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Stock market multiples in the valuation of unlisted agrifood companies

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ABSTRACT

Stock price determination is one of the main issues involved in the acquisition of companies. The transparency and high volume of the stock market make it possible to ascertain valuation multiples. In the case of privately-held agrifood companies, valuation multiples are scarce and barely representative. This paper focuses on answering whether listed stock valuation multiples of the agrifood industry can be useful for the purposes of valuing unlisted small and medium-sized companies. A study into Spanish unlisted agribusinesses is designed for several samples and accounting years. By means of a discounted cash flow model combined with bootstrap techniques, the empirical distribution of the unlisted multiples is obtained for three growth hypotheses. The results show that the stock market P/E should not be used in the valuation process of unlisted agrifood companies, whereas the stock market EV/EBITDA may be used in the valuation process of unlisted small and medium-sized agrifood companies that consistently obtain positive cash flows.

Keywords: SMEs, bootstrap, food industry, valuation multiples.
JEL classification: G12; G34; M41; Q14.
MSC2010: 62F40M; 62P05; 62P20.

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Múltiplos de mercado en la valoración de empresas agroalimentarias no cotizadas

RESUMEN

La determinación del precio de las acciones es uno de los principales problemas en la adquisición de compañías. La transparencia y el alto volumen de la bolsa de valores permiten determinar múltiplos de valoración. En el caso de las empresas agroalimentarias privadas, los múltiplos de valoración son escasos y poco representativos. Este trabajo se centra en responder si los múltiplos de valor de las empresas de la industria agroalimentaria que cotizan en bolsa pueden ser útiles para valorar Pymes. Un estudio sobre compañías españolas agroalimentarias no cotizadas ha sido diseñado para varias muestras y años base. Por medio de un modelo de flujos de caja descontados, combinado con técnicas bootstrap, se ha obtenido una distribución empírica de los múltiplos de empresas no cotizadas para tres hipótesis de crecimiento. Los resultados muestran que el múltiplo EV/EBITDA bursátil puede utilizarse en el proceso de valoración de Pymes agroalimentarias no cotizadas que obtienen sistemáticamente flujos de caja positivos.

Palabras clave: Pyme, bootstrap, industria agroalimentaria, múltiplos de valoración.
Clasificación JEL: G12; G34; M41; Q14.
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1. Introduction.

The European agrifood industry is mostly characterized by Small and Medium-sized Enterprises (SMEs); as of 2013, SMEs represented 99.13% of the total number of companies (Eurostat, 2016). Moreover, in 2014, SMEs employed almost 90 million people (67% of total employment) and generated 58% of the sector's value added. Indeed, the European Commission considers SMEs and entrepreneurship as key to ensuring economic growth, innovation, job creation, and social integration in the EU, given that, in the past five years they have created around 85% of the new jobs and provided two-thirds of the total private sector employment in the EU (Muller et al., 2014). McCann and Ortega-Argilés (2016) point out that, given the fact that SMEs and entrepreneurs are important drivers of the regional socio-economic system, they should be involved in the process of the setting-up, implementation and evaluation of smart specialization policies. As a large portion of the European regulations governing mergers focuses on large mergers and acquisitions, Weitzel and McCarthy (2011) indicate a possible need for more differentiated policies with respect to the mergers and acquisitions of SMEs. Specifically, they showed that in the period 1996-2007, 17.6% of Western European mergers and acquisitions in the agriculture industry were by SMEs. Van der Krogt et al. (2007) state that the major structural development in the agrifood industry is the wave of consolidations through mergers, acquisitions and alliances.

Stock price determination is one of the issues for the acquisition of companies (Koeplin et al. 2000). Having information on the P/E and EV/EBITDA for unlisted agrifood companies can provide a good grasp of the likely stock price range. The use of P/E or EV/EBITDA can yield starting figures for acquisition processes and the assessment of how the share price is evolving. In a study into mergers and acquisitions in the food business, Declerck (2016) concludes that transaction market multiples are widely used as benchmarks in negotiations between buyers and sellers as a focal point, since buyers may obtain more information in order to avoid overpaying. Weitzel and McCarthy (2011) also conclude that smaller firms finance M&A primarily with stock, which highlights the importance of having market benchmarks.

For Bancel and Mittoo (2014), multiple valuation models implicitly assume that markets are efficient and trades and transactions reflect fundamental or intrinsic firm values; but can those fundamental values be used for SMEs? Our study focuses on answering whether listed stock valuation multiples of the agrifood industry can be useful for the purposes of valuing unlisted small and medium-sized agrifood companies.

Specifically, we have worked with a sample of Spanish agrifood companies together with European listed agrifood companies using 4 base years (2010-2013). Furthermore, both P/E and EV/EBITDA are specifically taken into consideration in order to discover which one is a better means of valuing small and medium-sized unlisted companies.

To answer these questions, we need to know if the P/E (or the EV/EBITDA) of unlisted agrifood companies is significantly different from the P/E (EV/EBITDA) of listed agrifood companies. To this end, the P/E and EV/EBITDA of the unlisted companies have to be obtained. Consequently, both the stock price and the company value are needed for each unlisted company. As there is no available market for unlisted companies, both the price and the value are obtained applying a discounted cash flow model under several growth scenarios. In order to deal with variability, the bootstrap is incorporated into the valuation method and into the later valuation multiples. The bootstrap is also used to obtain the empirical distribution of the average multiple of the listed companies. Finally, the statistical difference between multiples is checked.

The rest of the paper is developed as follows. Section 2 carries out a literature review about valuation multiples. Section 3 details how to determine the fundamental EV and price of unlisted agrifood companies considering several growth hypotheses. Section 4 explains how to carry out the statistical contrast between unlisted and listed equity and entity multiples by means of bootstrap techniques. Section 5 introduces a study into unlisted Spanish agribusinesses which has been designed

for several samples and accounting years. Additionally, the estimation of the fundamental multiples for the Spanish agrifood companies is detailed. Section 6 shows the main results of the statistical contrast, while section 7 provides the main conclusions.

The work sheds some light on the use of stock exchange multiples to estimate the share price or the value of unlisted companies. As a novelty, it combines discounted cash flow models together with the bootstrap technique in order to obtain the empirical distribution of the average valuation multiples of the unlisted agrifood companies. The results show the stock market P/E and EV/EBITDA multiples should not be used in the valuation process of unlisted agribusinesses. However, the stock market EV/EBITDA multiples may be used in the valuation process of those unlisted small and medium-sized agribusinesses that are consistently obtaining positive cash flows.

2. Literature review.

Having reviewed accounting and finance literature, a number of studies have shown that earnings-based multiples (e.g, P/E, EV/EBITDA) are the most popular valuation methods used in practice (Eberhart, 2004; Cascino et al., 2014). Other authors agree with this research work: Cheng and McNamara (2000) explain that the P/E valuation method is one of the most popular in the investment community; in a survey of analysts, Vydrzel and Soukupová (2012) find that 94% of the participants choose EV/EBITDA as the most commonly used valuation market multiple; by means of a survey answered by 1,980 US analysts, Pinto et al. (2015) discover that the P/E is the most popular multiple, used by 88.1% of the analysts who use market multiples. These authors also note that EV/EBITDA is overwhelmingly the most popular EV ratio and is clearly a widely used metric in current valuation practice. Imam et al. (2008) find that the P/E ratio has been considered as an unsophisticated valuation multiple, though it is still widely acknowledged by investment analysts in particular.

The transparency and high volume of the stock market make it possible to ascertain the valuation multiples. Unfortunately, this is only true for listed companies. In the case of privately held companies, valuation multiples are scarce and barely representative (Ribal et al., 2010). Plenborg & Pimentel (2016) state that smaller firms are often characterized by a lower information environment when compared with larger firms, which makes the valuation of such firms more challenging. Several studies analyze how professionals price privately held companies: Rojo & García, 2006 state that, when pricing SMEs, practitioners tend to rely on accounting methods, namely net asset valuation, or on fundamental methods, namely discounted cash flows, DCF. However, Vydrzel & Soukupová (2012) find that in privately held firms multiples are sometimes given higher priority over DCF for time reasons.

Stock multiples, as unsophisticated models (Imam et al., 2008), might be useful to estimate the value of privately held firms in scarce information environments. However, Plenborg & Pimentel (2016), among others, state that applying stock multiples to privately held firms requires the valuation to be adjusted for the lack of marketability. In the same way, Officer (2007) finds that unlisted companies sell at a discount of 15% to 30% on average relative to control-related trades of public firms. Overall, the question remains whether stock multiples can be applied to pricing unlisted companies.

3. Methodological procedures.

According to the main goal of the study, fundamental P/E and EV/EBITDA for unlisted agrifood companies have to be estimated and then contrasted with the observed P/E and EV/EBITDA of the agrifood stock market. This involves obtaining the fundamental price (value of common equity) and the enterprise value, without recurring to the stock market.

3.1. Estimation of valuation multiples for unlisted agrifood companies.

The fundamental price (fundamental EV) will be obtained from a model of discounted free cash flows (Damodaran, 2006). This is a two-stage model. The first stage estimates the present value of free cash flow during an explicit forecast period. The second stage estimates the present value of free cash flows assuming that the firm reaches steady state after n years and starts growing at a stable rate after that; this is called the terminal value.

