

INTANGIBLES FINANCIAL VALUATION: A METHOD GROUNDED ON A IC-BASED TAXONOMY

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ABSTRACT

This paper is the result of an applied research project developed at the University of the Basque Country, in collaboration with companies that are particularly interested in quantifying the value of their intangibles. It proposes a method for the financial valuation of the intangibles based on a specific taxonomy. On the one hand, this distinguishes between intangible assets and core competences and, on the other hand, it classifies the latter according to the different intellectual capital categories driven by them. The paper aims to identify and quantify a company's intangibles in monetary terms, taking the incomes that they are capable of generating into account.

1. INTRODUCTION¹

This paper puts forward a method for intangibles financial valuation based on a specific taxonomy that distinguishes between a company's intangible assets and core competencies as value drivers. Our approach assumes that the value of a company's intangibles fundamentally lies in the core competencies.

The proposed method is based on a strategic analysis that allows the firm's core competencies and assets to be identified, as well as their main characteristics that help to generate value.

Financial valuation models, fundamentally based on the cash flow generated by the company and on real options valuation, are proposed to measure the value added to the company by individual intangibles. The company's financial information and the analysis and opinions provided by its directors are used to implement these models. This method is appropriate for valuing the intangibles of large companies and, also small companies where large databases are not available.

In Section 2, the basic concepts for intangibles' financial valuation are first of all considered, and a critical survey is then performed of the different approaches and models that have been developed to perform this valuation. Section 3 is devoted to the basic concepts and the characteristics of the proposed method. Section 4 describes initial stages of the method, aimed to obtain the information necessary to determine the value of a company's intangibles. Section 5 shows how, in the context of this method, financial valuation models can be applied to obtain the value of firm's intangibles. Finally, the conclusions summarise the results obtained. The paper ends with a list of the relevant bibliography for the subject.

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2. BACKGROUND: THE FINANCIAL VALUATION OF INTANGIBLES

2.1. Why should a firm's intangibles be valued?

There is an undeniable concern regarding the management and valuation of companies' intangible resources and assets, in particular those related to knowledge, which are also known as "intellectual capital" (Hussi, 2004; Kaufmann and Schneider, 2004)².

The proportion of intangible assets as part of the overall total assets of the company is often greater than that of the tangible assets. However, the value of the majority of them do not appear on the financial statements, as the lack of transparency or the absence of a benchmark market makes it difficult to value them (Lev and Zarowing, 1998).

Some authors have considered that it is not necessary to report explicitly about the value of the companies' intellectual capital, as the market already does so by valuing their securities. The above statement would be correct if the stock market was continuously efficient, but it has been proven not to be. On the other hand, this market always values the set of a firm's intangibles, which means that the problem of individually valuing them persists. Furthermore, the stock market valuation is not applicable to the SMEs that are not quoted on the market and where it is difficult to find comparable companies that are listed.

In the academic field, given the demand of the corporate world, a research line has been generated since the Nineties in the 20th century aimed at reflecting the value of the intangibles on the financial statements (García-Ayuso, Monterrey and Pineda, 1997; Lev and Zarowin, 1998; Lev, Sarath and Sougiannis, 1999; Lev, 2001b; Cañibano *et al.*, 2002). However, the problem is not easy to solve.

The lack of an explicit valuation of the intangible assets may be encouraging information asymmetries and inefficiencies in the stock markets. In fact, it has been seen that when the value of the intangible assets is included in the market analysis, the forecasts regarding the companies' future performance improve, which shows the important role they play in making the market efficient, reducing the information asymmetries and therefore the risk of adverse selection.

Apart from the advantages that fuller information about the firm's intangibles would provide for the better functioning of the financial markets, special mention should also be made of the importance of detailed knowledge about them inside the company:

- In order for the management, shareholders and workers to know what is the true value of their company.
- To encourage the preservation, regeneration and strengthening of the firm's intangibles, and thus help to increase present and future corporate profits.
- To show the firm's guarantees when seeking new financing, either through indebtedness or equity. True information about the value of the intangibles reduces information asymmetries, which makes it easier to access financial resources in better cost conditions.
- In order to negotiate the value of the company in case of merger or takeover.
- Where applicable, in order to compare it with the stock value and check to what degree this reflects the real value of the company or to "market sentiment".

Therefore, the valuation of the firm's intangibles is becoming increasingly more necessary.

² Some authors make no distinction between the terms "intangible assets" and "intellectual capital". Others, however, reserve the latter to indicate those assets due to knowledge, and therefore exclude intangibles such as, on the one hand, reputation and image, and on the other hand, organisational culture, motivation or the values system. The latter, nonetheless, are difficult to separate in practice from the complex know as "tacit knowledge". On the other hand, more recent approaches tend to take all the intangibles in consideration. Andriessen (2004b), after discussing various terms, chose "intangible resources" as being the most adequate.

