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A 9-year analysis of the impact of goodwill and other intangible assets on the EBITDA of FMCG companies listed on the Euronext: 2009 - 2017

Research Master's Thesis submitted by
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Abstract

The importance of intangible assets has been constantly increasing for the past couple of years (Ocean Tomo, 2017). Firms have progressively seen their industries being drastically reshaped by the disruptive technological wave. The definition of competitive advantage shifted from power and size to competencies, capabilities and knowledge (Thum-Thysen et al., 2017). While the effect of intangible assets on profitability has been thoroughly explored in the literature (Emmanouil & Dimitros, 2017; Li & Wang, 2014), the precise case of FMCG companies listed on the Euronext remains understudied.

Our research combines theory gathering different concepts such as: (i) intangible and tangible assets (ii) goodwill (iii) valuation methods, and (iv) accounting procedures. Those concepts helping in the assessment of the evolution of goodwill, tangible and intangible assets impact on a company's profitability.

After defining our objectives concerning this work, pursuing a meticulous literature review, identifying the key elements/gaps, and clustering them into several groups, we constructed our hypotheses. Following that, we conducted a multiple regression analysis on the fifty-three FMCG companies forming our sample during a time period running from 2009 to 2017.

The results suggest that the evolution of tangible assets impact is significant, positive and increasing throughout the years. Concerning the evolution of intangible assets, it is as well significant, positive and increasing to a higher extent. Finally, the impact of goodwill was nonsignificant. A significant, positive but decreasing impact can only be assessed while the goodwill is combined with other variables such as property, plant and equipment or intangible assets.

By analysing and extending the current studies conducted in the field of intangible assets, we do believe that our paper contributes to the scientific literature.

Acknowledgment

While reaching the end of this thesis we want to express our gratitude for all the people who contributed to its realisation from a distant or close help.

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1. List of figures and tables

2. List of acronyms and abbreviations

CPG	Consumer packaged goods
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortization
EVA	Economic Value Added
D&A	Depreciation & Amortization
FAT	Fixed Asset Turnover
FMCG	Fast Moving Consumer Goods
FS	Financial Statements
IAS	International Accounting Standards
IFRS	International Financial Reporting Standards
IRR	Internal Rate of Return
M&A	Mergers and Acquisitions
MLR	Multiple Linear Regression
NCI	Noncontrolling Interest
PHI	Previously Held Interest
PPA	Purchase Price Allocation
PP&E	Property Plant & Equipment
R&D	Research and Development
SEC	Securities and Exchange Commission
VIF	Variance Inflation Factors
WACC	Weighted Average Cost of Capital

PART I: LITERATURE REVIEW

3. Introduction

In the year 2000, Paul Krugman made the following statement in the New-York Times: “The big difference between the new economy and the old is the changed nature of investment. In the past, businesses primarily invested in the tangible means of production, things like buildings and machines. The value of a company was at least somewhat related to the value of its physical capital; to grow bigger, a business had to build new factories roughly in proportion to the increase in its sales. But now businesses increasingly invest in intangibles. And once you’ve designed a chip, or written the code for a new operating system, no further investment is needed to ship the product to yet another customer.” (Krugman, 2000). This statement can be considered as being ahead of its time and quite predictive of today’s reality. As a result, it raised our interest towards intangible assets. Companies have been increasing their investments in intangible assets over the past couple of years (Nolan, 2011), but what about their actual impact on a firm’s profitability? This question led us to conduct a study about the evolution of intangible assets’ impact throughout the years.

The first part of this thesis will be dedicated to the respective introductions of intangible and tangible assets and finally the goodwill. We dive into each of those concepts by defining them, explaining their evolution throughout the years, their accounting procedures and valuation methods among others.

The second part will be oriented towards the model that we developed in order to assess the evolution of their impacts between 2009 and 2017. We first introduce the FMCG industry, and the company sample on which we investigated. We then explain the different components of our model such as the dependent, explanatory and control variables.

In the final part of our thesis, we analyse the results of our multiple linear regressions, we establish the limitations of our study, and we complete our work with an overall conclusion.

4. Intangible assets

4.1. Definition of an asset: breakdown between tangible and intangible assets

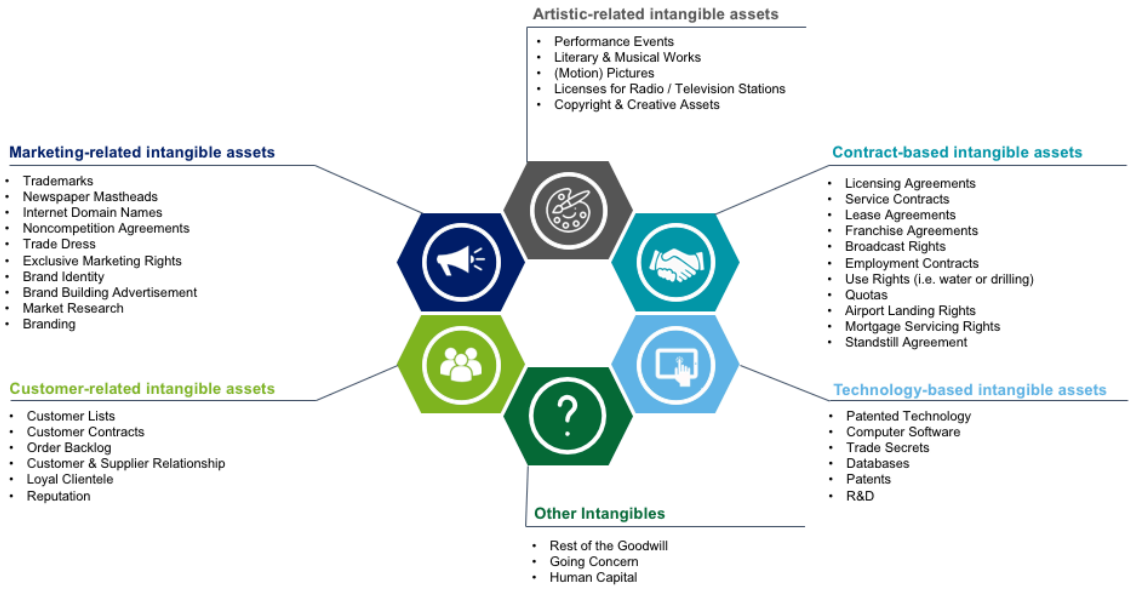
Assets are economic resources, controlled by the organisation as an outcome of past events. They are a current or future source of economic benefit (Bannister et al., 2012). Among those assets, we can distinguish two main categories: tangibles and intangibles.

Tangible assets are characterised by their physical form, they consist of non-current and current assets, fixed assets being hardly convertible in cash oppositely to current ones which are more liquid. The first category gathers assets such as property, plant and equipment (PP&E), long-term investments, equity and other investments and finally other assets (which gathers all the other assets not included in the previous categories). Current assets are deferred income and taxes, prepaid expenses, inventories, receivables, short-term investments, cash and cash equivalents and other assets (which gathers all the other assets not included in the previous categories). Those subdivisions find their importance in the assessment of the financial robustness of a firm and its ability to meet its obligations (Garanina, 2018).

Intangible assets are defined following three requirements, they should be non-monetary, identifiable and non-physical (IFRS Foundation, 2017). Within this intangible asset category, Riley and Robinson (2011) & Thum-Thysen et al. (2017) distinguish three subdivisions: (i) Economic competencies (i.e. this subdivision includes firm specific resources such as human capital, organisational structure, advertising and marketing expenditures); (ii) Innovative property (i.e. this subdivision includes research and development, copyright and creative assets, mineral explorations, new product development in financial services); and finally (iii) Digitised or computerised information (i.e. this final subdivision gathers IT capital including software, databases).

However, we decided to create our own framework, adapted from existing ones, in order to regroup intangible assets in more detailed classifications and try to have a summary as exhaustive as possible. The framework is subdivided in six different categories: (i) Marketing-related (ii) Artistic-related (iii) Customer-related (iv) Contract-based (v) Technology-based, and finally (vi) Other intangible assets.

Figure 1: Intangible assets framework.



Adapted from: Haskel, J., & Westlake, S, Capitalism without capital: The Rise of the Intangible Economy, 2017.

Additionally, Haskel & Westlake describe the characteristics of these intangible assets using what he calls the 4Ss: scalability, sunkenness, spillovers and synergies. "Scalability" is the possibility for an intangible asset to be shared or transferred from one another without losing its benefits. This feature is named as "non-rival" as it can be used without limits. "Sunkenness" is the fact that intangible assets are usually value drivers for the ones possessing them, meaning that they can hardly be traded for a higher or equal value to what it brought to the initial owner. "Spillovers" refer to the benefits enjoyed by others while an investment concretises into a value driving asset even if the intellectual property is protected. Oppositely to the previous statement, "synergies" are spurred by intangible assets since it is better to join forces than to freely give away resources (Haskel & Westlake, 2017).

4.2. Accounting procedures

Accounting regulations vary from country to country, each having its own requirements, recognition criteria and measurement methods. International standards have been established for transparency and comparability reasons, known as International Accounting Standards and International Financial Reporting Standards (IAS IFRS). Those regulations are usually applied to international, publicly traded companies.

However, the United States of America have a different accounting system United States Generally Accepted Accounting Principles (US GAAP), initiated by the US Security and Exchange Commission (SEC). The difference between those accounting methods finds its roots in the cultural contrast between Europe and the USA, Europe is more deductive, large principles applied to reality. On the other hand, the USA is more inductive, they establish rules based on what happened in reality (Colmant, 2017). For more ease and coherence we will focus on IAS IFRS for both the literature review and the research part of our thesis.

4.2.1. Applicability rules

According to the European Commission, under the European Union rules and based on the regulation (EC) No 1606/2002, every listed company which has its security traded on a regulated market has to prepare its consolidated financial statements with respect to the IFRS rules. However, it is up to each European country to either oblige or allow the use of IFRS rules in: (i) the annual statements of listed companies (ii) the statutory statements, and (iii) the consolidated financial statements of non-listed companies (CCE, 2006).

In the case of Belgium, listed companies have to publish their consolidated financial statements and their statutory statements according to IAS IFRS rules. Credit institutions (i.e. listed or not) have to publish their consolidated statements according to IAS IFRS rules. Finally, non-listed companies have the possibility to choose or not to publish their consolidated financial statements according to IAS IFRS rules or Belgian GAAP. Moreover, if the majority of their business is done in a foreign country (the US for example), they have the possibility to ask for a special derogation in order to publish their financial statements according to US GAAP rules (CCE, 2006).

4.2.2. Recognition and creation

According to IAS 38, an intangible asset can be initially recognised if: (i) the future potential economic advantages imputable to the asset will go to the company, and that (ii) the cost of that asset can be reliably computed (IFRS, 2017b).

Intangible assets can end up in a firm's balance sheet in different ways. First, an intangible asset can be acquired "independently" (i.e. through external transactions/acquisitions).

In this case, its cost includes: (i) the purchasing price (i.e. including non-refundable taxes and customs duties), and (ii) every cost (i.e. which is attributable to the asset's preparation in order to be used).

Secondly, an intangible asset can be purchased through mergers and acquisitions, its cost will be in this case its fair value at the acquisition date. Thirdly, an intangible asset can be acquired free of charge (or for nominal consideration) through a government grant. A company can receive airport landing rights, television stations, import licenses or quotas among others directly from the government. The asset can either be recognised at fair value or at a nominal amount increased by the related costs of preparing the asset to be used. Finally, an intangible asset can be generated internally (i.e. brand image, list of clients). In this particular case, intangible assets can be taken into account if and only if a research and a development phase can be distinctly distinguished from one another (IFRS, 2017b).

However, some self-created intangible assets are not taken into account either in the balance sheet or in the financial statements. Examples can be Apple's iOS and OSX operating systems, Coca-Cola's Coke brand name, American Express' list of clients identities or creditworthiness (Lim et al., 2017).

Furthermore, internally recognising its own intangible assets such as a brand name or a customer base while not being in an acquisition context is a decision that has to be made on a case-by-case basis. In fact, it will depend on different external factors such as tax issues (recognising intangible assets will generally lead to re-evaluation premium on which the company will have to pay taxes) or a desire to faithfully reflect the economic reality in the financial statements (if a company is developing a technology, activating and recognising the costs related to its development will allow them to amortise them over a certain period of time instead of assuming the financial burden only one year). Some companies are also required to respect financial ratios towards their bankers, and recognising new assets could increase their solvency ratio (Meunier, 2018).

The value of an intangible asset has to be initially calculated at cost. "After the initial recognition, an entity usually measures an intangible asset at cost less accumulated amortisation. It may choose to measure the asset at fair value in rare cases when fair value can be determined by reference to an active market" (IFRS, 2017b).

Intangible assets can either have a (i) finite or (ii) indefinite useful life. In the case of a finite useful life, the intangible asset will be amortised and will be exposed to impairment testing. On the contrary, in the case of an indefinite useful life, the intangible asset will not be exposed to amortisation but will have to go through an impairment testing at least annually (IFRS, 2017b).

Moreover, Skroupa (2017) argues that "Conventional accounting methods have not necessarily evolved to measure the value of intangibles as effectively as they do tangible capital". In fact, while intangible assets' importance has been increasing over the years, so was increasing the need to update accounting standards. Within a forty-year period of time, IAS 38—Intangible Assets (i.e. which outlines the accounting requirements for intangible assets) has only been revised twelve times (Deloitte, 2017a). As a result, we could thus wonder if regulators can keep the pace of intangible assets' boom and if current accounting rules are able to reflect them accordingly.

5. Goodwill

Goodwill has always been problematic, already in 1883 LJ Cooper said that "Goodwill is a word of which few people understand the meaning" (Cooper, 1883). Goodwill is known for being constantly redefined over the years and experts still did not find a consensus on a standardised definition (Lemeshko et al., 2013).

As previously mentioned, when a merger or an acquisition occurs, the firm has to recognise its own intangible assets to reflect the full value of the enterprise. In these intangible assets arising from the company valuation we can distinguish: (i) the assets towards which a part of the price can be distinctively allocated such as client lists, brands or a specific technology (ii) the part of the assets where the rest of the price paid that cannot be assigned separately will be gathered in one asset's class. The latter category is called goodwill and clusters assets such as human capital or the going concern that a firm can have (Meunier, 2018).

5.1. Definition attempt and different types of goodwill

In 2010, the International Accounting Standards Board stated the following; goodwill is "future economic benefits arising from assets that are not capable of being individually identified and separately recognised" (Hussey, 2014). In fact, goodwill can only be recognised after a merger or an acquisition as the difference between the price paid for a stock and its market value (Deloitte, 2017b). The latter definition is called the purchased goodwill and arises only in the case of the acquisition of an existing business concern.

However, there exists a second type called the non-purchased goodwill. It relates to the goodwill that has been generated by the company itself throughout the years. It is computed as being the difference between the company's fair value and net assets' value identifiable in the balance sheet. A plethora of factors can trigger its creation such as a good credit worthiness, a good location or even a good product quality among others. However, by contrast to purchased goodwill, non-purchased goodwill cannot be included in the balance sheet of a company (Leeney, 2007; IFRS, 2017b; Deloitte, 2017a).

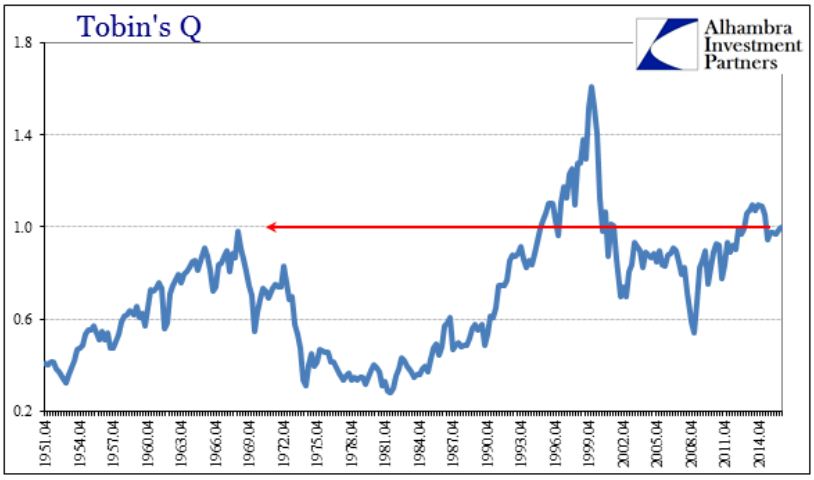
5.2. Introduction to Tobin's Q ratio

On the framework (Appendix 1) developed by KPMG in 2010, we clearly observe that the goodwill is the difference between the acquisition price, and the sum of the book value of equity and the excess fair value of tangible and intangible assets, to which we subtract the deferred taxation (KPMG, 2010). This statement corroborates the fact that the value of a business is worth more than the sum of all its separable and identifiable net assets. Meaning that even if the goodwill is not always accountable and identifiable, it exists and should not be neglected (Deloitte, 2017a). The renowned economist and Nobel prize James Tobin set up a ratio to measure the difference between a company's market value and its book value. The formula may be written as follows:

$$Tobin's\ Q\ ratio = \frac{(Equity\ Market\ Value + Liabilities\ Market\ Value)}{(Equity\ Book\ Value\ +\ Liabilities\ Book\ Value)}$$

This theory stipulates that if the Q ratio of a firm is superior to one and superior to the Q ratio of its peers, they have the capacity to generate higher profits. Therefore, the firm possesses something intangible and not accounted providing it with a competitive advantage, probably the goodwill (Andriessen, 2004). After a study led by Alhambra Investment Partners, we observe the evolution of the Tobin's Q ratio through the years. We could presume that this progression is to put into parallel with the one of goodwill. An important thing to note here is the two drops during the internet and subprime bubbles (Snider, 2017).

Figure 2 : Tobin's Q ratio evolution



Retrieved from: Snider, No paradox: Economy to Debt to Assets, 2017.

5.3. Accounting procedures

From an accounting point of view, goodwill represents the future economic benefits derived from assets that cannot be individually identified (Nethercott & Hanlon, 2002). Under IFRS 3, at the day of the acquisition, the acquirer has to account goodwill separately from the other assets (Deloitte, 2017b). The acquirer has to account goodwill as being the excess value of (a) compared to (b):

(a) The total amount of:
- The transferred counterpart properly valued following the applying norms and regulations (P);
- The noncontrolling interest (NCI) ;
- The fair value of the previously held equity interest in the acquiree (PHI).

(b) The net value (at the acquisition date) of the identifiable assets acquired and the liabilities assumed.

This can be summarised by the following formula:

$$Goodwill = P + NCI + PHI - Net\ Assets$$

5.3.1. Goodwill impairment

Under IFRS and GAAP, companies are requested to assess the value of their goodwill at least once a year. This procedure is called impairment testing. An impairment consists in ensuring that "an asset must not be carried in the financial statements at more than the highest amount to be recovered through its use or sale" (IFRS, 2017a). Since March 2004, IAS 36 regulation on impairment also applies to goodwill. It says that goodwill impairment tests should be operated at least annually, goodwill can thus no longer be amortised (IFRS, 2017c). The purpose behind this change in standards was to move towards international convergence (i.e. especially with the US GAAP) in order to "increase the comparability of financial statements and to improve the transparency of accounting and reporting of business combinations" (Jerman & Manzin, 2008).

In order to proceed goodwill impairments, the goodwill generated by a merger or an acquisition must be allocated to each cash generating entity of the buyer.

This allocation must take into account how much those entities are supposed to increase their cash flows, thanks to synergies emerging from the deal. The entities should follow two principles: (i) they should be at the most granular level of the firm structure at which the goodwill can be allocated (ii) they should not go beyond the definition of an entity as stipulated in IFRS 8 (Deloitte, 2017b). Every unit has a carrying amount which is the value of an asset on the balance sheet after that all depreciations and impairment losses have been recognised and a recoverable amount, being the fair value of the assets and the present value of their future cash flows to which we subtract the cost of disposal. The impairment test is made by comparing the carrying amount of the entity and its recoverable amount. If the recoverable amount is lower than the carrying amount, then the firm should recognise an impairment loss emerging from one or more entities. If the recoverable amount is higher than the carrying amount, then there is no impairment (Deloitte, 2017b).