Equation (1) shows the whole model for the company "j" for "n" years in the first-stage. Once the enterprise value (EV) is obtained, the price can be worked out by subtracting all the non-equity claims from the enterprise value (Koller et al., 2015).

$$EV_j = \sum_{i=1}^{i=n} \frac{FCF_{ji}}{(1+WACC)^i} + TV_j \tag{1}$$

The Free Cash Flows (FCF) for company "j" in the projected year "i" are calculated as shown in Equation (2), with:

EBIT: Earnings before Interest and Taxes

t: corporate tax rate

DA: are the Depreciations and Amortizations

CAPEX: Capital Expenditure

CWC: Change in the Working Capital

$$FCF_{ji} = EBIT_{ji} * \left(1 - t_j\right) + DA_{ji} - CAPEX_{ji} - CWC_{ji} \tag{2}$$

The FCF are discounted by using the Weighted Average Cost of Capital (WACC), Equation (3) with

E: Equity, D: Debt, ke: cost of equity, kd: cost of debt (kd)

$$WACC = k_e * \frac{E}{(E+D)} + k_d * (1-t) * \frac{D}{(E+D)} \tag{3}$$

The terminal value (TV) is calculated according to Equation (4) as a going concern at the time of the terminal value estimation (Gordon's model). Using a survey of 356 valuation experts across 10 European countries, Bancel and Mitto (2014) report that 51% of the respondents rely on a normative terminal cash flow growing until infinity. Vydrzel and Soukupová (2012) indicate that Gordon's model for economic growth is the dominant model for the terminal value calculation.

$$TV_j = \frac{\left[\frac{FCF_{jn} \cdot \left(1+g_j\right)}{\left(WACC_j - g_j\right)}\right]}{\left(1+WACC_j\right)^n} \tag{4}$$

Finally, the P/E is ascertained by dividing the price by the net income while the EV/EBITDA is obtained by dividing its components.

This valuation model is widespread (Damodaran, 2006) but we need to apply it to a whole industry of unlisted companies and contrast the existence of a statistical difference between the P/E (EV/EBITDA) of unlisted and listed agrifood companies.

3.2. Null hypothesis.

As seen in section 2, some authors suggest that privately held firms will sell at a discount to comparable listed firms. The null hypothesis to be tested is:

H_0: On average, the P/E (EV/EBITDA) multiple of unlisted agrifood companies, obtained by discounted cash flows, is statistically different from the P/E (EV/EBITDA) multiple of the agrifood stock market, assuming the same risk measure for both types of companies.

3.3. Contrast of valuation multiples.

We will assume, as the null hypothesis, that the P/E (EV/EBITDA) of unlisted agrifood companies is statistically different from the P/E (EV/EBITDA) multiple of the agrifood stock market.

Instead of computing the mean of the P/E multiple, the statistical contrast is based on the harmonic weighted average method for calculating the P/E multiple of the industry. This is equivalent to computing the industry P/E as shown in Equation (5).

$$P/E_{agrifood} = \frac{P_1 + P_2 + \cdots + P_n}{E_1 + E_2 + \cdots + E_n} \tag{5}$$

with Pi: market (fundamental) Price of equity of company "i", Ei: Earnings of company "i". Operating on (5), the harmonic weighted average is obtained (Equations 6 to 9).

$$P/E_{agrifood} = \frac{1}{\frac{E_1}{\sum P_i} + \frac{E_2}{\sum P_i} + \cdots + \frac{E_n}{\sum P_i}} \tag{6}$$

$$P/E_{agrifood} = \frac{1}{\frac{E_1 * P_1}{\sum P_i * P_1} + \frac{E_2 * P_2}{\sum P_i * P_2} + \cdots + \frac{E_n * P_n}{\sum P_i * P_n}} \tag{7}$$

$$P/E_{agrifood} = \frac{1}{\frac{E_1}{P_1} * \frac{P_1}{\sum P_i} + \frac{E_2}{P_2} * \frac{P_2}{\sum P_i} + \cdots + \frac{E_n}{P_n} * \frac{P_n}{\sum P_i}} \tag{8}$$

$$P/E_{agrifood} = \frac{1}{\frac{E_1}{P_1} * W_1 + \frac{E_2}{P_2} * W_2 + \cdots + \frac{E_n}{P_n} * W_n} \tag{9}$$

with Wi: weighted price of company "i" in the whole industry.

At the same time, the EV/EBITDA contrast can be set in the same way.

This has some advantages, such as showing less sensitivity to the presence of outliers, which can easily distort the results in average multiples (Vakili & Schmitt, 2014). Researchers, such as Liu et al. (2002) and Damodaran (2006), report the existence of skewness in valuation multiple distributions, which introduces a bias into the mean multiple. Some financial data providers, such as Morningstar (2005), use this procedure to determine the average price ratios of investment portfolios. For Agrrawal et al. (2010), the portfolio harmonic mean of the P/E multiple is the logical approach to averaging valuation multiples. Liu et al. (2002) also reported that performance improves when multiples are computed using the harmonic mean, when compared with the mean or the median.

In order to test the difference between unlisted agrifood companies and stock market observed average P/E (EV/EBITDA) multiples, a bootstrap technique has been used. Bootstrapping is a technique

that resamples from the original data set (Efron, 1979; Davidson & Hinkley, 1997) allowing any lack of normality issues to be avoided. Bootstrap methods have many applications for certain kinds of computations, such as biases, standard errors and confidence limits (Hesterberg et al., 2005; Chernick & LaBudde, 2014).

The implementation of the bootstrap, together with the harmonic weighted average P/E (EV/EBITDA) ratio, has been carried out as follows.

Each variable of the fundamental model applied to unlisted companies is resampled, the bootstrap mean is obtained and the procedure is replicated 10,000 times. At the same time, the earnings are also bootstrapped. A matrix is obtained, made up of the valuation parameters and the earnings as columns and each bootstrap replicate in rows. For each row, the fundamental mean value is worked out and the fundamental price is obtained by subtracting the net debt. Using those 10,000 fundamental mean prices (values) and the corresponding earnings (EBITDA), the empirical bootstrap distribution for the mean P/E (EV/EBITDA) ratio is built. In the same way, the empirical bootstrap distribution for quoted stock P/E (EV/EBITDA) ratio has been determined by bootstrapping Prices and Earnings (Enterprise Values and EBITDAs).

Comparing the empirical distribution of the P/E (EV/EBITDA) ratio for both unlisted and listed companies, the null hypothesis can be tested. To do this, a new empirical distribution is built by means of the ratio shown in Equation (10), the position of zero (no difference) relative to the empirical distribution will allow the level of statistical significance to be obtained.

$$Contrast\ ratio = \frac{M_{unlisted}}{M_{listed}} - 1 \qquad (10)$$

4. Data management and sample selection procedure.

To contrast the null hypothesis, an application has been developed over four different base years (2010, 2011, 2012 and 2013), by using two main data sources of food companies.

The accounting data of unlisted Spanish food companies have been obtained from a database, specifically the 'Sistema de Análisis de Balances Ibéricos' (SABI).

The data for quoted food companies have been obtained from the European stock markets instead of only using the Spanish quoted food companies. Currently, there are 8 listed companies in the Food industry in Spain. This figure was even lower in the years of this study (around 6 companies) and it has been deemed insufficient to carry out the contrast.

Accounting and market data of listed European agrifood companies from 2005 to 2013 have been gathered from the Damodaran website (2014) under the industry group of food processing. None of the data sources include beverage manufacturers.

The unlisted Spanish companies have been selected, taking those Limited Companies whose main NACE code is C10 (Manufacture of food products). The NACE is the statistical classification of economic activities in the EU. Overgaard-Knudsen and Kold (2015) proved that selections based on industry affiliation are more accurate than those based on any measure of quality in the P/E valuations. For Kang (2016), the precision of the valuation is affected by both the choice of multiple and that of the peer selection criteria, and concludes that EV/EBITDA leads to a more accurate valuation in some specific cases.

The companies that make up the food industry exhibit great variability in terms of capital, turnover or results. For that reason, in addition to the whole sample, two subsamples have been considered in order to gain some homogeneity:

a) **Whole sample**. Unlisted Spanish food companies with a turnover of over 2 million euros. Imposing this condition on turnover excludes companies classified as micro-companies according to EU recommendation 2003/361. The main reason for discarding those companies is to ensure better quality accounting data.

b) **Small and Medium Enterprises (SMEs)**. Those companies with a turnover of under 50 million Euros have been selected from the whole sample. According to the definition of a SME in EU recommendation 2003/361, a turnover of 50 million euros is the maximum established amount.

c) **Success bias SMEs.** Those companies with positive free cash flow in each of the 5 years prior to the base year have been drawn from the previous category sample.

The whole sample of unlisted food companies is made up of those companies with accounting data for the base years. For each base year, 5 years of historical data are needed. 3,175 companies were found with the accounting data necessary for the base years as well as for the historical years. Table 1 gathers the number of companies for each sample and base year. It also shows the number of food manufacturing companies listed in the European markets.

Table 2 shows both the average and several percentile measures of some of the main accounting variables (from the balance sheet: Assets; from the Income Statement: Sales and EBITDA) for the unlisted agribusiness samples. In the three subsamples and for Assets, Sales and EBITDA, the average value is greater than the percentile 50, meaning that the distributions are skewed to the right. The values of the whole sample are higher than those of the success subsample, which are higher than those of the SMEs subsample.

Table 1. Sample size according to the base year.

Base year	Historical data	Unlisted agribusinesses			Listed agribusinesses
		Whole sample	SMEs	Success	
2010	2005-2009	1,639	1,504	122	84
2011	2006-2010	1,663	1,510	140	75
2012	2007-2011	1,732	1,560	137	91
2013	2008-2012	1,801	1,627	265	94

Source: Own elaboration.

Table 2. Main accounting variables of Spanish unlisted agrifood companies.

