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Economic engineering: Valuation as a tool to analyze the market value of an aeronautical company through the announcement of a joint venture

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Abstract

The aeronautical industry in Brazil is paradoxical: while, on one hand, Brazilian population is proud of Alberto Santos-Dumont, a pioneer in air navigation and flight with the 14-bis airplane, on the other, this is a country where large-scale aeronautical manufacturing occurred late. Throughout the early decades of the twentieth century, there have been successive attempts to create a long-term, unsustainable aeronautical industry in the country. This paper aims to perform an analysis of the valuation of a publicly traded company in the industrial goods, transport material, aeronautical material and defense sector, according to the classification of the Brazilian stock exchange. The method used to use the discounted cash flow, which is projected or the company's cash flow, uses the discounted historical financial data at a rate that represents its business value. This proved to be reliable as the market value found through it was within expectations compared to the value disclosed by the company. As a tool, valuation was applied to the data disclosed, in the stock exchange, by the studied company.

Keywords: Company Valuation; Discounted Cash Flow; Transportation Material; Aeronautical and Defense Material

1. Introduction

However, with the end of the second world war, in 1945, among the paradigm changes that occurred, it was verified, that it is through the control of its airspace, that a country definitively exercises its sovereignty [1]. In this context, too, the Brazilian government started to treat the domain of its aeronautical technology with greater strategic relevance, beginning to plan the creation of an institution focused on the development of this industry [1,2]. In the years after 1945, therefore, an aeronautical engineering school - the Instituto Tecnológico de Aeronáutica [ITA] - and a research and development center in its surroundings - the aeronautical. For [3,1] the aeronautical industry in Brazil is paradoxical: on the one hand, the Brazilian population is proud of Alberto Santos-Dumont, pioneer of navigation through the air and flying with the 14-bis plane. On the other hand, this is a country in which large-scale aeronautical manufacturing planted roots late. Throughout the first decades of the twentieth century, there were successive attempts to create an aeronautical industry in the country, sustainable in the long run, which was not successful.

Since it was a country until then, poor in fuels, importer of oil, and with a low standard of living, one way out would be to develop economical airplanes with light engines, unlike the North American and British, which were expensive, as they sought to gather large speed and maximum comfort Technical Center [CTA] [1].

Inserted in this context, in 1969, a national company was founded that represented the realization of an old project of the military of the aeronautics: the constitution of an aeronautical industry in the country [2]. This, in the future, would

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be the main responsible for the generation of jobs and income in this high technology sector, in addition to generating products of very high added value [1]. In July 2018, the formation of a joint venture between the aforementioned company and an american company was announced, in the context of the notice to the market of investor relations, filed at the Securities and Exchange Commission [CVM] of the brazilian company [4].

According to [5], in the face of the current international business environment, companies from different segments seek competitive differentiation through the formation of alliances, intending to achieve their strategic objectives. To [6] concluded that the justification previously disclosed by the analyzed company refers to the agreement between a European and a Canadian manufacturer, rooted companies and producers of a direct competitor line of the studied company's commercial jets. He also mentions the new entrants, original from China, Japan, and Russia, emphasizing the company's need to remain competitive in the sector.

This research paper aims to present valuation as a tool for the evaluation of a publicly-traded company on the brazilian stock exchange, in the aeronautical sector, before it announces the formation of a joint venture. The value found will then be compared to the value disclosed after the announcement. The method to be used will be the discounted cash flow, the most robust, traditional and recommended by the CVM. The present study started in March 2019 and was completed in November of the same year.

2. Theoretical background

2.1. The valuation tool

Valuation is the process by which a company's performance forecasts are converted into price estimates. Many assessment techniques can be employed and there is no single method that clearly dominates others. In fact, since each technique involves different advantages and disadvantages, there are gains in considering several approaches simultaneously [7]. Its objective is to provide a company with a fair value of its assets and liabilities, in order for its balance sheet to support management decisions. In order to obtain consistent results for a company, valuation must form the basis for all valuations in the balance sheet, which involves assessing the fair value of the portfolios of assets and liabilities and calculating risk capital [8].

