

COLEGIO UNIVERSITARIO DE ESTUDIOS FINANCIEROS
MÁSTER EN INSTITUCIONES Y MERCADOS FINANCIEROS

Company Valuation with @Risk by Montecarlo: Procter & Gamble

Realizado por:

D. Enrique Gay García

D. David López Villa

D. José Ignacio Ruiz Rodríguez

Dirigido por:

José Jaime Álvarez Plaza

CUNEF (Colegio Universitario de Estudios Financieros)

MADRID, a 31/05/2019

INDEX

1. INTRODUCTION	5
1.1. OBJECT OF STUDY	5
1.2. TOOLS USED	6
1.3. METHODOLOGY	7
2. VALUATION	8
2.1. DEFINITION	8
2.2. VALUATION METHODS	9
2.3. VALUATION MODEL	12
3. MONTECARLO	18
4. P&G	20
4.1. FROM SCRATCHES TO A GLOBAL MULTI-BILLION COMPANY	20
4.1.1. <i>Origin and first products</i>	20
4.1.2. <i>International expansion and acquisitions</i>	22
4.2. CORE STRENGTHS, PURPOSE, VALUES AND PRINCIPLES	24
4.3. BRAND, PRODUCTS AND COMPETITIVE ADVANTAGE	28
4.4. CURRENT FINANCIAL OVERVIEW	32
4.5. COMPANY SECTOR AND COMPETITORS	39
5. ANALYSIS	44
5.1. VARIABLES	44
5.2. HYPOTHESIS AND PROBABILITY DISTRIBUTIONS	48
5.3. OUTPUT VALUE AND STATISTICS	56
5.3.1. <i>Scenario under Perpetual Growth of 0.375%</i>	57
5.3.2. <i>Scenario under Perpetual Growth of 2%</i>	66
5.3.3. <i>Current market capitalization comparison</i>	68
6. CONCLUSIONS	68
7. BIBLIOGRAPHY	71

TABLE INDEX:

Table 1. NET SALES AND TOTAL ASSETS (in billions)	6
Table 2. MOST COMMONLY USED MULTIPLES	10
Table 3. DCF IS USELESS BECAUSE:.....	11
Table 4. ACCOUNTS RECEIVABLE MODELLING	14
Table 5. INVENTORIES MODELLING	14
Table 6. ACCOUNTS PAYABLE MODELLING	14
Table 7. TANGIBLE FIXED ASSETS MODELLING	15
Table 8. INTANGIBLE FIXED ASSETS MODELLING	15
Table 9. SHAREHOLDERS EQUITY MODELLING	16
Table 10. SUMMARY 2018 RESULTS	33
Table 11. NET SALES VARIATIONS.....	33
Table 12. CONSOLIDATED STATEMENT OF CASH FLOWS	35
Table 13. HISTORICAL P&G PROPERTY, PLANT AND EQUIPMENT BREAKDOWN.....	45
Table 14. HISTORICAL P&G TRADEMARKS AND OTHER INTANGIBLES BREAKDOWN.....	46
Table 15. HISTORICAL NET SALES AND SALES GROWTH	46
Table 16. CREDIT SUISSE AND BERNSTEIN SALES GROWTH EXPECTATION ON P&G	49
Table 17. SALES GROWTH HYPOTHESIS	49
Table 18. P&G GROSS MARGIN HISTORICAL DATA	50
Table 19. CREDIT SUISSE AND BERNSTEIN GROSS MARGIN EXPECTATIONS ON P&G.....	50
Table 20. GROSS MARGIN HYPOTHESIS.....	50
Table 21. SALES & SELLING, GENERAL AND ADMIN. EXPENSES HISTORICAL DATA	51
Table 22. CREDIT SUISSE AND BERNSTEIN SG&A EXPECTATION ON P&G.....	51
Table 23. SG&A HYPOTHESIS.....	51
Table 24. RISK FREE HISTORICAL	52
Table 25. RISK FREE HYPOTHESIS	52
Table 26. BETA HISTORICAL INFORMATION	53
Table 27. BETA HYPOTHESIS	53
Table 28. MARKET PREMIUM HISTORICAL INFORMATION	53
Table 29. MARKET RISK PREMIUM HYPOTHESIS	54
Table 30. CASH FLOW PERPETUAL GROWTH HYPOTHESIS	54
Table 31. VARIABLES AND DISTRIBUTIONS SCHEME(I).....	55
Table 32. VARIABLES AND DISTRIBUTIONS SCHEME (II).....	56

FIGURES INDEX:

Figure 1. DIFFERENT APPROACHES TO DCF	9
Figure 2. FCF CALCULATION	11
Figure 3. RELATIONSHIP AMONG FINANCIAL STATEMENTS	13
Figure 4. CASH GENERATED	17
Figure 5. UNIFORM DISTRIBUTION	19
Figure 6. TRIANGULAR DISTRIBUTION	19
Figure 7. PROCTER & GAMBLE.....	20
Figure 8. IVORY SOAP	21
Figure 9. CRISCO ANNOUNCEMENT.....	21
Figure 10. PAMPERS ANNOUNCEMENT	22
Figure 11. P&G DISTRIBUTION.....	24
Figure 12. P&G CORE STRENGTHS	26
Figure 13. BEAUTY CATEGORY BRANDS	29
Figure 14. GROOMIG BRANDS	30
Figure 15. HEALTH CARE BRANDS	30
Figure 16. FABRIC AND HOME CARE BRANDS	31
Figure 17. BABY, FEMININE AND FAMILY CARE	31
Figure 18. FINANCE AND VALUATION METRICS	35
Figure 19. METRICS	38
Figure 20. METRICS	39
Figure 21. COMPANY SEGMENTS.....	39
Figure 22. P&G 2017 GLOBAL MARKET SHARE.....	41
Figure 23. MORGAN STANLEY' S EXPECTATIONS	41
Figure 24. HPC/BEV MEGA CAP GROSS DEBT OVER 15 YEARS (USD)	42
Figure 25. HPC/BEV MEGA CAP (50B+) NTM CONSENSUS NET DEBT/EBITDA	42
Figure 26. PG EPS GROWTH SURPASSES HPC PEER AVERAGE BY CY19	43
Figure 27. SHAREHOLDER RETURNS	44
Figure 28. EQUITY VALUE HISTOGRAM PROBABILITY DENSITY	57
Figure 29. EQUITY VALUE PROBABILITY DISTRIBUTION ADJUSTMENT	58
Figure 30. EQUITY VALUE VS FREE CASH FLOW 2019 CORRELATION	58
Figure 31. EQUITY VALUE VS FREE CASH FLOW 2020 CORRELATION	59
Figure 32. EQUITY VALUE VS FREE CASH FLOW 2021 CORRELATION	59
Figure 33. EQUITY VALUE VS FREE CASH FLOW 2022 CORRELATION	60
Figure 34. EQUITY VALUE VS FREE CASH FLOW 2023 CORRELATION	60
Figure 35. EQUITY VALUE VS WACC 2019 CORRELATION	61
Figure 36. EQUITY VALUE VS WACC 2020 CORRELATION	61
Figure 37. EQUITY VALUE VS WACC 2021 CORRELATION	62
Figure 38. EQUITY VALUE VS WACC 2022 CORRELATION	62
Figure 39. EQUITY VALUE VS WACC 2023 CORRELATION	63
Figure 40. EQUITY VALUE VS PERPETUAL GROWTH 2023 CORRELATION	63
Figure 41. EQUITY VALUE VS RESIDUAL VALUE CORRELATION	64
Figure 42. EQUITY VALUE TORNADO CHART	65

Figure 43. EQUITY VALUE SPIDER CHART65

Figure 44. EQUITY VALUE HISTOGRAM PROBABILITY DENSITY FOR A 2% PERPETUAL
GROWTH66

Figure 45. EQUITY VALUE PROBABILITY DISTRIBUTION ADJUSTMENT FOR A 2%
PERPETUAL GROWTH.....67

Figure 46. EQUITY VALUE TORNADO CHART FOR A 2% PERPETUAL GROWTH.....67

1. INTRODUCTION

1.1. OBJECT OF STUDY

We are currently living in a society in which, in order to succeed, one of the most important things we must take into consideration is the importance of having data or information. In a specific sector, companies with a larger amount of information will be in a higher position than others.

However, despite having the information being crucial, it will not be enough if the companies do not use it properly. It is necessary to anticipate different possible scenarios that can take place in the future, not only regarding our own company but also within our competitors.

There are many fields at the corporate level that will be affected by the correct use of information. Strategy at the top level is linked to production, human resources, marketing policies and overall, finance. At this point the company needs to be at the edge of the value creation. To do so, being able to measure the creation of value has been greatly increasing in importance. In the end, measuring the performance of a company in terms of value creation is a key indicator for its stakeholders.

One way to measure this is by company valuation, which is one of the most important ways to predict how an institution's value is going to evolve during the following years; however, doing just one analysis might not be quite accurate, as there are different situations that can affect this evolution.

The dynamics of the economy are translated into variation on expected values that are part of the business performance. Therefore, business risks and financial risks are an essential reality of the company performance.

The conclusion derived from this reality is that value is not a given output nor a range of values but a bunch of possibilities, each one with higher or lower probabilities of occurring. All these possible outputs come from the combination of different variables including value drivers and economic variables with different probability distributions.

Heading to a complex and dynamic interaction between economic, financial and business variables needs a powerful analysis technique that gathers all this information and allows the managers to get real pictures of the value creation, variation and risks and possible scenarios. This is the point at which Montecarlo analysis becomes clearly useful.

For this study we are going to perform a Montecarlo valuation for a multinational

company: Procter and Gamble. The main reason for choosing this company is because is one of the most interesting, as it has a huge market share, the amount of different brands, and its importance to the different countries in which the company is allocated.

It must remain clear that despite the importance that valuation has in order to reach our results, it is not the goal of this project. This is to understand the relevance of applying the Montecarlo method into the Valuation model.

Other reasons for selecting this company is due to the importance that the company has worldwide, as it is “global company, with operations in approximately 70 countries and products sold in more than 180 countries and territories around the world”. (P&G 2018 Annual Report, p.21). Also, its main results are quite relevant, as shown in the following chart:

TABLE 1. NET SALES AND TOTAL ASSETS (IN BILLIONS)

Net Sales (years ended June 30)	United States	International
2018	\$27.3	\$39.5
2017	\$27.3	\$37.8
2016	\$27.0	\$38.3
Total Assets (years ended June 30)		
2018	\$63.4	\$54.9
2017	\$59.8	\$60.6
2016	\$64.4	\$62.7

SOURCE: P&G 2018 ANNUAL REPORT, P.20

1.2. TOOLS USED

To complete our analysis, it is important to mention that we used the Excel programme in order to do the financial model, and in order to do the Montecarlo simulation we used the @Risk software. To better understand our process, we are going to give some additional details on how this program functions.

According to the explanation Palisade gives on its web page¹, “@RISK (pronounced “at risk”) is an add-in to Microsoft Excel that lets you analyse risk using Monte Carlo simulation. @RISK shows you virtually all possible outcomes for any situation—and tells you how likely they are to occur. This means you can judge which risks taking on and which ones to avoid—critical insight in today’s uncertain world.”

¹ <https://www.palisade.com/risk/>

By using this tool, we were able to obtain different graphs and figures that will allow us to do some interpretations of the model such as histograms or tornado analysis.

1.3. METHODOLOGY

This project is structured in 6 main chapters, starting by the most general topics and advancing to more specific ones as it moves forward. The first one is the introduction, which is the one we are explaining right now.

The second chapter is divided in three points. In the first one we explain what is valuation, what are the main methods that are applied (basically three, Discounted Cash Flow, Peers based method and Dividend Discount Model) and in the third one we will explain how we have made the financial model for P&G.

In the third chapter, which is also divided in other two points, we explain what Montecarlo is, as well as the use it has on company valuation. The Montecarlo method is a *“numerical stochastic process, which means a series of different statements defined by random variables”* (Illana, 2013).

Then, chapter 4 is based on explaining what the main activity of P&G is, how is it doing in the market and explain the current situation of the sector. As we have mentioned on the introduction, we decide to use P&G, as it is a greatly interesting companies nowadays due to the different brands it carries worldwide, allowing us to perform a more exhaustive analysis on a multinational company.

The fifth chapter consists on the valuation of P&G by Montecarlo. First, we designed model and valuation, and we have selected the different variables to simulate the different scenarios through the @Risk program.

In this chapter, we will explain all the reasons that led us to do the analysis in one way or another, and we will also explain the results that we obtained by observing the histograms and the tornado scenario, and we will compare the Equity Value with each one of the Free Cash Flows from 2019 to 2023, with the WACC in that same period, to the Perpetual Growth and to the residual value.

It is important to mention that we also divided this chapter in three points. We did the analysis based on two different Perpetual Growth rates scenario, which will be one point for each rate, and a third one in which we compare our results with the market.

At the end, we will have a chapter in which we will talk about the main conclusions of the project, discussing whether or not the results were expected.

2. VALUATION

2.1. DEFINITION

As mentioned before, having information nowadays is one of the most powerful tools needed to have an advantage over the competition. It is useful both, for the company in question, so that it is aware of its strengths and weaknesses, and for other companies or investors who might like to invest into the company. Therefore, valuation is a very useful way in order to understand what is, or what can be, the situation of a company in the future.

Valuation is a process by which the economic value of a company can be estimated. However, it depends on the different hypothesis that each people or company uses to do the financial modelling. According to the slides provided by professor Morales for the Company Valuation course in the Masters in International Finance during the 2018-2019 course, in order to do a proper valuation, it is firstly important to have a good financial model because *“It is able to indicate the most likely outcome from financial magnitudes if a series of hypotheses hold true [...] Making decisions without adequate information becomes an intuitive process and, therefore, loaded with risk [...] by varying the assumptions adopted in the construction of the model, it allows us to determine what would hypothetically be the consequence of one or another scenario occurring in the future, hence giving us an idea of a probable and foreseeable future. So much the more probable, the more certain is the future evolution of the main assumptions.”* (Morales, 2019).

In order to do a good financial modelling, Professor Morales Plaza establishes 7 main points:

- “Step 1: Define and structure the problem”: From a professional perspective, the different models used are not only based on source of information, but in more, being able to know more about the different sectors.
- “Step 2: Define the Input and Output variables of the model.” When we already have the different information that we need, it is important to identify the different variables that can be most useful for our analysis.
- Step 3: Decide who will use the model and how often. It is important to notice that the model can be used by people who doesn't have enough information or

knowledge about the sector, and depending on this, the model must be built in one way or another.

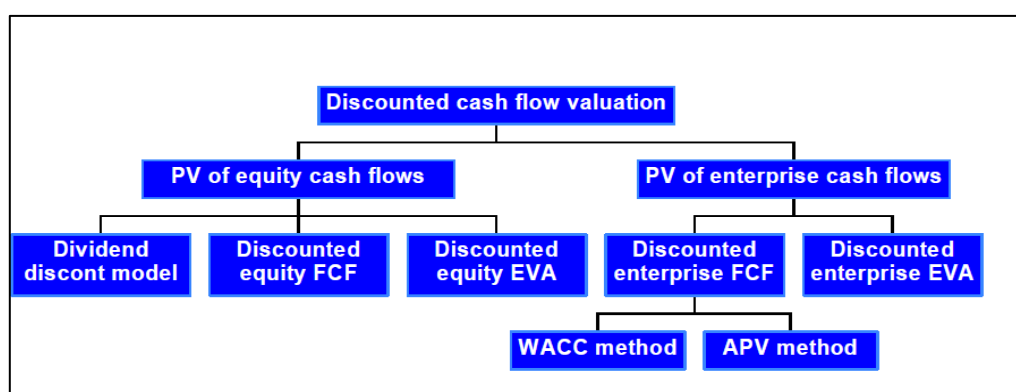
- “Step 4: Understand the mathematical aspects and financial relationships that exist in the financial model”
- “Step 5: Design the model”.
- “Step 6: Create the spreadsheet.”
- “Step 7: Verify the model’s results and behaviour”. The model must be continuously updated, as is not the same to analyse the model today or 5 months in the future, as lot of changes in the sector can affect the development of the model.

These are the most important steps when proceeding with financial modelling. Furthermore, we always have to protect the model by blocking the different formulas, do a report explaining the main points of the model for anyone who wants to understand it and has no worked on it, and keep on updating the model whenever its necessary.

2.2. VALUATION METHODS

Once the model is complete, there are several ways to value a company. Continuing with another set of slides taught us during the Company Valuation course for the master’s in international finance at CUNEF, we are going to explain the different methods we learned: Discounted Cash Flows (from now on DCF), Peers Based Valuation and the Dividend Discount Model (from now on DDM). The model that we used for doing the P&G valuation is the DCF Method, but as it is the longest method, we have decided to explain it at the end of this section.

FIGURE 1. DIFFERENT APPROACHES TO DCF



Source: Slides Company Valuation, J. Ignacio Morales Plaza, p.42.

We will start with the DDM. According to Viebig, Poddig and Varmaz explain in its book Equity Valuation: Models from Leading Investment Banks, “is the most simplified

form of a discounted cash flow model. Dividends are cash flows equity holders actually receive from a company [...] Several versions of the dividend discount models exist, each based on different simplifying assumptions. The most basic form is the perpetuity version which is based on two extremely simplifying assumptions:

(1) Investors receive constant dividends in perpetuity.

(2) Costs of equity are constant forever”

(Viebig, Poddig and Varmaz; Equity Valuation: Models from Leading Investment Banks, p.14)

The next model we are going to explain is the Peers Based Valuation or by Multiples. Professor Pablo Fernández explains on its book *Valuation and Common Sense, chapter 5 Valuation using multiples. How do analysts reach their conclusions?* for IESE Business School that the use of this method is highly debatable, as it is quite dispersed. However, it is useful after had valuated the company using another method, as it is useful to see the differences with other companies. (Fernández, 2017, p.2). The next chart below shows the most common multiples used:

TABLE 2. MOST COMMONLY USED MULTIPLES

Table 1. Most commonly used multiples		
Multiples based on the company's capitalization (equity value: E).	Multiples based on the company's value (equity value and debt value: E+D)	Growth-referenced multiples.
Price earnings ratio	Enterprise Value to EBITDA	Price earnings (PER) to growth
Price to cash earnings	Enterprise Value to Sales	EV to EBITDA growth
Price to sales	Enterprise Value to unlevered FCF	
Price to levered FCF		
Price to book value		
Price to asset value		
Price to customer		
Price to units		
Price to output		

Source: Own from data obtained from *Valuation and Common Sense, chapter 5 Valuation using multiples. How do analysts reach their conclusions?* Pablo Fernández (pp.2-4)

Finally, we are going to explain the DCF method which is the one we used in order to do P&G valuation. This method looks to “*determine the company's value by estimating the cash flows it will generate in the future and then discounting them at a discount rate matched to the flows' risk.*” (Fernández 2017, p.8)

According to the set of slides professor Jose Ignacio Morales Plaza gave us for the Company Valuation course for the master's in international finance at CUNEF, “*there are some people who believe DCF is useless*” due to the reasons explained on the next chart:

TABLE 3. DCF IS USELESS BECAUSE:

♦ DCF is difficult and subjective	♦ Yes. But so are all other valuation techniques - these are not reasons to reject it.
♦ Many value drivers need to be combined to produce a DCF valuation	♦ Yes. But making judgements about multiples also requires consideration of these same factors
♦ DCF requires a cost of capital and nobody seems to have a clue what this is.	♦ Agreed. But differences in required return is a key factor in valuation and cannot be ignored. Also DCF can be used to give the implied discount rate
♦ DCF is very sensitive to long term growth assumptions	♦ Yes. But so are multiples. Also the problem is mitigated by using zero value adding long term growth assumptions

Source: Slides Company Valuation, J. Ignacio Morales Plaza.

In order to calculate the FCF, we did it in the following way:

FIGURE 2. FCF CALCULATION

	EBIT
-	Op. Taxes
=	NOPAT
+	D&A
-	CAPEX
-	Inv Working Cap
=	FCF

Source: Own

The FCF “is the operating cash flow, that is, the cash flow generated by operations, without taking into account borrowing (financial debt), after tax” (Fernández, 2017, p.10).

Then, we calculate the WACC by using the following formula:

$$WACC = Ke * \left(\frac{E}{E + D} \right) + Kd * (1 - T) * \left(\frac{D}{E + D} \right)$$

Being:

- Ke: Cost of Equity
- E: Market Value of Equity
- D: Market Value of Debt

- K_d : Cost of Debt
- $(1-T)$: Being T Corporate Tax

2.3. VALUATION MODEL

Valuating anything claims for an attempt to predict the future. There always steams questions about how those predictions are expected to be true what at the end positions the valuation model on an uncertain scenario. Modelling is based on hypothesis from which decisions should be taken in order to complete the valuation. In addition, a proper valuation model allows us to identify what could be the potential consequences of projecting a certain variable in a determined way or another. For these reasons, valuation modelling is not exact, but putting in context the target to be valued helps to reduce the error peg to it.

The DCF valuation methods, as explained in point 2.2, are based on the discount of cash flows generated by the company in the future plus a terminal or residual value of those cash flows. The cascade of cash flows takes either the net income or the EBIT as the starting point and adds or deducts other variables like the capital expenditure, the depreciation and amortization and the variation of working capital generated within that year. However, in order to estimate the final result of each of those cash flows that will be later discounted it is also important to know the value of all those other variables that determines its value.