2.2. Value measurement and financial valuation

There are two general procedures for intangibles valuation: *value measurement* and *financial valuation* (Andriessen, 2004a).

Value measurement basically includes two tasks: on the one hand, identifying and placing the intangibles in a structured order, i.e., to discover which type of intangibles exist in the company, which generate basic competencies, what relationship exists between them, etc.; and on the other hand, looking for indicators that allow the development of the most important intangibles, as well as comparing the situation of the company with other benchmark entities. These indicators are mainly ratios and therefore the measurement of intangibles is, basically, non monetary in nature. The contributions of Brooking (1996), Edvinsson and Malone (1997) –Scandia Navigator–, Kaplan and Norton (1997) –Balanced Scorecard–, Roos *et al.* (1997), Sveiby (1997) –Intangible Assets Monitor–, Joia (2000), Viedma (2001) –Intellectual Capital Benchmarking System– and Bueno (2003) –Intellectus Model–, are interesting in this area.

Financial valuation seeks to find a monetary valuation of intangibles. As is indicated below, there are various ways to reach this valuation. They all have pros and cons, and therefore the search of methods and models for intangibles' financial valuation that are both true and simple is not an easy task. A critical analysis of the proposed different approaches and methods to perform that valuation, both of the set of intangibles and the isolated intangible elements, is performed in Rodríguez and Araujo (2005). In table 1 we summarize the main methods for intangibles' financial valuation.

Table 1. Approaches and methods for the financial valuation of intangibles

Approaches	Methods	Joint valuation of all intangibles	Separate valuation of intangibles	Valuation of specific intangibles
Cost Approach	Historic cost	-	-Historical cost -Historical cost adjusted for inflation (s. a.)	-
	Actual cost	-	-Reproduction cost -Replacement cost (s. a.)	-
Market Approach	Stock Market	-M/B ratio -Tobin's q (s. a.) -Analogical stock market valuation (Caballer and Moya, 1997)	-FiMIAM (Rodov and Leliaert, 2002)	-
Income Approach	Retrospective methods	-Goodwill (s. a.) -Calculated intangible value (Stewart, 1997)	-	-
	Prospective and mixed methods	-Intangibles scoreboard (Lev, 2001a; Gu and Lev, 2001)	-Weightless wealth toolkit (Andriessen and Tissen, 2000; Andriessen, 2004b) -Real options approach (s. a.)	-Technology Factor (Khoury, 1998)

s. a.: Several authors

2.3. Future yields and core competencies

In order to perform intangibles' financial valuation, the intangibles making up the company have to first of all be identified and listed. In the majority of the aforementioned works on intangibles' value measurement, general models are used to identify the intangibles in companies and organizations. While acknowledging the undeniable value and usefulness of those models, preparing a comprehensive list could be highly laborious and possibly fruitless, as, as the competitive capacities are different, the key intangibles of the different companies will be different. It is also highly likely that certain important intangibles that allow the company to obtain competitive advantages are not individualised, but are rather the result of combinations of various elements.

On the other hand, it should also be taken into account that an asset, whether tangible or intangible, only has value according to the use that is going to be made of it, and therefore the value depends on the yields that are obtained from its use (Tissen et al., 2000; Cummings, 2003; Lev and Zambon, 2003; Schunder-Tatzber and Markom, 2004).

Well, from where does this yield that the intangible assets may provide come from? We know that most companies focus their endeavours and internal resources on some activities or knowledge sources, known as core competencies, which provide the basic competitive advantages, and therefore determine the value creation. Hamel and Prahalad (1994) define them as the set of skills or aptitudes developed by the company that generate a significant value or benefit for the client. Therefore, as Coff and Laverty (2002) indicated, a core competence is always based on a type of knowledge or a knowledge combination.

Therefore, and in accordance with other authors (Andriessen and Tissen, 2000; Sullivan, 2000; Sullivan and Sullivan, 2000; Tissen et al., 2000; Viedma, 2001; Mouritsen, 2003; Andriessen, 2004b), we estimate that a fundamental prior step to valuing the intangibles of an organisation involves identifying its core competencies.

As will be seen later, various aspects have to be evaluated in order to identify a firm's core competencies: its capacity to provide added value and differentiate the company from the competition, its sustainability in time and the ease for the appropriability of the value generated.

3. A METHOD FOR INTANGIBLES' FINANCIAL VALUATION: BASIC CONCEPTS AND CHARACTERISTICS

3.1. Intangibles' taxonomy and firm's value: Intangible assets and core competencies

Our proposed intangibles' valuation method considers that the value of a company is determined by the tangible and intangible assets, together with the core competencies (Eustace, 2001, Mouritsen, 2003, Schunder-Tatzber and Markom, 2004). Thus, the first sub-division of our proposed intangibles' taxonomy refers to the difference between "intangible assets" and "core competencies". These concepts are fundamental in order to develop the proposed method. Therefore, their meaning needs to be specified.