6. Valuation methods for goodwill and other intangible assets

According to Trugman (2011), in order to have value, intangible assets have to create some quantifiable amount of economic benefit to the owner which can be divided into three different categories: (i) incremental revenues or earnings (i.e. such as pricing, volume) (ii) cost savings (i.e. such as process economies and marketing cost savings); and finally (iii) increased market share or visibility. We can thus put forward the hypothesis that it is straightforward to identify how a firm can practically and concretely make money out of intangible assets.

Nevertheless, numerous authors emphasise the challenge to put an actual figure on intangible assets (Hughes, 2008). In fact, to value any intangible asset there is a need to get down to the cash flows, represented by the costs and the revenues, related with that specific intangible asset. Being able to correctly value each intangible asset category independently, and being able to properly allocate and understand the revenue stream and associated costs constitutes a real challenge (Roche & Tyler, 2014).

A possible solution consists in conducting a Purchase Price Allocation (PPA). When a firm is valued in order to be acquired or merged, the total price to be paid needs to be allocated to different assets, this process is called PPA. It starts with the allocation to a stake of the price to the existent book value of assets. The second step consists in looking into this existent assets' base and assess if some should be revalued. We can take the example of a building which would be worth more in the current state of the market than the value it was accounted for ten years ago. The third and last step of the process will be to allocate the remaining stake of the purchase price to different categories of intangible assets. This part starts with a discussion with the buy-side to understand the specific reason of their purchase, it could be for example: a technology, a brand recognition or a specific customer base. Knowing the purpose of the purchase will help to value the intangible assets which are more relevant for the buyer and why they could be worth more for one buyer than another (Meunier, 2018).

Following IAS IFRS policies, there are three recognised approaches to value intangible assets: market-based, revenue-based and cost based. We will explain them in order of preference when applying IAS IFRS standards (Meunier, 2018; Trugman, 2011).

6.1. Market approach

The market-based approach, more commonly called the comparable approach, consists in finding an "identical or substantially similar intangible assets recently exchanged in an arm's length transaction" (Trugman, 2011). However, the market approach does not bring great excitement in the valuators community due to the lack of information concerning identical previous transactions and the difficulty of comparing intangible assets. In fact, intangible assets are "combined" with other assets which makes it challenging to value them separately. The value of an intangible asset is influenced by the interdependence with other components and the enterprise environment (Fustec & Marois, 2006; Louzzani, 2006). Finally, the market approach will most likely be used in the case of brand valuation (Meunier, 2018).

6.2. Revenue approach

The revenue-based approach is probably the most commonly used for valuing intangible assets. This concept states that the economic value of an asset is determined by the future benefits generated by this asset on a determined period. We have two separated steps for this approach. First, identification, separation and quantification of the cash flow attributable to the asset. Second, the discounting of the cash flows attributed at the required date. The revenue-based approach includes three different methods: relief from royalty, excess earnings and incremental income revenue (Streel et al., 2017; Beldi et al., 2010).

The relief from royalty is based on the price estimation (royalty) that a company is sparing because they do not have to pay this royalty to use the asset or what a counterpart would agree to pay in exchange for an intangible asset they do not possess. Therefore, the attributable value of the intangible asset, following the relief from royalty method, will be the discounted value of the spared future royalties during the life of the asset. In the case of an asset with a non-defined lifetime, a terminal value will be estimated and discounted. On the one hand, in the case of an asset that is licensed to a third party, the royalty that is paid can be used as a base for the valuation. On the other hand, in the case of a non-licensed asset, comparable license contracts made between similar firms will be used as a benchmark for the valuation. An important fact to consider is that the rates applied for the usage of the intangible asset will exclude any cost of using the concerned asset. This valuation practice will typically be used for assets that currently are or could be traded such as brands, patents or licensable know-how. Even if the relief from royalty is widely used and accurate, the access to information remains its main disadvantage.

Indeed, it is first difficult to find closely similar license contracts on the market, second, those documents are often not publicly available (Streel et al., 2017; Beldi et al., 2010).

The excess earnings method consists in allocating the cash flows generated by a firm to all the cash-generating assets excepted the one we try to assess. The cash flows are calculated using the return rate required for each concerned asset. Once the cash flows have been allocated to the concerned assets, the excess cash flows are attributed to our selected asset. Moreover, this method is generally used for cases where the asset is linked to the core business of the company, among other examples we have, customer relations, backlogs, certain technologies. For this specific type of asset, the main challenge is to allocate for each of them a precise stake of the benefits (Streel et al., 2017).

The last method is the incremental revenue method which says that we can value an asset by the present value of the excess profits (or premium) it is generating for the firm. We can take as example firm A selling beers under a famous brand name and firm B selling the same product under a white label. The premium that customers will pay for a beer from A compared to a beer from B will be the stake of the revenue attributable to the intangible asset (in this precise case the brand recognition). We should note that there can also be margin differentials and volume premiums (Meunier, 2018).

The discount rate is used for the methods using the revenue-based approach. Usually, we would take the internal rate of return (IRR) required by investors for investments in similar assets. As expected, this is considered in the case where no synergies are expected otherwise, the benefits would exceed the IRR. In general, the weighted average cost of capital (WACC) of all the assets of the firm will be taken as starting base. Then we will adapt this rate of a few percent depending on how risky the asset is (Streel et al., 2017).

6.3. Cost approach

This last method may be used in two different ways. First, through the historical costs that were recorded for the creation of the asset. Second, assessing how much it would cost to recreate the asset with the means of today. This latter technique is called the replacement cost method (Streel et al., 2017; KPMG, 2010).

The costs to create or recreate the asset include among others: R&D, marketing, advertising or events. The main limitation to this approach is the fact that it is based on historical or current data while the value of an asset is usually based on the future benefits that it will bring. For example, some assets could be worth zero because they are not marketable even if they cost a lot of money (Streel et al., 2017). Finally, the cost approach will often be used in the valuation of assembled workforce or internally developed softwares (Louzzani, 2006).

7. Goodwill, tangible and intangible assets evolution

7.1. The rising importance of goodwill

The importance of goodwill as part of intangible assets has evolved over the years, this assertion is to put into parallel with the change in the industries driving the economy. Two statements made in 2012 by Nadine Riedel from Oxford University's Centre for Business Taxation enable us to understand the growing importance of intangibles in the modern environment. First, she emphasises that ideas are driving the economic growth instead of manufacturing as it used to be, "modern business is based increasingly on the potential, rather than the piecemeal value of assets". Second, "As the costs of many tangible assets have declined through mass production and technological innovation, the value of intangible assets has increased and these assets often constitute a significant, if not the major portion of a business's value" (Riedel, 2012).

Even though the stake of intangibles in the global economy is more important than ever before, some industries are still heavily relying on tangible assets. Those industries are known as having a low Fixed Assets Turnover ratio (FAT):

$$FAT = \frac{Net\ sales}{Average\ fixed\ assets}$$

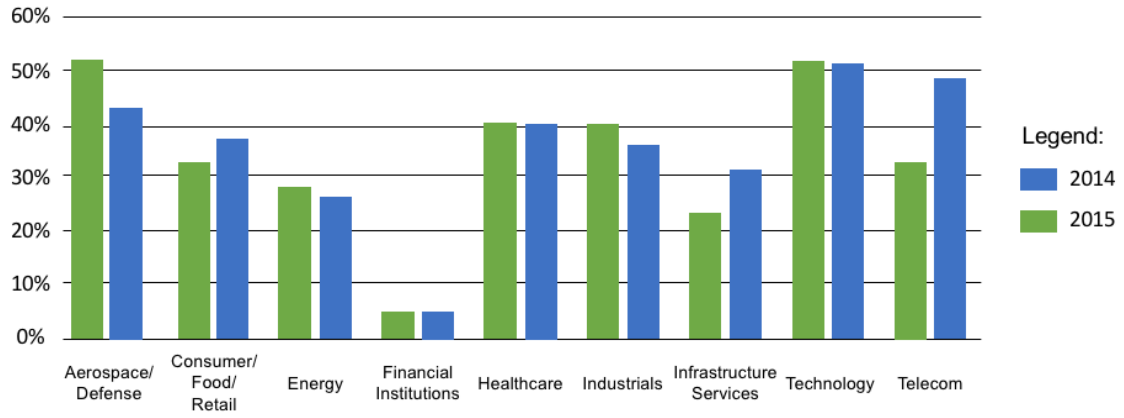
The aim of this ratio is to detail how much a business is using its fixed assets to generate sales. Industries such as mining, oil and gas, automotive, aviation, defense or transports, have a more important usage of their fixed assets compared to sectors such as advertising, IT, entertainment, technology or telecoms (Garanina, 2018).

Goodwill can have more or less importance depending on the stakeholder. We distinguish two main groups of individuals concerned about the weight of the goodwill on a balance sheet, the acquirers and the creditors.

7.1.1. For the acquirers

Houlihan Lokey led a study in 2016 about acquisitions realised in 2015 in the United States of America. The sample contained originally 1525 publicly traded company which they had to narrow down to 563 because of a lack of disclosures. The main objective of the study was to determine the importance of goodwill and other intangible assets as a share of the total purchase price (Houlihan Lokey, 2016).

Figure 3: Median results for goodwill as percentage of the purchase price.



Adapted from: Houlihan Lokey, 2016

As we can clearly see, the share of goodwill varies between the different industries. Aerospace & Defense together with technology is leading the ranking while financial institutions and energy are lagging behind.

In a research led by Luc Paugam from the University of Paris Dauphine in 2011, he divided the price paid for acquisitions in cutting-edge technology firms into four categories: current R&D expenses, identifiable intangible assets, tangible assets and goodwill (see Appendix 2). The R&D expenses are insignificant and the intangible and tangible assets represent respectively ~12% and ~25% of the acquisition price. The rest (~62%) is allocated to the goodwill which means that if the valuation is reliable, investors have high expectations of the future value they could extract from non-currently identifiable and separable assets (Paugam, 2011).

Therefore, since the size of the goodwill is related to the industry, a firm will have to allocate a larger stake of the acquisition price to goodwill depending on the target industry.

7.1.2. For the creditors

Firms with more tangible assets tend to have more debt (Harris & Raviv, 1991; Frank & Goyal, 2008; Parsons & Titman, 2009). This association is understandable since tangible assets represent a good collateral for several reasons. First, they can easily be sold or reused at a reasonable price (Lim et al., 2017). Moreover, tangible assets tend to be easier to separate, identify and value, while for example self-created intangible assets are difficult to report on a balance sheet even if they generate a lot of revenue (Lim et al., 2017). Nonetheless, as mentioned by Virginie Meunier (2018), manager at BDO, the previous statement is not always true. Indeed, if the firm has very specific activities in a precise scope, its tangible assets might not be very liquid.

Furthermore, firms are often asked to keep a capitalisation ratio above a certain threshold when being lent money. As mentioned earlier, oppositely to tangible and some intangible assets, goodwill is not amortised but subject to at least an impairment test every year. As a consequence, the goodwill value is hardly predictable. In case of a bad scenario, the goodwill could be drastically reduced leading to a reduction of the equity value. Depending on the intensity of this value decrease, the firm could go below the bottom line previously fixed by the creditor which would put it in a distress position (Ji, 2017).

7.2. Towards the end of tangible assets

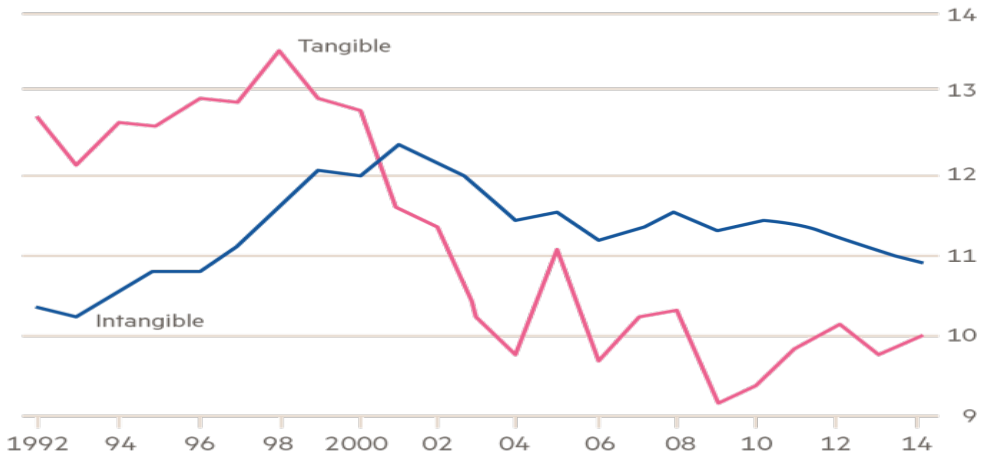
During the two previous centuries, the value driving resources were labor, land and capital. These scarce resources are still important today but do not guarantee an ability to engender profits as it used to. The main reason behind this is the increasing mobility of labor and capital. Today, the earth is considered as flat from a business point of view since the availability of factors of production is borderless. The “new economy” needs factors to create sustainable competitive advantages (Teece, 2016). As former U.S. Federal Reserve Chairman Alan Greenspan stated, “we must begin the important work of developing a framework capable of analysing the growth of an economy increasingly dominated by conceptual products” (Greenspan, 2004).

Andriessen (2004) highlights three breaking elements which enabled to go from an economy of tangibles to intangibles:

- The development of information and communication technology (ICT);
- The development of the services economy like telecommunication, transport, energy and the financial sector;
- The growing importance of innovation and creation.

This revolution is quite destabilising as mentioned by Professor Jonathan Haskel "This is capitalism without capital (…) from the mid-2000s onwards, companies have been investing more in 'intangibles' such as branding, design and technology than they have in machinery, hardware or property" (Haskel, 2017). We can observe this statement regarding the investments made in tangibles and intangibles in the UK on the graph below.

Figure 4: Investment as a share of sector value added—UK



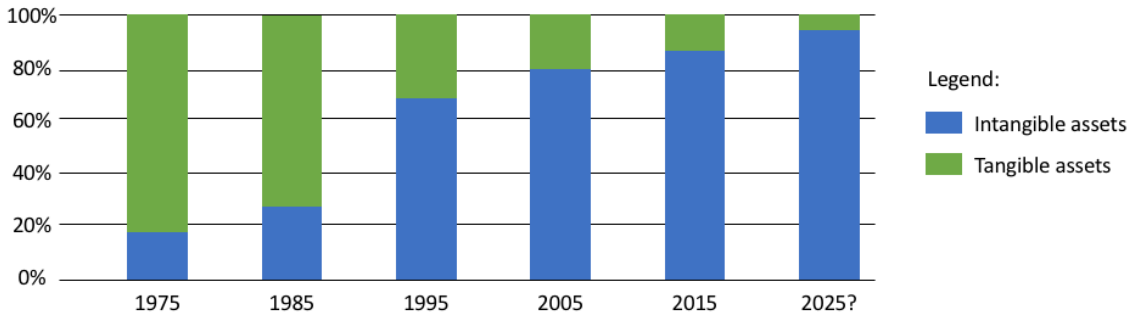
Retrieved from: Haskel & Westlake (2017)

7.3. The dazzling evolution of intangible assets

The importance of intangible assets has been constantly increasing for quite a few years in the financial sphere. As mentioned by Thum-Thysen et al. (2017), there has been a shift in mentality from the idea that firms' competitive advantage has to be based on power and size to the mentality that it has to be based on intangible resources such as "competencies, capabilities and the assimilation of knowledge". According to Lev (2001), such a change has been triggered by the rapid growth of information technologies coupled with globalisation and deregulation.

Within a forty-year period of time, an increasing importance has been given to intellectual capital compared to bricks-and-mortar, to research and development compared to capital spending or even to services compared to manufacturing (Skroupa, 2017). A recent study of Ocean Tomo (2017) (see Figure 5) allows us to quantify that substantial increase. In fact, in 1975, intangible assets represented "only" 17% of the total market value on average for the companies listed on the S&P 500. According to ETF Database, most of the biggest companies at that time were either in the telecom, oil or computer manufacturing industry and thus highly relying on tangible assets (Johnston, 2013). Four decades later, intangible assets account for 84% of the total market value and experts are unanimous regarding its continuous growth as a key factor for companies (Villanueva, 2011).

Figure 5: Evolution of intangible assets throughout the years in the S&P 500 Market Value



Adapted from: Ocean Tomo, Intangible Assets Market Value Study, 2017.

Moreover, and as mentioned by Roche & Tyler (2014), it is interesting to see that over the last fifteen-twenty years, intangible assets' acknowledgement has spread throughout many sectors. In fact, it is not confined to pharmaceutical, biotechnological and technological industries anymore but also to financial institutions and lending companies, for example.

However, a study from Lim et al. (2017) shows that firms in the technology industry will be able to leverage more on their intangible assets (i.e. included in the innovative property subdivision such as patents and R&D) than companies in other industries. Moreover, the authors argue that intangible assets are more difficult "to identify, separate, utilise and value. Furthermore, their value is more sensitive to who owns and employs them". We can thus conclude that the sector/industry in which a company is established has its importance speaking of concretely and effectively taking advantage of their intangible assets, and that some intangible assets can happen to be sector exclusive.

Finally, it has been proven that intangible assets have an impact on a firm's performance. In fact, Chen (2014) argues that companies with a higher share of intangible assets in total assets "start smaller, grow faster, and have higher Tobin's Q".

7.4. Link to Profitability

After reviewing the evolution of goodwill, tangible and intangible assets, we decided to investigate on their respective relation towards profitability. Xiao & Liu (2016) mention that there exist a positive correlation between goodwill and profitability. Moreover, they argue that the bigger the proportion of goodwill, the stronger the profitability will be. Furthermore, Kamasak (2017) argues that intangible resources contribute to a firm's performance at a higher level than tangible resources. However, he emphasises the importance of explanatory power of a combination of intangible and tangible resources of a firm's profitability. Finally, Tudor et al. (2014) observe a positive correlation between intangible assets and profitability measures.

7.5. Literature conclusion

The analysis of the evolution of goodwill, tangible and intangible assets throughout the years according to the literature allows us to draw our first conclusions: (i) the influence of goodwill and intangible assets has been constantly increasing during the past decades, and is expected to continue so in the near future. On the contrary (ii) tangible assets' importance has been decreasing over the years, and firms are less and less investing in that area. Moreover (iii) intangible resources have a higher impact on profitability than tangible resources.

PART II: PRACTICAL PART

8. Empirical research

8.1. General description

8.1.1. Company sample and market capitalisation

We decided to choose a sample of fifty-three companies listed in Europe (see Appendix 3). This choice was motivated by the fact that we wanted to be able to analyse companies reporting using IAS IFRS accounting rules in their financial statements. Moreover, the companies are either segmented in what is called the compartment A or B. The compartment A gathers companies with a market capitalisation of more than €1 billion, and the compartment B gathers companies with a market capitalisation between €150 million and €1 billion (Euronext, 2018). We did not choose companies in the compartment C (with a market capitalisation below €150 million) due to the fact that (i) financial figures reported on databases are not as exhaustive as firms from categories A and B and that (ii) their propensity to invest in intangible assets is lower than for bigger companies (there exists a positive correlation between a firm's size and its investment in intangible assets) (Corrado et al., 2018).

