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Abstract

With this thesis, we aim to analyse and understand the relationships between the different dimensions of global diversification (industrial, geographical, and the combination of both dimensions) and firms' performance, represented by their profits in millions of euros, and their profitability in percentage.

To help us understand these relationships, we performed a series of statistical tests on a database of the top 500 MNEs in terms of turnover for the years 2011 to 2015.

We first hypothesized that higher R&D expenses would increase firms' performances. Our results indicated that while it does have a positive effect on profits, it does not necessarily increase the profitability in percentage. Therefore, we expect globally diversified companies, which spend more in R&D, to be more performant than their non-diversified counterparts.

We expected to see corporate performance increase with the degree of geographical diversification, represented by the number of regions the enterprises are significantly active in. This assumption was confirmed to a certain extent; whereas geographically diversified organizations perform better than their single-region counterparts, the best performers were, however, not the most diversified ones.

We also predicted performances to be positively correlated with product diversification. However, product diversification seems to hinder firms' performance, especially in terms of profitability in percentage.

We assumed that the combination of geographical and product diversification would lead to superior performances. This assumption was confirmed for the profits in millions, but infirmed for the profitability. Indeed, we could observe the negative impact of the product diversification dimension since firms diversified exclusively on the geographical dimension displayed the best profitability in percentage.

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Introduction

During the past decades, there has been a growing interest in the topic of globally diversified firms. Indeed, a countless number of companies are recently making the decision to expand the scope of their activities, by entering new geographical markets or by diversifying their portfolios, providing institutions with new potential consumers for their products and services. In view of their perpetual quest to maximize their profits and profitability, is it really the better option for these companies? Opinions seem to be diverging.

Some authors argued that diversifying a firm's activities and geographical locations might increase its performance by providing it with higher economies of scale and scope (Contractor, Kundu & Hsu, 2003 ; Grant, Jammine & Thomas, 1988), opportunities to capture new markets that are more interesting and profitable (Michel, 1984), and new markets for the procurement of raw materials at lower costs (Grant, 1987 ; Kogut, 1985 ; Porter, 1986).

Conversely, others claimed that the costs engendered by global diversification may be too important and that it might end up hindering the institutions' performance. Firms must be warned that they will have to face and overcome costs related to the liability of foreignness (Qian, Li & Rugman, 2013 ; Zaheer, 1995) which can strongly affect businesses' benefits, especially on the short-term. Furthermore, the increased complexity of globally diversified enterprises makes it more difficult to decide in which segments and countries to invest in. Therefore, overinvestments in non-profitable segments (Berger & Ofek, 1995) or geographical locations (Denis, Denis & Yost, 2002) sometimes occur and can result in a significant drop in the firms' profitability.

The purpose of this thesis is to determine whether globally diversified institutions are more performant than their non-diversified counterparts, aiming to find an answer to our problematic: "does it pay to be globally diversified?".

We will consider two indicators to determine companies' performance, namely their profits and profitability. Previous work on the topic of diversification mainly focused on only one of the two dimensions of diversification, i.e. the geographical or the industrial dimension. However, as Chan Kim, Hwang & Burgers (1989) explain, "*an increasing number of firms have pursued global diversification involving diversification across global market space with varying modes of product diversification".* Therefore, it is important for our study to encompass both dimensions of global diversification, as this phenomenon is becoming increasingly more frequent.

In the first part of this paper, we will review the literature on this topic and analyse as precisely as possible the potential links between innovation, global diversification, and performance. More specifically, we will first have a look at the two dimensions of global diversification (geographical and industrial) as well as the risks and opportunities that are involved. We will then analyse the potential relationships between innovation and global diversification, trying to understand whether innovation, represented by firms' R&D expenses, contributes to increasing firms' performance. Finally, we will review the authors' findings regarding the effects of the different types of diversification (industrial, international and the combined effect of both dimensions) on performance.

The second part will be dedicated to the setting of our hypotheses. Our hypotheses focus on firms' profits and profitability and are formulated in a way that they help us answer to our problematic concisely, in a straightforward way. We consider both profits and profitability; even though they are both indicators of the companies' performance, these are two distinct measures, and we might end up with different results depending on the variable used.

In the third part, we will explain how we managed to fill in our database of the top 500 MNEs in terms of turnover (the 500 firms with the biggest turnover from 2011 to 2015) which will be our working tool for this empirical study and describe the data used for our statistical tests. We will also review Rugman & Verbeke's (2004) article, which inspired us for the classification of the institutions within our sample. Then, the hypotheses will be tested, and we will discuss our findings for each of those.

Finally, we will conclude this paper by summing up our findings and see in what way and to what extent it might help managers making the decision to diversify their activities industrially, geographically, or both. We will also discuss the limitations of our study and open the topic for future research.

Part 1: Literature review

1. Global diversification, risks, and opportunities

Over the last decades, an increasing number of companies decided to expand the scope of their operations, in terms of locations, of activities or both at the same time. The reason behind this phenomenon is that it offers a certain number of benefits. We already know that, in order to remain profitable and to survive, a company must be better than – or at least as good as – the competition. The benefits of diversification might provide enterprises with crucial advantages over the competition. However, before reaching the point where diversification generates benefits, firms must be ready to take the risks associated with global diversification and to overcome the difficulties that come with it. In this part of the paper, we will have a closer look at the risks faced by these institutions entering new markets and the difficulties they must overcome, as well as all the benefits they should obtain if the diversification is successful.

1.1. The global diversification phenomenon

Before tackling the risks and opportunities of global diversification, we need to define what a "globally diversified" firm is. There are two dimensions of diversification and we will consider them both for this paper: the product, or industrial diversification, and the geographical, or international diversification.

We can distinguish two types of industrial diversification;

- Related product diversification: some companies diversify their activities into products or services that are related to the core activity. For example, let us take a look at the well-known company Apple. They started with Macintosh, and as their success was growing, they diversified their activities and created the iPod, then the iPhone and the iPad. While these are different products per se, they are all fundamentally related to high-tech.

- Unrelated product diversification: on the other hand, firms might diversify their activities and offer products or services that are not linked in any way to their original or main activity, in a different industry. A perfect example for this would be the multinational enterprise 3M; they are well-known for their post-it notes, but they also have a strong presence in the health-care industry, security and protection services, and many others.

Firms that diversify internationally can also be differentiated into two categories;

- Firms might decide to expand their activities in a country within the region of the home-country. This could be, for example, a Belgian company that expands its activities in Germany. We will consider three main regions in this paper: America, EMEA, and APAC.
- Firms might also diversify across regions, which is allegedly more complex than within-region diversification as we will see it in the next section (1.2.).

Furthermore, it can happen that organizations diversify their activities on both dimensions, geographically and industrially. According to Ref (2015), it is a very complex process, and only institutions that have had previous experience in diversification manage to expand their activities in a new country and with a new product at the same time. Indeed, his study shows that none of the single-country/single-industry firms managed to enter simultaneously into new products and geographic markets ***(Appendix 1, p.74).*** Companies that were already product- or geographically-diversified rarely managed to diversify into a new market with a new product at the same time, although it did happen in some cases. Only firms that were already diversified on both dimensions managed to consistently enter new markets with new products. This proves that there is an experience factor in diversification. This experience lowers the risk perceived by enterprises to diversify their activities and to expand internationally, which makes them more inclined to repeat the operation in the future.

1.2. Risks and Difficulties of Global Diversification

When firms make the decision to diversify internationally, they must be prepared to face a lot of uncertainties, challenges, and difficulties which can be called *liabilities of*

foreignness (LOF). These can be defined as all the costs incurred by a business because of its overseas presence, costs that local companies would not incur (Hymer, 1976).

Zaheer (1995) identified at least four sources from which these costs may arise: first, he identifies the spatial distance costs, such as transportation costs for the goods and coordination costs. Second, there are the firm-specific costs based on a particular company's unfamiliarity with and lack of roots in a local environment. Third, there are also costs resulting from the host country's environment such as the lack of legitimacy of foreign enterprises and economic nationalism, which can be translated as the discrimination faced by foreign firms. Finally, there are also the costs resulting from the home country's environment, such as the restrictions on high technology sales to certain countries.

Sethi & Guisinger (2002) defined the liability of foreignness as the aggregated effect of the company's interactions with the International Business Environment (IBE). In his paper, they try to analyse the whole process while focusing on the antecedents and consequences of this liability. They explain that the original dyadic home/host country view on the liability of foreignness isn't complete enough to get a clear understanding of the whole situation. The subsidiary's ability to leverage the parent MNE's worldwide strength, R&D and the firm's brand equity need to be considered as well.

Also, this dyadic view presents a static picture which might be valid at the time the firm enters new markets. But it turns out that the liability of foreignness does not remain constant after entering the new market: while some costs (such as transportation costs) will probably remain stable over time, others might decrease or increase as times goes by. For example, costs resulting from government regulations might increase or decrease over time as regulations in this specific country evolve.

Additionally, the longer an institution remains in a country, the more it will get used to this environment and the more internal skills it will develop to deal with this environment, which might reduce the LOF as well. More generally, we might even say that international experience in any country will reduce the liability of foreignness of companies in new markets; if an enterprise is used to entering new countries, it will be easier for this specific firm to enter a

new market than for another company that has limited international experience. However, the authors claim that even with similar levels of international experience, the LOF incurred by these two organizations would still be different in case one of them develops better skills and internal processes to cope with the International Business Environment. Besides, the entry mode of different companies will also result in a variation of the LOF incurred.

It is also argued that all firms are impacted by the IBE: whereas it is clear for MNEs, local institutions are also indirectly affected by it in the sense that the domestic business environment exists within an overreaching IBE. Even local businesses need to take the IBE into consideration when formulating their strategies: "*a local, purely domestic firm in China would still need to consider the prevailing IBE to formulate an appropriate strategy against its rival—a US subsidiary in China—because the latter's strategy is more directly shaped by the IBE*". Therefore, it is imperative for companies to be able to read the environment, to formulate strategies and to implement processes in order to cope with the complexity of the international business environment. It is also important to reassess these strategies over time, as environmental changes and experience may have an impact on the extent of the LOF. The faster the organization is able to identify these changes and to adapt its strategy, the better it will stay synchronised to its environment. Firms that are able to deal with this will enjoy a competitive advantage over the competition.

The liability of foreignness has been further discussed by Qian et al. (2013), who distinguish between two types of LOF: the liability of *country* foreignness (**LCF**) and the liability of *region* foreignness (**LRF**). They explain that some elements have been overlooked in past research: the authors used to conceptualize LCF and LRF in isolation, without looking at the effects that one might have on the other. Differentiating LCF and LRF is very important because firms might experience these liabilities individually or in combination, and very often, their effects will accumulate.

LCF is the cost of doing business in a different country than the home country of the institution. This means that a firm will face LCF whether it expands intra-regionally or inter-regionally. However, we can argue that it will be lower within than across regions because of the similarities between countries within a region – enabling enterprises to benefit from the

experience factor – and because of the easier transferability of certain Firm-Specific Advantages (such as brand awareness). The geographical, cognitive, normative and regulative distances are shorter within the same region than across different regions.

LCF can, however, vary a lot from one country to another, even within the same region: typically, a US company would experience lower LCF if it were to expand to Canada than to Mexico, even though these countries are in the same region (America). The United States is indeed culturally closer to the former than to the latter, and this would lower the impact of LCF on the organization's performance.

LRF is different: it is the cost of doing business across different regions, which means it only occurs when a firm diversifies inter-regionally (inexistent in intra-regional diversification).
LRF will increase with inter-regional diversification; that is, the more regions a company expands to, the more LRF it will face. The diversities and complexities increase with inter-regional expansion because the economic, cultural and geographical distances are even more important than for intra-region diversification.

LRF is manifested along three dimensions: first, the complexity and diversity of operations increases as firms operate in different regions (Rugman & Verbeke, 2007). These complexities and diversities have a "*mix of cultural, cognitive, regulatory, geographic and economic roots with important implications for learning and coordination"* (Li, Qian & Qian, 2012). Second, location-bound and non-location bound FSAs are easier to exploit within regions than across regions. Third, a company that enters a new region is influenced by the conditions that prevail in this region; this includes factors of production, institutions, and agglomeration (Ma, Tong & Fitza, 2013). The institution also must make efforts in order to fit with the new environment, which can be costly and can take a long time.

