berger and Ofek (1995), as their approach has been widely used (for example Campa and Kedia, 2002; Denis et al., 2002; Villalonga, 2004a; He, 2009; Hund et al., 2010). I select

[2]The coefficients are -10.3, -0.259, -0.203 and -0.107 for the four size quartiles, respectively, see He (2009) table 5, panel B, row 1 (OLS) on p. 380.

[3]SFAS 131 became effective for firm-years starting December 15, 1997. SFAS 131 requires the disclosure of ‘operating segments’, while the previous standard SFAS 14 focused on industry segments. See Martin and Sayrak (2003) for a discussion. I focus on post-SFAS 131 data, because prior studies find that segment disclosures provided by management are more accurate after the new accounting rules became effective (for example Berger and Hann, 2003).

all firms with business and operating segments, while excluding geographic segments.[4] I exclude firm-years with segments in the financial sector (SIC 6000-6999) and utilities (SIC 4000-4949), firm-years with total sales less than 20 million, firm-years with missing values of total capital[5], firm-years with missing SIC in the segment files, and firm-years where the sum of segment sales is outside the 99-101% range of total sales. This procedure leads to an initial sample of 36,705 firm-year observations. I cannot compute my proxy for firm growth for 40 observations for which cash flow from financing activities is missing. I also drop 578 observations when constructing industry instruments.[6]

The measure of diversification (D) is based on the number of segments the firm reports. I set D to 0 for firms with a single segment, and 1 for firms with multiple segments. When a firm reports segments with identical 4-digit SIC, I do not aggregate these, but I follow the reporting decision of the company and treat it as a multiple-segment - hence diversified - firm. The resulting sample consists of 36,087 firm-years (21,332 single-segment and 14,755 multiple-segment firm-years) for 6,565 unique firms.

2.2 Measures of Excess Value

I compute two sets of measures of excess value. The first set follows Berger and Ofek (1995) where the measures are based on the sum of the segments (discussed next in 2.2 Segment-Based Measures of Excess Value). Following Stowe and Xing (2006) I create a second set where I incorporate firm growth in the industry matching procedure (see 2.2 Growth-Adjusted Measures of Excess Value). This should lessen the concern that firm

[4]I match `SEGITEM` with `SEGNAICS` to retrieve segment type (stype), and subsequently match with `SEGDTAIL` to get operating segment type 1 (soptp1). I drop segments where soptp1 equals “GEO”.

[5]Capital is computed as the sum of market value of equity (prcc_f×csho), liquidating value of preferred shares (pstkl), and total debt (which equals debt in current liabilities (dlc) plus total long term debt (dltt)). Missing values for pstkl, dlc and dltt are replaced by zeros. Firms with missing values for csho are dropped. If end of fiscal year stock price (prcc_f) is missing, I attempt to retrieve it from CRSP daily stock file (`DSF`) by matching gvkey (`FUNDA`) on COMPUSTAT-Crsp mergetable (`ccmxpf_linktable`) to obtain historical permno (lpermno). Firm-years with missing prcc_f in `FUNDA` for which I cannot retrieve end of year stock price are dropped.

[6]These observations are firm-years where the firm is the only firm active in its 4-digit SIC industry, see section 3.2.

growth may not be adequately captured by a control variable in an OLS regression. For each set I construct a measure of excess value based on sales, and a measure based on assets.

Segment-Based Measures of Excess Value

I compute EVSBO and EVABO as excess value measures based on sales and assets, respectively, in line with Berger and Ofek (1995). First, for the single-segment firms I compute the valuation multiples capital-to-sales (VtoSALES) and capital-to-assets (VtoASSETS). Then, I group single-segment firm-years based on the segments' SIC so that each group contains at least 5 single-segment firm-years.[7] For each industry-year group k, I select the median values of the valuation multiples $ind_{S,k}$ and $ind_{A,k}$, of the sales and assets-based multiples, respectively. The sales-based measure of excess value (EVSBO) is computed as follows:[8]

$$IV_S = \sum_{i=1}^{n} SALES_i \times ind_{S,k(SSIC(i))} \tag{1}$$

$$EVSBO = ln\left(\frac{V}{IV_S}\right) \tag{2}$$

The number of segments (n) equals 1 for single-segment firms, so the sales-based imputed value (IV_S) equals the firm's sales multiplied by the industry median capital-to-sales ratio for the segment's industry ($ind_{S,k}$).[9] The sales-based measure of excess value (EVSBO) is the natural log of the firm's capital (V) divided by the sales-based imputed value (IV_S).[10] A positive (negative) value for EVSBO implies a positive (negative)

[7] I start with 4-digit SIC grouping, and consequently drop one digit until each group contains at least 5 firm-years. Following Berger and Ofek (1995); Campa and Kedia (2002), I group all firms that remain unmatched after grouping at the 2-digit level.

[8] Replace 'S' ('SALES') by 'A' ('ASSETS') for the assets-based measure of excess value (EVABO).

[9] $SSIC(i)$ is the 4-digit SIC for segment i, and $k(\cdot)$ is the mapping of a 4-digit SIC to the corresponding industry group containing at least five single-segment firm-years.

[10] Taking the natural log is common practice in this line of research even though it gives a lower weight to positive excess values. For example, the simple average of 0.9 and 1.1 is 1.0, while the

excess value.

For multiple-segment firms I match each segment to a single-segment industry group. I start to match on 4-digit segment SIC, and subsequently drop a digit until a matching single-segment industry group is found.[11] The imputed value for a multiple-segment firm equals the sum of the segment-imputed values.[12]

I set the assets-based measure of excess value (EVABO) to missing when the sum of the assets reported for the segments is outside the 75-125% range of total assets at the firm level.[13] Next, I winsorize these variables by fiscal year at 1% and 99%.[14]

Growth-Adjusted Measures of Excess Value

There are various variables that could serve as a proxy for firm growth. Analyst expectations of long term growth in earnings, past earnings or sales growth, or actual growth in earnings or sales observed with hindsight. The drawback of using any of these proxies is that it is often argued that agency costs resulting from diversification negatively affect profitability (Martin and Sayrak, 2003). When lower profitability in turn restricts firm growth, performance-based measures of firm growth are potentially inappropriate.

average of the natural log of these numbers is less than 1. If there is more variation in the excess value for multiple-segment firms, this will result in a lower *mean* excess value. This however does not affect the median. It also does not have a material impact on regression estimates.

[11] I group all segments into a single group that cannot be matched at the 2-digit SIC. I match these on the median of the single-segment firms that fell below 5 firms when grouping at the 2-digit SIC level.

[12] All firm-years have total segment sales within 99-101% of sales at the firm level. However, if total assets at the firm level differ from total segment assets, I scale the imputed value accordingly. For example, if total assets at the firm level equals 100, while the sum of the assets allocated to segments equals 80, then I scale the imputed value up by dividing by 0.8.

[13] For consistency, I also apply this to single-segment firms, even though segment assets equal assets at the firm level. However, this only affects 0.6% of the single-segment firms. For multiple-segment firms total segment assets are out of range for 43.9% of the firm-years in the sample.

[14] Berger and Ofek (1995) continue to set measures of excess value to missing when the absolute value exceeds 1.386. This effectively removes measures where the firm's actual value is less than 25% or more than 400% of the imputed value. Additional analyses reveal that the observations with extreme high (low) excess value are driven by high (low) profitability, high (low) growth and large (small) firm size. I therefore don't disregard these observations as outliers, but include them as valid data points instead. Additional analyses reveal that including these observations results in a larger discount. In section 5 I provide additional analyses to relate the findings of this paper to previous research, including summary statistics for the sample where these observations are excluded.

I consider two 'balance sheet' measures of firm growth: capital expenditures and financing cash flows. Each measure has its own merits. Capital expenditures may overstate growth when the expenditures are merely replacing existing assets. Some mature firms may thus be classified as growth firms. On the other hand, financing cash flows may understate growth when the firm is using operating cash flows to fund growth. As a result, growth firms may be misclassified as mature.

It could be argued that capital expenditures and financing cash flows also proxy for performance. For example, poor performing firms may need to issue new equity to cover losses, while high dividend payout signals high performance. Nevertheless, partitioning on either variable will still reveal such differences. For example, if single-segment firms issue equity to grow, while multiple-segment firms issue equity to cover losses, then within the corresponding financing cash flows portfolio, single-segment firms will have higher valuation multiples. Equivalently, if poor performing growth firms have too little cash at hand to make investments and end up being grouped in a mature portfolio, then within that portfolio these firms will have lower excess values.

I choose to use financing cash flows as the proxy for firm growth, based on a bias in the assets-based measure of excess value (EVABO) identified by Custodio (2010). This measure of excess value is based on the capital-to-assets ratio VtoASSETS, which equals capital (V) divided by assets (ASSETS). Consider the impact of financing cash flows (CFF) on this ratio:

$$VtoASSETS|CFF = \frac{V + CFF}{ASSETS + CFF} \tag{3}$$

When the firm repays debt, pays dividends or buys back shares, cash flow from financing activities (CFF) is negative and it reduces both the numerator and the denominator by the same amount. As a result, VtoASSETS increases since the market value of assets is typically higher than its book value. Similarly, when the firm issues debt or shares, assets (ASSETS) and capital (V) increase by the same amount, resulting in a decline of VtoASSETS. This implies that VtoASSETS will be biased downwards for high growth firms. Thus, financing cash flows may be more suitable to use as the proxy for growth compared with capital expenditures as the former reduces the bias in EVABO.

I use 5-year average cash flows from financing activities (CFF5Y) as the proxy for firm growth.[15] I scale financing cash flows by end of year assets, and compute a 5-year average, where the last year is the fiscal year for which the measure is constructed for.[16] For negative (positive) values, the firm has paid (received) cash to (from) its debt/shareholders. I create decile ranks for this variable, that I use for matching. Firms in the low deciles are cash cow firms, while firms in the high deciles are growth firms.

I create EVSCFF and EVACFF as firm-level growth-adjusted measures of excess value, based on total sales and total assets, respectively. I do not use any information from the segment files to compute these measures, other than identifying which firms operate in a single segment, which are the benchmark firms.[17] I use firm level SIC for industry grouping.[18] In addition to matching on industry and year, I also match on the decile rank of CFF5Y. The industry-grouping therefore needs to be 'wider' than the 5 observations following Berger and Ofek (1995). I use Fama and French 12 industry grouping[19] to create industry-CFF5Y decile rank-year portfolios using single-segment firm-years. I do not require a minimum number of firm-years in each grouping, and I

[15] I use out of sample firms over the period 1987-1997 to examine the difference in future sales growth using life cycle proxies of Dickinson (2011). The difference in average future sales between 'Growth' and 'Mature' portfolios is highest when using 5-year average CFF (CFF5Y).

[16] I use 5 years when available, but at least 1 year. I scale by end of year assets to prevent a large influence of low beginning of year total assets. In addition, using end-of-year assets prevents me from using pre-IPO data for newly listed firms which may not always be available.

[17] The weakness of these measures is that useful information at the segment level is not used, while the upside is that this measure is less sensitive to errors and biases of segment information, see Martin and Sayrak (2003) for a discussion on the (lack of) quality of segment disclosures.