Year	Stat	Assets			Sales			EBITDA		
		Whole	SMEs	Success	Whole	SMEs	Success	Whole	SMEs	Success
2010	Mean	15,030	5,902	7,461	19,069	7,024	9,089	1,140	410	965
2010	P05	778	741	992	1,399	1,365	1,727	21	19	37
2010	P25	1,746	1,661	1,947	2,436	2,322	2,864	74	67	171
2010	P50	3,313	2,952	3,788	4,252	3,859	4,978	182	157	438
2010	P75	8,865	6,512	9,803	10,828	7,985	12,187	544	398	1,275
2010	P95	50,401	20,881	28,350	68,210	25,563	28,971	3,575	1,655	3,422
2011	Mean	15,058	5,927	8,002	20,433	7,074	10,427	1,167	399	1,008
2011	P05	830	799	938	1,444	1,398	1,935	22	21	39
2011	P25	1,835	1,725	1,960	2,497	2,379	3,135	77	69	155
2011	P50	3,530	3,092	4,462	4,479	3,979	6,122	182	156	451
2011	P75	9,348	6,641	11,196	11,689	8,176	14,774	543	392	1,352

2011	P95	49,935	20,822	25,868	70,062	24,301	32,862	3,768	1,632	3,604
2012	Mean	15,054	6,005	7,791	20,281	7,132	10,090	1,134	390	1,007
2012	P05	878	848	933	1,484	1,438	1,883	22	20	39
2012	P25	1,901	1,785	1,952	2,528	2,395	2,996	77	69	135
2012	P50	3,711	3,211	3,994	4,590	4,007	5,517	181	153	356
2012	P75	9,784	6,891	11,126	12,045	8,254	13,823	556	383	1,320
2012	P95	51,236	21,223	25,800	71,543	24,625	35,016	3,730	1,522	3,730
2013	Mean	15,854	6,370	7,254	21,158	7,588	8,690	1,117	404	693
2013	P05	904	872	958	1,510	1,468	1,560	21	19	29
2013	P25	1,982	1,858	1,912	2,572	2,441	2,522	74	67	86
2013	P50	3,870	3,353	3,597	4,815	4,223	4,443	180	151	217
2013	P75	10,306	7,302	8,222	12,661	9,079	9,956	571	387	685
2013	P95	55,667	22,574	25,187	75,249	26,685	34,055	3,866	1,570	3,210

Mean and percentiles in thousands of euros.
Source: Own elaboration.

Those companies with incomplete, inconsistent or illogical data have been removed. In addition, every year those companies had negative EBIT, they have been removed (Damodaran, 2006; Liu et al., 2002). For all of these reasons, there are fewer companies in the whole sample (Table 1) than in the original one.

5. Estimation of the fundamental multiples of the unlisted Spanish agrifood companies.

The estimation of the stock price implies determining the enterprise value (EV) first, following the aforementioned two-stage valuation model (Equation 1).

5.1. Time horizons and time windows.

The time span of the first stage of valuation is fixed at five years. In a survey of analysts, Vydrzel and Soukupová (2012) find that respondents (82%) make forecasts ranging from one up to five years. Rojo and García (2006) report that five years is the most frequent length of period used to forecast the value of firms. In a study into how corporate financial advisers and private equity funds apply present value approaches in privately held firms, Petersen et al. (2006) show that the average forecasting horizon is six years.

The FCF predictions have been carried out for four different time windows, considering that the valuation process takes place over four different base years from 2010 to 2013. For each base year, the accounting information of the preceding 5 years has been used. Bancel and Mittoo (2014) find that nearly half (49%) of a sample of European analysts examine the firm's past performance when estimating cash flows. Table 3 shows the time layout for each base year.

Table 3. Layout of valuation time windows.

Historical Data	Base year	Projected years (1st stage)	Terminal Value (2nd stage)
2005:2009	2010	2011:2015	2016-
2006:2010	2011	2012:2016	2017-
2007:2011	2012	2013:2017	2018-
2008:2012	2013	2014:2018	2019-

Source: Own elaboration.

The average value of the main components of the FCF for each base year and the five previous years are shown in Table 4 for the three subsamples.

Table 4. FCF average inputs* for each base year and previous years for the 3 subsamples.

Sample	Year	n	EBIT	DA	CAPEX	CWC	Taxes
	2006	1,639	992.16	502.38	783.44	226.58	227.58
	2007	1,639	1141.11	551.58	900.61	206.12	294.39
Whole	2008	1,639	1199.71	543.20	934.31	358.54	239.84
	2009	1,639	1160.98	557.68	772.48	-335.99	240.88
	2010	1,639	1208.40	583.74	711.63	7.13	271.27
	2007	1,663	1079.54	524.29	899.12	189.35	276.56
	2008	1,663	1235.09	525.56	882.56	350.47	254.06
Whole	2009	1,663	1157.44	536.08	748.73	-272.23	237.29
	2010	1,663	1183.97	558.86	698.95	106.55	270.97
	2011	1,663	1178.90	575.62	744.13	480.37	268.39
	2008	1,732	1174.51	500.29	1018.52	378.59	244.76
	2009	1,732	1098.39	516.98	741.44	-196.16	220.89
Whole	2010	1,732	1131.44	548.03	720.12	162.94	261.79
	2011	1,732	1128.80	565.01	717.63	460.16	258.70
	2012	1,732	1136.41	581.71	850.68	-319.46	243.67
	2009	1,801	1092.36	510.87	910.94	-105.78	218.52
	2010	1,801	1135.08	545.96	704.07	111.21	260.89
Whole	2011	1,801	1121.65	564.17	720.47	450.02	254.86
	2012	1,801	1160.80	581.07	841.18	-330.55	247.64
	2013	1,801	1077.52	603.57	798.35	-112.20	237.21
Sample	**Year**	**n**	**EBIT**	**DA**	**CAPEX**	**CWC**	**Taxes**
	2006	1,504	353.91	208.54	369.57	80.97	105.81
	2007	1,504	411.83	223.29	433.30	88.51	104.36
SMEs	2008	1,504	419.19	236.45	422.43	392.19	84.79
	2009	1,504	429.36	253.23	340.75	-48.16	95.14
	2010	1,504	437.39	262.51	368.64	53.58	100.48
	2007	1,510	372.88	219.16	430.13	92.65	93.27
	2008	1,510	396.84	232.94	399.28	358.03	81.32
SMEs	2009	1,510	399.82	246.78	316.15	-46.84	87.93
	2010	1,510	414.48	255.96	354.87	75.49	95.05
	2011	1,510	411.16	262.56	351.60	132.52	90.69
	2008	1,560	377.43	228.44	480.65	358.51	74.42
	2009	1,560	383.55	243.93	297.98	-0.67	82.24
SMEs	2010	1,560	397.36	254.23	349.91	66.55	88.83
	2011	1,560	396.57	257.87	335.70	121.63	87.52
	2012	1,560	395.57	257.53	313.78	100.41	82.92
	2009	1,627	390.00	239.57	396.79	76.30	83.40
	2010	1,627	401.37	250.46	337.35	42.57	89.07
SMEs	2011	1,627	400.96	254.01	339.65	100.60	86.66
	2012	1,627	409.72	255.29	306.51	109.94	84.67
	2013	1,627	416.22	261.00	297.52	28.79	88.18
Sample	**Year**	**n**	**EBIT**	**DA**	**CAPEX**	**CWC**	**Taxes**
	2006	122	787.25	317.50	269.82	2.74	249.99
	2007	122	958.27	328.00	270.11	146.79	284.26
Success	2008	122	988.34	326.52	290.55	-3.57	267.51
	2009	122	983.04	320.82	213.49	-228.73	278.75
	2010	122	1108.10	304.24	261.25	-23.22	312.27
	2007	140	893.70	361.04	320.88	79.05	255.51
	2008	140	973.10	364.73	298.43	-57.74	249.96
Success	2009	140	1018.24	361.71	246.59	-276.65	278.11
	2010	140	1094.81	344.97	254.50	-1.62	305.91

	2011	140	1058.33	334.01	269.96	25.48	295.23
	2008	137	893.85	354.34	287.93	-115.58	228.34
	2009	137	963.18	349.14	235.67	-223.74	266.28
Success	2010	137	1068.99	343.02	249.75	-24.74	293.87
	2011	137	1047.20	329.55	245.48	97.56	290.23
	2012	137	1060.14	311.59	251.53	5.55	287.65
	2009	265	641.60	335.25	230.46	-217.40	153.28
	2010	265	706.38	347.38	192.42	-8.97	176.51
Success	2011	265	702.51	335.88	194.74	44.41	175.02
	2012	265	705.54	320.75	192.15	-10.05	180.70
	2013	265	707.65	311.40	201.15	-91.79	180.10

*Accounting variables in thousands of Euros.
Source: Own elaboration.

5.2. Determination of the free cash flows (FCFs).

When estimating the future FCFs in the valuation of private companies, there is no analysts' prediction available. In order to tackle the uncertainty of the future cash flows, three different forecasting approaches have been used. All of them try to mimic the different ways that valuation professionals can estimate the FCFs of a private company valuation. The three approaches use the 5 years prior to the base year to compute the future FCFs. Also, all of the approaches use a bootstrap technique to obtain possible future paths of the FCFs of the average company. In order to ensure that all of the companies are considered in every run of the bootstrap process, a stratified resampling has been used (Davidson & Hinkley, 1997). The criterion to form the strata is the fiscal number of the company.

The first approach uses the historic FCFs to obtain the empirical distribution of the FCFs of the average agrifood company. The historic FCFs of each company make up each stratum. 10,000 bootstrap replicates are obtained for each forecasted year; therefore, a 10,000 x 5 matrix is obtained. Each matrix row is a feasible path of the future FCFs of the average company. This procedure is repeated for each base year. The future FCFs in this approach are built upon the previous FCFs and it uses no growth rate.

