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How the Equity Terminal Value Influences the Value of the Firm?

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Abstract:
The discounted cash flow model (DCFM) views the intrinsic value of common stock as the present value of its expected future cash flows. This paper analyses whether the equity terminal value (EqTV) of the firm calculated by fundamentals is appreciated by the market. It also studies the impact of variations in EqTV and the extent to which the market perceives these variations. Using a sample of 62 Spanish listed companies, this paper shows that EqTV and its variations are positively and significantly correlated with EqTV assigned by the market and its corresponding variations. It therefore corroborates the validity and relevance of the valuation model.

Keywords: business valuation, terminal value, equity terminal value, implied terminal value, discounted cash flow model

1 Introduction

One of the issues of greatest concern to business valuators when applying the two-period discounted cash flow model (DCFM), usually depicted as:

$$V = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t} + \frac{TV}{(1+k)^n} \tag{1}$$

is the part of the firm value assigned to the terminal value (TV), that is updated to the present at the discount rate (k) ($\frac{TV}{(1+k)^n}$). This portion represents a substantial part of the total firm value that is usually beyond the value assigned to the discrete part of the equation ($\sum_{j=1}^{n} \frac{CF_t}{(1+k)^t}$), where CF_t are the expected cash-flows of the firm at the year t.

Professionals clearly notice their interest concerning this issue when they discuss their perception of valuation (Demirakos, Strong, and Walker 2004). Along with them, a great number of firms and professional organizations have also openly pronounced themselves to this respect.[1]

The DCFM is currently the cornerstone model used in business valuation (Bruner et al. 1998; Demirakos, Strong, and Walker 2004; Graham and Harvey 2001; Rojo Ramírez and García Pérez de Lema 2006; Welch 2000). However, it has scarcely been the subject of business valuation research. Most research was conducted concerning fundamental analysis and valuation associated to accounting information field (Bauman 1996; Giner Inchausti, Reverte Maya, and Arce Gisbert 2002; Penman 2007; Tippett 2000). No doubt there is plenty of room for further work on the application of DCFM (Rojo Ramírez and García Pérez de Lema 2006), especially in determining the relevance of terminal value in the firm's final value.

TV has been of great concern for quite some time now. Different researchers (Berkman, Bradbury, and Ferguson 1998; Blasco and Ribal 2013; Jennergren 2008) have highlighted its relevance given that it represents a great proportion of the firm's final value (Buus 2007; Copeland, Koller, and Murrin 1994).

In a recent study, Bancel and Mittoo (2014) surveyed 356 firm valuation experts from 10 European countries, all of whom were qualified Chartered Financial Analysts or similar. These authors showed that there is wide variation on how experts compute TV and this, in and of itself, poses one of the major challenges of current valuation models. Moreover, it also concurrently reveals growing interest among professionals. For example, in

the hotel business industry it is often common to finance a purchase with a loan warranty. Undoubtedly a high TV represents more risk coverage. TV is therefore a key tool in establishing the viability of the hotel business (Camilleri 2015).

This interesting issue not only affects researchers in their efforts to deliver value to the businesses, but also transcends the professional world of trading operations. Moreover, it has much to do with the social perception of investment and the creation of wealth, both of which require regulation. This is why several authors (e. g. Nogueira Reis and Augusto 2014, among others) have promoted studies to fill this research gap.

This paper delves into the business valuation field, especially in matters pertaining to terminal value. It thus opens a research line with a wealth of practical content for valuators that is also of great interest for regulators.

Regarding the question '*What methods do you use to estimate terminal value? Do you use the same discount rate for the terminal value as for the interim cash-flows?*'Brotherson et al. (2013) noted that financial advisors in USA recommend both multiples and perpetual growth DCF models, although 27 % prefer perpetuity model and 18 % prefer multiples approach. Further, 91 % use the same WACC for the TV when valuing the enterprise.

The main objective of this study is to address from an empirical point of view one of the most elusive issues in firm valuation (and thereby also in investment theory), that is, the question regarding the TV calculus through the two-stage DCFM equation. We analyse whether the market takes into account the TV calculated by fundamentals and the extent to which it perceives changes in its value. Namely, this research offers new insight through the lens of the equity terminal value (EqTV). In this vein, we determine whether the EqTV corresponds to the market assessment of the owners' firm value, i. e., the implied terminal value (ITV). This perspective is of great importance because the owner's terminal value is a component that represents most of the firm value.

To this end, we develop two regression models that firstly analyse the relationship between the implied terminal value assigned by the market (ITV) and the EqTV calculated by the fundamental model. Afterwards we analyse the relationship between the ratios of the implied terminal value (ITVR) and terminal value (EqTVR).

Findings obtained from a final sample of 62 Spanish listed companies show that investors (market) appreciated significantly the EqTV calculated by fundamentals. The findings also demonstrate that possible variations in EqTV, perceived in the EqTVR, also have a positive and significant relationship with ITVR. This indicates that market values reflect these variations.

This study contributes to the existing literature by providing new insights into the influence of EqTV on the final firm value by the owners. To the best of our knowledge, this is the first article that analyses the impact of the EqTV in the assessment of the owners' firm value by the market, that is the ITV. Thus, our findings stress the importance of TV in the valuation processes. Moreover, and which is also important, this study demonstrates the validity and relevance of calculating TV with fundamentals inasmuch as firms' valuation made by experts following DCFM fit the implied valuations of the market. Not only the EqTV is specified in the ITV, but also variations in EqTV measured by EqTVR are perceived and reflected by the market through the ITVR.

This article has practical implications for both valuators and regulators given that it demonstrates that valuation through DCFM and the TV estimation are relevant to the markets.