Intangible assets are taken to be those assets of the company that do not have a physical basis, and which are also "codified": the relevant rights or the company's appropriation capacity regarding the results generated, have to be established by means of a contract, a regulation or some other deed of right. Patents, concessions, brands, licences and so on are therefore intangible assets.

Given the characteristics of these assets, we believe that the most appropriate way of obtaining their value is according to the market in which they are traded, or should that not exist, by using those approaches that according to the information available better determine their value (replacement value, capitalised historical cost, comparative methods, etc.). This is what we refer to as the *conventional value* of the intangible assets.

Core competencies, as we have already indicated, are those corporate characteristics or factors that give the firm a more or less sustainable competitive advantage over its competitors. We estimate that the core competencies are the main source of value in the company. The associated value depends on factors such as its sustainability and degree of appropriability by the company of the results generated.

Core competencies may be linked to or derived from a specific tangible or intangible asset, or not be linked to a specific asset, but rather to a generally undetermined set of assets, which shall be referred as “intangible core competencies”. They usually refer to some knowledge category, particularly of tacit type.

We defend that a suitable taxonomy of the core competencies should take the types of intellectual capital driven by them into consideration.

Although there exist diverse classifications of intellectual capital (Brennan & Connell, 2000; Petty & Gutrie, 2000; Bontis, 2001; Seetharaman *et al.*, 2002; Andriessen, 2004b; Pike and Ross, 2004), we have adopted the classification raised by the Intellectus Forum (Bueno, 2003), that divides intellectual capital into three categories: *Human capital*, *Structural capital* –integrated by *Organizational capital* and *Technological capital*– and *Relational capital*, incorporating in this one the *Business Capital* and *Social capital*. Human capital is defined as a set of explicit and tacit knowledge of the people in the organisation. Structural capital is presented as the explicit knowledge related to the internal processes in the organization, and can be both *organizational* (the operating environment derived from the interplay between management and business processes, technology and culture) and *technological* (patents, licenses, proprietary software, databases and so on). Relational capital can be defined as the set of explicit and tacit knowledge concerning the way in which the organization deals with external agents, and can be decomposed in *business capital* (understanding this like the base of relations with agents linked directly to the “business”: clients, suppliers, and others) and *social capital* (integrating the relations with agents in a more wide environment: public administrations, citizens’ organisations and others).

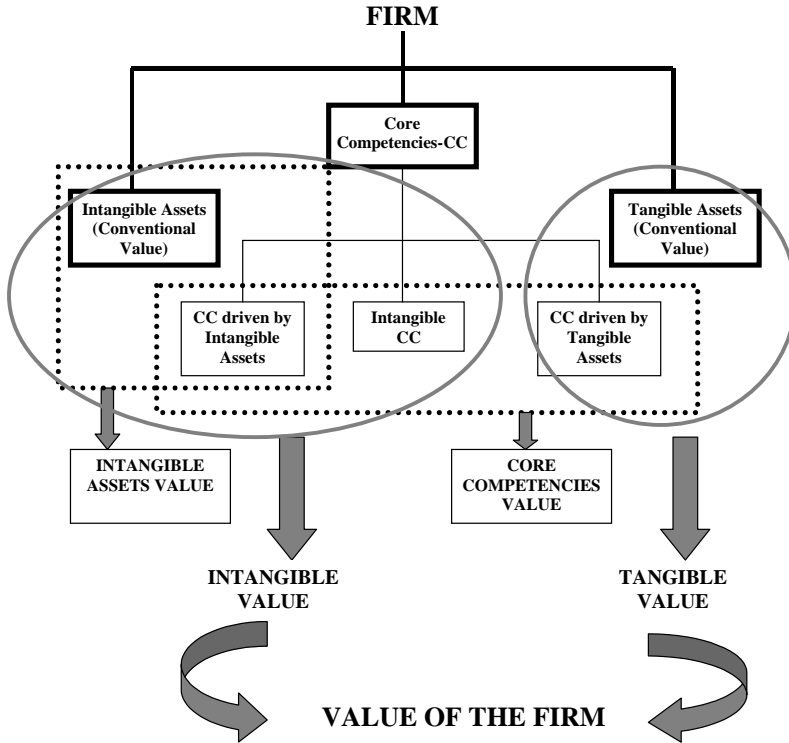
In accordance with this classification, we propose the following taxonomy of the intangible core competencies:

- Human Resources’ competencies.
- Organizational competencies.
- Technological competencies.
- Business relational competencies.
- Social relational competencies.

Finally, and taking into account that synergies may exist between different core competencies in an organisation, we believe that those synergies should be explicitly taken into account for the full valuation of intangibles.

A core competence may reside in one or various tangible assets –fixed assets, geographical location, etc. Obviously, the value of that core competence cannot be computed as value of the intangible assets. Nonetheless, it has to be taken into account in our method as it affects the “total operating net income”, although it is not included in the final value of the intangibles.