The second approach models the historic growth of the sales by using a bootstrap with stratified resampling as well. According to Ahmed and Safdar (2016), sales growth has frequently been used by researchers as a summary growth measure. Penman (2007) notes that sales are the primary driver of the forecasted future performance of companies. The historic sales of each company make up each stratum. From 10,000 bootstrap replicates of the industry sales, a matrix of 10,000 rows and 5 columns (5 forecasted years) is obtained. The expected annual growth for each future year and path is obtained and applied to the average FCFs of each respective base year.

The third approach uses the historic growth of the EBITDA in a similar manner to the second approach. In this approach, the historic EBITDAs of each company make up a stratum. Kaplan and Ruback (1995) state that EBITDA is a good proxy for cash flows and is, therefore, especially relevant in a valuation context.

These three growth approaches are used in the FCF model to determine the FCF of the first five forecast years. They are termed:

Growth approach 1: Stratified bootstrap

Growth approach 2: Sales growth bootstrap

Growth approach 3: EBITDA growth bootstrap

Each of these approaches will generate thousands of possible paths to be followed by the future FCFs of the average company. Every path will be used to determine the value (EV) according to Equation (1) in each sample.

The main distributional characteristics of the average FCF of the 5 forecast years are included in Tables 5.1, 5.2 and 5.3 for each sample, growth model and base year.

Table 5.1. Characteristics of the average FCF of the 5 forecast years (Whole Sample).

	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2010	2011	346.64	522.66	677.82	830.16	841.61	853.68	825.23	844.63	870.75
	2012	378.92	523.93	664.78	858.25	877.66	898.27	852.70	884.51	927.27
	2013	343.79	521.90	694.25	894.14	915.39	937.56	885.26	926.11	984.59
	2014	319.75	522.83	673.80	928.34	954.81	985.78	922.52	970.04	1031.96
	2015	340.93	523.38	666.13	959.37	996.02	1033.97	962.75	1015.48	1091.31
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2011	2012	248.45	488.85	705.20	277.29	281.69	286.29	268.91	275.62	282.98
	2013	260.01	490.07	675.58	287.64	294.72	300.96	273.57	281.98	293.99
	2014	293.20	487.11	714.08	297.90	308.48	315.99	275.07	288.52	305.85
	2015	285.75	487.73	695.05	311.93	322.79	334.31	279.22	295.22	312.88
	2016	276.87	487.69	732.39	326.68	337.71	351.56	284.09	302.10	320.52
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2012	2013	175.39	512.63	937.37	948.51	965.77	982.27	891.69	931.97	967.91
	2014	205.64	520.56	953.00	985.80	1008.40	1030.38	874.71	939.05	990.27
	2015	190.38	526.99	914.27	1023.70	1052.89	1079.47	870.06	946.11	1009.47
	2016	227.65	523.82	895.64	1064.31	1099.52	1135.03	870.22	954.05	1028.94
	2017	149.13	520.33	986.76	1104.08	1148.12	1185.91	876.39	960.95	1058.17
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2013	2014	348.70	633.61	1025.99	787.94	802.51	813.50	693.48	759.72	796.95
	2015	329.47	631.70	1041.44	837.14	859.09	875.99	668.70	769.88	828.15
	2016	326.49	632.69	1053.14	892.50	919.73	949.82	691.09	781.05	863.17
	2017	329.59	642.64	1049.45	941.33	984.64	1015.39	676.32	791.76	893.57
	2018	349.12	633.09	1016.01	1009.09	1053.82	1089.56	694.31	802.97	945.96

*FCF in thousands of euros

Source: Own elaboration.

Table 5.2. Characteristics of the average FCF of the 5 forecast years (SMEs Sample).

	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2010	2011	4.27	50.39	105.82	180.82	182.93	185.19	182.03	185.56	189.97
	2012	6.74	52.15	105.19	187.54	190.47	193.48	190.44	196.03	201.96
	2013	0.33	51.11	95.91	194.99	198.35	201.86	199.60	206.98	214.90
	2014	4.51	52.36	106.94	201.77	206.52	211.59	208.96	218.66	230.28
	2015	-2.58	51.11	101.66	209.27	215.05	220.34	218.57	230.90	243.22
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2011	2012	18.02	57.67	99.80	97.24	98.26	99.25	95.63	97.41	99.73
	2013	18.56	58.34	95.73	100.91	102.35	104.05	97.69	100.61	103.35
	2014	18.39	58.27	95.43	104.79	106.62	108.52	100.12	103.89	107.29
	2015	6.86	58.18	99.91	108.72	111.08	113.34	102.71	107.34	111.48
	2016	15.24	57.73	102.83	113.14	115.71	118.21	105.48	110.87	115.95
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2012	2013	25.55	64.49	98.53	151.74	153.09	154.53	147.71	150.65	153.85
	2014	27.79	64.53	116.11	156.45	158.50	160.80	149.45	153.51	158.27
	2015	22.41	65.13	109.28	161.40	164.09	166.55	151.30	156.38	162.38
	2016	21.89	65.17	100.56	166.80	169.84	172.73	153.98	159.33	166.33
	2017	31.08	65.68	104.63	172.30	175.78	178.96	155.16	162.34	169.89
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2013	2014	121.70	156.97	195.55	267.62	270.88	273.21	253.00	260.83	265.91
	2015	123.37	156.59	190.64	283.05	286.54	290.27	256.95	265.70	273.31
	2016	109.03	156.61	191.14	299.13	303.06	307.56	260.27	270.60	281.68
	2017	113.33	156.31	193.68	314.74	320.58	326.58	262.32	275.53	288.04
	2018	120.08	156.71	194.52	332.62	339.06	346.86	265.70	280.55	295.96

*FCF in thousands of euros

Source: Own elaboration.

Table 5.3. Characteristics of the average FCF of the 5 forecast years (Success Sample).

	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2010	2011	715.87	815.56	948.13	924.57	942.56	965.11	920.48	964.68	1014.10
	2012	712.68	813.43	958.75	951.49	978.85	1007.70	961.34	1025.08	1090.27
	2013	710.52	812.05	949.80	973.12	1016.94	1052.27	1005.73	1089.30	1171.83
	2014	714.62	812.15	965.59	999.54	1056.21	1100.66	1048.62	1158.38	1281.53
	2015	690.56	813.89	957.45	1039.49	1096.96	1147.38	1079.28	1232.13	1380.74
	Forecast Year	Stratified Bootstrap			Sales Growth Bootstrap			EBITDA Growth Bootstrap		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Base Year 2011	2012	803.19	889.49	1049.67	847.37	865.99	884.56	818.94	862.71	900.11
	2013	776.88	888.12	989.43	865.55	892.16	920.18	832.96	885.15	941.16
	2014	804.36	890.06	1010.60	885.87	919.10	952.85	841.27	908.94	981.56

	2015	794.21	888.44	1024.65	907.34	947.01	990.31	847.99	933.00	1032.96
	2016	775.15	889.77	1003.26	928.71	975.87	1024.61	848.28	957.71	1063.83
Forecast Year		**Stratified Bootstrap**			**Sales Growth Bootstrap**			**EBITDA Growth Bootstrap**		
		Min	**Mean**	**Max**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**
Base Year 2012	**2013**	813.78	903.34	1007.36	869.26	886.83	908.90	834.93	884.22	950.36
	2014	814.85	902.43	1013.67	876.33	910.29	940.88	834.67	905.08	992.77
	2015	816.94	902.02	1006.85	892.77	934.31	968.44	839.77	926.90	1035.70
	2016	810.10	901.44	1009.46	919.14	959.00	1007.18	836.17	948.25	1077.20
	2017	817.97	901.44	999.24	938.08	984.39	1035.30	851.98	971.23	1105.45
Forecast Year		**Stratified Bootstrap**			**Sales Growth Bootstrap**			**EBITDA Growth Bootstrap**		
		Min	**Mean**	**Max**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**
Base Year 2013	**2014**	656.24	715.95	777.82	766.20	780.37	795.66	721.03	753.72	781.96
	2015	661.39	715.75	765.90	795.52	817.09	841.20	716.40	761.65	802.03
	2016	662.74	716.07	762.97	830.92	855.36	880.47	706.82	770.10	821.74
	2017	666.82	715.71	765.93	863.71	895.60	932.95	707.52	778.35	846.18
	2018	667.55	715.51	764.77	897.25	937.52	981.23	707.37	786.36	861.33

*FCF in thousands of euros
Source: Own elaboration.

5.3. Determination of the terminal value.

The terminal value is determined by Equation (2). The starting FCF is taken from each respective random path. The long-term growth is fixed by taking the Spanish GDP series from 1996 to the base year. When using the DCF model, growth is assumed to adjust to the estimated long-term growth rates of the GDP (Brealey et al., 2016; Muller & Ward, 2016). Penman (2001) states that, in practice, analysts often apply an assumed growth rate equal to average gross domestic product growth. A bootstrap procedure is applied to compute the empirical distribution of the average GDP. Each bootstrap replicate is used in each random path.

The main distributional characteristics of the average discounted terminal value are included in Table 6 for each sample, growth model and base year.

Table 6. Distributional characteristics of the average discounted terminal value.