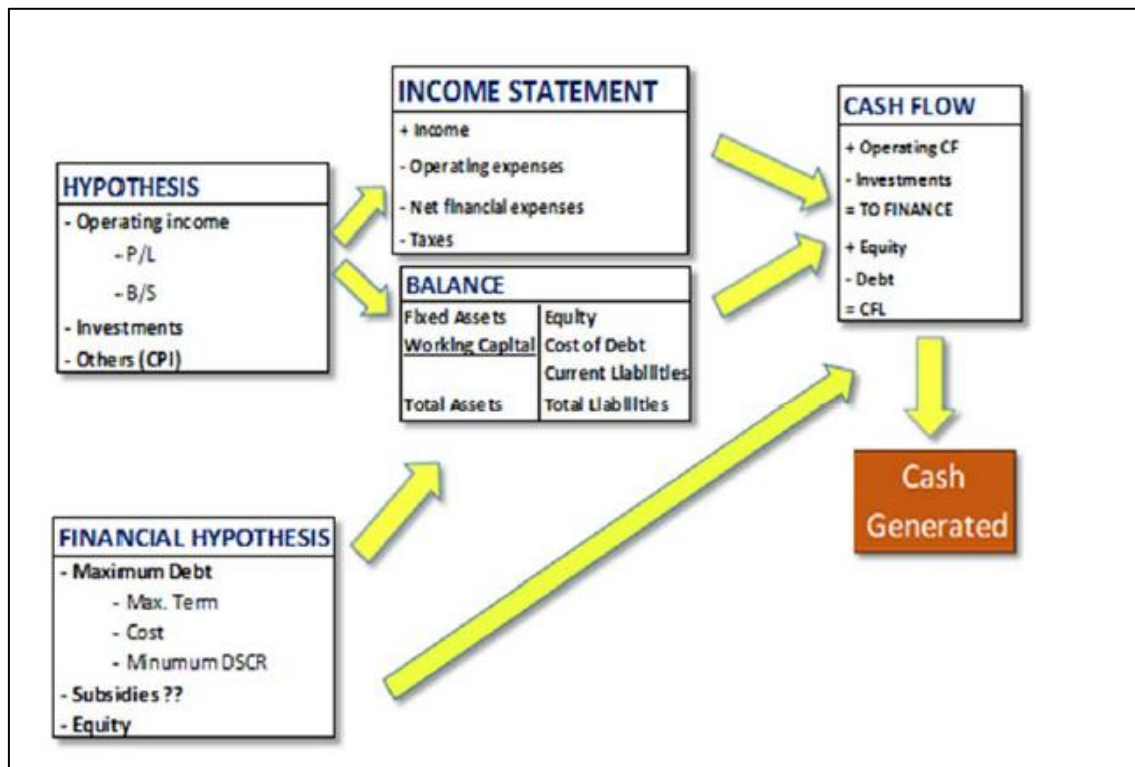
A valuation model plays a key role at this point. Forecasting a reasonable value of a company demands to come up with a strong base sort of historical data to build it properly. The valuation model developed for our purpose is based on the projection of each the main financial statements of a company in order to reach to the cash flows generated, and finally the Equity Value.

This is the point at which Montecarlo simulation comes into play. Modelling assumptions or hypothesis are applied over the different variables that take part in the composition of the financial statement and Montecarlo simulation is applied over those ones that are considered to the most important (See point 5.1) ones for the specific company that it is being valued.

Nonetheless, all variables are projected no matter its importance either under a given hypothesis or by simply fixing them. In this case, there will be some assumptions that has been carried out for simplicity reasons, since the aim of this project is to analyse how is the Montecarlo simulation affecting the valuation of a company rather than studying in depth how to build a very detailed valuation model.

Once the basis is defined, it is important to deploy a proper analysis on the relationship between the different financial statements and how the different variables will affect one each other. Figure 3 shows graphically the relationship and the order that should be followed to come up with a possible Equity Value. This order would be as follows: identify the variables and define the hypothesis, project the financial statement, follow with the balance sheet and build the cash flow.

FIGURE 3. RELATIONSHIP AMONG FINANCIAL STATEMENTS



Source: Slides Company Valuation, J. Ignacio Morales Plaza.

Our model has started from the income statement of the company. From this point variables like the Sales Growth, Gross Margin and selling, general and administrative expense are projected while others, such as tax rate or minorities are projected by applying an average of the percentage represented over EBT for the former and net earnings for the latter. Finally, for simplicity purposes, it has been assumed that debt will be maintained fixed over the following five years of projection. Thus, the net financial debt generated each year will be assumed to pay a certain interest, either positive or negative depending on the sign of that net debt, that will be linked to the income statement as income interest income/expense.

The projection of the net income entails some variables that will affect other statements such as the balance sheet. It is first necessary to choose how to project the net financial debt which is composed by the cash of the company minus the sum of both short term and long-term debt. In our case, as explained before, we have assumed a constant debt and it has been the cash the element projected by adding to the accumulated cash the corresponding cash generation of the year. Later, it is necessary to define again what variables would be projected and how it would be done.

On the one hand account receivables are projected by calculating the days of sale of each of the historical years and by using them as a proxy for the coming years.

In the same way, the inventory and the accounts payables are calculated but, in this case, based on the days of inventory and days of purchased respectively.

TABLE 4. ACCOUNTS RECEIVABLE MODELLING

<u>Accounts Receivable</u>	2014	2015	2016	2017	2018
Accounts Receivable	6,386	4,861	4,373	4,594	4,686
Sales	74,401	70,749	65,299	65,058	66,832
Sales/365	204	194	179	178	183
Days of Sale (DSO)	31.33	25.08	24.44	25.77	25.59

Source: own elaboration based on Procter and Gamble financial statements

TABLE 5. INVENTORIES MODELLING

<u>Inventories</u>	2014	2015	2016	2017	2018
Inventories	6,759	5,454	4,716	4,624	4,738
COGS	39,030	37,056	32,909	32,535	34,268
COGS/365	107	102	90	89	94
Days of Inventory (DIO)	63.21	53.72	52.31	51.88	50.47

Source: own elaboration based on Procter and Gamble financial statements

TABLE 6. ACCOUNTS PAYABLE MODELLING

<u>Accounts Payables</u>	2014	2015	2016	2017	2018
Accounts Payables	8,461	8,257	9,325	9,632	10,344
Purchases		35,751	32,171	32,443	34,382
Purchases/365		98	88	89	94
Days of Purchase (DOP)		84.30	105.80	108.36	109.81

Source: own elaboration based on Procter and Gamble financial statements

In addition, property plant and equipment and intangible assets are forecasted starting from the final balance of each of those items of the previous year that will be used as proxy of the initial balance of the year of projection. After it the capex is added, and the depreciation and amortization deducted (we are assuming that no write-offs are applied). At this point is very important to bear in mind the coherence of the model and the relationship

between the assumptions made. Sales Growth, capex and depreciation and amortization are correlated; the higher the growth of a company in terms of sales the higher the capital expenditure will be and so the gap between depreciation and capital expenditure will increase as well.

On the other hand, lower growths will shrink the amount of capital invested for fixed assets and the difference between depreciation and amortization will decrease. In addition, historical data for both capex and D&A is obtained from the cash flow statement and weighted, in case given as a total amount, depending on the amount of tangible and intangible assets.

Once again, the percentage of both variables over the initial amount of tangible and intangible assets will be applied as a proxy of future projections, by adding or detracting a certain amount depending on the expectations of the company for the future and the Sales Growth prediction.

TABLE 7. TANGIBLE FIXED ASSETS MODELLING

PROPERTY, PLANT AND	2014	2015	2016	2017	2018
Beginning		22,304	20,268	19,385	19,893
CAPEX	1,615	1,608	1,463	1,527	1,721
D&A	(1,318)	(1,349)	(1,359)	(1,273)	(1,312)
Write-off	0.00	0.00	0.00	0.00	0.00
End	22,304	20,268	19,385	19,893	20,600
CAPEX Hypothesis (%)		7.21%	7.22%	7.88%	8.65%
D&A Hypothesis (%)		-6.05%	-6.70%	-6.57%	-6.59%
Write-off Hypothesis (%)	0.00%	0.00%	0.00%	0.00%	0.00%

Source: own elaboration based on Procter and Gamble financial statements

TABLE 8. INTANGIBLE FIXED ASSETS MODELLING

TRADEMARKS AND OTHER INTANGIBLE ASSETS, NET	2014	2015	2016	2017	2018
Beginning		30,843	26,829	24,527	24,187
CAPEX	2,233	2,128	1,851	1,857	1,996
D&A	(1,823)	(1,785)	(1,719)	(1,547)	(1,522)
Write-off					
END	30,843	26,829	24,527	24,187	23,902
CAPEX Hypothesis (%)		6.90%	6.90%	7.57%	8.25%
D&A Hypothesis (%)		-5.79%	-6.41%	-6.31%	-6.29%
Write-off Hypothesis (%)	0.00%	0.00%	0.00%	0.00%	0.00%

Source: own elaboration based on Procter and Gamble financial statements

Shareholder's equities are projected based on the final balance of previous years as the beginning balance for the current year of study, over which net income is added, dividends are deducted as part of the net income that is pay out and thus, leaves the balance of the

company. Finally, any capital decrease or increase is also taken into account. The net income corresponds to the one projected on the income statement, while the historical dividends.

TABLE 9. SHAREHOLDERS EQUITY MODELLING

Shareholder's Equity	2014	2015	2016	2017	2018
Beginning		69,214	62,419	57,341	55,184
Net Income	11,643	7,036	10,508	15,326	9,750
Dividends	(6,911)	(7,287)	(7,436)	(7,236)	(7,310)
Cap Increase	0.00	0.00	0.00	0.00	0.00
Cap Decrease	—	—	—	—	—
END	69,214	62,419	57,341	55,184	52,293
Dividends Pay-out Ratio (%)		-103.57%	-70.77%	-47.21%	-74.97%

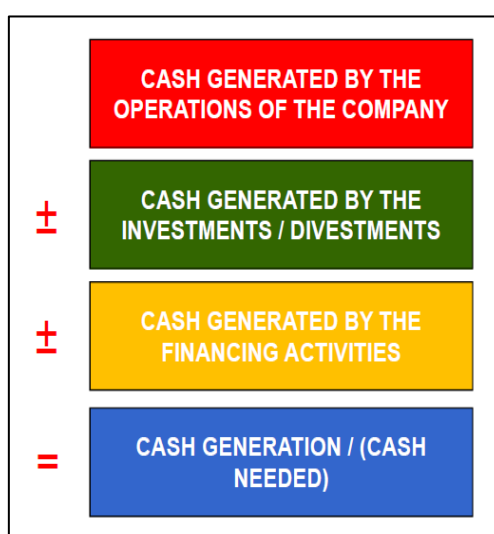
Source: own elaboration based on Procter and Gamble financial statements

Other variables such as prepaid expenses or accrued liabilities are also projected as percentage of that variables over the sales.

Once all these variables are properly forecasted, it is necessary to calculate the cash generated for each of the periods, balancing both assets and liabilities.

We start calculating the gross cash flow by adding back to net income the depreciation and amortization and adding minority interests in case they deduct in the income statement or deducting them if they instead add in the profit and loss account. To the gross cash flow capital expenditure of the year and variation of working capital are deducted as the cash related to expenses. Cash flow associated to the repayment or acquisition of debt has been assumed to be zero and thus the cash steaming from it, either positive or negative will be zero as well. Finally by deducting dividends and any variation of capital increase or decrease we will arrive at the final cash generated by the company at the end of the year, which will be added back to the cash accumulated to computed the total amount of cash accumulated along the years of projection.

FIGURE 4. CASH GENERATED



Source: Slides Company Valuation, J. Ignacio Morales Plaza..

The final step to close and balance both income statement and balance sheet would be to compute the net financial debt and the net financial expenses or income attributable to that that result. As explained before, the net financial debt is compute by deducting the total amount of financial debt, both short and long, from the amount of cash and cash and equivalents generated over that year.

Therefore, if the amount of net financial debt is positive it would mean that the company has more cash than financial debt in its balance and thus, we will assume a certain amount of interest generated from the investment of that cash. In our case, due to the low interest rates that exist nowadays it has been assumed a 0.25% of interest income.

On the other hand, if the net financial debt is negative, the amount of financial debt of the company will be higher than the cash accumulated up to that year. Thus, a financial interest will be considered (4% in our model). In any of the cases, that financial result must be reflected on the income statement as by deducting it form the operating income in case of a debt balance and adding it if the company has generated an income form a cash surplus.

This is the processed followed to calculate the variables that will be inserted in the free cash flow cascade define in point 2.2. At this point cash flows for each of the years are projected and each of the weighted average cost of capital for each of the years are projected as well in order to discount both the cash flows of the five years of projection and the Terminal Value to the present obtaining the enterprise value of the company. Finally, the financial debt is deducted in order to find the Equity Value of the company.

The model described along this point has been used as the structure of our simulation. From points 4 onwards it will be defined what have been the variables chosen to be simulated under the Montecarlo method and the reasons behind that decision. On the other hand, some of the most important variables that have not been simulated, but that are kept in the model under fixed hypothesis, will also be explained.

3. MONTECARLO

The Montecarlo method is a group of mathematical methods, based on stochastic numerical models, random variables, being these ones those which take place with certain probability. (Illana, 2013)

As Viebig, Poddig and Varmaz explain in its book *Equity Valuation: Models from Leading Investment Banks*, that “*Monte Carlo simulation can be used to solve high-dimensional differential equations and to calculate the probability of a successful outcome of a game of luck, like solitaire, or more generally of a stochastic process with uncertain realizations, like an investment in the stock market.* (Viebig et al. 2008, p.85). They explain that economic variables also have some element of randomness.

This means that this helps to see which distributions can help to show an approximation to each of the inputs in order to know the value of a company, but it will not be completely be certain. This is important when doing company valuation, as uncertainty helps to create a more realistic scenario, and Montecarlo simulations help to introduce this uncertainty.

At the end, if we check how does this method works, we can notice that it has only two main tasks in order to solve a problem:

1. “*Generating (a reasonable amount of) random numbers*
2. *Transforming random variables to capture the statistical characteristics of the model’s input variables*” (Viebig et al. 2008, pp.86-87)

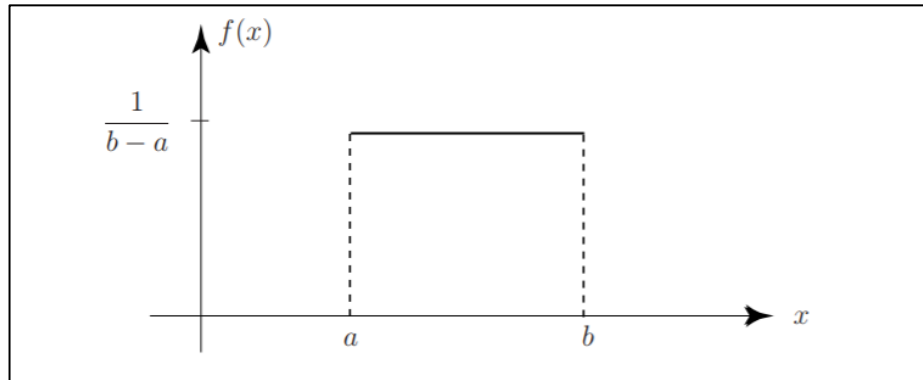
In the second point, it is necessary to determine which distributions are we going to use. As there a lot of them, we decided just to explain the ones that are being used in our model. These distributions are:

- a) Normal: “*is a continuous probability distribution widely used by financial economists. The normal distribution is bell shaped and symmetrical about*

its mean and can be fully described by only two parameters, its mean [...] and its standard deviation [...]”. (Viebig et al. 2008, p.87)

- b) Uniform: “has random variable X restricted to a finite interval $[a, b]$ and has $f(x)$ a constant over the interval”.

FIGURE 5. UNIFORM DISTRIBUTION



Source: Uniform distribution, Workbook 38: Continuous Probability Distributions. Helmo, 2008, p.19

- c) Triangular: José Manuel Herrerías Velasco, José Callejón Céspedes and Rafael Herrerías Pleguezuelo explain on their article *Comparación de la distribución triangular, con una distribución tipo I de Pearson, como modelos para los problemas en ambiente de riesgo e incertidumbre* that a “random variable (Z), follows a triangular distribution $T(0, m, 1)$ if only its density function is:

FIGURE 6. TRIANGULAR DISTRIBUTION

$$f(z) = \begin{cases} 2 \frac{z}{m} & \text{si } 0 < z \leq m \\ 2 \frac{1-z}{1-m} & \text{si } m \leq z < 1 \\ 0 & \text{en otro caso} \end{cases}^2$$

This means that there are only three possible values to be applied for a specific input.

² Callejón, Herrerías and Herrerías, Comparación de la distribución triangular, con una distribución tipo I de Pearson, como modelos para los problemas en ambiente de riesgo e incertidumbre, p.6

4. P&G

4.1. FROM SCRATCHES TO A GLOBAL MULTI-BILLION COMPANY

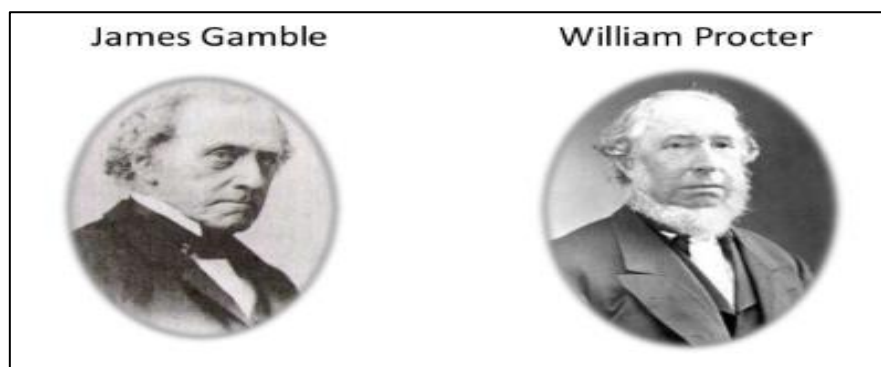
4.1.1. *Origin and first products*

The Procter and Gamble company was founded in 1837 in Cincinnati, Ohio, by William Procter and James Gamble.

William Procter was born in 1801 in England. As a boy, he worked as a general store apprentice, learning to “dip candles” – a skill that would later lead him to both fame and fortune.

James Gamble was born in 1803, in Ireland. He immigrated with his family to America in 1819 as part of a mass exodus from Northern Ireland. At the age of 18, James began as an apprentice in a local soap maker, then years later, opened his own soap and candle shop.

FIGURE 7. PROCTER & GAMBLE



Source: P&G History Report, p.3.

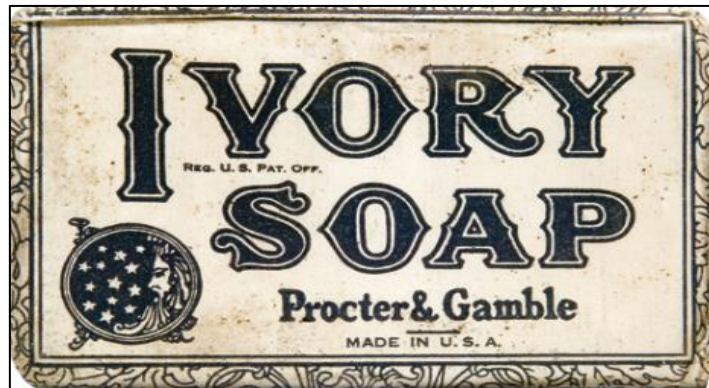
The two might never have met if they had not married sisters, Olivia and Elizabeth Norris, whose father convinced them to become business partners. As a result, Procter & Gamble was founded.

1837 was a difficult time to start a business. Although Cincinnati was a flourishing marketplace, the U.S. was involved in a financial crisis. Hundreds of banks were closing across the country and there was a great concern that the United States might be bankrupt. However, William and James were more concerned about how to compete with the 14 other soap and candle makers in their city than they were with the financial panic that was hitting their country.

In 1859, Twenty-two years after the company was founded, P&G sales reach \$1 million and the Company employed 80 people by that time.

In 1879, James Norris Gamble, son of the founder and a trained chemist, develops an inexpensive white soap which was the origin of the “Ivory Soup”.

FIGURE 8. IVORY SOAP

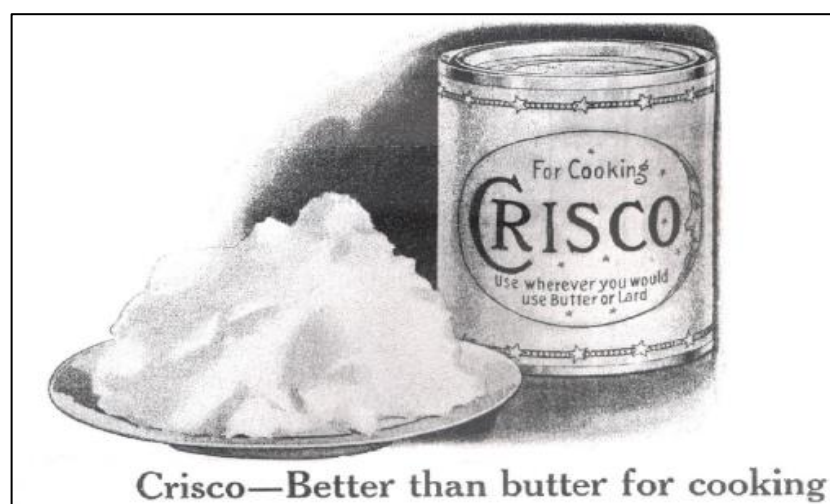


Source: www.PG.com

By 1890, P&G was selling more than 30 different types of soap, including Ivory. Promoted by full-colour print ads in national magazines, consumer demand for P&G soaps continued to grow. To meet this increasing demand, the Company had to expand its operations outside Cincinnati with a plant in Kansas City, followed by a plant in Ontario.

