




The market value of SMEs: a comparative study between private and listed firms in alternative stock markets

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Abstract

This study aims to compare the market value of private firms and publicly listed small and medium-sized firms (SMEs) in alternative stock markets through a private discount approach with estimates of value based on discounted cash flow projections and along with a comparable multiples approach. The valuation methodology applied in this study yielded a final sample that included 232 observations between public and private companies in the Spanish market. To calculate the discount, we apply the different approaches of discounted cash flow and multiples, such as valuation, earnings, book value, and revenue. Our results conclude there is no private discount, instead, the outcomes of this article suggest a premium over public firms for some ratios. The negative private company discounts mean a premium and, on the other hand, some multiples suggest a discount according to the method of valuation. This paper proves private discounts resulted does not have any comparable value within the same country although all firms in Spain use the same currency. We value the discounted cash flows of our forecasts using a discount rate based on the Capital Asset Pricing Model (CAPM), so our study can also be viewed as a test sensitivity of CAPM-based approaches to equity risk premium, terminal value, and growth rate. Furthermore, we compare historical transaction multiples of privately held companies with transaction multiples of similar publicly held firms.

Keywords Firm value · Valuation multiples · Private discount · Financial valuation · Alternative stock markets

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1 Introduction

Valuation plays a key role in many areas such as portfolio management, acquisition analysis (mergers and acquisitions), and corporate finance. Investors and investment bankers usually set the price for acquisitions, leveraged buyouts, IPOs, and other transactions using multiples of cash flow or current earnings for comparable firms. The investor must decide on a fair value for the target firm before making a bid, and the target firm must determine a reasonable value for itself before deciding to accept or reject the offer. In fact, the overall market can be valued and compared. A valuation model can be used to understand if the stock market is overvalued or undervalued.

The accurate value of the firm can be related to its financial characteristics, for instance, risk, growth prospects, and cash flows. Valuation represents a minimal role in portfolio management for a passive investor, whereas it plays a larger role for an active investor. For its part, small and medium-sized firms (SMEs) constantly face greater difficulties in accessing financing than large firms (Fernández 2005). Among the possible causes can be its size, negotiating capacity, information asymmetries, and owner's reluctance about transferring control to third parties. Most SMEs choose to finance through debt, however, those are restrictive (Mascareñas 2011). Therefore, other alternative sources of financing are under debate (Covring and McConaughy 2015; Brealey et al. 2018).

The purpose of this paper is to compare the market value of listed and non-listed small and medium-sized firms through a private discount approach with estimates of value based on discounted cash flow (DCF) projections and along with a comparable multiples approach (CMA), also called relative valuation because the market values similar companies in similar ways.

The above arguments lead to our central research question, that is: can the market value of a listed firm in alternative stock markets in Spain be adequately better than an un-listed firm, and if not how large is the illiquidity discount attached to un-listed firm valuations? Accordingly, two alternatives hypotheses are developed: (1) A listed small and medium-sized firm in the alternative stock market will yield a better valuation than un-listed SME firms in Spain, or (2) an un-listed SME firm has a higher illiquidity discount than SME firms listed on the domestic stock exchange.

To examine the valuation of Spanish SME firms, we value the discounted cash flows of our projections using a discount rate based on the Capital Asset Pricing Model (CAPM), our study can also be viewed in part as a test sensitivity of CAPM-based approaches to equity risk premium, terminal value, and growth rate. Furthermore, we compare historical transaction multiples of privately held companies with transaction multiples of similar publicly held firms. The values used in the multiples are EBITDA, EBIT, Operating Income, and Total Assets. We stress that our valuations rely on several ad hoc assumptions that readers should be able to improve on in a specific valuation.

This paper is organized as follows. Section 2 discusses further the theoretical framework and research questions. Section 3 explains the methodology and Sect. 4 describes

and analyzes the empirical results conducted in Spain. To conclude, Sect. 5 summarizes the main findings and conclusions.

2 Literature review

The valuation serves as a comparison between the acquired values with the market share price to make a decision such as selling, buying, or holding a position (Fernández 2005). Furthermore, the valuation of several firms and their evolution over time serves to establish comparisons between them and business strategies valuation is a previous step to management decisions as continue, sell, merge, grow or buy other firms, allowing to measure the impact of the firms' possible policies and strategies on the creation and destruction of value (Ferraro 2017).

One factor affecting value estimates is the purpose of the valuation. The valuation purposes and perspectives influence the value assumptions and the type of value to be measured. In general, the points of view usually fall into two categories: pricing and reporting. The first point of view (pricing) is taken by an investor who is assessing an enterprise for purposes of acquisition; and, the reporting point of view is concerned with an estimated value for accounting and tax purposes (Rezaee 2001; Kim et al. 2019).

The application of valuation methods has seen limited by the characteristic of private companies such as: the absence of positive cash flow, limited history of discount rates, unknown industry growth rates, and changes in the business model and competition (Covring and McConaughy 2015; Dong et al. 2017). The two approaches to valuation (discounted cash flow valuation and multiples valuation) will normally yield different estimates of value for the same firm. Even with multiples valuation, we can reach different estimates of value depending on which multiple we use and what firms we based the valuation on (Krch 2018; Serra and Lopes 2018; Rubio 2019).