Base Year	**FCF Growth Approaches**	**Whole**			**SMEs**			**Success**		
		Min	**Mean**	**Max**	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**
2010	**Stratified Bootstrap**	4,845.7	9,387.4	15,636.47	-56.6	1,012.0	2,531.6	9,586.2	13,958.9	22,438.5
	Sales Growth	11,380.3	17,848.6	26,681.89	2,550.8	4,259.1	6,391.4	12,655.3	18,821.2	27,746.9
	EBITDA Growth	11,883.5	18,197.7	28,096.68	2,765.2	4,573.3	6,789.3	14,198.1	21,136.9	31,952.6
2011	**Stratified Bootstrap**	3,261.1	6,740.0	11,302.67	249.7	879.0	1,605.6	8,220.5	11,873.7	17,586.9
	Sales Growth	3,372.0	4,665.0	6,812.07	1,146.7	1,764.8	2,490.0	8,932.5	13,023.6	18,583.7
	EBITDA Growth	3,067.5	4,173.3	5,978.71	1,087.5	1,690.8	2,358.2	8,762.3	12,781.5	18,360.1
2012	**Stratified Bootstrap**	1,993.7	6,746.2	12,810.34	395.5	937.9	1,614.4	7,733.1	11,275.5	16,807.9
	Sales Growth	9,451.2	14,890.8	21,754.14	1,589.5	2,514.7	3,947.1	8,618.5	12,315.4	18,959.0
	EBITDA Growth	7,727.2	12,462.8	18,522.52	1,489.5	2,322.3	3,604.3	8,269.2	12,152.7	17,822.6
2013	**Stratified Bootstrap**	3,480.7	7,619.6	13,802.09	1,161.2	2,071.1	3,210.4	6,031.9	9,409.5	14,566.9
	Sales Growth	9,184.5	12,687.3	21,152.41	2,861.6	4,482.5	6,748.2	8,003.6	12,327.7	19,287.1
	EBITDA Growth	6,519.2	9,669.3	16,859.82	2,260.8	3,709.2	5,610.8	6,435.2	10,342.6	17,213.8

*Terminal value in thousands of Euros
Source: Own elaboration.

5.4. Determination of the discount rate.

FCFs are discounted by using the Weighted Average Cost of Capital (WACC), Equation (3). This implies determining both the cost of equity and the cost of debt for every company. That is to say, the cost of capital is firm-specific and constant for each valuation simulation.

The cost of equity is typically calculated via the CAPM in both listed companies (Breuer et al., 2014) and unlisted companies (Rojo & García, 2006), Equation (11).

$$K_e = R_f + \beta_l * RP_m \tag{11}$$

with *Rf:* Risk-free rate*, Bl:* Levered Beta*, RPm:* Market Risk Premium.

The risk-free rate has been estimated by using the 10-year Spanish Bond (Banco de España, 2016), while the market risk premium has been obtained as the geometric mean of the excess of return of the IGBM (Índice General de la Bolsa de Madrid) over the risk-free rate. The unlevered beta of the listed food sector is obtained as the arithmetic mean of the individual betas of the listed companies. Woolley (2009) explains that there can be several ways to compute the beta after unlevering: by means of the arithmetic average, the weighted average based on market values or by computing a sector index and assessing its beta. However, he concludes that the arithmetic average is the simplest and it is the approach he would use "in real life". The individual unlevered betas of the stock exchange are obtained from the Damodaran website. Then the individual betas for each SME are computed by levering the unlevered beta of the listed companies by means of the Hamada formula, Equation (12) (Hamada, 1972).

$$\beta_u = \frac{\beta_l}{\left[1+(1-t)*\frac{D}{E}\right]} \tag{12}$$

where*, Bu:* Unlevered Beta.

Petersen et al. (2006) also report the use of this formula in the valuation of privately held firms. For the valuation of each company, the levered beta is computed by using the capital structure. The weights of the capital structure in the WACC equation are based on the accounting book information of each company. This choice can be controversial. Woolley (2009) states that there are many studies that use the book value of debt and equity. For McLaney et al. (2004), book value weights may be more objective yet less sensitive to economic reality than market values. However, Damodaran (2006) is not convinced by the arguments of those analysts who continue to use book value weights. Since market prices on equity and debt cannot be observed for equity privately held firms, there is no available capital structure of the market, in which case the book structure becomes a good option to lever the unlevered betas.

According to Brealey et al. (2016), in the absence of taxes, the company cost of capital stays the same regardless of the amount of leverage; however, when considering corporate tax, the WACC declines slightly as debt increases. As the cost of equity is calculated using the CAPM, by unlevering and levering the beta coefficient, the method of fixing the weights is not critical.

The agrifood industry cost of debt has been obtained by bootstrapping the financial costs and interest-bearing liabilities of the base year.

Petersen et al. (2006) report that the valuation of privately held firms often involves investors who are not well-diversified. With our approach, a well-diversified investor is assumed; nevertheless, additional corrections to the fundamental multiples could be introduced later on.

Therefore, the general valuation expression made up by (1) and (4) becomes (13) for company "j":

$$EV_j = \sum_{i=1}^{i=5} \frac{FCF_{ji}}{\left(1 + WACC_j\right)^i} + \frac{\left[\frac{FCF_{j5} \cdot \left(1 + g_j\right)}{\left(WACC_j - g_j\right)}\right]}{\left(1 + WACC_j\right)^5} \tag{13}$$

The main distributional characteristics of the average cost of equity, cost of debt and cost of capital are included in Table 7 for each sample and base year.

Table 7. Characteristics of the average cost of equity, cost of debt and cost of capital.

Sample	Variable	Base Year	Mean	Std.error	P05	P25	Median	P75	P95
Whole Sample	kd	2010	0.070	0.002	0.066	0.068	0.070	0.071	0.073
		2011	0.073	0.003	0.068	0.070	0.072	0.075	0.078
		2012	0.073	0.004	0.067	0.070	0.073	0.076	0.080
		2013	0.071	0.004	0.065	0.068	0.071	0.074	0.078
	ke	2010	0.080	0.002	0.077	0.078	0.080	0.082	0.084
		2011	0.092	0.002	0.088	0.090	0.092	0.093	0.095
		2012	0.091	0.002	0.087	0.089	0.091	0.092	0.095
		2013	0.093	0.003	0.088	0.091	0.093	0.096	0.099
	WACC	2010	0.070	0.002	0.068	0.069	0.070	0.071	0.073
		2011	0.078	0.002	0.075	0.077	0.078	0.079	0.080
		2012	0.078	0.002	0.075	0.076	0.078	0.079	0.081
		2013	0.079	0.002	0.075	0.078	0.079	0.081	0.083
Sample	**Variable**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
SMEs Sample	kd	2010	0.064	0.001	0.061	0.063	0.064	0.065	0.066
		2011	0.062	0.001	0.060	0.061	0.062	0.063	0.064
		2012	0.060	0.002	0.058	0.059	0.060	0.062	0.064
		2013	0.058	0.002	0.056	0.057	0.058	0.060	0.062
	ke	2010	0.079	0.002	0.075	0.077	0.079	0.080	0.082
		2011	0.090	0.002	0.087	0.089	0.090	0.092	0.094
		2012	0.089	0.002	0.086	0.088	0.089	0.091	0.093
		2013	0.091	0.003	0.086	0.089	0.091	0.094	0.097
	WACC	2010	0.067	0.001	0.065	0.066	0.067	0.068	0.069
		2011	0.074	0.001	0.072	0.073	0.074	0.075	0.076
		2012	0.074	0.002	0.071	0.073	0.074	0.075	0.076
		2013	0.075	0.002	0.072	0.074	0.075	0.077	0.079
Sample	**Variable**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
Success Sample	kd	2010	0.097	0.007	0.086	0.092	0.097	0.101	0.108
		2011	0.083	0.005	0.076	0.080	0.083	0.086	0.092
		2012	0.081	0.005	0.073	0.078	0.081	0.084	0.089
		2013	0.058	0.002	0.055	0.057	0.058	0.060	0.062
	ke	2010	0.072	0.002	0.069	0.071	0.072	0.073	0.075
		2011	0.084	0.002	0.081	0.082	0.084	0.085	0.087
		2012	0.083	0.002	0.080	0.082	0.083	0.085	0.087
		2013	0.088	0.003	0.083	0.086	0.088	0.091	0.093
	WACC	2010	0.071	0.002	0.069	0.070	0.071	0.072	0.074
		2011	0.079	0.002	0.077	0.078	0.079	0.081	0.082
		2012	0.079	0.002	0.077	0.078	0.079	0.080	0.082
		2013	0.075	0.002	0.072	0.074	0.075	0.077	0.079

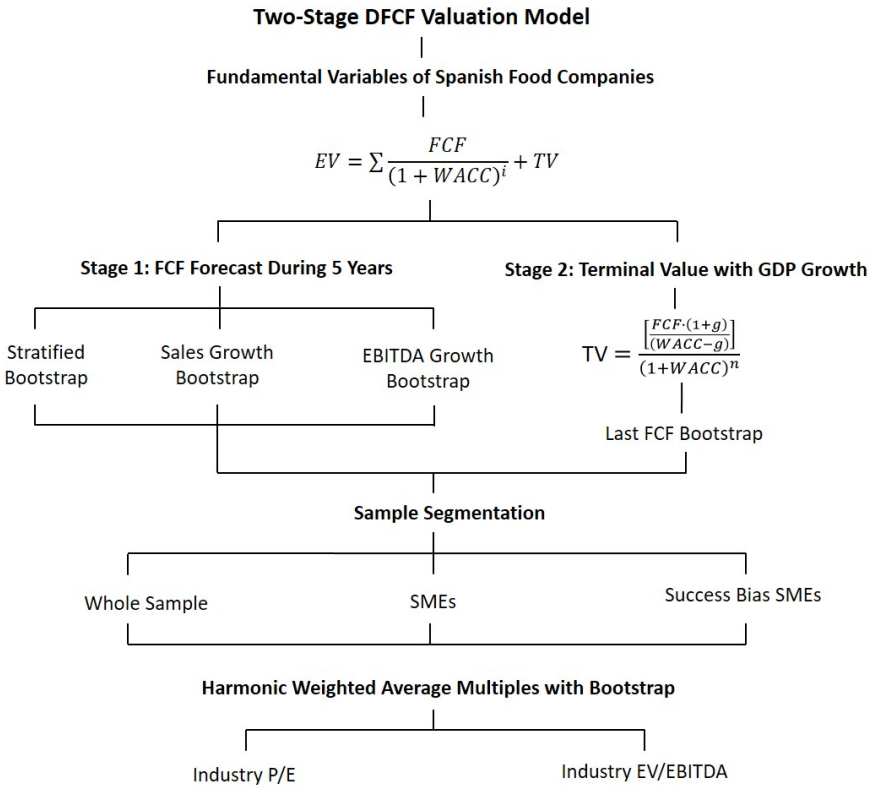
Source: Own elaboration.