The company in 1911, began producing Crisco, a shortening made of vegetable oils rather than animal fats, providing a healthier alternative to cooking with animal fats and a more economical alternative to butter. As radio became more popular in the 1920s and 1930s, the company sponsored several radio programs.

FIGURE 9. CRISCO ANNOUNCEMENT



Source: www.Wikipedia.org

In 1946, P&G introduced Tide, its most important product since Ivory. Tide was notably superior to other products on the market, and it quickly became a great success. In

the years following Tide's introduction, P&G expanded into several new businesses. Crest, the first fluoride toothpaste, rose to market leadership on the strength of an unprecedented endorsement by the American Dental Association.

In 1961, P&G invented the disposable diaper category with the product Pampers. The Company also improved its existing businesses, getting into new food and beverage categories, remarkably with the acquisition of Folger's coffee.

FIGURE 10. PAMPERS ANNOUNCEMENT



Source: www.pg.com

What was more important, however, was the Company's growing focus on its international businesses. Convinced that its success in new geographic markets required operations in those countries, P&G started building start-up businesses, first in Mexico, then in Europe and Japan. By 1980, P&G was doing business in 23 countries around the world as we will see more in depth in the next chapter, with sales of nearly \$11 billion and earnings 35 times greater than in 1945. (P&G History Report, 2016)

4.1.2. International expansion and acquisitions

Procter & Gamble was not interested in making acquisitions merely for the sake of growth, however, the deals had to fit with P&G values, technology, capabilities and at the same time, the categories had to offer stronger growth potential than those in which the company had already invested.

In late 1980s P&G's overseas businesses in Western Europe, United Kingdom, Latin America, Middle East and Japan were a major development behind the scenes. During the 1980s, P&G's foreign sales grew by nearly 150 percent, from \$3.5 billion to \$8.5 billion, and the share of total revenues from 32 percent to 40 percent. Growth in earnings was even

more impressive, from \$149 million to \$417 million, and from 23 percent to 35 percent of the corporate total.

In July 1980, P&G got involved in its first significant acquisition in seventeen years. It spent \$53 million to purchase the Canadian soft drink Crush International Limited. After that acquisition Procter & Gamble became the sixth-biggest soft-drink maker in the United States, with a 4 percent market share and brands including Orange Crush soda, Hires root beer, and Sun-Drop lemon-lime soda competing neck-in-neck with Coca-Cola and PepsiCo.

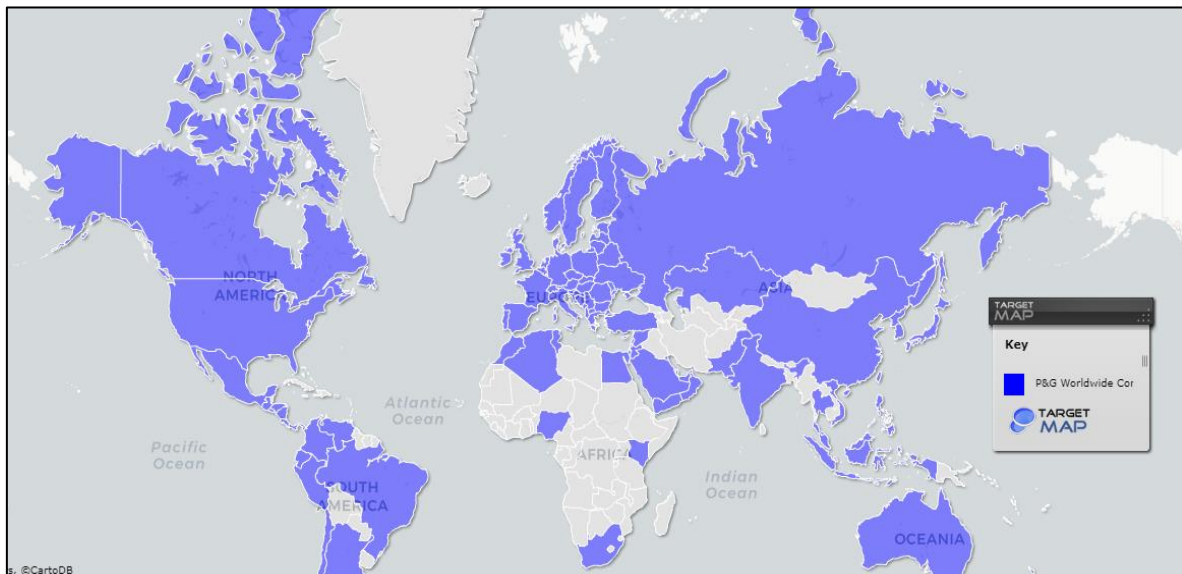
Next acquisition was Frostproof a citrus processing company based in Florida with revenues of 175 million and 700 employees.

Shortly after, P&G closed two more deals. The first purchase, for \$312 million, brought in the OTC lines of Monsanto's pharmaceutical subsidiary, G. D. Searle & Co., including Metamucil, the leading laxative in the United States. The second acquisition was Richardson-Vicks Inc. which in the previous year, it had earned \$72.2 million on sales with nearly half of these revenues originated outside the United States and employed eleven thousand people; P&G paid 1,2 billion for this acquisition. This purchase was by far the biggest operation for the company at that time.

After these acquisitions P&G purchased a few more companies such as Noxell, Shulton's Old Spice, Max Factor, the Iams Company, and Pantene, among others.

By 2018 P&G has become a global multibillion company, it owns more than 50 brands and has acquired more than 25 companies, with 95.000 employees with operations in more than 80 countries and selling its products in more than 180 countries. (Dyer, Dalzell and Olegario, 2004)

FIGURE 11. P&G DISTRIBUTION



Source: www.targetmap.com

4.2. CORE STRENGTHS, PURPOSE, VALUES AND PRINCIPLES

P&G focus its business on 5 core strengths which we will explain in the following lines:

- **Consumer understanding:** P&G is the company which has invested the most in the world in consumer and market research with \$350 million invested last year and they also conduct more than 15.000 research studies every year in order to keep improving their products. These researches let them know where the innovation opportunities as well as how to serve and communicate with consumers.
- **Scale:** P&G is creating scale advantage by integrating and consistently operating as one Company across their businesses and markets. They know that this is a powerful tool and they therefore use it in order to better serve high-quality products to more consumers in more parts of the world. They create scale advantages by allocating resources more strategically and efficiently than any individual business can do on its own. The combination of the individual components is greater together as one Company than the sum of the parts individually, therefore, maximizing the total value they add to the costumers.
- **Go-to-market capabilities:** they are consistently ranked by leading retailers in industry surveys as a preferred supplier and as the industry leader in a wide range of capabilities including clearest company strategy, brands most important to retailers,

strong business fundamentals and innovative marketing programs which allow them to surpass their competitors.

- **Brand building:** It is the brand-building leader of the industry with an outstanding portfolio of more than 50 brands that are among of the world's best-known household names and all of them together make up 90% of P&G's sales and more than 90% of profits. Twenty-three of these brands each generate more than \$1 billion dollars in annual sales.
- **Innovation:** P&G is the innovation leader in the industry, they have had a solid Sales Growth in the past nine years, and this is a product of acquiring new brands and of new or improved product innovation. P&G is continuously strengthening their innovation capability and pipeline by investing two times more than its major competitors. In addition, they have multiplied their internal innovation capability with a global network of innovation partners outside P&G. More than half of all product innovation coming from P&G today includes at least one major component from an external partner. Over the past 15 years, 125 P&G innovations have earned a spot on the top 25 Pacesetters list (annual list of the biggest innovations in the industry) and Forbes' most innovative list. Based on this we consider P&G as the most innovative manufacturer in the consumer-packaged goods industry for the last decade³.

³ Source https://www.pg.com/en_balkans/company/core_strengths.shtml

FIGURE 12. P&G CORE STRENGTHS



Source: www.us.pg.com

Regarding the purpose, values and principles P&G states in its official website: *“Throughout our history of over 181 years, our business has grown and changed while these elements have endured and will continue to be passed down to generations of P&G people to come. Our Purpose unifies us in a common cause and growth strategy of improving more consumers’ lives in small but meaningful ways each day. It inspires P&G people to make a positive contribution every day. Our Values reflect the behaviours that shape the tone of how we work with each other and with our partners. And Our Principles articulate our unique approach to conducting work every day”.*

Purposes: *“We will provide branded products and services of superior quality and value that improve the lives of the world’s consumers, now and for generations to come. As a result, consumers will reward us with leadership sales, profit and value creation, allowing our people, our shareholders and the communities in which we live and work to prosper.”*

Values:

- **Integrity:** *“We always try to do the right thing. We are honest and straightforward with each other. We operate within the letter and spirit of the law. We uphold the values and principles of P&G in every action and decision. We are data-based and intellectually honest in advocating proposals, including recognizing risks.”*
- **Leadership:** *“We are all leaders in our area of responsibility, with a deep commitment to delivering leadership results. We have a clear vision of where we are*

going. We focus our resources to achieve leadership objectives and strategies. We develop the capability to deliver our strategies and eliminate organizational barriers.”

- Ownership: *“We accept personal accountability to meet our business needs, improve our systems and help others improve their effectiveness. We all act like owners, treating the Company’s assets as our own and behaving with the Company’s long-term success in mind.”*
- Passion for Winning: *“We are determined to be the best at doing what matters most. We have a healthy dissatisfaction with the status quo. We have a compelling desire to improve and to win in the marketplace.”*
- Trust: *“We respect our P&G colleagues, customers and consumers, and treat them as we want to be treated. We have confidence in each other’s capabilities and intentions. We believe that people work best when there is a foundation of trust.”*

Principles:

- We Show Respect for All Individuals: *“We believe that all individuals can and want to contribute to their fullest potential. We value differences. We inspire and enable people to achieve high expectations, standards and challenging goals. We are honest with people about their performance.”*
- The Interests of the Company and the Individual Are Inseparable: *“We believe that doing what is right for the business with integrity will lead to mutual success for both the Company and the individual. Our quest for mutual success ties us together. We encourage stock ownership and ownership behaviour.”*
- We Are Strategically Focused in Our Work: *“We operate against clearly articulated and aligned objectives and strategies. We only do work and only ask for work that adds value to the business. We simplify, standardize and streamline our current work whenever possible.”*
- Innovation is the Cornerstone of Our Success: *“We place great value on big, new consumer innovations. We challenge convention and reinvent the way we do business to better win in the marketplace.”*
- We Value Mastery: *“We believe it is the responsibility of all individuals to continually develop themselves and others. We encourage and expect outstanding technical mastery and executional excellence.”*

- We Seek to Be the Best: *“We strive to be the best in all areas of strategic importance to the Company. We benchmark our performance rigorously versus the very best internally and externally. We learn from both our successes and our failures.”*
- We Are Externally Focused: *“We develop superior understanding of consumers and their needs. We create and deliver products, packaging, and concepts that build winning brand equities. We develop close, mutually productive relationships with our customers and our suppliers. We are good corporate citizens. We incorporate sustainability into our products, packaging and operations.”*
- Mutual Interdependency is a Way of Life: *“We work together with confidence and trust across business units, functions, categories and geographies. We take pride in results from reapplying others’ ideas. We build superior relationships with all the parties who contribute to fulfilling our Corporate Purpose, including our customers and suppliers, universities and governments⁴.”*

These values, principles and purposes are what have made P&G become one of the best American companies of all times and applying them on a daily basis have made P&G achieved many awards, among them: World’s most admired companies (Fortune), Most Reputable Companies (Forbes), Best place to work (Glassdoor), 100 Best Corporate Citizen (Corporate Responsible Magazine), Global Corporate Social Responsibility Silver Award for Product Excellence (Pinnacle Group) and many more.

4.3. BRAND, PRODUCTS AND COMPETITIVE ADVANTAGE

P&G business model relies on the continued growth and success of existing brands and products, as well as the creation of new innovative products. The markets and sectors where they offer their products are highly competitive, hence the importance of new innovations which give P&G competitive advantages. The Company’s products are sold in more than 180 countries mainly through mass merchandisers, ecommerce, grocery stores, membership club stores, drugstores, department stores, distributors, wholesalers, baby stores, specialty beauty stores, high-frequency stores and pharmacies.

Their growth and competition strategy consists on delivering superiority in all elements of their business from product, packaging, brand communication, retail execution to value equation.

⁴ Source: https://www.pg.com/en_IN/company/purpose-values-principles.shtml

The Company has five reportable product segments under U.S. GAAP: Beauty; Grooming; Health Care; Fabric & Home Care and Baby, Feminine & Family Care which we will explain in depth in the paragraphs below:

- **Beauty:** P&G is one of the global leaders in the beauty category. This market is highly fragmented with a great number of global and local enterprises competing in the skin, personal care and hair care sector which P&G includes all these sectors in the beauty category. In regard to the skin and personal care, the company offers a wide range of products, going from deodorants to personal cleansing to skin care. In the hair care sector P&G owns 20% of the global market share thanks to brands like Pantene and Head and Shoulders. In the beauty category we find several brands such as: Aussie, Olay, SK-II, Herbal Essences, and the previously mentioned Head and Shoulders and Pantene brands.

FIGURE 13. BEAUTY CATEGORY BRANDS



Source: www.pg.co.uk

- **Grooming:** The company competes in this category in shave care and appliances. In shave care P&G is the global leader with nearly 65% market share with brands like Gillette, Braun, Gillette Vennus and The Art of Shaving. Regarding appliances, such as electric shavers and epilator, P&G holds more than 25% of the male shavers' market share and over 50% of the female epilators market.

FIGURE 14. GROOMING BRANDS



Source: www.pg.co.uk

- Health Care: in this category the company competes in the oral care and personal health sectors. In the first one P&G has a 20% global market share with brands like Oral-B and Crest. In personal health care, the company is positioned as a top ten player in this huge sector which is highly competitive, behind brands like Vicks, Prilosec OTC, Metamucil and a few more. Most of the sales outside the U.S in personal health care are achieved through Teva Pharmaceuticals Ltd. Partnership.

FIGURE 15. HEALTH CARE BRANDS



Source: www.pg.co.uk

- Fabric and Home care: in this category we find a variety of fabric care products, including laundry detergents, additives and fabric enhancers, and home care products, including dishwashing liquids and detergents, surface cleaners and air fresheners. In fabric care, P&G holds 25% of the global market share behind brands like Tide, Ariel, Downy, Dreft, Era, Gain and many more. Moreover, in the home

care sector P&G holds a 20% of the market shares with brands such as Cascade, Dawn, Febreze, Mr. Clean, Joy and more.

FIGURE 16. FABRIC AND HOME CARE BRANDS



Source: www.pg.co.uk

- Baby, Feminine and Family Care: In baby care P&G is positioned as the market leader with over 25% of the market share leading with Pampers brand, one of the company's largest brand with net sales of \$8 billion, and competing in pants, baby wipes and diapers. In feminine care, P&G is as well the market leader behind the brand Always. Regarding the family care segment, the company is focus mainly in the U.S using their brands Bounty and Charmin to become leaders of the market in this sector.

FIGURE 17. BABY, FEMININE AND FAMILY CARE



Source: www.pg.co.uk

Overall, as we have seen P&G is well positioned in each of the 5 categories previously described, with 25% or more of the market share in each of them. This market power reflects how satisfied P&G's customers are and why they are one of the global leaders in the industry. In terms of negotiation, this gives P&G a great advantage compared to its competitors, since because of these numbers they can reach better deals with suppliers or get funding more easily which is key in the company's industry. Moreover, this market share and leadership implies an important role in the society, and they truly keep this matter in mind as we have mentioned before in the purposes, values and principles chapter.

Regarding the competitive advantages of the company, which are what makes P&G stands out from its competitors. Following the 2018 Annual Report of P&G, the company is creating and extending competitive advantage through:

- Product: superiority starts with providing superior product performance to our customers and they do recognize this difference compared to other brands.
- Packaging: products are delivered in superior packaging which attracts costumers, keeps the product in good conditions and transmits to consumers the quality of the brand and its products.
- Brand communication: exceptional brand publicity and marketing which communicate the features and benefits of the products offered.
- Retail execution: P&G works in cooperation with its customers in order to deliver superior retail execution. In store, with the right store coverage, product shape, size, price and online, with the suitable content, rating, reviews and so on.
- Consumer and customer value: the company is 100% focus on delivering superior value to consumers and retailer customers in each tier price, each segment and each industry they compete in. (P&G Annual Report, 2018)

4.4. CURRENT FINANCIAL OVERVIEW

In this chapter we are going to analyse the financial situation of P&G, taking a deep look into the main items of the financial statements and some financial and valuations ratios.

First, we are going to go through the financial statements and more concrete into the net sales, net earnings from continuing operations, net earnings attributable to Procter & Gamble, diluted net earnings per share from continuing operation and cash flow from

operating activities. For this study we are going to use the 2018 P&G's annual report, and we will compare year 2018 to years 2017 and 2016.

TABLE 10. SUMMARY 2018 RESULTS

SUMMARY OF 2018 RESULTS					
<u>Amounts in millions, except per share amounts:</u>	2018	Change vs. Prior Year	2017	Change vs. Prior Year	2016
Net sales	\$ 66,832	3 %	\$ 65,058	— %	\$ 65,299
Operating income	13,711	(2)%	13,955	4 %	13,441
Net earnings from continuing operations	9,861	(3)%	10,194	2 %	10,027
Net earnings from discontinued operations	—	N/A	5,217	N/A	577
Net earnings attributable to Procter & Gamble	9,750	(36)%	15,326	46 %	10,508
Diluted net earnings per common share	3.67	(34)%	5.59	51 %	3.69
Diluted net earnings per share from continuing operations	3.67	(1)%	3.69	6 %	3.49
Core earnings per share	4.22	8 %	3.92	7 %	3.67
Cash flow from operating activities	14,867	17 %	12,753	(17)%	15,435

Source: P&G 2018 Annual Report, p.33.

In regard to net sales, as we can see in the table above there was not a change in fiscal year 2017 compared to the 2016 fiscal year despite the increase of sales in some segments, such as Health Care as we can appreciate in the table down below which summarises the net change sales per segment; this increase was balanced out by the decrease of some segments such as Grooming and Baby, Feminine & Family Care. However, fiscal year 2018 to 2017 it is observed a net sales increase of 3% due to the good performing in fiscal year 2018 of the Beauty category with 9% growth and Health Care category with a 5% growth. All of these results can be observed in the following table.

TABLE 11. NET SALES VARIATIONS

Net Sales Change Drivers 2018 vs. 2017 ⁽¹⁾							
	Volume with Acquisitions & Divestitures	Volume Excluding Acquisitions & Divestitures	Foreign Exchange	Price	Mix	Other ⁽²⁾	Net Sales Growth
Beauty	2 %	2 %	2 %	— %	5 %	— %	9 %
Grooming	— %	— %	3 %	(3) %	(1) %	— %	(1) %
Health Care	3 %	3 %	3 %	(1) %	— %	— %	5 %
Fabric & Home Care	3 %	4 %	1 %	(1) %	— %	— %	3 %
Baby, Feminine & Family Care	(1) %	(1) %	1 %	(1) %	— %	— %	(1) %
TOTAL COMPANY	1 %	2 %	2 %	(1) %	1 %	— %	3 %
Net Sales Change Drivers 2017 vs. 2016 ⁽¹⁾							
	Volume with Acquisitions & Divestitures	Volume Excluding Acquisitions & Divestitures	Foreign Exchange	Price	Mix	Other ⁽²⁾	Net Sales Growth
Beauty	(2) %	1 %	(2) %	1 %	2 %	1 %	— %
Grooming	2 %	3 %	(2) %	(1) %	(2) %	— %	(3) %
Health Care	3 %	4 %	(2) %	— %	1 %	— %	2 %
Fabric & Home Care	1 %	2 %	(2) %	— %	1 %	— %	— %
Baby, Feminine & Family Care	2 %	2 %	(2) %	(1) %	— %	— %	(1) %
TOTAL COMPANY	1 %	2 %	(2) %	— %	— %	1 %	— %

(1) Net sales percentage changes are approximations based on quantitative formulas that are consistently applied.

(2) Other includes the sales mix impact from acquisitions and divestitures, the impact from India Goods and Services Tax implementation and rounding impacts necessary to reconcile volume to net sales.

Source: P&G 2018 Annual Report, p.38.

In reference to the net earnings from continuing operations observed in Table 10 we see that fiscal year 2017 to 2016 increased 2%, \$167 Million. This change was due to the improvement of the Gross Margin and the reduction of SG&A costs, as well as the fact that it benefited from a lower tax rate in 2017. From fiscal year 2018 to 2017, we observe a reduction of 2% as a result of a decline in the operating income in 2%, and this was caused by the increase in net sales and the decrease in SG&A as a percentage of net sales were more than offset by the reduction in Gross Margin.