According to [9], there are four techniques most commonly used to infer the value of a company: (i) discounted cash flow, (ii) relative valuation - transactions of comparable companies, (iii) market value and (iv) value accounting. To [10], in turn, adapted the advantages and disadvantages of the main evaluation methodologies listed by [9], as can be seen in Chart 1 below:

Chart 1 Advantages and disadvantages of the main evaluation methodologies

Methodology	Advantages	Disadvantages
Discounted cash flows	<ul style="list-style-type: none"> Result of fundamental analysis of cash flow projections - Involves detailed cash flow profile Reflet reflects investments cash flow risk is captured at the discount rate - Little influence of stock market conditions that can be volatile - Allows you to capture a growth perspective 	<ul style="list-style-type: none"> - Subject to differing opinions on the company's future projections - Minor adjustments to assumptions can result in significant changes in assessments
Relative valuation - comparable company transactions	<ul style="list-style-type: none"> - Indication of how much and how buyers paid in similar transactions - "Real" benchmark, as it reflects transactions that have already occurred in the past - Easily found and objective multiples 	<ul style="list-style-type: none"> - Absence or limited number of truly comparable companies - Affected by factors that are not intrinsic values, such as: liquidity, size, analyst coverage and management - Limited availability of reliable public information

	<ul style="list-style-type: none"> - Can reflect trends such as industry consolidation, potential buyers, etc. 	<ul style="list-style-type: none"> - Incorporates distortions based on different perspectives on profits, risks, competitive tension, and buyer motivation - Usually based on historical figures, not considering future perspectives, therefore it does not capture the growth perspective
Market value	<ul style="list-style-type: none"> - Simple elaboration - Reflects market vision 	<ul style="list-style-type: none"> - Restricted to companies with securities traded in markets with reasonable liquidity
Book value	<ul style="list-style-type: none"> - Requires fewer assumptions defined by the appraiser - Relatively simple 	<ul style="list-style-type: none"> - The temporal focus of this model is the past, with some adjustments for the present - Does not consider expectations about the company's future performance - All intangible assets that are not recognized in the financial statements are excluded

Source: [10]

2.2. Discounted cash flow valuation

Over the past two decades, it has been possible to experience the opportunity to popularize the use of business assessment tools in Brazil [11].

One of them, discounted cash flow valuation, consists of a method used to assess a company's economic wealth, projecting its cash flow based on historical values and discounting an attractiveness rate capable of reflecting the opportunity cost. Its approach is widely used by investment banks, consultants and entrepreneurs, who want the value of a company, for several purposes: internal purposes, for investment analysis or for mergers and acquisitions. When evaluating a company, the objective is to reach the fair market value, that is, the one that represents in a balanced way, the economic potential of a certain company [12].

According to [11], it is initially possible to highlight two more points of view. To set up a business, it is necessary to invest an amount of capital, raised by creditors and shareholders, that is, investors. Thus, one can think of the first point of view (cash flow for shareholders) and the second, which consists of investors as a whole (creditors and shareholders (cash flow for investors), also called operational cash flow.

3. Material and methods

The methodology of this work can be classified as a quantitative case a study which objective is exploratory.

In the present work, the researchers sought to evaluate the impacts generated at the market value of a company in a brazilian aeronautical sector, after the announcement of the formation of a joint venture, through the application of the discounted cash flow valuation tool. To validate this method, it was applied in a period equal to one year prior to the analyzed event, which occurred on July 5, 2018. That is, the valuation of the same company was carried out for the 3rd quarter of the year 2017.

The enterprise financial reports were consulted from the period of years from 2016 to 2019 [13,14, 15, 16, 17, 18,19, 20, 21].

The procedure adopted for the calculation, follows the next steps (I to V) for the discounted cash flow valuation proposed by [11].

3.1. The company's weighted average cost of capital [WACC]

The WACC is given by equation 1:

$$WACC = K_e \cdot \frac{E}{E+D} + K_d \cdot (1 - T) \frac{D}{E+D} \quad (1)$$

Being:

K_e : cost of equity - capital asset pricing model [CAPM];

E : shareholders' equity;

D : debt;

K_d : cost of third party capital = (finance expenses – tax over own capital)/debt;

T : taxes.

CAPM (debt securities pricing model), in turn, is obtained through equation 2:

$$r = r_f + \beta \times (r_m - r_f) \quad (2)$$

Being:

r_f : risk-free rate;

β : risk of action;

r_m : return required by the investor to take risk.