[18] I use 'Standard Industry Classification Code' (SIC) from `COMPANY.COMPANY` and not 'Standard Industrial Classification - Historical' (sich) from `FUNDA` as the latter has many missing observations.

[19] See Kenneth French's website:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/ftp/12_Industry_Portfolios.zip

drop multiple-segment firms that cannot be matched when no single-segment firms are present in the industry-year-rank CFF5Y group.[20]

2.3 Descriptive Statistics

Summary statistics are shown in table 1. I include median and mean values as well as the number of observations for single-segment firms (A) and multiple-segment firms (B). When comparing multiple-segment firms with single-segment firms, I find that multiple-segment firms are older and larger, while growth is lower, as indicated by lower sales growth, lower capital expenditures and lower financing cash flows.[21]

Insert table 1 here

Multiple-segment firms have higher ROA, which contradicts previous findings of Berger and Ofek (1995), who report that the median industry-adjusted ebit to sales margin is 1.9% lower for multiple-segment firms. However, when I adjust for industry membership by subtracting the median ROA for Fama and French 12 industry-year grouping, the difference turns negative to -0.3%. The median 5-year average monthly stock return (MRET5Y) is negative (-0.001) and significant at 5%, while the median of average monthly return over the fiscal year (MRET1Y) is positive (0.001) and not statistically significant.[22]

The market-to-book ratio (MTB) and the multiples VtoSALES and VtoASSETS used in constructing the measures of excess value indicate that multiple-segment firms

[20] Of the single-segment firms, 2.0% are matched to an industry group smaller than 5 firm-years. Of the multiple-segment firms, 0.3% of the firm-years are dropped, and 5.0% of the firm-years are matched to a group with less than 5 observations.

[21] When computing sales growth, I control for sales growth through acquisitions. When a firm has discontinued operations (do in `FUNDA`), I set sales growth to missing, as the sales of the discontinued operations is no longer included in the sales of that year, while it is included in the sales number of the previous year.

[22] MRET5Y (MRET1Y) is the average monthly stock return over a five year window ending at fiscal year end (over the fiscal year). I use 60 (12) months of returns, if available. For both return measures, I require no minimum number of months. Thus, I include firms for which no stock returns are available. This way, the sample selection most closely resembles that of Berger and Ofek (1995).

have lower stock prices. The difference in the median values of the segment-based (BO) measures of excess value are -9.5% and -10.0% for sales-based and assets-based measures, respectively. When matching on wider Fama and French 12 industry grouping, but also on the decile rank of average financing cash flows (CFF5Y), the discount for the sales-based and assets-based measures drops significantly to 4.8% and 3.6%, respectively. This suggests that a substantial portion of the diversification discount is related to differences in firm growth between single-segment and multiple-segment firms.

Insert figure 1 here

Figure 1a shows the average sales-based sum-of-segments measure of excess value (EVSBO) over the 5-year average financing cash flows (CFF5Y) deciles. High growth firms in CFF5Y decile 10 have the highest excess values for either diversification profile. The average excess values in this decile are 47.3% and 28.4% for single-segment and multiple-segment firms, respectively. Furthermore, the excess value for multiple-segment firms is lower compared with single-segment firms for deciles 4-10, but not for cash cow firms in deciles 1-3. This is consistent with a diversification discount for high growth diversified firms and not for diversified firms that are mature. Finally, the relation between firm growth and excess value is nonlinear.[23]

Figure 1b includes a similar graph where EVSBO is shown by firm age. I compute firm age as the difference between the fiscal year and the first fiscal year with stock return available.[24] Even though firm age is not a good proxy for firm growth (Dickinson, 2011) the graph is illustrative. Especially newly listed firms (firm age being zero) are high growth firms, and are priced accordingly. The average excess value EVSBO for single-segment and multiple-segment IPO firms is 61.1% and 19.9%, respectively.[25] For

[23]Excess value is increasing in growth, as well as in profitability. Low growth deciles contain firms with high dividend payments and debt repayments which correlates with high profitability.

[24]The first firm-year with Compustat data is typically pre-IPO.

[25]These numbers are different from the excess values reported in table 8, which is based on sub-sample of firms that are also in the Field-Ritter dataset of company founding dates.

firms aged 15-30 years, this difference has largely disappeared. Figure 1b thus confirms the relation between firm growth and excess value, and shows that the diversification discount is driven by growth firms.

Figure 1c shows the excess value by firm size (lnASSETS) decile. Consistent with firm size being a risk factor, the average excess value increases with firm size. In each decile, the average excess value for multiple-segment firms is lower compared with the excess value for focused firms. Also, the gap widens as firm size increases, indicating there is an interaction effect of diversification and firm size.

If firms start out as single-segment firms, and diversify at a larger stage, then single-segment and multiple-segment firms are not randomly distributed with respect to growth. This is potentially problematic and may bias the diversification discount.[26] Figures 1d-1f show the relative frequency of single-segment versus multiple-segment firms for the different groups and deciles:

$$r_d = \frac{n_{d,SS}}{n_{SS}} \times \frac{n_{MS}}{n_{d,MS}} \tag{4}$$

Where n_{SS} and n_{MS} are the total number of single-segment and multiple-segment firm-years, respectively. The number of single-segment (multiple-segment) observations within a group or decile d is indicated by $n_{d,SS}$ ($n_{d,MS}$). r_d holds the ratio of the frequencies. Values of $r_d > 1$ (<1) [= 1] indicate that it is more (less) [equally] likely for single-segment firms relative to multiple-segment firms to be in group or decile d.

Figures 1d, 1e and 1f shows the relative frequency (r_d) for observations by firm growth, firm age, and firm size, respectively. If observations are randomly distributed, then r_d equals 1 for each decile and age group. Figure 1d show that single-segment firms are more (less) likely to be high (low) growth firms. Similarly, figure 1e shows that as

[26] Typically, measures of excess values are regressed against a diversification indicator variable and control variables. Even if firm growth is included as a control variable, it is unlikely that this variable will fully capture firm growth since the relation between excess value and firm growth is non-linear.

focused firms age, they tend to diversify. Likewise, small firms tend to be focused, while large firms are more likely to be diversified (figure 1f).

When stating the diversification discount as the mean or median difference between single-segment and multiple-segment firms, these graphs imply there are two opposing biases. First, the diversification discount will be overstated as high growth focused firms (low growth diversified) firms with corresponding high (low) excess values are oversampled. Second, size differences between focused and diversified firms reduces the diversification discount as small focused (large diversified) firms with corresponding low (high) excess value are oversampled. These differences may affect the coefficient on diversification in a regression where excess value is regressed on diversification and control variables depends, when these control variables do not fully capture firm growth and firm size. The nonlinear relation between excess value (EVSBO) and firm growth in figure 1a indicates this is most likely to be the case for firm growth. The second set of excess value measures (EVSCFF, EVACFF) that are constructed while matching on financing cash flow deciles should better control for differences in growth. In addition, I create a propensity score matched sample where I include firm growth and firm size as factors. This sample will - by construction - have a more evenly distribution of r_d over the firm growth and firm size deciles.[27]

3 Results

3.1 Firm Growth and Diversification Profile

Univariate summary statistics and figure 1 suggest that firm growth (firm size) and diversification profile are negatively (positively) associated. That is, newly listed firms and small firms are more likely to be single-segment firms, while mature and large firms

[27]It actually also flattens r_d for firm age, even though this variable is not included as a factor.

tend to be multiple-segment firms. In this section, I formally test these relationships, before examining the interaction effects of diversification with firm growth as well as firm size. I use a logit regression with diversification profile (D) as the dependent variable, which is 1 for multiple-segment firms, and 0 for single-segment firms. I also use the fitted values of this regression to create a propensity score matched sample.

In line with Campa and Kedia (2002) and Villalonga (2004b), I model the diversification profile[28] as follows (firm and year subscripts omitted):

$$D^* = \boldsymbol{\Theta}(1, Z_1, Z_2, \ldots, Z_m) + \mu \tag{5}$$

$$D = \begin{cases} 1 & \text{if } D^* > 0 \\ 0 & \text{if } D^* \leq 0 \end{cases} \tag{6}$$

Firms are diversified (D=1) when the latent variable D^* is positive, and focused (D=0) when D^* is zero or negative. The diversification profile is explained by factors $\boldsymbol{Z}$.

I use the fitted value $\hat{D}$ (PRED), that is, the probability to diversify, to construct a propensity score matched sample, with focused and diversified firms that are *equally likely* to be diversified. At the same time, differences between single-segment and multiple-segment firms in $\boldsymbol{Z}$ are reduced.

I test for a relation between diversification (D) and firm growth as well firm size. I use 5-year average financing cash flows (CFF5Y) as a proxy for firm growth, as well as the Life Cycle Proxy variables of Dickinson (2011), which include 'Introduction', 'Growth', 'Mature', 'Shake-out' and 'Decline'. The partitioning is based on the sign of the cash flows from operating, investing and financing activities.[29, 30] I use the log of total assets (lnASSETS) as a measure of firm size.

[28]Campa and Kedia (2002) and Villalonga (2004b) benchmark firms that *diversify* against focused firms, while I examine *diversified* firms versus focused firms. This difference affects the sample selection and choice of variables, but not the model itself.

[29]'Introduction' CFO ≤ 0, CFI ≤ 0 and CFF > 0, 'Growth' CFO > 0, CFI ≤ 0 and CFF > 0,'Mature' CFO > 0, CFI ≤ 0 and CFF ≤ 0, 'Decline' CFO ≤ 0, CFI > 0. 'Shake-out' holds remaining firm-years (Dickinson, 2011).

[30]I also require EVSCFF and life cycle variables to be non-missing.

I include industry instruments based on Campa and Kedia (2002) and Santalo and Becerra (2008). Campa and Kedia (2002) measure the industry instruments at the 2-digit SIC level. However, the results of Santalo and Becerra (2008) show the importance of the industry characteristics at the 4-digit SIC level. Accordingly, I construct all industry instruments at the 4-digit SIC level.

I create the following industry instruments. INDDSEGM is the fraction of firms in the firm's industry that are diversified, INDDIVSALES is the proportion of sales by firms that are diversified of total industry sales. INDCAPX is the average capital expenditures to sales ratio, and INDMERGERS is the number of merger announcements over the firm's fiscal year. Based on Santalo and Becerra (2008), I include the natural log of 1 plus the number of focused firms within the 4-digit SIC level (INDFOCUSED). When computing each of the industry measures, I exclude the firm for which the variables are constructed.[31] I exclude firm-years where the firm is the only observation in a 4-digit SIC as there are no other firms left to base the measures on. This results in a loss of 285 single-segment firms and 293 multiple-segment firms, where these firms have an average sum-of-segments based excess value (EVSBO) of 4.9% and -4.2%, respectively.

Campa and Kedia (2002) include instruments to capture trends in macroeconomic conditions and business cycles, in particular the GDP growth rate and the number of months in the calendar year the economy was in a recession. However, later research has documented a relation between these instruments and excess value (Dimitrov and Tice, 2006; Kuppuswamy and Villalonga, 2010; Yan et al., 2010). I therefore do not include them.