When a company diversifies inter-regionally, it will face both LRF and LCF, and these two might strengthen each other: when entering a new region, the firm will first face LRF incurred because of complexities and discrimination from local governments. Then, LCF adds up to LRF; the enterprise faces country-specific foreignness which increases the former difficulty to operate in a new region. The institution is left without landmarks, with no close friend to lobby

for local government help and lacks knowledge on how to reduce the effects of the treatment reserved by local governments to outsiders from other regions.

Therefore, it is safe to say that it is much more difficult for firms to enter inter-regional markets than intra-regional markets. Rugman & Verbeke (2008) indeed claimed that "*These increased "unfamiliarity" costs and complexities combined make it even more difficult for an outsider to overcome the disadvantages of discriminatory treatments imposed on outsiders. Empirical studies have confirmed that it is much more difficult to deploy and exploit non- location-bound FSAs in a host region than in a home region*"

1.3. Opportunities and benefits of Global Diversification

Only if a company overcomes the challenges and survives the new environment it is facing will it be able to benefit from the perks offered by global diversification. These can be multiple and they can confer important comparative and competitive advantages that can set them ahead of the competition.

According to Amit & Livnat (1988), participating in the global market provides firms with unique opportunities that can lead to improved return performance; first, it offers economies of scale and scope above and beyond the potential of product diversification (Grant et al., 1988). Moreover, the exposure to multiple national markets provides extended learning opportunities and the ability to develop different, more diverse capabilities. As a result, it stimulates institutions to innovate and increases their chances to survive in a dynamic world (Kogut, 1983). Furthermore, it allows enterprises to gain cost advantages by configuring their value-added chain accordingly. They can configure it in such a way that every link is located in the country where it is the least expensive to produce (Kogut, 1985).

Participating in global markets also provides firms with more options than their domestic counterparts; they benefit from multiple national market bases from which they can retaliate against competitors' aggressive moves (Hamel & Prahalad, 1985). These multiple national

markets also minimize the effects of adverse changes regarding a country's interest rates, wage rates as well as commodity and raw material prices by providing the option to easily shift production and source sites to more profitable national markets (Kogut, 1985 ; Porter, 1986). Finally, globally diversified firms are released from the mercy of supply and demand fluctuations of any given national market. In sum, diversifying the location of activities provides enterprises with operational flexibilities that will serve to reduce earnings and profit fluctuations. These options and opportunities suggest that companies might be able to reduce their risks while increasing their returns at the same time (Bowman's Paradox; Bowman, 1980) by diversifying their activities internationally.

According to Qian, Li, Li & Qian (2008), intra-regional diversification provides MNEs with more opportunities for growth and performance increase than local institutions: it grants them access to resources that are specific to a certain country, which is a comparative advantage over other enterprises. It also provides the diversified companies with immediate and geographically close opportunities, together with a high potential for agglomeration economies (Rugman & Verbeke, 2008). The similarities on cognitive, normative and regulatory levels maximize the compatibility between the firm's FSAs and the host country's market since there is less need for substantial, location-specific investments (Rugman & Verbeke, 2004)

Qian et al. (2008) also claims that inter-regional diversification further increases MNEs growth potential, but the costs are even higher. One of the biggest advantages is that it provides them with different environments to source and combine new location-specific resources (Almeida, 1996). Another big asset is that it allows firms to benefit from higher economies of scale, as well as maximizing their market power and competitive advantages (Qian, Khoury, Peng & Qian, 2010). Finally, and more generally, it helps companies to maximize market opportunities and to successfully arbitrage consumer market differences (Delios & Beamish, 2005).

2. Research and Development, Innovation, and Global Diversification

There have been a lot of papers written about the relationship between R&D efforts, firms' innovation performances[1] and global diversification. While we cannot really argue on the fact that big multinationals are the ones spending the hugest amounts in research and development, it does not necessarily mean that they are getting the most returns on their R&D expenditures or that they have the highest scores in innovation efficiency. In this part of the work, we will identify the relationships between R&D, innovation, and global diversification. We will also review the MNEs' innovation efficiency compared to local companies and analyse why they might not be the ones getting the most returns from their money invested in research.

There is no clear definition for the term "innovativeness". Wang & Ahmed (2004) defined it as the "*ability to create new products or services or management practices that bring about sound renewal and changes*", or in other words, the organization's ability to introduce new products and services to the market, as well as opening up new markets through the combination of strategic orientation with innovative strategies and processes. Verhees & Meulenberg (2004) defined innovativeness as the "*willingness of a firm to learn about and to adopt innovations*".

2.1. Positive relationship between innovation and global diversification

Previous literature has been able to clearly identify that innovation is an element of competition: the more competition, the more institutions have to come up with new, innovative products in order to stay relevant and to survive in their environment. As Lundvall, Madsen &

[1] Innovation performance or efficiency can be defined as the ability of a firm to convert R&D input into future growth and income. We can measure innovation efficiency by the number of patents issued per year scaled either by R&D expenses or R&D capital (weighted average of R&D expenditures over the last 5 years).

Kristensen (1997) pointed out: "*Innovation is an instrument of competition for a company, that innovation could be influenced by competition*". This statement implies that a change in an institution's competitive environments will have an impact on its capacity to innovate. The authors added that "*Firms experiencing an intensified competition are much more prone to develop new products*". We could then hypothesise that if a business expands internationally, this change of environment could impact this enterprise's propensity to innovate. Indeed, the competition in globalized markets is by nature much more intense than the competition in local markets. Since competition is an incentive for innovation, we may believe that the increased competition resulting from the firm's internationalization would bring about increased innovation efforts and performance.

Building upon this idea that innovation and global diversification are positively related, some authors argue that being globally diversified could offer advantages for increasing R&D efficiency and better innovation performance. Starting from the idea that multinational companies are able to achieve bigger economies of scale in innovation activities, have better access to human capital and knowledge stock, and are better positioned in securing finance for their risky R&D projects, we can assess that MNEs benefit from a greater innovation capacity. According to Panzar & Willig (1981), their size enables them to obtain competitive advantages resulting from economies of scale and scope of their R&D efforts. Additionally, large institutions may also benefit from the larger scale of commercialization and a better rent extraction from their innovations. As Ciftci & Cready (2011) explain it, large firms' R&D investment is associated with substantially higher future earnings than smaller companies, that cannot afford to spend as much in Research and Development. These large scales of commercialization are especially important for businesses whose products' life cycles are becoming shorter; larger markets are required to rapidly earn positive returns on innovation investments. It is also very important in markets where firms need to make significant investments to produce innovation (more slack resources are needed to make the investments).

Moreover, MNEs' financial stability, in comparison with smaller companies, allows them to perform better at converting R&D efforts into an innovative output (Cohen, Levin & Mowery, 1987). The cash flow variability of globally diversified firms will be lower thanks to their presence in multiple countries which has a stabilizing effect. By doing so, they avoid "putting all their eggs in one basket". They also have the operational flexibility to shift production to

less expensive countries, which also increases their profits and ensures a better profit stability at the same time. The availability and stability of these funds in MNEs might make it possible for them to achieve superior innovation performance. Indeed, they are less exposed to the risk of budget cuts and less likely to have no choice but to discontinue some of their R&D projects because of financial issues.

Besides, MNEs are more exposed to new and diverse ideas from multiple markets and cultural perspectives which can stimulate innovation. According to Teece (1986), internationalization increases the chances of obtaining strategic complementary assets (through alliances for example), and with these resources, MNEs are more experienced and enjoy learning economies in innovation activities. Macher & Boerner (2006) have highlighted the importance of experience and learning as drivers of development performances. They suggest that experience "*enhances R&D productivity by shaping and facilitating firms' abilities to absorb knowledge spillovers"*. Cockburn & Henderson (2001) also wrote that scope economies result from internal knowledge *spillovers* among different projects: since they have more money to spend in R&D, they can have more R&D projects ongoing, and the learnings they will extract from one project may enhance their efficiency regarding future projects or research.

2.2. Negative relationship between innovation and global diversification

Conversely, other studies attest that global diversification might have a negative impact on corporate R&D productivity and innovation performance (e.g. Seru, 2014). Gao & Chou (2015) claim that multinational enterprises are less efficient in innovation than purely domestic institutions; whereas their expenditures in R&D are much higher than their domestic counterparts, they show lower results in their patents and patent citations to R&D expenses ratios. Their results also show that this negative correlation exists for both industrially-diversified and concentrated firms. Therefore, it does not matter if the company is diversified in terms of products or not, the negative relationship between global diversification and innovation performance exists in both situations.

Szulanski (1996) claims that inefficient resource allocation can be caused by higher management complexity, coordination costs, and information asymmetry, and it can lead to less efficient and effective R&D activities. The information asymmetry between corporate headquarters and divisional managers is even more important since the decision making on R&D projects is hard to communicate as it relies heavily on soft information. Seru (2014) states that this is an important cause for inefficient cross-subsidization that could negatively affect a firm's quantity and quality of R&D efforts.

De Meyer (1991) found that the globalization of R&D activities deteriorates the information problem even further and results in even higher costs. That is, if an MNE has multiple R&D centres located around the globe, the fact that they have to transfer the information across these different centres is an additional difficulty in comparison with local enterprises: "*One of the most important productivity problems in R&D is stimulating communication among researchers ... it becomes more difficult when laboratories are located far from each other*". Singh (2008) goes in the same direction, affirming that the quality of a firm's innovation output is negatively correlated with the geographic dispersion of its R&D activities.

Additionally, the lower cost of capital that MNEs benefit from may lead to lower innovation efficiency. Although this might sound surprising, one may argue that since they have a lower cost of capital, MNEs are more likely to accept undertaking R&D projects with lower returns, that national firms would never undertake (Gao & Chou, 2015). Therefore, it is possible that MNEs show lower results of innovation efficiency because they are the only ones able to fund these less profitable projects. Although they might just decide not to fund these projects, to err is human, and it is not rare that some R&D projects are funded by MNEs and turn out to be non-profitable.

Furthermore, most of the goods need to be adapted for each country in which they are sold because of differences in culture, regulation, political, economic and legal systems, as well as different languages. This makes the innovation process even more complex and time-consuming. Baum, Caglayan & Talavera (2015) wrote that a product designed for one specific market might not be suitable for another market in a different country. Therefore, these firms need to invest higher amounts in R&D to design a product that will be suitable for each of the

regions/countries in which they are active, in order to maintain their competitive edge in the globalized market.

Finally, product diversification might also have a negative correlation with innovation: Hoskisson & Hitt (1988) found that product diversified companies invest less in R&D than concentrated firms. Hitt, Hoskisson & Kim (1997) argue that product diversification leads to a shift from strategic to financial controls. The more a business is diversified in terms of products, the harder it becomes to apply strategic controls. There is an overemphasis on financial controls that leads to a reduction in long-term investments, such as R&D expenses for example. Hoskisson, Hitt & Hill (1993) state that "*the incentive compensation system for business-unit managers reduces the attractiveness of such investments".* They experience more risks when financial controls are emphasized, and one way to reduce these risks is to lower the amount spent in R&D.

2.3. External factors

Traditional thinking about the management of innovation mostly focuses on internal factors. However, we tend to forget the importance of external factors such as the business environment, which play a role at least as big as internal factors in a firm's innovation performance. As Porter & Stern (2001) explain it, "*Location matters for innovation, and companies must broaden their approaches to the management of innovation accordingly: by developing and commercializing innovation in the most attractive location, taking active steps to access locational strengths, and proactively enhancing the environment for innovation and commercialization in locations where they operate*". Each country can be characterized by factors such as the overall human and financial resources it devotes to scientific and technological advances, the public policies bearing on innovative activities and the economy's level of technological sophistication.

External factors can also be policies that incentivise an institution to invest more in R&D and to innovate more, such as:

- The protection of intellectual property rights: companies might be willing to invest in

countries offering a better protection of intellectual property rights, since they will be able to maintain monopoly power, thus appropriating more returns on their innovations. Patent protection also reduces innovation costs and adds a layer of security for institutions regarding the transferability of their rents. We can, therefore, assess that a developed economic environment and a good protection of intellectual rights will incentivise companies to push their investments in R&D which will generate innovation. Studies by Levin et al. (1987) and Mansfield (1986) demonstrate that this phenomenon is particularly true for firms in specific sectors, such as the pharmaceutical and chemical industries. Keller (2010) found that the most important technologies, i.e. the ones that have the biggest impact are created in a small number of countries and are mainly the result of big MNEs R&D efforts.