The greater the risk, the investor demands a greater return. The difference between the required return (r_m) and the risk-free rate (r_f) is the required premium (pm), which is directly proportional to the risk taken. For risk equal to 1 (market risk), the required premium is the difference between the market return (r_m) and the risk-free rate (r_f) and is called the market premium (pm). For risks greater than 1, the premium is proportionally greater than pm , and for risks less than 1, proportionally less [11].

3.2. The cash flow for “n” years

- : take the operating result from the income statement [IS];
- : calculate the operating tax ($t \times$ operating result);
- : identify the depreciation in this case, highlighted in the IS itself;
- : identify the capital expenditure [CAPEX];
- : calculate the investment in net working capital.

3.3. The perpetuity [Perp], which represents the cash flow value of investors from “n + 1” onwards, represented by a single value on date “n”

$$Perp = \frac{FC}{i-g} \quad (3)$$

Where:

FC = Free cash flow from the last projection period;

i = cost of capital, desired r_m ;

g = Rate of growth of free cash flows in the perpetuity period.

3.4. The current enterprise value (EV)

$$EV = \sum_{t=1}^n \frac{FCL_n}{(1+WACC)^n} + \frac{FCL_t(1+t)}{WACC-t} \quad (4)$$

Where:

EV = enterprise value - company value;

WACC = weighted average cost of capital;

FCLn = Free cash flow in period n;

FCLt = Free cash flow in the last projection period;

t = Rate of growth of free cash flows in the perpetuity period.

To calculate the enterprise value, it is necessary to calculate the net operating profit after taxes [NOPAT], obtained through equation 5:

$$NOPAT = \text{Earnings Before Interest and Taxes [EBIT]} * (1-T) \quad (5)$$

Being:

EBIT = company operating profit;

T = taxes;

3.5. The equity value [Eq.V], subtracting the net debt from the enterprise value

4. Results and discussion

4.1. Valuation tool application

4.1.1. WACC calculation

The first step in obtaining the company's market value is to calculate the WACC, using equation 1 mentioned in this paper, as shown in Table 1:

Table 1 WACC calculation (R\$ million)

WAAC	10,3891	
Risk-free rate (rf)	3,11278	(a)
Beta risk (β)	0,69	(b)
Market Award (rm)	6,5	(c)
CAPM (Ke)	12,75	(d)
Shareholders' equity (E)	81%	(e)
Debt (D)	19%	(f)
Cost of third party capital (Kd)	0,13132	(g)
Taxes	0,34%	(h)

Source: Authors

- Minimum return required by the investor for conceptually risk-free securities (risk free). As a risk-free rate parameter, the average of the rates disclosed by the US government, for the last day of the third quarter of 2017,

for validation, and the last day of the third quarter of 2018 for the application, was adopted (30-year-old American T-Bond) [22]. The average value for 2018 of 1US\$= R\$3.65. Where R\$ is brazilian currency reais.

- Measure of the risk of the company or the sector in which it is located [11].
- Additional amount of interest required by the investor to invest in Brazil (country risk premium). Emerging markets bond index plus [EMBI +] was adopted as a parameter [11].
- Return above the risk-free rate required by the investor to expose the risk in the capital market. This is obtained through [CAPM] - equation 2.
- Net equity value obtained in the company's balance sheet for the third quarter of 2017 in the validation and third quarter in the application.
- Debt amount obtained in the company's quarterly report for the third quarter of 2017 in the validation and third quarter in the application.
- Third party cost of capital calculated using equation 3.
- Taxes for large companies equal to 34%.

4.1.2. Projection of net revenue [NR]

The projection of NR in the application followed the same logic applied in the validation. Due to the large adherence in the number of commercial and executive aircraft delivery, the arithmetic average of the past quarterly values was made, and the values compared with the variation in sales. These, as expected, were found in median values, as shown in Table 2 for the year 2017.