Additionally, Campa and Kedia (2002) and Villalonga (2004b) include ebit margin as an instrument. For this study it is important *not* to include profitability as a control

[31] For INDDSEGM, INDPSALES, and INDCAPX/SALES, I first compute averages by 4-digit SIC and year. Then for each firm, I 'back out' the firm's influence on the average. When measuring INDMERGERS, I count the number of announcements within the firm's fiscal year excluding announcements made by the firm itself. For INDFOCUSED, I simply sum the number of single-segment firms in the firm's 4-digit SIC in that year, and subtract 1 if the firm itself is a single-segment firm.

variable. The procedure of estimating the probability of diversifying will result in a sample of single-segment and multiple-segment firms that are equally likely to be diversified, while at the same time minimizing differences in $\boldsymbol{Z}$. In other words, if there are differences in profitability between single-segment and multiple-segment firms, then including profitability as a factor will minimize such differences, potentially resulting in a sample where the diversification discount is reduced mechanically.

I estimate the following regression equation:

$$\begin{aligned} D =& \boldsymbol{\Lambda}(X_1, \ldots, X_k) + \theta_0 + \theta_1 INDDSEGM + \theta_2 INDPSALES + \\ & \theta_3 INDCAPX/SALES + \theta_4 INDMERGERS + \theta_5 INDFOCUSED + \epsilon \end{aligned} \tag{7}$$

$$(X_1, \ldots, X_k) = \begin{cases} (CFF5Y, lnASSETS) & \text{Model 1} \\ (LCP_2, \ldots, LCP_5, lnASSETS) & \text{Model 2} \\ (CFF5Y, LCP_2, \ldots, LCP_5, lnASSETS) & \text{Model 3} \end{cases} \tag{8}$$

I run three models where I vary the specification of the test variables firm size and firm growth $(X_1, \ldots, X_k)$. In model 1 I include assets (lnASSETS) and 5-year average financing cash flows (CFF5Y). In model 2 I replace CFF5Y with four indicator variables for the Life Cycle Proxy (LCP) portfolios. In model 3, I include both CFF5Y as well as the LCP indicator variables. The results are included in table 2. Note that the number in parentheses is the odds ratio.

Insert table 2 here

The coefficient on firm size (lnASSETS) is positive and significant at 1% in each of the three models, indicating that large firms are more likely to be diversified. This is in line with previous research. Firm growth proxied by CFF5Y in model 1 is negative and significant at 1%, indicating that high growth firms are more likely to be focused. This is also in line with previous research that typically included capital expenditures to sales as a proxy for firm growth. In model 2 I replace CFF5Y with the four LCP indicator variables. Firms in 'Introduction' (LCP1=1) make up the control group. Coefficients on LCP3 and LCP4 are positive and significant, indicating that firms in 'Mature' and 'Shake-out' are more likely to be diversified than firms in 'Introduction'. The R^2 in model 2 drops from 0.179 to 0.176, indicating that CFF5Y explains more variation in D than the LCP indicators. Including both proxies for firm growth in model 3 does not add to the power of the model. I therefore use model 1.[32, 33]

Using $\hat{D}$ (PRED), which is the probability for a firm to be diversified, single-segment firms and multiple-segment firms are matched. For each multiple-segment firm, I select all single-segment firms with a probability within 0.01 of the fitted value of the multiple-segment firm. I also require a match on LCP portfolio membership. I do a double sort, where I minimize the difference in probability. I first sort the single-segment firms on the difference in probability where I keep a single observation for each single-segment firm-year where the difference in PRED is lowest. This results in a dataset where all single-segment are included once, but multiple-segment firms are not unique. Then, I sort the multiple-segment firms and keep the observations where the difference in PRED is lowest. Using this procedure, potential matched pairs are lost where the difference in PRED is not the lowest, yet within the 0.01 range. I therefore keep repeating this procedure with all dropped observations until no new matched pairs are identified. In the resulting sample, firm-years in the sample are unique.

Insert table 3 here

Summary statistics for the propensity score matched sample are included in table 3. The sample consists of 9,909 single-segment and 9,909 multiple-segment firms, so roughly two thirds of the 14,755 multiple-segment firms are matched. The difference in firm growth, firm size and the industry instruments has been reduced, although some

[32] In creating the matched sample, I do require that single-segment and multiple-segment are included in the same LCP portfolio.

[33] Further analysis reveals a high correlation between INDFOCUSED and INDDSEGM as well as INDMERGERS, which equals -0.55 and 0.80, respectively. When I create the propensity score matched sample on the model without INDFOCUSED the results remain essentially unchanged.

differences remain statistically significant. I continue with this sample, as the purpose was not to eliminate such differences, but merely reduce them. In the regression analyses I nevertheless include firm growth and firm size as control variables.

While assets (lnASSETS) are similar in size, market capitalization (lnMCAP) is significantly lower for multiple-segment firms compared with single-segment firms. The differences in sales growth (SALESGROWTH) and capital expenditures (CAPX/SALES) remain negative.

While in the full sample multiple-segment firms have higher operating cash flows (OCF) and return on assets (ROA), in the matched sample these differences turned negative. The PSM procedure has reduced the oversampling of mature multiple-segment firms, which are more profitable and have higher operating cash flows. Stock performance is mixed. The difference in one year average monthly returns is negative (-0.001) and significant at 5%, while 5-year average monthly return is 0.001 and not statistically different.

The difference in the measures of excess value values has widened. For example, the median diversification discount using EVSCFF is 4.8% for the full sample (table 1), while it is 9.8% for the matched sample. This can be attributed to reduced variation in firm growth, firm size and industry characteristics between single-segment and multiple-segment firms.[34]

Insert figure 2 here

Figure 2a (2b) shows the average value of EVSBO (EVSCFF) by growth decile for the propensity score matched sample. While figure 1a shows a discount only for firm growth deciles 4-10, figure 2a shows a discount for each of the CFF5Y deciles, which is in line with the higher diversification discount for the propensity score matched sample.

[34] A key risk driver is firm size. Large firms have higher excess values than small firms. As diversified firms are larger, their size premium mitigates the diversification discount. When firms are matched on size, the difference in excess value widens as this 'size-premium' is removed. See also figure 1c.

Figure 2b shows the distribution of EVSCFF over the firm growth deciles. For single-segment firms, the median excess value is zero by construction for each of the CFF5Y deciles. While multiple-segment firms in CFF5Y decile 10 have the highest value for EVSBO (28.4%), the same firms have the lowest value for EVSCFF (-36.1%). The intuition behind this difference is that the EVSBO is computed using single-segment firms regardless their CFF5Y decile. When computing EVSCFF, firms in the tenth CFF5Y decile are benchmarked against single-segment firms in the same thenth CFF5Y decile, which have the highest excess value.

3.2 OLS Regression Results Diversification Discount

I test for an effect for firm growth and firm size on the diversification discount by regressing the following equation:

$$\begin{aligned} EV =& \beta_0 + \beta_1 D + \beta_2 D \times sdrCFF5Y + \beta_3 D \times lnASSETS + \\ & \beta_4 sdrCFF5Y + \beta_5 lnASSETS + \mathbf{\Gamma}(FF_1, FF_2, \ldots, FF_9) + \epsilon \end{aligned} \tag{9}$$

I report the two sales-based measures of excess value (EV) EVSBO and EVSCFF. I transform CFF5Y by scaling its decile rank, creating sdrCFF5Y. This variable equals 0.1, 0.2, ..., 1.0 for observations in decile 1, 2, ..., 10. I include an interaction variable of diversification with firm growth (D×sdrCFF5Y) as well as diversification with firm size (D×lnASSETS). Diversification (D) and its interactions with sdrCFF5Y and lnASSETS are my test variables. Finally, I include indicator variables based on Fama and French 12 industry grouping (not reported). I have excluded financial firms and utilities, so I include 9 industry indicator variables.[35]

Based on prior research I expect a negative coefficient for D. Based on figures 1 and 2, I expect a larger discount for high growth diversified firms. I therefore expect the

[35] The propensity score matched sample no longer contains observations from 'Telephone and Television Transmission' and 'Other'. Accordingly, I include 7 industry indicator variables for this sample.

coefficient for D×sdrCFF5Y to be negative. I have no expectation for D×lnASSETS. He (2009) reports a U-shaped pattern, with the largest discount (most negative excess value) for quartiles 2 and 3. In this specification I estimate a single coefficient for the full sample, so it is not clear up front if the coefficient will be positive or negative. When net benefits of diversification are positive (negative) and increasing in firm size, the coefficient will be positive (negative).

Since excess value is increasing in firm growth and firm size, I expect sdrCFF5Y and lnASSETS to be positive. EVSCFF is constructed while matching on CFF5Y decile rank, so the coefficient of sdrCFF5Y in this regression should only be capturing variation within the decile. I therefore expect this coefficient to be smaller for EVSCFF than for EVSBO.

I regress equation 9 with and without the interactions D×sdrCFF5Y and D×lnASSETS. I report the results for the full sample as well as the propensity score matched sample. Results are included in table 4.

Insert table 4 here

Results for the regression without the interaction variables are reported in columns 1-2 (5-6) for the full (PSM) sample. The signs of the coefficients are as expected. The coefficient for diversification (D) using EVSBO (column 1) is -0.202, which is more negative than the -0.144 reported by Berger and Ofek (1995) in a similar regression.[36] The other coefficients for diversification in the models without interactions are similar. Overall, the diversification discount varies between 14.4% and 20.9%. Firm growth and firm size are positive and significant at 1%. Also, the coefficient of firm growth (sdrCFF5Y) is smaller for EVSCFF compared with EVSBO, as expected.

When including the interactions D×sdrCFF5Y and D×lnASSETS in the full sample

[36] I have included observations with 'extreme' excess values, which results in a larger discount. Also, contrary to Berger and Ofek (1995) I do not include a control variable for profitability. However, including ebit margin or return on equity has very little impact on the coefficient for diversification.

(panel A, columns 3 and 4), the coefficient of D turns positive and is significant at 1%. Both interactions are negative and significant at 1% for both measures of excess value. These results suggest that for the full sample, the diversification discount is driven by high growth and large multiple-segment firms.

However, when using the propensity score matched sample, the results are mixed. While the sign of the coefficients and their statistical significance for EVSCFF in column 8 remain the same as in the full sample, the results for EVSBO in column 7 are no longer in line. The coefficient of D is negative for this measure of excess value, the coefficient of D×sdrCFF5Y is roughly two thirds smaller and the coefficient of D×lnASSETS is no longer statistically significant.

The negative coefficient of D on EVSBO (-0.104) which is significant at 5% suggests an 'overall' discount for multiple-segment firms in the propensity score matched sample. The coefficient on D is positive (0.226) and significant at 1% for EVSBO in the full sample. The propensity matched score procedure has resulted in a larger diversification discount for EVSBO for each of the CFF5Y deciles. For EVSCFF, the matching procedure also widened the discount, but mainly for firms in higher deciles (see figure 2). The general increase in the discount in EVSBO is picked up by D (column 7), while the 'widening' of the discount for the higher CFF5Y for EVSCFF is picked up by the interaction D×sdrCFF5Y (column 8).