- The extent of tax-based incentives for innovation: lower taxes for R&D activities can encourage firms to locate their R&D activities in one specific country rather than another, where they would be paying more taxes.
- Some literature argues that both economic development and patent protection stimulate firms' innovation efficiency (Qian, 2007). It is more interesting for companies to invest in R&D in countries with higher education levels, better law enforcement and greater levels of economic development since they have more incentives to do so - one of the main incentives being lower technology transfer costs. As Maskus (2000) states: "*When globally diversified firms expand into developed markets, the well-established economic infrastructures are likely to facilitate technology transfer and lower the associated costs"*.

However, for Porter & Stern (2001), external factors are so important that they recommend that institutions should not choose their R&D locations based on the input cost, taxes, subsidies or even wage rates for scientists and engineers. Instead, they should choose to invest in R&D in the most "fertile locations for innovation". A location might be favourable for R&D investments for reasons such as low manufacturing costs and access to key markets, but at the same time unfavourable for innovation. It is important that managers choose their R&D location strategically, being aware that there are only few innovation centres for a given industry, and that even the smallest improvement can make a huge difference and provide a firm with a strong competitive advantage. The choice of R&D location is crucial for companies aspiring to global strategies.

3. Global Diversification and Profitability

Over the last years, authors found a variety of results regarding the effects of product diversification, geographical diversification and both dimensions combined on the performance of a firm. In this part, we will review their findings and see why they sometimes came to conclusions that can be totally opposite. As we will see it, it is very often question of *performance* and not just *profitability*, so we will also need to check the different indicators these authors used to describe and represent the performance of an institution.

This part of the work is inspired by the paper of Asrarhaghighi, Rahman, Sambasivan, & Mohamed (2013) which reviewed a great part of the literature about this topic and summarized the main discoveries of these authors. We will also include findings resulting from personal readings in order to get the most complete literature review possible.

3.1. Potential effects and measures of Product Diversification

3.1.1. Potential effects of product diversification on firms' performance

Michel & Shaked (1984) posited that product diversification could **increase** performance, by giving the enterprise the opportunity to escape their current unattractive market and target a new, more profitable one. He affirms that while both related and unrelated product diversification do increase a company's performance, diversifying in unrelated areas results in a significantly higher performance gain.

On the other hand, Berger & Ofek (1995) found out that product diversification results in a **decrease** of 13 to 15% of a firm's value. Overinvestment problems and the subsidizing of poorly performed segments might lead to a negative relationship between product diversification and a firm's performance. He adds that this reduction in value is mitigated when the diversification is carried out in a related industry rather than unrelated industries. It is worth noting that this study only focused on enterprises that adopted a product diversification strategy during the 1980's and might no longer be valid as of today; it is indeed mentioned that the

effectiveness of the corporate control and monitoring mechanisms in place during this period might be the cause of this loss of value.

Montgomery (1985) claimed that product diversification may have a **neutral effect** on performance. He attests that, in contradiction to a lot of studies, highly diversified organizations do not benefit from "unfair" market advantages. His study also showed that in general, they compete in less attractive markets than companies with lower levels of diversification. This proves that highly diversified firms have low market power. Montgomery adds that diversification may have advantages that derive from cost efficiencies and not from market power.

Tallman & Li (1996) found an **inverted U-shaped relationship** between product diversification and performance: firm performance first increases thanks to product diversification up to a certain point (the optimum), and then decreases due to the loss of control and governance if the institution's product diversification becomes too important: "*Both transaction cost and resource-based theory suggest that excess product diversification may harm performance. We have shown that this is indeed the case for multinational firms. International diversity (…) has a less significant linear effect on performance".* According to Robins & Wiersema (2003), it can also negatively impact the organization's capacity to achieve economies of scope.

3.1.2. Product diversification measures

One of the most commonly used factor is the 4-digit *Standard Industrial Classification* (SIC) code. It is a very popular classification in the United States, and since a lot of these studies were done on American institutions, many authors have used it. In summary, it is a system that classifies industries by a 4-digit code. It is used by government agencies to classify industry areas. There are certain limitations to the use of this code: it cannot define whether a firm's different businesses are related or not, nor can it classify the size of the businesses.

Other authors have used continuous measures such as the Herfindahl measure of diversification (Berry, 1971) which can be used to measure the size of an institution's different businesses. We can also mention the Jacquemin-Berry Entropy Measure (Jacquemin & Berry, 1979), which was later used by Palepu (1985) and can provide information about the size as well as the relatedness of the firm's businesses.

Alternatively, two categorical measures of product diversification have also been used in the past: Rumelt's classification (Rumelt, 1974) and Varadarajan and Ramanujam's broad and mean narrow spectrum diversity matrix (Varadarajan & Ramanujam, 1987). These methods consist in classifying the organizations in one of the categories proposed. The issue is that this classification can be biased by the researchers themselves since the classification is subjective (Asrarhaghighi et al., 2013).

Later, researchers stated that one of the reasons why related diversifiers are achieving better results than unrelated diversifiers is that they benefit from economies of scope (Montgomery, 1994). Therefore, it was needed to use indicators that would capture this element of relatedness between the firms' businesses. These continuous measures mentioned above only allow us to understand the relatedness of the businesses at an industry or market level and *"they cannot capture the level of the resource sharing among the firm's businesses"* (Robins & Wiersema, 1995). To capture the relatedness of activities, new measures were introduced such as skill-based, manufacturing-based relatedness. The only drawback of these measures is that they can only capture one dimension of relatedness (Asrarhaghighi et al., 2013).

3.2. Potential effects and measures of International Diversification

3.2.1. Potential effects of international diversification on firms' performance

International diversification can have a **positive effect** on performance for many reasons. Organizations that are internationally diversified have access to multiple markets and can therefore benefit from comparative advantages. This means for example that they have

more options than single-country institutions regarding the procurement of their raw materials; they have access to many markets and can choose from which market they want to buy; they can bargain for lower prices. We already know that prices for all goods and services vary from one country to another, and internationally diversified firms can buy their resources in the country that offers the best prices thanks to their international presence. As Grant (1987) expresses it, "*a major feature of the structural evolution of a wide range of industries from raw material extraction to business services has been their increasing domination by multinational companies*."

Denis et al. (2002), however, claim a **negative relationship** between international diversification and firms' performance due to cross subsidization of less profitable segments, complexity of management and agency problems. Going in the same direction, Michel & Shaked (1986) found that "*domestic corporations appear to have a significantly superior risk-adjusted, market-based performance than multinationals".*

The relationship between international diversification and performance can also be an **inverted U-shaped** one: Gomes & Ramaswamy (1999) argued that at first, the relationship is positive as the company expands in new countries and benefits from the economies of scale and scope, up to the point where the coordination and governance costs become more important than the profits drawn from this international diversification. Then the relationship between international diversification and performance becomes negative.
The authors added that although it might not be profitable for the company to exceed the optimum point, their motivations might be non-monetary. For example, it is not uncommon for MNEs to make defensive investments to hold-off a competitor overseas, even if they end up losing money. A firm might also choose to expand their international activities above the optimum point because they want to benefit from the new technologies available in a specific country. As Gomes & Ramaswamy pointed out, "*They might be seeking to capitalize on intangible benefits, such as technology, and proprietary input access, that are essential to maintain the overall health of the network"*. Finally, some institutions might also exceed this optimum without even increasing their international presence: the underlying factors determining the overall cost structure of overseas expansion can change over time. Therefore, it can happen that a MNE which was operating within the optimum threshold can

unintentionally cross this optimum point over time due to externally-driven changes in the cost-benefit equilibrium.

Conversely, Lu & Beamish (2001) found a **U-shaped relationship** between international diversification and performance. They argue that the *liability of foreignness* first decreases the firm's performance, but that this is then compensated by the learning effects and the benefits from the newly acquired knowledge. "*SMEs should not curtail internationalization activities at the export stage, nor be deterred by the potentially high costs in initializing FDI, but explore opportunities to make FDIs so as to benefit from the latent value associated with such investments.*"

Ruigrok & Wagner (2003) found similar results: MNCs' profitability first decreases up to a certain point, after which profit development reverses and exponentially increases. Once firms get past this threshold, they usually catch up really fast. They conclude that "*MNCs pass through an organizational learning process characterized by internal reconfiguration that allows for superior performance development*".

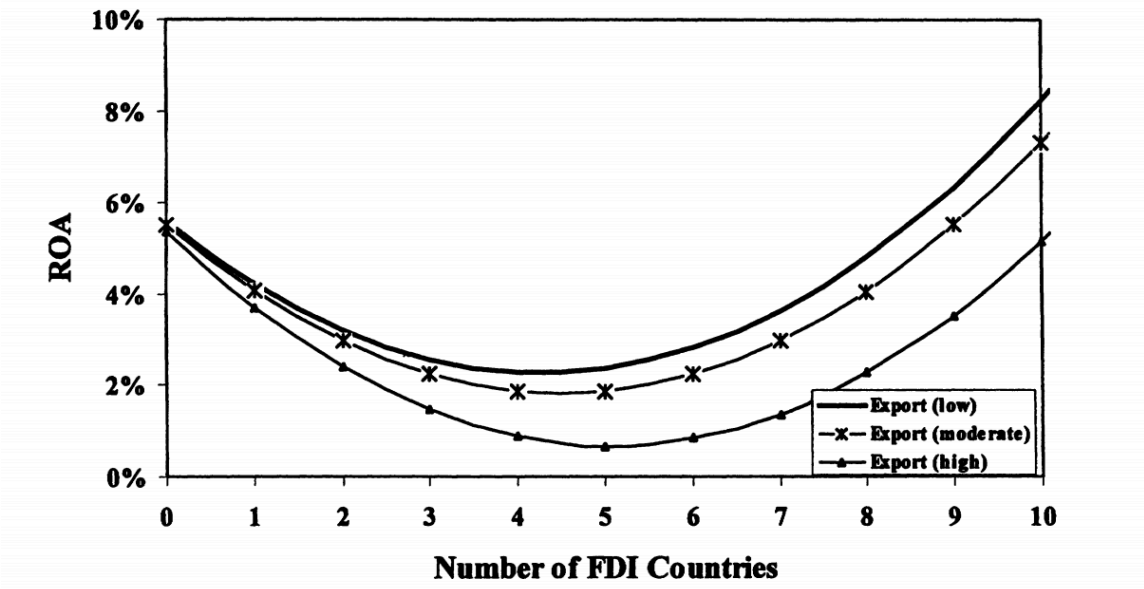


Figure 1: Moderating effect of export intensity on the relationship between number of FDI countries and ROA. Source: Lu & Beamish (2001)

Literature about a U-shaped and inverted U-shaped relationship between international diversification and performance hinted at the existence of a three-stage model. Researchers

such as Contractor et al. (2003) and Lu & Beamish (2004) found that there might be a **sigmoid relationship** between international diversification and performance. They describe a 3-step model for international diversification: at first, performance decreases due to the *liability of foreignness,* the inexistent or low level of economies of scope and scale, market inexperience and costs and barriers related to the international expansion. Then the relationship becomes positive thanks to the economies of scale and scope, access to cheaper resources and the decreasing costs of transaction through internationalization. Finally, the relationship becomes negative again due to the costs of governance and coordination. Some companies may also tend to over-internationalize by expanding in too many countries, which results in a negative impact on the firm's performance. The level of internationalization is beyond the optimal threshold. (see figure below)

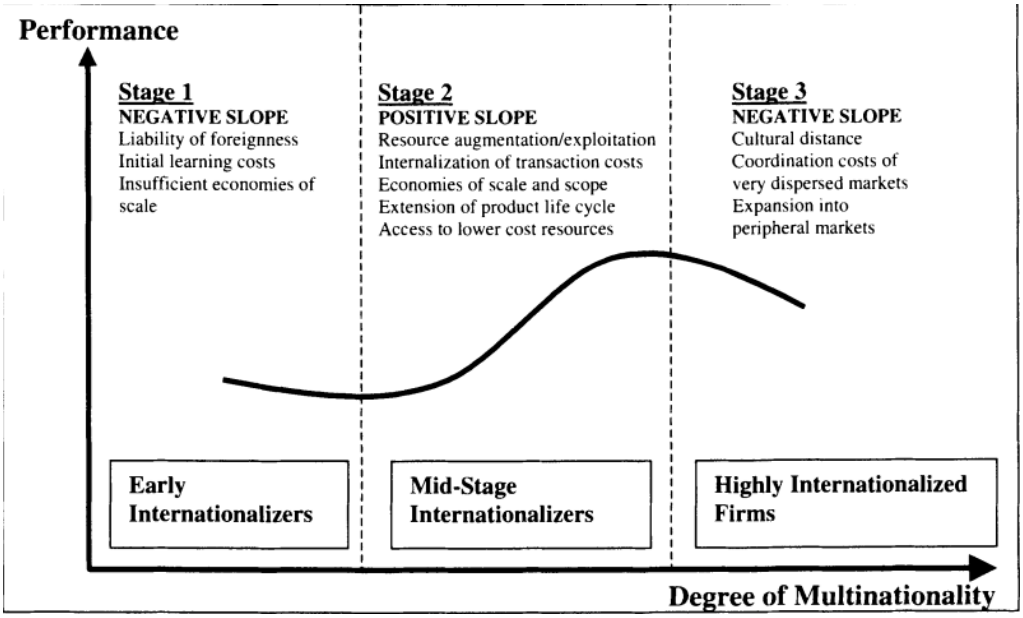


Figure 2: Three-stage sigmoid (S-shaped) relationship between the degree of multinationality and firms' performance. Source: Contractor et al. (2003)

3.2.2. International diversification measures

The most commonly used international diversification measures are single dimension measures. There are 3 main dimensions indicated by Li (2007): Operational Structure, Operational Performance and Attitudinal Attributes/Stock ownership. These single dimension

measures are ratios such as the foreign sales/total sales ratio, the foreign assets/total assets ratios as well as the number of host countries and the number of a company's subsidiaries. The Herfindahl index and Entropy Measure have also been used as international diversification measures. Unlike the ratios mentioned above, these have the ability to capture the size and the importance of foreign operations. By nature, these measures only capture one dimension of international diversification.