Figure 1: Firm’s value components



With respect to the intangible assets, they may not drive basic competitive advantages, although they may have value, “conventional value”, as has already been indicated. So, if they represent a competitive advantage and therefore have an associated core competence, the traditional methods cannot be used to value them.

Based on the differentiation between tangible assets, intangible assets and core competencies, which can be driven by assets or be intangible core competencies, the basic valuation relations are established.

$$FV(IA) = FV_c(IA) + FV(CC^{IA})$$

With:

$FV(IA)$: Financial value of the intangible assets.

$FV_c(IA)$: Conventional financial value of the intangible assets.

$FV(CC^{IA})$: Financial value of the core competencies driven by intangible assets.

$$FV(I) = FV_c(IA) + FV(CC^{IA}) + FV(CC^I)$$

With:

$FV(I)$: Financial value of the intangibles’ set.

$FV(CC^I)$: Financial value of the intangible core competencies.

$$FV(CC) = FV(CC^{TA}) + FV(CC^{IA}) + FV(CC^I)$$

With:

$FV(CC)$: Financial value of the core competencies.

$FV(CC^{TA})$: Financial value of the core competencies driven by tangible assets.

Therefore, the financial value of the set of intangibles can also be expressed as:

$$FV(I) = FV(IA) + FV(CC^I)$$

These basic valuation relations are set out in figure 1.

Therefore, the value of the company's intangibles consists of the conventional value of the intangible assets, the value of the core competencies deriving from the intangible assets and the value of the intangible core competencies.

The value of the core competencies, in general, is more difficult to establish than the value of the intangible assets, where there is usually a conventional value as we have already indicated. The proposed method is therefore fundamentally based on valuing the core competencies.

3.2. Analysis of the core competencies

As has already been stated, our approach is based on the premise that the intangibles' value is mainly found in the firm's core competencies. Yet prior to analysing them, we should clarify what is meant by "firm".

We believe that a business unit's intangibles should be valued as a whole, as it is difficult to consider that the core competencies may be easily separated by products, business lines, etc. So, when there is a clear separation between business unit within a "legal" unit, by divisions, geographical locations, etc., the intangibles may be valued separately.

Once the economic unit to be valued has been defined, its core competencies need to be identified. The purpose of the paper is not to identify and provide a detailed analysis of a firm's core competencies, but rather to value them. If the management team of the firm whose intangibles are to be valued has already identified their core competencies, they can then be valued. If they have not been identified, that task should be performed, following the guidelines laid down in the relevant works of reference (Grant, 1991; Andriessen and Tissen, 2000; Tissen *et al*, 2000; Andriessen, 2004b).

3.3. Other characteristics of the proposed method

Apart from applying the aforementioned intangibles' taxonomy, and focus on the firm's core competencies, the proposed method for the intangibles financial valuation has the following characteristics:

- Starts with a strategic analysis of the company.
- Allows the company's intangibles to be valued individually.
- Is based on discounted cash flows and real option valuation.
- Uses both the standardised and objective information from the financial statements and other corporate documents, and the perceptions and opinions of the corporate directors. This allows the information available for the valuation to be maximised.
- Explicitly includes the possible existence of synergies between basic competencies.
- Is appropriate for valuing the intangibles of large companies, and also small companies where large databases are not available.

4. SETTING OUT OF THE METHOD – FIRST STAGES

4.1. *Identifying the firm's intangible assets and core competencies*

First of all, with respect to identifying the intangibles, we will establish if a strategic analysis has been carried out in the company that has allowed its intangibles and core competencies to be identified. If this has not been performed, the team of analysts will focus on encouraging the company's directors to perform analysis by stressing the fundamental characteristics of the core competencies, as has been previously indicated.

Second of all, once the directors have established a map of what are their intangible assets and core competencies, tables will be provided that allow other previously unidentified intangible elements to be located.

It should be stressed that the valuation of the core competencies is an important element of the proposed method. Therefore, these tables distinguish between the core competencies driven by intangible assets and those not associated to assets (*intangible core competencies*). Seven tables will be set out: the first one regarding the existence of both tangible and intangible assets that generate core competencies in the company; five of the remaining six are dedicated to identify the intangible competencies according to the intellectual capital categories driven by them, and the sixth to the synergies between basic competencies³.

Information is also requested in these tables relating to the determining characteristics of the core competencies value. The following will be considered among the main aspects analysed:

- type of impact on the company's results (present or future),
- importance in the company,
- degree of sustainability of the competitive advantage,
- where applicable, characteristics of the core competencies as options.

On the one hand, this information will allow guidelines to be established in order to quantify in time and amount the impact of each of the core competencies on the company's results and, on the other hand, to establish the most suitable method or methods for their financial valuation.