8.1.2. Industry

Between 2004 and 2007, KPMG analysed 342 transactions occurring during this four-year period. The objective of the study was to examine how the price allocation for a merger or an acquisition would differ between the following industries: automotive, building & construction, chemicals, computer & semiconductors, consumer products & services, energy & power generation, entertainment & media, financial services, industrial products, the internet & e-commerce, life science & healthcare, software and telecommunications. The study aims more precisely to evaluate the importance of goodwill and intangibles as part of the total acquisition price. As we can see on Appendix 4, a significant stake (57%) of the total acquisition price is allocated to intangibles in the specific industry of consumer products and services. This high proportion is partly due to high marketing related intangible assets (69.2%), product brands being often recognised in the sector (KPMG, 2010). This study helped us in our industry selection process. Indeed, we opted for the fast-moving consumer goods (FMCG) also called the consumer packaged goods (CPG) industry since it is the one with the most significant relative intangible value of the acquisition price.

For this reason, we thought that if there is a correlation between intangible assets growth and profitability, it would be more striking in that specific sector.

The FMCG is one the largest industries in the world and is characterised by manufacturing, trading and dealing with goods with very short shelf lives (Bickersteth et al., (2016). Trends emerge very quickly and disappear even faster though the industry manages to leverage on intangible assets (Lavi, 2016).

Nevertheless, and as previously mentioned, Lim et al. (2017) argue that technology-based companies have a higher ability to leverage their intangible assets in order to produce more revenue than other companies. Following this statement, we wanted to investigate the evolution of the FMCG sector in the conversion of its intangible assets into profits.

8.1.3. Multiple linear regression

Choosing an appropriate regression model is anything but simple. According to Gogtay et al. (2017), the decision-making process to pick the appropriate regression model will depend on three different metrics: (i) number and nature of the dependent variable (i.e. such as continuous, categorical or normally distributed among others); (ii) number and nature of the independent variable (i.e. such as continuous, categorical or normally distributed among others); and finally (iii) the shape of the regression line (i.e. which represents the relationship between variables which can be linear, logistic or polynomial among others).

As a result, we decided to opt for a multiple linear regression (MLR). The MLR model is used in order to assess the relation between one dependent variable (EBITDA) and multiple independent variables (PPE, goodwill, intangible assets). This model is characterised by the following assumptions: (i) there is a linear relationship between the dependent and independent variables; (ii) independent variables should not be too highly correlated among each other; (iii) observations of the dependent variable should be picked randomly and independently from the population, and finally (iv) residuals should be normally distributed (variance σ and mean of 0) (Tranmer & Elliot, 2008). Considering the fact that we have a nine-year timeframe, we had to conduct nine multiple linear regressions in order to be able to analyse the results accordingly and see the evolution of the variables' impact.

8.1.4. Source of data

For the purpose of obtaining reliable outputs from the regression which will lead us to a meaningful interpretation, we needed to access a database following two criteria. The database must (i) gather all the companies of our sample (ii) be consistent in time, not lacking any data set from 2009 to 2017. We agreed to select Bloomberg, the leader in financial reporting, as it fulfils the criteria. Moreover, we wanted to take advantage of their "comprehensive view of industries and their key constituents at the sector, industry and company levels" (Bloomberg, 2018). We thus extracted every financial figure through the terminals available at the Louvain School of Management.

8.2. Model and variables

8.2.1. The model

Our analysis focuses on the relation between the EBITDA generated by companies in the FMCG industry and the increasing or decreasing importance of goodwill, intangible and tangible assets. For this purpose, we constructed a multiple linear regression model connecting the EBITDA and three explanatory variables (goodwill, intangible and tangible assets). Moreover, the model also includes key EBITDA drivers highlighted in the literature (OCDE, (2018) ; Keuper et al. (2012)). Therefore, the inventory turnover ratio, R&D spending, and the number of employees were included in the regression as control variables.

As for information purposes, we gathered the data of several other variables identified in the literature (Bickersteth et al., (2016); Renner, (2017); Patton, (2016)) such as: population density, KOF Globalization index, total value and number of M&As, spread interest rate, stock price, inflation, and finally the market share. However, following a plug in methodology, we found out that their respective statistical significance did not match our regression model while including them as control or explicative variables. We thus decided not to take them into account in our multiple linear regression, in order to only continue with the variables fitting the model.

The four final models that have been used to do the multiple linear regression are thus the following ones:

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IAT + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IA + \beta_3 GW + \beta_4 R\&D + \beta_5 ITO + \beta_6 EMP + \varepsilon_t$$

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IAGW + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

$$EBITDA_t = \beta_0 + \beta_1 PPEGW + \beta_2 IA + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

8.2.2. The variables

8.2.2.1. Dependent variables

EBITDA, stands for Earnings Before Interest, Taxes, Depreciation and Amortisation, is a metric that is used in order to assess a company's operating performance. This metric is often used as a proxy for cash flow, and is a variation of the EBIT by ignoring some non-operating and non-cash expenses (Damodaran, 2012). The main reason we decided to choose EBITDA as our dependent variable is to avoid managerial discretion/earnings manipulations as much as possible. In fact, by omitting non-operating and non-cash expenses, the EBITDA focuses on the business' profitability from its very core operations without taking into account the capital structure, leverage and depreciation. We attempted to detail the advantages of EBITDA through six different points (CFI, 2016):

EBITDA:

- Provides a good assessment of the current business health, and how well a company's core operations are working;
- Does not take into account financial investments;
- Only considers daily operating expenses;
- Illustrates the cash flow from current operations;
- Is a good representation of a company's profitability;
- Is a reliable benchmarking figure.

8.2.2.2. Explanatory variables

As previously mentioned, our goal is to assess whether or not goodwill, tangible and/or intangible assets have seen their importance increase in the EBITDA generation of FMCG companies listed on the Euronext between 2009 and 2017. This is the reason why we decided to pick the three of them as our explanatory variables.

The first explanatory variable is tangible assets. We decided to restrain its definition by only including the fixed assets, represented by the firm's Property Plant & Equipment (PP&E). PP&E are physical and tangible long-term assets (i.e. such as lands, buildings or vehicles) that are critical to business operations and expected to contribute to the economic benefits' generation of a company for a period of more than one year (Damodaran, 2012). We omitted the current assets due to their highly liquid feature (Myers & Rajan, 1998) that is out of our research interest. The Property Plant & Equipment variable name will take the form of "PPE" in our regression model.

The second explanatory variable is intangible assets. We started with total intangible assets (IAT) in our first regression. Then we decided, in the second regression, to split intangible assets in two distinct parts: goodwill (GW) and other intangible assets (IA). For more information about intangible assets refer to Chapter 4 of our thesis.

The third explanatory variable is represented by the goodwill. For more information about the goodwill refer to the Chapter 5 of our thesis. The goodwill's variable name will take the form of "GW" in our regression model.

8.2.2.3. Control variables

In order to either control or eliminate the influence of variables that are not of primary interest in our research, we decided to incorporate three control variables which will allow us to estimate the effect of the goodwill, tangible and intangible assets on profits free from omitted variable bias (Clarke, 2005).

The first variable is innovation and has been identified by Keuper et al. (2012). The variable has two main components being respectively: (i) M&A, and (ii) R&D spending. However, we decided to include only R&D spending due to the non-significance of the number or the value of M&As in our regression. As a result, we decided to gather the data about the total spending in R&D done by each company of our sample in the FMCG sector during the nine-year timeframe. R&D spending's variable name will take the form of "RD" in our regression model.

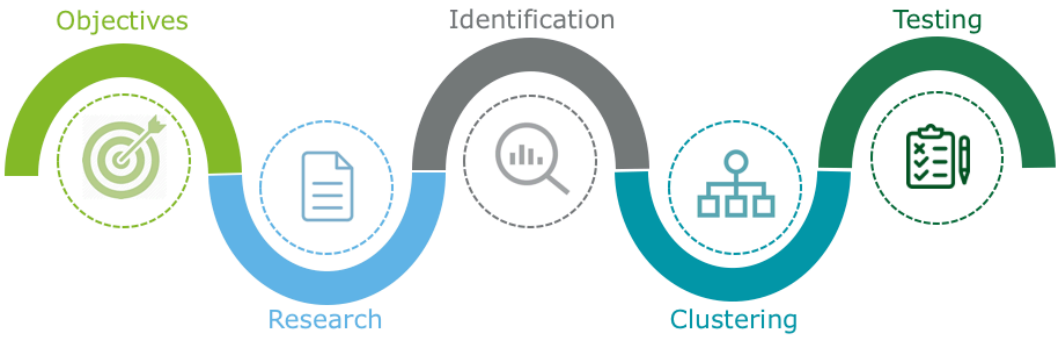
As a second control variable, we selected the number of employees that has been identified by Ton (2009). Hiring new employees is not always as obvious as we expect it to be. In fact, managers perceive it more as a cost than a profit driver due to the relative straightforwardness of measuring the costs of increasing labor compared to the more indirect benefits (King & Lenox, 2002). However, Ton (2009) demonstrates that employees are a profitability driver. In fact, an increase in the amount labor is correlated with an increase of profitability. The number of employees' variable name will take the form of "EMP" in our regression model.

The final control variable we decided to choose is the inventory turnover ratio and it was identified by Singhal & Vyas (2017). The inventory turnover ratio is a metric that highlights the management's ability to use resources in an effective way. The metric indicates the number of times a company sells its inventory in one year, and thus the higher the ratio the better (Rao & Rao, 2009). Inventory management is key for a lot of firms, but especially in the FMCG sector. In fact, a lot of companies declare bankruptcy because of cash flows issues rather than a deterioration of their profitability. As a result, companies try to generate cash quickly enough in order to cover their immediate liabilities (Singhal & Vyas, 2017). The inventory turnover ratio's variable name will take the form of "ITO" in our regression model.

8.3. Hypotheses

In order to come up with our hypotheses, we used a particular methodology composed of five different steps (see Figure 6 below).

Figure 6: Methodology followed for writing our hypotheses



Research hypotheses are presumed answers to research questions (Tremblay & Perrier, 2006). Those hypotheses are not built from nothing, they have to follow a strict process to be tangible and accurate.

The first step starts with the setup of objectives, Robert et al. (2006) describe the latter as the contribution that researchers hope to bring to a field of study by validating or invalidating one or more hypotheses. This objective is defined as the general objective arising from personal enthusiasm and curiosity towards a topic. The general objective will be then broken down into several operational objectives. The operational objectives illustrate all the practical work to be realised in order to properly answer our initial objective (Tremblay & Perrier, 2006). Our general objective is to assess the intangible assets and goodwill influence overtime on the profitability of a firm. Our operational objectives are numerous, we attempted to gather them in the following list: (i) literature review (ii) research of a relevant database (iii) homogenisation of the database (iv) research of variables relevant for our study, and finally (v) analysis of the data (regression and interpretation).

Research comes as the second step. We went through a thorough literature review aimed at, validating our assumptions but also to explore and understand the field to capture as much information as possible.

Furthermore, we identified the gaps in the literature. This step does not only confirm what you can or cannot do but it helps you to reorient your topic towards something that has not been done. We found that similar studies had already been made but never in the same industry, within the same time period and with identical variables.

Moreover, this process is closely linked to the previous one as for one particular topic, you have specific related data and models but for a slightly different topic the analysis can be totally different. Therefore, we listed all the possible explanations and grouped them in different clusters. As a result, we came up with the following hypotheses:

Hypothesis on total intangible assets:
H0: Intangible assets and goodwill's influence on profitability decreased or stayed constant between 2009 and 2017.
H1: Intangible assets and goodwill's influence on profitability increased between 2009 and 2017.

Hypothesis on tangible assets:
H0: Tangible assets' influence on profitability increased between 2009 and 2017.
H1: Tangible assets' influence on profitability decreased or stayed constant between 2009 and 2017.

Hypothesis on intangible assets:
H0: Intangible assets' influence on profitability decreased or stayed constant between 2009 and 2017.
H1: Intangible assets' influence on profitability increased between 2009 and 2017.

Hypothesis on goodwill:
H0: Goodwill's influence on profitability decreased or stayed constant between 2009 and 2017.
H1: Goodwill's influence on profitability increased between 2009 and 2017.

Finally, we conducted our multiple regression analysis and confronted the results with our hypotheses. Nevertheless, it is important to mention that, after having performed and tested the first four hypotheses, we decided to dig deeper down in the subject.

As a result, we drew two new hypotheses:

Hypothesis on goodwill and intangible assets combined:

H0: The combined effect of goodwill and intangible assets' influence on profitability decreased or stayed constant between 2009 and 2017.

H1: The combined effect of goodwill and intangible assets' influence on profitability increased between 2009 and 2017.

Hypothesis on goodwill and PPE combined:

H0: The combined effect of goodwill and PPE's influence on profitability decreased or stayed constant between 2009 and 2017.

H1: The combined effect of goodwill and PPE's influence on profitability increased between 2009 and 2017.

9. Results

9.1. Statistical criteria for significance

Before diving into our analysis, we found useful to quickly go through the different indicators used in regressions on which we base our interpretations.

Firstly, the p-value (P > |t|). This indicator is used in order to assess the significance of variables on their own, and can be defined as "the level of marginal significance within a statistical hypothesis test representing the probability of the occurrence of a given event." (Brebbia & Boukalova, 2017). In other words, a p-value is "the probability of obtaining an effect at least as extreme as the one in our sample data, assuming the truth of the null hypothesis. However, it is not the probability of making a mistake" (Sellke et al., 2001). If a p-value is lower than 0.05, we reject the null hypothesis which states that there is no relationship between two measured phenomena, making it significant. Oppositely, if the p-value is larger than 0.05, we fail to reject the null hypothesis, making it not significant (Filho et al., 2013).

Secondly, the Prob > F. This indicator is used in order to assess the significance of the whole regression model, if a group of variables are jointly significant. The F statistic is the probability that the null hypothesis is true for the whole model. As a matter of fact, it means that a low value would indicate that at least a few regression parameters are non-zero and that the whole regression equation has some validity in fitting the data (Reid, 2013).

Finally, the Adj R-squared. This indicator is used in order to assess the global fit of the model. In other words, the adjusted coefficient of determination will provide us with indications concerning the proportion of the variance in the dependent variable that is predictable from the independent variable. The "adjusted-feature" takes into account the number of explanatory variables used, and is thus not influenced by the latter. It's coefficient is between 0 and 1, and the closer it gets to 1, the better the adjustment quality of the model towards the data (Gillaizeau & Grabar, 2011; Gujarati, 2004).

9.2. Regression analysis

In order to adopt the best approach possible, we decided to divide our multiple regression analysis in four different steps each characterised by one particular regression: (i) Total Intangible Assets Model (ii) Intangible Assets & Goodwill Model (iii) Intangible Assets and Goodwill combined Model, and finally (iv) Intangible Assets and PPE combined Model.

9.2.1. Total Intangible Assets Model

At first, we wanted to test our model, and more specifically our explanatory and control variables. As a result, we decided not to make any distinction between the goodwill and other intangible assets. The regression that we conducted is the following:

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IAT + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

As may be seen on Appendices 5 to 13, all the variables but one (IAT13) are significant, the F statistic is equal to 0.0000 for the nine regressions, and the lowest value taken by the Adjusted R^2 during this nine-year time frame is 0.9704 in 2017. From this point, we can thus assume that our model is correct and can presumably well explain the dependent variable.

In order to be able to analyse the evolution of our variables' coefficients, we decided to take 2009 as a reference year. As shown on the Appendix 41, we can observe that RD and ITO almost share the same pattern until 2016 where ITO continues its increase, and RD slightly started to decrease. Concerning EMP, it decreased until 2016 and then started to increase to reach an all-time high level in 2017 (increase of 24% with regard to 2009). Moreover, we can argue that the effect of control variables on the EBITDA has been quite constant over the 2012 to 2015 period and more volatile at the beginning and at the end.

Concerning the explanatory variable, as shown in the Appendix 42, we can see that PPE's impact on the EBITDA is constantly increasing over the years until 2016 where it started to plummet. On the whole, PPE's influence gained 68.49% from 2009 to 2017. We can argue that its impact on the EBITDA will start decreasing over the coming years. Regarding IAT, its impact on the EBITDA started to increase constantly until 2011, and then started to plummet in 2012, skyrocketed in 2013 until 2014, to decline again in 2015 (becoming even negative), and finally started to increase again in 2016.

Its volatility comforted us in our desire to break it down in two different components: (i) Goodwill, and (ii) Other intangible assets in order to assess their individual impact on profitability.

9.2.2. Intangible Assets and Goodwill Model

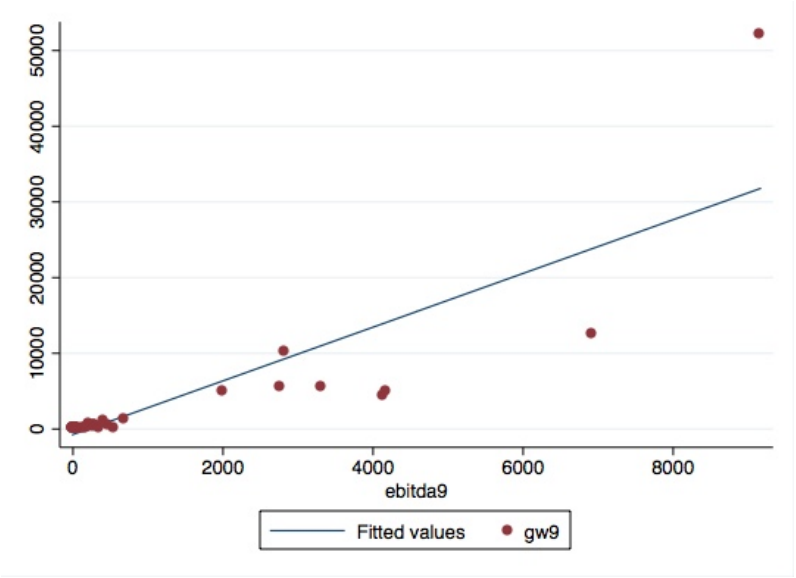
After the conclusive results of the first regression, we deepened the analysis separating goodwill and other intangible assets in the regression. This would help us to see the difference between the effect of goodwill and other intangible assets on EBITDA. The formula we used is the following:

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IA + \beta_3 GW + \beta_4 R\&D + \beta_5 ITO + \beta_6 EMP + \varepsilon_t$$

If we look at Appendices 14 to 22, we observe that the average Adjusted R-squared of the model is of 98.47%, meaning that the whole model fits our data almost perfectly. Moreover, all the variables are constantly statistically significant except for goodwill. The graph below (representing the scatter plot and trend line), shows us the relationship between the values for 2009 goodwill and EBITDA. Due to large spreads between EBITDA values in our sample forcing us to choose non-adequate scales for every company, the visual representation could not be appealing at first sight (we preferred to include all the sample on a same graph for exhaustivity reasons). However, if we could zoom in, we would see that dots (each representing a different firm) do not fit on the regression line explaining the non-significance of the GW variable.

The same conclusions as for 2009 happen for every year of our analysis except 2013, 2015 and 2016. For this reason we decided not to intent any interpretation between goodwill and EBITDA.