The remaining part of the paper is organised as follows. After the introduction, Section 2 reviews the previous literature. The next section develops the theoretical framework for the hypotheses. The methodology used to accomplish the empirical analysis and the listed results are presented in Section 4. Finally, Section 5 discusses the results and concludes with the main contributions and limitations of the paper.

2   Theoretical Background

Concern regarding the impact of TV in the valuation process is by no means new to research. Rappaport (1983), 32 already indicated that only a small fraction of the value of the company could be assigned to the strategic planning period (e. g. 5 or 10 years[2]) used in the DCFM. DeAngelo (1990) explained how First Boston operated in the valuation of Fort Howard and placed TV on the shares' value in ranges of 53 and 80 %. Using a sample of 45 companies in the New Zealand market for the period 1989–1994, Berkman, Bradbury, and Ferguson (1998) analysed the DCFM behaviour by using different TV formulas.

At the beginning of this century Penman (1998) showed that dividend discount formula is an umbrella that covers discounting cash flow and residual income methods. He suggested that TV is a way to correct the effect of accounting numbers. Latter, Francis, Olsson, and Oswald (2000) compared this three valuation models: the discounted dividend model, the discounted free cash flow model, and the discounted abnormal earnings. They concluded that the abnormal earnings model "is fundamentally similar to other valuation models [i. e., DCF models], and given consistent assumptions will yield equivalent results" (Pinto et al. 2015). Nonetheless, they concluded that discounted abnormal earning performs significantly better than the other two due to the high representation of TV in the firm value when the discounted free cash flow or the discounted dividend models

were used (82 % and 65 % respectively). Platt, Demirkan, and Platt (2009) estimated that the TV might represent up to 96 % of the firm value. This amount decreased as the time horizon for these projections increased.

Rojo Ramírez, Alonso Cañadas, and Casado Belmonte (2012a) demonstrated that TV accounted for about 76 % of the final firm value for owner-investors in Spain. That is to say, it represented two thirds of the business value. They also noted that the percentage of that value varied between 60 % and 80 %, depending on the industry.

Recently, Camilleri (2015) analysed the TV importance in the hotel sector by studying five hotels with different classification grades (from III to V) in Malta. His findings suggested that the TV ranged between 9 % and 45 % of the firm value.

Previous studies showed that TV not only represented a significant percentage of the firm value, but it seemed to have become more relevant for business valuation over recent years, albeit with the exception of specific cases such as those in the hotel industry. Even so, few empirical studies have attempted to justify the importance of TV.

Among those studies is the article of Platt, Demirkan, and Platt (2009) who, by using a sample of 1,817 listed companies with data from 1988 and 2000, regressed what they called the Implied Terminal Value (ITV) over the TV and the asset value:

$$ITV = f(TV, \ ASSETS) \tag{2}$$

where:

– ITV was calculated as the difference between the firm's actual value as of the last trading day of the year[3] (Enterprise Value, EV), and the firm value by discounting cash flows, i. e. the portion of eq. (1) above without the TV. In Platt et al.'s words, *ITV is the residual after subtracting the present discounted value of future cash flows (but not the terminal value) from the market's estimate of enterprise value.*

$$ITV = EV - \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t} \tag{3}$$

where t denotes time and n the final year of the discrete period.

– TV was calculated using the stable growth model based on the well-known Gordon-Shapiro model (Gordon and Shapiro 1956) and using the future value of cash flows (CF) as the numerator.

$$TV = \sum_{t=n+1}^{\infty} \frac{CF_t}{(1+i)^t} = \frac{CF_{n+1}}{i-g} \tag{4}$$

where the numerator estimates the CF value in year (n + l), and the denominator calculates the difference between the discount rate (i, usually, equal to k) and the growth rate (g). The strategic period in which is possible to estimate the CF, is denoted by n.

The authors concluded that the value of the firm (e. g. the ITV) given by the stock market (which they assumed was capable of adequately predicting future cash flows and true terminal value) is inversely related to the actual rate at which cash flows are earned in the long run (TV) thus, their findings suggest that the market "appears not to rely heavily on cash flows that will actually be earned in the long term". Consequently, they gave three recommendations to analysts in order to limit the damage being done by reliance on forecasts:

1. Analysts should put relatively less effort into their detailed early-year forecasts.

2. Analysts should put relatively more emphasis on the values used for the growth rate and the discount rate as they greatly impact the terminal value.

3. Analysts should consider reporting results for a range of terminal values generated with different growth rate assumptions.

Furthermore, their conclusions are disconcerting, especially when justified on the logical premise of a large TV, given that under the assumption of the going concern principle adopted in DCFM (Penman 1998), the discrete period is rather insignificant in relation to the indefinite useful life of a firm.

Nevertheless, although they dare with an important and difficult task, we have some concerns about their conclusions. Particularly, they work with firm value (EV) and not with equity value (EqV) that accurately reflects the market view, centred on financial investors. As a consequence, they used capital cash flows instead of free cash flows in their calculus. Albeit both are algebraically equivalent (Ruback 2002; Fernández 2007), the capital

cash flows can give misleading results (Booth 2007) due to it is still an incomplete capital structure model and implies 100 % debt.

Authors like Penman (1998) considered that TV should not represent a high percentage of firm value. They stated that when this happens, the model must be questioned since economic theory suggests that competition eliminates abnormal long-term results. Therefore, the likely incremental profitability would be equal to the cost of the capital even if conservatism were argued to lead to returns different from the cost of capital (Penman 2007). In such cases, conservatism would be offset by the uncertainty of the valuator-analyst (Cassia and Vismara 2009).

Other authors, like Jennergren (2008), considered that the presence of a high amount of TV is largely due to the fact that this value is associated to fixed investments in the firm at the valuation time. Jennergren added that the difficulty of modelling TV estimation in the long-term is not a valid argument because it is often actually even more difficult modelling the explicit forecast period.