4.2. *Impact on the company's net income - Basic concepts*

Once the firm's core competencies have been established, the "net income" (*NI*) that they help to generate has to be estimated. First of all, a distinction should be made between the part of the net income that is being generated and the part that could be generated in the future. Therefore, the management group will consider, for each identified competence, if it is currently affecting the firm's net income (in which case they will be referred to as "basic project") or whether it is expected to affect, positively, that income in the future –in which case, it can be considered as a "real option"–, or they are deemed to have both characteristics at the same time.

The impact on the future net income should be discussed in a little more detail. As has previously been stated, it implies that the competence in question has call option, competencies or future investment project characteristics (Rodríguez and Araujo, 2005).

Given that it is considered that the core competence may affect future net income as it may allow other assets or competencies to be acquired or projects to be implemented in the future, it shall always be taken to be a *call option*. Likewise, we shall assume that they may only be exercised at a future date ("European options"). This is justified as we believe that, in the majority of cases, the new

³ These tables are not included in this paper, but are available on request.

core competence or the new fundamental investment project, fostered by the currently existing competence, shall only be possible at a future date.

Therefore, two components can be distinguished in the core competencies value:

$$FV(CC) = FV(CC)_{BP} + FV(CC)_{RO}$$

With:

$FV(CC)$: financial value of the core competencies.

$FV(CC)_{BP}$: financial value of the core competencies in the part that are currently affecting the net income (“basic project” - BP).

$FV(CC)_{RO}$: financial value of the core competencies in the part that are expected to affect the net income in the future (as “real options” - RO).

This shall be applied to each of the core competencies, in both the case of those associated and those not associated to the tangible or intangible asset:

$$FV(CC^{TA}) = FV(CC^{TA})_{BP} + FV(CC^{TA})_{RO}$$

$$FV(CC^{IA}) = FV(CC^{IA})_{BP} + FV(CC^{IA})_{RO}$$

$$FV(CC^I) = FV(CC^I)_{BP} + FV(CC^I)_{RO}$$

With:

$FV(CC^{TA})_{BP}$: Financial value as basic project of the core competencies driven by tangible assets.

$FV(CC^{TA})_{RO}$: Financial value as real options of the core competencies driven by tangible assets.

$FV(CC^{IA})_{BP}$: Financial value as basic project of the core competencies driven by intangible assets.

$FV(CC^{IA})_{RO}$: Financial value as real options of the core competencies driven by intangible assets.

$FV(CC^I)_{BP}$: Financial value as basic project of the intangible core competencies.

$FV(CC^I)_{RO}$: Financial value as real options of the intangible core competencies.

Therefore:

$$FV(I) = FV(IA) + FV(CC^I) = FV_c(IA) + FV(CC^{IA}) + FV(CC^I) = FV_c(IA) + FV(CC^{IA})_{BP} + FV(CC^{IA})_{RO} + FV(CC^I)_{BP} + FV(CC^I)_{RO}$$

$$FV(CC) = FV(CC^{TA}) + FV(CC^{IA}) + FV(CC^I) = FV(CC^{TA})_{BP} + FV(CC^{TA})_{RO} + FV(CC^{IA})_{BP} + FV(CC^{IA})_{RO} + FV(CC^I)_{BP} + FV(CC^I)_{RO}$$

4.3. Impact on the company's net income - Scope and sustainability

Scope of the impact on current net income

Calculating the core competence value as the basic project is based on estimating the net income that they currently generate. Net income are considered to be the earnings before interest and taxes (EBIT) obtained over what can be considered as a “normal” profit or minimum achievable return, given the characteristics of the company according to its size, sector, etc. This minimum achievable return is calculated as the amount equivalent to applying the weighted averaged cost of capital ex-taxes to the conventional value of all the firm’s tangible assets.

Two alternatives are considered in order to quantify the impact that the core competencies are already having on the company's net income, its future development and sustainability:

1. An estimate based on the direct analysis of the company's earnings account, which allows the part of net income linked to the core competence to be identified.
2. An approximate method where the management team is questioned about the percentage of the net income that they consider to be associated to each core competence, or alternatively, they are questioned using scales of importance, which will subsequently transformed into percentages.

Degree of sustainability of the competitive advantage provided by the core competence.

The competencies deteriorate and then the resulting competitive advantages tend to disappear over time. The managerial group should be asked to estimate the degree of sustainability (in years, no more than 5) of each core competence detected.

4.4. Characteristics of the asset or the competence as option

As has already been stated, the other component of the financial value of the core competencies [$FV(CC)$] is their impact on future net income [$FV(CC)_{RO}$]. In order to estimate this, those intangible assets or competencies with real options need to be identified first of all.

An intangible asset or a competence includes real options if its holding or current availability may affect future net income, either because it allows other assets or components to be acquired in the future, or because it allows investment projects to be carried out in the future. In that case, the *underlying assets* of the assets or competencies as real options need to be established. Those assets, competencies or projects that the current holding of the assets or competencies in question will allow to acquire or pledge in the future have to be identified. The following aspects have to be taken into account in order to determine them:

- The core competencies or essential assets that may not be acquired in the future, or fundamental investment projects that may not be implemented in the future, if the company does not have the current competence in question.
- These assets, competencies of future projects have to be essential or fundamental for the company, in order to maintain or increase its competitive edge.