Figure 7 : Comparison regression line and sample data: goodwill / EBITDA 2009



9.2.3. Intangible Assets and Goodwill Combined Model

As goodwill was not statistically significant in the previous regression, we deepened our analysis by combining goodwill and intangible assets. As a result, we created an interaction factor which is an outcome of the multiplication between goodwill and intangible assets of each firm of our sample. An interaction effect consists in the simultaneous effect of two or more explanatory variables on at least one dependent variable in which the sum of their effects is lower than their combined effect. Including interaction variables is key in order to highlight how the cooperation of two explanatory variables impact the dependent variable. Moreover, it also allows us to have a better understanding and representation of that latter relationship (Lavrakas, 2008). In our case, this interaction variable would mean that the effect of intangible assets on EBITDA varies for different values of the goodwill. However, we decided not to incorporate the "main effect" variables (IA and GW) in the regression due to a multicollinearity issue measured by the VIF. As a reminder, multicollinearity issues can result in unstable parameters estimations leading to difficulties regarding the assessment of the effect of independent variables towards dependent variables due to high correlation among predictor variables (Daoud, 2017). Moreover, such a procedure can be done as mentioned by IDRE (2018), but will change the interpretation of the interaction variable that is conducted as we only took into account the interaction coefficient. The formula below represents the equation we used for the linear regression, including the combined variable IAGW (intangible assets * goodwill).

$$EBITDA_t = \beta_0 + \beta_1 PPE + \beta_2 IAGW + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

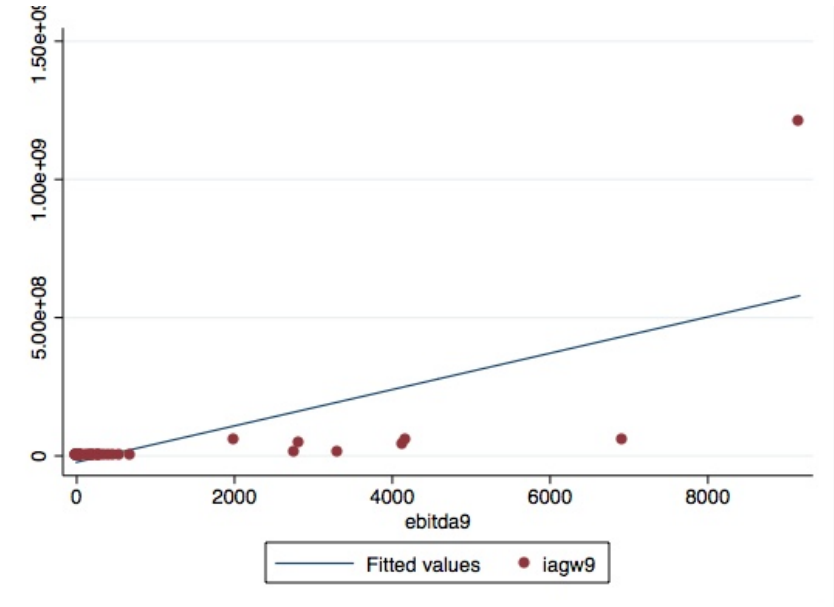
As may be seen on the Appendix 23, IAGW impacts the EBITDA of 0.000134% in case of a combined increase of GW and IA of one. However, in a hypothetical case of independency and statistical significance for all the variables, where we could have included the combined variable to the original equation, we would have been able to state the following conclusion: for the year 2010, the effect of intangible assets, goodwill and the interaction coefficient on the EBITDA is of 10.58% - 3.15% + 0.000163% for each unit of intangible assets and goodwill added. If there is no increase of goodwill at that time, the effect of a rise in intangibles will only be of 10.58%. However, these figures are retrieved from Appendix 46 and are not all statistically significant and were used as illustration purposes.

Multicollinearity

$$EBITDA_t = \beta_0 + \beta_1 PPE + 0.0163\% IAGW + 10.58\% IA - 3.15\% GW + \beta_5 R\&D + \beta_6 ITO + \beta_7 EMP + \varepsilon_t$$

Unfortunately, as we can see on the graph below for the year 2009, representing the impact of intangible assets combined with goodwill on EBITDA, the variable is statistically insignificant since the data does not fit on the regression line. The same verdict accounts for the years 2013, 2014 and 2017.

Figure 8 : Comparison regression line and sample data: IA&GW / EBITDA 2009



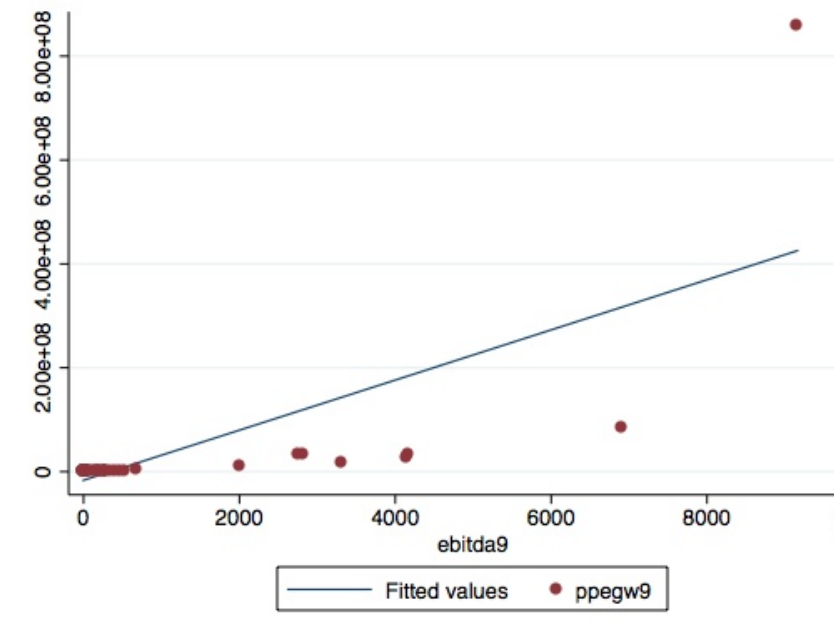
9.2.1. PPE and Goodwill Combined Model

This regression is the second part of the combined effect analysis. After conducting a regression to understand the impact of the combined variable IAGW, we built the equation below to assess the effect that goodwill and PPE have together on EBITDA.

$$EBITDA_t = \beta_0 + \beta_1 PPEGW + \beta_2 IA + \beta_3 R\&D + \beta_4 ITO + \beta_5 EMP + \varepsilon_t$$

The regression is statistically significant for all the variables over the nine periods, but for the combined variable PPEGW (PPE*goodwill) in 2013 and 2017 which are not statistically significant as we can see on the graph below where the plotted data does not completely fit the regression line of the model.

Figure 9 : Comparison regression line and sample data: PPE&GW / EBITDA 2009



9.2.2. Regressions interpretations and conclusion

9.2.2.1. Total Intangible Assets Model

The results of the Total Intangible Assets Regression Model allows us to draw two important conclusions. Firstly, we can observe that IAT's impact on the EBITDA has been very volatile during the nine years. The coefficient ended up suffering a loss of 52.57% from 2009 to 2017.

As a result, we fail to reject the null hypothesis on total intangible assets which states that "*Intangible assets and goodwill's influence on profitability decreased or stayed constant between 2009 and 2017*".

Secondly, we can see that the evolution of PPE's impact on the EBITDA has been increasing over the years, and only decreased in 2016. As a result, we fail to reject the null hypothesis on tangible assets which states that: "*Tangible assets' influence on profitability increased between 2009 and 2017.*"

Those two results can be explained by the fact that, even though it is proven that intangible assets drive more the value of companies than tangible assets, some companies still do not consider intangible assets as a key factor of success and prefer investing in tangible assets (Volkov & Garanina, 2007).

9.2.2.2. Intangible Assets and Goodwill Model

This second regression result is similar to the previous one in the sense that PPE and intangible assets have increased at the end of the nine periods. We can therefore reject the null hypothesis, which states that "Intangible assets' influence on profitability decreased or stayed constant between 2009 and 2017." Regarding the PPE, the evolution is the same as in the previous regression, we fail to reject the null hypothesis.

On Appendix 43, we observe on the graph the two lines representing the evolution of the PPE coefficient compared to the one of IA. We notice a growth of 18% over nine years in PPE while the rise in intangible assets reaches 135%. Meaning that even if an increase in PPE will still bring more profit than the same amount in intangible assets the spread is reducing. If the trend does not change, the IA coefficient will exceed the PPE one, in less than ten years. This would indicate that in 2027, the intangible assets would be a higher profit driver than property, plant and equipment. This switch in production factor has two possible explanations (i) the state of the global economy will be even more receptive to the profitability engendered by intangible assets, and (ii) the management of FMCG firms will learn to use the intangible assets in a more profitable fashion.

(i) "In today's world, intangibles have moved from the periphery to the core of modern organizations" (Marr, 2007). The results of our regression are confirmed by a study led by Jeremy Galbreath where he finds out that on average, all industries combined, intangible assets are a higher guarantee of economic thriving than tangible assets (Galbreath, 2005). As mentioned by Tom Goodwin "Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate" (Goodwin, 2015). Today, business models can be built on intangibles, and if they are not able to properly recognise, value and take advantage of them, they will most likely end up uncompetitive in the future (Ramasundara, 2018).

(ii) After a survey lead by Accenture, we understand that managers do agree that having a strong base of intangible assets is essential to the future economic survival of their firm. However, they admit not knowing how to manage them the best (Marr, 2007). Another survey led by Jozef Vodak states the following "it was proven that the ability of a company to mobilise and utilise the tangible and intangible assets is much more determining for its performance than to invest in physical tangible assets and their management" (Vodak, 2011). Today's economy, often qualified as knowledge economy needs new management mechanisms. First, intangibles are not identified and measured the same way as tangible assets. Second, managers have to understand how these intangibles can be used as performance drivers (Madhani, 2009). Those statements emphasise the importance of intangibles management as a value driver for the firm.

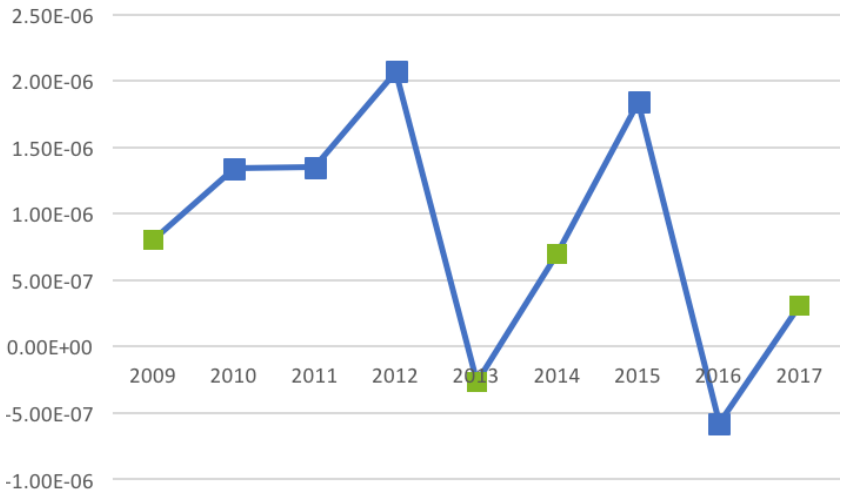
A relevant fact to note is that there is no single selection that should be made between tangible and intangible assets. Intangibles might already be in some industries, or will be in others, the most important asset category to build long-term profitability. However, the intangible assets alone will rarely produce any value. It is the combination between tangibles and intangibles that will lead to higher profitability, the two categories must be seen as complementary and not adverse (Teece, 2016).

9.2.2.3. Intangible Assets and Goodwill Combined Model

Even though there is a certain degree of non-significance on this model (44.44%), we still decided to make an interpretation regarding the first regression on the combined effect of goodwill. We can clearly see that we fail to reject the null hypothesis which states that "The combined effect of goodwill and intangible assets' influence on profitability decreased or stayed constant between 2009 and 2017".

On the graph below, we can observe the evolution of the coefficient of intangible assets and goodwill combined. The blue squares are the statistically significant values while the green ones represent the non-statistically significant values. Even if there is a positive correlation between the interaction variable and EBITDA, except for the year 2016, there is a global decrease of the influence of the interaction variable on EBITDA.

Figure 10 : Evolution of the IAGW coefficient on EBITDA

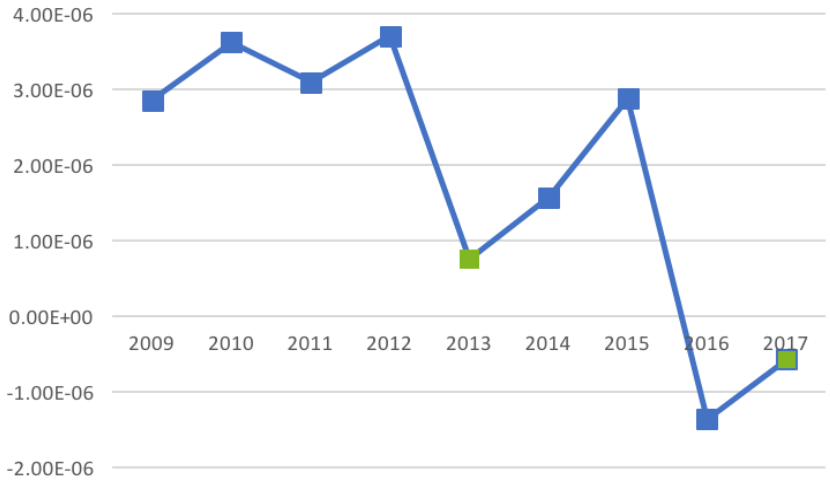


9.2.2.4. PPE and Goodwill Combined Model

Given the fact that there are seven coefficients statistically significant over the nine periods, we allow ourselves to draw some conclusions out of this second regression on the combined effect of PPE and goodwill. The Figure 11 represents the evolution of the combined effect of goodwill and PPE on EBITDA, where the statistically significant values are in blue and the statistically insignificant values are in green. We can still observe a decreasing impact of PPEGW on EBITDA over the years, going from a coefficient of almost 0.0003% to a negative impact of -0.0001%. This effect is minimal when compared to the EBITDA but the decrease is huge relatively to the previous years.

As a result, we fail to reject the null hypothesis which states that "The combined effect of goodwill and PPE's influence on profitability decreased or stayed constant between 2009 and 2017".

Figure 11 : Evolution of the PPEGW coefficient on EBITDA



The decrease in importance of the combined effect of PPE and goodwill on EBITDA could be explained by one potential factor. In a report from McKinsey, the authors argue that the modern automation will have the same utility as the previous automation wave, namely, to avoid human mistakes, reduce laborious work and to scale down manufacturing costs. However, these new automation machines are removing a certain know-how from the factories. Indeed, the automation of factories does not need a qualified labour force to run operations (Tilley, 2017). Therefore, we can assume that technical know-how is less required for the daily executions of common tasks. As a result, the combined effect of machinery as part of the equipment and the skills such as technical know-how as part of goodwill is not as much required as it used to.

9.2.2.5. Regressions conclusion

To summarise, the four regressions that we conducted allow us to: (i) fail to reject the null hypothesis of the total intangible assets model (ii) reject the null hypothesis of the intangible assets and goodwill model (iii) fail to reject the null hypothesis of the intangible assets and goodwill combined model, and finally (iv) fail to reject the null hypothesis of the PPE and goodwill combined model.

9.2.3. Limitations

The first limitation we have is in regards to our company sample. We have chosen fifty-three companies being part of the FMCG industry. For our study, we used variables such as R&D spending and number of M&A. However, in the case of small capitalisation firms, those variables would be insignificant. Indeed, it is more common for a larger firm to spend money in R&D and to execute frequent mergers or acquisitions (Corrado et al., 2018). As a result, we decided not to take those "small firms" into our companies' sample. Another reason that pushed us to select "bigger firms" is the higher availability of consistent data. Nevertheless, we know that fifty-three firms are not representative of the whole industry, even if some of them such as AB Inbev, L'oreal, Danone or LVMH are among the top players of the industry, it is far from being depictive of a worldwide scale. This said, we cannot confirm that the same conclusions would apply to the whole FMCG sector.

Second, our analysis concerns the evolution of the impact of intangible assets and goodwill from 2009 to 2017, we analyse the impact of each year intangible assets and goodwill on EBITDA. However, the effect of an increase of intangible assets or goodwill could take years to pay off in terms of profits. As mentioned by Ingrid Torjesen from the pharmaceutical journal, on a typical twenty-year patent for a drug, there will be on average twelve years of R&D and tests, costing £1.15 billion before the market launch (Torjesen, 2015). In our case, an increase in intangible assets in 2009 might even pay off after 2017. The limitation of our study is that this time lag is not taken into account.

However, we tried to conduct a regression for the year 2017 to observe the impact of previous goodwill and intangible assets (from 2009 to 2017). As we can observe (see Appendices 44 and 45), the significance is not consistent and fluctuates throughout the years. Concerning the goodwill, only the years 2011, 2012 and 2015 have a significant impact on the EBITDA of 2017. However, even their coefficients vary (GW11 and GW15 have a positive coefficient, while GW12 has a negative one). Concerning intangible assets, only the years 2013, 2014 and 2017 have a significant impact on the EBITDA of 2017. The coefficient varies as well (ia14 has a negative coefficient, while ia15 and ia17 have a positive one). We can thus conclude that previous goodwills and intangible assets can have a delayed impact on future EBITDAs and that this aspect was not covered in our thesis.

Third, we mentioned earlier that goodwill accounting is one of the most controversial and debated topics in international accounting (Lemeshko, 2013). In fact, our explanatory variable can be subject to managerial discretion. A good example could be the big bath earnings theory which consists in managers charging substantial non-recurring items to income, in periods when the company's earnings are already poor quality (Jordan & Stark, 2015). Companies are implementing this technique due to the fact that the market penalises a company the same way regardless of whether the company misses its financial objectives by a narrow margin or by far. By doing so, a company will be relieved of a burden for future periods and will thus more easily reach its financial objectives (Henry & Schmitt, 2001).

According to multiple studies, one particular area where big bath earnings occurs is with goodwill impairments (Jordan & Stark, 2015). We can thus conclude that our goodwill variable might not always be representative of the company's financial reality.

Fourth, even though we decided not to incorporate the main effect variables in our model in order to reduce the multicollinearity, the VIF of certain variables can still be considered as "high". Nevertheless, there is a clear lack of consensus in the literature concerning the maximum level of VIF accepted (Hair et al., 1995 & Ringle et al., 2015). As a result, we would advise the reader, depending on its own VIF criteria, to pay attention (or not) to a risk of multicollinearity in our data.

Fifth, even if the variable IAT (total intangible assets) includes goodwill and is statistically significant, we cannot confirm that goodwill is a driver of profits. As the second regression splits intangible assets and goodwill, the results are only statistically significant for intangible assets. Therefore, we cannot assert that goodwill contributes in any way to the increasing correlation between IAT and profits.

And finally, we mentioned that different valuation methods existed. As a result, we do believe that there is a high degree of subjectivity in any intangible assets valuation. A certain company might decide to choose a certain valuation method in order to value one of its assets, with their own computed WACC while another might decide to choose a totally different valuation method for the same type of asset. As a result, we argue that some of our variables might be impacted by such behaviors and thus could not represent the exact economical-reality.

10. Discussion

Through our four regressions, we faced unplanned outcomes. First, the statistical significance was not always respected, preventing us from drawing some conclusions. Second, the results we expected after reading the literature did not always materialise. This discussion part will confront the theory and previous work on the topic to our practical analysis, taking into consideration the limitations faced during our work.

Looking back at Figure 2 in the literature review, Ocean Tomo (2017) shows us that in 2015 the stake of intangible assets (including goodwill) as part of total assets of the S&P 500 companies is of 84% while it was of 17% in 1975. This highlights the increasing importance of intangible assets over the years. Furthermore, the S&P 500 is composed of various industries which proves the contrary to the common belief that intangible assets are only important in certain sectors. When we look at the correlation between intangibles and profit, Tudor et al. (2014) tell us that investing in intangible assets is positively correlated to profit generation. This statement is later confirmed by Kamasak (2017), who states that intangibles can be better leveraged to generate profit than tangible assets. A similar conclusion holds for goodwill which is positively correlated with profits (Xiao & Liu, 2016).

Our practical analysis confirms these statements found in the literature. Indeed, the coefficients for intangible assets, including goodwill and excluding goodwill, are (i) positively correlated (ii) globally growing over the selected time frame. However, as stated in the limitations we are not able to link goodwill (on its own) and profitability.

In regards to what is reported on the tangible assets evolution in the literature, Haskel (2017) and Adriessen (2004), both confirm that the global economy is going towards the end of tangible assets as a leverage for profitability. However, what we experienced in our practical analysis is contradictory since we observed a growth in tangible assets' influence on profitability. Even if the growth of PPE's influence is almost eight times lower than the one of intangibles, the impact of PPE on EBITDA is still important and non-negligible.