5.5. Determination of the fundamental multiples.

Once the 10,000 paths of the average company and the corresponding EVs are obtained, it is straightforward to work out the empirical distribution of the EV/EBITDA multiple for each base year

and approach by dividing by the EBITDA. It is also a straightforward procedure to work out 10,000 possible stock prices and their corresponding P/E. By adjusting with net debt and cash, the price of the stock will be available for each base year. After that, and by dividing it by the earnings, the empirical distribution of the P/E ratio for each base year and approach will be obtained. Figure 1 shows the outlay of the model application.

Figure 1. Outlay of the valuation model.



Source: Own elaboration.

6. Main results.

The model has been applied to three samples, with three different FCF growth approaches and for two valuation multiples, hence, the results can be interpreted following those three dimensions. The use of four different time windows allows the robustness of the solutions to be tested.

The main distributional characteristics of the average multiple (P/E and EV/EBITDA) are shown in Tables 8 and 9 for each sample, growth model and base year. As regards variability, the fundamental mean P/E exhibits greater variability than the fundamental mean EV/EBITDA, as happens in the stock sample.

As for the growth approach, the stratified bootstrap has the lowest multiples since it is bootstrapped on the previous FCF and no growth rate is used. There are no clear differences between the estimated multiples for the other two growth approaches (sales and EBITDA). As regards the sample, the success sample exhibits higher multiples than the other two, as it is limited to those companies with positive FCF in all the historic years (the 4 years prior to the base year). In fact, the success sample is around 10 times smaller than the others as only companies with positive FCF in the

4 years prior to the base year are considered. The whole sample multiples are usually greater than the SMEs sample, since bigger companies with better results are included in the whole sample.

Table 8. Main distributional characteristics of the average P/E multiple.

Multiple	Approach	Base Year	Mean	Std.error	P05	P25	Median	P75	P95
Whole Sample	Stratified Bootstrap	2010	9.02	1.88	5.98	7.63	8.91	10.16	12.16
		2011	6.02	1.63	3.59	4.98	5.96	7.18	8.99
		2012	7.55	2.44	3.92	5.83	7.34	9.09	12.02
		2013	9.41	2.31	6.04	7.60	9.01	10.83	13.22
	Sales Growth Bootstrap	2010	20.38	2.86	15.68	18.09	20.07	22.13	24.97
		2011	2.77	0.71	1.58	2.19	2.66	3.14	3.94
		2012	21.13	2.58	17.36	19.21	20.84	22.70	25.70
		2013	17.38	2.14	14.22	15.71	17.04	18.60	21.05
	EBITDA Growth Bootstrap	2010	20.83	2.94	16.00	18.42	20.47	22.58	25.50
		2011	2.01	0.64	1.01	1.54	1.97	2.43	3.14
		2012	17.4	2.23	14.18	15.65	17.14	18.90	21.37
		2013	12.69	1.80	10.09	11.39	12.50	13.82	15.81
Multiple	**Approach**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
SMEs Sample	Stratified Bootstrap	2010	0.98	0.77	0.05	0.34	0.77	1.47	2.45
		2011	0.53	0.51	0.03	0.14	0.38	0.77	1.49
		2012	0.64	0.52	0.07	0.26	0.53	0.93	1.52
		2013	5.75	1.18	4.08	4.88	5.67	6.51	7.71
	Sales Growth Bootstrap	2010	13.02	2.35	9.43	11.45	13.02	14.67	17.20
		2011	3.16	0.91	1.82	2.56	3.21	3.84	4.74
		2012	7.55	1.31	5.54	6.56	7.47	8.37	9.83
		2013	17.1	2.29	13.73	15.53	17.05	18.56	21.05
	EBITDA Growth Bootstrap	2010	14.23	2.53	10.39	12.59	14.21	16.00	18.66
		2011	2.83	0.87	1.55	2.25	2.87	3.49	4.40
		2012	6.7	1.21	4.84	5.79	6.62	7.42	8.78
		2013	13.7	1.92	10.81	12.36	13.62	14.96	16.99
Multiple	**Approach**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
Success Sample	Stratified Bootstrap	2010	21.66	2.56	18.03	19.88	21.62	23.50	26.22
		2011	19.35	1.93	16.28	17.80	18.92	20.40	22.61
		2012	18.81	1.83	16.03	17.56	18.64	19.92	22.21
		2013	23.48	2.50	19.62	21.50	23.12	24.88	27.67
	Sales Growth Bootstrap	2010	28.75	3.30	24.02	26.47	28.55	31.01	34.89
		2011	20.90	2.05	17.70	19.25	20.53	22.06	24.27
		2012	20.25	1.93	17.40	18.82	20.08	21.45	23.64
		2013	30.33	3.29	25.32	27.82	29.80	32.28	36.01
	EBITDA Growth Bootstrap	2010	31.95	3.80	26.38	29.50	31.92	34.62	39.15
		2011	20.55	2.06	17.21	18.96	20.20	21.72	24.10
		2012	20.03	2.00	17.12	18.60	19.89	21.31	23.59
		2013	25.69	2.84	21.43	23.68	25.36	27.26	30.58

Source: Own elaboration.

As to the base years, 2011 has smaller multiples than the rest.

Table 9. Main distributional characteristics of the average EV/EBITDA multiple.

Multiple	Approach	Base Year	Mean	Std.error	P05	P25	Median	P75	P95
Whole Sample	Stratified Bootstrap	2010	6.46	0.94	4.94	5.77	6.41	7.04	8.03
		2011	4.94	0.77	3.79	4.44	4.91	5.49	6.34
		2012	5.15	1.07	3.54	4.39	5.05	5.82	7.11
		2013	6.09	1.07	4.54	5.26	5.91	6.75	7.86
	Sales Growth Bootstrap	2010	12.15	1.43	9.80	11.00	11.99	13.02	14.44
		2011	3.36	0.34	2.83	3.12	3.35	3.57	3.95
		2012	11.12	1.14	9.46	10.28	11.00	11.82	13.14
		2013	9.78	0.99	8.32	9.01	9.62	10.34	11.48
	EBITDA Growth	2010	12.37	1.47	9.96	11.17	12.19	13.24	14.71
		2011	3.04	0.30	2.57	2.82	3.02	3.24	3.57