The Degree of Internationalization measure (DOI) was later implemented by Sullivan (1994) to capture the three dimensions of international diversification in one single measure. Although this measure was more reliable than the previous single dimension measures, the content validity of this new measure is still uncertain and authors such as Ramaswamy, Kroeck & Renforth (1996) have questioned the fact that equal weight was attributed to each of the three dimensions to compute this measure.

As for product diversification, categorical measures were also proposed to measure international diversification. Goerzen & Beamish (2003) introduced the geographical configuration matrix, which captures both the effects of country diversity and international assets dispersion. Aggarwal, Berrill, Hutson & Kearney (2011) used the matrix of multinationality to define 16 categories which he could use to categorize different firms.

3.3. Potential effects and measures of total diversification[2]

3.3.1. Potential effects of total diversification on firms' performance

Chan Kim et al. (1989) published the main study about this topic. They introduced the notion of profit stability, claiming that *"investing in diversified stock with non-correlated profits can reduce the volatility of a firm's total profits"*. They classified the companies into four groups, based on 2 axes: related/unrelated product diversification and low/high global market diversification. They reached the following conclusions:

[2] We will use the term "totally diversified" for firms that are diversified on both dimensions, i.e. industrially and internationally.

1) Unrelated diversifiers with high global market diversification get a higher profit growth than those with low global market diversification. However, there is no impact on profit growth for related diversifiers.
2) Regarding profit *stability*, related diversifiers with high global market diversification obtain much higher profit stability than firms with low global market diversification. There is no impact on profit stability regarding unrelated diversifiers.
3) The different strategic modes of product diversification (related-unrelated) influence the corporate profit growth of firms that are slightly internationally diversified, but not of those which are highly internationally diversified. However, strategic modes of product diversification do not have any impact on profit stability.
4) Related diversifiers with high global market diversification outperform unrelated diversifiers with low global market diversification in terms of profit growth. However, there is no difference in profit stability between these two strategic groups.
5) They could find no evidence that related diversifiers with low global market diversification obtain a higher profit growth than unrelated diversifiers with high global market diversification. However, in terms of stability, the latter outperformed the former, which indicates that international diversification ensures profit stability more than product diversification.

Qian (1997) expanded on Chan Kim's research, and added that related product diversification works better than unrelated product diversification with international diversification. That is, firms that are already industrially diversified will perform better internationally if the diversification is related rather than unrelated.

Later, Palich, Carini & Seaman (2000) claimed that the relationship between product diversification and performance was attenuated (whether it is positive or negative at first) by the international diversification factor. However, this moderating effect was then denied by Geringer, Tallman & Olsen (2000).

Hitt et al. (1997) found that there was a positive relationship between international diversification and performance for companies that were already highly product diversified: this positive relationship is issued from the higher levels of economies of scale and of scope.

Sambharya (1995) discovered that Multinational Companies which are more internationally diversified (according to four different measures) are not more successful than less diversified ones. This goes against many studies realized in the past, which were stating that more international diversification would lead to better performance. He was also able to prove an inverse relationship between international and product diversification, but his main finding was that, by themselves, international and product diversification strategies are not profitable; instead, the effects of the interaction between product and international diversifications lead to a substantial increase in performance. He explains that "*related business firms can exploit interdependencies across business units through economies of scale and scope, resource sharing and core competencies. International diversification reduces risk in related diversified firms by stabilising returns. On the other hand, as firms become more diversified in terms of unrelated products, their international presence decreases due to the lack of interdependencies across business units".*

Qian (2002) came to the conclusion that both product diversification and international diversification have a positive impact on performance, as long as the intensity of these diversifications is moderated. If the diversification factor becomes too big, the effect on performance becomes negative.

3.3.2. Total diversification measures

Little work has been done regarding total diversification measures.

Chan Kim et al. (1989) worked on the entropy measure. They exploited the fact that this measure was decomposable to add a geographical dimension to it. This measure cannot capture the related/unrelated international diversification factor.

In reaction, Vachani (1991) proposed a model based on two axes: related/unrelated international diversification and related/unrelated product diversification. As this measure is based on entropy, it cannot capture multinationality of international diversification, nor its breadth or depth.

3.4. Performance measures bias

As we can see it, previous authors found varying results regarding the impact of international diversification, product diversification and total diversification on the performance of firms, and these diverging opinions do not allow us to draw any conclusion so far. One of the reasons that might explain these differences between the authors' findings could be the measures they used in their papers: all of them proposed different indicators of diversification, but also different performance measures.

Whereas the goal of this paper is to know whether it is profitable to be globally diversified, most of the literature investigates the effects of global diversification on *performance*. And as mentioned, authors have been using different performance measures: some used accounting-based measures, others used market-based or growth-based measures. Performance is a multidimensional factor; therefore, we need to use multiple measures to have a good representation of it. These single-dimension measures can lead to totally different conclusions, and it is often the case in the literature reviewed: for example, international diversification might increase financial performance, but it would also lead to a drop in operational performance simultaneously (Gomes & Ramaswamy, 1999).

Thomas & Eden (2004) suggested that if our goal is to determine the long-term effect of international diversification on Performance, we should use market-based indicators such as *Tobin's q*. On the other hand, if we are more focused on the short-term impact, it would be recommended to use accounting-based measures (such as ROA), since these show the firms' performance in past periods, and we can expect the institution's performance not to change drastically from one period to the next.

As we are interested in the profitability of globally diversified firms, we will need to use appropriate measures, which will be developed in the third part of this paper.

3.5. Sampling bias

The final reason that might explain such discrepancies in the results of past studies is that while some of them were based on randomly selected samples, a lot of them have been using purposive samples. Short, Ketchen & Palmer (2002) argued that results from studies that did not use a random sample are less reliable and that their variability is unpredictable.

Sometimes, data availability can also be an issue: not all firms' results are easy to find or available, and it can be very time-consuming to create a new database for such studies.

Part 2: Hypotheses

Now that we have a clearer understanding of the potential relationships between innovation, global diversification, and profitability, we can place our hypotheses. Each of them will be split into two parts; one testing the profits in millions of euros, while the other will test the profitability in percentage.

1. H1: The more a firm spends in R&D, the more profitable it will be.

The goal with this hypothesis will be to understand the correlation between R&D expenses and firms' profitability. We will test whether the correlation is indeed positive, and to what extent it impacts the institutions' performance. We know that the ability to innovate is important to achieve strategic competitiveness, which leads to increased performance. Therefore, we hypothesise that firms investing the most resources in R&D would develop innovative capabilities and be more profitable over the long term.

Building upon the idea that there is a positive relationship between global diversification and R&D expenses (as discussed in section 2.1. and 2.2. of the literature review), we want to test whether higher R&D expenses lead to higher profits and profitability. This would imply that global diversification and firm performance are positively correlated in a way.

2. H2: Global firms are more profitable than bi-regional firms, and bi-regional firms are more profitable than home- and host-region firms.

This hypothesis will test the link between profitability and geographical diversification. We want to test if the firm's profitability increases with the degree of internationalization, represented here by the number of regions a company is significantly active in (in relation with

Rugman & Verbeke's classification). Our hypothesis is that the more regions an institution is active in, the more profitable it will be, since it will benefit from a wide variety of location-bounded advantages, synergies, spillovers, etc.

3. H3: Industrially diversified firms are more profitable than firms with concentrated activities.

With this hypothesis, we want to test the link between product diversification and profitability. To do so, we will use Herfindahl measure of diversification and split our sample into two groups (industrially-diversified and industrially-concentrated companies) to compare their respective profits and profitability and determine if product diversification has a positive, negative or neutral effect on corporate performance.

4. H4: Totally diversified firms are more profitable than firms diversified on a single dimension.

After testing both the effects of geographical and industrial diversifications alone on firms' performance, we want to test the effect of both diversifications combined on the profitability of enterprises within our sample. This way, we will be able to determine if totally diversified companies perform better in terms of profitability than their competitors diversified only geographically or industrially, and see if the combination of both dimensions of diversification has a positive or negative effect on the firms' performance.

Part 3: Empirical study

1. Preamble

Before tackling the practical part of this work and the analysis of the database we have built, we need to review Rugman & Verbeke's (2004) article and define the classification terms we will be using for the rest of this paper.

The definition of "global company" differs from one study to another; some authors consider companies to be global if 10, 20% of their sales were realized in another country than their home country. Others considered that, even with the smallest presence abroad, a company could be considered as global since it cannot be regarded as a "local" company anymore.

Rugman & Verbeke start their paper by explaining that there are three main regions in the world in which most of the business activities take place: the European Union, North America, and Asia. They call these three regions the "triad".

The authors noticed that, among the biggest companies that were usually considered as global, most of them showed a relative sales dominance in a specific regional market and not an evenly distributed spread of sales across the different regions. If an MNE's sales are mostly concentrated in one single region, the authors argue that this company cannot be called "global"; it would indeed mean that this firm's products are not available or attractive *globally* (i.e. all around the world), but only *regionally* (i.e. within one specific region of the triad, very often the home-region). The lack of global market success could also be an indicator of a failure to transfer their knowledge internationally, and a rejection from customers across regions.

The authors also argue that the lack of performance across regions may be due to the firm's inability to "*access and deploy the required location-bound FSAs*". If the MNE's position is very different from one region to another, this may indicate that they did not manage to adapt their competitive strategies in each region.

Moreover, environmental circumstances (e.g. government shelter of local industries, buyers preferring to buy from local companies, cultural differences, etc.) might also explain, in some cases, the reduced presence of a certain institution in a particular region.

For all the aforementioned reasons, Rugman & Verbeke claim that we need to revise the definition of "global" companies. They came up with the following classification and explanations:

- If at least 50% of a firm's sales are realized in their home region of what they called the "triad" (North-America, the EU or Asia), then the company can be considered as *Home Region Oriented*. The threshold of 50% was chosen because the authors assumed that if 50% of the sales are realized in one single region, this region will influence and constrain the decisions taken by the MNE.
- Conversely, if at least 50% of the firm's sales are realized in another region than the firm's region of origin, then the company can be characterized as *Host Region Oriented.*
- If a firm fulfils at least 20% of its sales in two of the three regions, but less than 50% in any single region, then it can be considered as *Bi-Regional.* The threshold of 20% was chosen because it is assumed that if at least 20% of the sales are issued from one region, it reflects a considerable success of the activities in that region.
- Finally, if and only if at least 20% of a firm's sales are realized in each of the triad's region, and less than 50% in any of the regions, the company can be categorized as global. Conceptually, this implies the successful deployment of the institution's FSAs in three distinct markets.

Regardless of the various terms used in the Literature Review of this paper, we will use the same criteria as Rugman and Verbeke for the classification of MNEs within our database, and it is this with this distribution that we will run our statistical tests with the statistical software SPSS. However, we slightly adapted their definition of the triad: in this paper, we will consider the three main regions to be ***America, EMEA, and Asia Pacific*** instead of North America, the EU, and Asia.

2. Methodology

This part has been written in collaboration with Justin Joly, Maxime Vanneer and Nicolas Blockerye as agreed with our common supervisor, Professor Régis Coeurderoy. We will describe the database we have been working on together, which is our support for every statistical test realized in this part of the paper.