Finally, the combined effect regressions' results are the most astonishing in our opinion. Kamasak (2017) attests that intangible assets, including goodwill, combined with tangible assets are high profit drivers. This allegation was not verified in our study, we have a decrease in the influence of both goodwill and PPE (PPEGW) and goodwill and intangibles (IAGW). In addition to the fact that their influence is of minimal importance we end up with negative values for both coefficients in 2016, which is the last significant year. Meaning that the combined effect has a negative impact on the profitability of the firm.

While working on both the theoretical and practical part of our thesis, some questions arose, leading to new lines of thoughts:

- First, the EBITDA is a good indicator of the first level of profitability of a firm. However, it could be interesting to analyse a lower figure in the income statement such as the EBIT, to see the effects of the D&A on the study results.

- Second, we could have taken a larger sample of companies from the FMCG industry which would have been more representative of: (i) the size of the whole sector and (ii) the differences that could exist between different regions of the world.

- Third, since we have a nine-period time frame, an interesting research would be to include lagged variables in the analysis to observe the delayed effect of the increase in assets of the previous year on the profitability in time t.

- Fourth, we could have extended the time period to: (i) a longer period and (ii) a different period, since the one we analysed might have been biased by an unfavourable post crisis environment.

Those subjects deserve to be tackled down and deepened in a further research as they would give a complementary conclusion of work, however, they go beyond the scope of our study.

11. General conclusion

After doing some initial readings as starting point, we were both intrigued by two topics. First, we wanted to grasp the concepts of intangible assets and especially goodwill. The general concept behind those assets is easily understandable but knowing how to identify, account and value them is whole different topic. Second, in a fast-moving economy led by automation, robotisation and technological improvements, our desire was to analyse if we could observe a direct link between the investments in intangible assets and the profitability of a firm. To bring the reflection one step further, we chose firms from a traditional industry in developed countries with a conservative economic growth. In addition, to assess the correlation between intangible assets and profitability, we wanted to see if it does not only apply to cutting-edge technology firms in low tangible asset-based companies.

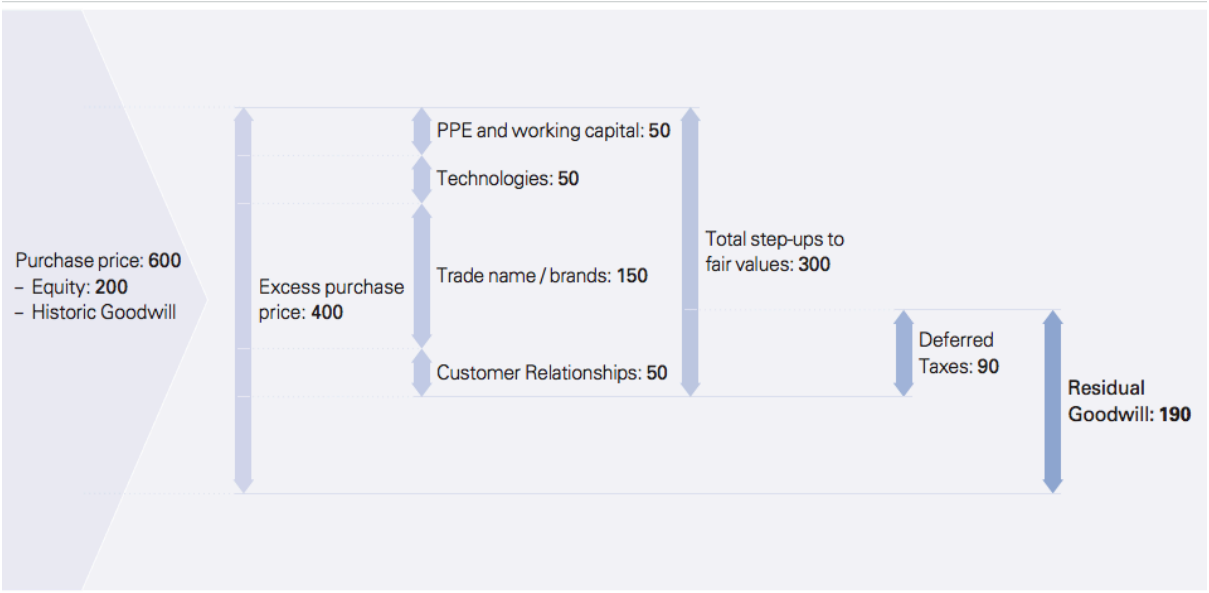
The first part of the thesis intents to define what intangible assets and goodwill are, how they are accounted and valued. This part represented a big challenge since the goodwill is still an abstract concept and its accounting rules can give some interpretation freedom. Then, we tried to catch what the current situation was on our topic. Browsing through the literature and previous researches, we gave a brief preview where we summarised what the different authors mentioned in the literature.

The second part of the thesis details our practical analysis and its results. It starts with a description of the model that we used and its different characteristics. Then we describe the results and what they could reflect as interpretation. Finally, we conducted a confrontation between the theory and our practical analysis.

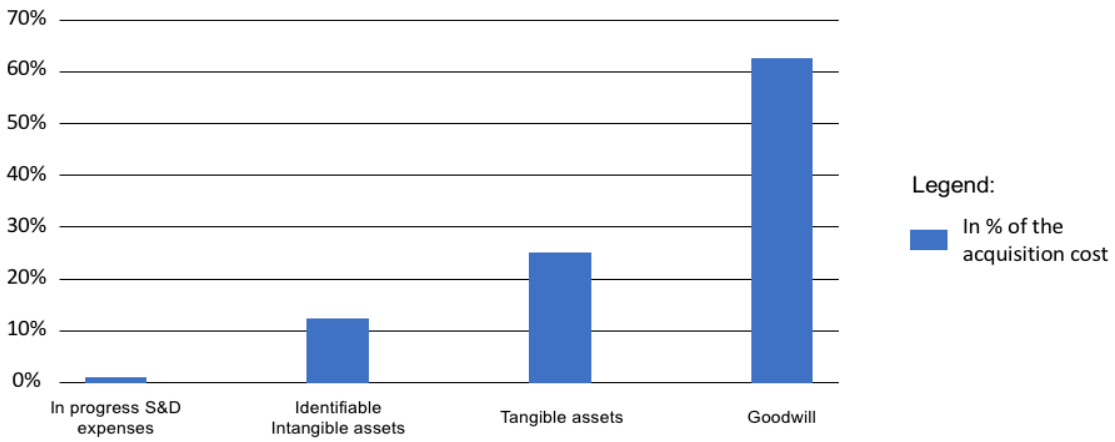
We concluded that even if there are some evidence that intangible assets' impact on profitability is higher than ever, tangible assets in the specific sector of FMCG will never be completely erased from the balance sheet. Those two categories of assets are inseparable as they are complementary. In that sense, we can say that what brings value to a firm is to work as a whole with an articulation of different types of assets and human capital bringing a higher value than the sum of all the components apart.

12. Appendices

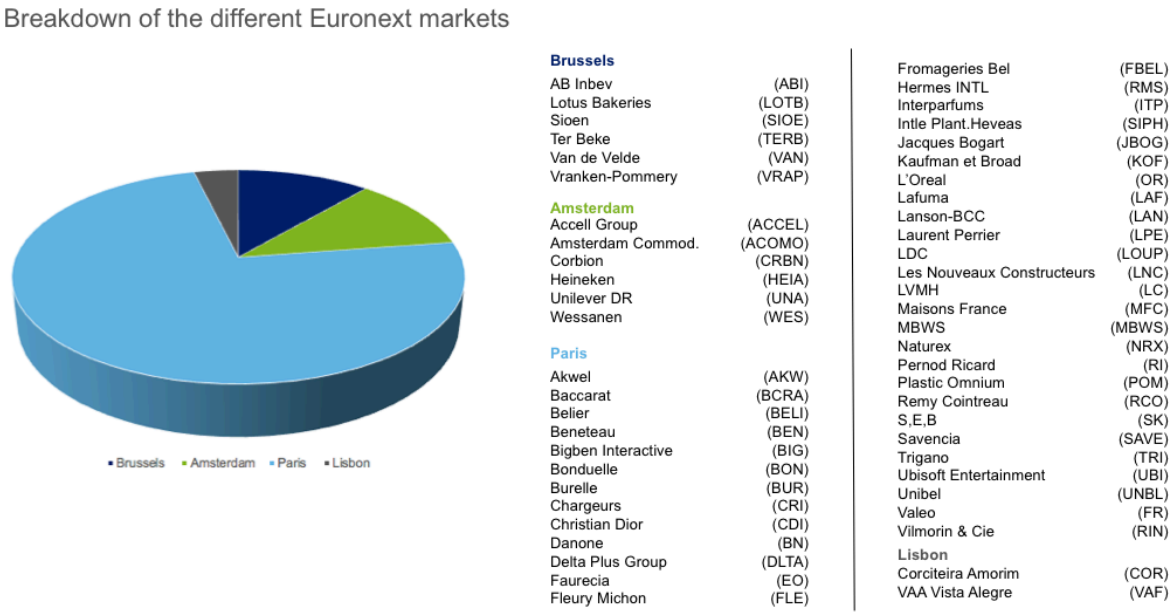
12.1. Appendix 1: Goodwill Framework. Retrieved from KPMG (2010)



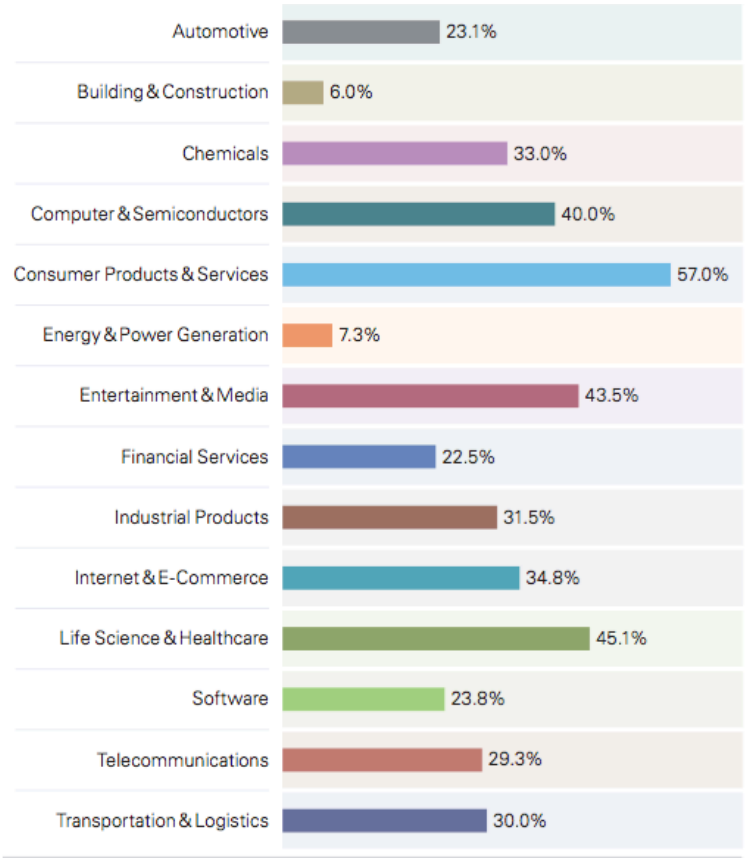
12.2. Appendix 2: Breakdown of the price paid for acquisitions of cutting-edge technology firms. Adapted from Paugam (2011)



12.3. Appendix 3: Sample: Euronext market repartition



12.4. Appendix 4: Percentage allocation of purchase price to intangible assets by industry (Median). Retrieved from: KPMG (2010)



12.5. Appendix 5: Regression's results: Total Intangible Assets Model 2009.

```
. reg ebitda9 ppe9 iat9 rd9 ito09 emp9
```

Source	SS	df	MS		
Model	165571477	5	33114295.3	Number of obs	53
Residual	1899017.16	47	40404.6203	F(5, 47)	819.57
				Prob > F	0.0000
				R-squared	0.9887
				Adj R-squared	0.9875
Total	167470494	52	3220586.42	Root MSE	201.01

ebitda9	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe9	.2575693	.0431239	5.97	0.000	.1708152	.3443235
iat9	.0368521	.0080065	4.60	0.000	.0207451	.0529591
rd9	1.454146	.2683295	5.42	0.000	.9143366	1.993955
ito09	-46.97761	7.621806	-6.16	0.000	-62.31071	-31.64452
emp9	.0199503	.0022734	8.78	0.000	.0153768	.0245239
_cons	116.0745	42.92029	2.70	0.009	29.72999	202.4189

12.6. Appendix 6: Regression's results: Total Intangible Assets Model 2010.

```
. reg ebitda10 iat10 ppe10 rd10 ito10 emp10
```

Source	SS	df	MS		
Model	214423096	5	42884619.1	Number of obs	53
Residual	3275192.91	47	69684.9554	F(5, 47)	615.41
				Prob > F	0.0000
				R-squared	0.9850
				Adj R-squared	0.9834
Total	217698289	52	4186505.55	Root MSE	263.98

ebitda10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat10	.039778	.0089101	4.46	0.000	.0218533	.0577028
ppe10	.3493879	.0498561	7.01	0.000	.2490905	.4496854
rd10	1.832273	.2993667	6.12	0.000	1.230025	2.434521
ito10	-41.49986	8.755955	-4.74	0.000	-59.11457	-23.88515
emp10	.0151935	.0027804	5.46	0.000	.0096	.0207869
_cons	116.4967	55.51839	2.10	0.041	4.808082	228.1853

12.7. Appendix 7: Regression's results: Total Intangible Assets Model 2011.

```
. reg ebitda11 iat11 ppe11 rd11 ito11 emp11
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	514.21
Model	245830329	5	49166065.8	Prob > F	=	0.0000
Residual	4493913.9	47	95615.1894	R-squared	=	0.9820
				Adj R-squared	=	0.9801
Total	250324243	52	4813927.75	Root MSE	=	309.22

ebitda11	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat11	.0490922	.0104726	4.69	0.000	.028024	.0701604
ppe11	.3807324	.0548861	6.94	0.000	.2703158	.4911489
rd11	1.250951	.3053584	4.10	0.000	.6366487	1.865253
ito11	-27.22633	9.529163	-2.86	0.006	-46.39654	-8.056132
emp11	.0119373	.0029472	4.05	0.000	.0060084	.0178662
_cons	89.03238	63.58753	1.40	0.168	-38.88923	216.954

12.8. Appendix 8: Regression's results: Total Intangible Assets Model 2012.

```
. reg ebitda12 iat12 ppe12 rd12 ito12 emp12
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	354.54
Model	299394707	5	59878941.3	Prob > F	=	0.0000
Residual	7937955.33	47	168892.667	R-squared	=	0.9742
				Adj R-squared	=	0.9714
Total	307332662	52	5910243.5	Root MSE	=	410.97

ebitda12	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat12	.0635896	.0145265	4.38	0.000	.034366	.0928132
ppe12	.3518047	.0764184	4.60	0.000	.1980707	.5055387
rd12	1.682341	.3931666	4.28	0.000	.8913918	2.47329
ito12	-38.09221	13.02862	-2.92	0.005	-64.30243	-11.882
emp12	.0122085	.0039494	3.09	0.003	.0042633	.0201537
_cons	119.5052	84.85711	1.41	0.166	-51.20525	290.2157

12.9. Appendix 9: Regression's results: Total Intangible Assets Model 2013.

```
. reg ebitda13 iat13 ppe13 rd13 ito13 emp13
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	369.57
Model	328620043	5	65724008.6	Prob > F	=	0.0000
Residual	8358524.05	47	177840.937	R-squared	=	0.9752
				Adj R-squared	=	0.9726
Total	336978567	52	6480357.06	Root MSE	=	421.71

ebitda13	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat13	.014108	.0137705	1.02	0.311	-.0135947	.0418107
ppe13	.4689978	.0801976	5.85	0.000	.3076611	.6303344
rd13	1.692821	.4009237	4.22	0.000	.8862665	2.499375
ito13	-47.31149	13.97556	-3.39	0.001	-75.42668	-19.1963
emp13	.0121786	.0041268	2.95	0.005	.0038765	.0204806
_cons	157.4228	88.68408	1.78	0.082	-20.98656	335.8322

12.10. Appendix 10: Regression's results: Total Intangible Assets Model 2014.

```
. reg ebitda14 iat14 ppe14 rd14 ito14 emp14
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	578.20
Model	370262150	5	74052430.1	Prob > F	=	0.0000
Residual	6019508.89	47	128074.657	R-squared	=	0.9840
				Adj R-squared	=	0.9823
Total	376281659	52	7236185.76	Root MSE	=	357.88

ebitda14	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat14	.0325376	.0098381	3.31	0.002	.0127459	.0523292
ppe14	.4485639	.0606547	7.40	0.000	.3265425	.5705853
rd14	1.628542	.3283626	4.96	0.000	.9679622	2.289123
ito14	-44.81644	12.67638	-3.54	0.001	-70.31803	-19.31484
emp14	.0104364	.0034636	3.01	0.004	.0034685	.0174044
_cons	129.1394	75.94295	1.70	0.096	-23.63808	281.9169

12.11. Appendix 11: Regression's results: Total Intangible Assets Model 2015.

```
. reg ebitda15 iat15 ppe15 rd15 ito15 emp15
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	597.88
Model	449623479	5	89924695.7	Prob > F	=	0.0000
Residual	7069121.39	47	150406.838	R-squared	=	0.9845
				Adj R-squared	=	0.9829
Total	456692600	52	8782550	Root MSE	=	387.82

ebitda15	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat15	.0610982	.0100171	6.10	0.000	.0409465	.08125
ppe15	.3820833	.0611825	6.24	0.000	.2589999	.5051667
rd15	1.669947	.3202609	5.21	0.000	1.025665	2.314228
ito15	-45.82843	13.60951	-3.37	0.002	-73.20724	-18.44963
emp15	.01348	.0037325	3.61	0.001	.0059713	.0209888
_cons	134.5216	82.61328	1.63	0.110	-31.67491	300.718

12.12. Appendix 12: Regression's results: Total Intangible Assets Model 2016.

```
. reg ebitda16 iat16 ppe16 rd16 ito16 emp16
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	475.49
Model	481535642	5	96307128.5	Prob > F	=	0.0000
Residual	9519607.59	47	202544.842	R-squared	=	0.9806
				Adj R-squared	=	0.9786
Total	491055250	52	9443370.19	Root MSE	=	450.05

ebitda16	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat16	-.0213328	.006507	-3.28	0.002	-.0344231	-.0082425
ppe16	.5942924	.0599775	9.91	0.000	.4736333	.7149516
rd16	1.735285	.3489649	4.97	0.000	1.033258	2.437312
ito16	-58.88873	16.44695	-3.58	0.001	-91.97573	-25.80174
emp16	.0122537	.0042737	2.87	0.006	.0036561	.0208514
_cons	167.5963	94.90513	1.77	0.084	-23.32817	358.5208

12.13. Appendix 13: Regression's results: Total Intangible Assets Model 2017.

```
. reg ebitda17 iat17 ppe17 rd17 ito17 emp17
```

Source	SS	df	MS		
Model	694365718	5	138873144	Number of obs	= 53
Residual	19098136.1	47	406343.322	F(5, 47)	= 341.76
				Prob > F	= 0.0000
Total	713463854	52	13720458.7	R-squared	= 0.9732
				Adj R-squared	= 0.9704
				Root MSE	= 637.45

ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
iat17	.0174676	.0082603	2.11	0.040	.00085	.0340853
ppe17	.433825	.0718468	6.04	0.000	.2892878	.5783622
rd17	1.57965	.4448365	3.55	0.001	.6847539	2.474545
ito17	-68.44103	22.49202	-3.04	0.004	-113.6891	-23.19292
emp17	.0247896	.005228	4.74	0.000	.0142721	.0353071
_cons	135.682	134.4973	1.01	0.318	-134.8916	406.2556

12.14. Appendix 14: Regression's results: Intangible Assets and Goodwill Model 2009.

```
. reg ebitda9 ppe9 ia9 gw9 rd9 ito09 emp9
```

Source	SS	df	MS		
Model	166079508	6	27679917.9	Number of obs	= 53
Residual	1390986.17	46	30238.8299	F(6, 46)	= 915.38
				Prob > F	= 0.0000
Total	167470494	52	3220586.42	R-squared	= 0.9917
				Adj R-squared	= 0.9906
				Root MSE	= 173.89

ebitda9	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe9	.2593131	.037309	6.95	0.000	.184214	.3344122
ia9	.0925689	.0152562	6.07	0.000	.0618597	.1232781
gw9	.0119291	.0092167	1.29	0.202	-.0066231	.0304814
rd9	1.748248	.2429686	7.20	0.000	1.259178	2.237319
ito09	-41.47989	6.728674	-6.16	0.000	-55.024	-27.93577
emp9	.0179947	.0020238	8.89	0.000	.013921	.0220683
_cons	82.77358	38.00885	2.18	0.035	6.265734	159.2814

12.15. Appendix 15: Regression's results: Intangible Assets and Goodwill Model 2010.

```
. reg ebitda10 ppe10 ia10 gw10 rd10 ito10 emp10
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	666.33
Model	215221999	6	35870333.2	Prob > F	=	0.0000
Residual	2476289.15	46	53832.3727	R-squared	=	0.9886
				Adj R-squared	=	0.9871
Total	217698289	52	4186505.55	Root MSE	=	232.02

ebitda10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe10	.3477582	.0438218	7.94	0.000	.2595495	.4359669
ia10	.1077699	.0193089	5.58	0.000	.0689031	.1466367
gw10	.0094387	.0111064	0.85	0.400	-.0129174	.0317948
rd10	2.132607	.274428	7.77	0.000	1.580212	2.685002
ito10	-35.09428	7.873417	-4.46	0.000	-50.94265	-19.24592
emp10	.0131677	.0024997	5.27	0.000	.0081361	.0181994
_cons	71.85111	50.15389	1.43	0.159	-29.10343	172.8057

12.16. Appendix 16: Regression's results: Intangible Assets and Goodwill Model 2011.