2.1 Discounted cash flow valuation

The value of a firm is the present value of expected future cash flows, discounted back at an appropriate rate (Dönbak and Ukav 2016; Takacs et al. 2019). Therefore, the discounted cash flow is based on the expectations of the excess liquidity generated by the firm once the necessary investments have been made (Chi and Su 2017), and using discount rates calculated as the opportunity cost of capital (Mari and Marra 2019; Realdon 2019). Nevertheless, there are disadvantages to this method such as the difficulty in forecasting the firm's growth, and the difficulty of establishing the discount rate and the terminal value (Li and Tong 2018).

Furthermore, discounted cash flow valuations succeed despite the additional concerns posed beyond those associated with capital market imperfections and intertemporal asset pricing models in any valuation problem (Kaplan and Ruback 1995). First, the cash flow forecasts come from published legal filings. Second, even if the cash flow forecasts are intended to be expected cash flows, the forecasting process is likely to involve substantial errors because of often organizational changes. Finally,

since these firms have leveraged capital structures, their access to capital markets and their ability to use interest tax shields may be limited (Brealey et al. 2018; Dempsey 2019).

This study is based on the idea of relating the value of the company and operating revenues, EBITDA, EBIT, or total assets, thus firms in similar industries can be compared bordering on the problem of its capital structure, amortization policy, and tax impact (Hammar 2014; Gupta 2018). Normally, EBITDA multiples are used by technology and communications firms, and firms that practice purchase operations through financial leverage (LBO) because it is compatible with their idea of seeking leverage opportunities (Mascareñas Pérez-Iñigo 2011).

Some examples of multiples:

$$\frac{VE}{EBITDA} = \frac{ROIC - g}{ROICx(ko - g)}x(1 - t) \quad (1)$$

$$\frac{VE}{EBIT} = \frac{ROIC - g}{(ko - g)} \quad (2)$$

$$\frac{VE}{CI} = \frac{ROIC - g}{(ko - g)} \quad (3)$$

$$\frac{VE}{OR} = \frac{ROIC - g}{(ko - g)} \quad (4)$$

where VE: enterprise value, EBITA: earnings before interest, taxes, depreciation, and amortization, EBIT: earnings before interest and taxes, CI: total assets, OR: operating revenue, ROIC: return on investment capital, k_o : weighted average cost of capital (WACC), G: growth rate.

In the case of unlisted firms, they are not different from the ones we used to value listed firms, the differences between private firms and publicly traded firms must show up in how we estimate these inputs to the discounted cash flow model.

2.2 Relative valuation

In relative valuation, the value of an asset is derived from the pricing of comparable assets. If the investor decides to value a specific un-listed firm by comparing it to listed firms in a similar industry or sector, the exactitude of the valuation will depend on how alike are both firms according to in terms of a characteristic such as size, risk, capital structure, liquidity level, and growth rate.

Officer (2006) compared the multiples paid for by private firms with portfolios of comparable public firms. Officer found that multiples of unlisted firms had an average discount of 15%-30% relative to the multiples paid to listed firms. The research from Koeplin et al. (2000) is similar to Officer (2006), but this last one attributed the discount to the lack of liquidity.

The purpose is to identify the total reduction in the price of an unlisted firm compared to a public company, where marketability is just one of the factors accounted for.

Applying just a liquidity discount is only appropriate when valuing firms based on multiples of comparable transactions (Alford 1992).

The marketability discount has been studied and measured using different models and different results attempted to estimate a liquidity premium or marketability discount exclusively (Bajaj et al. 2001; Hibbert et al. 2009; Chiming 2010).

2.3 Illiquidity discounts

When an investor takes an equity position in an entity, this investor would like to liquidate that position in case of changing the portfolio holdings or cash flow options. Liquidation is simple and quick with public-traded firms, in fact, it commonly has a low transaction cost. But, in the case of equity in a private firm, liquidation costs as a percent of firm value can be considerable. Consequently, the value of equity in an unlisted firm may need to be discounted for this potential illiquidity (Grbenic 2017).

The value of the private firms is not reported, and commonly the illiquidity discount is the difference between the value and the price. Much of the evidence on illiquidity discounts comes from examining restricted stock at publicly traded firms.

The first studies about marketability or illiquidity discount dated from 1997, which calculate the illiquidity discount in IPO transactions. Emory (1997) finds a range for the marketability discount from 60 to 43%. Nevertheless, Koeplin and Saphiro (2000) and Bajaj et al. (2001) find that discounts appear to include the expectation of investors over the public transformation of the company.

The technique of comparable acquisitions approach is the most developed for illiquidity discount studies. Kooli et al. (2003) calculate the illiquidity discount by comparing a portfolio of public firms with a comparable private firm, like Block (2007), find the medium discount is 20% but the lowest discount is for financial firms. Elnathan (2010) compares public and private market ratios of enterprises and the results obtained was the existence of a discount in private firm valuations because the experts complied with the interests of the commissioner. Paglia (2010) explains the illiquidity discount in private versus public firms which the discount is 70% in some industries.