It seems indisputable that TV must be studied from an empirical perspective in order to support the arguments of different authors, especially in the case of postulations concerning the market effect on TV.

In the next section we analyse the impact of the TV on the equity value of the firm (EqV) instead of the firm's value (EV) as Platt, Demirkan, and Platt (2009) do, although we follow the same structure that these authors. In this vein, as stated above, with the equity value of the firm we try to reflect more accurately the market view by using free cash flows instead of capital cash flows.

3   Hypotheses Development

Although well known, we will start by presenting the equity value (EqV) of a firm when applying the two-stages DCFM which is the most used model and it is expressed as follows:

$$EqV = \sum_{t=1}^{n} \frac{EqFCF_t}{(1 + k_e)^t} + \frac{EqTV}{(1 + k_e)^n} \tag{5}$$

where: $EqFCF_t$ are the owners' free cash flows at the year t, and k_e, is the owners' opportunity cost of capital. Finally, EqTV reflect the TV for the owners.

For the first-stage, the discrete valuation period, an EqFCF explicit projection is usually done for the following 5 years (e. g. Courteau, Kao, and Richardson 2001; Jorgensen, Lee, and Yoo 2011). These flows are discounted at an owners' opportunity rate of return or at the cost of equity capital (Rojo Ramírez 2014).

The second part of the formula estimates the firm value of the equity owners over an infinite horizon. This value is known as the terminal value (Buus 2007; Jennergren 2008; Levin and Olsson 2000; Feltham and Ohlson 1999; Penman 1998). This value is calculated according to expression (6), projecting EqFCF at the end of the first interval ($EqFCF_{n+1}$), which is expected to grow at a constant perpetual rate (g). In practice, it is usually expressed as follow:

$$EqTV = \frac{EqFCF_n \ (1 + g)}{k_e - g} \tag{6}$$

where g is the stable growth rate.

Equation 6 has two constraints (Damodaran 2002):

1. The g rate must not exceed k_e. This might possibly limit the application of the model to leading technology firms for which high growth might be expected over long periods of time. Nevertheless, this constraint does not limit application of the model at all because if high growth is expected for a long time, then that "long time" must be considered part of the "discrete" period.

2. The EqFCF growth rate cannot be above the long-term economic growth rate: $k_e > g$. Actually, this situation should not be presented in a competitive market in which $ROE = k_e$. Since $ROE\ b = g$, being b the retention ratio, which should be less that one (since opportunities in infinite time would not warrant b = 1 if we would need to have some cash flows to owners in infinite time). Then, $ROE > g$ and because we admit that $ROE = k_e$, then $k > g$.

Thus, the question is how large can be g. Is in this vein that practitioners and researchers assume a growth rate equals the growth rate in GDP (g_{GDP}), although different perspective could be adopted.

Several authors have highlighted the difficulty of establishing a long-term growth rate level. Cassia and Vismara (2009) following the argument in 2 stated that the characteristics of competitive markets made it impossible to maintain investment growth rates above the cost of capital. In the event of a competitive advantage for the firm, growth rates would be very difficult to maintain both throughout the discrete interval of the model as well as in the TV. These authors discussed the convenience of establishing an ideal growth rate (capital cost per estimated reinvestment rate for the previous year) under the assumption of long-term stability. This is the underlying principle in the approach of Levin and Olsson (2000) concerning the existence of a long-term equilibrium (steady state).

According to Jennergren (2008), TV depends on committed investment. Jennergren highlighted the importance of the TV (a continuing value across the post-horizon period in a steady state) when calculating the firm value. He claimed that this element should not distort the final firm value if the calculation, based on the Gordon-Shapiro model (Gordon and Shapiro 1956), is correctly decomposed. This division is effectuated to take into account firm fixed investments and their effects on amortization and, thus, on taxes. Subsequently, Blasco and Ribal (2013) applied Jennergren's (2008) model to a sample of small and medium-sized Spanish companies. They concluded that the economic life of fixed assets and investment intensity have a significant impact on TV, which amounts over 50 % of the firm's value.

Kramná (2014), in a study based on reports from analysts valuing companies in 2012 (482 transactions) in the Czech Republic, concluded that 62 % of the analysts applied a g rate without providing any explanation for doing so. In the same vein, Petersen and Plenborg (2009) analysed the spread sheets of five Danish financial institutions to check whether these firms had correctly applied valuation models. With respect to the TV, the valuation model assumes that TV cash flow should be consistent with the cash flow throughout the continuous period. However, the analyses only reflected this consistency in 2 of the 5 institutions. Additionally, while the model assumes that the TV cash flow grows at a constant g rate, this was only the case in 2 of the 5 institutions. The work of Sabal (2014) also brought this inconsistency to light.

The difficulty of establishing the growth rate led to the proposal of alternative methods including the use of multiples or the value of disposed assets (McDaniel and Evans 2012). In fact, analyst-valuators are even more conservative than the accounting itself. They not only tend to consider that $g = g_{GDP}$ to avoid the effects of inflation (Ashton and Wang 2013; Kiechle and Lampenius 2012; Lundholm and Sloan 2007), but they also assume that there is no growth rate ($g = 0$) (i. e. Buus 2007; Breuer, Fuchs, and Mark 2014) that can be rational in a scenario where $ROE = k_e$ and assuming that depreciation and amortization equal the sum of net investment and change in working capital (Berkman, Bradbury, and Ferguson 1998). Thus, EqTV results from capitalizing on EqFCF in the year subsequent to the final year of the discrete period ($EqFCF_{n+1}$) at the rate of return required by owner-investors (k_e), reduced (or not) in function of the growth rate of the economy g_{GDP}

$$EqTV = \frac{EqFCF_{n+1}}{k_e - g_{GDP}} \Rightarrow \frac{EqFCF_{n+1}}{k_e} \tag{7}$$