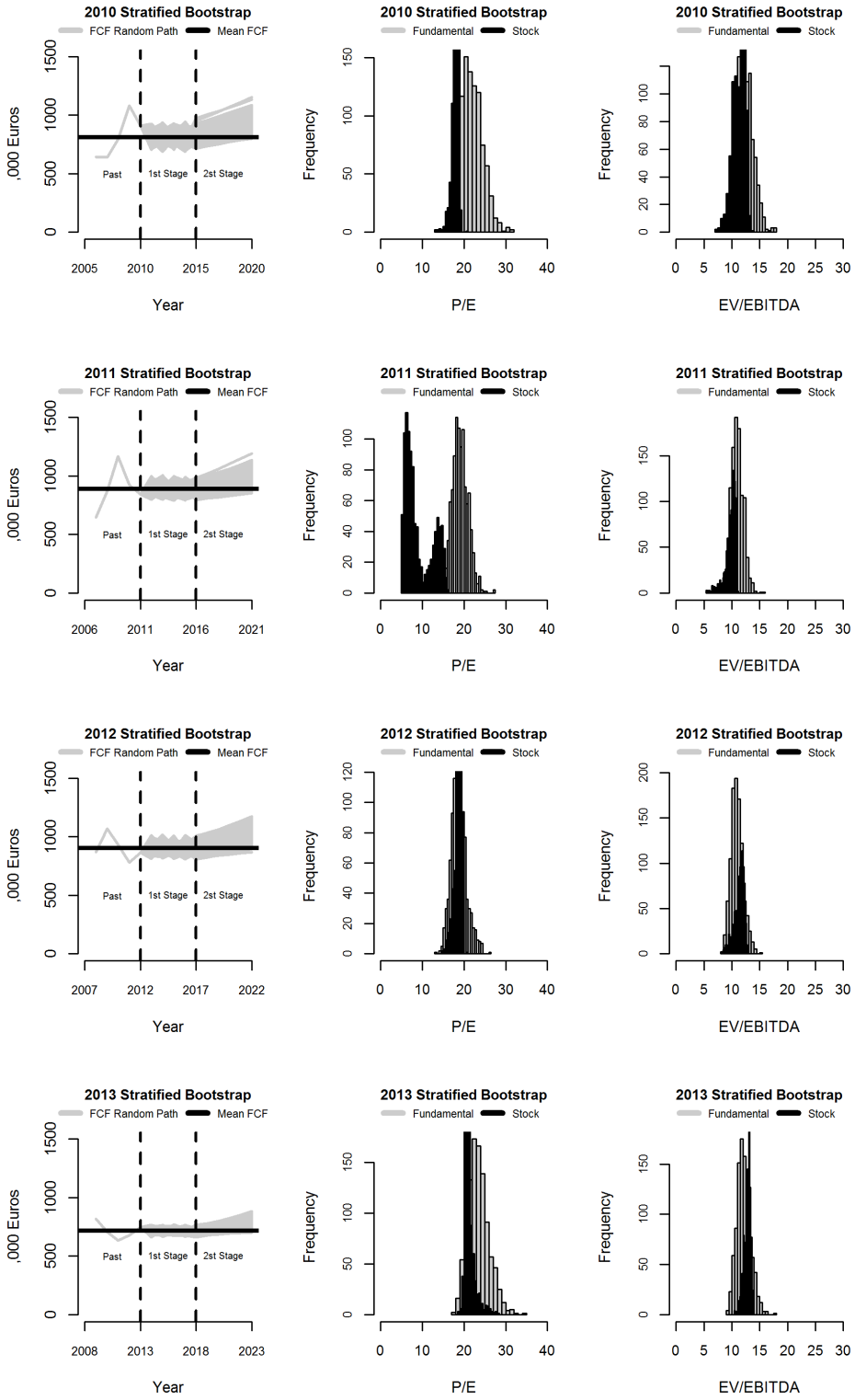
	Bootstrap	2012	9.48	0.98	8.06	8.71	9.37	10.14	11.23
		2013	7.61	0.83	6.41	7.01	7.53	8.13	9.06
Multiple	**Approach**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
SMEs Sample	**Stratified Bootstrap**	2010	1.76	0.50	1.02	1.40	1.72	2.07	2.62
		2011	1.65	0.35	1.09	1.42	1.64	1.87	2.25
		2012	1.82	0.34	1.28	1.60	1.82	2.05	2.43
		2013	4.01	0.47	3.25	3.65	3.99	4.27	4.80
	Sales Growth Bootstrap	2010	7.24	0.95	5.75	6.58	7.21	7.89	8.91
		2011	3.25	0.35	2.72	3.00	3.25	3.49	3.84
		2012	4.87	0.52	4.08	4.48	4.84	5.19	5.77
		2013	8.43	0.89	7.09	7.79	8.38	8.97	9.93
	EBITDA Growth Bootstrap	2010	7.73	1.03	6.14	7.04	7.70	8.43	9.51
		2011	3.12	0.33	2.62	2.89	3.12	3.36	3.71
		2012	4.53	0.48	3.80	4.18	4.50	4.82	5.35
		2013	7.1	0.75	5.95	6.55	7.04	7.56	8.35
Multiple	**Approach**	**Base Year**	**Mean**	**Std.error**	**P05**	**P25**	**Median**	**P75**	**P95**
Success Sample	**Stratified Bootstrap**	2010	12.22	1.47	10.15	11.22	12.21	13.29	14.85
		2011	11.13	1.10	9.34	10.20	10.84	11.68	12.95
		2012	10.88	1.06	9.33	10.22	10.85	11.59	12.91
		2013	12.11	1.24	10.20	11.13	11.93	12.81	14.19
	Sales Growth Bootstrap	2010	16.27	1.89	13.59	15.00	16.19	17.60	19.83
		2011	12.01	1.17	10.15	11.03	11.76	12.63	13.89
		2012	11.73	1.12	10.13	10.95	11.68	12.47	13.74
		2013	15.51	1.63	13.02	14.26	15.24	16.47	18.31
	EBITDA Growth Bootstrap	2010	18.18	2.18	14.95	16.74	18.13	19.67	22.28
		2011	11.81	1.17	9.87	10.86	11.57	12.44	13.80
		2012	11.60	1.16	9.96	10.82	11.57	12.39	13.72
		2013	13.23	1.41	11.10	12.21	13.04	13.98	15.63

Source: Own elaboration.

Figures 2, 3 and 4 are made up of panels. Each figure corresponds to one of the FCF growth approaches applied to the success sample. The left-hand panels show the paths of the cash flows considering the whole of the first stage (5 years) and the first 5 years of the second stage for the sample of successful companies for each base year. In the left-hand panels of Figure 2, , it can be noticed that the cash flow path is much flatter than in Figures 3 and 4 since the stratified bootstrap approach relies on bootstrapping the historic FCF without including any growth rate. In Figures 3 and 4, the forecast FCF is modelled using a bootstrapped growth rate over the last observed average FCF, which is why both show an expanding cone. The expanding cone is wider in some years, pointing to the greater variability of the observed growth rates in the historic years. Furthermore, the expanding cone of the EBITDA growth approach is wider, meaning that the EBITDA growth rates were more variable than the sales growth rates in the historic period.

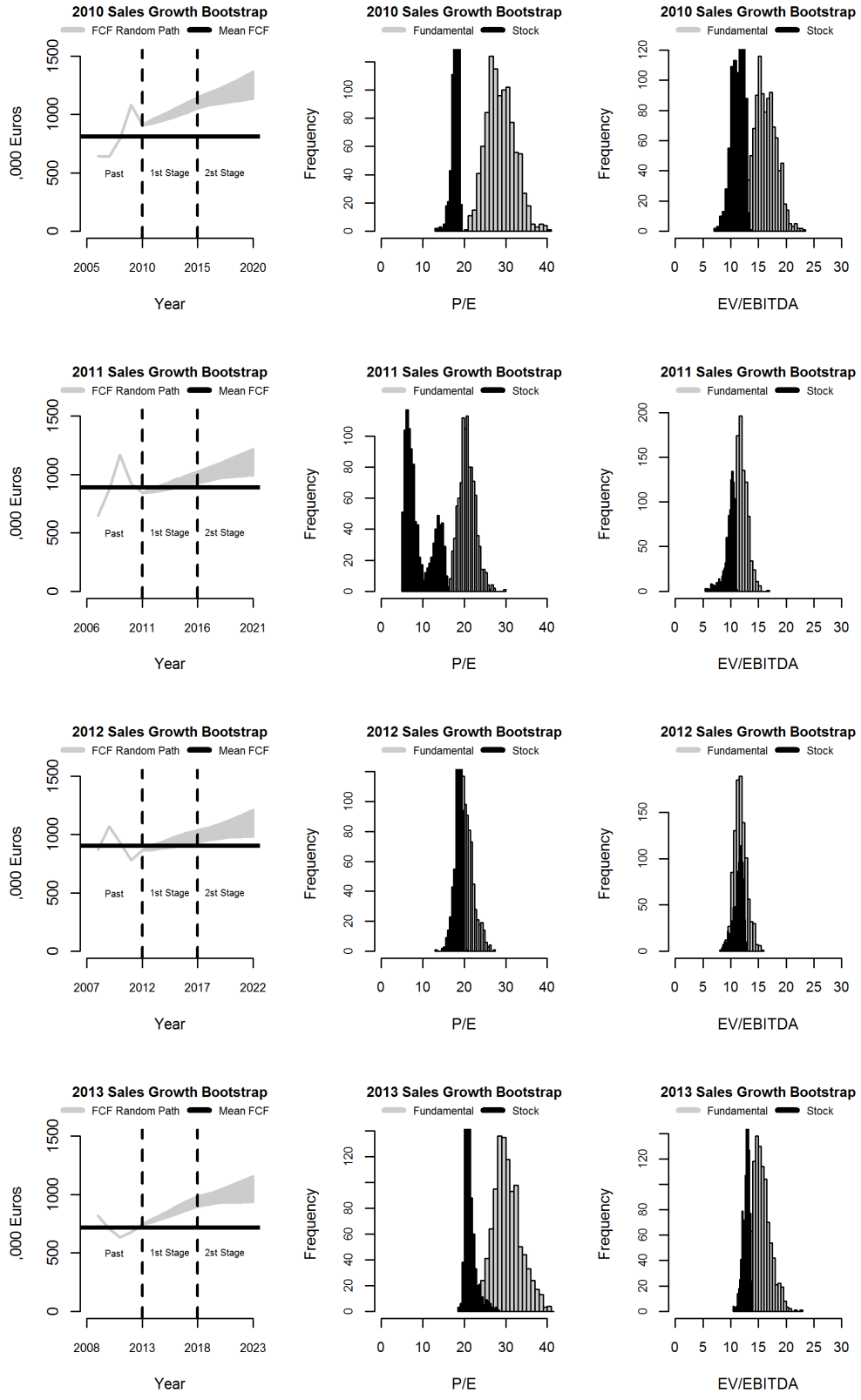
The central panels show the empirical distribution of the average P/E multiple for both listed and unlisted companies for every base year and forecasting approach, while the right-hand panels show the same for the EV/EBITDA multiple. The greater the overlap between the empirical distributions, the greater the likelihood that the null hypothesis is false. The overlap is clearly noticeable for the EV/EBITDA in the stratified bootstrap approach.

Figure 2. Random paths of FCF, empirical distributions of average P/E and average EV/EBITDA. Sample: SMEs with positive FCF. Base years: 2010-2013. FCF growth approach: Stratified bootstrap.