In summary, for the full model, both measures of excess value show that the discount is driven by high growth and large diversified firms. For the propensity matched score sample, this result remains robust only for the growth-adjusted measure of excess value (EVSCFF).

4 Additional Analyses

I include several additional analyses. First, I partition the sample into the Life Cycle Proxy (LCP) portfolios. If high growth multiple-segment firms drive the diversification discount, then partitioning the sample by life cycle is likely to reveal a larger discount for multiple-segment firms in the growth portfolio compared with multiple-segment firms that are mature.

Second, the diversification discount uses firm value as a point of reference. If a firm is trading at a discount, then by definition such a firm would have experienced lower stock return, or have a lower IPO price, or both, compared with the benchmark firm, as the stock price equals IPO price plus dividend-adjusted cumulative stock return. In sections 4.2 and 4.3 I triangulate the results for the differences in excess value with stock return and IPO price, respectively.

4.1 Life Cycle Proxy

The results in table 4 indicate that the diversification discount is driven by high growth as well as large diversified firms. As an additional analysis, I partition the sample on the firm's life cycle stage using the Life Cycle Proxy (LCP) introduced by Dickinson (2011). She partitions firm-years into 5 categories: 'Introduction', 'Growth', 'Mature', 'Shake-out' and 'Decline'. The partitioning is based on the sign of the cash flows from operating, investing and financing activities.[37] If high growth firms are responsible for a large portion of the discount, then there should be differences in the discount across the life cycle portfolios. I expect the discount to occur in the 'Introduction' and 'Growth' portfolios.

Insert table 5

[37]'Introduction' CFO ≤ 0, CFI ≤ 0 and CFF > 0, 'Growth' CFO > 0, CFI ≤ 0 and CFF > 0,'Mature' CFO > 0, CFI ≤ 0 and CFF ≤ 0, 'Decline' CFO ≤ 0, CFI > 0. 'Shake-out' holds remaining firm-years.

Table 5 holds median values for single-segment firms (panel A) and differences in the median values for multiple-segment firms (panel B) for the full sample. I focus on the first three stages ('Introduction', 'Growth' and 'Mature') as these hold most of the observations and are most relevant to examine the difference between growth and mature firms.

The partitioning in panel A is consistent with 5-year average financing cash flows (CFF5Y), which is largest for 'Introduction' (0.179), positive for 'Growth' (0.068) and negative (-0.015) for 'Mature'. The Berger and Ofek (1995) measures of excess value (EVSBO and EVABO) show a premium for firms in 'Growth', while the excess value is slightly negative or zero for the other portfolios. When controlling for financing cash flows (EVSCFF and EVACFF), firms in 'Growth' still have a positive excess value, while it is negative for firms in 'Introduction' and about zero for mature firms.

The differences for multiple-segment firms in panel B show that the BO measures show a lower excess value for all of the portfolios. The difference ranges from -22.2% for EVSBO in 'Introduction' to -7.1% for EVABO in 'Mature'. Thus, these measures suggest an average discount for all portfolios but a larger discount for high growth multiple-segment firms. The CFF measures however, show only a discount for the growth portfolios, while the difference for firms in 'Mature' is close to zero (-0.001 and 0.001 for EVSCFF and EVACFF, respectively). In summary, the univariate statistics confirm the larger discount for multiple-segment growth firms.

Insert table 6 here

I separately estimate the regression reported in table 4 for each of the Life Cycle Proxy (LCP) portfolios using EVSCFF. Results are included in table 6 with results for the full sample and the propensity score matched sample in panels A and B, respectively.

For the full sample (panel A), I find that diversification (D) is positive and significant in each of the portfolios. In addition, the interaction variables D×sdrCFF5Y and

D×lnASSETS are negative and significant at 1%. The control variables are as expected, with the exception of sdrCFF5Y for the mature portfolio, which turned negative. In this portfolio one year financing cash flows (CFF) are negative by construction. It is therefore likely that the 5-year average financing cash flows (CFF5Y) correlates with profitability. That is, when CFF5Y is smaller (more negative) the firm is repaying more debt or paying more dividend, or both. Such payments are likely to correlate with profitability, which is increasing in excess value.[38]

The propensity score matched sample for each of the LCP portfolios in panel B are the subsamples of the propensity score matched sample included in table 3.[39] Overall, the results remain the same but at lower levels of statistical significance. The interaction of D with sdrCFF5Y is still significant at 1% for firms in 'Introduction' and D×lnASSETS is significant at 1% for three of the five LCP portfolios. The lower levels of statistical significance are consistent with the reduced sample size of the PSM sample.

In summary, partitioning the sample by Life Cycle Proxy confirms the finding that high growth multiple-segment firms contribute more towards the diversification discount than mature multiple-segment firms do.

4.2 OLS Regression Results Performance

As a benchmark, I repeat the analyses with stock return as the dependent variable. I use past stock return, measured over the fiscal year (MRET1Y), as well as over five years (MRET5Y), with the last year being the fiscal year the measure is constructed for. If diversified firms have lower valuations than single-segment firms, then I expect diversified firms also to experience lower stock returns compared with single-segment

[38]I do not include profitability as an additional control, as my research question is not about maximizing the R^2. Instead, it is important that excess value-related firm characteristics other than growth and firm size are allowed to be absorbed by D and its interaction variables. To this end, I do not include any other control variables other than growth, size and industry membership.

[39]When creating the propensity score matched sample, I required that each pair of single-segment and multiple-segment had identical LCP portfolio membership. In this analysis I simply partition each pair of firms on LCP to create propensity score matched samples for each LCP portfolio.

firms, or a lower excess value at the time of the IPO (I examine IPO pricing in section 4.3).

I use raw returns, but include firm size (lnASSETS) as a control variable. This approach seems to be most appropriate since the valuation procedure does not take risk factors into account, while I include assets as a control in subsequent regressions on the measures of excess value. I also use cash flow from operating activities scaled by end of year assets as a performance measure. I report results based on the full sample in panel A, and results for the propensity score matched sample in panel B in table 7.

Insert table 7 here

First of all, the coefficient of diversification (D) on the two stock return measures is positive for both samples, which is consistent with the non-negative coefficient of this variable on the measures of excess value. The positive coefficient of D on operating cash flows turns from positive and significant for the full sample to -0.004 and statistically insignificant for the PSM sample. This is likely related with the over-sampling of mature diversified firms in the full sample, which is reduced in the matched sample.

The coefficient of the interaction of diversification with firm growth (D×sdrCFF5Y) is positive and significant at 1% for 5-year average monthly return (MRET5Y). This is inconsistent with the discount for high growth firms as shown in table 4. I further investigate this issue in section 4.3 as it is possible that high-growth diversified firms have positive excess stock return and at the same time trade at a discount if the IPO price is low compared with single-segment IPO firms.

The coefficient of D×lnASSETS is negative and significant for 5-year average monthly stock return (MRET5Y), while it is mixed for 1-year average monthly stock return (MRET1Y). Firm size is a common risk factor (Fama and French, 1992), where smaller firms have future higher returns. In this regression, the sign of the coefficient for firm size is positive, which is contrary to expectations. This may be explained however, by the fact that size as a risk factor correlates negatively with future stock returns, while I use past stock return.[40] Furthermore, large (growth) firms have higher (lower) operating cash flows.

In summary, large diversified firms have lower past stock return, which is consistent with the diversification discount for these firms. On the other hand, high growth diversified firms have higher stock returns, which is contrary to expectations. I continue by investigating IPO pricing.

4.3 Excess Value Priced at IPO

Figure 1b shows a lower excess value for multiple-segment firms versus single-segment firm when firm age is zero. This is in line with the regression estimates in table 4 which show a lower excess value for high growth multiple-segment firms. At the same time, these firms outperform single-segment firms in terms of past stock return, reported in table 7. These seeminly contradicting findings suggest that diversified firms may be priced at a discount at the time of the IPO. In this section I investigate whether or not this is the case. I match my sample with the Field-Ritter dataset of company founding dates as used in Field and Karpoff (2002).[41] I keep 1,128 IPO firm-years for 918 single-segment firms and 210 multiple-segment firms.[42]

Insert table 8 here

Descriptive statistics are included in table 8. Single-segment and multiple-segment firms are similar in size.[43] Multiple-segment firms have a longer operating history since

[40] Firms that perform well, have positive stock return and grow in size. This may result in a positive association between size and past stock return.

[41] Available for download from Jay Ritter's website at http://bear.warrington.ufl.edu/ritter/

[42] The IPO firm-year is the firm-year where the end of fiscal year is after the IPO, i.e., it is the first 10-K that the firm issues. It is not necessarily the first year that COMPUSTAT has on record as they use the prospectus as a source for pre-IPO years. In other words, the first year of COMPUSTAT coverage fyear1 in `NAMES` is typically several years before the IPO.

[43] At the same time, the firms in the Field-Ritter dataset are larger than the firms in the COMPUSTAT sample.

the median number of years between the year of founding and the IPO is 8 years longer. In addition, median sales (SALES) is about 2.5 times as large for multiple-segment IPO firms relative to single-segment IPO firms, while capital expenditures are lower. In addition, financing cash flows for single-segment IPO firms are 0.460 versus 0.202 for multiple-segment IPO firms. Hence, single-segment IPO firms raise more capital. These variables suggest that at time of the IPO, single-segment firms fit the profile of a 'growth' firm better than multiple-segment firms.

Return on assets (ROA) and average stock return are higher for multiple-segment firms and stock return.[44] The firm valuation multiples confirm that single-segment IPO firms are priced for growth. For example, the median capital to sales (VtoSALES) ratio is 4.389 for single-segment firms, while it is 2.285 for multiple-segment firms. The difference in firm-level valuation multiples is also reflected in the measures of excess value. The median difference in excess value between single-segment and multiple-segment IPO firms ranges between 13.8% and 45.1%.

In summary, at the time of the IPO there are growth-related differences between multiple-segment and single-segment firms factored into the measures of excess value, resulting in a large discount for multiple-segment firms. Nevertheless, the growth-adjusted measures of excess value still indicate that multiple-segment firms trade at a discount after controlling for differences in growth.

5 Discussion

The results in this paper show an increase in the diversification discount when using propensity score matching. This is not in line with previous work that has shown that the diversification discount is reduced or even turns into a premium when controlling

[44] Average stock return is the average monthly return for the months between the IPO and end of fiscal year. I do not drop firms if return info is not available as long as stock price at end of the fiscal year is known.

for self-selection (Campa and Kedia, 2002; He, 2009; Villalonga, 2004b). In this section I discuss differences related to the choice of the dependent variable (levels or changes of excess value) as well as the choice of examining differences based on diversified firms versus diversifying firms. Such differences have an impact on the discount. The mean and median of levels and changes for excess value for various samples are included in table 9.

Insert table 9 here

First, I show the impact of excluding observations where the absolute excess value exceeds 1.386. Even though previous research generally has dropped these observations, I have included these observations as additional (untabulated) analyses revealed that profitability, growth and size are all highly statistically significant in explaining these excess values. In panel A I include EVSBO and EVSCFF and the trimmed versions of both variables. When excluding the extreme observations, the median diversification discount for EVSBO and EVSCFF drops from 9.5% and 4.8% to 6.6% and 1.8%, respectively. Thus, excluding the observations with extreme values results in a smaller discount.