In short, although most authors agree on the importance of TV (e. g. equity terminal value) in the final firm value, few empirical studies actually stress how important it is for valuators to include EqTV when they calculate equity value. The empirical gap concerning the effect of EqTV on equity value, and thus the extent to which both the market and analysts perceive and understand residual value, lead us to propose the following hypotheses:

> *Hypothesis 1: The implied terminal value (ITV) of the equity comprises the expectations of long-term value reflected in the equity terminal value (EqTV).*

This hypothesis assumes that the market is competitive and perceives the contributions made by valuator-analysts who apply the DCFM (Larrán Jorge and Rees 1999). Otherwise, contrary to what Platt, Demirkan, and Platt (2009) claimed, DCFM fits the market and its calculation reflects the value of securities.

However, this does not mean that the market necessarily gives an adequate value to securities as Platt, Demirkan, and Platt (2010) suggested. There has been much research concerning the relationship between market price and fundamentals, suggesting that fundamental analysis contribute to market price influenced by the analysts' forecast. Overall, they suggested that fundamental value should not be affected by market price (e. g. Rutterford 2004). Thus, under the hypothesis that market behave efficiently and given that EqTV can be quite large as a percentage of the total estimated value (e. g. Bauman 1996), we admit that ITV, in relation to market value, should be correlated with the amount that the EqTV. If the gap between prices and fundamentals is small, we said that price is fair and ITV will approach to EqTV. If the price seems too high or too low then, market is over/under-priced securities and differences between ITV and EqTV will appeared (Marsat and Williams 2013).

Therefore, we propose the following second hypothesis:

Hypothesis 2: The Implied Terminal value (ITV) assigned by the market comprises the possible variations of the equity terminal value (EqTV) calculated through discounted cash flow model.

According to this hypothesis, if the market is efficient, the possible variations of the implied terminal value (ITV), in relation to market value, should correlate with the amount that the EqTV represents over the total equity value.

The next section provides the methodology to check both hypotheses.

4 Methodology

4.1 Data Set

The data used in this study were obtained from the SABI database (Sistema de Análisis de Balances Ibéricos) and the market, through the Spanish Treasury and the Madrid Stock Exchange. The empirical analysis covers the period 2000–2010. The information from SABI refers to all the accounting and the market information required to estimate the EqFCFs, the EqTV and the ITV according to the previously mentioned equations.

Company data exclude banking, insurance businesses and SICAV.[4] Moreover, we required continuous data for the period under study. This generated an initial sample of 110 non-financial firms classified by industry following the criteria of the Madrid Stock Exchange. Thus, we differentiated between the following industries: Oil and Energy (O&E); Basic Material, Industry and Construction, which was divided into two categories: Basic material & Industry (BM&I) and Construction (CON); Consumer Goods (CG); Consumer Services (CS); Financial Services (FS) others than banks, insurance, SICAVs and EFTs; and, Technology and Telecommunications (T&T).

The firm value was calculated at 2005, using the EqFCF for the period 2006–2010 plus the EqTV at the last year of the period. The EqTV estimation through the updating of $EqFCF_{n+1}$ requires a positive free cash flow for that year (Rojo Ramírez, Alonso Cañadas, and Casado Belmonte 2012a). In light of this, we eliminated all the firms that had a negative EqFCF in 2011. Considering all of these aspects, we reduced the sample to 80 companies. Then, we excluded a further 13 companies: 11 firms were excluded because their equity value, calculated in 2005 (EqV_{2005}), was negative; and 2 firms were excluded for being in special situations, that is arrangement with creditors or bankruptcy). Moreover, we used natural logarithms (as explained below) to achieve a greater normality of our dependent variables. All these processes led us to a final sample of 62 quoted firms.

We addressed the potential for multicollinearity, heteroscedasticity, and common method bias in our sample. Firstly, based on the values in our correlation table, multicollinearity can be thought to be a concern. Nevertheless, once the variance inflation factor analysis (VIF) was executed, the highest value (3.72) was far below values that might suggest a concerns[5] (Belsley, Kuh, and Welsch 1980; Tabachnick and Fidell 1996). Secondly, an examination of the residual plots indicated that the assumptions of linearity and homoscedasticity were met to the extent that the plot of standardized residuals against predicted values (Field 2013) showed no indications of heteroscedasticity or curvilinearity.

4.2 Models

We developed the following regression analysis, the variables of which are explained below, to test the hypotheses described in the previous section:

$$ITV = \beta_0 + \beta_1 FAge + \beta_2 FSize + \beta_3 CG + \beta_4 CON + \beta_5 BMI + \beta_6 OE + \beta_7 FS + \beta_8 CS + \beta_9 EqTV + \epsilon (Mod.1)$$

$$ITVR = \beta_0 + \beta_1 FAge + \beta_2 FSize + \beta_3 CG + \beta_4 CON + \beta_5 BMI + \beta_6 OE + \beta_7 FS + \beta_8 CS + \beta_9 TVR + \epsilon (Mod.2)$$

Thus, model 1 checks whether the EqTV calculated by discounting the $EqFCF_{n+1}$ fits the market and whether its calculation is reflected in the value of the shares. Model 2 checks whether the possible errors of ITV over the fair market value, that is the ITVR, is associated with the amount that EqTV represents over the EqV, i. e. the EqTVR.

4.3 Variables of the Study

Table 1 provides a detailed definition of all the variables included in the regression models.

Table 1: Definition of variables.