Table 2 Executive aircraft

Executive aircraft	Net Revenue (in R\$ million)	Variation		
15	3217,5	-0,4375	-0,6512	-0,5199
24	5696	0,94444	0,6	0,77032
18,72	5126,4	-0,16	-0,22	-0,1
48,2976	8356,032	0,36	1,58	0,63

Source: Authors

In order to check also the variations in NR, Table 3 was made, which can be verified below:

Table 3 Net Revenue variation

Net Revenue variation						
2012	2013	2014	2015	2016	2017	Mean
not applicable (n.a.)	-45%	-45%	-42%	-37%	-52%	-44%
65%	50%	34%	52%	-5%	77%	42%
-16%	-9%	-28%	-2%	3%	-10%	-9%
38%	80%	86%	75%	36%	63%	68%

Source: Authors

It can be concluded that:

- There is a standard growth between the first and second quarter in aircraft delivery, with an average rate of 54% for commercial aircraft and 72% for executives;
- j) There is a standard drop in aircraft delivery from the second to the third quarter, with an average rate of -12% for commercial aircraft and -19% for executive aircraft;
- k) There is a marked standard growth from the third quarter to the fourth, with the exception of commercial aircraft in 2012 and in 2016. The average growth rate is 32% for commercial aircraft and 145% for executive aircraft;
- l) There is a drop in growth from the fourth quarter of the previous year to the first quarter of the following year, with an average of -38% for commercial aircraft and -63% for executives.

Table 4 shows a consolidated of the NR projection, with the values projected according to the arithmetic average of the previous quarters.

Table 4 Net revenue estimation (R\$ million)

Net revenue estimation	1T16	2T16	3T16	4T16	1T17	2T17	3T17	4T17
Net revenue	5048,5	4771,6	4913,4	6702,2	3217,5	5696	4144,7	5654,8
Growth	n.a.	-5%	3%	36%	-52%	77%	-10%	63%
Commercial aircraft	21	26	29	32	18	35	29	40
Growth	n.a.	24%	12%	10%	-44%	94%	-16%	36%
Executive aircraft	23	26	25	43	15	24	19	48
Growth	n.a.	13%	-4%	72%	-65%	60%	-22%	158%
Net revenue estimation		1T18	2T18					
Net revenue		5701,3	4533,1	4115,9	6912,4	3870,0	5478,6	4974,5
Growth		-42%	39%	-9%	68%	-44%	42%	-9%
Commercial aircraft		25	48	42	56	34	53	47
Growth		-38%	94%	-12%	32%	-38%	54%	-12%
Executive aircraft		16	26	21	52	19	33	27
Growth		-66%	60%	-19%	145%	-63%	72%	-19%

Source: Authors

4.1.3. Costs estimation

The costs of the company, due to the products and services sold, the average value of sales of commercial and executive aircraft was stipulated for the projection of costs, according to Table 5:

Table 5 Costs estimation (R\$ million)

Costs estimation	1T16	2T16	3T16	4T16	1T17	2T17		
Cost of products and services sold								
growth	-4040,2	-3778,8	-3990,4	-5356,7	-2733,5	-4674,1		
	n.a.	6%	-6%	-34%	49%	-71%		
Costs estimation	3T17	4T17	1T18	2T18				
Cost of products and services sold								
growth	-3358,0	-4526,1	-4684,8	-4046,8	-3405,2	-6430,2	-3176,4	-5177,2
	28%	-35%	-4%	14%	-16%	89%	-51%	63%
								-4356,4
								-16%

Source: Authors

4.1.4. Operational expenses forecast

Analogous to validation, the principles adopted for the projection of operating expenses consisted of the evaluation of the results of the previous quarters. In cases where it was possible to observe a standard drop in values, a rate of decrease was adopted for future data. In extraordinary cases that depend on justification, the average values for the

quarter plus inflation for the year were used, being equal to 3.75% in 2018 and 3.8% in 2019. The results obtained can be seen in Tables 6 to 10:

Table 6 Operational expenses forecast (R\$ million)

Operational expenses forecast	1T15	1T16	1T17	1T18	1T19	1T19
Operating income (expenses)						
Administrative	-123,7	-152,2	-133,9	-128,3	-134,53	-139,64
Commercials	-247,8	-393,2	-222,7	-256,1	-279,95	-290,59
Researches	-21,2	-25,3	-25,7	-45,1	-29,325	-30,439
Other operating income (expenses), net	-97,5	-112,4	-29	-166,5	-101,35	-105,2
Equity	-0,3	-0,3	-0,3	-0,2	-0,275	-0,2855

Source: Authors

Table 7 Operational expenses forecast (R\$ million)