I have examined the difference in excess value between single-segment firms and multiple-segment firms in line with Berger and Ofek (1995) and He (2009). Campa and Kedia (2002) examine the difference in excess value for diversifying firms versus focused firms, while Villalonga (2004b) compares the change in excess value for diversifying firms versus focused firms.[45]

In panel B I report the change in excess value. For both single-segment as well as multiple-segment firms, the median and mean change in excess value are negative, while the decline in excess value is larger for single-segment firms. This is consistent with figure 1b, which shows a decline in excess value EVSBO over time and, as well as a

[45]The change in excess value without controlling for self-selection is also used by Graham et al. (2002), Stowe and Xing (2006) and Hund et al. (2010).

declining gap between single-segment firms and multiple-segment firms. Thus, higher growth for single-segment firms compared with multiple-segment firms explains the high excess value in the early years after the IPO. Growth deceleration, which is the flip-side of high growth, explains the larger drop in excess value for single-segment firms relative to multiple-segment firms over time. This result is important, as it suggests that zero is not the appropriate benchmark for the change in excess value. This potentially affects the interpretation of the results of Graham et al. (2002), for example, who interpret a negative change in excess value for multiple-segment firms as evidence of value destruction. Instead, the change in excess value of multiple-segment firms should be compared with the change in excess value for single-segment firms.

Panel C tabulates excess value for firm-years where the firm diversifies (A), versus the years following the diversification (B). Campa and Kedia (2002), and Villalonga (2004b) compare diversifying firms with focused firms. This may potentially bias results, as figure 1b suggest that on average the excess value drops. Thus, the 'best' year is used for the diversifying firms, while the 'average' year is used for focused firms. The results in panel C show that the median $\text{EVSBO}^{\text{TRIM}}$ is 3.8% lower in post-diversifying years.[46] Examining diversifying firm-years effectively excludes the post-diversifying years and thus mitigates the diversification discount.

Finally, panel D shows the change in excess value for diversifying firms in the year they diversify versus the following years. Only focused firms that diversify are included in this sample as firms that are diversified at the time of the IPO are not diversifying while they are listed. Villalonga (2004b) uses propensity score matching to match diversifying firms with focused firms and compares the difference in the change in excess value ('difference in differences'). Using this method, she reports a lower, yet still negative, discount. The median change in excess value for diversifying firms using $\text{EVSBO}^{\text{TRIM}}$

[46] Also, the median discount for diversifying firms using $\text{EVSBO}^{\text{TRIM}}$ is 3.1%, while it is 6.6% for all diversified firms (panel A).

is -10.8% (panel D), while the median change in excess value for focused firms is -3.8% (panel B). Hence, comparing these numbers results in a discount of 7.0%, which is close to the median difference in the level of excess value of 6.6% (panel A). However, the matching procedure of Villalonga (2004b) includes firm age and firm growth as instruments. It is therefore possible that the matched focused firms are younger than the sample average, and therefore experience larger drops in excess value as the growth deceleration is strongest in earlier years (figure 1b).[47] A larger drop for the matched focused firms would lead to a reduced discount for the diversifying firms. Additionally, Villalonga (2004b) uses firm profit as an instrument in the propensity score matching procedure. By construction, this will reduce differences in profitability between single-segment firms and multiple-segment firms which may have contributed to a reduced diversification discount for the resulting sample.

In summary, the results in this study do not seem to contradict the findings of previous work, given the differences in the dependent variable as well as differences in sample selection.

6 Conclusion

In this paper I examine the growth and size properties of diversified firms to test if certain diversified firms (small, large, cash cow or high growth) are more prone to be trading at a discount. First, I document that high growth (low growth) and small (large) firms are more likely to be focused (diversified). My main findings are that high growth diversified firms and large diversified firms are driving the diversification discount. The findings are robust for using propensity score matching to minimize differences in firm growth and firm size between focused and diversified firms. When further partitioning the sample based on the Life Cycle Proxy (Dickinson, 2011) I find confirming evidence

[47] Figure 1e shows the steepest decline in the relative frequency of focused firms relative to diversified firms in the first five years after the IPO.

as the discount is present for multiple-segment firms in the 'Introduction' and 'Growth' portfolios but not in 'Mature'.

The finding that diversified firms trade at a large discount and yet outperform focused firms in terms of stock return has been subject to prior research, which used future returns to solve this puzzle (Lamont and Polk, 2001; Mitton and Vorkink, 2010). In this study I find a straightforward explanation for the 'diversification puzzle'; I find that the excess value for multiple-segment firms at time of the IPO is more than 30% lower compared with single-segment IPO firms. For large diversified firms I find lower past stock return compared with large focused firms.

In short, firm growth is an important value driver which is systematically higher for focused firms compared with diversified firms. In addition, diversified firms are not equally discounted. When examining differences in the level of excess value, high growth and large diversified firms drive the discount. Differences in firm growth also impact the change in excess value. As a result, 'difference-in-differences' as opposed to benchmarking the change in excess value against zero should be the basis for inferences. Future research will need to take these findings into account when examining diversification-related research questions.

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Appendix I Variable Definitions

Variable	*Definition*
ΔEVSBO	Change in EVSBO (current year EVSBO minus previous year EVSBO).
$\Delta\text{EVSBO}^{\text{TRIM}}$	Change in EVSBO (current year EVSBO minus previous year EVSBO), set to missing if the absolute value of EVSBO in either year exceeds 1.386.
ΔEVSCFF	Change in EVSCFF (current year EVSCFF minus previous year EVSCFF).
$\Delta\text{EVSCFF}^{\text{TRIM}}$	Change in EVSCFF (current year EVSCFF minus previous year EVSCFF), set to missing if the absolute value of EVSCFF in either year exceeds 1.386.
CAPX/SALES	Capital expenditures (capx) divided by sales (sale).
CFF	Cash flow from financing activities (fincf) divided by end of year assets (at).
CFF5Y	Five-year average CFF, when available computed over 5 years, but at least 1 year.
CFI	Cash flow from investing activities (ivncf) divided by end of year assets (at).
CFO	Cash flow from operating activities (oancf) divided by end of year assets (at).
D	Indicator variable, 1 if firm has multiple segments, 0 otherwise.
D×lnASSETS	Interaction of D and lnASSETS.
D×sdrCFF5Y	Interaction of D and sdrCFF5Y.
EVABO	Natural log of the ratio of firm value and the assets-based imputed value, following Berger and Ofek (1995).
EVACFF	Natural log of the ratio of firm value and the assets-based imputed value. The imputed value is based on yearly grouping, using Fama and French 12 industry classification as well as matching on the decile rank of CFF5Y. The industry matching is performed at the firm level (and not the sum of segments).
EVSBO	Natural log of the ratio of firm value and the sales-based imputed value, following Berger and Ofek (1995).
$\text{EVSBO}^{\text{TRIM}}$	EVSBO, set to missing if absolute value exceeds 1.386.
EVSCFF	Natural log of the ratio of firm value and the sales-based imputed value. The imputed value is based on yearly grouping, using Fama and French 12 industry classification as well as matching on the decile rank of CFF5Y. The industry matching is performed at the firm level (and not the sum of segments).
$\text{EVSCFF}^{\text{TRIM}}$	EVSCFF, set to missing if absolute value exceeds 1.386.
FIRMAGE	Firm age, measured as fiscal year (fyear) minus the first fiscal year with non-missing end of year stock price (prcc_f).
$\text{FIRMAGE}^{\text{F}}$	Firm age at time of IPO, computed as the difference between fiscal year (fyear) and founding date on Field-Ritter dataset of company founding dates (Field and Karpoff, 2002).
INDCAPX/SALES	Average CAPX/SALES for other firms in the firm's 4-digit SIC.
INDDSEGM	Fraction of other firms in the firm's 4-digit SIC that have multiple segments.
INDFOCUSED	Natural log of 1 plus the number of (other) focused firms in the firm's 4-digit SIC.

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Appendix I – Continued

Variable	*Definition*
INDMERGERS	Natural log of 1 plus the number of merger/acquisition announcements by other firms in the firm's 4-digit SIC.
INDPSALES	Percentage of sales by multiple-segment firms of total 4-digit SIC industry sales; the firm's sales are excluded in this calculation.
LCP2	Indicator variable, equals 1 if Life Cylce Proxy (LCP) is 'Growth', 0 otherwise.
LCP3	Indicator variable, equals 1 if Life Cylce Proxy (LCP) is 'Mature', 0 otherwise.
LCP4	Indicator variable, equals 1 if Life Cylce Proxy (LCP) is 'Shake-out', 0 otherwise.
LCP5	Indicator variable, equals 1 if Life Cylce Proxy (LCP) is 'Decline', 0 otherwise.
lnASSETS	Natural log of end of fiscal year total assets (at).
lnMCAP	Natural log of market value of equity at fiscal year end (csho multiplied by prcc_f).
MRET1Y	Average monthly stock return over the fiscal year (when available, set to missing when no returns available).
MRET5Y	Average monthly stock return over the last 5 years, ending at the fiscal year (using 60 monthly returns when available, set to missing when no returns are available).
MTB	Market to book ratio, calculated as closing price at fiscal year end (prcc_f) divided by book value of equity per share calculated as equity (ceq) divided by common shares outstanding (csho).
PRED	Fitted value (probability) of logit regression where diversification (D) is regressed on instruments.
ROA	Return on assets, calculated as net income (ni) divided by total assets (at).
SALES	Sales in millions (sale).
SALESGROWTH	Sales (sale) minus sales contribution of acquisitions (aqs) divided by previous' year sales minus 1. Set to missing if variable discontinued operations (do) is nonzero. Missing values of aqs are assumed to be zero, unless acquisitions (aqc) is nonzero. In that case, the variable is set to missing.
sdrCFF5Y	Scaled decile rank of CFF5Y.
SEGMENTS	Number of business and operating segments, excluding geographical segments, reported on Compustat segment files SEGITEM and SEGNAICS.
VtoASSETS	Value to assets (at) ratio, where value is computed as the sum of equity market capitalization, liquidating value of preferred stock (pstkl), total debt in current liabilities (dlc) and total long term debt (dltt).
VtoSALES	Value to sales (sale) ratio, where value is computed as the sum of equity market capitalization, liquidating value of preferred stock (pstkl), total debt in current liabilities (dlc) and total long term debt (dltt).