2.1. The database

In order to be able to bring more detailed responses to our interrogations about the international expansion of MNEs, we filled in a pre-existing database. To do so, we used the database pre-established by our supervisor and added data related to the geographical diversification as well as the product/activity diversification of 500 of the biggest MNEs.

2.2. Structure of the database

The existing database includes the data of 500 of the biggest multinational enterprises in terms of turnover over a 5-year period, from 2011 to 2015. This database includes 22 indicators about various information regarding the firms' performance, their efforts in terms of Research and Development, the type of industry in which they operate and their capital investments.

We have then added to this the indicators linked to the geographical diversification and to the product/activity diversification of the firms.

2.3. Description of the database

2.3.1. Indicators/information included in the initial database

The initial database included 22 indicators/information presented as following:

year	Year in which the data was collected.
Worldrank	Ranking from 1 to 500 based on the annual turnover. 1 representing the company with the biggest turnover for a certain year x. x ∈ [2011 ; 2015].
Company	Name of the company.
Country	Country where the company's head office is located.
Industry	Industry in which the company is active.
R&D	Amount allocated to Research and Development.
R&D1-yeargrowth	Difference in % of the amount allocated to R&D in comparison with the previous year.
R&DCAGR-3y	Three-year ratio of changes in the amount of R & D allocated.
Sales-2011€m	Sales turnover.
Sales1-yeargrowth	Difference in % of sales compared to the previous year.
SalesCAGR-3y	Three-year ratio of sales evolution of the firm.
R&Dint.	Intensity of R&D.
Capex€m	*"CapEx[3] (Capital Expenditures) is the amount of money invested by a company to acquire or improve physical and non-expendable property such as industrial premises or production equipment. "* *"CAPEX[4] is an interesting data for those interested in the politics of a company. By comparing it to the amortization expense, it makes it possible to apprehend the situation of the company. If CAPEX is greater than depreciation, it is because the company is expanding. On the other hand, if it is lower, it is because the company is in a period of under-investment, probably demonstrating the excitement of its activity. "*
Capex1-yeargrowth	Difference in % of the CAPEX in comparison to the previous year.

[3] L, B. (2017). [Dossier] Les CapEx et les OpEx à l'ère du Cloud et des IaaS. Retrieved from https://www.lebigdata.fr/dossier-capex-opex-cloud-iaas-1001

[4] CAPEX - Définition du glossaire. Retrieved from http://www.daf-mag.fr/Definitions-Glossaire/CAPEX-245397.htm#3r1TJKD1omjTzoYO.97

CapexCAGR-3y	Three-year ratio of the evolution of the CAPEX of the firm.
Capexintensity	Measures the firm's requirements in capital.
Profits€m	Profit realized.
Profits1-yeargrowth	Difference in % of the profit made compared to the previous year
ProfitsCAGR-3y	Profit according to Compound Annual Growth Rate: ratio giving a constant return over a period of time. Here the period is three years.
Profitability (%)	Profitability of the company in %
Employees	Number of employees
Employees1-yeargrowth	Difference in% of the number of employees compared to the previous year.
EmployeesCAGR-3y	Three-year ratio of increase in employees.

2.3.2. Indicators added to the initial database

To these 22 initial indicators, we worked as a team to add the following data for each firm, for years 2011 to 2015:

Regoforigin	Firm's region of origin: Emea, America, Apac or other.
Emea	Percentage of the sales realized in the region: Europe, Middle East & Africa.
America	Percentage of the sales realized in the region: North- and South-America
Apac	Percentage of the sales realized in the region: Asia pacific
Other	Percentage of the sales realized in other regions
Homepercent	Percentage of the sales realized in the region of origin
Totintsales	Percentage of the international sales
Biregion*	Firm considered as bi-regional
Homeregion*	Firm realizing more than 50% of its sales in the region of origin
Hostregion*	Firm considered as Host Region
Global*	Firm considered as Global
Nosalesinfo	No information on sales (missing)
act1n	First activity of the firm in terms of sales

act1pcent	Percentage share of sales of the first activity.
act2n	Second activity of the firm in terms of sales
act2pcent	Percentage share of sales of the second activity.
act3n	Third activity of the firm in terms of sales
act3pcent	Percentage share of sales of the third activity.
act4n	Fourth activity of the firm in terms of sales
act4pcent	Percentage share of sales of the fourth activity.
Otherpcent	Percentage share of sales of other activities.
Totaldiv	Total percentage of sales
comments3	Comment related to a firm in a specific year

*A detailed explanation about the conditions to be considered as *bi, home, host region or* global is included in the preamble of this empirical part.

2.4. Choice of the method used

In this part, we will describe the different methods used to fill in the database that was already pre-established by our supervisor (the geographical segmentation as well as the different activities, sectors of the companies)

Our first step will be to explain how the geographical segmentation has been achieved. Then, in order to describe the orientations of the different companies, we will consider the four existing geographical orientations described by Rugman and Verbeke (2004)

The second step will be to explain how the different activities of the firms have been integrated into the database.

Finally, each of the two subheadings will be illustrated by an example coming directly from our database: we will have a look at Japanese pharmaceutical company OTSUKA.

2.5. Geographical segmentation

There are four possible orientations for a firm, in function of the sales realized in the different regions of the triad. The table down below presents the four types of different orientations as well as the conditions needed to belong to each group.

The four geographical orientations are the following:

Geographical orientation of the firm	Condition(s)
Home-region	- To be considered as Home-Region, at least 50% of the sales must be realized in the firm's region of origin from the triad
Bi-region	- To be considered as Bi-Region, a firm must accomplish 20% of its sales in at least two regions of the triad - AND realize less than 50% in all of the triad's regions.
Host-region	- To be considered as host-region, at least 50% of the firm's sales must take place in one of the regions of the triad that is NOT the company's region of origin.
Global	- To be considered as global, at least 20% of the sales must take place in each of the three regions of the triad. - AND less than 50% of the sales must be realized in each of the triad's regions.

Figure 3: Geographical orientation of the firms. Source: Rugman & Verbeke, 2004

Taking Japanese pharmaceutical Japanese company OTSUKA as our example, after reading the part reporting the geographical segmentation of the sales in the annual reports, we found the following results:

ye	Worldra	Company	Country	regoforigi
2011	72	OTSUKA	Japan	AsiaPacific
2012	67	OTSUKA	Japan	AsiaPacific
2013	63	OTSUKA	Japan	AsiaPacific
2014	99	OTSUKA	Japan	AsiaPacific
2015	86	OTSUKA	Japan	AsiaPacific

emea	america	apac	other	homeperc	totintsales
0,00%	32,10%	57,00%	10,90%	57,00%	100,00%
0,00%	35,80%	49,80%	14,40%	49,80%	100,00%
0,00%	36,60%	48,90%	14,50%	48,90%	100,00%
0,00%	41,30%	43,20%	15,50%	43,20%	100,00%
0,00%	33,20%	44,30%	23,50%	44,30%	100,00%

biregi	homeregi	hostregi	global
	1		
1			
1			
1			
1			

Figure 4: Extract of our database regarding the geographical segmentation of Japanese pharmaceutical company OTSUKA. Source: Annual reports of the company Otsuka (2012, 2013, 2014, 2015, 2016)

In 2011, as a matter of fact, company OTSUKA would have been considered as Home-region since it had over 50% of its sales located in their region of origin (APAC).

But then, from 2012 to 2015, we can see that it changed to a Bi-region orientation, with at least 20% of the sales in two regions of the triad and less than 50% in each of the three regions.

2.6. Diversification of the activities

Regarding the diversification of the firm's activities, sales are simply computed by dividing the sales per region by the total sales. We obtain a result in percentage.

ye	Worldra	Company	Country	regoforigi
2011	72	OTSUKA	Japan	AsiaPacific
2012	67	OTSUKA	Japan	AsiaPacific
2013	63	OTSUKA	Japan	AsiaPacific
2014	99	OTSUKA	Japan	AsiaPacific
2015	86	OTSUKA	Japan	AsiaPacific

act1n	act1pcent	act2n	act2pcent
Pharmaceuticals	66,20%	Nutraceuticals	22,90%
Pharmaceuticals	67,80%	Nutraceuticals	21,80%
Pharmaceuticals	69,80%	Nutraceuticals	20,30%
Pharmaceuticals	71,20%	Nutraceuticals	19,40%
Pharmaceuticals	67,20%	Nutraceuticals	22,30%

act3n	act3pcent	act4n	act4pcent	otherpcer	totaldiv
ConsumerProducts	4,30%			6,60%	100,00%
ConsumerProducts	4,20%			6,30%	100,00%
ConsumerProducts	3,70%			6,20%	100,00%
ConsumerProducts	3,00%			6,40%	100,00%
ConsumerProducts	3,00%			7,50%	100,00%

Figure 5: Extract of our database regarding the diversification of the activities of Japanese pharmaceutical company OTSUKA. Source: Annual reports of the company Otsuka (2012, 2013, 2014, 2015, 2016)

Japanese firm Otsuka diversifies itself through three different activities: Pharmaceuticals, Nutraceuticals and Consumer Products. There is also a small percentage in "other activities".

2.7. Analysis of the annual reports

To fill in the database, we used the annual reports from fiscal years 2011 to 2015, looking for information regarding the different regions in which the studied companies were active and in which sectors/activities they were competing. We looked at the "sales" category, which is the factor that indicates the international/product diversification of the companies.

While some institutions reported these results in a common way, i.e. in a table located either in the appendices or at the end of the report, others related this information in more unusual ways, e.g. presented on a world map or using graphs for the different activities.

Companies were reporting their results in various currencies, most of them reported it in dollars, but APAC firms reported them in their own currencies: this did not matter much as what we are interested in is the *percentage* of activities in each part of the world or sector, in order to analyse the product and geographical diversification.

2.8. Encountered difficulties

While filling in the database, we faced some difficulties for a handful of companies. This was often due to the location of these companies in different regions, which impacts the way they publish their annual reports.

The first problem we faced was the differences between the dates companies publish their annual reports. While firms in Europe usually publish them at the end of the year (31st of December), APAC and American companies usually published theirs on the 31st of March of every year. To tackle this issue, we chose to consider that annual reports published on the 31st of March for one year represented the data for the previous year. For instance, to fill the data for year 2015, we would use the annual report published on the 31/03/2016.

The other most recurrent issue was the discrepancies between the regions reported in the annual reports. In our database, we only consider 4 regions: *EMEA*, *America*, *APAC* and *Others*. We often faced cases where the companies would use different areas to report their results, such as *Latin America*, *Africa*, etc.

Moreover, some companies simply provided the results of their home region and considered the rest as "*International"*, without providing any further explanation.

When facing such cases, we always made sure that the results would match the four pre-established categories. In the rare cases where the company would not provide information about the breakdown of their international activities, we carried out thorough research in order to find more specific information; if we did not find anything else, we wrote this percentage under the *Others* category. This might create a bias for our analysis since we were sometimes not able to categorize these firms according to Rugman & Verbeke's classification. Fortunately, these cases were uncommon and it should not have too big of an impact.

Below is an example of such a case with the company Amazon:

Information on reportable segments and reconciliation to consolidated net income (loss) is as follows (in millions):

	Year Ended December 31,		
	2015	2014	2013
North America			
Net sales	$ 63,708	$ 50,834	$ 41,410
Segment operating expenses (1)	60,957	49,542	40,244
Segment operating income (loss)	$ 2,751	$ 1,292	$ 1,166
International			
Net sales	$ 35,418	$ 33,510	$ 29,934
Segment operating expenses (1)	35,509	33,654	29,780
Segment operating income (loss)	$ (91)	$ (144)	$ 154
AWS			
Net sales	$ 7,880	$ 4,644	$ 3,108
Segment operating expenses (1)	6,017	3,984	2,435
Segment operating income (loss)	$ 1,863	$ 660	$ 673
Consolidated			
Net sales	$ 107,006	$ 88,988	$ 74,452

Figure 6: Geographical repartition of the sales for company Amazon. Source: Annual report of the company Amazon (2015)

Finally, we faced some cases where there had been a restructuring of the activities from 2011 to 2015, where data would be incomplete, missing, or had been adjusted. In such situations, we adapted the different activities of the concerned company for the affected years, and we established a colour-code in the database for all users to be aware of any of these 4 issues:

- RED for missing data
- YELLOW for incomplete data
- BLUE for adjusted data
- GREEN in case of restructuring

2.9. The database after corrections and eliminations

Home_Host_Bi_Global

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bi-regional	167	10.0	10.0	10.0
	Home-region	1025	61.5	61.7	71.7
	Host-region	208	12.5	12.5	84.2
	Global	262	15.7	15.8	100.0
	Total	1662	99.7	100.0	
Missing	System	5	.3		
Total		1667	100.0		

After deleting the rows where data was missing, incomplete for our analysis or duplicated, we are left with 1667 observations out of the initial 2500. This is a big reduction, but it was necessary to remove these cases where data was incomplete in order not to induce any bias within our computations. We can see that 71.7% of the companies are significantly active in only one region of the triad, with a majority based in their home-region of the triad. There are also considerably more global firms than bi-regional companies.