Related to the net earnings attributable to Procter & Gamble we have to highlight that from fiscal year 2017 to 2016 there was an increase of 46%, \$15.3 billion as a result of the great performing of the Beauty category and Health Care category as mentioned before which made increase the operating income by 4% between fiscal year 2016 and 2017. On the other hand, as it is observed in Table 10 that the net earnings attributable to Procter & Gamble decreased in \$5.6 Billion mainly due to the reduction in net earnings from discontinued operations.

Diluted net earnings per share from continuing operation according to Table 10 in fiscal year 2017 compared with fiscal year 2016 increased \$0.20, or 6%, to \$3.69 due to the increase in net earnings from continuing operations and the reduction in the number of weighted average shares outstanding following the shares tendered in the sale of the Beauty Brands to Coty. Moreover, in 2016 the Company completed the divestiture of four product categories to Coty. The divestiture included 41 of the Company's beauty brands, including the global salon professional hair care and colour, retail hair colour, cosmetics and a majority of the fine fragrance businesses, along with select hair styling brands. In fiscal year 2018 compared with fiscal year 2017 diluted net earnings per share from continuing operations declined \$0.02, or 1%, to \$3.67 due primarily to the turndown in net earnings from continuing operations and the reduction in the number of weighted average shares outstanding.

Lastly, and according to Table 10, the cash flow from operating activities from fiscal year 2017 compared with 2016 decreases 17%. This decrease that we can find broken down in Table 12, down below, was because of the gain on sale of assets which reduced the operating cash flow in \$5 Billion. Despite of the fact that in year 2016 to 2017 there was a great decrease as previously mentioned, in fiscal year 2018 compared with fiscal year 2017 there was an increasing in the operating cash flow of \$2 Billion caused mainly as we can see in table below by the decrease in the negative item of the gain on sale of assets and as well

due to the decrease in working capital that generates more than \$3 Billion. (P&G Annual Report, 2018)

TABLE 12. CONSOLIDATED STATEMENT OF CASH FLOWS

Consolidated Statements of Cash Flows			
Amounts in millions; Years ended June 30			
	2018	2017	2016
CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	\$ 5,569	\$ 7,102	\$ 6,836
OPERATING ACTIVITIES			
Net earnings	9,861	15,411	10,604
Depreciation and amortization	2,834	2,820	3,078
Loss on early extinguishment of debt	346	543	—
Share-based compensation expense	395	351	335
Deferred income taxes	(1,844)	(601)	(815)
Gain on sale of assets	(176)	(5,490)	(41)
Goodwill and intangible asset impairment charges	—	—	450
Change in accounts receivable	(177)	(322)	35
Change in inventories	(188)	71	116
Change in accounts payable, accrued and other liabilities	1,385	(149)	1,285
Change in other operating assets and liabilities	2,000	(43)	204
Other	431	162	184
TOTAL OPERATING ACTIVITIES	14,867	12,753	15,435

Source: P&G 2018 Annual Report, p.59.

After having done the analysis of the main items of the financial statements we will move onto the financial and valuations ratios based our study in the report of Credit Suisse about the Company.

FIGURE 18. FINANCE AND VALUATION METRICS

Financial and valuation metrics				
Year	6/18A	6/19E	6/20E	6/21E
EPS (CS adj.) (US\$)	4.21	4.38	4.70	5.06
Prev. EPS (US\$)	-	-	-	-
Revenue (US\$ m)	66,832.0	67,420.1	70,831.7	73,738.3
EBITDA (US\$ m)	16,922	16,941	18,231	19,373
EV/EBITDA (current)	15.9	15.9	14.8	13.9
FCF yield (%)	4.2	3.9	4.7	5.1
Net debt (US\$ m)	19,436	22,752	21,605	19,745
ROIC (%)	15	15	16	17
Number of shares (m)	2,502	IC (current, US\$ m)		72,319
EV/IC (x)	3.5	Net debt (Next Qtr., US\$ m)		22,449.0
Dividend (current, US\$)	2.89	Net debt/EBITDA (06/18A)		1.3
Dividend yield (%)	2.90			

Source: Company data, Refinitiv, Credit Suisse estimates

Source: Equity Research Credit Suisse 2019, P.1

As we can see in the picture above, several ratios are analysed, but we will only comment the most relevant ones.

According to Credit Suisse estimations, the EPS which measures the amount of net income earned per share of stock outstanding, is growing year by year with a forecast of \$5.06 earnings per share in 2021. This increase in the EPS shows us the potential growth of P&G's net earnings in the future.

Furthermore, we can observe a great increase in the Revenues and the EBITDA from year 2018 to the estimation of year 2021 which is a really good sign of the company's health and sustainability, as it is able to generate greater EBITDA every year.

The EV/EBITDA ratio estimation is decreasing from year 2018 to year 2021 and this is mainly due to the expectation of the EBITDA growth that we have mentioned in the previous paragraph. The downturn of this ratio could imply that the company is undervalued, however in order to confirm this we should compare this ratio with that of its competitors, which is what we will do in the next chapter.

The FCF yield which relates the Free Cash Flow with the market value of the shares. This ratio and following Credit Suisse estimations seems to be growing every year until 2021 with a 5.1 FCF yield. The uptrend of this ratio is a highly positive sign since it shows the potential increase of the Cash Flows of the company, an aspect that is really essential for the company's sustainable growth. (Credit Suisse, 2019)

The reasons behind Credit Suisse's positive estimations are as result of the following changes that P&G has made in the last years, and are stated in a report that details the following:

- *“Transformation Nearly Done, Refocus on Top Line: From 2014 to 2018, P&G fundamentally altered its portfolio and strategy. It eliminated ~100 brands, with entire categories being divested and realignment behind core labels. This required the divestiture of low-growth, lower-margin periphery brands such as Duracell batteries, Iams and Eukanuba pet food, and multiple Latin American detergents and soaps. Recent results of improving organic sales (0-1% up to 4% in the past two quarters) and an EBITDA margin above 25% (the first time since 2010) are promising. The last leg remains, which is to create six sub-units to emphasize focus markets and Ventures, but we expect better top-line and share trends in the coming years.”*
- *“Function over Fashion: The shift in emphasis away from fashion brands and toward functional, daily use products is, in our opinion, better suited to P&G's strengths. Of the ~100 brands eliminated, about 40% were in the cosmetics, hair color, and fragrance categories. The remaining Beauty portfolio (including Head & Shoulders, Pantene, and Olay, among other products) constitutes 19% of company sales and underlines a functional value proposition for consumers,*

leveraged through household products' high annual marketing spend of \$7B (11% of sales) and R&D spend of \$2B (3% of sales)."

- *"Category Expansion, Market Share Meaningful Barometers: Brand share missteps, notably the share loss by Gillette (nearly 250bp lost globally in the past five years), marred recent company brand management. We do not expect these mistakes to be made twice. As the company has completed the task of reshaping its portfolio, it will likely now focus on category and share growth. Given its core categories are up 3-5% globally over the last five years and are expected to maintain the same growth rate or accelerate over the medium-term, we see the opportunity for this new portfolio to grow. Unit dose laundry, for example, has grown from 13% value share of the U.S. laundry detergent category to 18% in the last three years. P&G holds a 80%-plus share throughout that time, with its nearest competitor at 10% share."*
- *"Prioritization of Profit Dollar Growth: P&G has struggled to grow profit dollars for multiple years (the last time growth was greater than +1% was 2010), even when excluding the divestiture of multiple businesses in 2014 and 2015. As the company increasingly prioritizes profit dollar growth from the top line over margin expansion from cost saves, we see the opportunity to accelerate innovations that play to its strengths – function and value – even if this means a drag on percentage margin. Examples of this higher price point, potentially lower margin innovations include Pampers Pure natural baby care and Tide Pods single-dose products. The focus on profit dollars is aligned with our view across our coverage that more companies will be shifting focus away from cost saves and efficiency. For P&G, we model for a return to profit dollar growth in fiscal 2020 (+7%) with an EBITDA margin of 25.7%."*
- *"M&A in Start-ups Health Care Could Be Pivot to Future: We see a step-function shift in P&G's long-term brand portfolio evolution. P&G's return to M&A, after a seven-year hiatus, has largely focused on start-up brands such as Native (deodorant), Walker & Co. (personal care), and this is L. (feminine care). While these small brands are insignificant in isolation, we believe they could become increasingly meaningful in aggregate. Brands from natural skincare to a direct-to-consumer (DTC) cleaning operation suggest P&G is looking to the needs of its future consumers. In addition, the ~\$4bn purchase of Merck's Consumer Health business increases exposure to the growing over the counter (OTC) health market*

(Johnson & Johnson estimates a \$150bn global market in 2017 growing at a 3% CAGR). A solid margin trajectory (pretax margin of 22% in 2015 to our estimate for 26% in 2021) and an opportunity to expand make it a logical pivot for P&G, in our view.”

- *“More Defensive Than in the Past: We view PG shares as more defensive than in the past owing to (1) a brand portfolio leaning into P&G’s core strengths and, importantly, with significantly less fashion risk; (2) a leaner, more efficient business model; (3) an ability to make price moves in the mass channel owing to a willingness as market share leader to dictate segment pricing; and (4) a healthy balance sheet (with leverage at less than 1.5x net debt/EBITDA) and the only Staples mega cap to reduce gross debt since the recession. Offsetting P&G’s defensive nature is a generally premium portfolio as well as valuation.”*

Before closing this chapter, we want to add another brief comment related to the financial and valuations ratios, however this time we are going to go through the analysis done by Bernstein & Co. We thought this would be interesting in order to show the reader, two difference sources that conclude in very similar estimation, as we can see in the pictures down below.

We observe Solid growth in revenues with a 1.9% CAGR, increase of 6.8% FCF from 2018 to year 2020 estimations, EPS growth going up, EV/EBITDA going down. As we can see both reports are quite similar and share same thoughts on the performing forecast of P&G in the following years. (Bernstein, 2019)

FIGURE 19. METRICS

Financials	F18A	F19E	F20E	CAGR	Valuation Metrics	F18A	F19E	F20E
Revenues (M)	66,832	67,087	69,380	1.9%	P/E Adjusted (x)	22.41	21.19	19.56
FCF (M)	11,150	11,369	12,726	6.8%	REL P/E Adjusted (x)	1.33	1.33	1.36
Operating Margin (%)	21.08	21.39	22.07		EV/Sales (x)	3.88	3.87	3.74
ROIC (%)	11.90	12.18	12.18		EV/EBITDA (x)	15.33	15.15	14.27
Organic Sales Grwth (%)	1.00	3.46	3.12		Div Yield (%)	2.95	3.07	3.23
EPS Growth (%)	7.69	5.80	8.32		FCF Yield (%)	4.44	4.60	5.23
Div Payout Ratio (%)	65.24	64.10	62.05					

Source: Research Sanford C. Bernstein and Co. 2019, p.1.

FIGURE 20. METRICS

Procter and Gamble Long-term Earnings Forecast	2017	2018	2019E	2020E	2021E
Net sales	\$65,058	\$66,832	\$67,087	\$69,380	\$71,680
YoY growth	(0.4%)	2.7%	0.4%	3.4%	3.3%
Organic growth	2.0%	1.0%	3.5%	3.1%	3.3%
Earnings per share (recurring/core)	\$3.92	\$4.22	\$4.46	\$4.83	\$5.25
YoY growth	6.7%	7.7%	5.8%	8.3%	8.7%

Source: Company reports, Bernstein estimates and analysis

Source: Research Sanford C. Bernstein and Co. 2019, p.5.

4.5. COMPANY SECTOR AND COMPETITORS

P&G is a global leader in the consumer goods industry. The markets in which P&G's products are sold are fast changing and highly competitive and include both well-known global companies and small business.

The Company is extremely well positioned in the industry segments and markets in which it operates, often holding a leadership or remarkably high market share position as we will see in the following paragraphs.

As we have already mentioned in Chapter 4.3 related to brand, product and competitive advantage, P&G reports five product segments; Beauty, Grooming, Health Care, Fabric & Home Care and Baby, Feminine & Family Care. In the picture below we can observe the five segments with the percentage that the segment means to the Net Sales and Net Earnings, product categories and its major brands.

FIGURE 21. COMPANY SEGMENTS

Reportable Segments	% of Net Sales ⁽¹⁾	% of Net Earnings ⁽¹⁾	Product Categories (Sub-Categories)	Major Brands
Beauty	19%	23%	Hair Care (<i>Conditioner, Shampoo, Styling Aids, Treatments</i>) Skin and Personal Care (<i>Antiperspirant and Deodorant, Personal Cleansing, Skin Care</i>)	Head & Shoulders, Pantene, Rejoice Olay, Old Spice, Safeguard, SK-II
Grooming	10%	14%	Grooming ⁽²⁾ (<i>Shave Care - Female Blades & Razors, Male Blades & Razors, Pre- and Post-Shave Products, Other Shave Care; Appliances</i>)	Braun, Fusion, Gillette, Mach3, Prestobarba, Venus
Health Care	12%	13%	Oral Care (<i>Toothbrushes, Toothpaste, Other Oral Care</i>) Personal Health Care (<i>Gastrointestinal, Rapid Diagnostics, Respiratory, Vitamins/Minerals/Supplements, Other Personal Health Care</i>)	Crest, Oral-B Metamucil, Prilosec, Vicks
Fabric & Home Care	32%	27%	Fabric Care (<i>Fabric Enhancers, Laundry Additives, Laundry Detergents</i>) Home Care (<i>Air Care, Dish Care, P&G Professional, Surface Care</i>)	Ariel, Downy, Gain, Tide Cascade, Dawn, Febreze, Mr. Clean, Swiffer
Baby, Feminine & Family Care	27%	23%	Baby Care (<i>Baby Wipes, Diapers and Pants</i>) Feminine Care (<i>Adult Incontinence, Feminine Care</i>) Family Care (<i>Paper Towels, Tissues, Toilet Paper</i>)	Luv's, Pampers Always, Tampax Bounty, Charmin, Puffs

Source: P&G 2018 Annual Report, p.31.

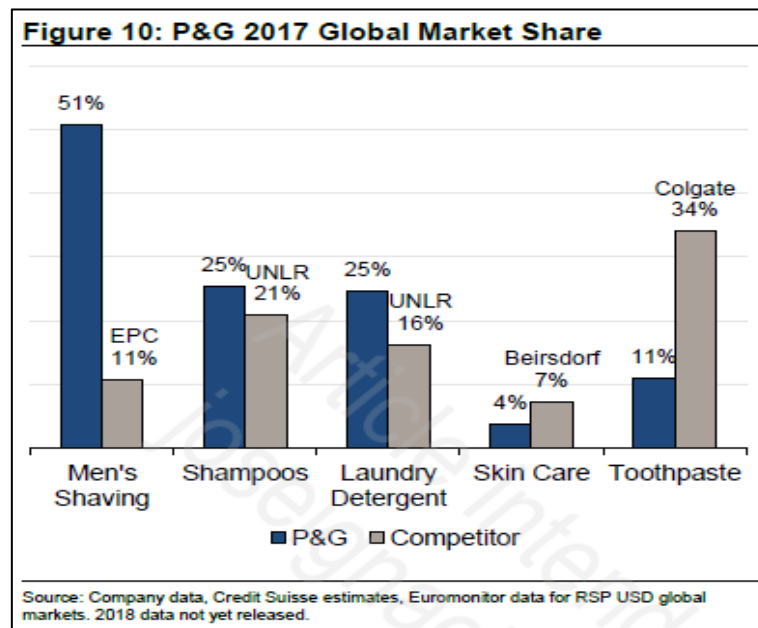
Within the different segments P&G competes against different companies. In the Beauty segment, The Company main competitors are Avon, Colgate-Palmolive, Estee Lauder and Coti. In the Grooming industry we find several competitors as well such as Bic and Dollar Shave Club, however P&G with Gillette and Brown holds the leadership by far in this segment. Regarding Health Care industry, main competitors are the following, CCA Industries, Colgate-Palmolive, Church and Dwight Co., Ecolab and Stepan Company. In the Fabric & Home Care sector P&G competes against Colgate-Palmolive, Unilever, and Church and Dwight Co. Lastly, Baby, Feminine & Family Care segment notably competitors are the same as in the Fabric & Home Care sector; Colgate-Palmolive, Unilever, and Church and Dwight Co⁵.

Diving deeper in the analysis of the Company's main competitors we are going to focus on different parameters like the Global Market share, Growth Sales, Debt, EPS growth and Shareholder returns.

Regarding Global Market share we can observe in the chart below, from the Credit Suisse report, which shows the Global Market share in 2017 of P&G in different segments compared to main competitors in those sectors, that P&G is the main actor in every segment but in the Toothpaste sector, which is led by Colgate. We should remark the huge difference in the Grooming sector (Men's shaving) between P&G that holds more than half of the market share and the second actor EPC with only 11% Market share.

⁵ Source: <https://www.investopedia.com/ask/answers/120114/who-are-proctor-gambles-pg-main-competitors.asp>

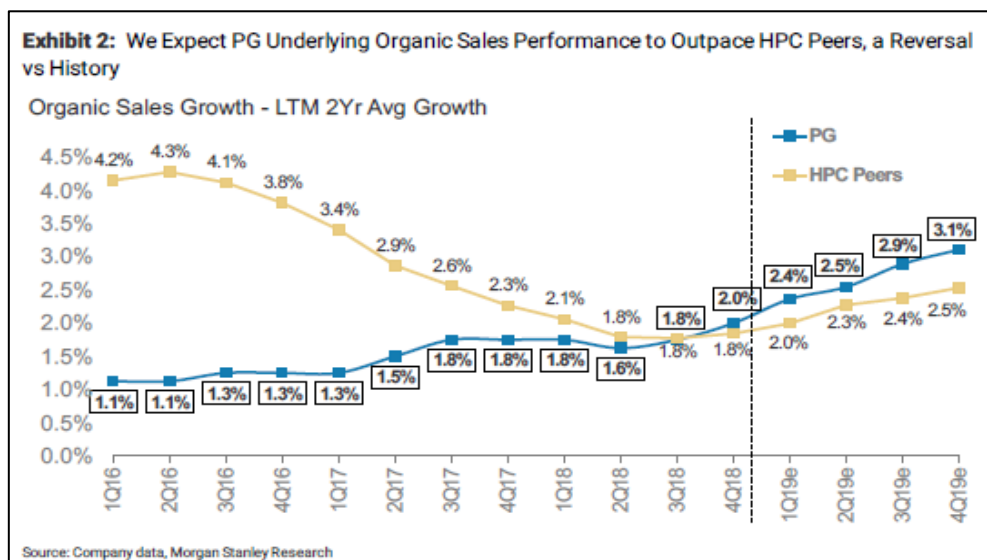
FIGURE 22. P&G 2017 GLOBAL MARKET SHARE



Source: Company Data. Equity Research Credit Suisse 2019, p.11.

Referring to P&G's Sales Growth compared to its peers we have find some interesting data in a Morgan Stanley report that we wanted to show. In the chart below we see how Morgan Stanley's analysts expect higher growth of P&G than its peers (HPC peers Home and Personal care which are CL, CLX, CHD and KMB). Being P&G's estimated growth in 2019 was set at 3.1% and for the peers an estimated growth of 2.5% was established.

FIGURE 23. MORGAN STANLEY' S EXPECTATIONS

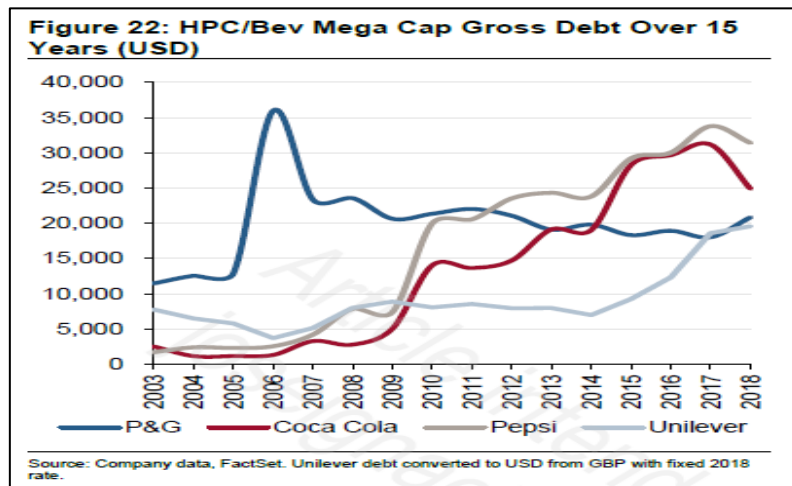


Source: Research Morgan Stanley 2019, p.5

For P&G's debt comparison with its peers we have used again the Credit Suisse report in which we found some interesting data that we provide here. In the chart below we observe

how it is compared P&G with Coca-Cola, Pepsi and Unilever regarding Gross Debt and we can clearly see how P&G's Gross Debt is going down since 2006 while its competitors' Gross Debt is going up which shows how the Company is properly managing its debt over time.