In recent years, the studies according to illiquidity or marketability discount present their determinants or specific studies with data of geographical areas. Rodríguez and Rubio (2019) present the marketability discount in the Spanish market for valuation multiples comparing public and private firms. Hur et al. (2018) propose a measure of liquidity premium or discount based on USA data and confirm it to be a function of a time discount factor, a relative risk aversion parameter, and the expected return and volatility of the asset given the risk-free rate. Chen et al. (2015) study the determinants of discounts on private placements such as risk, illiquidity, and marketability; otherwise, Albuquerque and Schroth (2015) show how to estimate the control discount, stockholders' marketability discount, and dispersed shareholders' illiquidity-spillover discount.

3 Methodology

The small and medium firms' data have been used according to Schreiner (2009) to select comparable firms between public and private enterprises. In line with Kooli et al. (2003), we match just one private transaction with a public comparable firm. The valuation methodology applied to estimate the value for Spanish listed and unlisted firms is: Discounted cash flow valuation (DCF) and relative valuation according to the methodology of Damodaran (2012) and Fernández (2005). After the multiples have been obtained, following Elnathan et al. (2010), each variable has been transformed into its natural logarithm. The comparable approach for multiples of private and public-held firms is according to Koeplin et al. (2000) with the private discount calculations.

To estimate the value of the Spanish listed and unlisted firms, we applied the following methodology used by Young and Zeng (2015) and Occhino and Maté (2018):

a. Analysis of target firms

This step is important to select comparable firms with aspects such as sector, products/services it manufactures or provides, geographic markets in which it operates, and nationality. The more we know about the firm that is being valued, the more rational criteria can be considered in the valuation work.

All transactions have been sorted out in the following dimensions: country (Spain), year (2015–2018), industry (classified by CNAE 2009 code list), business purpose, and operating revenue.

b. Selection of comparable firms

A key aspect of applying this methodology is the selection of comparable firms. The conventional practice is to look at firms within the same industry as comparable firms, this is not necessarily always the correct or the best way of identifying these firms. At times, no matter how carefully we choose comparable firms, differences will remain between the firm we are valuing and the comparable firms (Schreiner 2009).

It would be ideal to find similar firms with the same terms of risk, growth, cash flows, market segments, and organizational structures, among others. In practice, it is difficult to find firms that meet all the previous aspects mentioned, so it tends to broaden the scope of the selection of comparable firms to have significant numbers of companies in the analysis. Due to the process of globalization, we are faced with a new challenge, where firms in a sector are incorporated and trade in different markets with different risk exposure, accounting standards, and currencies. Thus, it will depend on the sector being analyzed and the availability of information, and the similarities of those chosen with the objective.

This research focused on SME firms listed in the Spanish alternative stock market. Nowadays, there are 117 listed firms in MAB-Spain (Alternative stock market-Spain). The types of firms are classified into: (a) Expanding firms, (b) SICAV (Variable capital investment firms), (c) SOCIMI (Real estate market investment firms) and d) ECR (Venture capital entities).

Once the search was conducted, the total firms were reviewed to narrow down the results to only those firms directly related to expanding firms without considering tech companies because there is some specific methodology for valuing their assets.

Table 1 Firm type differentiated by industry

Industry
Pharmaceutical and biotechnology
Transportation and distribution
Leisure, tourism, and hospitality
Engineering and others
Commerce
Mineral, metals, and transformation
Renewable energy
Telecommunications and others
Media and advertising
Manufacture and assembly of capital goods

Therefore, the final sample results from the filtering process explained above, yield a final selection of firms' types differentiated by industry. (see Table 1).

c. Calculations and selection

It is typical to use the discount cash flow (DCF) method along with a comparable multiples approach (CMA, also called relative valuation) to value a firm because the market values similar companies in similar ways. However, the DCF valuation method fits better to publicly held than privately held firms. This is due mainly to the difficulties to measure the unlisted firms' market risk and, therefore, their cost of capital. The less reliable these factors are, the less reliable is also the value of the estimated firm.

To estimate a value for Spanish unlisted firms, we developed two methods following the studies of Damodaran (2012) and Fernández (2005):

3.1 Discounted cash flow valuation (DCF)

In discounted cash flow valuation, the objective is to find the value of assets, given their cash flow, growth, and risk characteristics. Since the expected price is itself determined by future dividends, the value of a stock is the present value of dividends through infinity:

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} \tag{5}$$

where n represents the life of the asset, CF_t is the cash flow in period t , and r is the discount rate reflecting the riskiness of the estimated cash flows.

For this research, all the listed and private firms were assessed with the same level of risk and growth according to the industry (see Table 2). Then, after obtaining the value of their firm, they were divided with their total assets and operating revenues to get multiples to standardize the firm size.

Table 2 Assumptions to discounted cash flow valuation

Industry	Value		Firm's unlevered Beta	Risk-free Rate (%)	Market risk Premium (%)
	Growth rate (%)	CAPM (%)			
Pharmaceutical and biotechnology	2	7.8	1.48	1	5
Transportation and distribution	2	6.6	1.21	1	5
Leisure, tourism, and hospitality	2	5.0	0.87	1	5
Engineering and others	2	6.4	1.17	1	5
Commerce	2	5.2	0.90	1	5
Mineral, metals, and transformation	2	7.4	1.41	1	5
Renewable energy	2	6.2	1.14	1	5
Telecommunications and others	2	6.1	1.12	1	5
Media and advertising	2	6.5	1.19	1	5
Manufacture and assembly of capital goods	2	5.9	1.07	1	5

The Iberian Balance Analysis System, SABI (Sistema de Análisis de Balances Ibéricos) has been used as a database in this appendix, which adequately reproduces financial information provided by the Central Directory of Spanish Companies (Directorio Central de Empresas Españolas).