Operational expenses forecast	2T15	2T16	2T17	2T18	2T19	2T19
Operating income (expenses)						
Administrative	-267	-169,5	-128,3	-149,6	-124,76	-129,5
		37%	24%	-17%		
Commercials	-555,7	-346,9	-272,9	-255,2	-271,75	-282,08
		38%	21%	6%		
Researches	-54,2	-36,1	-30	-35,3	-29,064	-30,168
		33%	17%	-18%		
Other operating income (expenses), net	-181,2	-872,5	-28,1	-129,1	-142,01	-147,41
Equity	-0,1	-0,1	-0,2	0,1	0,1	0,1038

Source: Authors

Table 8 Operational expenses forecast (R\$ million)

Operational expenses forecast	3T15	3T16	3T17	3T18	3T18	3T19	3T19
Operating income (expenses)							
Administrative	-418,7	-107,4	-151,1	-225,73	-234,2	-227,85	-236,51
Commercials	-833,3	-281,5	-216,9	-167,12	-173,39	-138,61	-143,88
Researches		-66%	-23%		-20%		
Other operating income (expenses), net	-84,9	-38,7	-45,1	-56,233	-58,342	-56,761	-58,917
Equity	-0,1	-0,5	-0,2	-0,2667	-0,2767	-0,2692	-0,2794

Source: Authors

Table 9 Operational expenses forecast (R\$ million)

Operational expenses forecast	4T15	4T16	4T17	4T18	4T19
Operating income (expenses)					
Administrative	-609,2	-145	-159,4	-304,53	
Commercials	-1206,6	-267,4	-269,1	-581,03	
Researches	-142,3	-61,9	-56,8	-87	
Other operating income (expenses), net	-694,2	50,5	-430,3	-358	
Equity	-1	-0,2	4,7	1,16667	

Source: Authors

Table 10 Operational expenses forecast (R\$ million)

Operational expenses forecast	1T15	2T15	3T15	4T15	1T16	2T16	3T16	4T16	1T17	
Operating income (expenses)										
Administrative	-123,7	-267	-418,7	-609,2	-152,2	-169,5	-107,4	-145	-133,9	
Growing	n.a.	-116%	-57%	-45%	75%	-11%	37%	-35%	8%	
Commercials	-247,8	-555,7	-833,3	-1207	-393,2	-346,9	-281,5	-267,4	-222,7	
Growing	n.a.	-124%	-50%	-45%	67%	12%	19%	5%	17%	
Researches	-21,2	-54,2	-84,9	-142,3	-25,3	-36,1	-38,7	-61,9	-25,7	
Researches	n.a.	-156%	-57%	-68%	82%	-43%	-7%	-60%	58%	
Other operating income (expenses), net	-97,5	-181,2	-217,7	-694,2	-112,4	-872,5	-591,3	50,5	-29	
Growing	n.a.	-86%	-20%	-219%	84%	-676%	32%	109%	-157%	
Equity	-0,3	-0,1	-0,1	-1	-0,3	-0,1	-0,5	-0,2	-0,3	
Growing	n.a.	67%	0%	-900%	70%	67%	-400%	60%	-50%	
Operating income (expenses)	2T17	3T17	4T17	1T18	2T18	3T18	4T18	1T19	2T19	3T19
Administrative	-128,3	-151,1	-159,4	-128,3	-149,6	-234,2	-304,5	-139,6	-129,5	-236,5
Growing	4%	-18%	-5%	20%	-17%					
Commercials	-272,9	-216,9	-269,1	-256,1	-255,2	-173,4	-581	-290,6	-282,1	-143,9
Growing	-23%	21%	-24%	5%	0%					
Researches	-30	-45,1	-56,8	-45,1	-35,3	-58,3	-87	-30,44	-30,17	-58,92
Researches	-17%	-50%	-26%	21%	22%					
Other operating income (expenses), net	-28,1	-166,5	-430,3	-166,5	-129,1	-337,4	-358	-105,2	-147,4	-340,7
Growing	3%	-493%	-158%	61%	22%					
Equity	-0,2	-0,2	4,7	-0,2	0,1	-0,3	1,1667	-0,285	0,1038	-0,279
Growing	33%	0%	2450%	-104%	150%					

Source: Authors

4.1.5. Financial expenses forecast

Financial expenses, through analysis of historical data, did not show a pattern, therefore, the arithmetic mean of the previous growth rates was calculated to obtain the projections in Table 11:

Table 11 Financial expenses forecast (R\$ million)