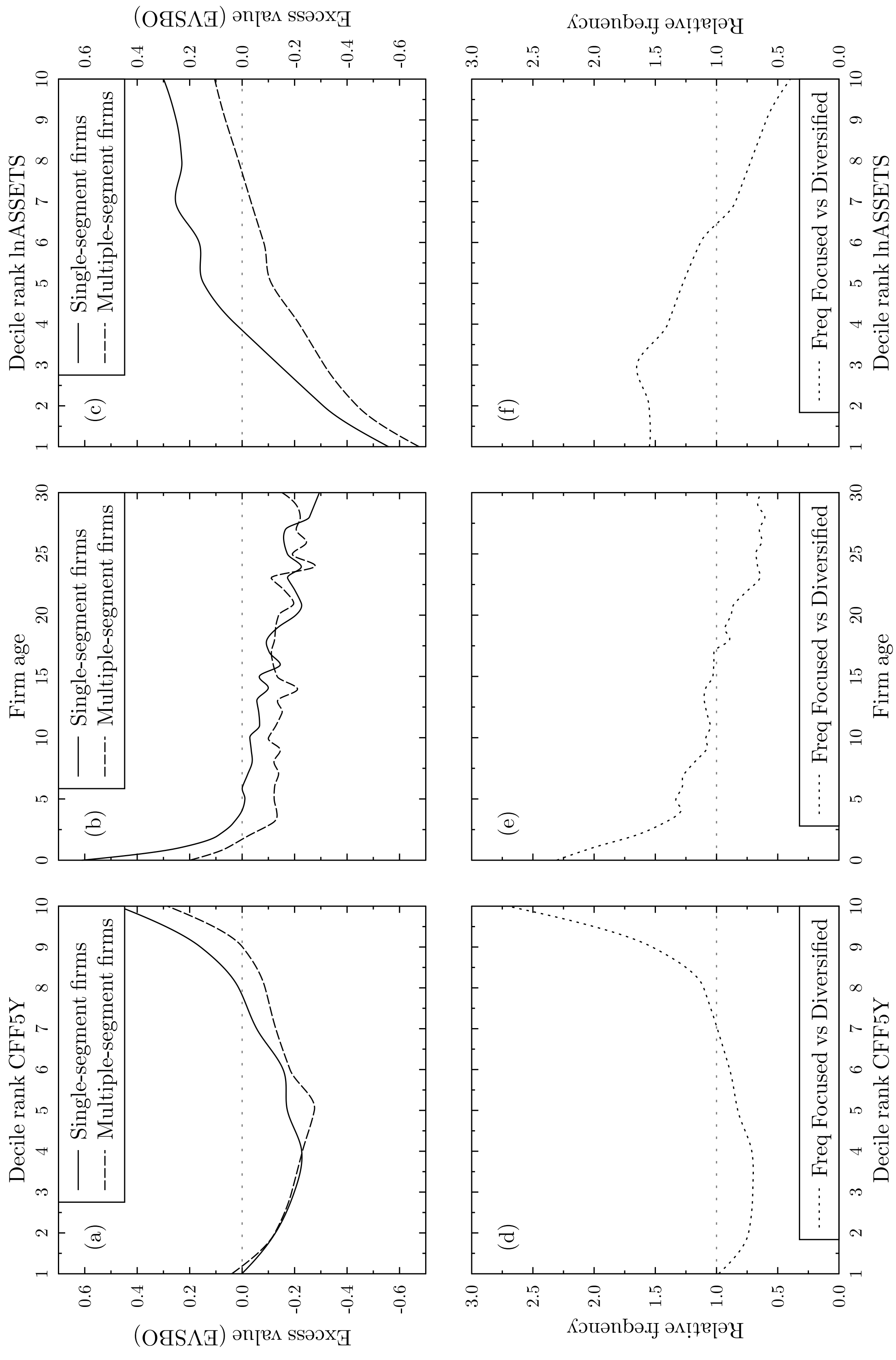
Decile rank CFF5Y
Firm age
Decile rank lnASSETS
(a)
(b)
(c)
(d)
(e)
(f)
Single-segment firms
Multiple-segment firms
Freq Focused vs Diversified
Excess value (EVSBO)
Relative frequency
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1 2 3 4 5 6 7 8 9 10
0 5 10 15 20 25 30

Figure 1. Excess value by firm growth, firm age and firm size for full sample. Figures 1a, 1b and 1c show the average sales-based sum-of-segments excess value (EVSBO) for single-segment and multiple-segment firms over 1998-2009 by financing cash flows (CFF5Y), firm age (FIRMAGE) and firm size (lnASSETS), respectively. CFF5Y is the average financing cash flows scaled by end-of-year assets over the last 5 years (when available, but at least 1 year). Decile 1 (10) holds the firm-years with the lowest (highest) growth. FIRMAGE is measured as fiscal year (fyear) minus the first fiscal year with end-of-year stock price available. lnASSETS is the natural log of total assets. Decile 1 (10) holds the smallest (largest) firms. Figures 1d, 1e and 1f show the relative distribution of observations over the deciles and age groups to examine whether or not diversification profile is random with respect to CFF5Y, FIRMAGE and lnASSETS, respectively. The relative frequency for a decile or group is computed as the frequency of single-segment firms divided by the frequency of multiple-segment firms. For values > 1 (< 1) [$= 1$], it is more (less) [equally] likely for a single-segment firm to be in the decile/age group than [as] it is for a multiple-segment firm.

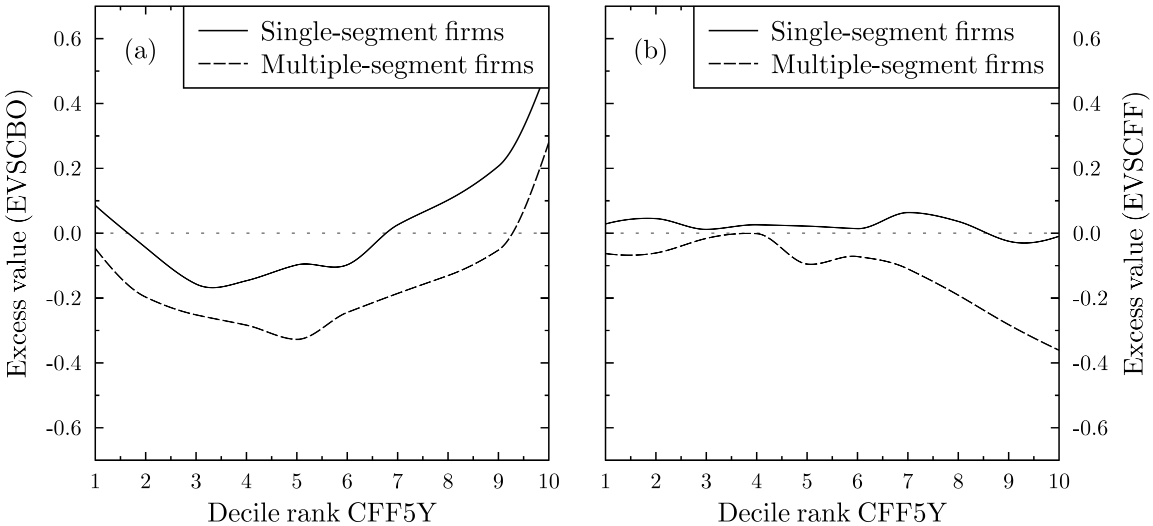

Figure 2. Firm growth and excess values for PSM sample. Figure 2a (2b) shows the average value of EVSBO (EVSCFF) for single-segment and multiple-segment firms over 1998-2009 in the propensity score matched (PSM) sample by financing cash flows decile (CFF5Y). The propensity score matched sample uses model 1 in table 2 where single-segment firms and multiple-segment firms are matched on the fitted value (PRED) and Life Cycle Proxy (LCP) portfolio. EVSBO is the sum-of-segment sales-based measure of excess value, following Berger and Ofek (1995). EVSCFF is the firm-level sales-based measure of excess value that incorporates a match on 5-year average financing cash flows to control for firm growth (CFF5Y). The median value of EVSCFF for each CFF5Y decile is zero by construction. CFF5Y is the average financing cash flows scaled by end-of-year assets over the last 5 years (when available, but at least 1 year). Decile 1 (10) holds the firm-years with the lowest (highest) growth.

Table 1
Summary Statistics by Diversification Profile

This table reports descriptive statistics for single-segment versus multiple-segment firms included in COMPUSTAT and COMPUSTAT segment files over 1998-2009. Single-segment firms (A) are firms with a single segment (D=0), while multiple-segment firms (B) have at least two segments (D=1). Firm valuation multiples are valuation multiples at the firm level. Excess value measures include the Berger and Ofek (1995) measures (BO) and growth-adjusted measures (CFF). BO measures of excess value are based on the sum-of-segment approach. CFF measures of excess value are based on matching on the Fama and French 12 industry group at the firm level as well as firm growth as proxied by cash flows from financing through matching on CFF5Y decile rank. Differences in medians (means) are tested with Wilcoxon-Mann-Whitney ranked test (t-test). All variables except SEGMENTS and FIRMAGE are winsorized by fiscal year at 1% and 99%. See appendix I for variable definitions.

	Single-segment firms (A)			Multiple-segment firms (B)			Difference (B-A)	
	Median	Mean	N	Median	Mean	N	Median	Mean
Size and growth related								
SEGMENTS	1.000	1.000	21,332	3.000	2.850	14,755	2.000**	1.850**
lnMCAP	5.352	5.307	21,330	5.926	5.863	14,755	0.574**	0.556**
lnASSETS	5.194	5.360	21,332	6.086	6.131	14,755	0.892**	0.771**
FIRMAGE	8.000	11.129	21,332	13.000	16.845	14,755	5.000**	5.716**
SALESGROWTH	0.076	0.159	15,933	0.053	0.095	9,516	-0.023**	-0.064**
CAPX/SALES	0.035	0.091	21,169	0.032	0.060	14,671	-0.003**	-0.031**
CFF5Y	0.031	0.086	21,332	0.006	0.035	14,755	-0.025**	-0.051**
Firm performance								
CFO	0.074	0.055	21,313	0.078	0.068	14,746	0.004**	0.013**
ROA	0.028	-0.038	21,332	0.033	-0.013	14,755	0.005**	0.025**
MRET1Y	0.008	0.011	19,272	0.009	0.010	13,693	0.001	-0.001
MRET5Y	0.014	0.013	19,389	0.013	0.014	13,739	-0.001*	0.001
Firm valuation multiples								
MTB	2.055	3.358	20,097	1.863	2.820	14,031	-0.192**	-0.538**
VtoASSETS	1.269	1.919	21,332	1.096	1.487	14,755	-0.173**	-0.432**
VtoSALES	1.389	3.055	21,332	1.101	1.862	14,755	-0.288**	-1.193**
Excess value measures								
EVSBO	0.000	-0.000	21,332	-0.095	-0.119	14,755	-0.095**	-0.119**
EVABO	0.000	0.036	21,196	-0.100	-0.087	8,275	-0.100**	-0.123**
EVSCFF	0.000	-0.012	21,332	-0.048	-0.079	14,716	-0.048**	-0.067**
EVACFF	0.000	0.036	21,332	-0.036	-0.016	14,716	-0.036**	-0.052**

* and ** indicate significance at 5% and 1%, respectively.

Table 2
Logistic Regression Diversification Profile

This table reports logistic regression estimates for firms over 1998-2009 with D as the dependent variable, which equals 0 (1) for single (multiple) segment firms. The odds ratio is included in parentheses. Test variables are firm size (lnASSETS) and CFF5Y, which is the average financing cash flows scaled by end-of-year assets, measured over 5 years when available, but at least 1 year, and indicator variables LCP2 - LCP5, which equal 1 if the Life Cycle Proxy (LCP) equals 'Growth', 'Mature', 'Shake-out', and 'Decline', respectively, 0 otherwise. To prevent circularity, the industry variables (variables starting with IND) are based on the other firms in the firm's 4-digit SIC. R^2 is the likelihood-based pseudo R^2 (not rescaled). All continuous variables are winsorized by fiscal year at 1% and 99%. See appendix I for additional information on variable definitions.