3.2 Valuation multiples

The use of relative valuation is widely used. A valuation based on multiple and comparable firms can be completed with far fewer explicit assumptions and far more quickly than a discounted cash flow valuation. However, there are a lot of pitfalls as ignoring key variables such as risk, growth, or cash flow potential.

The multiples selected must be precise and accurate in reflecting the essentials of the firm because these ratios or multiples obtained will be then applied to any firm being valued. In other words, they should be potential measures of value for both public and private firms.

Usually, multiples are standardized relative to revenues, book value (such as net assets or stock/equity's book value), and earnings. It is also common in some industries to use additional specific parameters such as employees, clients, etc., each one with some advantages and pitfalls (Mascareñas 2011).

It is important to use potential measures of value that can be applied to both (private and public firms). Nevertheless, it is not possible to specify which measure will be appropriate for valuation purposes. Kaplan and Ruback (1995) use measures such as: earnings before interest, taxes, depreciation, and amortization (EBITDA) as their sole measure of performance. In contrast, we use four different measures: valuation, earnings, book value, and revenue.

3.3 Earnings multiples

A way to value any asset is a multiple of the earnings generated by those assets. It is common to examine the value of the operating assets of the firm (also called enterprise value) as a multiple of the operating income or the earnings before interests, taxes, depreciation, and amortization (EBITDA).

$$EV/EBITDA - (\text{Enterprise value/earnings before interests, taxes, depreciation, and amortization}) \quad (6)$$

EBITDA is considered a suitable index in the construction of comparable multiples because it indicates the structure of costs and expenses of a sector/industry regardless of its geographical location and that does not take into account financing decisions or fiscal areas.

$$EV/EBIT - (\text{Enterprise value/earnings before interests and taxes}) \quad (7)$$

These two measures selected (EBITDA and EBIT) are independent of the capital structures or the mix of equity and debt, therefore two firms with identical profit streams may have different earnings ratios due to their capital structures.

3.4 Book value or replacement value multiples

The accounting estimate of book value is determined by accounting rules and is influenced by the original price paid for assets and any adjustment such as depreciation made since.

$$EV/BV - (\text{Enterprise Value/Book Value of total assets}) \quad (8)$$

This ratio indicates how many times the equity is valued by the firm. It is a common indicator in capital-intensive firms. However, there may be differences in accounting for certain liabilities such as capital and vice versa that make comparison difficult.

3.5 Revenue multiples

For enterprise value, this ratio can be used as the value-sales (VS) ratio, where the numerator becomes the enterprise value of the firm. When a firm has negative EBITDA

or EBIT, this ratio may be the most appropriate.

$$EV/OR - (\text{Enterprise value}/\text{Operating Revenue}) \quad (9)$$

The advantage of using revenue multiples, however, is that it becomes far easier to compare firms in different markets, with different accounting systems, than it is to compare earnings or book value multiples. It is also useful in sectors composed of young companies, where most or all are losing money especially whose firms with operational costs exceed sales.

The ratios calculated for comparable firms are multiplied by the corresponding financial data of the target firm to calculate the value. It is recommended that the range of multiples obtained be applied to historical data and estimated future data of the target firm.

3.6 Hypothesis thesis

We carry out the Student T-Test to each multiple of listed and unlisted firms to check if there is statistical significance in the mean estimation. In other words, to test if the private company discounts are likely to occur by chance or not. In this case, the null hypothesis used for multiple i is:

H_0 Mean a private discount for multiple $i = 0$.

On the other hand, the alternative hypothesis is:

H_a Mean a private discount for multiple $i \neq 0$.

4 Results and analysis

Table 3 exhibits the mean, median, and standard deviation of multiples relative to each fundamental such as: Operating revenue, EBITDA, EBIT, and Total Assets for the ten sectors studied. All transactions have been further broken down into private and public companies. In addition, Table 3 shows the results by industry for the valuation of the discounted cash flow and comparable valuation methods.

The mean and median are higher for private than public companies for eight sectors/industries studied for the discounted cash flow method. The exceptions are the media advertising and transportation and distribution industries. This could be attributed to a high level of losses in the balance sheets of listed companies. In comparison with the multiples valuation method, the median are higher than discounted cash flow multiples instead of the mean, which is varied in both cases.

The median and mean are unbiased estimators of the central tendency, but the mean is highly sensitive to extreme outliers, whereas the median is barely sensitive and consequently a more robust metric.