Financial forecast	expenses	1T15	2T15	3T15	4T15	1T16	2T16	3T16	4T16	1T17	
Financial income (expenses), net		-47,2	-1,2	-1,3	-27,6	-3,4	16,6	-68,2	-117,8	-14,1	
Monetary and exchange variations, net		-18,9	154,0	-88,7	27,7	-42,1	17,0	2,9	32,9	21,7	
Financial forecast	expenses	2T17	3T17	4T17	1T18	2T18	3T18	4T18	1T19	2T19	3T19
Financial income (expenses), net		-36,9	5,0	-108,0	-36,9	-36,9	-21,5	-84,5	-25,4	-14,6	-21,5
Monetary and exchange variations, net		-22,8	15,7	6,2	-22,8	-22,8	-23,4	22,3	-15,5	31,4	-23,4

Source: Authors

4.1.6. Projection of depreciation, amortization, CAPEX and working capital

For the depreciation, amortization, CAPEX and working capital projections, also, as no growth or fall pattern was observed in a given quarter, the arithmetic average of the previous quarterly values was calculated, in order to find a median value, according to Table 12:

Table 12 Other estimation (R\$ million)

Other projections	1T16	2T16	3T16	4T16	1T17	2T17	3T17	4T17
(+) Depreciation / Amortization	200,0	279,1	300,7	377,2	245,1	282,8	250,6	317,8
Growth	n.a.	0,4	0,1	0,3	-0,4	0,2	-0,1	0,3
(-) CAPEX investment	142,6	215,4	238,5	197,8	112,1	146,6	95,1	224,3
Growth	n.a.	0,5	0,1	-0,2	-0,4	0,3	-0,4	1,4
(+/-) Working capital investment (inventory, c / r, suppliers)	1080,3	1075,8	915,5	1899,7	837,6	1102,9	725,6	1360,4
Other projections		1T18	2T18	3T18	4T18	1T19	2T19	3T19
(+) Depreciation / Amortization		217,7	246,8	306,0	329,6	321,9	292,7	347,4
Growth		-0,3	0,1	0,2	0,1	0,0	-0,1	0,2
(-) CAPEX investment		74,0	58,6	57,3	86,2	115,9	65,0	57,5
Growth		-0,7	-0,2	0,0	0,5	0,3	-0,4	-0,1
(+/-) Working capital investment (inventory, c / r, suppliers)		895,7	378,5	914,3	1043,0	1128,1	637,1	646,4

Source: Authors

4.1.7. Estimation the company free cash flow and income statement

Through all the calculated and projected values, it was possible to calculate NOPAT using equation 5 presented in this work. After considering the values of the CAPEX investment and working capital investment, considered as inventory, accounts receivable and suppliers, the value for the firm's cash flow was found, as shown in Figure 1:

	1T17	2T17	3T17	4T17	1T18	2T18	3T18	4T18	1T19	2T19	3T19
Net revenue	3217,5	5696	4144,7	5654,8	5701,3	4533,1	4115,95	6912,45	3870,03	5478,62	4974,45
Cost of goods and services sold	-2733,5	-4674,1	-3358	-4526,1	-4684,8	-4046,8	-3405,2	-6430,2	-3176,4	-5177,2	-4356,4
Gross profit	484	1021,9	786,7	1128,7	1016,5	486,3	710,78	482,29	693,64	301,37	618,08
Operating expenses											
Administrative expenses	-133,9	-128,3	-151,1	-159,4	-128,3	-149,6	-234,20	-304,53	-139,64	-129,50	-236,51
Commercial expenses	-222,7	-272,9	-216,9	-269,1	-256,1	-255,2	-173,39	-581,03	-290,59	-282,08	-143,88
Net R&D and other expenses	-25,7	-30	-45,1	-56,8	-30	-35,3	-58,34	-87,00	-30,44	-30,17	-58,92
Equity	-29	-28,1	-166,5	-430,3	-28,1	-129,1	-337,36	-358,00	-105,20	-147,41	-340,69
EBIT	-0,3	-0,2	-0,2	4,7	-0,2	0,1	-0,28	1,17	-0,29	0,10	-0,28
Net financial expenses	72,4	562,4	206,9	217,8	573,8	-82,8	-92,79	-847,11	127,49	-287,68	-162,19
Non-operating expenses	-14,1	-36,9	5	-108	-36,9	-151,6	-21,5	-84,467	-25,4	-14,6	-21,5
EBITDA	21,7	-22,8	15,7	6,2	-22,8	-34,5	-23,367	22,2667	-15,525	31,35	-23,367
Income tax expense	80	502,7	227,6	116	514,1	-268,9	-137,66	-909,31	86,57	-270,93	-207,06
NOPAT	60,9	-276,5	127,5	9,2	-279,7	-191,6	-296,92	-498,66	-279,18	-395,22	-358,85
Depreciation/Amortization	140,9	226,2	355,1	125,2	234,4	-460,5	-434,58	-1407,97	-192,61	-666,15	-565,91
CAPEX	47,784	371,184	136,554	143,748	378,708	-54,648	-61,242	-559,09	84,1455	-189,87	-107,05
Working capital investment	245,1	282,8	250,6	317,8	217,7	246,8	306,032	329,642	321,924	292,741	347,435
Company cash flow	112,1	146,6	95,1	224,3	74	58,6	57,3244	86,1951	115,867	64,9903	57,5205
	768,2	1041,4	725,6	1360,4	895,7	378,5	914,25	1043	1128,05	637,1	646,375
	1173,18	1841,98	1207,85	2046,25	1566,11	629,252	1216,36	899,746	1649,99	804,962	944,283