3. Hypothesis test

3.1. Test H1: The more a firm spends in R&D, the more profitable it will be

The purpose here is to test whether firms investing considerably more in R&D will be rewarded with more profits and profitability. To test this hypothesis, we will use a simple linear regression between the dependent variable "Profits€m" and the independent variable "R&D". We will then proceed to the same test, with the profitability in percentage as dependent variable, to see if the results lead to the same conclusion or not.

We will also include control variables, which are by definition not of primary interest for the hypothesis. Nonetheless, it is still interesting to include them since we expect these variables to have a significant impact on the firms' profits and profitability. The control variables that we will include are the following:

- The region of origin (America, EMEA, Asia Pacific). In order to include the region of origin (which is a nominal variable) to the regression, we created dummy variables for each of the three regions.
- The size of the company, represented by the natural logarithm (ln) of the sales. We used the natural logarithm so that the distribution of the data is closer to the normal, and to make the interpretation of the results easier (Contractor et al., 2003).

3.1.1. H1a: The more a firm spends in R&D, the more profitable it will be (in millions of euros)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.573[a]	.329	.327	3986.36037

a. Predictors: (Constant), LnSales, Dummy variable for APAC firms, Dummy variable for EMEA firms, R&D

The R^2 value is of 0.329; this implies that 32.9% of the total profits' variability is explained by the expenses in R&D, the region of origin and the size of the company.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8566.855	658.733		-13.005	.000
	R&D	.969	.069	.319	14.049	.000
	Dummy variable for EMEA firms	-794.527	237.013	-.076	-3.352	.001
	Dummy variable for APAC firms	-1302.408	243.660	-.122	-5.345	.000
	LnSales	1144.282	74.927	.349	15.272	.000

a. Dependent Variable: Profits€m

This table indicates many things:

- First, these variables all have a P-value inferior to 5%, which means that they are all statistically significant.
- The size of the company (represented by the natural logarithm of the sales) and the R&D expenses are positively correlated with the firms' profits. We can see that the standardized coefficients beta for these variables are positive. In other words, the bigger the company and the more it invests in R&D, the more profits it will generate.
- Regarding the region of origin, results indicate that American institutions are the ones with the highest profits, followed by EMEA and APAC companies.

Our regression model for H1a is the following:

$$\boldsymbol{Profits€m = -8566.855 + 0.969 * R\&D - 794.527 * EMEA - 1302.408 * APAC + 1144.282 * lnSales}$$

In other words, corporate profits will get bigger as expenses in Research and Development increase. The size effect is also positive, the bigger the company, the higher the profits. If the firm is from the region EMEA, the profits generated will be diminished by 794.527 million

euros on average (in comparison with an American counterpart). If the MNE is from APAC, this reduction is even more important (more than one billion euros).

In essence, we can say that H1a has been confirmed. An increase in R&D expenditures leads to an increase in the firms' profits in a substantial way. As we saw it, since our control variables were statistically significant, there are other factors influencing the profits' variability.

Other factors such as the industry in which the organizations are active may also have a major impact on their profitability. Certainly, the type of company (home-region, host-region, bi-regional or global) will be a major indicator of the firms' profitability, but we will test this in our next hypotheses.

3.1.2. H1b: The more a firm spends in R&D, the more profitable it will be (in percentage units)

For this test, since we are using the profitability which is expressed in percentage units, we have used the R&D intensity rather than the R&D expenses in order to respect the symmetry. The R&D intensity is also expressed in percentage units, and it is the portion of the total sales that is invested in R&D.

$$R\&D\ Intensity = \frac{R\&D\ expenditures}{Total\ Sales}$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.273[a]	.075	.073	13.1327450

a. Predictors: (Constant), Dummy variable for APAC firms, LnSales, Dummy variable for EMEA firms, R&Dint.

This time, the R^2 value is of 0.075, which means that 7.5% of the variability of the profitability is explained by the R&D intensity, the size of the company (lnSales) and the region of origin. This is significantly lower than the score we obtained for H1a. There must be other more important factors that explain the variability of the profitability in percentages, such as the industry or the type of firm (home-region, host-region, bi-regional, global).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	26.741	2.983		8.965	.000
	R&Dint.	-.295	.032	-.260	-9.208	.000
	LnSales	-.998	.300	-.092	-3.323	.001
	Dummy variable for EMEA firms	-4.472	.794	-.152	-5.631	.000
	Dummy variable for APAC firms	-6.967	.817	-.232	-8.531	.000

a. Dependent Variable: Profitability(%)

This table shows that:

- Once again, all the p-values are inferior to the 5% threshold, which means that all these variables are statistically significant and need to be kept it in the model.
- However, unlike what we have found for H1a, the size of the company and R&D intensity are negatively correlated with the profitability of companies.
- American MNEs appear to be the most profitable ones, followed by EMEA enterprises and APAC firms, similarly to what we have seen in H1a.

Our regression model for H1b is the following:

$$\boldsymbol{Profitability}(\%) = \mathbf{26.741} - \mathbf{0.295} * \boldsymbol{R\&D\_Intensity} - \mathbf{4.472} * \boldsymbol{EMEA} - \mathbf{6.967} * \boldsymbol{APAC} - \mathbf{0.998} * \boldsymbol{lnSales}$$

This means that firms' profitability decreases with all factors; the bigger the institution, the lower the profitability. The bigger the R&D intensity, or in other words, the bigger the percentage of total sales a company devotes to R&D expenses, the lower the profitability.

These results are surprising, and we must reject our hypothesis H1b because they show the exact opposite of what we predicted. It looks like the more firms are dedicated to investing in R&D (relative to their total sales), the more their profitability will decrease.

3.1.3. Summary of H1 and discussion

As we can see, we found opposite results depending on the variable used for the regression: while MNEs with higher R&D expenses appear to benefit from more profits, firms investing a big portion of their revenues in R&D appear to be less profitable than those investing a smaller portion.

The relationship between profits and R&D expenses is easily understandable and intuitive; it is indeed normal and expected that the profits of an MNE will grow as this firm invests more in R&D, for the simple reason that the variable "profits" is a very brut, single-dimensioned piece of information. It does not provide any information regarding the costs incurred by these firms, unlike profitability, which represents the profits weighted by the institution's expenses.

Conversely, the relationship between R&D intensity and profitability is not as intuitive and we cannot clearly identify the reason for this negative correlation. The only teaching that can be drawn from this test is that investing too much of its revenues in R&D can be harmful for the organization. We could hypothesize that R&D investments are more profitable in the long term, and we might see a negative impact on the profitability in the short term if an organization invests more in R&D than it should. However, it does not necessarily mean that this company will be less profitable than others in the long run. Moreover, as we mentioned earlier, there must be other factors that explain the variation in the firms' profitability.

Building upon the idea that diversification and R&D expenses are positively correlated (developed in section 2.1 of the literature review) and thanks to the results found for this hypothesis, we can assess that profits will be positively correlated with global diversification,

while profitability won't necessarily increase accordingly. Our next hypotheses will provide us with more information regarding this statement.

Even if the profitability (in percentage) is more relevant than the profits (millions of €) as part of this paper, it is sometimes interesting to compare the results from both tests as their differences or similarities may provide additional information for us to interpret. In this case, what these differences in the results teach us is that profitability and profits are two distinct measures and that making more profits does not always mean increasing the firms' profitability.

3.2. Test H2: Global firms are more profitable than bi-regional firms, and bi-regional firms are more profitable than home- and host-region firms.

In order to test this hypothesis, we will need to use a one-way ANOVA to compare the means of the four types of companies, namely global, bi-regional, home-region and host-region. This will tell us whether there is a difference in the means of the four groups. In addition, we will also use a linear regression to get more information about the nature of this effect.

3.2.1. H2a: Global firms are more profitable than bi-regional firms, and bi-regional firms are more profitable than home- and host-region firms (in millions of euros)

- **One-way ANOVA**

In order to identify whether there are statistical differences in the profits' means of the four types of companies, we run a One-Way ANOVA. The results are below:

Descriptives

Profits€m

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Bi-regional	167	3428.58903	5916.38327	457.823483	2524.68169	4332.49638	-5193.9672	39765.0510
Home-region	1019	2156.55254	4676.65140	146.503468	1869.06922	2444.03586	-23012.734	65426.6809
Host-region	207	2691.69083	4712.77000	327.560158	2045.89069	3337.49097	-5303.5751	37919.7359
Global	261	3158.51689	4840.87745	299.642792	2568.48128	3748.55250	-2382.0000	41868.2750
Total	1654	2510.06912	4865.29540	119.630374	2275.42608	2744.71215	-23012.734	65426.6809

According to these results, bi-regional institutions benefit from the highest profits, followed by global multinationals, host-region and finally home-region firms. The homogeneity of variances ***(Appendix 2A, p.74)*** hypothesis is violated since the p-value is inferior to 5%. Therefore, we will need to use Brown-Forsythe's test ***(Appendix 2B, p.74)*** to determine whether the differences between the means of the four groups are significant.

Since Brown-Forsythe's p-value is inferior to 5% (0.002), we conclude that there is a statistically significant difference between the means of the four types of MNEs. Games-Howell's test ***(Appendix 2C, p.75)*** provides us with more detailed information; we can tell that the differences between the means of the groups "home-region" and "global" are statistically significant at the 5% level, as well as the differences between groups "home-region" and "bi-regional".

- **Linear Regression**

We run a linear regression between dependent variable "profits" and the four types of MNEs as independent variables (we use home-region as reference). We also include the same control variables we used for our previous regressions: the size of the company (lnSales) as well as the firms' region of origin.

In the model summary ***(Appendix 2D, p.75)***, the R^2 indicates that 25.7% of the total profits' variability is explained by the type of MNE, the size and the region of origin.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-12000.137	662.666		-18.109	.000
	biregion	1040.529	355.612	.064	2.926	.003
	hostregion	698.581	326.185	.048	2.142	.032
	global	993.441	297.112	.074	3.344	.001
	Dummy variable for EMEA firms	-1241.017	254.540	-.119	-4.876	.000
	Dummy variable for APAC firms	-1726.715	257.919	-.161	-6.695	.000
	LnSales	1622.671	70.448	.495	23.033	.000

a. Dependent Variable: Profits€m

This table indicates the following:

- These variables are all statistically significant (their p-value is inferior to 5%).
- Bi-regional firms have more profits, followed by global, host-region and home-region institutions.
- American companies are the most profitable, followed by EMEA and APAC firms.
- Profits are positively correlated with the size of the institution.

Our regression model for H2a is the following:

$$\boldsymbol{Profits€m = -12000.137 + 1040.529 * biregion + 698.581 * hostregion + 993.441 * global - 1241.017 * EMEA - 1726.715 * APAC + 1622.671 * lnSales}$$

Although the multiplier difference between bi-region and global is small, we cannot say that H2a has been confirmed. However, we notice that companies active in more than one region benefit from more profits than single-region firms.

3.2.2. H2b: Global firms are more profitable than bi-regional firms, and bi-regional firms are more profitable than home- and host-region firms (in percentage units)

- **One-Way ANOVA**

Running the same tests, this time with the profitability in percentage, we obtain the results below for our One-Way ANOVA:

Descriptives

Profitability(%)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Bi-regional	165	12.8653631	13.3582168	1.03993577	10.8119740	14.9187522	-105.13724	45.8124473
Home-region	1016	10.0082366	14.5629518	.456880432	9.11169829	10.9047748	-110.52213	100.000000
Host-region	207	15.0257374	12.9460112	.899809977	13.2517201	16.7997548	-29.962969	51.5522952
Global	260	12.2476453	9.31016460	.577391898	11.1106651	13.3846256	-64.683008	38.1143759
Total	1648	11.2778329	13.6462887	.336152196	10.6185022	11.9371637	-110.52213	100.000000

According to these results, Host-region companies are the most profitable ones with a mean of 15% of profitability. They are followed by bi-regional, global and finally home-region firms. We can immediately notice that the hypothesis of homogeneity of variance is violated since the test of homogeneity of variance's P-value is inferior to 0,05 ***(Appendix 2E, p.75)***.