Medians are lower than means in both sample types (multiple methods and discounted cash flow for private firms), but the mean is even more outstanding in listed

Table 3 Multiples

Sector	No. Ob	Fundamental	Discounted cash flow method						Multiple method						
			Listed			Private			Listed			Private			
			Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	
Pharmaceutical and Biotechnology	72	N = 18	Operating revenue	-18.5	-	53.3	2.5	1.2	3.4	97.7	7.5	264.6	97.7	7.5	264.6
			EBITDA	-0.1	-	0.9	1.5	0.8	2.2	5.4	1.5	22.7	5.4	1.5	22.7
			EBIT	47.7	1.8	121.2	-3.8	3.3	34.2	-183.4	-	645.4	-183.4	-	645.4
			Total assets	31.9	3.2	104.4	23.9	8.5	193.1	-155.6	-8.8	592.5	-155.6	-8.8	592.5
			N = 2	Operating revenue	11.2	10.6	2.6	0.5	0.4	0.2	1.8	1.8	0.1	1.8	1.8
Transportation and distribution	8	N = 2	Operating revenue	5.4	5.0	1.3	1.9	1.8	0.4	0.8	0.8	0.0	0.8	0.8	0.0
			EBITDA	20.3	19.0	4.4	-52.0	-49.2	5.8	3.2	3.2	0.1	3.2	3.2	0.1
			EBIT	67.5	62.1	12.1	32.5	35.5	6.2	10.7	10.7	1.1	10.7	10.7	1.1
			Total assets	-0.4	-0.4	0.3	0.9	0.8	0.3	6.3	6.5	1.2	6.3	6.5	1.2
			N = 2	Operating revenue	-0.3	-0.3	0.2	2.2	2.0	0.7	4.9	5.6	1.6	4.9	5.6
Leisure, Tourism, and Hospitality	8	N = 2	EBITDA	2.0	2.0	1.9	40.6	21.4	46.5	-27.8	-27.4	7.6	-27.8	-27.4	7.6
			EBIT	1.1	1.1	1.1	34.7	42.2	17.5	-15.6	-15.1	4.1	-15.6	-15.1	4.1
			Total assets	-0.4	-0.4	0.3	0.9	0.8	0.3	6.3	6.5	1.2	6.3	6.5	1.2
			Operating revenue	-0.3	-0.3	0.2	2.2	2.0	0.7	4.9	5.6	1.6	4.9	5.6	1.6
			N = 2	EBITDA	2.0	2.0	1.9	40.6	21.4	46.5	-27.8	-27.4	7.6	-27.8	-27.4

Table 3 (continued)

Sector	No. Ob	Fundamental	Discounted cash flow method						Multiple method						
			Listed			Private			Listed			Private			
			Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	
Commerce	24	N = 6	Operating revenue	-3.1	-4.7	2.8	2.4	2.8	1.4	1.7	0.8	1.6	1.7	0.8	1.6
			EBITDA	-2.5	-2.7	2.8	4.9	4.1	2.5	1.3	1.0	0.6	1.3	1.0	0.6
			EBIT	12.8	37.8	68.1	41.9	41.1	45.7	-13.3	-20.0	46.3	-13.3	-20.0	46.3
			Total assets	44.4	45.3	29.4	47.5	31.3	47.5	-0.9	-15.3	37.0	-0.9	-15.3	37.0
Mineral, Metals, and Transformation	8	N = 2	Operating revenue	-0.1	-0.1	0.1	1.5	1.5	0.3	1.3	1.3	0.3	1.3	1.3	0.3
			EBITDA	-0.1	-0.1	0.1	0.9	0.9	0.1	0.8	0.9	0.2	0.8	0.9	0.2
			EBIT	-1.2	-1.1	1.0	-21.2	-53.8	70.5	17.4	17.7	6.1	17.4	17.7	6.1
			Total assets	-1.7	-1.7	1.4	33.4	32.2	7.7	26.5	27.2	10.6	26.5	27.2	10.6
Telecommunications and others	24	N = 6	Operating revenue	-5.3	0.1	10.3	1.8	1.1	1.5	4.1	1.8	4.1	4.1	1.8	4.1
			EBITDA	-0.2	0.2	2.3	3.1	1.5	3.0	1.5	1.4	0.2	1.5	1.4	0.2
			EBIT	-10.8	10.5	167.3	33.6	25.6	28.9	5.6	11.4	76.1	5.6	11.4	76.1
			Total assets	19.5	19.3	33.2	17.2	19.5	6.6	4.8	-11.4	38.3	4.8	-11.4	38.3

Table 3 (continued)

Sector	No. Ob	Fundamental	Discounted cash flow method						Multiple method					
			Listed			Private			Listed			Private		
			Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Renewable energy	16	N = 4	-6.4	-5.1	8.5	0.3	1.4	17.7	4.6	25.2	17.7	4.6	25.2	
		Operating revenue												
		EBITDA	-0.3	-0.2	0.8	0.6	0.6	1.7	1.5	1.0	1.7	1.5	1.0	
		EBIT	-47.1	4.8	141.4	8.1	92.7	68.2	32.6	91.5	68.2	32.6	91.5	
		Total assets	-68.2	4.9	204.1	4.2	91.6	78.8	33.6	97.2	78.8	33.6	97.2	
Engineering and others	48	N = 10	-1.1	2.2	8.6	1.8	1.6	11.4	4.4	11.7	11.4	4.4	11.7	
		Operating revenue												
		EBITDA	0.7	1.0	1.4	1.3	1.4	1.6	1.3	1.2	1.6	1.3	1.2	
		EBIT	13.2	12.8	21.5	14.3	28.1	9.1	16.2	45.4	9.1	16.2	45.4	
		Total assets	29.8	16.9	87.2	7.4	35.6	12.2	22.0	84.3	12.2	22.0	84.3	
Media and Advertising	16	N = 4	8.2	4.4	11.7	0.3	0.7	7.0	4.9	6.3	7.0	4.9	6.3	
		Operating revenue												
		EBITDA	4.1	1.5	7.2	0.1	2.1	1.8	1.9	0.9	1.8	1.9	0.9	
		EBIT	14.9	7.7	23.8	11.3	25.0	36.1	28.8	34.5	36.1	28.8	34.5	
		Total assets	41.2	27.3	52.2	2.6	9.8	63.1	48.9	66.3	63.1	48.9	66.3	