Figure 1 Company income statement (R\$ million). Source: Authors

4.1.8. Perp calculation

Perpetuity, calculated below, followed equation 6 represented in this work, thus finding the value of R\$16.73 billion.

$$\text{Perp} = \frac{\text{FCL}_t (1+t)}{\text{WACC}-t} = \frac{944,3 \cdot (1+0,045)}{0,104-0,045} = 16725 \quad (6)$$

4.1.9. EV calculation

After calculating the cash flow for the firm, WACC and perpetuity, it was possible to calculate the enterprise value, through equation 7, finding the company's market value, equal to R\$ 20.37 billion.

$$\text{EV} = \sum_{t=1}^n (t-1) \cdot \frac{\text{FCL}_t}{(1+\text{WACC})^t} + \frac{\text{FCL}_t (1+t)}{\text{WACC}-t} = 3642 + 16725,3 = 20367,3 \quad (7)$$

It can be observed through Figure 2 (a) and (b), that in the period prior to the announcement of joint venture formation, the company presented increasing projection of market value. However, after July 5, 2018, she suffered a sharp fall in her shares.



Figure 2 (a) and (b) – (a) Bloomberg's market value before joint venture announcement; (b) - Bloomberg's market value after joint venture announcement. Source: [23].

Such validation was highly accurate, with the company's market value calculated at R\$16.23 billion, against R\$16.13 billion. Due to the great adherence of values, it was possible to apply the tool to analyze the market value of the company in the aeronautical sector after the announcement of a joint venture. The value found was R\$20.37 billion, against R\$14.47 billion after the announcement of the joint venture. These values, in turn, can be explained due to the difficulty in adapting the culture, new technologies, less flexibility for decision making and the resistance of the market to the entry of a relatively new participant. Also, these results show that the repercussion of the announcement of the formation of a joint venture for such a company did not obtain a positive result since the market reacted negatively to the disclosure.

Finally, it can be concluded that the disclosure of the formation of joint venture for the company, did not have a positive impact on the Brazilian market, causing a decrease in its market value, which would not have been observed if it continued with its projections of previous growth.

5. Conclusion

The work claimed to present valuation as a tool for the evaluation of a publicly-traded company as described above, and taking into account the presented results, it demonstrated that the tool performed well in terms of the output data. As practical application of the work is that valuation can be considered an innovative approach for a company evaluation, mainly if it be observed the market segment in which the company belongs. This work has a proposal to be a base for next researches in the company evaluation and impacts of joint ventures fields. But a limitation for this work must be pointed that it was applied only to one company in the aeronautical sector, making it possible to suggest future work, an extrapolation to other sectors of the market. Other limitations that can be mentioned, consist of obtaining the company's value for the third quarter of 2018, and not for the specific day of the event, that is, July 5, 2018; in addition to the use of arithmetic averages of historical values, making the values found median, which does not consider unforeseen. The researchers strongly recommended to further works an new approach applying valuation to evaluate companies of different segments, as well as the application of an alternative tool instead of valuation, in order to promote the comparison of the results.

Compliance with ethical standards

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Disclosure of conflict of interest

Authors of the article claims that he has no conflict of interest.

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