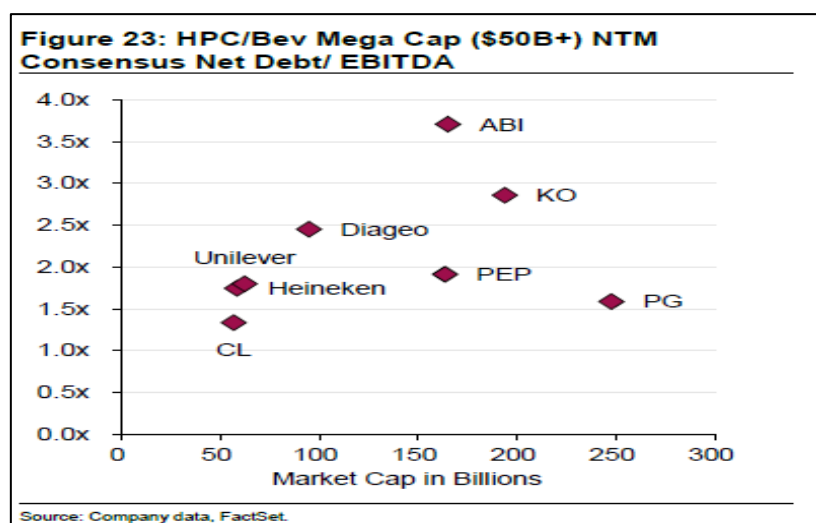
FIGURE 24. HPC/BEV MEGA CAP GROSS DEBT OVER 15 YEARS (USD)



Source: Company Data. Equity Research Credit Suisse 2019, p.18.

Furthermore, the Credit Suisse report which provides the following chart that studies HPC peers and Beverage mega cap companies' Net debt to EBITDA ratio. We can observe that, according to this chart, despite P&G being the biggest company in market capitalisation it has the lowest Net Debt/EBITDA ratio after Colgate which means that P&G can easily fulfil its debt obligations.

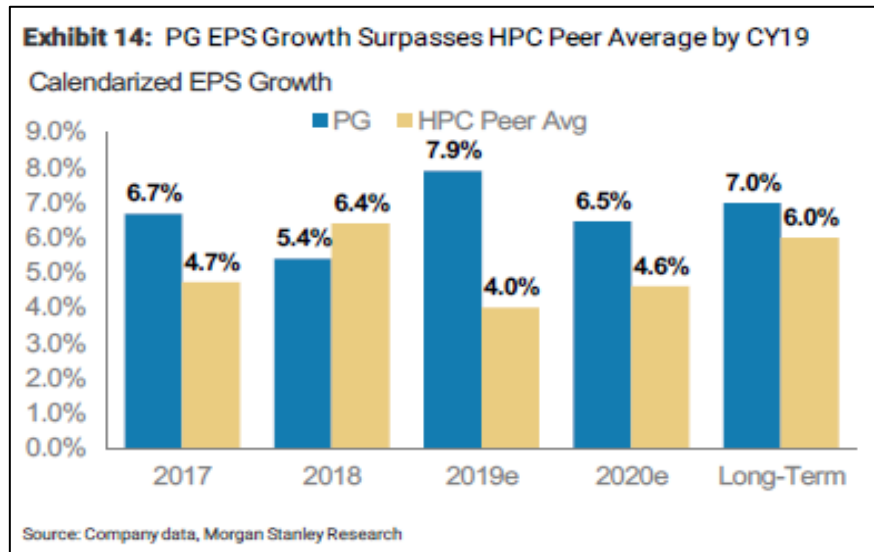
FIGURE 25. HPC/BEV MEGA CAP (50B+) NTM CONSENSUS NET DEBT/EBITDA



Source: Company Data. Equity Research Credit Suisse 2019, p.18.

In reference to the EPS growth ratio we have based our study in the Morgan Stanley report that we have previously mentioned. The chart below represents the EPS growth of P&G compared to its peers' average (Home and Personal Care Peer Average) and we can see how P&G EPS growth is year by year higher than its peers with a long-term estimation of 7% EPS. This explains the great potential of the Company and the expected growth in the net earnings for the upcoming years.

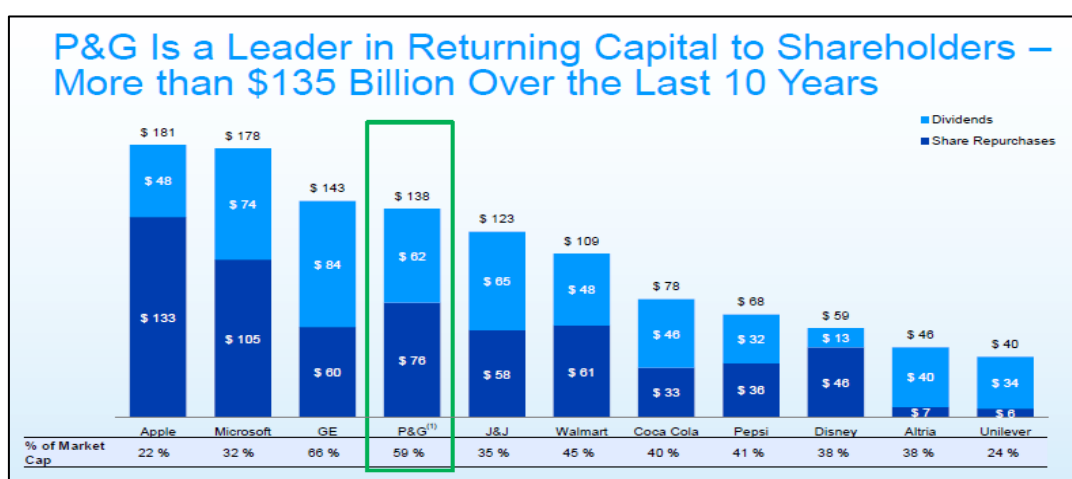
FIGURE 26. PG EPS GROWTH SURPASSES HPC PEER AVERAGE BY CY19



Source: Research Morgan Stanley 2019, p.5

Lastly, we will get into the P&G's shareholders return compared to its main competitors. For that purpose, we have based our study in the 2017 official Executive Summary of P&G showed the chart below; "*P&G has returned to the shareholders more than \$135 Billion in over 10 years*". If we see the chart below P&G is one of the companies that have returned more capital to its shareholders in the last 10 years, behind Apple, Microsoft and General Electric. Moreover, Unilever one of P&G's main competitors has only returned one third of what P&G has returned to its shareholders which shows that P&G greatly cares about its shareholders.

FIGURE 27. SHAREHOLDER RETURNS



Source: P&G 2017 Executive summary, p.8.

5. ANALYSIS

5.1. VARIABLES

The introduction of an uncertainty factor into any valuation model is one of the keys that increases the realism of the model. As it is known, valuating a company does not cease to be an act of forecasting under fully uncertain scenarios that, depending on how they are expected to be and the numerical figure attached to each of the variables, the outcome will vary considerably. In other words, since variables are rarely constant over time and do not only depend on economic processes, it is very important to introduce some sort of uncertainty component in order to gain an understanding of how the unpredictable future could possibly look (Viebig et al., 2008).

However, it is necessary to put in context the type of company to be valued, as well as the industry in which it operates and the life-cycle stage it is experimenting. This framework will help us to understand which are the variables that affect the most the final Equity Value of any company, and thus, the variables that may be needed to be simulated and those that do not. In this section we are going to explain, under our point of view, which are the critical variables affecting Procter and Gamble Discounted Cash Flow method valuation, starting from its three main financial statements (Income Statement, Balance Sheet and Cash Flow Statement) historical data.

Procter and Gamble is a matured and consolidated company that belongs to the healthcare industry. These two characteristics have led us to discard the simulation of two variables such as the Capex and the Depreciation and Amortization inputs. The reason stems from the fact that maturing companies tend to generate positive but considerably

low sales revenues growth. On the other hand, companies that wants to see their revenues and cash flows increase (Start-up and development stage companies) need to proportionally invest in Capex, and so, its Depreciation and Amortization expenses will not be so high, since the latter is directly related to the amount of Capex invested.

Companies in early stages will not have to depreciate their assets at the beginning since they do not have so much assets recorder in their balance sheet. Consequently, this relation is also reflected in the reciprocity with Sales Growth. It makes sense, that the higher the willingness to increase sales and cash flows, the higher will need to be the Capital Expenditure of the company and the lower the Depreciation and Amortization expenses. Procter and Gamble represents this principle just the other way around. As a maturing and consolidated company, its necessity to grow is linked to a much lower revenues growth rate (in comparison to early stage companies) and thus, its Capex and D&A will be lower, stable along time and numerically, one close to each other.

The following tables indicate which has been P&G's Capex and D&A weight over beginning amount of non-current assets for both tangible (property plant and equipment) and intangible (trademarks and other intangible assets) for the last 5 historical years. The explanation provided matches the figures indicated in both tables.

TABLE 13. HISTORICAL P&G PROPERTY, PLANT AND EQUIPMENT BREAKDOWN

PROPERTY, PLANT AND EQUIPMENT	2014	2015	2016	2017	2018
Beginning		22,304	20,268	19,385	19,893
CAPEX	1,615	1,608	1,463	1,527	1,721
D&A	(1,318)	(1,349)	(1,359)	(1,273)	(1,312)
Writte-off	—	—	—	—	—
End	22,304	20,268	19,385	19,893	20,600
CAPEX Hypotheisis (%)		7.21%	7.22%	7.88%	8.65%
D&A Hypotheisis (%)		-6.05%	-6.70%	-6.57%	-6.59%
Writte-off Hypotheisis (%)	0%	0%	0%	0%	0%

Source: own elaboration based on official Procter and Gamble Financial Statements

TABLE 14. HISTORICAL P&G TRADEMARKS AND OTHER INTANGIBLES BREAKDOWN

TRADEMARKS AND OTHER INTANGIBLE ASSET	2014	2015	2016	2017	2018
Beginning		30,843	26,829	24,527	24,187
CAPEX	2,233	2,128	1,851	1,857	1,996
D&A	(1,823)	(1,785)	(1,719)	(1,547)	(1,522)
Write-off					
END	30,843	26,829	24,527	24,187	23,902
CAPEX Hypothesis (%)		6.90%	6.90%	7.57%	8.25%
D&A Hypothesis (%)		-5.79%	-6.41%	-6.31%	-6.29%
Write-off Hypothesis (%)	0%	0%	0%	0%	0%

Source: own elaboration based on official Procter and Gamble Financial Statements

Moreover, variations of the Working Capital is another variable with a lot of weight in the Free Cash Flow projections. Working Capital depends at the same time on the amount of Account Receivables, Inventory, Accounts Payables and other sort of current assets and liabilities such as Prepaid Expenses and Accrued Liabilities. Since each of these variables have been launched into the future independently based on historical sales, cost of goods sold and purchases, we have decided not to simulate the variation of Working Capital but to apply the outcome steaming from the composition of the factors indicated.

On the other hand, we consider that Sales Growth is a variable that must be simulated. Revenues are, most likely, one of the most important variables affecting the value of a company. Sales are the first and biggest source of cash coming into a corporation and it is affected by the operating activity of the company. In the case of Procter and Gamble, its sales steams form the number of units and its corresponding price of each of the business units that form the company. Actually, the simulation of Sales Growth gains even more importance if we have a look to the volatility expressed by its historical figures (See next table). For this reason, the way this variable moves up or down will have a tremendous impact on the Equity Value of the company.

TABLE 15. HISTORICAL NET SALES AND SALES GROWTH

Amounts in millions. Years ended June 30	2014	2015	2016	2017	2018
NET SALES	\$ 74,401	\$ 70,749	\$ 65,299	\$ 65,058	\$ 66,832
Sales Growth		-4.91%	-7.70%	-0.37%	2.73%

Source: Procter and Gamble Annual Report 2018

Furthermore, analysing Free Cash Flow cascade, operating income (EBIT) is a key driver that conditions its value in the first line. Besides D&A, EBIT depends on the amount of sales but also on the Gross Margin generated by the company and the Operating Expenses that will decrease the Operating Margin to reach the EBIT. Thus, we consider

that it is important for valuation purposes to simulate the growth of the Gross Margin of the company over Sales as well as the relative weight of Operating Expenses to Sales.

Besides Income Statement, pure DCF variables are also important to be considered as a source of simulation due to its importance in the final result. Once analysed the variables that conformed the FCF cascade are analysed, there are two more variables that conditions the valuation outcome.

On the one hand, the rate at which each of the cash flows are discounted to the present hugely affects the final result. This rate is the Weighted Average Cost of Capital (WACC) which at the same time depends on the following variables:

$$WACC = Ke * \frac{E}{E + D} + Kd * \frac{D}{E + D} * (1 - t)$$

Where Ke is calculated based on the Capital Asset Pricing Model (CAPM):

$$Ke = Rf + Beta * (Em - Rf)$$

Based on historical Procter and Gamble data extracted from Bloomberg we have agreed on simulating Ke, Rf and (Em-Rf), in order to consider the slight variations of this variables triggered over the last 5 years. On the other hand, we do not consider the cost of debt (Kd) to be a simulated variable since in our valuation model we have kept the debt fixed over the five years forecasted in this valuation for simplicity purposes.

The enterprise value of the company is determined by the present value of future cash flows plus the present value of the Terminal Value of the company, being the latter composed by the perpetual cash flows generated by the company. In order to discount this Terminal Value, it is necessary to apply a perpetuity formula:

$$TV = \frac{Last\ Projected\ Cash\ Flow * (1 + g)}{WACC - g}$$

Where g represents the Perpetual Growth of the cash flows generated by the company from the last projected cash flow onwards. This variable is a key factor for the calculation of the Terminal Value which represents more than a half of the final enterprise value of a company. For this reason, we consider Perpetual Growth to be a variable to be simulated.

By way of summary, the variables that have been simulated are:

- Sales Growth rate.

- Gross Margin Growth rate (relative to sales).
- Selling, General and Administrative Expenses growth rate (relative to sales).
- Risk Free rate.
- Beta parameter.
- Market Risk Premium.
- Cash flow Perpetual Growth rate.

It is also important to highlight that in our valuation model each of the variables have been simulated five times each of them, corresponding to each of the five years of projection of the model. Although we are aware that by increasing the number of simulations, volatility and uncertainty are also increased, we consider that it would be more realistic to obtain one different number each year for each of the variables.

5.2. HYPOTHESIS AND PROBABILITY DISTRIBUTIONS

Once all variables to be simulated have been defined, in this point, it will be detailed which are the different hypothesis and probability distributions applied to each of them. In order to do so, it has been taken into account not just Procter and Gamble's historical data, but also the expectations of some of the reports elaborated by a sort of financial institutions and the cyclical tendency of this type of companies. The type of distributions applied are explain in section number 3.

- **Sales Growth rate**

As it was explained above, this variable is one of the critical ones for the final outcome of this valuation model. This variable measures the variation of sales from one year to another in percentual rate and, therefore, depending on the direction of that variation (either increase or decrease) the sign will change, and it could be either negative or positive. In other words, these variables can take values from plus infinite to minus infinite. For this reason, it has been applied a Normal Distribution as it precisely takes into account, and where the mean is the most probably value but is affected by a standard deviation.

In order to define the hypothesis, we first have had a look at Procter and Gamble's historical growth rates. Historical mean for Sales Growth amounts to -2.56% with a standard deviation of around 0.046447 for the last 5 years according to official 2018 Procter and Gamble reports. These parameters however are not trustworthy to predict

future 5 years Sales Growth since they do not reflect the true potential situation on the company.

For that reason, we have supported our hypothesis on the financial report published by Credit Suisse (6th March 2019) and Bernstein (24th January 2019) regarding Procter and Gamble expected financial statements and valuation. The following chart shows which are the expected Procter and Gamble Sales Growth according to both Institutions and the average of those expected values.

TABLE 16. CREDIT SUISSE AND BERNSTEIN SALES GROWTH EXPECTATION ON P&G

Bernstein	2017	2018	2019E	2020E	2021E
Sales	\$65,058	\$66,832	\$67,087	\$69,380	\$71,680
Sales Growth		2.727%	0.382%	3.418%	3.315%
Credit Suisse	2017	2018	2019E	2020E	2021E
Sales	\$65,058	\$66,832	\$67,420	\$70,832	\$73,738
Sales Growth		2.727%	0.880%	5.060%	4.104%
Average		2.73%	0.63%	4.24%	3.71%

Source: own elaboration based on Credit Suisse and Bernstein reports

These figures have led us to apply a Normal probability distribution with the following parameters:

TABLE 17. SALES GROWTH HYPOTHESIS

Year	Distribution	Mean	Std. Deviation
2019	Normal	0.50%	1%
2020	Normal	3%	1%
2021	Normal	3%	1%
2022	Normal	3%	1%
2023	Normal	3%	1%

Source: own elaboration

These hypotheses start from a 0.5% for 2019 and 3% onwards and 1% of standard deviation in order to provide the variable with a sufficient, but not excessive, uncertainty.

- **Gross Margin rate (relative to sales)**

While Sales Growth can vary from negative to positive values, Gross Margin rate can only move along positive ranges. Sales can never be negative and thus, the margin generated by matured companies like Procter and Gamble (sales – cost of goods sold) is

usually positive as well. For this reason, we thought it was not appropriate to apply a Normal distribution to this variable, but a Uniform distribution instead. This type of probability distribution applied over a range of possible values delimited by a maximum and a minimum figure, provides all values within the range with same probability.

In this case it has been used both historical data and other financial institutions reports. The following tables shows both.

TABLE 18. P&G GROSS MARGIN HISTORICAL DATA

Historical Data	2014	2015	2016	2017	2018
Gross Margin	\$35,371	\$33,693	\$32,390	\$32,523	\$32,564
Gross Margin %	47.54%	47.62%	49.60%	49.99%	48.73%

Source: own elaboration-based Procter and Gamble 2018 Annual Report.

TABLE 19. CREDIT SUISSE AND BERNSTEIN GROSS MARGIN EXPECTATIONS ON P&G

Bernstein	2017	2018	2019E	2020E	2021E		
Gross Margin	\$32,420	\$32,400	\$32,845	\$34,473	\$36,118		
Gross Margin %	49.83%	48.48%	48.96%	49.69%	50.39%		
Credit Suisse	2017	2018	2019E	2020E	2021E	2022E	2023E
Gross Margin	\$32,918	\$33,125	\$33,084	\$34,963	\$36,582	\$38,304	\$39,961
Gross Margin %	50.60%	49.56%	49.07%	49.36%	49.61%	49.90%	50.10%
Average	50.22%	49.02%	49.02%	49.52%	50.00%	49.90%	50.10%

Source: own elaboration based on Credit Suisse and Bernstein reports

Based on the data showed above our hypothesis on the Procter and Gamble Gross Margin are the following:

TABLE 20. GROSS MARGIN HYPOTHESIS

Year	Distribution	Min	Max
2019	Uniforme	49%	50%
2020	Uniforme	49%	50%
2021	Uniforme	49%	50%
2022	Uniforme	49%	50%
2023	Uniforme	49%	50%

Source: own elaboration

- **Selling, General and Administrative Expenses (relative to sales)**

Selling and administrative expenses (operating expenses) follows the same principle as Gross Margin relative to sales does. Expenses are either expressed either positive or negative in the Income Statement depending on the company and the way to

organize and show its figures. In any case, this variable can only adopt one of those two signs, in other words, it cannot move between minus infinite and plus infinite. Instead, a uniform distribution must also be applied to this variable.

In the next chart we can see how historical Selling, General and Administrative Expenses have decreased as far as sales have increased and vice versa; its value has moved up as revenues have diminished. This variable however has been simulated considering its percentual weight over sales.

TABLE 21. SALES & SELLING, GENERAL AND ADMIN. EXPENSES HISTORICAL DATA

Historical Data	2014	2015	2016	2017	2018
NET SALES	\$ 74,401	\$ 70,749	\$ 65,299	\$ 65,058	\$ 66,832
Selling, general and administrative exper	\$ 21,461	\$ 20,616	\$ 18,949	\$ 18,568	\$ 18,853
Relative to Sales (%)	28.85%	29.14%	29.02%	28.54%	28.21%

Source: own elaboration-based Procter and Gamble 2018 Annual Report

These figures, however, have been also balanced with the Credit Suisse and Bernstein reports:

TABLE 22. CREDIT SUISSE AND BERNSTEIN SG&A EXPECTATION ON P&G

Bernstein	2017	2018	2019E	2020E	2021E		
SG&A expenses	\$18,654	\$19,037	\$18,653	\$19,162	\$19,725		
SG&A Relative to Sales (%)	28.70%	28.50%	27.80%	27.60%	27.50%		
Credit Suisse	2017	2018	2019E	2020E	2021E	2022E	2023E
SG&A expenses	\$18,761	\$19,037	\$18,922	\$19,709	\$20,286	\$21,182	\$22,124
SG&A Relative to Sales (%)	28.54%	28.21%	28.10%	27.80%	27.50%	27.60%	27.70%
Average	28.62%	28.35%	27.95%	27.70%	27.50%	27.60%	27.70%

Source: own elaboration based on Credit Suisse and Bernstein reports

Finally, our hypotheses are:

TABLE 23. SG&A HYPOTHESIS

Year	Distribution	Min	Max
2019	Uniforme	27%	28%
2020	Uniforme	27%	28%
2021	Uniforme	27%	28%
2022	Uniforme	27%	28%
2023	Uniforme	27%	28%

Source: own elaboration

All these variables explained are key variables for the projection of the income statement that will then have an impact on the cash flows forecasted to be discounted in

the future. However, there is a key issue when deciding which is the rate at which each of this cash flows must be discounted to present.

As it was explained in section 5.1, the Weighted Average Cost of Capital depends not only on the capital structure of the company but also on the cost of debt, Risk Free rate, Beta and risk premium. For this reason, it has been used historical data from Bloomberg in order to extract the parameter needed to define the distribution.

- **Risk Free rate**

The following table shows the historical data for the Risk Free rate of Procter and Gamble for the last 5 years and the parameters of its mean and standard deviation.