```
. reg ebitda11 ppe11 ia11 gw11 rd11 ito11 emp11
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	763.09
Model	247834286	6	41305714.3	Prob > F	=	0.0000
Residual	2489957.01	46	54129.5003	R-squared	=	0.9901
				Adj R-squared	=	0.9888
Total	250324243	52	4813927.75	Root MSE	=	232.66

ebitda11	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe11	.3560669	.0414952	8.58	0.000	.2725413	.4395924
ia11	.1580797	.0195688	8.08	0.000	.1186898	.1974696
gw11	.0044052	.0107717	0.41	0.684	-.0172771	.0260875
rd11	1.685207	.2405842	7.00	0.000	1.200936	2.169478
ito11	-17.59667	7.342418	-2.40	0.021	-32.37619	-2.817146
emp11	.0090478	.0022677	3.99	0.000	.004483	.0136125
_cons	30.52327	48.80057	0.63	0.535	-67.7072	128.7537

12.17. Appendix 17: Regression's results: Intangible Assets and Goodwill Model 2012.

```
. reg ebitda12 ppe12 ia12 gw12 rd12 ito12 emp12
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	378.46
Model	301230421	6	50205070.2	Prob > F	=	0.0000
Residual	6102240.64	46	132657.405	R-squared	=	0.9801
				Adj R-squared	=	0.9776
Total	307332662	52	5910243.5	Root MSE	=	364.22

ebitda12	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe12	.3138336	.0684913	4.58	0.000	.1759677	.4516995
ia12	.1724786	.0319777	5.39	0.000	.1081108	.2368465
gw12	.0213882	.0171595	1.25	0.219	-.013152	.0559284
rd12	2.088852	.3651812	5.72	0.000	1.353781	2.823924
ito12	-29.28911	11.78673	-2.48	0.017	-53.01457	-5.563649
emp12	.0100001	.0035502	2.82	0.007	.0028539	.0171462
_cons	62.07962	76.77336	0.81	0.423	-92.45714	216.6164

12.18. Appendix 18: Regression's results: Intangible Assets and Goodwill Model 2013.

```
. reg ebitda13 ppe13 ia13 gw13 rd13 ito13 emp13
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	552.58
Model	332367203	6	55394533.8	Prob > F	=	0.0000
Residual	4611364.65	46	100247.058	R-squared	=	0.9863
				Adj R-squared	=	0.9845
Total	336978567	52	6480357.06	Root MSE	=	316.62

ebitda13	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe13	.3890872	.061614	6.31	0.000	.2650646	.5131098
ia13	.1754023	.0283353	6.19	0.000	.1183663	.2324382
gw13	-.0303867	.0126434	-2.40	0.020	-.0558365	-.0049369
rd13	2.184637	.311574	7.01	0.000	1.557471	2.811803
ito13	-36.82924	10.63189	-3.46	0.001	-58.23013	-15.42835
emp13	.0093981	.0031316	3.00	0.004	.0030945	.0157016
_cons	87.41598	67.56076	1.29	0.202	-48.57677	223.4087

12.19. Appendix 19: Regression's results: Intangible Assets and Goodwill Model 2014.

```
. reg ebitda14 ppe14 ia14 gw14 rd14 ito14 emp14
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	652.19
Model	371909773	6	61984962.2	Prob > F	=	0.0000
Residual	4371886.01	46	95041.0002	R-squared	=	0.9884
				Adj R-squared	=	0.9869
Total	376281659	52	7236185.76	Root MSE	=	308.29

ebitda14	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe14	.3760398	.0550771	6.83	0.000	.2651753	.4869042
ia14	.1423445	.027701	5.14	0.000	.0865851	.1981038
gw14	.0045752	.0108132	0.42	0.674	-.0171907	.0263411
rd14	1.938709	.2925087	6.63	0.000	1.349919	2.527498
ito14	-36.65819	11.09431	-3.30	0.002	-58.98989	-14.3265
emp14	.0095303	.0029916	3.19	0.003	.0035085	.0155521
_cons	82.36363	66.37773	1.24	0.221	-51.24781	215.9751

12.20. Appendix 20: Regression's results: Intangible Assets and Goodwill Model 2015.

```
. reg ebitda15 ppe15 ia15 gw15 rd15 ito15 emp15
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	550.09
Model	450415083	6	75069180.5	Prob > F	=	0.0000
Residual	6277516.98	46	136467.76	R-squared	=	0.9863
				Adj R-squared	=	0.9845
Total	456692600	52	8782550	Root MSE	=	369.42

ebitda15	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe15	.3367343	.0612448	5.50	0.000	.213455	.4600136
ia15	.1351909	.0322093	4.20	0.000	.070357	.2000249
gw15	.0388381	.0132841	2.92	0.005	.0120986	.0655775
rd15	1.852802	.3143656	5.89	0.000	1.220017	2.485587
ito15	-41.02056	13.11634	-3.13	0.003	-67.42239	-14.61873
emp15	.0128628	.0035645	3.61	0.001	.0056877	.0200378
_cons	106.6562	79.53807	1.34	0.187	-53.44562	266.7581

12.21. Appendix 21: Regression's results: Intangible Assets and Goodwill Model 2016.

```
. reg ebitda16 ppe16 ia16 gw16 rd16 ito16 emp16
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	559.24
Model	484414367	6	80735727.8	Prob > F	=	0.0000
Residual	6640883.3	46	144367.028	R-squared	=	0.9865
				Adj R-squared	=	0.9847
Total	491055250	52	9443370.19	Root MSE	=	379.96

ebitda16	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe16	.4557958	.0593799	7.68	0.000	.3362704	.5753213
ia16	.1341762	.0352555	3.81	0.000	.0632106	.2051419
gw16	-.0469413	.0079415	-5.91	0.000	-.0629267	-.030956
rd16	1.965315	.2990849	6.57	0.000	1.363288	2.567342
ito16	-49.98928	14.02771	-3.56	0.001	-78.22559	-21.75297
emp16	.013083	.0036129	3.62	0.001	.0058106	.0203554
_cons	119.4449	80.84643	1.48	0.146	-43.29049	282.1803

12.22. Appendix 22: Regression's results: Intangible Assets and Goodwill Model 2017.

```
. reg ebitda17 ppe17 ia17 gw17 rd17 ito17 emp17
```

Source	SS	df	MS	Number of obs	=	53
				F(6, 46)	=	373.17
Model	699100894	6	116516816	Prob > F	=	0.0000
Residual	14362960.2	46	312238.266	R-squared	=	0.9799
				Adj R-squared	=	0.9772
Total	713463854	52	13720458.7	Root MSE	=	558.78

ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe17	.3062869	.0709865	4.31	0.000	.1633984	.4491754
ia17	.2184203	.0521078	4.19	0.000	.1135327	.3233079
gw17	-.0223904	.0125375	-1.79	0.081	-.047627	.0028462
rd17	1.769471	.392974	4.50	0.000	.9784557	2.560487
ito17	-54.09943	20.05728	-2.70	0.010	-94.47264	-13.72622
emp17	.0226444	.0046158	4.91	0.000	.0133532	.0319356
_cons	71.10507	119.0594	0.60	0.553	-168.5491	310.7592

12.23. Appendix 23: Regression's results: Intangible Assets and Goodwill combined Model 2009.

```
reg ebitda9 ppe9 iagw9 rd9 ito09 emp9
```

Source	SS	df	MS		
Model	164876586	5	32975317.2	Number of obs	53
Residual	2593907.61	47	55189.5237	F(5, 47)	597.49
				Prob > F	0.0000
				R-squared	0.9845
				Adj R-squared	0.9829
Total	167470494	52	3220586.42	Root MSE	234.92

ebitda9	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe9	.3627751	.047318	7.67	0.000	.2675837	.4579666
iagw9	8.07e-07	4.72e-07	1.71	0.094	-1.43e-07	1.76e-06
rd9	1.482561	.3153045	4.70	0.000	.8482498	2.116872
ito09	-47.69743	9.089902	-5.25	0.000	-65.98396	-29.41091
emp9	.0193341	.0030872	6.26	0.000	.0131235	.0255446
_cons	109.8972	51.04904	2.15	0.037	7.199761	212.5946

12.24. Appendix 24: Regression's results: Intangible Assets and Goodwill combined Model 2010.

```
. reg ebitda10 ppe10 iagw10 rd10 ito10 emp10
```

Source	SS	df	MS		
Model	213661906	5	42732381.3	Number of obs	53
Residual	4036382.38	47	85880.4762	F(5, 47)	497.58
				Prob > F	0.0000
				R-squared	0.9815
				Adj R-squared	0.9795
Total	217698289	52	4186505.55	Root MSE	293.05

ebitda10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe10	.4239452	.0514542	8.24	0.000	.3204326	.5274578
iagw10	1.34e-06	4.94e-07	2.70	0.010	3.42e-07	2.33e-06
rd10	1.814221	.3332213	5.44	0.000	1.143866	2.484576
ito10	-44.41238	9.969863	-4.45	0.000	-64.46916	-24.3556
emp10	.0161372	.0035011	4.61	0.000	.0090938	.0231805
_cons	125.2961	62.7325	2.00	0.052	-.9053922	251.4976

12.25. Appendix 25: Regression's results: Intangible Assets and Goodwill combined Model 2011.

```
. reg ebitda11 ppe11 iagw11 rd11 ito11 emp11
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	392.26
Model	244465873	5	48893174.5	Prob > F	=	0.0000
Residual	5858370.21	47	124646.175	R-squared	=	0.9766
				Adj R-squared	=	0.9741
Total	250324243	52	4813927.75	Root MSE	=	353.05

ebitda11	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe11	.4936311	.054555	9.05	0.000	.3838807	.6033816
iagw11	1.35e-06	5.56e-07	2.43	0.019	2.33e-07	2.47e-06
rd11	1.259634	.348638	3.61	0.001	.5582644	1.961003
ito11	-29.34967	11.11421	-2.64	0.011	-51.70857	-6.990768
emp11	.0121033	.0036978	3.27	0.002	.0046643	.0195422
_cons	89.4917	73.58155	1.22	0.230	-58.53528	237.5187

12.26. Appendix 26: Regression's results: Intangible Assets and Goodwill combined Model 2012.

```
. reg ebitda12 ppe12 iagw12 rd12 ito12 emp12
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	297.48
Model	297918938	5	59583787.7	Prob > F	=	0.0000
Residual	9413723.43	47	200291.988	R-squared	=	0.9694
				Adj R-squared	=	0.9661
Total	307332662	52	5910243.5	Root MSE	=	447.54

ebitda12	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe12	.4769101	.0693885	6.87	0.000	.3373184	.6165017
iagw12	2.07e-06	6.98e-07	2.96	0.005	6.65e-07	3.47e-06
rd12	1.690642	.4281612	3.95	0.000	.8292927	2.551991
ito12	-42.47005	14.48277	-2.93	0.005	-71.60563	-13.33446
emp12	.0128837	.004706	2.74	0.009	.0034165	.0223509
_cons	134.2214	93.57745	1.43	0.158	-54.03219	322.4749

12.27. Appendix 27: Regression's results: Intangible Assets and Goodwill combined Model 2013.

```
. reg ebitda13 ppe13 iagw13 rd13 ito13 emp13
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	363.82
Model	328491336	5	65698267.2	Prob > F	=	0.0000
Residual	8487231.08	47	180579.385	R-squared	=	0.9748
				Adj R-squared	=	0.9721
Total	336978567	52	6480357.06	Root MSE	=	424.95

ebitda13	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe13	.5742532	.0667119	8.61	0.000	.4400462	.7084601
iagw13	-2.66e-07	4.70e-07	-0.57	0.574	-1.21e-06	6.80e-07
rd13	1.703552	.4040061	4.22	0.000	.8907962	2.516307
ito13	-43.4879	14.37643	-3.02	0.004	-72.40955	-14.56625
emp13	.0085562	.0045317	1.89	0.065	-.0005605	.0176729
_cons	134.5403	90.45081	1.49	0.144	-47.42322	316.5039

12.28. Appendix 28: Regression's results: Intangible Assets and Goodwill combined Model 2014.

```
. reg ebitda14 ppe14 iagw14 rd14 ito14 emp14
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	506.62
Model	369427183	5	73885436.6	Prob > F	=	0.0000
Residual	6854476.25	47	145839.92	R-squared	=	0.9818
				Adj R-squared	=	0.9798
Total	376281659	52	7236185.76	Root MSE	=	381.89

ebitda14	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe14	.5361928	.0542522	9.88	0.000	.4270515	.6453341
iagw14	7.01e-07	3.56e-07	1.97	0.055	-1.49e-08	1.42e-06
rd14	1.644625	.3506241	4.69	0.000	.9392607	2.34999
ito14	-45.87425	13.77262	-3.33	0.002	-73.58119	-18.16732
emp14	.0093813	.003915	2.40	0.021	.0015053	.0172572
_cons	128.3001	81.92797	1.57	0.124	-36.5177	293.1179

12.29. Appendix 29: Regression's results: Intangible Assets and Goodwill combined Model 2015.

```
. reg ebitda15 ppe15 iagw15 rd15 ito15 emp15
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	491.13
Model	448115898	5	89623179.6	Prob > F	=	0.0000
Residual	8576701.9	47	182483.019	R-squared	=	0.9812
				Adj R-squared	=	0.9792
Total	456692600	52	8782550	Root MSE	=	427.18

ebitda15	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe15	.4871263	.0574587	8.48	0.000	.3715344	.6027182
iagw15	1.84e-06	3.88e-07	4.73	0.000	1.06e-06	2.62e-06
rd15	1.734205	.353692	4.90	0.000	1.022668	2.445742
ito15	-52.64355	15.23223	-3.46	0.001	-83.28685	-22.00025
emp15	.0144978	.0043082	3.37	0.002	.0058308	.0231649
_cons	155.4354	91.92174	1.69	0.097	-29.48727	340.3581

12.30. Appendix 30: Regression's results: Intangible Assets and Goodwill combined Model 2016.

```
. reg ebitda16 ppe16 iagw16 rd16 ito16 emp16
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	531.13
Model	482515565	5	96503113	Prob > F	=	0.0000
Residual	8539685.09	47	181695.427	R-squared	=	0.9826
				Adj R-squared	=	0.9808
Total	491055250	52	9443370.19	Root MSE	=	426.26

ebitda16	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe16	.5913043	.0500708	11.81	0.000	.4905749	.6920338
iagw16	-5.76e-07	1.38e-07	-4.17	0.000	-8.55e-07	-2.98e-07
rd16	1.661547	.3319096	5.01	0.000	.9938308	2.329263
ito16	-52.94438	15.77413	-3.36	0.002	-84.67784	-21.21092
emp16	.010119	.0041442	2.44	0.018	.0017819	.018456
_cons	141.2852	90.59905	1.56	0.126	-40.97654	323.547

12.31. Appendix 31: Regression's results: Intangible Assets and Goodwill combined Model 2017.

```
. reg ebitda17 ppe17 iagw17 rd17 ito17 emp17
```

Source	SS	df	MS		
Model	693677644	5	138735529	Number of obs	= 53
Residual	19786209.7	47	420983.185	F(5, 47)	= 329.55
				Prob > F	= 0.0000
Total	713463854	52	13720458.7	R-squared	= 0.9723
				Adj R-squared	= 0.9693
				Root MSE	= 648.83

ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe17	.4761157	.0653663	7.28	0.000	.3446156	.6076157
iagw17	3.07e-07	1.88e-07	1.64	0.108	-7.02e-08	6.85e-07
rd17	1.586236	.4536521	3.50	0.001	.6736053	2.498866
ito17	-69.31118	23.10934	-3.00	0.004	-115.8012	-22.82119
emp17	.0247559	.0055607	4.45	0.000	.0135693	.0359424
_cons	132.4531	137.523	0.96	0.340	-144.2075	409.1138

12.32. Appendix 32: Regression's results: PPE and Goodwill combined Model 2009.

```
. reg ebitda9 ppegw9 ia9 rd9 ito09 emp9
```

Source	SS	df	MS		
Model	164628841	5	32925768.3	Number of obs	= 53
Residual	2841652.49	47	60460.6913	F(5, 47)	= 544.58
				Prob > F	= 0.0000
Total	167470494	52	3220586.42	R-squared	= 0.9830
				Adj R-squared	= 0.9812
				Root MSE	= 245.89

ebitda9	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw9	2.85e-06	5.01e-07	5.69	0.000	1.85e-06	3.86e-06
ia9	.1420575	.0187994	7.56	0.000	.104238	.179877
rd9	1.418783	.3296849	4.30	0.000	.7555427	2.082024
ito09	-46.48582	9.511342	-4.89	0.000	-65.62017	-27.35146
emp9	.0294686	.0021396	13.77	0.000	.0251644	.0337729
_cons	114.4503	53.42174	2.14	0.037	6.979645	221.921

12.33. Appendix 33: Regression's results: PPE and Goodwill combined Model 2010.

```
. reg ebitda10 ppegw10 ia10 rd10 ito10 emp10
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	374.37
Model	212366067	5	42473213.3	Prob > F	=	0.0000
Residual	5332221.98	47	113451.531	R-squared	=	0.9755
				Adj R-squared	=	0.9729
Total	217698289	52	4186505.55	Root MSE	=	336.83

ebitda10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw10	3.62e-06	6.94e-07	5.22	0.000	2.22e-06	5.02e-06
ia10	.1644264	.0245382	6.70	0.000	.115062	.2137908
rd10	1.770822	.3872983	4.57	0.000	.9916786	2.549966
ito10	-47.21722	11.34908	-4.16	0.000	-70.04863	-24.38582
emp10	.0294884	.0026158	11.27	0.000	.0242262	.0347506
_cons	135.182	72.31378	1.87	0.068	-10.29456	280.6586

12.34. Appendix 34: Regression's results: PPE and Goodwill combined Model 2011.

```
. reg ebitda11 ppegw11 ia11 rd11 ito11 emp11
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	363.00
Model	244005722	5	48801144.3	Prob > F	=	0.0000
Residual	6318521.2	47	134436.621	R-squared	=	0.9748
				Adj R-squared	=	0.9721
Total	250324243	52	4813927.75	Root MSE	=	366.66

ebitda11	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw11	3.09e-06	7.64e-07	4.04	0.000	1.55e-06	4.63e-06
ia11	.2350543	.0264031	8.90	0.000	.181938	.2881705
rd11	1.547747	.3724372	4.16	0.000	.7984995	2.296994
ito11	-28.1779	11.52194	-2.45	0.018	-51.35704	-4.998755
emp11	.023719	.0027494	8.63	0.000	.0181879	.02925
_cons	90.94286	76.51713	1.19	0.241	-62.98975	244.8755

12.35. Appendix 35: Regression's results: PPE and Goodwill combined Model 2012.