Therefore, we will run Brown-Forsythe's test to determine whether the differences between the means of the four groups are significant.

Since Brown-Forsythe's ***(Appendix 2F, p.75)*** P-value is inferior to 5% (0.00), we conclude that there is indeed a significant difference between the profitability means of the four types of companies. Games-Howell's test ***(Appendix 2G, p.76)*** indicates that there are significant differences at the 5% level between the means of the groups "home-region" and "host-region", the groups "home-region" and "global" as well as the groups "host-region" and "global".

- **Linear Regression**

We repeat the linear regression we have used for H2a, using the profitability in percentage instead of the profits as dependent variable. We keep the four types of MNEs as independent variables (still using home-region as reference) as well as our control variables.

In the model summary ***(Appendix 2H, p.76)***, the R^2 indicates that 4% of the total profitability's variability is explained by the type of MNE, the size and the region of origin.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.960	2.499		3.585	.000
	biregion	2.849	1.140	.063	2.499	.013
	hostregion	4.151	1.041	.101	3.987	.000
	global	2.649	.950	.071	2.788	.005
	Dummy variable for EMEA firms	-3.857	.820	-.131	-4.703	.000
	Dummy variable for APAC firms	-4.831	.827	-.161	-5.841	.000
	LnSales	.396	.268	.037	1.475	.141

a. Dependent Variable: Profitability(%)

This table indicates that:

- The variables are statistically significant, except for the size of the company (lnSales) which has a p-value of 0.141.

- Host-region companies are the most profitable in terms of percentage units, i.e. when the profits are weighted by the firms' expenses. They are followed by bi-regional, global and home-region enterprises.
- EMEA firms are 3.857% less profitable than American multinationals, and APAC institutions are 4.831% less beneficial than their counterparts from America.
- Profitability is positively correlated with the size of organizations.

Our regression model for H2b is:

$$\boldsymbol{Profitability}(\%) = \mathbf{8.96} + \mathbf{2.849} * \boldsymbol{biregion} + \mathbf{4.151} * \boldsymbol{hostregion} + \mathbf{2.649} * \boldsymbol{global} - \mathbf{3.857} * \boldsymbol{EMEA} - \mathbf{4.831} * \boldsymbol{APAC} + \mathbf{0.396} * \boldsymbol{lnSales}$$

These results do not allow us to confirm our hypothesis H2b. Indeed, host-region companies show the best profitability score while being considerably active in only one of the three regions of the triad. They are followed by bi-regional firms which appear to be slightly more profitable than global enterprises. Finally, home-region organizations are the less profitable from our sample.

We cannot draw any conclusion from this test; since host-region organizations are performing the best while home-region firms perform the worst, we cannot say that profitability is inversely correlated with geographical diversification.

3.2.3. Summary of H2 and discussion

Our results lead, once again, to different findings in function of the variable tested. While bi-regional firms appear to have the most profits, when we take the institutions' expenses into consideration, we find that host-region enterprises are outperforming the others, with the highest profitability score.

While results for H2a are somewhat in line with what we expected, in the sense that firms active in more than one region display higher profits than single-region companies, results for H2b are more surprising; while host-region institutions appear to be the most profitable, home-region enterprises show the lowest profitability of all four types of MNEs. This might indicate that there is no correlation between the degree of internationalization (i.e. the number of regions an MNE is significantly active in) and institutions' profitability.

Host-region companies being the most profitable is even more surprising since Rugman & Verbeke (2004) argued that value-added through aggregation, in the sense of exploiting similarities across countries can be achieved in the home-region but appears difficult across regions[5]. Therefore, we might have expected that home-region organizations would have performed better than host-region institutions, but the results show the exact opposite.

There must be reasons explaining why host-region firms are better performing than all the other types of companies. Looking at the top 10 performers among host-region institutions for the year 2013 (according to the profitability criterion, in percentage), we immediately notice that 7 out of 10 shifted the biggest part of their operations in the Asia Pacific region. This region seems to be the new "place to be" for MNEs, with many opportunities to seize and a whole market to capture. The workforce is also a lot cheaper in Asia than in Europe or in America, making it possible for firms to be even more profitable since they have reduced costs.

Company	Country	Industry	Profits€m	Profitability(%)	regoforigin	emea	america	apac	other
PHILIPMORRISINTERNATIONAL	US	Tobacco	9800,59	43,30	America	0,6122	0,1255	0,2622	0,0000
TAIWANSEMICONDUCTOR	Taiwan	TechnologyHardware&Equipment	5344,52	37,09	AsiaPacific	0,0691	0,7090	0,2189	0,0031
BAIDU	CaymanIslands	Software&ComputerServices	1329,84	35,04	America	0,0000	0,0000	0,9950	0,0050
HSBC	UK	Banks	16362,12	34,25	Europe,Midd	0,1524	0,1450	0,7025	0,0000
GAZPROM	Russia	Oil&GasProducers	37919,74	32,57	Europe,Midd	0,0000	0,0000	0,6430	0,3570
VALE	Brazil	Mining	10922,34	32,21	America	0,1870	0,2000	0,5680	0,0450
TENCENT	CaymanIslands	Software&ComputerServices	2064,09	28,74	America	0,0000	0,0000	0,9180	0,0820
ALTERA	US	TechnologyHardware&Equipment	337,40	26,86	America	0,2600	0,1800	0,5600	0,0000
JAPANTOBACCO	Japan	Tobacco	4069,19	24,62	AsiaPacific	0,0000	0,0000	0,2091	0,7909
ASMLHOLDING	TheNetherlands	TechnologyHardware&Equipment	1275,14	24,31	Europe,Midd	0,0379	0,1372	0,8249	0,0000

Figure 7: top 10 firms in terms of profitability for fiscal year 2013. Source: annual reports for the year 2013 of companies Philip Morris International, Taiwan Semi Conductor, Baidu, HSBC, Gazprom, Vale, Tencent, Altera, Japan Tobacco and ASML Holding.

[5] Rugman & Verbeke argue that many of the MNEs' Firm-Specific Advantages are region-bound, which means they can be deployed across national borders but only within a limited geographic region.

We can also see that 3 out of the top 10 companies are active in the technology & hardware industry. If we look at the whole database, 25 out of the 50 host-region firms are in this same industry, a staggering 50%. In comparison, organizations in the technology & hardware industry only represent 18.64% of all the global MNEs (11 out of 59), 10.87% of the bi-regional companies (5 out of 46) and 11.42% of the home-region firms (29 out of 254)

Even though they can be difficult to identify clearly, there might be reasons why MNEs in this industry are more profitable than others. There may be a positive correlation between the technology & hardware industry and APAC region. Companies in this industry might benefit greatly from the lower prices of raw materials and the lower costs of workforce offered in this region, which might explain why they seem to be more profitable than other firms. This is not the topic of this paper, but it would be interesting to analyse why they appear to have a better profitability than the other types of enterprises and if the technology & hardware industry benefits more from the globalisation than others. If it was the case, it would be interesting to identify the reasons explaining this.

In essence, these two tests did not reflect the results we were expecting, i.e. global firms outperforming the other companies, followed by bi-regional and home-region/host-region institutions. We can assert that H2 has not been confirmed and needs to be rejected. Moreover, we can outline once more that the companies with the most profits in millions of euros (bi-regional MNEs) are not the ones with the highest profitability in percentage units (host-region firms).

We have included in the appendices ***(Appendix 5, p.82)*** an alternative test, in which we make no distinction between home- and host-region institutions and consider them as "single region" companies. While this test does not allow us to confirm the hypothesis that was originally set since bi-regional organizations still appear to outperform global firms, it nevertheless enables us to conclude that once we stop making the distinction between home- and host-region companies, geographically diversified enterprises earn more profits and are on average more profitable than their single-region counterparts. It is also interesting to note that these results are in line with Contractor et al. (2003) findings of a sigmoid, S-shaped relationship between the degree of internationalization and firms' performance (see Lit. Review, section 3.2.1.).

3.3. Test H3: Industrially diversified firms are more profitable than firms with concentrated activities.

3.3.1. Computation of product diversification measure

There was no indication regarding the firm's classification of industrial diversification in Rugman & Verbeke's article, so we will first develop how we computed our indicator to determine whether a company is industrially concentrated or diversified.

For this hypothesis, we will use an inverted version of the Herfindahl Index, applied to the distribution of a firm's industrial activities rather than to the distribution of an industry's sales among companies (Berry, 1971). The inverted version has the same use as the classic Herfindahl index, but it is more intuitive and logical. A value of 0 for our indicator implies that the MNE is totally concentrated and focused on one activity, type of product or service. The closer we get from the value 1, the more the firm is diversified industrially. It is a continuous measure, and is computed as below:

$$PD = 1 - \sum_{i=1}^{n} p^2$$

Where pi is the ratio of the company's output in the i^{th} activity to the company's total output in N activities or the relative weight of the i^{th} activity in percentage (in terms of sales).

Once this indicator (which we call Product Diversification) is calculated, we need to set the thresholds that will allow us to determine whether we consider a company to be industrially diversified or not. Literature does not suggest anything about these thresholds, so we will fix them arbitrarily and assume that the separation point will be the median point. After computing it, SPSS indicates that the median is 0.52424 ***(Appendix 3A, p.76)***. Thus, institutions which have a value inferior to 0.52424 for this indicator will be considered as industrially non-diversified or concentrated, and firms displaying a value superior or equal to 0.52424 will be

classified as industrially diversified. By choosing the median point as our threshold, we will obtain two groups with an equal number of observations.

Since we are making the comparison between only two groups, we will use student t-tests for this hypothesis. Once again, we will test both profits and profitability as dependent variables. We will also add linear regressions with the same control variables that we have used in previous tests.

3.3.2. H3a: Industrially diversified firms are more profitable than firms with concentrated activities (in millions of euros)

- **Student t-test**

Group Statistics

	Product_Diversified	N	Mean	Std. Deviation	Std. Error Mean
Profits€m	Concentrated	829	2437.98707	5034.87918	174.868582
	Product Diversified	830	2569.00679	4679.79862	162.438182

According to our student t-test, product diversified institutions appear to benefit from slightly more profits than concentrated firms. The difference in profits' average is a little bit more than 131 million euros or around 5%.

Levene's test ***(Appendix 3B, p.77)*** indicates that the variances of these two groups (populations) are equal since its p-value is superior to 5% (0.687). Therefore, we look at the first row of the test, with "equal variances assumed". Since the test's p-value is superior to the threshold of 5% (0.583), we cannot reject the hypothesis of profits' equality of these two groups and we have to assume the equality of means between the two groups. At the 5% threshold, it is likely that product concentrated and diversified firms have the same profits.

- **Linear Regression**

We use the measure just computed (product diversification, which is a continuous variable) as independent variable, as well as the region of origin and the firms' size as control variables, to stay coherent with our previous hypotheses' tests.

In the model summary ***(Appendix 3C, p.77)***, the R^2 indicates that 24.9% of the total profits' variability is explained by the product diversification/concentration factor, the size of the enterprise and its region of origin.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-11562.309	664.603		-17.397	.000
	LnSales	1631.522	71.299	.498	22.883	.000
	Product Diversification	-431.564	421.571	-.022	-1.024	.306
	Dummy variable for EMEA firms	-1048.595	250.367	-.100	-4.188	.000
	Dummy variable for APAC firms	-1831.005	254.826	-.171	-7.185	.000

a. Dependent Variable: Profits€m

This table indicates:

- A positive relationship between profits and firms' size.
- A superiority of American institutions compared to EMEA and APAC companies, in terms of profits.
- A superiority of product concentrated firms over industrially diversified enterprises. This variable is, however, *not statistically significant* at the 5% level.

Our regression model for H3a is the following:

$$\boldsymbol{Profits€m = -11562.309 - 431.564 * ProductDiversification - 1048.595 * EMEA - 1831.005 * APAC + 1631.522 * lnSales}$$

The ANOVA and linear regression lead to different conclusions, but they do not allow us to confirm H3a; since the coefficient for product diversification is negative (in the linear regression), indicating the opposite of what we hypothesised and that these tests seem to be non-significant, we cannot attest that industrially diversified companies earn more profits than industrially concentrated enterprises.