TABLE 24. RISK FREE HISTORICAL

Source: Bloomberg	Risk Free
Risk Free Rate 2014	2.53%
Risk Free Rate 2015	2.35%
Risk Free Rate 2016	1.47%
Risk Free Rate 2017	2.30%
Risk Free Rate 2018	2.86%

Mean	Standard Deviation
2.30%	0.0051

Source: own elaboration based on Bloomberg

Based on these parameters it has been applied a Normal distribution for the forecast of this variable with the following hypothesis:

TABLE 25. RISK FREE HYPOTHESIS

Year	Distribution	Mean	Std Deviation
2019	Normal	2.30%	0.0051
2020	Normal	2.30%	0.0051
2021	Normal	2.30%	0.0051
2022	Normal	2.30%	0.0051
2023	Normal	2.30%	0.0051

Source: own elaboration

- **Beta**

The same procedure has been used in order to forecast the Beta parameter. The following table shows Bloomberg historical data for the last five years and the parameters obtained.

TABLE 26. BETA HISTORICAL INFORMATION

Source: Bloomberg	Beta
Beta 2014	0.718
Beta 2015	0.755
Beta 2016	0.742
Beta 2017	0.697
Beta 2018	0.670

Mean	Standard Deviation
0.7164	0.0342

Source: own elaboration based on Bloomberg

Same procedure is then applied. It has been applied a Normal distribution with the following hypotheses:

TABLE 27. BETA HYPOTHESIS

Year	Distribution	Mean	Std Deviation
2019	Normal	0.7164	0.0342
2020	Normal	0.7164	0.0342
2021	Normal	0.7164	0.0342
2022	Normal	0.7164	0.0342
2023	Normal	0.7164	0.0342

Source: own elaboration

- **Market Risk Premium.**

Finally, the last parameter affecting the calculation of the cost of equity under the Capital Asset Pricing Model is the Market Risk Premium.

TABLE 28. MARKET PREMIUM HISTORICAL INFORMATION

Source: Bloomberg	Risk Premium
Market Risk Premium (Rm-Rf) 2014	7.04%
Market Risk Premium (Rm-Rf) 2015	7.37%
Market Risk Premium (Rm-Rf) 2016	7.84%
Market Risk Premium (Rm-Rf) 2017	7.15%
Market Risk Premium (Rm-Rf) 2018	7.63%

Mean	Standard Deviation
7.41%	0.0033

Source: own elaboration based on Bloomberg

In this case, it has also been applied a normal distribution:

TABLE 29. MARKET RISK PREMIUM HYPOTHESIS

Year	Distribution	Mean	Std Deviation
2019	Normal	7.41%	0.0033
2020	Normal	7.41%	0.0033
2021	Normal	7.41%	0.0033
2022	Normal	7.41%	0.0033
2023	Normal	7.41%	0.0033

Source: own elaboration

Besides WACC parameters, DCF valuation also considers a perpetual valuation of the company projected based on the last cash flow predicted, the cost of equity of that same year and the Perpetual Growth by which those cash flows are expected to growth. In this analysis, we believe this is a crucial variable to simulate since the Terminal Value accounts for most of the value of the company under the DCF method.

- **Perpetual Growth Rate**

In order to define the hypothesis and distribution to be applied it is important to bear in mind what type of company we are dealing with. In this case, as it has been mentioned along this report, P&G is a matured stage company that has been paying dividends for the last 61 years uninterruptedly (Executive Summary Procter and Gamble, 2017). For this reason, we think we cannot apply a very high rate close to 2%. Instead we have selected a range between 0.25% and 0.5% in order to define a mean and standard deviation for the Normal distribution to be applied.

However, according to Credit Suisse and Bernstein financial reports on Procter and Gamble, the potential Perpetual Growth rate of cash flows is expected to trigger a 2%. For this reason, we want to simulate two different scenarios in order to compare the final result under these two possible values of the hypothesis.

TABLE 30. CASH FLOW PERPETUAL GROWTH HYPOTHESIS

Distribution	Mean	Standard Deviation
Normal	0.3750%	0.001768

Distribution	Mean	Standard Deviation
Normal	2.0%	0.001768

Source: own elaboration based on Credit Suisse reports on P&G

All variables can be defined in the following table:

TABLE 31. VARIABLES AND DISTRIBUTIONS SCHEME(I)

Nombre	Hoja de cálculo	Celda	Gráfico	Función	Min	Media	Máx
Sales Growth 2019	Hypothesis	D5		RiskNormal(G5;H5;RiskName("Sales Growth 2019 "))	-∞	0,005	+ ∞
Sales Growth 2020	Hypothesis	D6		RiskNormal(G6;H6;RiskName("Sales Growth 2020 "))	-∞	0,03	+ ∞
Sales Growth 2021	Hypothesis	D7		RiskNormal(G7;H7;RiskName("Sales Growth 2021 "))	-∞	0,03	+ ∞
Sales Growth 2022	Hypothesis	D8		RiskNormal(G8;H8;RiskName("Sales Growth 2022 "))	-∞	0,03	+ ∞
Sales Growth 2023	Hypothesis	D9		RiskNormal(G9;H9;RiskName("Sales Growth 2023 "))	-∞	0,03	+ ∞
Gross Margin 2019	Hypothesis	D12		RiskUniform(G12;H12;RiskName("Gross Margin 2019 "))	0,49	0,495	0,5
Gross Margin 2020	Hypothesis	D13		RiskUniform(G13;H13;RiskName("Gross Margin 2020"))	0,49	0,495	0,5
Gross Margin 2021	Hypothesis	D14		RiskUniform(G14;H14;RiskName("Gross Margin 2021"))	0,49	0,495	0,5
Gross Margin 2022	Hypothesis	D15		RiskUniform(G15;H15;RiskName("Gross Margin 2022"))	0,49	0,495	0,5
Gross Margin 2023	Hypothesis	D16		RiskUniform(G16;H16;RiskName("Gross Margin 2023"))	0,49	0,495	0,5
Selling, general and administrative expenses 2019	Hypothesis	D19		RiskUniform(G19;H19;RiskName("Selling, general and administrative expenses 2019"))	0,27	0,2725	0,275
Selling, general and administrative expenses 2020	Hypothesis	D20		RiskUniform(G20;H20;RiskName("Selling, general and administrative expenses 2020"))	0,27	0,2725	0,275
Selling, general and administrative expenses 2021	Hypothesis	D21		RiskUniform(G21;H21;RiskName("Selling, general and administrative expenses 2021"))	0,27	0,2725	0,275
Selling, general and administrative expenses 2022	Hypothesis	D22		RiskUniform(G22;H22;RiskName("Selling, general and administrative expenses 2022"))	0,27	0,2725	0,275
Selling, general and administrative expenses 2023	Hypothesis	D23		RiskUniform(G23;H23;RiskName("Selling, general and administrative expenses 2023"))	0,27	0,2725	0,275

Source: @Risk report based on Procter and Gamble own valuation model

TABLE 32. VARIABLES AND DISTRIBUTIONS SCHEME (II)

Risk Free Rate 2019	Hypothesis	D46		RiskNormal(G46;H46;RiskName("Risk Free Rate 2019 "))	-∞	0,02302	+∞
Risk Free Rate 2020	Hypothesis	D47		RiskNormal(G47;H47;RiskName("Risk Free Rate 2020 "))	-∞	0,02302	+∞
Risk Free Rate 2021	Hypothesis	D48		RiskNormal(G48;H48;RiskName("Risk Free Rate 2021 "))	-∞	0,02302	+∞
Risk Free Rate 2022	Hypothesis	D49		RiskNormal(G49;H49;RiskName("Risk Free Rate 2022 "))	-∞	0,02302	+∞
Risk Free Rate 2023	Hypothesis	D50		RiskNormal(G50;H50;RiskName("Risk Free Rate 2023 "))	-∞	0,02302	+∞
Beta 2019	Hypothesis	D58		RiskNormal(G58;H58;RiskName("Beta 2019"))	-∞	0,7164	+∞
Beta 2020	Hypothesis	D59		RiskNormal(G59;H59;RiskName("Beta 2020"))	-∞	0,7164	+∞
Beta 2021	Hypothesis	D60		RiskNormal(G60;H60;RiskName("Beta 2021"))	-∞	0,7164	+∞
Beta 2022	Hypothesis	D61		RiskNormal(G61;H61;RiskName("Beta 2022"))	-∞	0,7164	+∞
Beta 2023	Hypothesis	D62		RiskNormal(G62;H62;RiskName("Beta 2023"))	-∞	0,7164	+∞
Market Risk Premium (Rm-Rf) 2019	Hypothesis	D70		RiskNormal(G70;H70;RiskName("Market Risk Premium (Rm-Rf) 2019 "))	-∞	0,074064	+∞
Market Risk Premium (Rm-Rf) 2020	Hypothesis	D71		RiskNormal(G71;H71;RiskName("Market Risk Premium (Rm-Rf) 2020"))	-∞	0,074064	+∞
Market Risk Premium (Rm-Rf) 2021	Hypothesis	D72		RiskNormal(G72;H72;RiskName("Market Risk Premium (Rm-Rf) 2021"))	-∞	0,074064	+∞
Market Risk Premium (Rm-Rf) 2022	Hypothesis	D73		RiskNormal(G73;H73;RiskName("Market Risk Premium (Rm-Rf) 2022"))	-∞	0,074064	+∞
Market Risk Premium (Rm-Rf) 2023	Hypothesis	D74		RiskNormal(G74;H74;RiskName("Market Risk Premium (Rm-Rf) 2023"))	-∞	0,074064	+∞
CF Perpetual Growth 2023	Hypothesis	D77		RiskNormal(G78;H78;RiskName("CF Perpetual Growth 2023 "))	-∞	0,005	+∞

Source: @Risk report based on Procter and Gamble own valuation model

5.3. OUTPUT VALUE AND STATISTICS

Once all variables included in the simulation have been identified, and its corresponding probability distributions and hypothesis defined, the model is run through @Risk program. The construction of this model has been done by only applying one simulation but 20,000 iterations in order to provide the forecast with more uncertainty but more realism.

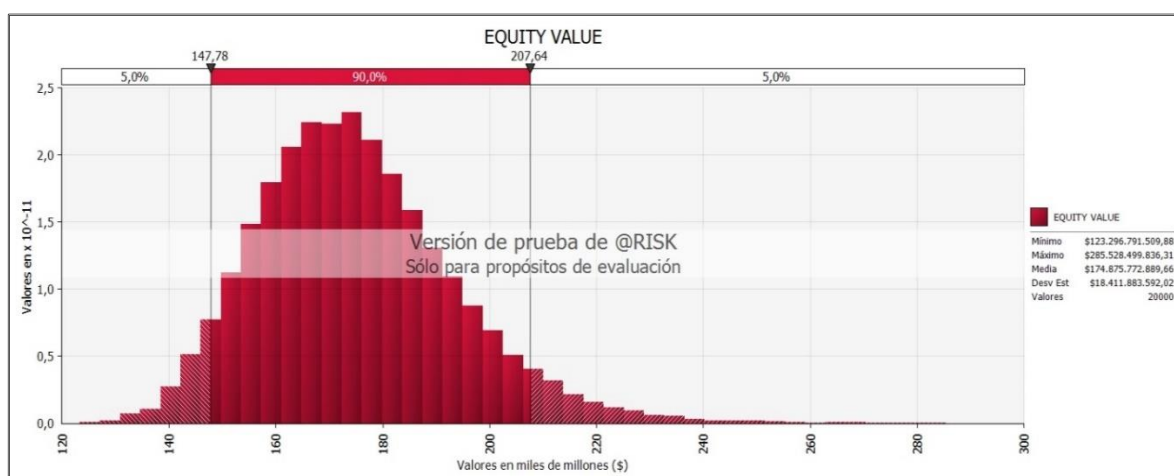
The greater number of iterations applied also provide the model with more stability for the parameters affecting the probability distribution. While at the beginning of the simulation these output statistics can suffer dramatic variations. On the other hand, as long as the number of iterations increase such parameters tend to stabilize and unusual high and low outputs do not vary the final outcome so much (Yoe, 2019).

Besides simulation features, the intention of this analysis also consists on comparing two different scenarios based on two different hypotheses applied on a single variable. From what have been explained along this paper, Perpetual Growth of cash flows has an outstanding effect on the result of the Equity Value of a company. In point 5.2., it has been detailed that two different values have been considered in the model. Along this analysis section it will be compared both assumptions in terms of Equity Value and the probability distribution followed; a base scenario of 0.375% Perpetual Growth and an alternative situation of 2%. It is important to highlight that in both cases the amount of iterations applied have been the same: 20,000.

5.3.1. Scenario under Perpetual Growth of 0.375%

The following chart represents the histogram probability density and shows that under our assumptions Procter and Gamble's Equity Value ranges from \$147.78 to \$207.64 billion at a 90% confidence level. Within all iterations carried out, the average result obtain for the Equity Value of Procter and Gamble has been \$174.88 billion and maximum and minimum values of \$285.53 and \$123.30 billion.

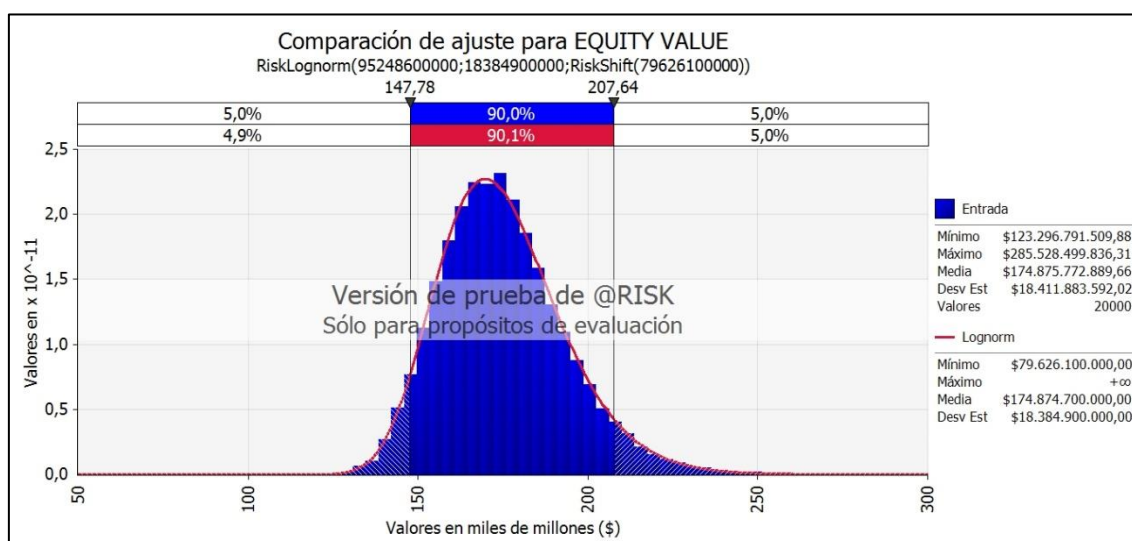
FIGURE 28. EQUITY VALUE HISTOGRAM PROBABILITY DENSITY



Source: @Risk report based on Procter and Gamble own valuation model

In addition, it has also been tested which is the probability distribution followed by this outcome according to @Risk simulation. The figure *Equity Value Probability Distribution Adjustment* shows in red the log-normal distribution followed by the Equity Value. In order to test the accuracy of this distribution over the probability density histogram showed in the previous graph, it can be noticed that both means are quite similar, approaching both to a value between \$174.874 and \$174.875 billion.

FIGURE 29. EQUITY VALUE PROBABILITY DISTRIBUTION ADJUSTMENT

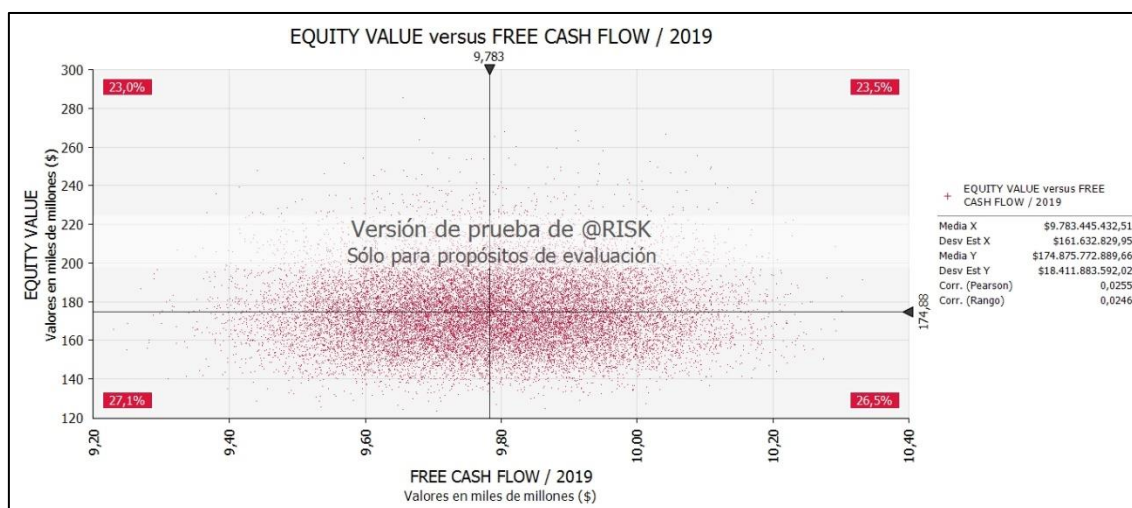


Source: @Risk report based on Procter and Gamble own valuation model

Moreover, it has also been analysed which are the variables affecting the Equity Value the most. For this reason, the Equity Value has been compared with each of the Free Cash Flows, WACCs, Perpetual Growth and Residual Value.

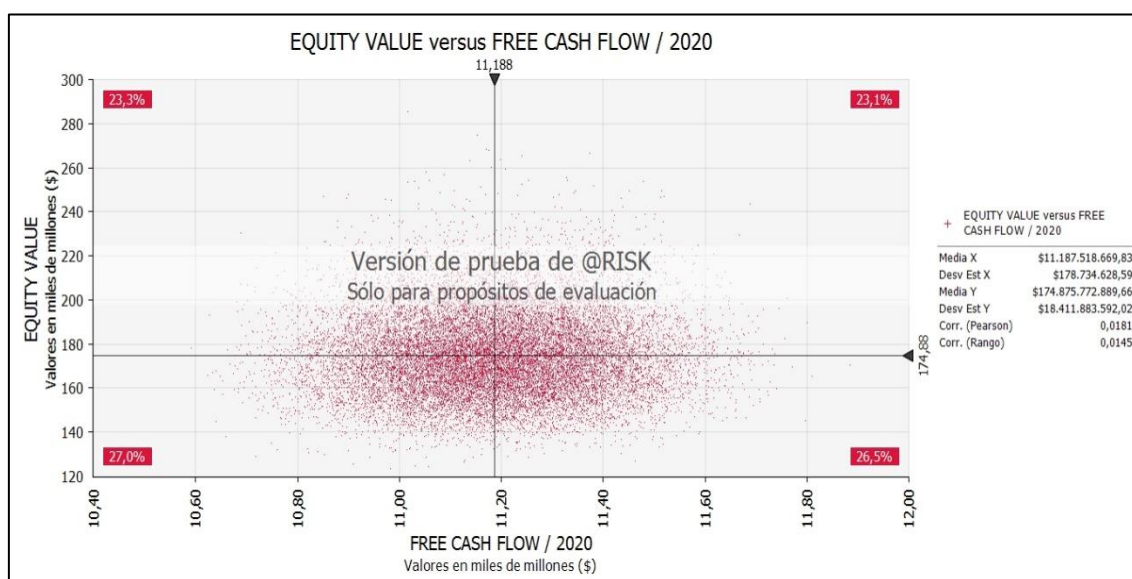
- **Free Cash Flows:**

FIGURE 30. EQUITY VALUE VS FREE CASH FLOW 2019 CORRELATION



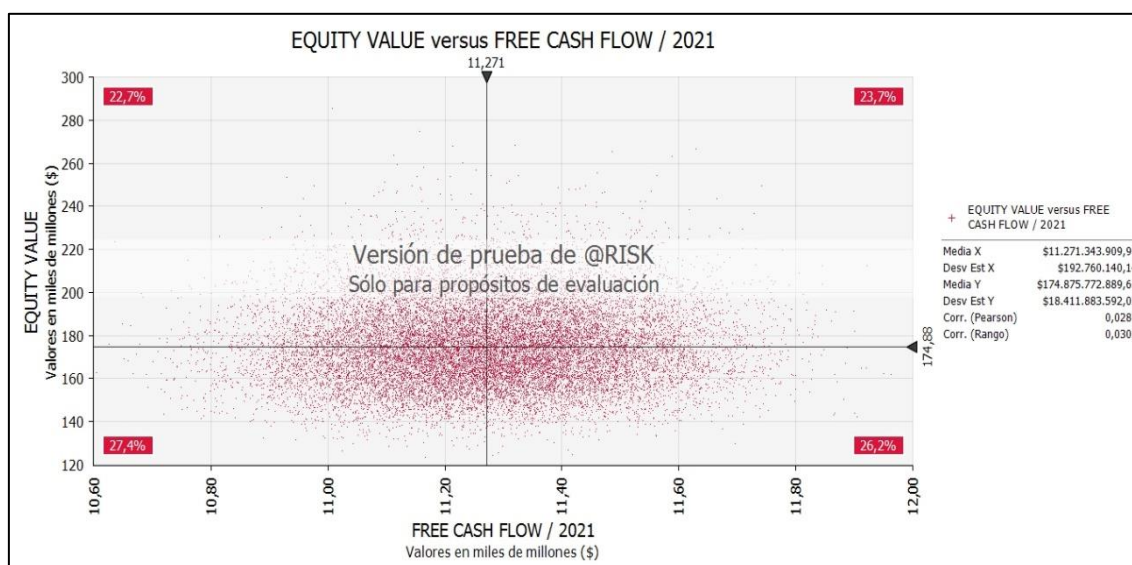
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 31. EQUITY VALUE VS FREE CASH FLOW 2020 CORRELATION