```
. reg ebitda12 ppegw12 ia12 rd12 ito12 emp12
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	341.84
Model	299107774	5	59821554.9	Prob > F	=	0.0000
Residual	8224887.54	47	174997.607	R-squared	=	0.9732
				Adj R-squared	=	0.9704
Total	307332662	52	5910243.5	Root MSE	=	418.33

ebitda12	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw12	3.70e-06	8.49e-07	4.35	0.000	1.99e-06	5.41e-06
ia12	.2461821	.0296912	8.29	0.000	.1864512	.305913
rd12	2.033417	.4120028	4.94	0.000	1.204574	2.86226
ito12	-38.50729	13.4982	-2.85	0.006	-65.66216	-11.35242
emp12	.0234156	.0029922	7.83	0.000	.0173962	.0294351
_cons	108.6229	87.99615	1.23	0.223	-68.4025	285.6483

12.36. Appendix 36: Regression's results: PPE and Goodwill combined Model 2013.

```
. reg ebitda13 ppegw13 ia13 rd13 ito13 emp13
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	361.16
Model	328430381	5	65686076.3	Prob > F	=	0.0000
Residual	8548185.78	47	181876.293	R-squared	=	0.9746
				Adj R-squared	=	0.9719
Total	336978567	52	6480357.06	Root MSE	=	426.47

ebitda13	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw13	7.55e-07	5.54e-07	1.36	0.179	-3.59e-07	1.87e-06
ia13	.2682037	.0305827	8.77	0.000	.2066793	.3297281
rd13	2.012823	.4149303	4.85	0.000	1.178091	2.847555
ito13	-46.07434	14.3096	-3.22	0.002	-74.86154	-17.28714
emp13	.0244132	.0029914	8.16	0.000	.0183952	.0304311
_cons	129.5237	90.92969	1.42	0.161	-53.4032	312.4507

12.37. Appendix 37: Regression's results: PPE and Goodwill combined Model 2014.

```
. reg ebitda14 ppegw14 ia14 rd14 ito14 emp14
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	391.80
Model	367465483	5	73493096.7	Prob > F	=	0.0000
Residual	8816175.94	47	187578.212	R-squared	=	0.9766
				Adj R-squared	=	0.9741
Total	376281659	52	7236185.76	Root MSE	=	433.1

ebitda14	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw14	1.57e-06	5.81e-07	2.71	0.009	4.05e-07	2.74e-06
ia14	.2525402	.0308223	8.19	0.000	.1905338	.3145467
rd14	1.965691	.4068985	4.83	0.000	1.147117	2.784266
ito14	-46.33341	15.62554	-2.97	0.005	-77.76793	-14.89889
emp14	.025687	.0029536	8.70	0.000	.019745	.0316289
_cons	120.5916	93.48559	1.29	0.203	-67.47711	308.6604

12.38. Appendix 38: Regression's results: PPE and Goodwill combined Model 2015.

```
. reg ebitda15 ppegw15 ia15 rd15 ito15 emp15
```

Source	SS	df	MS	Number of obs	=	53
				F(5, 47)	=	398.39
Model	446165286	5	89233057.2	Prob > F	=	0.0000
Residual	10527314	47	223985.404	R-squared	=	0.9769
				Adj R-squared	=	0.9745
Total	456692600	52	8782550	Root MSE	=	473.27

ebitda15	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw15	2.87e-06	7.37e-07	3.89	0.000	1.38e-06	4.35e-06
ia15	.2372775	.0336633	7.05	0.000	.1695557	.3049993
rd15	1.973806	.3988897	4.95	0.000	1.171343	2.776268
ito15	-52.76101	16.86831	-3.13	0.003	-86.69568	-18.82635
emp15	.0291445	.0032099	9.08	0.000	.0226871	.0356019
_cons	158.2186	102.2759	1.55	0.129	-47.53388	363.9711

12.39. Appendix 39: Regression's results: PPE and Goodwill combined Model 2016.

```
. reg ebitda16 ppegw16 ia16 rd16 ito16 emp16
```

Source	SS	df	MS		
Model	476297388	5	95259477.6	Number of obs	53
Residual	14757862.2	47	313997.068	F(5, 47)	303.38
				Prob > F	0.0000
				R-squared	0.9699
				Adj R-squared	0.9667
Total	491055250	52	9443370.19	Root MSE	560.35

ebitda16	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw16	-1.36e-06	3.72e-07	-3.66	0.001	-2.11e-06	-6.14e-07
ia16	.3013606	.0387936	7.77	0.000	.2233179	.3794032
rd16	1.934633	.4398515	4.40	0.000	1.049766	2.8195
ito16	-60.27126	20.71516	-2.91	0.006	-101.9448	-18.59773
emp16	.0317143	.0037508	8.46	0.000	.0241688	.0392599
_cons	158.0863	119.5282	1.32	0.192	-82.37354	398.5461

12.40. Appendix 40: Regression's results: PPE and Goodwill combined Model 2017.

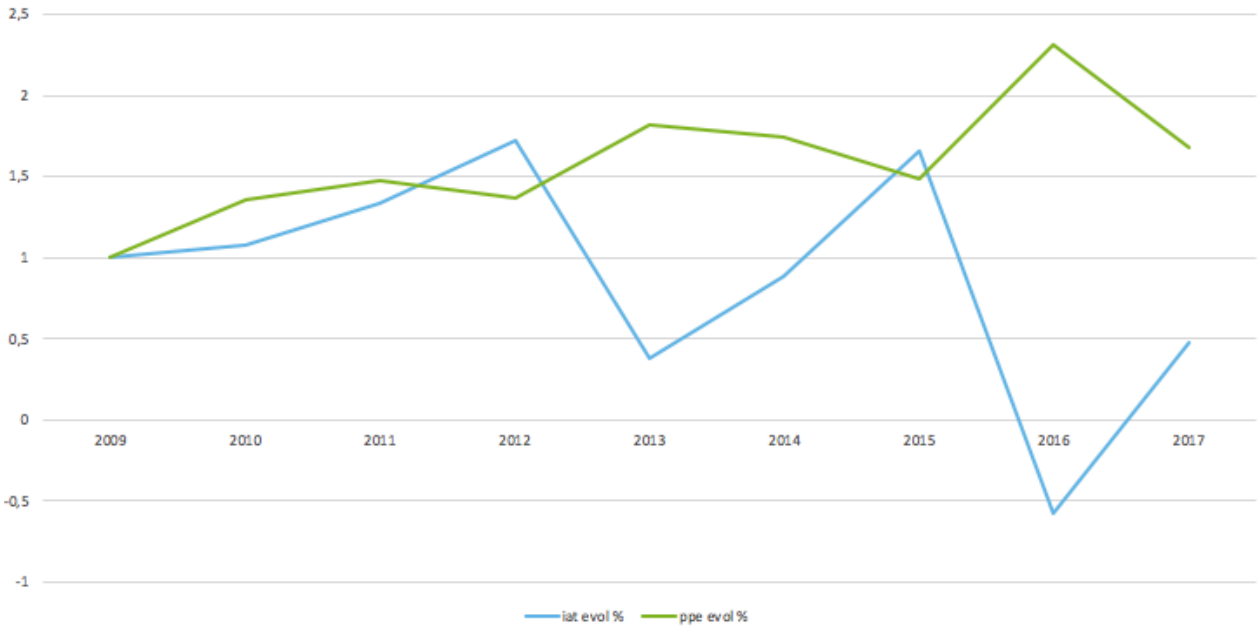
```
. reg ebitda17 ppegw17 ia17 rd17 ito17 emp17
```

Source	SS	df	MS		
Model	693127167	5	138625433	Number of obs	53
Residual	20336686.6	47	432695.46	F(5, 47)	320.38
				Prob > F	0.0000
				R-squared	0.9715
				Adj R-squared	0.9685
Total	713463854	52	13720458.7	Root MSE	657.8

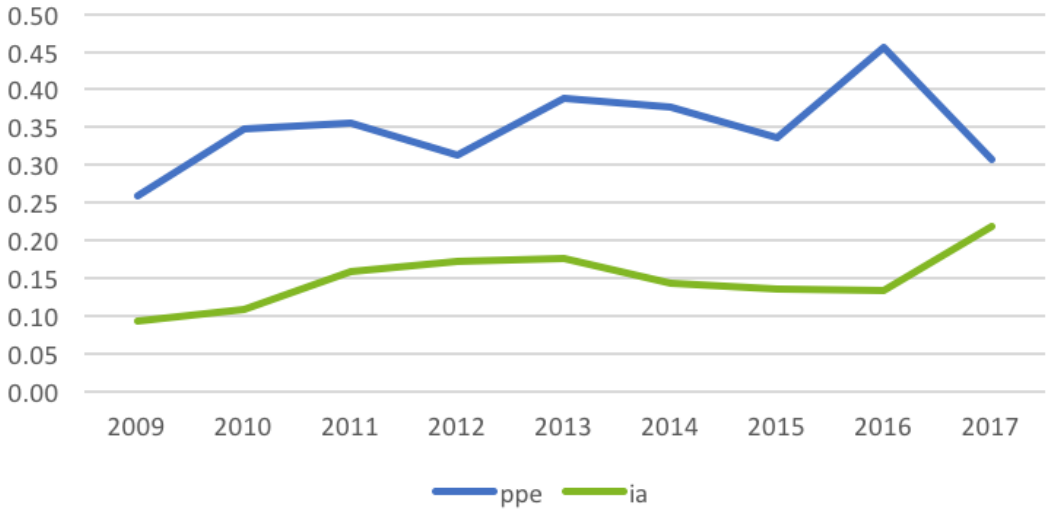
ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppegw17	-5.81e-07	4.72e-07	-1.23	0.224	-1.53e-06	3.68e-07
ia17	.3331154	.0480656	6.93	0.000	.2364199	.4298108
rd17	1.754403	.4615243	3.80	0.000	.825936	2.68287
ito17	-62.68609	23.70382	-2.64	0.011	-110.372	-15.00015
emp17	.0348753	.0044686	7.80	0.000	.0258856	.0438649
_cons	112.2168	140.1616	0.80	0.427	-169.7519	394.1856

12.41. Appendix 41: Evolution of the control variables in the Total Intangible Assets Model (RD, ITO & EMP)

12.42. Appendix 42: Evolution of the explanatory variables in the Total Intangible Assets Model (IAT & PPE)



12.43. Appendix 43: Evolution of the explanatory variable PPE and IA in the Intangible Assets and Goodwill Model.



12.44. Appendix 44: Regression's results: intangible assets from 2009 to 2017 on EBITDA 2017.

```
. reg ebitda17 ia9 ia10 ia11 ia12 ia13 ia14 ia15 ia16 ia17
```

Source	SS	df	MS
Model	696162084	9	77351342.7
Residual	17301769.5	43	402366.731
Total	713463854	52	13720458.7

Number of obs	53
F(9, 43)	192.24
Prob > F	0.0000
R-squared	0.9757
Adj R-squared	0.9707
Root MSE	634.32

ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ia9	-2.880011	1.718082	-1.68	0.101	-6.344853	.5848313
ia10	1.734573	2.014112	0.86	0.394	-2.327271	5.796417
ia11	1.556265	.99225	1.57	0.124	-.4447979	3.557328
ia12	-.8517632	1.537255	-0.55	0.582	-3.951934	2.248407
ia13	-3.91714	.8851285	-4.43	0.000	-5.702172	-2.132108
ia14	3.725718	1.389441	2.68	0.010	.9236423	6.527793
ia15	.3259488	1.113904	0.29	0.771	-1.920453	2.572351
ia16	-.6284168	.6693324	-0.94	0.353	-1.978254	.7214206
ia17	1.114598	.3711801	3.00	0.004	.3660423	1.863154
_cons	189.7059	100.4283	1.89	0.066	-12.82715	392.2389

12.45. Appendix 45: Regression's results: goodwill from 2009 to 2017 on EBITDA 2017.

```
. reg ebitda17 gw9 gw10 gw11 gw12 gw13 gw14 gw15 gw16 gw17
```

Source	SS	df	MS		
Model	702771167	9	78085685.2	Number of obs	53
Residual	10692686.8	43	248667.135	F(9, 43)	314.02
				Prob > F	0.0000
Total	713463854	52	13720458.7	R-squared	0.9850
				Adj R-squared	0.9819
				Root MSE	498.67

ebitda17	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gw9	-1.516914	1.015684	-1.49	0.143	-3.565236	.5314082
gw10	-.3028655	1.051433	-0.29	0.775	-2.423282	1.817551
gw11	2.560873	.48488	5.28	0.000	1.58302	3.538727
gw12	-2.643457	.7578434	-3.49	0.001	-4.171794	-1.11512
gw13	.3523692	.7304489	0.48	0.632	-1.120722	1.82546
gw14	-.3267052	.6618979	-0.49	0.624	-1.66155	1.008139
gw15	2.444948	.5663807	4.32	0.000	1.302732	3.587163
gw16	-.1728483	.1379893	-1.25	0.217	-.4511303	.1054337
gw17	-.1218504	.1428495	-0.85	0.398	-.4099339	.1662331
_cons	230.0435	78.83416	2.92	0.006	71.05929	389.0278

12.46. Appendix 46: Regression's results: IAGW, GW, IA model on EBITDA 2010.

```
. reg ebitda10 ppe10 iagw10 ia10 gw10 rd10 ito10 emp10
```

Source	SS	df	MS		
Model	215292863	7	30756123.4	Number of obs	53
Residual	2405425.17	45	53453.8927	F(7, 45)	575.38
				Prob > F	0.0000
Total	217698289	52	4186505.55	R-squared	0.9890
				Adj R-squared	0.9872
				Root MSE	231.2

ebitda10	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ppe10	.3451249	.0437273	7.89	0.000	.2570535	.4331963
iagw10	1.63e-06	1.41e-06	1.15	0.256	-1.22e-06	4.47e-06
ia10	.1057832	.0193181	5.48	0.000	.0668745	.1446919
gw10	-.0314797	.0372217	-0.85	0.402	-.1064481	.0434886
rd10	2.200976	.2798342	7.87	0.000	1.637361	2.764591
ito10	-37.83478	8.198781	-4.61	0.000	-54.34797	-21.32158
emp10	.0156822	.0033127	4.73	0.000	.0090102	.0223542
_cons	78.60306	50.32013	1.56	0.125	-22.74689	179.953

12.47. Appendix 47: Transcription of the interview from Virginie Meunier (Manager at BDO)

V.M: La notion de goodwill c'est déjà une notion qui peut être intéressante à définir dans votre mémoire. Parfois on parle d'un goodwill pour parler d'un fonds de commerce par exemple mais si on est dans le cadre d'une reconnaissance à l'actif de plusieurs actifs incorporels qui ont été acquis, typiquement le cas d'une société qui en acquiert une autre et qui doit reconnaitre des actifs incorporels dans ses comptes et le goodwill va être le résidu entre la valeur payée et la valeur des actifs qui ont été acquis et reconnu. Dans ce cas-là, le goodwill est beaucoup plus restreint parce que si on a reconnu une marque, une clientèle, une technologie ou autre, alors le goodwill qui est reconnu ce sont tous les actifs incorporels autres que ceux cités juste avant. Ca veut dire que la notion de goodwill va englober le personnel, c'est un élément important et aussi le « going concern ». Souvent quand on parle de goodwill de manière générale, on englobe souvent tous les actifs incorporels d'une société, quand on parle de goodwill d'un fonds de commerce, on englobe souvent la marque, la clientèle etc. Quand on s'attarde sur les normes IFRS, le lien est fait avec les opérations d'acquisitions et les exercices de PPA, c'est la norme IFRS 3 qui dit que quand une société qui publie ses comptes en IFRS prend contrôle d'une autre société, plutôt qu'imaginons qu'elle va payer un prix de 10 million d'euros par exemple, elle va devoir dire à quoi on servit les 10 millions. Qu'est-ce qui se cache derrière ce prix, si on a, imaginons une société A qui rachète B, imaginons que B a des fonds propres comptables pour 7 millions d'€ à la date d'acquisition, on va avoir un gap de 3 millions qu'on va devoir expliquer. Ce 3 millions d'€ on va le splitter entre différents actifs et passifs, ça peut s'expliquer de plusieurs manières. Ca peut être expliqué par des actifs au bilan qui sous ou sur-évalués dans les comptes, imaginons par exemple que la société qui a été acquise dispose d'un bâtiment qui vaut 1 million dans les comptes en valeur comptable mais en réalité ce bâtiment à une valeur de marché d'1,5 million. Un expert immobilier a établi que ce batiment valait 1,5 million. Dans ce cas-là il y a déjà 500 000 €qui sont expliqués par le bâtiment car on achète les actifs à leur valeur de marché. Donc il peut y avoir des corrections de valeur sur actifs et passifs, on peut avoir cela sur des stocks, créances commerciales et sur plein d'autres choses. A côté de ça, le travail principal d'un PPA va porter surtout sur les actifs intangibles, parce que il y a très peu de sociétés qui vont décider un jour d'elles-mêmes, de reconnaitre leurs actifs incorporels à l'actif de leurs bilans. Une société qui a été créée, qui a grandi, qui s'est développée progressivement, tout dépend du secteur d'activité mais il y a de grandes chances qu'elle ait développé la valeur de sa marque, il y a de grandes chances qu'elle ait développé sa clientèle, une technologie brevetée ou non, mais dans ces cas-là, c'est assez rare que la société se dise un jour, moi ma marque, je vais la faire évaluer par un expert et puis je vais porter à l'actif la valeur de ma marque. Si elle le fait, elle va devoir acter une plus-value dans ses comptes, elle va avoir un profit et ce profit va être taxé, donc il n'y a pas vraiment d'intérêt à part que le profit sera neutralisé par l'actif mais ce n'est pas très utile. La question se pose par contre quand une société est achetée par une autre parce que cette règle d'IFRS 3 dit qu'il faut procéder à un exercice de PPA. Le PPA consiste à dire quelle est la valeur de marché de la société qui devrait rejoindre le prix qui a été payé. Si on repart de nos 10 millions, on va les comparer avec la valeur comptable de l'entreprise et puis la différence on va se demander comment expliquer les 3 millions. Dans tout exercice de PPA on va commencer par identifier les raisons pour lesquelles l'acquisition a été faite et donc typiquement, on va discuter avec l'acheteur et le vendeur et se demander quel

était l'intérêt de cette société, qu'est-ce qui vous a attiré, par exemple surtout la marque ou la clientèle, la part de marché, la technologie. Je prends le cas par exemple de l'acquisition de « Prémaman » par le groupe français Orchestra, en 2012, ce qui les intéressait ce sont les pas de porte, les droits au bail, la localisation de tous les magasins Prémaman était ce qui les intéressait beaucoup ainsi que la marque. Ces deux actifs n'avaient jamais été portés au bilan du groupe Prémaman. On va lister les actifs incorporels qu'on estime avoir de la valeur puis on va procéder à l'évaluation. Quand on rentre dans les méthodes d'évaluation, il y a l'approche par le coût, l'approche par le marché et l'approche basée sur le rendement. Au sein de ces approches il y a plusieurs méthodes. Pour évaluer un actif incorporel, l'approche par le coût peut effectivement être une base pour certains types d'actifs, soit ce qu'on appelle le coût de reconstruction de l'actif. L'idée est de voir tous les coûts qui ont été supportés pour développer mon actif. On pourrait aussi se dire, même si j'ai supporté 300 000€ de coûts pour développer une technologie, une autre approche serait de dire, aujourd'hui à l'heure actuelle, compte tenu des évolutions qu'il y a eu sur le marché ces dernières années, est ce que ça me couterait vraiment 300 000€ pour recréer mon actif ? Ca me coûterait peut-être plus que 200 000€, on serait tentés de se dire, la valeur de mon actif c'est plus 300 000€ mais 200 000€, parce que personne ne sera prêt à me payer 300 000 pour m'acheter mon actif si il peut le reconstruire lui-même pour 200 000€. Sauf si on se dit que d'acheter un actif existant fera gagner du temps et donc permettra d'être en avance sur un concurrent. Alors la effectivement, on préférera payer 250 000€ tout de suite et prendre de l'avance sur nos concurrents. Ca c'est le principe de l'approche par le coût, elle est utilisée pour évaluer typiquement, une marque, une technologie, on va demander au client de dresser un inventaire de tous les coûts qu'il a supporté ça peut être des frais de personnel, des frais de déplacement à l'étranger. Le gros inconvénient c'est qu'il ne prend pas en compte le rendement de l'actif, on peut avoir dépensé 10 millions d'euros pour développer une marque ou une technologie, mais si il n'y a pas de besoin sur le marché, personne ne sera intéressé d'acheter la technologie. Imaginons qu'on ai passé 5 ans pour développer une technologie mais qu'il n'y a aucun besoin sur le marché, on a beau dire ça a couté 5 ans fois 2 personnes fois un salaire de x milliers d'euros par an, ça ne donne pas forcément une bonne idée de ce qu'un acteur serait prêt à payer sur le marché pour notre actif.