Table 3 (continued)

Sector	No. Ob	Fundamental				Discounted cash flow method				Multiple method										
		Listed		Private		Listed		Private		Listed		Private								
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD							
Man. and Assembly of Capital Goods	8																			
	N = 2																			
	Operating revenue	-730.8	-780.5	718.4	2.8	0.1	444.0	489.5	402.1	444.0	489.5	402.1	444.0	489.5	402.1					
	EBITDA	-1.4	-1.7	0.9	2.8	0.0	1.4	1.4	0.1	1.4	1.4	0.1	1.4	1.4	0.1					
	EBIT	-247.0	23.3	542.1	-28.8	-27.8	203.7	-13.8	441.3	203.7	-13.8	441.3	203.7	-13.8	441.3					
	Total assets	-193.3	23.5	435.0	96.9	103.3	160.0	-13.7	353.8	160.0	-13.7	353.8	160.0	-13.7	353.8					

firms' observations. Therefore, it can be inferred the presence of high outliers in samples. Observing metrics for all groups, there is a remarkable difference between them, and this is factored into the estimation of the private company discount.

Usually, investors pay an acquired price for private firms with a discount to compensate for the risk, growth, and cash flow. Following this line, the sample shows the opposite.

Finally, Table 3 shows a large standard deviation for most of the variables, indicating a great dispersion from the average. The standard deviation is usually higher than the mean in most of the sectors according to multiple methods and discounted cash flow method for public firms. In the case of private companies, their standard deviation is lower than public firms.

EBITDA ratio and Total assets ratio are the multiples with a large standard deviation in all the two valuation methods for private and public companies, reinforcing the thought of considerable outliers in the sample.

The model introduces variables such as: enterprise value, operating revenue, EBITDA, EBIT, and Total assets and a categorical dummy about characteristic company 0 = private company and 1 = public company. This model is defined as follows:

$$\begin{aligned} \text{Enterprise value} = & \alpha + \beta \text{ Operating revenue} + \beta \text{ EBITDA} \\ & + \beta \text{ EBIT} + \beta \text{ Total assets} + \beta \text{ Type of firm} + \varepsilon_i \end{aligned} \quad (10)$$

As a result, operating revenue, total assets, and EBIT are statistical significance in the mean estimation but EBITDA and the dummy variable (0 = private company and 1 = public company) are not statistical significance according to t student test. Thus, $R^2 = 0.8107$ and R^2 adjusted = 0.8065.

Initially, the sample includes 232 observations (see Table 4). The observations with values missing from any of the variables have been removed and the negative value multiples because it is not possible to use them as a measuring tool. Some sectors have been eliminated to accommodate data, being reduced from 10 to 8 sectors. Moreover, the outliers have been eliminated.

According to Kooli et al. (2003), we match just one private transaction with a public comparable firm. To avoid selection bias and an excessive sample size reduction, groups of similar unlisted and listed firms are compared. Following Elnathan et al. (2010), to homogenize the data and allow a non-linear relationship, each variable has been transformed into its natural logarithm.

Table 5 presents summary statistics for four measures of discounted cash flow and four measures for comparable valuation methods. Panel A of Table 5 reports the mean, median, and standard deviation, the performance measure is less than or equal to 75%, and the interquartile range. Mean and median values in listed firms are higher for comparable valuation methods than for the discounted cash flow method. The estimates based on the discounted cash flow method substantially underestimated values, with a median for revenue multiple = 0.7, EBITDA multiple = 1.7, EBIT multiple = 1.9, and Assets' multiple = - 0.2. The deviation standards are similar in both methods except for the assets' multiple in the discounted cash flow method which is 1.1. On the other hand, Percentile (Pct.) within 75% is higher in EBITDA

Table 4 Comparison of different valuation methods

	Valuation methods			Valuation methods					
	(A) Revenue multiple	(B) EBITDA multiple	(C) EBIT multiple	(D) Assets multiple	(E) Revenue multiple	(F) EBITDA multiple	(G) EBIT multiple	(H) Assets multiple	
<i>Panel A: Listed companies</i>									
1	Mean	3.0	5.7	21.9	1.6	5.3	19.1	35.3	1.5
2	Median	1.9	5.3	6.6	0.8	3.5	17.8	25.4	1.5
3	Standard deviation	5.3	30.3	60.7	2.9	6.7	30.6	62.1	0.9
5	Pct within 75%	3.7	16.4	32.2	1.8	6.0	31.9	54.8	2.2
6	Interquartile range	3.6	16.4	33.0	1.7	25.8	25.8	48.8	1.3
<i>Panel B: Private companies</i>									
1	Mean	1.3	8.3	16.1	1.7	5.3	19.1	35.3	1.5
2	Median	0.8	8.8	15.2	1.5	3.5	17.8	25.4	1.5
3	Standard deviation	1.7	37.8	34.0	1.9	6.7	30.6	62.1	0.9
4	Pct within 75%	2.4	22.0	26.4	2.7	6.0	31.9	54.8	2.2
5	Interquartile range	2.3	31.1	24.2	2.6	4.2	25.8	48.8	1.3