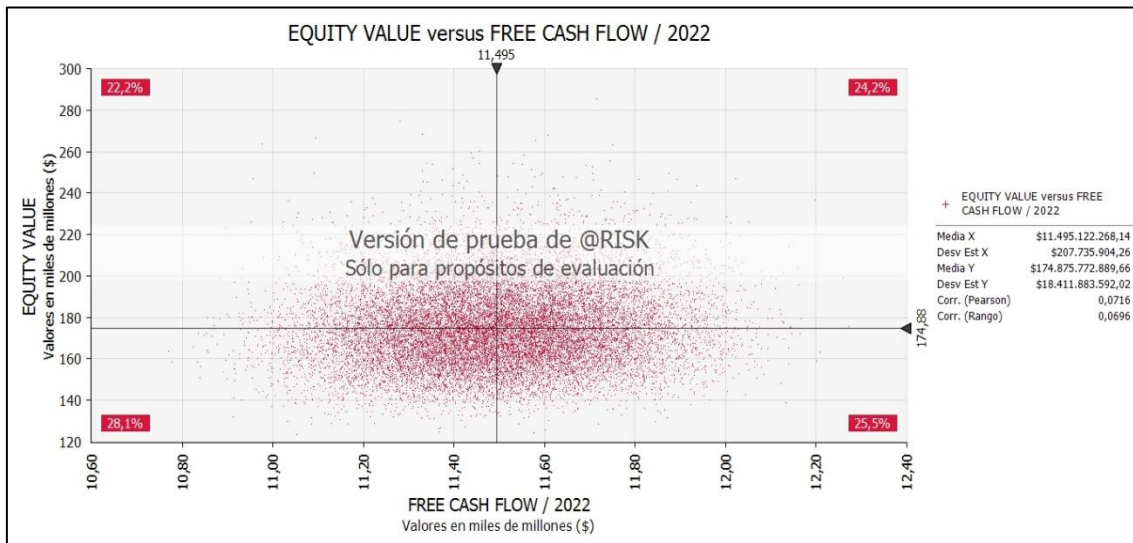
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 32. EQUITY VALUE VS FREE CASH FLOW 2021 CORRELATION



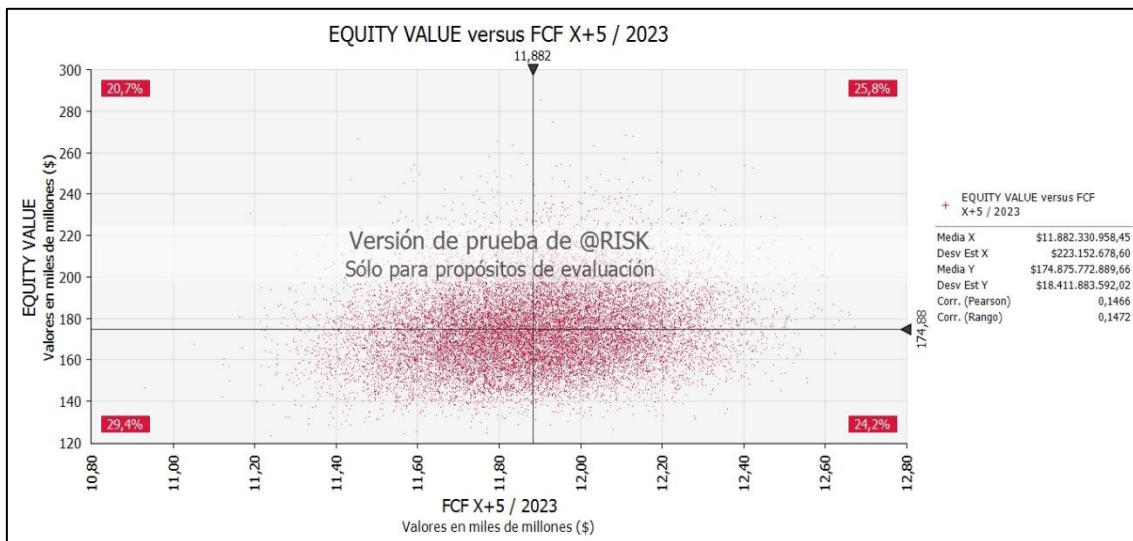
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 33. EQUITY VALUE VS FREE CASH FLOW 2022 CORRELATION



Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 34. EQUITY VALUE VS FREE CASH FLOW 2023 CORRELATION



Source: @Risk report based on Procter and Gamble own valuation model

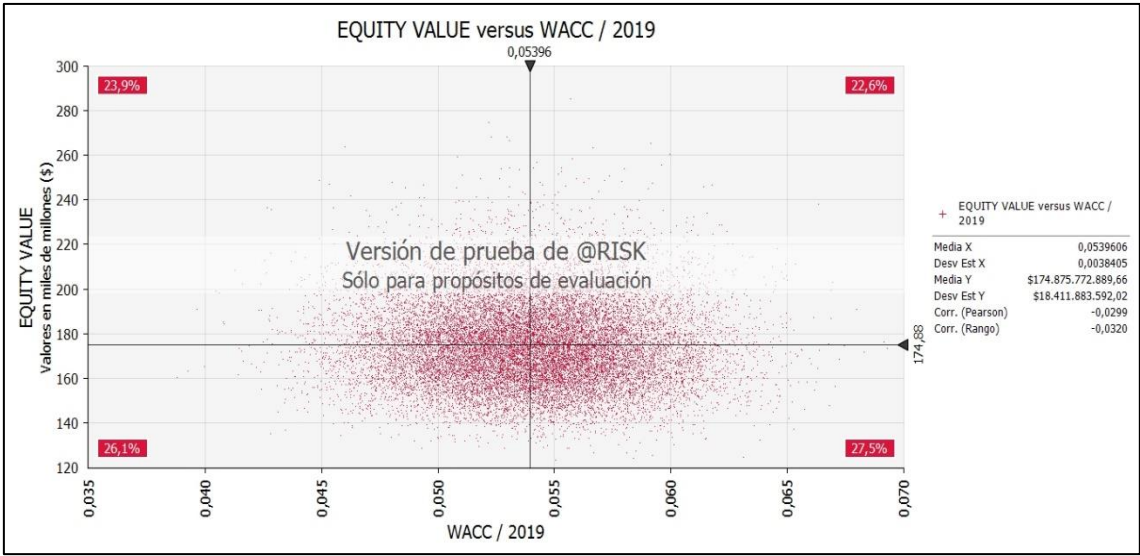
As it can be seen, the further we approach towards last Free Cash Flows the level of correlation between both Equity Value and that free cash flow increases. In consequence, the value of the Equity Value is more related to Free Cash Flow estimated for 2023.

With this result, it may be understood that last cash flows have more impact for the value of the Terminal Value, which as it was explained before represents an important portion of the Equity Value.

- **Weighted Average Cost of Capital (WACC)**

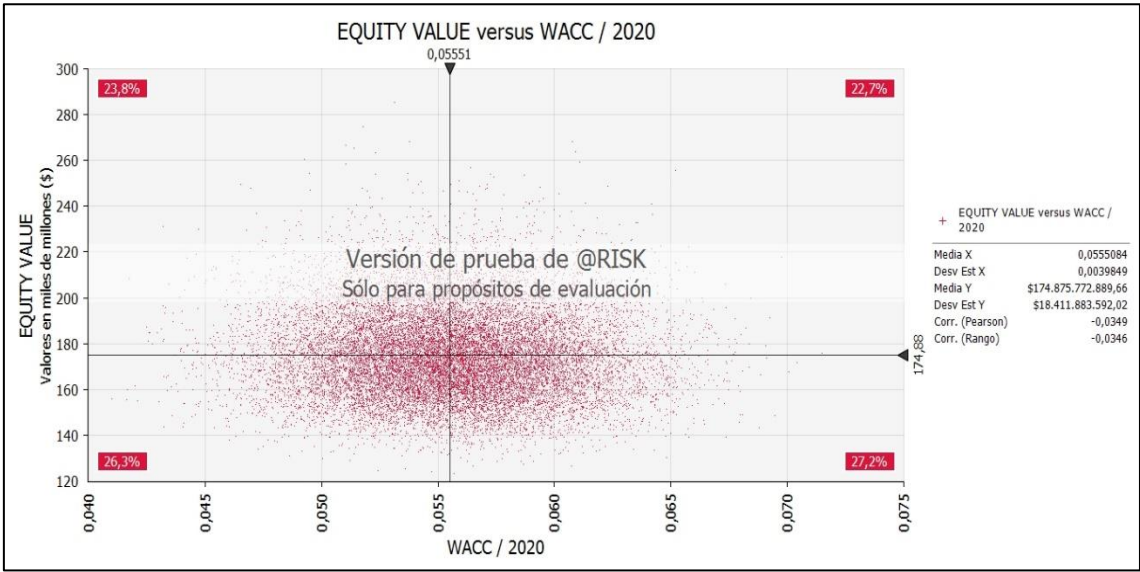
Secondly, the WACC has also been run under this same procedure obtaining the following results:

FIGURE 35. EQUITY VALUE VS WACC 2019 CORRELATION



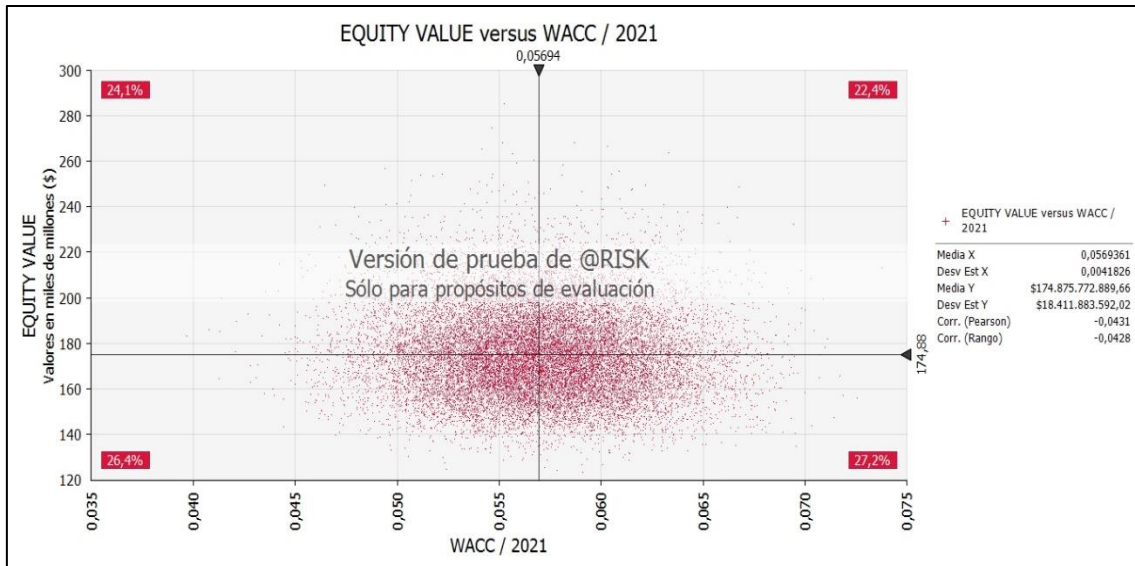
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 36. EQUITY VALUE VS WACC 2020 CORRELATION



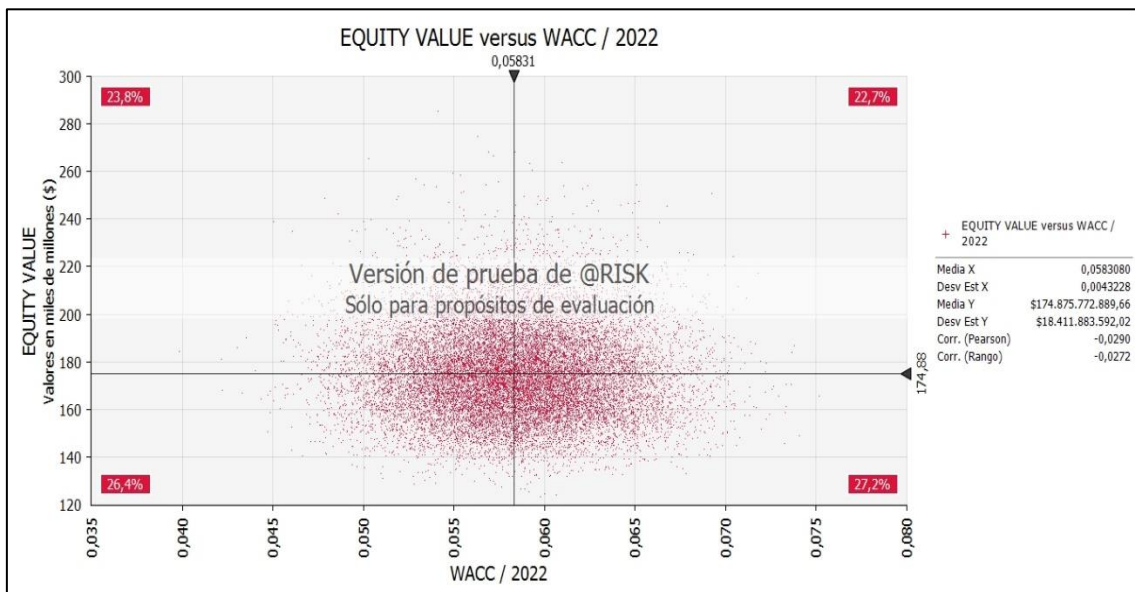
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 37. EQUITY VALUE VS WACC 2021 CORRELATION



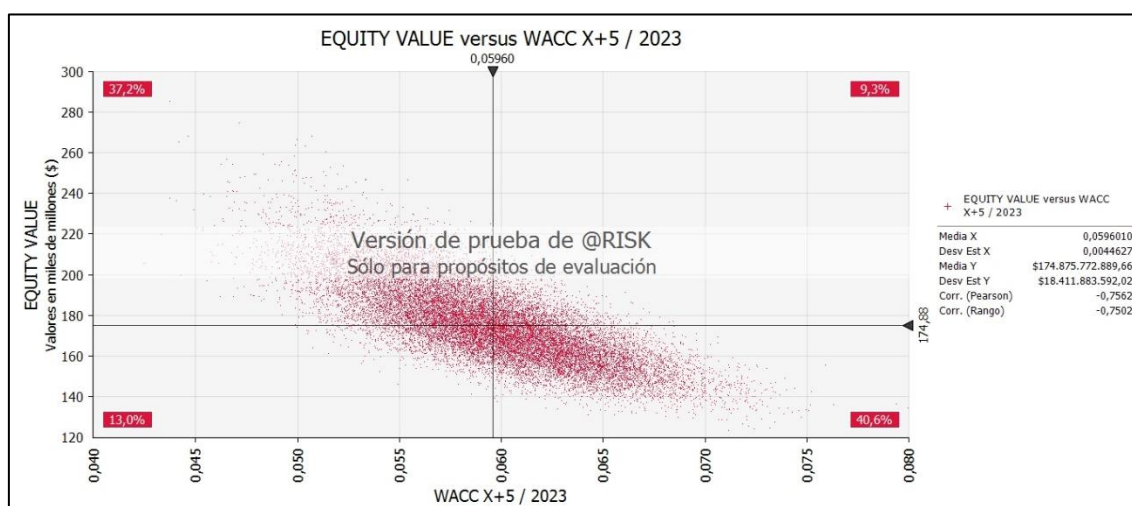
Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 38. EQUITY VALUE VS WACC 2022 CORRELATION



Source: @Risk report based on Procter and Gamble own valuation model

FIGURE 39. EQUITY VALUE VS WACC 2023 CORRELATION



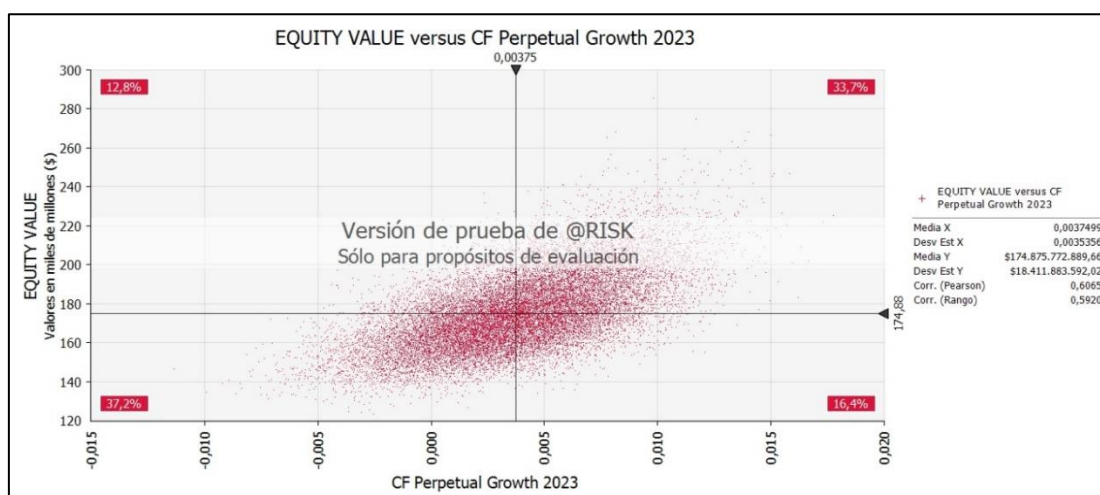
Source: @Risk report based on Procter and Gamble own valuation model

The relation between Equity Value and WACC is opposite to that with the Free Cash Flow. The higher the WACC the lower will be the value of the Free Cash Flows at present, and thus, the lower will be the value of the Equity Value. Therefore, a negative correlation shows that when one of the variables increases the other one decreases instead. The closer to minus one the correlation coefficient is the closer to imperfect correlation those variables are.

In this case we see that 2023 WACC vs Equity Value have the highest negative correlation with -0.7562 (Pearson). Thus, the movements in one unit of one of them will be answered with an opposite variation of 0.7562 by the other.

- **Perpetual Growth**

FIGURE 40. EQUITY VALUE VS PERPETUAL GROWTH 2023 CORRELATION

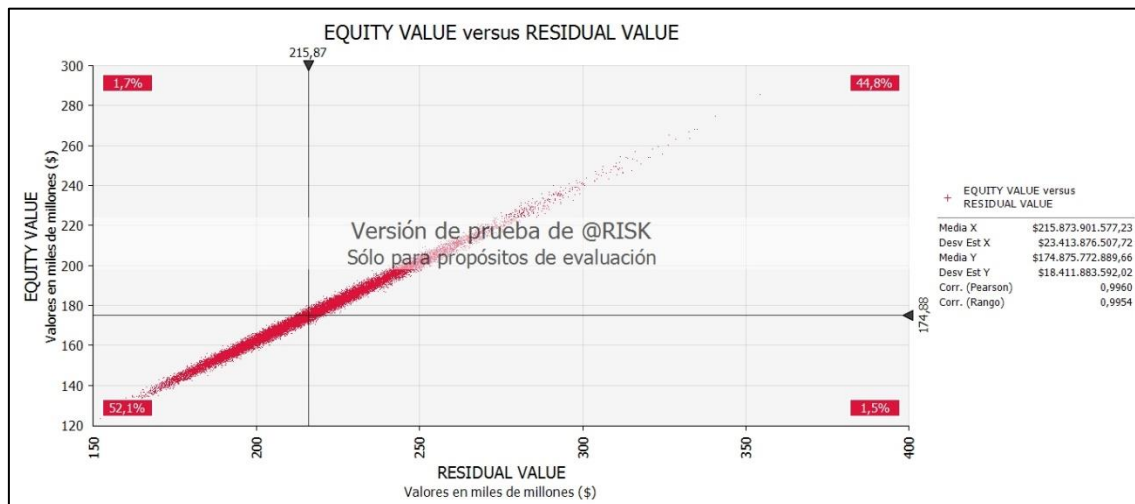


Source: @Risk report based on Procter and Gamble own valuation model

As it was expected the correlation between the Equity Value and the Perpetual Growth is quite high (0.6065 Pearson), as the latter one has an important role for the outcome of the Terminal Value.