Variables	Description
Dependent variables	
ITV	Difference between the FMV and the EqV, without the TV
ITVR	The ratio ITV over FMV
Independent variables	
TV	Capitalization of the $EqFCF_{n+1}$ taking a stable growth rate into account (g_{GPD})
EqTVR	The ratio TV over EqV
Control variables	
Ln Size	Natural logarithm of book total fixed assets
Ln Age	Natural logarithm of ($Year_t − Year_0$), where $Year_t$ is the date of valuation (2005) and $Year_0$ is the date of incorporation of the firm
Industry dummies	Dummy variables for each industry considered by the Madrid Stock Exchange: Oil and Energy (O&E); Basic material & Industry (BM&I); Construction (CON); Consumer Goods (CG); Consumer Services (CS); Financial Services (FS); Technology and Telecommunications (T&T)
Other variables used in the calculation	
FMV	Fair Market Value, i. e. number of shares multiplied by price per share at the last trading of the year, or market capitalization at that date
EqV	Present value of the equity for the strategic period, calculated by the DCFM

4.3.1 Dependent Variables

The Implied Terminal Value (ITV) in model 1 and the Implied Terminal Value Ratio (ITVR) in model 2 are the dependent variables.

The ITV is the difference between the Fair market value (FMV) and the Present value of firm's equity using the DCFM as shown in the following expression:

$$ITV_{2005} = FMV_{2005} - \sum_{t=2006}^{2010} \frac{EqFCF_t}{(1 + k_e)^t} \tag{8}$$

where FMV_{2005} is the market capitalization of the last trading day of the year 2005; and $\sum_{t=2006}^{2010} \frac{EqFCF_t}{(1+k_e)^t}$ is the explicit forecast period of eq. (5). That is to say, it is the present value of the Equity-Free Cash Flows (*EqFCF*) for the analysed period (2006–2010), using the minimum rate of return required by owner-investors (k_e) that had been calculated according to the Capital Asset Pricing Model (CAPM), without taking EqTV into account.

The following expression is used to calculate the EqFCF in each of the forecast years:

$$EqFCF_t = EBIT_t + \text{FI}_t + \text{Dep}_t - \text{CAPEX}_t - \Delta\text{NWC}_t + \Delta\text{FD}_t - \text{FE}_t \tag{9}$$

where EBIT are earnings before interest and tax, or net operating profit; FI are financial incomes; Dep is depreciation; CAPEX is capital expenditure; ΔNWC is net working capital variation; ΔFD is financial debt variation; and FE are financial expenses.

We used the natural logarithm of ITV (Tabachnick and Fidell 1996) to achieve a more normal distribution. The ITVR is calculated by dividing the ITV by the FMV as follows:

$$ITVR_{2005} = \frac{ITV_{2005}}{FMV_{2005}} \tag{10}$$

where ITV was calculated using eq. (8), and the denominator is the market value of the shares. In this regard we follow Platt, Demirkan, and Platt (2009) who utilize a similar ratio to measure the possible valuation error with respect to the market. Nonetheless, they used as denominator the present value (PV) that is calculated using the compressed adjusted present value (Kaplan and Ruback 1995), a transaction value that computes the firm value. By contrast we compute the equity value as we said in Section 2.

We also used the natural logarithm of ITV to achieve a more normal distribution (Tabachnick and Fidell 1996).

4.3.2 Independent Variables

The independent explanatory variables of the models include the Terminal Value (TV) in model 1, and the Terminal value Ratio (EqTVR) in model 2.

The TV was calculated following the expression by Gordon and Shapiro (1956), but taking the equity free cash flow (Penman 1998; Rojo Ramírez et al. 2012a) for the final year of the study (2010) as the numerator, as shown below:

$$EqTV_{2010} = \frac{EqFCF_{2011}}{(k_e - g_{GPD})} \tag{11}$$

where $EqTV_{2010}$ is the expected terminal value of the business for its owners as at the year 2010; $EqFCF_{2011}$ are the equity free cash flows as at 2011; k_e is the minimum required rate of return by shareholders; and, g_{GDP} is the gross domestic product growth rate to date in 2010.

As discussed in Section 2, the EqTV estimation model is the subject of broader discussion heavily focusing on allocating growth to the calculation (Cassia and Vismara 2009; Levin and Olsson 2000). We consider the growth rate as being equivalent to the gross domestic product growth rate (g_{GDP}) accordingly with Platt, Demirkan, and Platt (2009) who suggest that in the long run a firm's growth rate at most will be the rate of growth in the gross domestic product. Ashton and Wang (2013) based on Lundholm and Sloan (2007) also considered a growth rate that equates on average to the long run nominal growth in GPD.

We calculated the independent variable of model 2, the EqTVR, as follows (Platt, Demirkan, and Platt 2009; Rojo Ramírez et al. 2012a):

$$TVR = \frac{EqTV}{EqV} \tag{12}$$

where EqTV is the terminal value calculated using eq. (11), and EqV is the equity firm's value expressed in eq. (5).

It is important to note that the EqV was calculated to date in 2005 (EqV_{2005}), based on data for the period 2006–2010. To this end, EqFCF were estimated ($EqFCF_j$, for j = 2006 to j = 2010) for each of the years throughout the analysed period and discounted at the minimum rate of return required by owner-investors (k_e), calculated according to the CAPM. After this, the discounted EqTV as at 2010 ($EqTV_{2010}$) was aggregated to the EqFCFs.

4.3.3 Control Variables

The control variables included in the models are firm's age and firm's size. We also included industry dummies to control for the main business activities although we are aware about the limited dataset.