With respect to the identified assets, a series of elements that allow them to be valued as real options have to be established, together with the company's managerial group. Even though, to keep things simple, the type of real options that in principle are going to be considered is relatively simply –European call options– and the valuation method to be used is a derivation of the famous approach put forward by Black and Scholes (1973), notwithstanding the fact that characterising an asset or a competence as an option is not easy, and it is even more difficult to estimate the parameters that allow it to be assessed as such an option.

With respect to the future time when the assets or the competence may be obtained, or the project may be undertaken, in the questionnaire it is considered to be the moment when the expected impact on the firm's net income may begin. In conventional options terminology, it is the *expiration date* or *exercise date* of the option.

Therefore, expressed in this way, the question to answer is the following: at what time in the future will the company be ready to acquire that asset or that competence, or to undertake that project that it would not be able to acquire or undertake if it did not currently have the asset or competence?

Furthermore, the degree of impact on the firm's future net income and its sustainability should be able to be estimated. In other words, the expected value, at the moment of exercising the option, has to be able to be calculated of the new competence, the new asset or the new project (*underlying asset*). Therefore, its expected impact on the firm's future net cash flow and the duration shall have to be estimated, so that duly discounted they provided this expected value.

Likewise, the necessary costs to be able to acquire the asset, generate the competence or undertake the project in the future have to be estimated. At the time of exercising the option, the acquisition of assets or competencies, or the start of a project, has to have some cost, involve some payment (*strike price*), as otherwise the value of the option would simply be the current value of the underlying asset. Therefore, the cost or payment arising from the exercising of the option has to be estimated.

Finally, a decisive element in the characterisation of an option is the degree of associated risks. Any uncertainty regarding the current and future value of the asset, competence or future project is one of the fundamentals of the value of the options, as has already been stated. Volatility is an essential element in valuing options, although it is not easy to estimate in the case of real options, given the nature of the underlying assets taken into consideration. Therefore, as can be seen later on, in many cases a qualitative answer may be more convenient.

5. APPLYING FINANCIAL VALUATION MODELS

After the intangible assets and core competencies have been identified, and the impact of the latter on the net income has been estimated, financial valuation models shall be applied to obtain the value of the core competencies, together with a conventional valuation of the intangible assets.

5.1. Calculating the intangible assets' financial value

As has already been indicated, the firm's intangible assets, irrespectively of whether or not they are linked to a core competence, have a value associated to the asset itself or conventional value⁴. Should there be a market where the intangible asset is traded, its conventional value shall be calculated as the price that is established in that market. Should there be no such market, its conventional value shall be calculated by using the approach that, taking the available information in account, best determines its value. The approximate methods include the replacement value of the asset, the capitalised historical cost or the comparative method.

5.2. Financial valuation of the core competencies as basic projects: discounted cash flow models

The investment theory considers that the value of an asset comes from the expectation to generate returns. The value of the assets is calculated as the current value of the yields to be generated in the future by this asset discounted at a rate adjusted to the firm's characteristics and risk. That is:

$$\text{Value} = \sum_{t=1}^n \frac{P_t}{(1+d)^t}$$

⁴ Conventional valuation of the intangible assets has to consider, where applicable, those assets belonging to the company and that are not reflected in its accounting system.

With:

P_t : Future yields to be obtained in period t .

d : Discount rate adjusted to risk.

n : Time horizon.

The core competencies represent those aspect that make the company positively stand out from its competitors. Thus, the value of the core competencies as basic project shall be calculated taking into account:

- 1) The operating net income obtained above what may be considered a minimum achievable return, given the characteristics of the firm.
- 2) The weighted average cost of capital ex-taxes as discount rate.
- 3) The life horizon of the competence, determined by the degree of sustainability of the competitive advantage.

Estimating the Net Income

The Net Income (NI) refers to the net operational income coming from the firm's core competencies, and which therefore represents the income obtained above what can be considered as a minimum achievable return. As has already been indicated, the net income is calculated as the result of deducting from the earnings before interest and taxes ($EBIT$) the amount equivalent to multiplying the weighted average cost of capital ex-taxes ($WACC$) by the conventional value of the firm's tangible assets [$FVc(IA)$]⁵.

The $WACC$ is calculated as follows:

$$WACC = (\%_D \cdot K_D + \%_E \cdot K_E) / 100^6$$

With:

$\%_D$: Percentage that represents the long-term debt over the sum of equity and long-term debt.

$\%_E$: Percentage that represents the equity over the sum of equity and long-term debt.

K_D : Yield required by the long term debt.

K_E : Yield required by the equity.