	Dependent variable: D		
	Model 1	Model 2	Model 3
Test variables			
CFF5Y	-1.015**		-1.102**
	(0.362)		(0.332)
LCP2		-0.007	-0.117**
		(0.993)	(0.890)
LCP3		0.077*	-0.126**
		(1.080)	(0.882)
LCP4		0.140**	-0.053
		(1.150)	(0.949)
LCP5		0.031	-0.067
		(1.032)	(0.935)
lnASSETS	0.224**	0.239**	0.228**
	(1.251)	(1.270)	(1.257)
Control variables			
INDDSEGM	-1.626**	-1.638**	-1.627**
	(0.197)	(0.194)	(0.196)
INDPSALES	0.954**	0.972**	0.955**
	(2.595)	(2.643)	(2.598)
INDCAPX/SALES	-1.177**	-1.223**	-1.157**
	(0.308)	(0.294)	(0.315)
INDMERGERS	0.810**	0.789**	0.810**
	(2.248)	(2.200)	(2.248)
INDFOCUSED	-1.114**	-1.122**	-1.116**
	(0.328)	(0.326)	(0.328)
Constant	-0.000	-0.140*	0.076
	(1.000)	(0.869)	(1.079)
N	36,087	36,087	36,087
R^2	0.179	0.176	0.179
Percent Concordant	73.6	73.2	73.6
Percent Dependent = 1	40.9	40.9	40.9
Likelihood Ratio (LR)	7,114	6,985	7,126

* and ** indicate significance at 5% and 1%, respectively.

Table 3
Summary Statistics Propensity Matched Sample

This table reports descriptive statistics for the propensity score matched sample for single-segment firms (A) and multiple-segment firms (B) over 1998-2009. 'Instruments and predicted value' includes the variables used as instruments and the fitted value of the logistic regression (PRED). Single-segment and multiple-segment firms are matched on PRED within 0.01 range and Life Cycle Proxy (LCP) (Dickinson, 2011). Firm-years enter the sample only once such that the difference in PRED is minimized. Differences in medians (means) are tested with Wilcoxon-Mann-Whitney ranked test (t-test). All variables except PRED, SEGMENTS, and FIRMAGE are winsorized by fiscal year at 1% and 99%. See table I for variable definitions.

	Single-segment firms (A)			Multiple-segment firms (B)			Difference (B-A)	
	Median	Mean	N	Median	Mean	N	Median	Mean
Instruments and predicted value								
CFF5Y	0.014	0.056	9,909	0.016	0.050	9,909	0.002	-0.006**
lnASSETS	5.585	5.719	9,909	5.599	5.719	9,909	0.014	0.000
INDDSEGM	0.365	0.401	9,909	0.371	0.396	9,909	0.006	-0.005
INDPSALES	0.623	0.577	9,909	0.606	0.573	9,909	-0.017**	-0.004
INDCAPX/SALES	0.044	0.079	9,909	0.046	0.078	9,909	0.002**	-0.001
INDMERGERS	1.609	1.640	9,909	1.386	1.621	9,909	-0.223*	-0.019
INDFOCUSED	2.303	2.504	9,909	2.398	2.500	9,909	0.095	-0.004
PRED	0.393	0.406	9,909	0.393	0.406	9,909	0.000	0.000
Size and growth related								
SEGMENTS	1.000	1.000	9,909	2.000	2.736	9,909	1.000**	1.736**
lnMCAP	5.699	5.614	9,907	5.540	5.532	9,909	-0.159**	-0.082**
FIRMAGE	9.000	12.358	9,909	11.000	15.032	9,909	2.000**	2.674**
SALESGROWTH	0.072	0.136	7,264	0.058	0.110	6,705	-0.014**	-0.026**
CAPX/SALES	0.035	0.078	9,833	0.032	0.063	9,846	-0.003**	-0.015**
Firm performance								
CFO	0.083	0.071	9,909	0.076	0.063	9,909	-0.007**	-0.008**
ROA	0.036	-0.012	9,909	0.030	-0.027	9,909	-0.006**	-0.015**
MRET1Y	0.010	0.012	9,045	0.009	0.011	9,202	-0.001*	-0.001
MRET5Y	0.013	0.014	9,098	0.014	0.015	9,236	0.001	0.001
Firm valuation multiples								
MTB	2.022	3.319	9,383	1.868	2.911	9,446	-0.154**	-0.408**
VtoASSETS	1.230	1.835	9,909	1.148	1.601	9,909	-0.082**	-0.234**
VtoSALES	1.274	2.764	9,909	1.158	2.073	9,909	-0.116**	-0.691**
Excess value measures								
EVSBO	0.000	0.035	9,909	-0.158	-0.165	9,909	-0.158**	-0.200**
EVABO	0.000	0.048	9,836	-0.126	-0.108	5,088	-0.126**	-0.156**
EVSCFF	0.003	0.022	9,909	-0.095	-0.115	9,909	-0.098**	-0.137**
EVACFF	0.000	0.048	9,909	-0.045	-0.019	9,909	-0.045**	-0.067**

* and ** indicate significance at 5% and 1%, respectively.

Table 4
OLS Regression Diversification Discount

This table reports OLS regressions explaining excess value for firms over 1998-2009, for the full sample (panel A) and the propensity score matched sample (PSM, panel B). For the PSM sample, firms are matched on the probability of diversification (PRED) using model 1 as reported in table 2. All firm-years are unique. Fama and French 12 industry indicator variables are included, but coefficients are not reported. EVSBO, EVSCFF and lnASSETS are winsorized by fiscal year at 1% and 99%. T-statistics are based on robust standards errors adjusted for clustering by firm and year (Petersen, 2009). See appendix I for additional information on variable definitions.

	Panel A: Full sample				*Panel B: PSM sample*			
	EVSBO (1)	EVSCFF (2)	EVSBO (3)	EVSCFF (4)	EVSBO (5)	EVSCFF (6)	EVSBO (7)	EVSCFF (8)
Test variables								
D	-0.202	-0.209	0.226	0.396	-0.208	-0.144	-0.104	0.157
	(-22.540)**	(-22.200)**	(5.910)**	(10.050)**	(-18.060)**	(-11.870)**	(-2.100)*	(3.050)**
D×sdrCFF5Y			-0.299	-0.311			-0.111	-0.236
			(-8.980)**	(-9.080)**			(-2.550)*	(-5.230)**
D×lnASSETS			-0.047	-0.076			-0.008	-0.031
			(-9.300)**	(-14.430)**			(-1.170)	(-4.350)**
Control variables								
sdrCFF5Y	0.590	0.128	0.693	0.234	0.528	0.063	0.580	0.171
	(35.350)**	(7.430)**	(33.800)**	(11.170)**	(23.240)**	(2.690)**	(19.170)**	(5.460)**
lnASSETS	0.150	0.179	0.170	0.213	0.144	0.174	0.147	0.189
	(59.390)**	(67.150)**	(48.830)**	(57.800)**	(42.960)**	(49.080)**	(31.430)**	(37.900)**
Constant	-1.152	-1.042	-1.320	-1.288	-1.072	-1.015	-1.119	-1.157
	(-50.810)**	(-43.610)**	(-47.870)**	(-44.530)**	(-35.120)**	(-31.630)**	(-29.190)**	(-28.600)**
N	36,087	36,048	36,087	36,048	19,818	19,818	19,818	19,818
R^2	0.112	0.119	0.115	0.125	0.113	0.121	0.113	0.123

* and ** indicate significance at 5% and 1%, respectively.

Table 5
Descriptive Statistics by Life Cycle Proxy

This table reports median values of the main variables by Life Cycle Proxy (LCP) portfolios, based on Dickinson (2011). Portfolios are formed based on the signs of the fiscal year's cash flows from operating (CFO), investing (CFI) and financing activities (CFF): 'Introduction' CFO ≤ 0, CFI ≤ 0 and CFF > 0, 'Growth' CFO > 0, CFI ≤ 0 and CFF > 0, 'Mature' CFO > 0, CFI ≤ 0 and CFF ≤ 0, 'Decline' CFO ≤ 0, CFI > 0. 'Shake-out' holds remaining firm-years. The Wilcoxon-Mann-Whitney rank test is used to test for differences in medians (panel B only). All variables except SEGMENTS and FIRMAGE are winsorized by fiscal year at 1% and 99%. See appendix I for variable definitions.

	Life Cycle Proxy (LCP)				
	Introduction	Growth	Mature	Shake-out	Decline
Panel A: Single-segment firms					
SEGMENTS	1.000	1.000	1.000	1.000	1.000
lnMCAP	4.549	5.878	5.560	4.947	4.538
lnASSETS	4.474	5.475	5.551	5.000	4.539
FIRMAGE	5.000	7.000	11.000	9.000	6.000
SALESGROWTH	0.114	0.136	0.058	0.021	-0.014
CAPX/SALES	0.034	0.050	0.031	0.022	0.027
CFF5Y	0.179	0.068	-0.015	-0.001	0.106
ROA	-0.106	0.043	0.054	0.015	-0.204
MRET1Y	-0.002	0.015	0.010	0.002	-0.011
MRET5Y	0.011	0.020	0.013	0.007	0.003
EVSBO	0.000	0.117	-0.019	-0.065	-0.107
EVABO	-0.001	0.058	0.000	-0.113	-0.216
EVSCFF	-0.212	0.148	0.000	-0.037	-0.179
EVACFF	-0.094	0.095	0.003	-0.128	-0.228
N	3,213	6,761	7,532	2,142	1,665
Panel B: Multiple-segment firms, differences and N					
SEGMENTS	**1.000**	**2.000**	**2.000**	**2.000**	**1.000**
lnMCAP	-0.101	**0.324**	**0.816**	**0.766**	-0.240
lnASSETS	**0.290**	**0.803**	**0.971**	**0.880**	**0.108**
FIRMAGE	**3.000**	**4.000**	**5.000**	**4.000**	**3.000**
SALESGROWTH	**-0.037**	**-0.057**	**-0.010**	**-0.029**	-0.025
CAPX/SALES	**-0.007**	**-0.010**	0.000	**0.003**	**-0.002**
CFF5Y	**-0.080**	**-0.033**	**-0.003**	**-0.013**	**-0.053**
ROA	**0.035**	**-0.006**	**-0.006**	0.005	**0.068**
MRET1Y	0.002	**-0.004**	-0.001	**0.006**	0.004
MRET5Y	**0.002**	**-0.003**	**-0.002**	**0.002**	**0.002**
EVSBO	**-0.222**	**-0.108**	**-0.084**	**-0.107**	**-0.260**
EVABO	**-0.180**	**-0.127**	**-0.071**	**-0.076**	**-0.115**
EVSCFF	**-0.147**	**-0.093**	-0.001	-0.096	**-0.231**
EVACFF	**-0.090**	**-0.070**	**0.001**	-0.024	**-0.108**
N	1,584	4,424	6,525	1,461	752

Differences in panel B that are significant at the 5% level are printed in boldface.