- **Residual Value**

FIGURE 41. EQUITY VALUE VS RESIDUAL VALUE CORRELATION

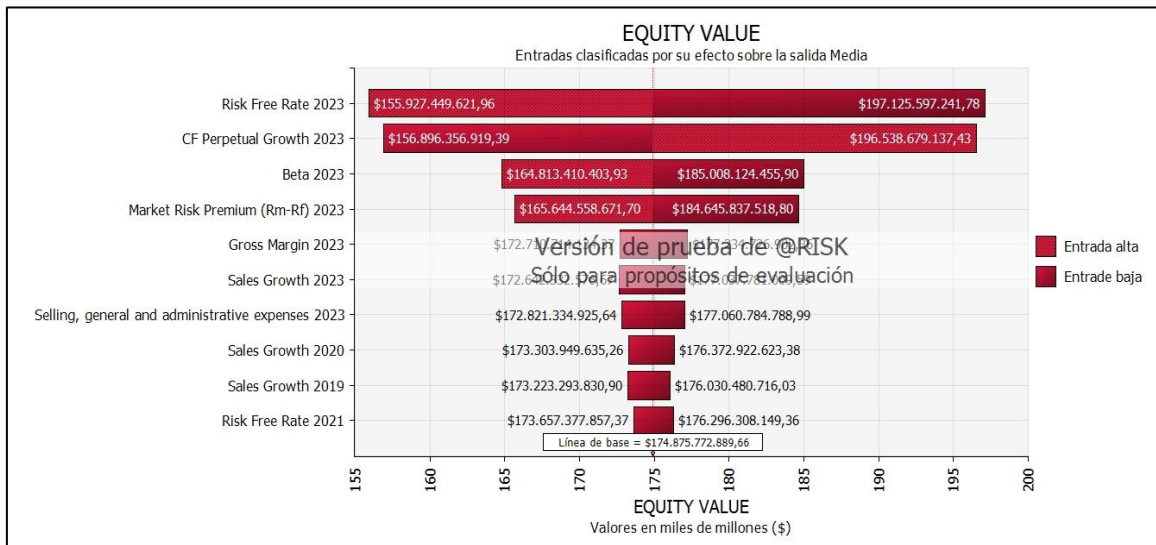


Source: @Risk report based on Procter and Gamble own valuation model

Finally, the Residual Value and the Equity Value are almost perfectly correlated (0.9960 Pearson correlation). The reason, again, steams from the weight of this variable in the Equity Value.

One last chart to analyse is the Tornado chart. As Jonathan Mun explains in his book *Modeling Risk* “it captures the static impacts of each variable on the outcome of the model; that is, the tool automatically perturbs each variable in the model a pre-set amount, captures the fluctuation on the model’s forecast or final result, and lists the resulting perturbations ranked from the most significant to the least”(Mun, 2010)

FIGURE 42. EQUITY VALUE TORNADO CHART



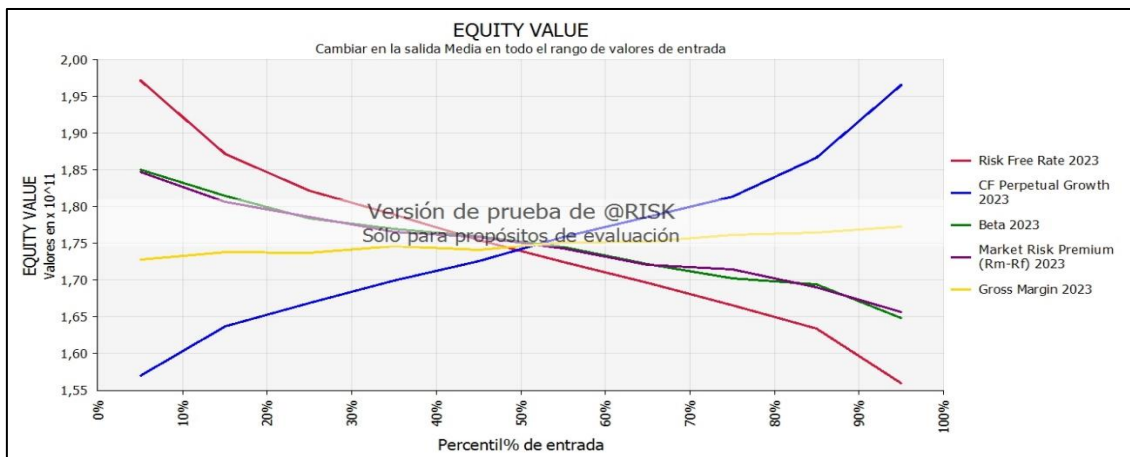
Source: @Risk report based on Procter and Gamble own valuation model

From this analysis we can find out that the Risk Free rate from 2023 represents the higher variation of the Equity Value from its mean (\$174.875 billion). Numerically, the 2023 Risk Free rate makes the Equity Value mean to vary between \$155.927 billion and \$197.125 billion. In addition, as it was also explained before, the Perpetual Growth is the variable that secondly more impacts the Equity Value.

On the other hand, it is very remarkable that among the ten most influenceable variables, Sales Growth represents three of them. Sales are the main source of cash in the company and its growth its critical for the value of each of the cash flows, and thus for the outcome of the Equity Value.

Another way to understand this relationship is the spider chart:

FIGURE 43. EQUITY VALUE SPIDER CHART



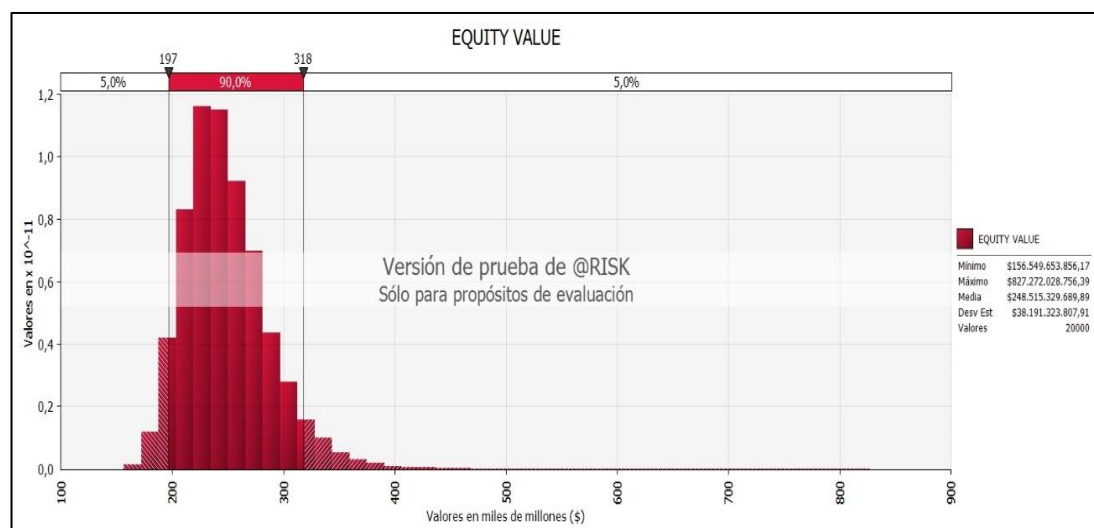
Source: @Risk report based on Procter and Gamble own valuation model

5.3.2. Scenario under Perpetual Growth of 2%

The second scenario shows, on the other hand, a completely different picture from the initial one in terms of Equity Value. While under the 0.375% Perpetual Growth hypothesis, the Equity Value amounts \$174.88 billion on average, in this case we extract a mean close to \$248.51 billion, what is translated into a \$73.63 billion variation.

The higher the mean of the Normal distribution applied over the Perpetual Growth of cash flows; the higher will be the dispersion from the mean for the same number of simulations applied for both hypotheses. This is also reflected on the outcome of both scenarios. A base scenario has generated a standard deviation of roughly \$18.41 billion while for a 2% Perpetual Growth of cash flows values varies wide more from the mean (\$38.19), with a difference of almost \$20 billion.

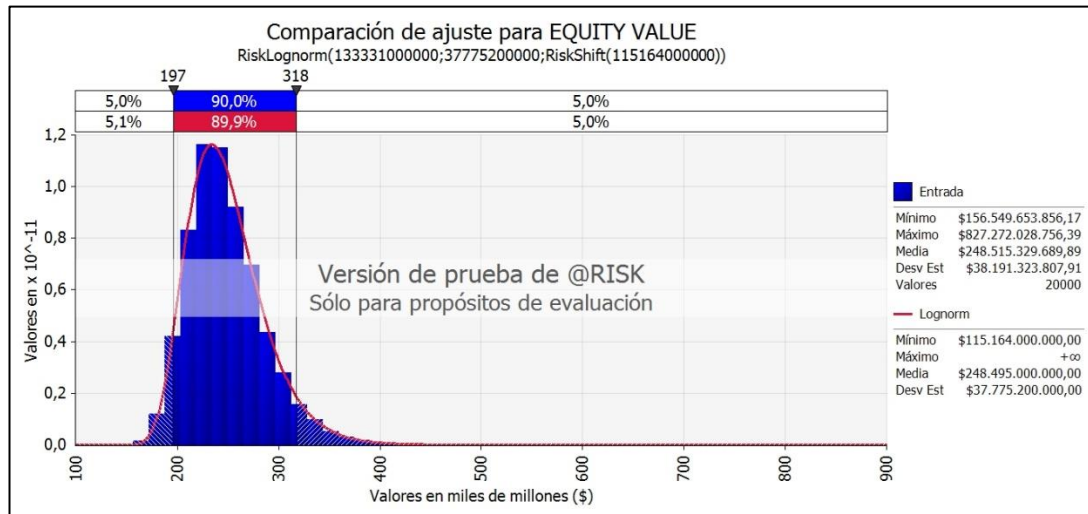
FIGURE 44. EQUITY VALUE HISTOGRAM PROBABILITY DENSITY FOR A 2% PERPETUAL GROWTH



Source: @Risk report based on Procter and Gamble own valuation model

In both cases, however the probability distribution followed approaches a lognormal.

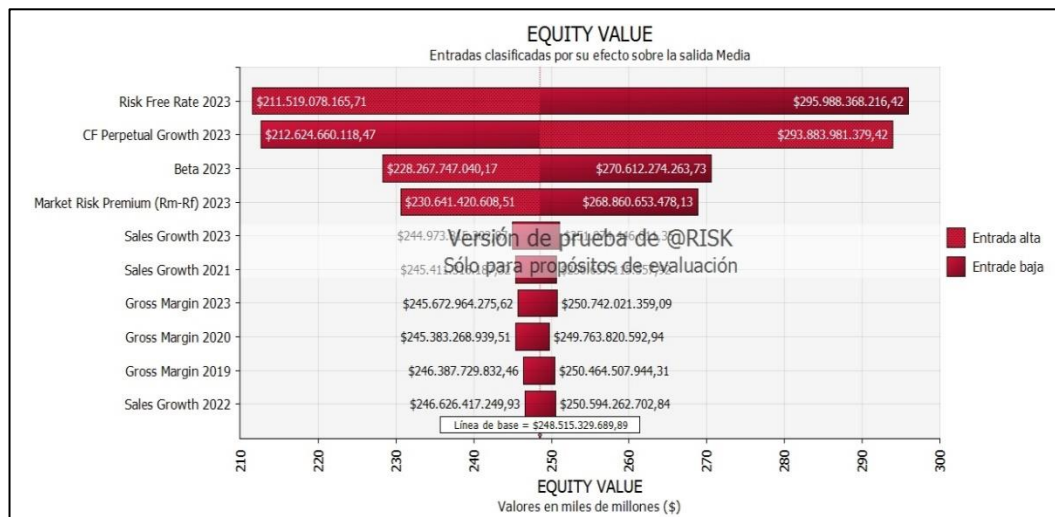
FIGURE 45. EQUITY VALUE PROBABILITY DISTRIBUTION ADJUSTMENT FOR A 2% PERPETUAL GROWTH



Source: @Risk report based on Procter and Gamble own valuation model

Regarding the variables that affect the most the Equity Value, they are quite similar if we only consider the name of that variable. Actually, the first four variables are the same ones. However, from a quantitative point of view, the total value in dollar deviating from the mean is close to double for a 2% Perpetual Growth. For scenario number one the variation of the Equity Value in terms of the Risk Free rate of 2023 is \$41.20 while for the second scenario it moves up to \$84.47 billion. These results make sense if we take into account the higher standard deviation triggered by the latter case.

FIGURE 46. EQUITY VALUE TORNADO CHART FOR A 2% PERPETUAL GROWTH



Source: @Risk report based on Procter and Gamble own valuation model

5.3.3. Current market capitalization comparison

After analysing the different outputs obtained from the two different scenarios it is important to put in context these figures and compare them with the current market value of the company.

According to Yahoo Finance the current market capitalization of Procter and Gamble amounts to \$261.732 billion, with a total amount of shares outstanding of 2.51 billion. With this figure we can compute a price per share of \$104.27.

Let's now repeat the same process for the first scenario. In this case the Equity Value equals \$174.88 billion and, by applying the same number of shares outstanding we reach to a price per share of \$69.67. The outputs are quite different with a variation of around 49.66% in share price.

On other hand, a Perpetual Growth rate of 2% generated an Equity Value of \$248.51 billion and a price per share of \$99.01. In this case the spread with current market price is reduced to a 5.31% difference.

Overall, under the assumption that the rest of hypothesis are kept equal for both scenarios, and by only changing the Perpetual Growth of cash flow mean value, we can conclude that the 2% approach is more accurate compared to the current market of Procter and Gamble Equity Value and price per share.

6. CONCLUSIONS

As we said at the beginning, information is a powerful tool in order to being able to succeed not only for personal topics, but also for the financial environment. The Montecarlo simulation applied over Procter and Gamble valuation has led us to find out how the different variables employed to add uncertainty to a valuation model can, therefore, greatly vary the final value of the study. Information is an extremely important input to consider in this type of research. However, it is also remarkable to bear in mind the type of information it is being managed the veracity as well and they quality it sustains.

Firstly, it has been developed some research about historical data of the company in order to build the valuation model that will be used as support to apply the Montecarlo simulation. Within this model is also critical to identify which are the main variables that affect variables that affect Procter and Gamble's business model and financial and profitable activity, and thus, that will directly influence the Equity Value of the company.

On the one hand, **Sales Growth** appears as a key variable for any company in terms of valuation, and in order to project its value, historical data from previous years generally shows some hints. However, Procter and Gamble Sales Growth historical data has been very volatile with an average growth of -2.56%, so it could not be used as an appropriate proxy to launch projected figures. Therefore, analysing peers expected data and business activities of the company, compared to professional reports help to build a strong approach for this variable.

In addition, **Gross Margins** close to 50% confirms Procter and Gamble solid competitive advantage on product quality and differentiation with high sales volumes and lower cost of good sold. This shows that they are able to create value over the real cost of the product making Gross Margin and **Selling, General and Administrative Expenses** key variables to be simulated.

From a valuation point of view, we have seen that the **Risk Free rate** has been the variable affecting the most the final outcome of this company. But some other simulated variables such as the **Beta** and the **Market Risk Premium** show a tremendous influence for Procter and Gamble valuation.

On the other hand, there exist also some other important variables that are not so relevant when analysing Procter and Gamble. Bearing in mind the type of company this study is dealing with; it helps to understand that capital expenditure and depreciation and amortization figures are not so crucial for the American multinational. Keeping a 3% Sales Growth average mean projection on a normal distribution basis does not allow to keep high capital expenditure rates. In addition, Procter and Gamble has historically shown capex investment over initial property plant and equipment of 7.74% on average and depreciation and amortization figures of around 6.5%. These types of figures correspond to a matured company, featured by relatively low stable growth rates and, in consequence relatively low capex investments close to depreciation and amortization percentages.

Last simulated variable (Perpetual Growth) has brought forward some challenges and conclusion about its impact in the model and Procter and Gamble value. Perpetual Growth of cash flows hypothesis affecting the Terminal Value on a discounted cash flow method accounts for a huge chunk of the final result of the Equity Value.

For that reason, two different approaches to this variable has brought two different scenarios. On the first hand, it has been appointed a Perpetual Growth with 0.375% for its

normal distribution mean parameter, based on the fact that Procter and Gamble is a matured company with low stable growth and continuous dividend payment. On the other hand, experts reports account for a 2% percent Perpetual Growth. The result of the Equity Value has led us to conclude that the former case is way more remote from the current Procter and Gamble market capitalization with a variation in terms of price per share of roughly 50%. On the other hand, the 2% Perpetual Growth scenario shows a much more accurate view with share price 5% below the market value of the company.

To sum up, working in the sector or doing company valuation needs a lot of information and experience in order to obtain results close to real values. For this reason, we believe that the Montecarlo methodology is a very interesting tool to introduce risks into the company model, especially because it allows to allocate different probabilities and distributions to multiple variables, obtaining different values within a range, while alternative valuation methods only give one.

7. BIBLIOGRAPHY

- Brathwaite, C. and Grom, P. *The Procter & Gamble Company (PG US) CEO Meeting Highlights: Momentum Likely Continues*. JP Morgan.
- Bonacina R. and Bonelli, F. *Luxury is about sexiness. The Luxury and Cosmetics Financial Factbook 2018 Edition*. EY. [Online] Available in: <https://cache.luxurydaily.com/wp-content/uploads/2018/11/EY-The-luxury-and-cosmetics-financial-factbook-2018-edition.pdf> [25/05/2019]
- Bonacina R. and Mazzucchelli, M.P. *Keep calm and care about your consumer. The luxury and cosmetics financial factbook 2016 edition*. EY. [Online] Available in: <https://www.eycom.ch/en/Publications/20161006-The-luxury-and-cosmetics-financial-factbook-2016/download> [25/05/2019]
- Callejón, J., Herrerías Pleguezuelo, R. and Herrerías Velasco, J.M. *Comparación de la distribución triangular, con una distribución tipo I de Pearson, como modelos para los problemas en ambiente de riesgo e incertidumbre* [Online] Available in: <https://dialnet.unirioja.es/descarga/articulo/6012850.pdf> [05/05/2019]
- Dibadj, A., Gordon, I.J. and Cook, L. (2019) *Procter & Gamble (PG): With a turnaround underway, revisiting our past advice to CEO David Taylor*. Bernstein
- Dyer, D., Dalzell, F. and Olegario, R. (2004) *Rising Tide: Lessons from 165 Years of Brand Building at Procter & Gamble*. Harvard Business School.
- Fernández, P. (2017) *Valuation and Common Sense* [Online] Available in: https://web.iese.edu/PabloFernandez/Book_VaCS/valuation%20CaCS.html [05/05/2019]
- Gajrawala, K., Bakshi, P. and Brito, T. (2019) *Procter & Gamble report*. Equity research.
- Gutiérrez Urzúa, M. and Mainhard Escalona, K. (2015) *New approaches to companies' valuation. Application of options methodology to a Chilean freight company*. [Online] Available in: <file:///C:/Users/enriq/Downloads/2810-Texto%20del%20art%C3%ADculo-10304-1-10-20170622.pdf>
- Illana, J.I. (2013) *Métodos Montecarlo*. Departamento de Física Teórica y del Cosmos Universidad de Granada [Online] Available in: <https://www.ugr.es/~jillana/Docencia/FM/mc.pdf> [25/05/2019]

- Mohsenian, D., Doctor, B., Falorni, F., Rotondi, S. and Adams, S. (2019) *Reiterate OW: Confidence in Topline Momentum Building with Robust Scanner Data; Lower Q3 EPS on Margins*. Morgan Stanley.
- Morales Plaza, J.I. (2018-2019) *Company Valuation Slides*.
- Mun, J. (2010) *Modeling Risk, + DVD: Applying Monte Carlo Risk Simulation, Strategic Real Options, Stochastic Forecasting, and Portfolio Optimization*. Ed: Wiley Finance
- P&G (2018) *Annual Report* [Online] Available in: <http://www.pginvestor.com/Cache/1001242072.PDF?O=PDF&T=&Y=&D=&FID=1001242072&iid=4004124> [08/03/2019]
- P&G (2017) *Annual Report* [Online] Available in: <http://www.pginvestor.com/Cache/1001226614.PDF?O=PDF&T=&Y=&D=&FID=1001226614&iid=4004124> [08/03/2019]
- P&G (2016) *Annual Report* [Online] Available in: <http://www.pginvestor.com/Cache/1500090608.PDF?O=PDF&T=&Y=&D=&FID=1500090608&iid=4004124> [08/03/2019]
- P&G (2015) *Annual Report* [Online] Available in: <http://www.pginvestor.com/Cache/1001201800.PDF?O=PDF&T=&Y=&D=&FID=1001201800&iid=4004124> [08/03/2019]
- P&G (2014) *Annual Report* [Online] Available in: http://www.pginvestor.com/interactive/lookandfeel/4004124/PG_Annual_Report_2014.pdf [08/03/2019]
- P&G (2019) *Procter & Gamble* [Online] Available in: https://www.pg.com/en_balkans/company/core_strengths.shtml [14/05/2019]
- P&G (2019) *Procter & Gamble* [Online] Available in: https://www.pg.com/en_IN/company/purpose-values-principles.shtml [14/05/2019]
- P&G (2003) *Our Purpose, Values and Principles* [Online] Available in: https://www.pg.com/translations/pvp_pdf/english_PVP.pdf [12/05/2019]
- Rees, M. (2018) *Principles of Financial Modelling. Model Design and Best Practices using Excel and VBA*. Ed: Wiley Finance

- Tocquigny, R. and Butcher, A. (2012) *When Core Values Are Strategic: How the Basic Values of Procter & Gamble Transformed Leadership at Fortune 500 Companies*. P&G Alumni.
- Viebig,J., Poddig,T. and Varmaz,A. (2008) *Equity Valuation: Models from Leading Investment Banks*, Ed: John Wiley & Sons Ltd.
- Yahoo (2019) *Yahoo Finance* [Online] available in: <https://finance.yahoo.com/quote/PG/key-statistics?p=PG> [29/05/2019]
- Yoe, C. (2019) *Principles of Risk Analysis: Decision Making Under Uncertainty*. Ed:CRC press.