Table 5 Comparison of different valuation methods

	Discounted cash flow valuation methods				Comparable valuation methods			
	(A) Revenue multiple	(B) EBITDA multiple	(C) EBIT multiple	(D) Assets multiple	(E) Revenue multiple	(F) EBITDA multiple	(G) EBIT multiple	(H) Assets multiple
<i>Panel A: Listed companies</i>								
1	1.1	1.7	3.1	0.4	1.7	2.9	3.6	0.4
2	0.7	1.7	1.9	-0.2	1.2	2.9	3.2	0.4
3	1.7	3.4	4.1	1.1	1.9	3.4	4.1	-0.1
			Standard deviation					
4	1.3	2.8	3.5	0.6	1.8	3.5	4.0	0.8
5	1.3	2.8	3.5	0.5	3.3	3.3	3.9	0.3
			Pct within 75% Interquartile range					
<i>Panel B: Private companies</i>								
1	0.3	2.1	2.8	0.5	1.7	2.9	3.6	0.4
2	-0.3	2.2	2.7	0.4	1.2	2.9	3.2	0.4
3	0.5	3.6	3.5	0.7	1.9	3.4	4.1	-0.1
			Standard deviation					
4	0.9	3.1	3.3	1.0	1.8	3.5	4.0	0.8
5	0.8	3.4	3.2	1.0	1.4	3.3	3.9	0.3
			Pct within 75% Interquartile range					

multiple in the DCF method than comparable methods and, in the case of interquartile range measure, the revenue multiple in the DCF method is lower (1.3) than the same multiple in comparable valuation method.

Panel B of Table 5 also reports values estimated for private companies using both methods (DCF and comparable valuation). All estimates based on the comparable valuation method substantially overestimated values for the discounted cash flow method, except for the assets' multiple.

Comparing both groups (private and listed companies), Table 5 indicates that public market valuation ratios are higher than the valuation ratios for unlisted firms. Hence, unlisted firms sell at a discount relative to comparable public. The mean of multiples suggests that there is a private company discount instead of a premium but in cases such as EBITDA multiple and Assets' multiple shows the opposite. Regarding the median, the values show that Revenues operating multiple for private companies is the only measure that is lower than the multiples for public companies.

To estimate the private discounts, we proceed as follows in Eq. (11):

$$\begin{aligned} & \textit{Private Company Discount} \\ & = 1 - (\textit{private company multiple} / \textit{public companies multiple}) \quad (11) \end{aligned}$$

For each of the multiples that we estimate, there is a corresponding discount. Table 6 reports the four different estimated discounts for discounted cash flow, and in the case of comparable valuation methods, we calculate the discounts using the data from DCF valuation for private firms.

Table 6 shows the estimates of private company discounts for private SME firms. The mean and median are all negative except for some multiples especially the revenue multiple for discounted cash flow methods and assets' multiple for comparable valuation multiple. In the case of the revenue multiple used for the DCF method, the estimated private company discounts are statistically and economically significant. For example, the mean and median discounts associated with the DCF method with revenue multiples of 0.8 and 1.4, respectively. However, operating revenue may have different valuation implications in different industries; that is, the operating revenue varies more across sectors/industries.

In the case of the earnings multiples, EBITDA is not statistically significant, but the EBIT multiple is statistically significant. Both methods show a negative private company discount suggesting a premium over public firms. This goes against the standard theory of a discount price paid for a firm with less liquidity, lower size, and higher risk.

The estimated discounts using the assets' multiple are also statistically and economically significant. Also, they are very similar (median), 3.1 and 3.2 for the DCF method and Comparable method valuation, respectively.

Figures 1 and 2 plot the results in Table 6. Mean private company discounts follow similar patterns between multiples, but for the assets ratio, it is the opposite because the comparable valuation method is higher than the DCF method. Remarkably, median discounts follow identical patterns to the first ones in which the comparable valuation

Table 6 Private company discounts

	Discounted cash flow valuation methods				Comparable valuation methods			
	(A) Revenue multiple	(B) EBITDA multiple	(C) EBIT multiple	(D) Assets multiple	(E) Revenue multiple	(F) EBITDA multiple	(G) EBIT multiple	(H) Assets multiple
Mean	0.8	- 0.2	0.1	- 0.2	- 0.5	- 0.7	- 0.2	0.1
Median	1.4	- 0.3	- 0.4	3.1	- 0.9	- 0.7	- 0.7	3.2