To control for *firm size* we used the book value of the total firm assets (in thousands of euros) (Bennedsen et al. 2007; Sacristan-Navarro, Gomez-Anson, and Cabeza-Garcia 2011). This variable fulfils two purposes simultaneously. On the one hand, it serves to take into account the possible appreciation that the market performs on the future cash flows of large and small businesses (Platt, Demirkan, and Platt 2009). On the other hand, it serves to analyse the likely influence of investment volume on firm value.

Firm age was computed as the natural logarithm of the difference between the year of the valuation date (2005) and the year of incorporation of the firm, as explained in Table 1.

We control for *firm industry* by integrating 6 dummy variables (Consumer goods, Construction, Basic material & Industry, Oil & Energy, Financial Services, and Consumer Services) leaving out a dummy variable for firms operating within Technology & Telecommunication. As we explained previously, the industry classification was taken from the Madrid Stock Exchange.

5 Data Analysis and Results

Table 2 shows the summary statistics (mean, standard deviation, minimum and maximum) for the variables under study. On average, a firm in our sample is 45 years and it has a total of 2,957 thousand euros in fixed

assets. In Table 2 we may see that the firms in our sample are between 5 and 106 years old and the firm size varies between 3,874 and 71,029 thousand euros. The ITV is 3,756 thousand euros on average, ranging from between 4,632 euros and 77,089 thousand euros. Moreover, the ITVR ranges from 0.23 to 2.87, with a value of 0.87 on average. It has also to be considered that ITVR usually takes values between 0 and 1, but in our sample there are some cases in which ITVR\gt1. This fact implies negative free cash flow, which might be due to the analysed period (2000–2010) that encompasses an economic downturn. On the other hand, the EqTV is 1,647 thousand euros on average and it ranges from between 8,848.88 euros and 15,063 thousand euros.

Table 2: Descriptive statistics.

	Mean	Std. Deviation	Mini-mum	Maximum
Implied terminal value[b]	3,756,242.12	10,578,789.29	4,632.81	77,089,309.71
Implied terminal value ratio[b]	0.87	0.40	0.23	2.87
Firm Age[b]	45.37	27.74	5	106
Firm Size[b]	2,957,291.55	9,713,663.17	3,874.38	71,029,999.83
Consumer Goods[a]	0.27	0.45	0	1
Construction[a]	0.13	0.34	0	1
Basic Material & Industry[a]	0.19	0.40	0	1
Oil & Energy[a]	0.08	0.28	0	1
Financial Services[a]	0.13	0.34	0	1
Consumer Services[a]	0.06	0.25	0	1
Equity terminal value[b]	1,647,395.52	3,172,966.08	8,848.88	15,063,994.71
Terminal value ratio[b]	0.83	1.44	0.28	10.66

Note: N = 62.
[a]Dummy variable.
[b]Natural logarithm used in the regression model.

The correlation matrix presented in Table 3, shows significant (univariate) effects of the organizational characteristics on the ITV and the ITVR. The Equity Terminal Value (LnEqTV) is positively related to the Implied Terminal Value (LnITV). Moreover, firm age (Lnage) and firm size (Lnsize) also correlate positively with the ITV. The correlations between ITV and the industry dummies are mixed: ITV correlates positively with construction, oil & energy, and consumer services but it correlates negatively with consumer goods, basic material & industry, and financial services.

Table 3: Pairwise correlations.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. LnITV	1.00											
2. LnITVR	0.107	1.00										
3. LnAge	0.038	−0.184	1.00									
4. LnSize	0.875***	0.097	0.094	1.00								
5. Consumer Goods	−0.296*	−0.015	−0.209	−0.313*	1.00							
6. Construction	0.25†	0.053	0.310*	0.306*	−0.237†	1.00						
7. Basic Material & Ind.	−0.041	−0.08	0.142	−0.173	−0.301*	−0.189	1.00					
8. Oil & Energy	0.362**	−0.118	−0.064	0.469***	−0.182	−0.114	−0.145	1.00				
9. Financial Services	−0.052	−0.173	−0.133	−0.021	−0.237†	−0.148	−0.189	−0.114	1.00			
10. Consumer Services	0.018	0.058	−0.08	−0.014	−0.161	−0.101	−0.129	−0.078	−0.101	1.00		
11. LnEqTV	0.854***	−0.137	0.045	0.815***	−0.285*	0.166	−0.057	0.453***	−0.03	−0.002	1.00	
12. LnTVR	−0.158	0.561***	−0.206	−0.086	0.055	0.064	−0.098	−0.112	−0.207	−0.053	−0.164	1.00

Note: N = 62.
† p \lt 0.10; *p \lt 0.05; **p \lt 0.01; ***p \lt 0.001.

Similar univariates are found when using the alternative dependent and independent variables of, i. e., LnITVR and LnTVR. Thus, ITVR correlates positively with EqTVR. In this case, firm age correlates negatively with ITVR, while firm size correlates positively with ITVR. Analogous correlations are found regarding the interaction between ITVR and control variables, with the exception of the firms pertaining to the oil & energy industry.

Based on the values in our correlation table, multicollinearity could have potentially been present in our analysis. So we computed the variance inflation factor (VIF) analysis among the variables. Its value did not

exceed 3.72, which is far below the threshold, as explained in Section 4.1. Thus, we discarded the presence of multicollinearity in our analysis.

Table 4 shows the results of the hierarchical regression analysis. Actually, we used four different models to test our two hypotheses. Models 1a and 1b test whether the discount model fits the market and whether the calculation is reflected in the value of the shares. We used *ITV* as a dependent variable in these models. Models 2a and 2b, which used *ITVR* as a dependent variable, check whether the possible errors of EqTVR are correlated with ITVR.

Table 4: The effects of EqTV on the ITV, and the effects of EqTVR on the ITVR. Regression analysis.