Table 6
OLS Regression by Life Cycle Proxy (LCP) Portfolio

This table reports OLS regressions explaining excess value for the firms over 1998-200 by Life Cycle Proxy (LCP). The dependent variable is EVSCFF. Panel A holds the full sample, while panel B uses the propensity score matched sample, where firms are matched on the probability of diversification (PRED) using model 1 (table 2) and LCP portfolio. All firm-years enter the sample once. An intercept and Fama and French 12 industry indicator variables are included, but coefficients are not reported. EVSCFF and lnASSETS are winsorized by fiscal year at 1% and 99%. T-statistics are based on robust standards errors adjusted for clustering by firm and year (Petersen, 2009). See appendix I for additional information on variable definitions.

	Life Cycle Proxy (LCP)				
	Introduction	Growth	Mature	Shake-out	Decline
Panel A: Full sample					
Test variables					
D	0.908	0.238	0.264	0.479	0.575
	(6.510)**	(2.980)**	(4.730)**	(4.050)**	(3.120)**
D×sdrCFF5Y	-0.489	-0.197	-0.159	-0.413	-0.104
	(-4.090)**	(-2.870)**	(-2.730)**	(-3.920)**	(-0.720)
D×lnASSETS	-0.153	-0.058	-0.059	-0.092	-0.166
	(-7.150)**	(-5.680)**	(-7.950)**	(-5.410)**	(-5.280)**
Control variables					
sdrCFF5Y	0.641	0.119	-0.147	0.245	0.268
	(9.070)**	(2.820)**	(-3.830)**	(3.910)**	(3.280)**
lnASSETS	0.273	0.153	0.193	0.263	0.339
	(19.560)**	(22.230)**	(36.750)**	(21.670)**	(17.320)**
N	4,793	11,172	14,040	3,601	2,414
R^2	0.131	0.082	0.150	0.179	0.175
Panel B: Propensity score matched sample					
Test variables					
D	0.636	0.086	0.072	0.124	0.617
	(3.420)**	(0.820)	(1.000)	(0.800)	(2.470)*
D×sdrCFF5Y	-0.531	-0.149	-0.077	-0.399	-0.095
	(-3.410)**	(-1.610)	(-1.010)	(-2.810)**	(-0.490)
D×lnASSETS	-0.084	-0.026	-0.024	-0.022	-0.165
	(-2.810)**	(-1.880)	(-2.440)*	(-0.940)	(-3.770)**
Control variables					
sdrCFF5Y	0.571	0.035	-0.223	0.318	0.274
	(5.080)**	(0.540)	(-4.090)**	(3.120)**	(2.190)*
lnASSETS	0.244	0.138	0.180	0.221	0.320
	(11.350)**	(13.920)**	(26.460)**	(13.210)**	(10.460)**
N	2,434	6,132	8,302	1,870	1,080
R^2	0.114	0.078	0.154	0.168	0.151

* and ** indicate significance at 5% and 1%, respectively.

Table 7
OLS Regression Performance

This table reports OLS regressions explaining excess value for firms over 1998-2009, for the full sample (panel A) and the propensity score matched sample (PSM, panel B). For the PSM sample, firms are matched on the probability of diversification (PRED) using model 1 as reported in table 2. All firm-years are unique. Stock return is measured as the average monthly return over the fiscal year (MRET1Y) and over the last 5 year (MRET5Y), using 12 and 60 monthly returns, respectively, when available. When no monthly returns are available, the return measures are set to missing. CFO is cash flows from operating activities, scaled by end of year assets. Fama and French 12 industry indicator variables are included, but coefficients are not reported. Continuous variables are winsorized by fiscal year at 1% and 99%. T-statistics are based on robust standards errors adjusted for clustering by firm and year (Petersen, 2009). See appendix I for additional information on variable definitions.

	Panel A: Full sample			*Panel B: PSM sample*		
	MRET1Y (1)	MRET5Y (2)	CFO (3)	MRET1Y (4)	MRET5Y (5)	CFO (6)
Test variables						
D	0.005	0.006	0.013	0.008	0.004	-0.004
	(1.610)	(4.340)**	(2.400)*	(2.050)*	(1.940)	(-0.520)
D×sdrCFF5Y	0.001	0.008	0.030	-0.004	0.005	-0.004
	(0.410)	(4.730)**	(6.060)**	(-1.080)	(2.480)*	(-0.600)
D×lnASSETS	-0.001	-0.002	-0.007	-0.001	-0.001	0.000
	(-2.500)*	(-8.780)**	(-9.130)**	(-2.380)*	(-4.040)**	(0.100)
Control variables						
sdrCFF5Y	-0.006	-0.002	-0.184	-0.001	0.001	-0.162
	(-3.550)**	(-1.400)	(-53.990)**	(-0.400)	(0.830)	(-33.810)**
lnASSETS	0.000	0.002	0.017	-0.000	0.001	0.013
	(1.220)	(14.440)**	(30.440)**	(0.000)	(7.590)**	(19.190)**
Constant	0.009	-0.001	0.082	0.009	0.001	0.090
	(4.350)**	(-0.930)	(19.830)**	(3.170)**	(0.770)	(16.530)**
N	32,965	33,128	36,059	18,247	18,334	19,818
R^2	0.003	0.015	0.210	0.004	0.017	0.204

* and ** indicate significance at 5% and 1%, respectively.

Table 8
Summary Statistics by IPO Diversification Profile

This table reports descriptive statistics for single-segment IPO firms (A) versus multiple-segment IPO firms (B) included in COMPUSTAT and COMPUSTAT segment files over 1998-2009. Firms are matched with the Field-Ritter dataset of company founding dates as used in Field and Karpoff (2002). This sample consists of IPO firm-years, where the excess value is measured at the first year-end following the IPO. $FIRMAGE^F$ equals fiscal year minus founding year. Differences in medians (means) are tested with Wilcoxon-Mann-Whitney ranked test (t-test). All variables except SEGMENTS and $FIRMAGE^F$ are winsorized by fiscal year at 1% and 99%. See appendix I for additional information on variable definitions.

	Single-segment IPOs (A)			Multiple-segment IPOs (B)			Difference (B-A)	
	Median	Mean	N	Median	Mean	N	Median	Mean
Size and growth related								
SEGMENTS	1.000	1.000	909	2.000	2.493	207	1.000**	1.493**
lnMCAP	6.132	6.115	909	6.120	6.140	207	-0.012	0.025
lnASSETS	4.997	5.130	909	5.620	5.711	207	0.623**	0.581**
$FIRMAGE^F$	8.000	14.406	909	16.000	27.314	207	8.000**	12.908**
SALES	81.882	287.808	909	212.845	921.461	207	130.963**	633.653**
CAPX/SALES	0.061	0.136	904	0.042	0.109	204	-0.019**	-0.027
CFF5Y	0.460	0.433	909	0.202	0.266	207	-0.258**	-0.167**
Firm performance								
CFO	0.036	0.006	909	0.054	0.032	207	0.018*	0.026*
ROA	0.013	-0.051	909	0.025	-0.013	207	0.012*	0.038*
MRET1Y	-0.004	0.005	753	-0.004	0.006	176	0.000	0.001
Firm valuation multiples								
MTB	4.009	7.095	890	2.817	5.327	199	-1.192**	-1.768**
VtoASSETS	2.684	4.556	909	1.761	2.918	207	-0.923**	-1.638**
VtoSALES	4.389	10.937	909	2.284	6.182	207	-2.105**	-4.755**
Excess value measures								
EVSBO	0.564	0.703	909	0.257	0.293	207	-0.307**	-0.410**
EVABO	0.395	0.498	906	-0.056	0.004	99	-0.451**	-0.494**
EVSCFF	0.179	0.247	909	-0.004	-0.011	207	-0.183**	-0.258**
EVACFF	0.181	0.284	909	0.043	0.073	207	-0.138**	-0.211**

* and ** indicate significance at 5% and 1%, respectively.

Table 9
(Change in) Excess Value for Focused, Diversified and Diversifying Firms

This table reports the (changes in) sales-based measures of excess value (EVSBO and EVSCFF). Trimmed excess value variables (TRIM) are included. For these variables observations where the absolute excess value exceeds 1.386 are dropped. Panel A shows the sales-based measures of excess value for the full sample. Panel B shows the change in the sales-based measures of excess value. Panel C shows the sales-based excess value measures for diversifying firms in the year of diversifying versus following years, while panel D shows the change in excess value for these firm-years. Differences in medians (means) are tested with Wilcoxon-Mann-Whitney ranked test (t-test). All variables are winsorized by fiscal year at 1% and 99%. See appendix I for variable definitions.

	Single-segment firms (A)			Multiple-segment firms (B)			Difference (B-A)	
	Median	Mean	N	Median	Mean	N	Median	Mean
Panel A: Full sample excess value								
EVSBO	0.000	-0.000	21,332	-0.095	-0.119	14,755	-0.095**	-0.119**
EVSCFF	0.000	-0.012	21,332	-0.048	-0.079	14,716	-0.048**	-0.067**
$EVSBO^{TRIM}$	0.000	-0.006	18,707	-0.066	-0.065	13,329	-0.066**	-0.059**
$EVSCFF^{TRIM}$	0.000	-0.001	18,406	-0.018	-0.025	12,986	-0.018**	-0.024**
Panel B: Full sample, change in excess value								
ΔEVSBO	-0.050	-0.073	16,779	-0.040	-0.059	11,718	0.010	0.014*
ΔEVSCFF	-0.047	-0.057	16,777	-0.036	-0.042	11,657	0.011*	0.015*
$\Delta EVSBO^{TRIM}$	-0.038	-0.046	13,891	-0.030	-0.039	10,085	0.008	0.007
$\Delta EVSCFF^{TRIM}$	-0.037	-0.040	13,496	-0.027	-0.026	9,689	0.010*	0.014*

	Diversifying, first year (A)			Diversifying, later years (B)			Difference (B-A)	
	Median	Mean	N	Median	Mean	N	Median	Mean
Panel C: Diversifying firms, excess value								
EVSBO	-0.056	-0.068	797	-0.112	-0.146	2,711	-0.056	-0.078*
EVSCFF	-0.056	-0.096	796	-0.071	-0.110	2,707	-0.015	-0.014
$EVSBO^{TRIM}$	-0.031	-0.027	697	-0.069	-0.077	2,437	-0.038	-0.050
$EVSCFF^{TRIM}$	-0.016	-0.025	683	-0.027	-0.027	2,376	-0.011	-0.002
Panel D: Diversifying firms, change in excess value								
ΔEVSBO	-0.134	-0.169	797	-0.054	-0.069	2,076	0.080**	0.100**
ΔEVSCFF	-0.103	-0.138	796	-0.042	-0.050	2,068	0.061**	0.088**
$\Delta EVSBO^{TRIM}$	-0.108	-0.112	637	-0.044	-0.051	1,782	0.064**	0.061*
$\Delta EVSCFF^{TRIM}$	-0.079	-0.085	616	-0.033	-0.041	1,717	0.046	0.044