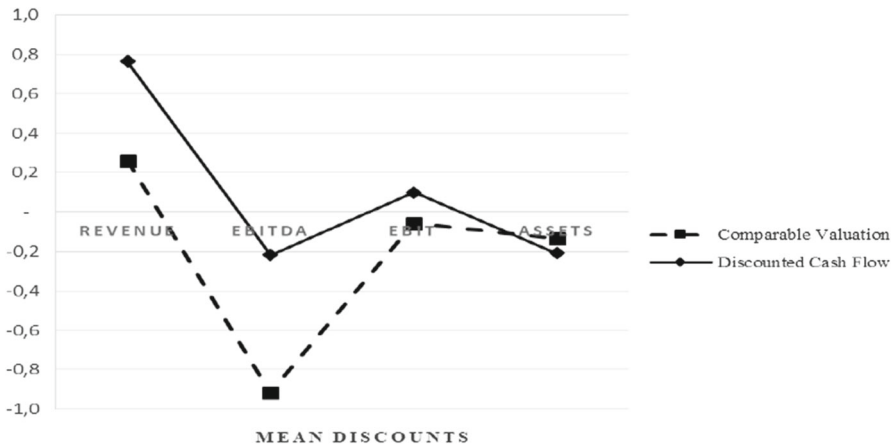


Fig. 1 Means discounts

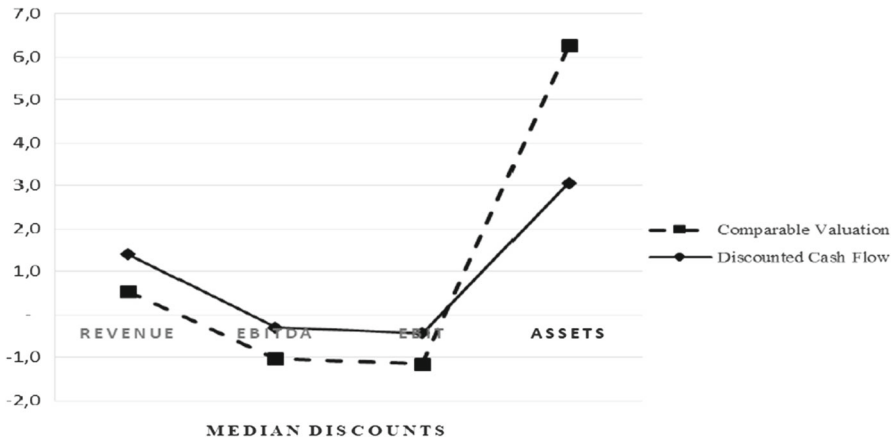


Fig. 2 Median discounts

method for assets' multiple is higher than the DCF valuation method. This may suggest that when buying a private firm, the market penalizes the assets' multiple.

As noted above, there is no private discount, instead, the outcomes of this article suggest a premium over public firms for some ratios. The negative private company discounts mean a premium and, on the other hand, some multiples suggest a discount according to the method of valuation, confirming the hypothesis of this study. This goes against previous theories of a discount price paid for a private firm (Emory 1997; Koepflin et al. 2000; Bajaj 2001; Kooli et al. 2003; Block 2007; Officer 2006; Elnathan et al. 2010; Paglia and Harjoto 2010). Nevertheless, in line with Rodríguez and Rubio (2019), marketability discount harms ratios EV/EBITDA and EV/Sales, confirming these results for the Spanish market.

5 Conclusions

When a private company is evaluated, they typically have a discount due to its relative illiquidity. This article presents a framework to estimate this discount by computing four valuation multiples for a set of unlisted firms and a comparable set of listed companies.

Firstly, we analyze target firms and select a group of comparable firms according to the size of the company, the industry operates, business purposes, and operating revenues. Then, we select the multiples to compare such as: operating revenue, EBITDA, EBIT and Total assets multiple using the discount cash flow (DCF) method along with a comparable multiples approach due to some measures fitting better according to the type of firm. As a result, we obtain multiples for ten different sectors or industries.

Nevertheless, the multiples were found to suggest the presence of large outliers with very large and extremely negative or positive resulting multiples. Thus, some variables have been removed with values missing and negative values to accommodate the data. Outliers can explain the large values and the gap between means and medians since the mean is more sensitive to them. Furthermore, it cannot be ignored the possibility of faulty or erroneous data.

The discounts are reasonable for all multiples, but the EBITDA multiple is not statistically significant. It was found that mean private company discounts (medians) range between 0.8 (3.2) and -0.7 (-0.9). The private company discount computed for Spanish SME firms is not economically reasonable because a negative private company discount suggests a premium over listed companies. This conclusion is similar to the one found in our previous analysis of the multiples for sectors/industries in both sample types of valuation method: there is no private company discount. Instead, the results suggest a premium for some multiples.

This goes against the theory of a discount price paid for a private firm with less liquidity and higher risk, but these results can also be attributed to the fact that this study compares companies, listed in the alternative stock market and small and medium enterprises in Spain; therefore, different features are not comparable. In private transactions, multiples come out higher than in publicly traded companies. These differences could be also correlated with firms' economic features since private firms are new and are high growth companies, thus they would command higher enterprise value ratios.

An explanation is that private discounts resulted does not have any comparable value within the same country although all firms in Spain use the same currency. They differ with a variety of factors such as different capital structures, risk levels, leverage levels, business cycles, fiscal systems, etc. Further, it could be the possibility of faulty data due to erroneous balance sheets of some publicly traded firms, which are under the process of investigation.

This article provides a comprehensive method to identify the private discount, the limitation is the absence of other transactions for listed companies whose ratios have been removed to correct the large outliers and accommodate the data. Future research could be the application of the model including more public and private companies depending on the different economic cycles classified by Spain's region.

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