Therefore, the net income will be calculated as:

Revenues – Operating expenses – Depreciation = Earnings before interest and taxes ($EBIT$)

$$\text{Net Income (NI)} = EBIT - WACC \times FVc(IA)$$

The managers will be asked about the current impact that each of the core competencies as basic project, taking in account both core competencies driven by tangible or intangible assets, or intangible core competencies, on the earnings before interests and taxes ($EBIT$); in other words, the managers should determine the percentage of the $EBIT$ that represents each core competence ($\%_{cc_j}$).

⁵ The firm's tangible assets shall be taken at their market value, where applicable, or at their replacement value.

⁶ The $WACC$ is calculated by taking into account the percentages corresponding to the long-term debt and the equity in the firm's target financial structure.

Therefore, the net come linked to each core competencies shall be calculated as:

$$NI_{CC_k} = \%_{CC_k} \times NI / 100$$

With NI_{CC_k} the net income linked to the k-th core competence.

Should it be difficult for the managers to estimate the percentage that each core competence represents on the *EBIT*, they can be asked to rate the impact on a scale of importance from 1 to 3. These degrees of importance shall be transformed into percentages as follows:

$$\%_{CC_k}^G = \frac{G_{CC_k}}{\sum_{j=1}^h G_{CC_j}} \times 100$$

With:

$\%_{CC_k}^G$: Percentage on the net-income of the k-th core competence from the scale.

G_{CC_k} : Degree assigned to the k-th core competence.

G_{CC_j} : Degree assigned to the j-th core competence.

h : Number of core competencies that currently affect the firm's net income.

Therefore, the net come linked to each core competence shall be calculated as:

$$NI_{CC_k} = \%_{CC_k}^G \times NI / 100$$

Calculating the discount rate

The variable used to estimate the net income, the *EBIT*, represents an economic result (corresponding to all the firm's financial permanent suppliers), operating result (its only includes operating results) and expressed in gross terms (before tax). Taking the above into account, the discount rate shall have to reflect the opportunity cost for all the capital suppliers ex-taxes, weighted by their relative contribution. This rate is the weighted average cost of capital ex-taxes (*WACC*), which has already been defined.

Calculating the time horizon

The estimate by the firm's management group regarding the degree of sustainability of each competence shall be taken as the time horizon. This value will be between 1 and 5 years.

Calculating the financial value of the core competencies as basic project:

The financial value of the k-th core competence as basic project [$FV(CC_k)_{BP}$] shall be calculated using the following formula:

$$FV(CC_k)_{BP} = \sum_{t=1}^{n \leq 5} \frac{NI^t_{CC_k}}{(1 + WACC)^t}$$

With $NI^t_{CC_k}$ being the net income associated to the core competence at the moment t .

The financial value of all core competencies that are currently affecting the net income [$FV(CC)_{BP}$] is calculated, according to the previously defined magnitudes and in sub-section 4.2 as:

$$FV(CC)_{BP} = \sum_{j=1}^h FV(CC_j)_{BP} = FV(CC^{TA})_{BP} + FV(CC^{IA})_{BP} + FV(CC^I)_{BP}$$

5.3. Financial valuation of the core competencies as real options

In order to value the core competencies in the part that are expected to affect the net income in the future (as “real options”), we shall only consider one type of option, i.e., European call options on core competencies, assets or investment projects. If we consider that these competencies or assets will only be possible at a future date, they are “underlying assets” that will not generate a yield until the option’s expiration date⁷. Therefore, in order to estimate the financial value of the k-th core competence as real option [$FV(CC_k)_{RO}$], we will use the option valuation model proposed by Black-Scholes (1973)⁸.

$$FV(CC_k)_{RO} = S N(d_1) - E e^{-rT} N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S}{E}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}; \quad d_2 = d_1 - \sigma\sqrt{T}$$

With:

S : Current value of the underlying asset.

E : Strike price.

T : Time of expiration of the option.

r : Risk-free rate of interest for maturity T (continuously compounded).

σ : Volatility of the underlying asset.

Current value of the underlying asset (S)

In our case, the underlying asset is a competence, asset, or investment project that begins to generate income at time T . Its value in T (PV_k) will be the value of the net cash flows (CF) that is generated throughout a set horizon, n^* , discounted to the weighted average cost of capital ex-taxes ($WACC$):

$$PV_k = \sum_{t=T+1}^{n^*} \frac{CF_k^t}{(1+WACC)^{t-T}}$$

Therefore, its current value ($t = 0$) will be obtained by discounting its value in T to the non-risk interest rate:

$$S = PV_k e^{-rT}$$

And, therefore:

$$FV(CC_k)_{RO} = PV_k e^{-rT} N(d_1) - E e^{-rT} N(d_2) = e^{-rT} (PV_k N(d_1) - E N(d_2))$$

⁷ Should the underlying asset generate yields for its owner over the life of the option, an extension of Black-Scholes’ model will have to be used. One of the most common alternatives is the Merton (1973) model, which is applicable when the yields are continuous and constant.