Interviewer: Vous avez parlé de deux méthodes pour l'approche par les coûts, la méthode de reconstruction et la deuxième ?

V.M: Oui une est basée sur les coûts historiques, l'autre plus sur les coûts qu'il faudrait supporter pour reconstruire l'actif aujourd'hui. La deuxième méthode est plus rare car les données sont plus difficilement accessibles ici. Les bons termes sont méthode du coût historique et méthode du coup de remplacement ou reproduction.

I: Et ces actifs sont alors amortis linéairement, de façon classique ?

V.M: Oui tout à fait, on parle d'actifs qui vont être amortis sur 5,7,10 ans ça dépend, il n'y a pas de règle fixe en la matière. Une marque ne va pas s'amortir sur 2 ans, ça n'a pas de sens, si on développe une marque et qu'on se dit qu'elle n'a plus de valeur dans 2 ans ça n'a pas de sens, la durée d'amortissement d'une marque ça sera entre 5 et 10 ans. La technologie ça dépend ça peut être amorti sur une durée de 20 ans dans le secteur de la construction par contre dans le secteur IT, je ne conçois pas une technologie qui pourrait durer 10 ans.

I: Très bien pour l'approche par les coûts, merci.

V.M: Alors l'approche par le marché consiste à aller chercher dans le marché des actifs qui sont comparables à l'actif incorporel qu'on veut évaluer. Donc c'est assez difficile pour un actif incorporel de mettre en œuvre ce genre d'approche. Tout dépend du genre d'actif incorporel, si on évalue une marque par exemple, d'ailleurs la marque, la technologie et la clientèle sont les trois actifs incorporels les plus courants, c'est assez facile de mettre en œuvre cette approche par le marché car on dispose de bases de données externes, qui reprennent des données issues d'exercices de PPA donc quand une société cotée procède à un exercice de PPA elle va devoir dans l'annexe de ses comptes annuels expliquer l'exercice de PPA et dire nous avons fait l'acquisition d'une société pour 10 million d'euros, l'exercice de PPA a évalué la marque au départ de telle et telle méthode avec telle et telle hypothèse parfois certains vont jusqu'à citer les paramètres d'évaluation comme un taux d'actualisation ou bien une durée d'amortissement de l'actif. Donc toutes ces données publiées sont collectées et misent dans les bases de données et nous ça nous permet quand on évalue une marque par exemple dans un secteur spécifique et là on va avoir toutes des données sur des méthodes, des taux d'actualisation etc. Donc ça va nous permettre d'avoir certains paramètres qui vont nous aider à évaluer l'actif. Car le principe de l'approche par le marché ce n'est qu'un règle de 3 comme la méthode du multiple de l'EBIDTA quand on évalue une société donc le principe est de dire je vais chercher des multiples comparables à la société que j'évalue et je remarque que les sociétés cotées comparables valent en moyenne 7x l'EBITDA et bien ce multiple de 7 je l'applique à la société que j'évalue. Pour une marque ça va être le même principe. Une des méthodes les plus fréquentes de l'approche par le marché va être la méthode des redevances (ou relief from royalties en anglais), le principe de cette méthode est de dire je vais évaluer mon actif incorporel, par exemple la marque, par actualisation des royalties que je pourrais recevoir en étant propriétaire d'une marque. Par exemple avec la marque coca cola, le fait d'être propriétaire de cette marque me permet de bénéficier de royalties si je concédais des licences à d'autres sociétés qui exploiteraient la marque coca cola. A l'inverse si on se dit que coca cola ne perçoit pas de royalties parce qu'il exploite lui-même sa marque. On pourrait très bien dire que l'avantage d'être propriétaire de sa marque est que ça lui permet d'économiser des royalties qu'il ne doit pas payer à quelqu'un d'autre. Imaginez-vous que vous demain vous décidiez de lancer une société qui vend des bouteilles coca cola, vous ne pourrez pas utiliser la marque coca cola sans payer de royalties a la société coca cola donc le fait que vous n'êtes pas propriétaires de la marque vous pénalise par le fait que vous allez devoir payer des redevances à Coca-Cola, en l'occurrence le propriétaire de la marque et les redevances sont souvent exprimées en pourcentage du chiffre d'affaire donc le prince d'une redevance est qu'on peut revendre les bouteilles au nom de coca cola mais pour chaque euro que vous vendez sur un produit coca cola, vous devez reverser 5 cents (5% du chiffre d'affaires) au propriétaire de la marque. Et donc quelque part ce 5% du chiffre d'affaires c'est la donnée / le paramètre clef dont on va avoir besoin quand on va mettre en œuvre cette méthode là parce que pour une société qui fait par exemple 1 million d'€ de CA par an, si on estime que le taux de royalties applicable dans ce secteur d'activité est de 5% par exemple (il vient de notre base de données qui a collecté un ensemble de données dans les annexes des comptes des sociétés) 1 million d'€ de CA multiplié par 5% de royalties ça va nous donner 50.000 € par an qui représente le revenu lié à la marque. Coca cola pourrait pour 1 million d'euros de CA générer 50.000 € de redevance. Ou à l'inverse,

en faisant 1 million d'€ de CA Coca-Cola économise 50.000 €par an de redevance. Ce montant de 50.000€ va servir de base pour déterminer la valeur de la marque et là on retombe sur le principe de la méthode DCF. On va actualiser les royalties avec un taux d'actualisation qu'on va déterminer selon plusieurs critères. La méthode des redevances est plus souvent assimilée à une méthode basée sur le rendement mais il y a quand même une notion de comparaison avec le marché parce qu'on va chercher un taux de redevance sur le marché. Pour coller encore un peu plus à l'approche par le marché, en collectant toutes les données sur le PPA, ils vont calculer des pourcentages de valeur de marque en proportion du CA. Par exemple, ils vont dire dans le secteur retail, en moyenne, les marques valent 30% du CA annuel. Imaginons une société qui dégage 1M d'euro de CA par an : dans tel secteur d'activité la marque vaut 300.000€. Et donc de nouveau ce ratio de 30% peut être compare aux multiples de 7X l'EBITDA donc je vous ai parlé tout à l'heure. C'est comparer une valeur a un élément financier que ce soit un CA, des fonds propres ou autres ratios financiers. En l'occurrence pour les marques, leur valeur est exprimé en pourcentage du CA annuel. Cette approche par le marché est souvent mise en œuvre pour évaluer une marque grâce aux bases de données qui nous donne ce genre d'informations. Pour les technologies, nous pouvons parfois essayer d'avoir des valeurs exprimées en proportion du CA ou autres mais ça devient beaucoup plus délicat car exprimer une valeur de technologie en fonction du CA a-t-il vraiment du sens ? Ce n'est pas du tout comparable donc beaucoup plus complique. L'approche par le marché hormis pour les marques est assez difficile à mettre en œuvre. Pour une clientèle par exemple c'est quasiment impossible, car on ne dispose pas des informations. Quand on mentionne le fait que cette approche est plus rarement utilisée, ce n'est pas par manque de sens mais par manque de données sur le marché. Pour évaluer une société c'est plus facile, on peut aller chercher des sociétés cotées, des multiples de CA ou EBITDA, c'est beaucoup plus facile à trouver comme information. Des références pour des valeurs d'actifs incorporels c'est beaucoup plus complexe. En ce qui concerne l'approche par le rendement, pour beaucoup de méthodes on va retrouver le fondement DCF mais ce sera pas la méthode DCF en tant que telle étant donné que cette méthode DCF est utilisée pour évaluer une entreprise de manière globale. Pour évaluer un actif incorporel, on va essayer d'identifier le rendement lié à un actif incorporel et surtout actualiser ce rendement à un certain taux. La difficulté n'est pas tant de déterminer un taux d'actualisation mais d'isoler le rendement uniquement lié à l'actif incorporel en question. Quand on évalue une société au départ avec la méthode DCF on va calculer un CF qui est un CF global (CF dégagé par la société chaque année) et on aura la valeur de la société. Quand on évalue une marque, on retombe sur la question : « Quel est vraiment le CF lié uniquement à la marque ? », et ça le client ne saura jamais vous dire. Il ne saura pas nous dire exactement quelle partie de son CF annuel est expliqué par la marque, quelle partie est expliquée par la technologie, ou encore par le personnel. Aucune société ne sait dire ça car ça devient trop fin, c'est une réflexion qui se fait uniquement dans le cadre d'un PPA. Là réside la difficulté de la méthode basée sur le rendement. Typiquement la méthode des royalties que je vous ai expliquée c'est un parallèle avec la méthode DCF. C'est de dire je vais essayer de déterminer un flux, un CF qui est expliqué / lié à la marque. Et donc la méthode des redevances c'est typiquement dire pour un CA de 100, si je constate que dans le marché un taux de redevance moyen est de 5% et bien j'estime que pour 100 de CA, 5 sera expliqué par la marque. Cette méthode des redevances est utile pour évaluer les marques, les technologies parce qu'on a des bases de données qui nous donnent des chiffres spécifiques aux technologies. La méthode basée sur le rendement va aussi être utile pour évaluer une clientèle. Je vous ai dit que la clientèle est un actif assez souvent utilisé /

évalué dans les PPA. C'est sans doute un des actifs les plus complexes à évaluer car c'est une méthode spécifique qu'on appelle la méthode de l'Excess Earnings. Plutôt que d'essayer d'allouer un flux directement à la clientèle (beaucoup plus complexe car personne ne va émettre une licence sur sa clientèle, ça ne se fait pas) comme on l'a fait pour les marques, on va travailler à l'envers. On va partir d'un flux / un CF global pour la société auquel on va retirer tous les CF qui sont expliqués par les actifs autres que la clientèle. Étant donné que c'est très compliqué d'aller dire sur un certain montant ce qui est expliqué par la clientèle, on va dire que 5% est expliqué par la marque, 10% par les bâtiments, … on va considérer tous les actifs corporels et incorporels autres que la clientèle pour arriver à un CF résiduel qui est donc expliqué par la clientèle car ce n'est pas expliqué par autre chose. C'est une des méthodes les plus complexes des actifs intangibles, aussi appelée méthode du surprofit. Dans la méthode basée sur le rendement, on peut aussi avoir la méthode du revenue incrémental. C'est une méthode qu'on a utilisée pour évaluer une marque de bière. Le principe est de dire que le fait d'être propriétaire de ma propre marque, ça me permet peut-être de vendre ma bière un peu plus cher qu'un concurrent qui vend sa bière sans marque. Typiquement on va acheter plus cher une bouteille de Coca plutôt qu'une bouteille marque produit blanc ou autre. La différence entre les deux c'est uniquement la valeur de la marque. Pour l'évaluation de notre marque de bière, le client nous avait dit qu'il vendait ses bières sous son propre nom / marque (Jon Martins) mais également les mêmes bières à des supermarchés qui vont les commercialiser sous leurs propres labels « produit blanc ». Et donc il suffisait de comparer le prix auquel il vendait sa bière sous la marque Timmermans et le prix auquel il la vend à Carrefour par exemple. La différence de prix est donc expliquée par la marque. Cette différence on va la multiplier par le volume de vente et actualiser ce rendement. Pour résumer l'approche par le cout, les deux grandes approches sont de regarder les couts historiques (plus souvent réalisée car plus facile) ou quels seraient les couts de reproduction / remplacement (plus rare car on a rarement l'info). L'approche par le marché c'est vraiment le principe de la règle de trois et d'aller chercher le plus souvent via des bases de données externes des valeurs de technologies qu'on va comparer au CA pour avoir un ratio et ce ratio on va l'appliquer à l'actif qu'on évalue (facile à mettre en œuvre pour les marques mais pour les autres incorporels c'est assez rare). L'approche par le rendement, on a la méthode des redevances qui est la plus couramment utilisée (marque, technologies), on a la méthode du revenu incrémental et la méthode du surprofit (clientèle).

I: Concernant la méthode par les rendements, quel est le taux d'actualisation utilisé ?

V.M: Le principe va être de prendre le WACC de l'entreprise majoré de quelques pourcents. Le WACC de l'entreprise n'est jamais qu'un taux de rendement qui est le rendement moyen exigé par les investisseurs sur toute l'entreprise. Sachant qu'une entreprise est toujours propriétaire de plusieurs actifs (incorporels, corporels, BFR, personnel) et tous ces actifs sont sensés générer du rendement à des niveaux divers en fonction de leurs degrés de risque. Typiquement, l'actif BFR (stock + créances commerciales – dettes commerciales) est un actif beaucoup moins risqué que le personnel par exemple. Le BFR le jour ou l'entreprise veut le liquider elle doit juste revendre ses stocks et aller chercher ses créances commerciales et elle transforme facilement son BFR en cash. Un actif comme un bâtiment est un peu plus risqué que le BFR mais moins risqué qu'un actif incorporel. Le rendement qu'attend généralement un investisseur sur un bâtiment de type industriel va être du 7-8% pas plus, mais il y a moyen de retrouver son argent assez rapidement quand on veut revendre un bâtiment.

A l'inverse un actif incorporel va être plus risqué. Si une entreprise veut revendre sa marque, peut être que personne sur le marché ne sera intéressé par sa marque ou sa technologie. Les actifs intangibles sont plus risqués que le risque moyen de tous les actifs. Le personnel est aussi assez risqué car une société ne détient pas son personnel. Si quelqu'un veut s'en aller on ne peut pas toujours le retenir. Tout ça pour dire que quelque part un WACC n'est que la moyenne pondérée de tous les rendements liés aux différents actifs. Pondéré car c'est pondéré en fonction du poids de chaque actif. Dans certains secteurs, on a une composante immobilière très importante et très peu d'actifs incorporels. Dans d'autres secteurs comme l'IT ou la consultance ce sont des secteurs qui présentent une grande part d'actifs incorporels même si ils ne sont pas reconnus au bilan. Et donc, quand on évalue un actif incorporel, quel taux d'actualisation va t'on utiliser ? Si on a une société qui présente un WACC de 10%, quand on évalue sa marque on va peut-être prendre un taux de 10% + 2% de risque supplémentaire lié à la marque. Si on évalue une technologie non-brevetée, on va considérer que ça sera encore plus risqué que la marque et donc on utilisera un taux de 13 ou 14% comparé au WACC. Il faut toujours pouvoir retomber sur le WACC, le lien est très fort avec le WACC.

I: On entend souvent parler du terme de « fair value », que pouvez-vous nous dire dessus ?

V.M: Selon les normes IAS IFRS, l'idée est de dire que ça va être une valeur de marché / un prix auquel un acheteur, pleinement informé, indépendant serait prêt à acquérir l'actif. Cette notion n'est pas lié à une approche en particulier. Maintenant les normes IAS IFRS prône l'approche par le marché. Donc ils disent que la meilleure approche pour déterminer une « fair value » sera de trouver un actif comparable sur le marché et d'utiliser celui-ci comme référence pour évaluer l'actif en question. Le problème c'est le manque de données disponibles et donc le plus souvent on retombe sur l'approche par le rendement à défaut d'information suffisante. Le plus souvent, on essaye de mettre en œuvre plusieurs approches lorsqu'on évalue un actif incorporel, il est rare de dire qu'on a une donnée de marché et de dire on a le chiffre c'est ok. On va mettre en œuvre une deuxième méthode et comparer les deux résultats obtenus. Si les valeurs sont très différentes, on se demande quels paramètres n'étaient pas pertinents… Une préférence est donnée à l'approche par le marché mais à défaut d'autres méthodes sont utilisées si pas possible autrement. Les méthodes utilisées vont vraiment dépendre du type d'actif à valoriser.

I: Vous avez mentionné le fait que certaines firmes pouvaient dans certains cas ne pas reconnaître certains actifs intangibles dû à des raisons fiscales notamment. Que pouvez-vous nous dire sur la non-reconnaissance du goodwill, et notamment du non-purchased goodwill ?

V.M: Aller reconnaître un actif incorporel sans être dans un contexte d'acquisition, il y a la question fiscale dont je vous ai parlé après si on amortit l'actif, il y aura juste une question d'étalement de cette taxation. Mais il y a beaucoup de choses qui entrent en jeu. Je ne veux pas donner un faux message en disant que ce n'est jamais intéressant de reconnaître un actif incorporel, je pense que c'est une question assez complexe qui doit être traitée au cas par cas. Il y a des clients, surtout dans le secteur IT, qui reconnaissent de l'actif incorporel pour des technologies / software qu'ils développent car si ils ne reconnaissent pas ça à l'actif du bilan, ça veut dire qu'ils doivent le prendre en charge et pour des développements de longues durées c'est tout simplement pas envisageable

au niveau de ce à quoi les comptes ressembleraient si on prend tous les couts en charges. Dans ce cas-là, il y a une certaine activation de couts et donc progressivement il y a un actif incorporel qui apparaît au bilan et qui peut prendre de la valeur. La raison peut être tout simplement de dire je veux présenter une vision un peu plus correcte de mes comptes et si je supporte 300.00€ de couts sur une année en frais de personnel pour développer une technologie qui va pouvoir plaire au client, on aura des comptes qui reflètent d'avantage la réalité si on neutralise ces couts-là, qu'on les active et qu'on les amortit sur un certain nombre d'années, plutôt que de se dire qu'on se prend une charge de 300.000€ sur une année et puis plus rien les années d'après alors qu'on va pouvoir bénéficier encore pendant un certain nombre d'années du CA envers mes clients. Certain hésitent à activer des intangibles car ils doivent répondre à des exigences de ratio vis-à-vis de leurs banquiers, et le fait de reconnaître un actif au bilan va leur permettre d'augmenter leur ratio de solvabilité. Il y a beaucoup d'aspects qui entrent en jeu. Pour ce qui est du goodwill, le non-purchased goodwill est reconnu sans acquisition, la question est de se dire que reconnaît-on la dedans ? Je pense que un non-purchased goodwill on va plus retomber dans le fait de reconnaître un marque, une clientèle… Peut-être que quand on parle de non-purchased, il se peut qu'on parle des actifs intangibles reconnus sans qu'on soit dans un contexte d'acquisition, il faut évidemment que tout soit libellé, et selon moi le goodwill est vraiment lié à une acquisition.

I: Merci beaucoup pour votre temps. Bonne soirée.

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