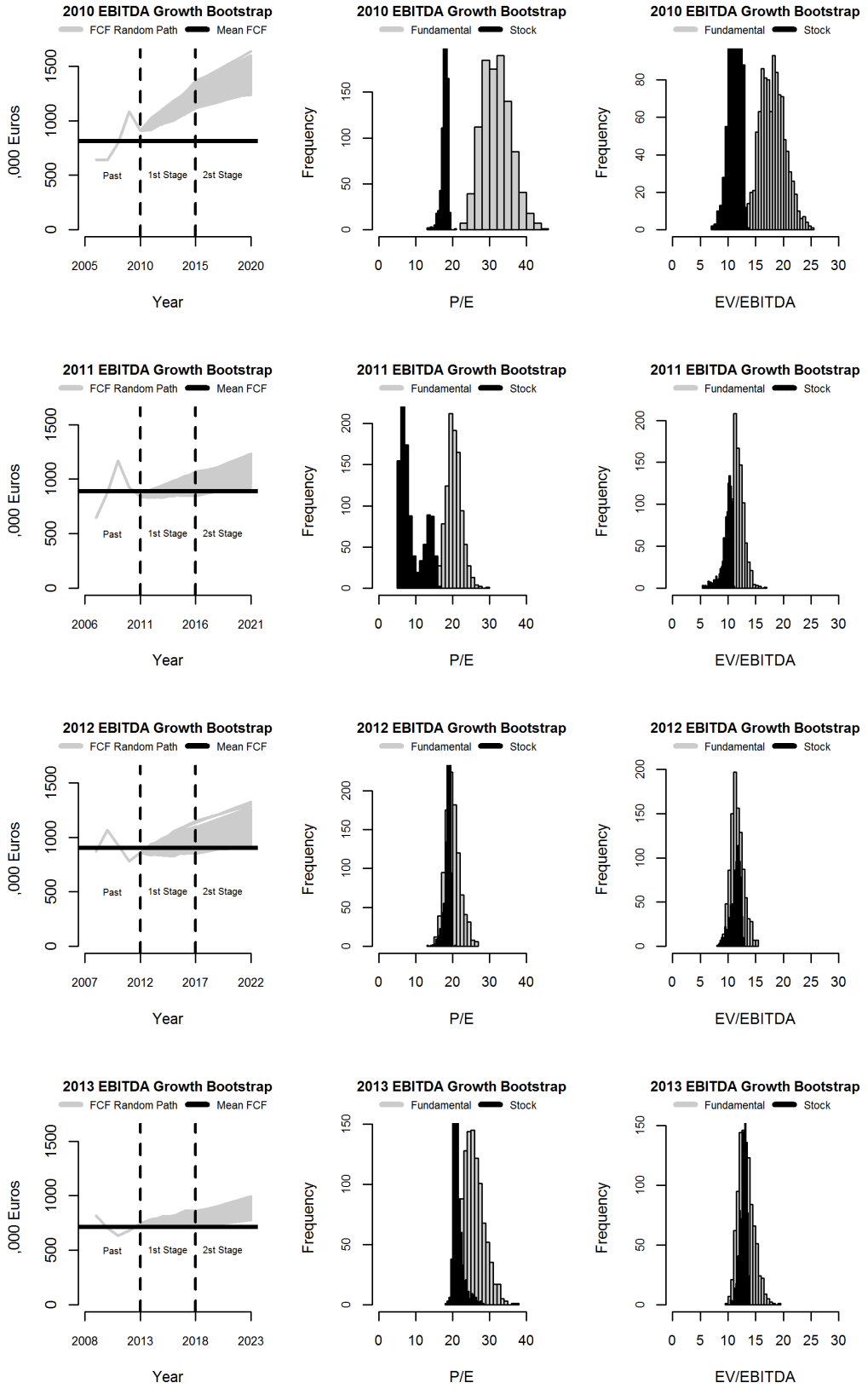
Source: Own elaboration.

Figure 3. Random paths of FCF, empirical distributions of average P/E and average EV/EBITDA. Sample: SMEs with positive FCF. Base year: 2010-2013. FCF growth approach: Sales growth bootstrap.



Source: Own elaboration.

Figure 4. Random paths of FCF, empirical distributions of average P/E and average EV/EBITDA. Sample: SMEs with positive FCF. Base year: 2010-2013. FCF growth approach: EBITDA growth bootstrap.



Source: Own elaboration.

The null hypothesis is checked for every sample, growth approach and base year, building the empirical distribution of the difference according to Equation (10) for both multiples.

For the P/E multiple, the null hypothesis cannot be rejected in most cases, as is shown in Table 10. That is, there is significant difference between the stock multiple and the fundamental multiple. As to the samples, both the whole and the SME samples usually show a mean P/E lower than that observed in the stock market, whereas the P/E multiple in the success sample is usually greater than that in the stock market . This can also be seen in the central column of Figures 2, 3 and 4 for the success sample. In the years 2012 and 2013, there are no significant differences between the P/E for the success samples exhibit any and that of the stock market regardless of the growth approach.

Table 10. Two-stage model results of P/E.

Samples	Base year	Market Exchange	FCF Growth Approaches		
			Stratified Bootstrap	Sales Growth	EBITDA Growth
Whole	2010	17.86	9.02 ***	20.38	20.83
	2011	9.28	6.02	2.77 ***	2.01 ***
	2012	18.75	7.55 ***	21.13	17.4
	2013	21.38	9.41 ***	17.38	12.69 ***
SMEs	2010	17.86	0.98 ***	13.02 *	14.23
	2011	9.28	0.53 ***	3.16 ***	2.83 ***
	2012	18.75	0.64 ***	7.55 ***	6.7 ***
	2013	21.38	5.75 ***	17.1	13.7 ***
Success	2010	17.86	21.66	28.75 ***	31.95 ***
	2011	9.28	19.35 ***	20.9 ***	20.55 ***
	2012	18.75	18.81	20.25	20.03
	2013	21.38	23.48	30.33 **	25.69

Statistical difference between stock P/E mean ratio and fundamental P/E mean ratio at ***1%, **5%, *10% significance level.
Source: Own elaboration.

As regards the EV/EBITDA, Table 11 shows the average multiple, considering FCF growth approaches, samples and base years. In most cases, there is a significant difference between the average EV/EBITDA of the whole and SME samples. However, in the success sample, the fundamental multiple for the stratified bootstrap growth approach does not exhibit any statistical difference in any base year (right-hand panels of Figure 2).

As far as the valuation multiple is concerned, none of the multiples perform substantially better either in the whole sample or in the SME sample. However, the EV/EBITDA multiple is clearly superior to the P/E multiple for the sample of successful SMEs. Martínez and Ortiz (2004) think that analysts try to reduce the impact of accounting diversity using less biased ratios, such as EV/EBITDA. Schreiner and Spremann (2007) find the opposite result when examining the accuracy of different types of multiples in European equity markets.

Table 11. Two-stage model results of EV/EBITDA.

Samples	Base year	Market Exchange	FCF Growth Approaches		
			Stratified Bootstrap	Sales Growth	EBITDA Growth
Whole	2010	11.36	6.46 ***	12.15	12.37
	2011	9.71	4.94 ***	3.36 ***	3.04 ***
	2012	11.35	5.15 ***	11.12	9.48
	2013	12.79	6.09 ***	9.78 **	7.61 ***
SMEs	2010	11.36	1.76 ***	7.24 **	7.73 **
	2011	9.71	1.65 ***	3.25 ***	3.12 ***
	2012	11.35	1.82 ***	4.87 ***	4.53 ***
	2013	12.79	4.01 ***	8.43 ***	7.1 ***
Success	2010	11.36	12.22	16.27 ***	18.12 ***
	2011	9.71	11.13	12.01 *	11.81
	2012	11.35	10.88	11.73	11.60
	2013	12.79	12.11	15.51 *	13.23

*Statistical difference between stock EV/EBITDA mean ratio and fundamental EV/EBITDA mean ratio at ***1%, **5%, *10% significance level*

Source: Own elaboration.

7. Conclusions.

The paper tries to shed light on the use of stock exchange valuation multiples as a tool in the valuation of SMEs. We have contrasted whether listed agrifood valuation multiples, as a reflection of fundamental firm values, are related to the valuation multiples of small and medium-sized agrifood companies obtained by means of fundamental models.

The study clearly shows that the stock market P/E multiple should not be used in the valuation process of unlisted agrifood companies regardless of the study sample, year and even the growth approach. While the P/E is a very popular multiple, the study nevertheless proves it to be ineffective for agrifood SMEs.

The stock market EV/EBITDA multiple may be used in the valuation process of those unlisted small and medium-sized agrifood companies that are consistently obtaining positive cash flows. This conclusion can provide useful insights into merger and acquisition processes.

Our results also confirm the importance of the year at industry level, as the average industry multiple shows clear changes from year to year. The study might point as well to the importance of size, as both Lie and Lie (2002) and Plenborg and Pimentel (2016) state.

As regards methodology, the use of the harmonic weighted average together with the bootstrap allows industry average multiples and their variability to be estimated by means of an empirical distribution. This combination is a promising way of obtaining average multiples and confidence intervals. Moreover, applying the bootstrap to the DCF valuation model under several growth hypotheses allows probable paths for future cash flow to be obtained.

Further research should be devoted to other industries that are mainly made up of SMEs in order to check whether these conclusions could be extended. Research into the valuation of SMEs has received little attention compared to the interest shown in the valuation of public companies. The listed companies are a source of ongoing information on industries, the economy and the behavior of investors and more advantage could be taken to apply it to SMEs.

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APPENDIX. Abbreviations.

Bl	*Levered Beta*
Bu	*Unlevered Beta*
CAPEX	*Capital Expenditures*
CAPM	*Capital Asset Price Model*
CWC	Change in Working Capital
D	*Debt*
DA	*Depreciations and Amortizations*
DCF	*Discounted Cash Flow*
DFCF	*Discounted Free Cash Flow Method*
EBIT	*Earnings Before Interest and Taxes*
EBITDA	*Earnings Before Interest, Taxes, Depreciation and Amortization*
E_i	*Earnings of Company*
EQ	*Equity Market Value*
EV	*Fundamental Enterprise Value*
EV/EBITDA	*Enterprise Value to EBITDA Multiple*
FCF	*Free Cash Flow to Firm*
g	*Growth Rate*
GDP	*Gross Domestic Product*
IGBM	*Índice General de la Bolsa de Madrid*
kd	*Cost of Debt*
ke	*Cost of Equity*
n	*Number of Years*
NACE	*Statistical Classification of Economic Activities*
P/E	*Price to Earnings Ratio*
P_i	*Market or Fundamental Price of Equity*
Rf	*Risk-free Rate*

RPm	*Market Risk Premium*
SABI	*Sistema de Análisis de Balances Ibéricos*
SMEs	*Small and Medium-sized Enterprises*
t	*Corporate Tax Rate*
TV	*Terminal Value*
WACC	*Weighted Average Cost of Capital*
W_i	*Weighted Price of Each Company*