⁸ The option is valued at the current time ($t = 0$).

$$d_1 = \frac{\ln\left(\frac{PV_k e^{-rT}}{E}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} = \frac{\ln\left(\frac{PV_k}{E}\right) - rT + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$$d_1 = \frac{\ln\left(\frac{PV_k}{E}\right) + \left(r - r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} = \frac{\ln\left(\frac{PV_k}{E}\right) + \frac{\sigma^2}{2}T}{\sigma\sqrt{T}}$$

In short,

$$FV(CC_k)_{RO} = e^{-rT} [PV_k N(d_1) - E N(d_2)]$$

$$d_1 = \frac{\ln\left(\frac{PV_k}{E}\right) + \frac{\sigma^2}{2}T}{\sigma\sqrt{T}}; \quad d_2 = d_1 - \sigma\sqrt{T}$$

Time of expiration (T) and strike price (E)

Both the moment (T) where the future core competence (or future essential asset) is able to generate income, and the necessary strike price (E) for the project to be turned into reality, are parameters that the director (or firm's management group) have to estimate.

Risk-free rate of interest (r)

Once the expiration time of the option is known, the valuating team has to establish the risk-free rate of interest continuously compounded (r) for that period.

Volatility of the underlying asset's value (σ)

The parameter to be estimated is the volatility of the underlying asset's value throughout the period of the option. One of the ways that Damodaran (2002) proposes to estimate this variable is to use similar projects that the firm has implemented in the past as benchmarks. However, given the nature of the projects involved, it is likely that there are no reliable benchmarks. An alternative way is to use the volatility of the stock exchange index for the firm's sector. The reference period to estimate this historical volatility will be of the same length as the period until the expiration of the option to be valued.

Should the firm's management team consider that the activity associated to the core competence to be valued may not be associated to any of the sector market indexes or to any other company listed on the stock exchange, they will be asked to rate the degree of uncertainty in three levels: "high", "medium" or "low". The end intervals will correspond to the largest and smallest historical volatilities of the sector indexes, taken the general index as the average value.

Calculating the financial value of the core competencies as real options:

The financial value of all core competencies as real options [$FV(CC)_{OR}$] is calculated as:

$$FV(CC)_{RO} = \sum_{j=1}^p FV(CC_j)_{RO} = FV(CC^{TA})_{RO} + FV(CC^{IA})_{RO} + FV(CC^I)_{RO}$$

With p the number of firm's core competencies with characteristics of real options. The rest of the concepts have already been defined in this sub-section, or in sub-section 4.2.

6. CONCLUSION

This paper has considered intangibles' financial valuation. There is a growing need to find methods and models that are more satisfactory than the ones proposed so far to perform this valuation.

On the one hand, the increasingly importance of the intangibles in the company's capital requires them to be correctly valued in order to reduce information asymmetries and the risk of adverse selection, for maintaining and increasing the efficiency of the financial markets. Yet it is particularly in the corporate internal sphere where detailed knowledge about the intangible assets and their value acquires greater relevance. Not only the large corporations, but also small and medium-sized companies need to value their intangibles correctly.

Therefore, given this pressing demand for valuation models and methods, we believe that the offer developed so far is rather unsatisfactory. And this is because the main intangible value of the companies does not usually reside in the codified assets, but rather in the core competencies, which, as their origin is in a complex and unique combinations of resources and skills, are sometimes difficult to identify and even more difficult to value.

In this paper, on the one hand, the basic concepts related to intangibles' financial valuation have been outlined, together with a critical survey of the existent approaches and models, and on the other hand, a financial valuation method developed by a research team belonging to the University of the Basque Country has been discussed.

This method is based on the income approach; it is aimed to value individually the company's intangibles, and shares with other methods that have already been exposed the idea that the main source of the firms' intangible value reside in the core competencies, together with the importance granted to the company's prior strategic analysis and the combined use of both objective information and perceptions of corporate directors. Yet we also believe that it offers various original characteristics:

- Apply a taxonomy of the core competencies based on the types of intellectual capital driven by them.
- It considers the real options embedded in intangible assets and core competencies.
- Explicitly includes the possible existence of synergies among core competencies.
- Due to the relative simplicity of the process used to obtain information, it is even appropriate for valuing the intangibles of medium and small companies where large databases are not available.

Nonetheless, we estimate that the proposed method, as well as the methods for valuing intangibles in general, needs to be perfected. And this perfecting will mainly require the development of the intangibles valuation practice in specific companies with different characteristics, which will provide a full view of the special features and problems of valuing intangibles in different environments.

We can therefore conclude by stating that we are facing a field with strong growth perspectives in the future, as the companies' managers –either from their own conviction or from external pressure– increasingly feel the need to have correct valuations of the intangibles, and the analysts develop increasingly more perfected relevant methods.

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