Variables	Dependent Variable ITV		Dependent Variable ITVR	
	Model 1a	Model 1b	Model 2a	Model 2b
Constant	1.957 (1.237)	-0.085 (1.186)	$-0.020^{\dagger}$ (0.431)	$-0.448(0.395)$
Ln Firm Age	-0.195 (0.186)	-0.136 (0.163)	-0.113 (0.065)	0.039 (0.060)
Ln Firm Size	0.937*** (0.081)	0.602*** (0.107)	0.040 (0.028)	0.45 (0.025)
Consumer Goods	-0.073 (0.449)	0.077 (0.392)	$-0.293^{\dagger}$ (0.156)	-0.126 (0.144)
Construction	0.025 (0.534)	0.127 (0.467)	-0.258 (0.186)	-0.172 (0.166)
Basic Material & Ind.	0.699 (0.470)	0.484 (0.414)	$-0.290^{\dagger}$ (0.164)	-0.115 (0.151)
Oil & Energy	-0.407 (0.646)	-0.665 (0.568)	-0.572^{*} (0.225)	-0.360 (0.206)
Financial Services	-0.063 (0.513)	-0.079 (0.448)	-0.472^{*} (0.179)	-0.204 (0.171)
Consumer Services	0.321 (0.630)	0.254 (0.551)	-0.243 (0.220)	-0.272^{**} (0.119)
LnEqTV		**0.478*** (0.114)**		
LnTVR				**0.311*** (0.077)**
R^2	0.788	0.841	0.194	0.385
Adjusted R^2	0.756	0.814	0.072	0.279
ΔR^2		0.053		0.191
F statistic	24.573***	30.573***	1.595	3.623**

Note: N = 62.

$\dagger$ $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Models 1a and 2a are the baseline models that only include control variables. These models show a differential effect of the control variables on the two dependent variables. For instance, the positive and significant effect on ITV ($p < 0.001$) of the variable firm size seems to indicate that larger businesses have larger ITVs. On the other hand, firm size has no significant impact on ITVR. Moreover, firm industry has no significant effect on ITV even though it correlates negatively with the consumer goods ($p < 0.1$), basic material &industry ($p < 0.1$), oil& energy ($p < 0.05$), and financial services industries ($p < 0.05$).

Model 1b and 2b include the effect of EqTV and EqTVR on ITV and ITVR, respectively. Thus, Model 1b shows that the EqTV correlates positively and significantly with ITV ($p < 0.001$). This supports H1. Furthermore, the adjusted R^2 is 0.814 and the model is significant (p < 0.001). It is important to highlight the increase of 0.053 in R^2 when the independent variable is included in the model.

Model 2b shows that the EqTVR relates positively and significantly to ITVR ($p < 0.001$) and it therefore supports H2. This model is also significant ($p < 0.05$) and its adjusted R^2 is 0.279, which represents an increase of 0.191 with respect to Model 2a

Thus, our results support both H1 and H2.

5.1 Robustness Test

We also executed a set of robustness tests. First, we repeated the same regression analysis valuing the businesses to date in 2004. The results were similar to the ones obtained in this paper. As a second robustness test, we re-estimated our dependent and independent variables (ITV, ITVR, EqTV and EqTVR) using a discount rate (k_e) to assess the EqFCFs calculated by the *Three Components Model* (3 CM); (Rojo Ramírez 2014; Rojo Ramírez, Cruz Rambaud, and Alonso Cañadas 2012). It is important to note that the 3 CM is a rather appealing alternative for estimating rates of return, especially for non-quoted businesses although it could be used if we consider that the CAPM does not properly operate due to a market that does respond to the parameters of competitive market. Among other authors, Martínez Romero and Rojo Ramírez (2017), Rojo Ramírez and Martínez Romero (2017), and Rojo Ramírez (2014) used this methodology to assess the minimum rate of return required by owner-investors. The results obtained when we used the 3 CM were consistent with the findings presented in this paper.

6 Discussion and Conclusions

The importance of TV in the final value of the firm is recognized in practice and theory, both from an economic (economic firm value) as well as from a financial (firm value for its owners) point of view. However, few empirical studies analyse the usefulness of TV (e. g. equity terminal value) in terms of final firm value (e. g. equity value of the firm) and the few studies that do (Platt, Demirkan, and Platt 2009; Rojo Ramírez, Alonso Cañadas, and Casado Belmonte 2012a), limit their work to confirming its relevance. Platt, Demirkan, and Platt 2009) suggest that making cash flow estimations for a discrete period is pointless because market really is not based on future cash flow estimates performed by valuators but on TV and so, efforts should focus on the growth rate used to calculate the TV.

Indeed, the owner's TV (EqTV) is a component that represents most of the firm value but our results do not seem to confirm this postulation.

The aim of this paper was to analyse the extent to which EqTV explains ITV. That is to say, it aim was to determine whether applying DCFM to calculate EqTV fits market valuation through ITV (Hypothesis 1). It also attempted to check the extent to which ITVR perceives EqTVR variations (Hypothesis 2). A database of Spanish listed companies and a hierarchical regression model were used to test both hypotheses.

Proposed model 1b findings shows that the implied terminal value (ITV) of the market is positively and significantly related to the equity terminal value (EqTV) calculated using the DCFM. Thus, the market seems to appreciate valuation through fundamentals as much research do. Therefore the work conducted by applying the TV model (eq. (8)) might satisfy valuators despite the constraints to which this equation is subjected (Cassia and Vismara 2009; Jennergren 2008; Levin and Olsson 2000, among others).

More importantly, unlike Platt, Demirkan, and Platt (2009) we accounted for the firm size in terms of assets as a control variable. This caused no effect on the model. As a matter of fact, the asset volume had a positive and significant impact on ITV (models 1a and 1b), which is in line with the work of Jennergren (2008). Moreover, when we introduced the EqTV as an independent variable (model 1b), we observed that the explanatory power of the asset volume decreased with respect to model 1a, in order to give greater preponderance to the EqTV calculated by DCFM. These outcomes indicated that the market accepts the EqTV calculated by fundamentals to the extent that it reduces the significance of the explanatory power of the asset volume. Otherwise, the market seems to significantly appreciate the EqTV value calculated by expert analysts.

Contrary to what Platt, Demirkan, and Platt (2009) suggested, our results show that ITV and EqTV are not entirely distinct concepts given that EqTV explains ITV to a great extent. Even so, these terms are not identical either. Discussion on the possible causes for these differences therefore prevails. In our view it may be due to the fact that Platt and his colleges use firm value and economic terminal value instead of equity value and equity terminal value that do not reflect as accurately as the later the financial market.

In an attempt to clarify these causes, we calculated the ratios of the implicit terminal value and the equity terminal value, i. e., the ITVR and EqTVR respectively (models 2a and 2b). The EqTVR was regressed to the ITVR to test hypothesis 2. If the market works as an efficient market, it should perceive the EqTV variations through the ITV. In other words, the EqTVR should be positively and significantly related to the ITVR. ITVR and EqTVR correlated as expected. Thus, model 2b accepts hypothesis 2. Thereby, the data were robust and, once again, they showed that the market is influenced by the valuators' calculation of the EqTV. It is worth noting here that the firm size has no significance in model 2a or model 2b. The volume of assets had no impact on the implied terminal value when the implied terminal value and the equity terminal value were relativized with respect to the value of the equity.

Another interesting conclusion that might be drawn from the results is that while the industry had no significant influence on the ITV (i. e. belonging to one or another industry does not necessarily imply a greater impact on the ITV) it did have a negative impact on ITVR. This could be because the market is sensitive to negative variations in ITVR, especially in the Oil & Energy and Financial Service industries. However, once EqTVR become an explanatory variable, the impact of industry vanishes and only the Consumer Service industry seemed to have a negative impact on the ITVR variable.

According to what might be expected, the market takes the EqTV component of the DCFM into consideration. It therefore follows that DCFM is a good valuation model. The reasons for the differences between ITV and EqTV might well be found in situations far from those of a purely economic-financial nature. These differences could be addressed from the standpoint of *Behavioral theory* (Cyert and March 1963) given that they might be the outcome of social and psychological behaviours, which are by no means easy to control and that the accounting research usually identifies as the market information not captured by the accounting (Ashton and Wang 2013).

6.1   Contributions

This paper contributes to the field of business valuation research in several ways. First, it approaches one of the most controversial but less discussed research topics from an empirical point of view: the role of TV (e. g. equity terminal value) calculated by DCFM in firm valuation (e. g. equity valuation). Secondly, contrary to what Platt, Demirkan, and Platt (2009) claimed, it reveals that EqTV calculated by fundamentals constitutes a component of the firm value that the market takes into account. In this sense, it seems reasonable to argue that the calculation of EqTV by fundamentals significantly explains the value of ITV according to the market. Third, it opens a field of research that has hardly been explored to date: the relevance of the fundamental components of value, in this case the EqTV, in the market value measured through ITV and, above all, the quest to explain the differences between EqTV and fundamental value.

This work also has implications for the practice of valuation. It supports the work of valuators, confirms the important role of fundamental analysis and helps to better understand the role of valuators in the valuation process. It also shows regulators the importance of valuations through DCFM and establishes criteria for the estimation of EqTV given its relevance to the market. Furthermore, it focuses on the need to pursue research concerning the importance of economic information in the markets (Milburn 2008).

6.2   Limitations and Future Research

Some of the limitations of this study are as follows. Firstly, the data used herein refer to a small sample of the Spanish market. Although the results are solid, they should be tested with larger samples. This is particularly the case in the analysis of industry effects. Secondly, the Spanish market could be restrictive due to the low numbers of quoted firms and the wide concentration of transactions in a small numbers of them, so it would be useful to conduct further research on more extensive markets.

Several lines of research on valuation might be developed to approach terminal value. To this effect, research should be aimed at addressing the above limitations, i. e., research should be developed using larger samples and it should be made extensive to other markets. Moreover, EqTV should be alternatively calculated using different variables, i. e., with different growth rates (constant, increasing and even decreasing). Furthermore, a possible extension of this paper could be to analyse the effect of possible changes in the expected cash flows (e. g. $EqFCF_{n+1}$) on the EqTV. Finally, an interesting research line is to reconcile the equity and economic perspective.

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Notes

1 For example: http://www.valuadder.com/blog/2014/07/16/terminal-value-in-business-valuation-some-alternatives/ offers alternatives to the growth model. Professional organizations such as the International Valuation Standards Council (IVSC) (http://www.ivsc.org) or the Spanish Business Accounting and Management Association (AECA) (http://www.aeca.es) also express interest at a national level. Some authors refer to specific valuation cases, such as those of hotels, and the importance of TV in final business values (Camilleri 2015).
2 Cassia and Vismara (2009) show an average of 8.7 years period covered by the first stage of explicit forecast. In Spain the most used period is 5 years (Rojo Ramírez and García Pérez de Lema 2006).
3 Platt et al. (2009) calculates EV following Arzac (2007) as follows EV = Market Cap + Debt−Cash
4 Most quoted firms in the Madrid Stock Exchange are SICAV (Investment Companies with Variable Capital) and ETFs, an investment instrument used in Spain to pay less tax (1 %). Most of them do not have employees. The total industrial firms in SABI in 2010 are 115.
5 When VIF takes values above 10, multicollinearity might be considered a concern.

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