3.3.3. H3b: Industrially diversified firms are more profitable than firms with concentrated activities (in percentage)

- **Student t-test**

Group Statistics

	Product_Diversified	N	Mean	Std. Deviation	Std. Error Mean
Profitability(%)	Concentrated	826	12.6947921	15.5225117	.540097256
	Product Diversified	827	9.84879459	11.2779362	.392172266

According to the t-test, concentrated firms appear to be more profitable in percentage than diversified ones: the mean profitability of concentrated institutions is 12.695% while the mean profitability of industrially diversified companies is 9.849%.

Levene's test ***(Appendix 3D, p.77)*** p-value being inferior to 5%, we conclude that the variances of these two sub-groups are not equal, and we will use the second row of the test with "equal variances not assumed". We can see that the p-value of the t-test is also inferior to 5% (0.000); hence we conclude that there is a statistically significant difference between the profitability means of concentrated and diversified firms. The actual difference sits between the values [1.53674597; 4.15524914].

- **Linear regression**

We run the same test as we did for H3a, using the profitability in percentage as dependent variable, rather than the profits in millions of euros. We keep the same control variables as all our previous tests, i.e. the region of origin and the size of the firms.

In the model summary ***(Appendix 3E p.77)***, the R^2 indicates that 4% of the total profitability variability is explained by the product diversification/concentration factor, the size of the enterprise and its region of origin (our control variables).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.798	2.477		4.764	.000
	LnSales	.545	.271	.050	2.013	.044
	Product Diversification	-6.325	1.344	-.115	-4.705	.000
	Dummy variable for EMEA firms	-3.324	.803	-.113	-4.141	.000
	Dummy variable for APAC firms	-5.565	.814	-.185	-6.833	.000

a. Dependent Variable: Profitability(%)

This table indicates that:

- These variables are statistically significant (p-value inferior to 0.05).
- Firms' profitability is positively associated with the size factor.
- American companies substantially outperform EMEA and APAC firms (3.324% and 5.565% respectively)
- The more the company is industrially diversified, the less profitable it will be. A totally concentrated organization will be 6.325% more profitable than a (hypothetical) totally diversified firm.

Our regression model for H3b is the following:

$$\boldsymbol{Profitability}(\%) = \mathbf{11.798} - \mathbf{6.325} * \boldsymbol{ProductDiversification} - \mathbf{3.324} * \boldsymbol{EMEA} - \mathbf{5.565} * \boldsymbol{APAC} + \mathbf{0.545} * \boldsymbol{lnSales}$$

At the sight of these results, we must reject H3b; our results show a negative relationship between the level of industrial diversification and firms' profitability. We are once again facing results indicating the opposite of what we had hypothesised.

3.3.4. Summary of H3 and discussion

This time, the results we obtained using the variables profits (millions of euros) and profitability (percentage) lead us to the same conclusion that industrial diversification hinders firms' performance. In other words, concentrated institutions appear to have more profits and to be more profitable than their industrially diversified counterparts, even if our tests with the "profits" as dependent variable were not statistically significant.

Overall, the findings of these tests are in line with Berger & Ofek's conclusion (1995). While the mean profitability of industrially diversified organizations remains positive, it is however significantly inferior to concentrated firms' profitability. The reason might be a failure to capture the advantages offered by product diversification such as the economies of scope or the spillover effects. Or maybe these advantages are not big enough to overcome the liabilities engendered by product diversification. Another explanation might be managers' confusion, making bad decisions regarding the segments they want to focus on and to invest in.

It is important to mention this test's limitations. Indeed, we rely on the Herfindahl Index measure to draw our conclusions. Even though literature claims that this is one of the most reliable indexes to this date, it is generally used to measure the concentration/diversification of an industry and not within individual firms. Moreover, we had to set the thresholds by ourselves since no previous study gave any sort of indication regarding the setting of thresholds for industrial diversification.

Also, since institutions report their activities in many different ways, there might be a bias in the way we determined whether a firm was industrially concentrated or diversified: for example, some companies might use very broad categories in their reports such as "banking", whereas another enterprise, from the same industry, might make the distinction between "short-

term credits" and "long-term credits", multiplying the number of activities on paper. Although these two companies probably have the same activities, they do not report it in the same way and it might have a big impact on the Herfindahl Index measure. By its nature, the Herfindahl index is only able to identify if a firm is industrially diversified or concentrated based on the activities reported in the annual reports.

Despite these difficulties, the Herfindahl Index still provides us with a good reflection of the reality and there is not any other indicator we might have used, based on the data available in this database. For future research, it might be interesting to use the entropy measure of Jacquemin-Berry for this test and see if we obtain the same results. This way, it might also be possible to take into consideration the relatedness factor of industrial diversification.

3.4. Test H4: Totally diversified firms are more profitable than firms diversified on a single dimension.

With this hypothesis, we want to test Sambharya's conclusion that the mixed effects of product- and industrial-diversification lead to better performance. If this turns out to be true, we will observe a superior profitability in percentage for totally diversified firms than for institutions diversified internationally or industrially only.

To do so, we will classify totally diversified firms according to the following definition: we will consider a company to be totally diversified if it has a PD value of at least 0.52424 and if it is significantly active in more than one region (i.e. if the institution is global or bi-regional) at the same time. We will consider that an enterprise is only geographically diversified if it is bi-regional or global, but has a PD lower to the threshold set previously. Finally, we will consider a firm to be only industrially diversified if its PD value is superior to 0.52424 while being a home- or host-region company. We won't take institutions that aren't diversified on any dimension (geographically or industrially) into consideration for this test.

In order to realize this test, we need to compute a new variable called "totally diversified". From our sample, 14.3% of the institutions (238) can be considered as totally diversified, 42.9% (715) as industrially diversified only, and 11.5% (191) as geographically diversified only. The rest of the companies (523 of them, 31.4%) were not diversified on any dimension and will, therefore, be excluded for this test. ***(Appendix 4A, p.78)***

We will proceed to an analysis of variance to compare the means of these subgroups and see if totally diversified firms show a better profitability (both in terms of millions of euros and in percentage) than companies diversified on only one dimension. Then we will proceed to linear regressions, using the same control variables as for previous hypotheses.

3.4.1. H4a: Totally diversified firms are more profitable than firms diversified on a single dimension (in millions of euros)

- **One-Way ANOVA**

In order to identify whether there are statistical differences in the profits' means of industrially, geographically and totally diversified companies, we run a One-Way ANOVA. The results are below:

Descriptives

Profits€m

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Totally diversified	237	3716.93943	5112.12723	332.068347	3062.74259	4371.13627	-5193.9672	41868.2750
Industrially diversified	712	2236.93240	4507.84615	168.938677	1905.25407	2568.61074	-9843.0666	43244.3572
Geographically diversified	191	2701.74153	5445.56706	394.027403	1924.51138	3478.97169	-2382.0000	39765.0510
Total	1140	2622.49399	4836.28477	143.238393	2341.45326	2903.53473	-9843.0666	43244.3572

According to these results, totally-diversified institutions benefit from a lot more profits than firms diversified on only one dimension. The homogeneity of variances ***(Appendix 4B, p.78)*** hypothesis is violated since the p-value is inferior to 5%. Therefore, we will need to use Brown-Forsythe's test ***(Appendix 4C, p.78)*** to determine whether the differences between the means of the four groups are significant.

Since Brown-Forsythe's p-value is inferior to 5% (0.001), we conclude that there is a statistically significant difference between the means of the four types of MNEs. With the help of Games-Howell's test ***(Appendix 4D, p.79)***, we can tell that the differences between the means of the groups "totally diversified" and "industrially diversified" are statistically significant at the 5% level.

- **Linear Regression**

For this test, we will use the firms' profits as dependent variable, and the diversification type as independent variable. We will use "totally diversified" companies as reference, and keep the same control variables, namely the size of the institutions and their region of origin.

In the model summary ***(Appendix 4E, p.79)***, the R^2 indicates that 30.3% of the total profits' variability is explained by the type of diversification, the size of the enterprise and its region of origin.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-11942.796	827.734		-14.428	.000
	dummy variable for product diversified firms	-1106.469	315.230	-.111	-3.510	.000
	dummy variable for geographically diversified firms	-245.626	401.481	-.019	-.612	.541
	Dummy variable for EMEA firms	-1558.787	291.599	-.154	-5.346	.000
	Dummy variable for APAC firms	-2086.066	306.394	-.194	-6.808	.000
	LnSales	1761.075	83.018	.532	21.213	.000

a. Dependent Variable: Profits€m

This table indicates that:

- All variables are statistically significant, except the variable "geographically diversified".
- Totally diversified companies earn more profits than firms diversified industrially or geographically only.
- American institutions earn more profits than their counterparts from EMEA and APAC.
- The bigger the business, the higher the profits.

Our regression model for H4a is the following:

$$\boldsymbol{Profits€m = -11942.796 - 1106.469 * ProductDiversified - 245.626 * GeographicallyDiversified - 1558.787 * EMEA - 2086.066 * APAC + 1761.075 * lnSales}$$

At the sight of these results, we can say that even though the profits' difference between groups "totally diversified" and "geographically diversified" is small, totally diversified appear to be more profitable than the other two groups, therefore H4a is confirmed.

3.4.2. H4b: Totally diversified firms are more profitable than firms diversified on a single dimension (in percentage)

- **One-Way ANOVA**

We run the same test, using the profitability in percentage as dependent variable this time:

Descriptives

Profitability(%)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Totally diversified	236	12.1276564	11.7521704	.765001134	10.6205199	13.6347928	-105.13724	38.1143759
Industrially diversified	709	10.2236871	11.8333846	.444412085	9.35116382	11.0962103	-93.482158	51.5522952
Geographically diversified	189	12.9367502	10.1130636	.735617135	11.4856257	14.3878747	-8.1201485	45.8124473
Total	1134	11.0721048	11.5923382	.344242524	10.3966803	11.7475293	-105.13724	51.5522952

This time, results show that geographically diversified firms are the most profitable ones, with a profitability of 12.937%. Totally diversified firms are the second most profitable, with 12.128%. Industrially diversified companies are less profitable, with a mean of 10.224%.

The homogeneity of variance is respected since its p-value is of 0.065 > 0.05 ***(Appendix 4F, p.79)***, so we don't need to run Brown-Forsythe's test for this hypothesis. The ANOVA's significance level being of 0.005 < 0.05 ***(Appendix 4G, p.80)***, there is a statistically significant difference between groups. Bonferroni's test ***(Appendix 4H, p.80)*** shows us that the differences between groups "industrially diversified" and "geographically diversified" are statistically significant.

- **Linear Regression**

As we did for H4a, we use "totally diversified" firms as a reference point for this regression, with the same control variables.

In the regression summary ***(Appendix 4I, p.80)***, the R^2 indicates that 5.6% of the total profitability's variability is explained by the variables included in the model.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.842	2.771		5.355	.000
	dummy variable for product diversified firms	-1.655	.881	-.069	-1.878	.061
	dummy variable for geographically diversified firms	1.966	1.124	.063	1.748	.081
	Dummy variable for EMEA firms	-3.747	.822	-.154	-4.559	.000
	Dummy variable for APAC firms	-6.206	.865	-.240	-7.178	.000
	LnSales	-.004	.285	.000	-.014	.988

a. Dependent Variable: Profitability(%)

This table indicates that:

- Geographically diversified enterprises outperform totally diversified and industrially diversified companies in terms of profitability. However, these two variables are not statistically significant.
- American institutions are the most profitable, followed by EMEA and APAC firms.
- Firms' profitability decreases very slightly with the size factor. This variable is not statistically significant.

Our regression model for H4b is the following:

$$\boldsymbol{Profitability}(\%) = \mathbf{14.842} - \mathbf{1.655} * \boldsymbol{ProductDiversified} + \mathbf{1.966} * \boldsymbol{GeographicallyDiversified} - \mathbf{3.747} * \boldsymbol{EMEA} - \mathbf{6.206} * \boldsymbol{APAC} - \mathbf{0.004} * \boldsymbol{lnSales}$$

This time, we must reject the hypothesis. Indeed, whereas totally diversified firms outperform product diversified organizations in terms of profitability, they are however surpassed by geographically diversified companies.

3.4.3. H4c: Totally diversified firms are more profitable than firms diversified on a single dimension (in percentage, corrected)

For this hypothesis, we will run an additional test that will neglect the effects of the firms' industries. We already know that some industries are more profitable than others, which might induce a bias in our results. In order to have more accurate results for this last hypothesis, it is important to neglect the effect of such factors on the results.

We already know that using the profitability in percentage rather than the profits in millions allows us to neglect the size effect of institutions. In order to further neglect the industry effect, we create a new variable called "Profitability(%)Corrected". To compute it, we calculate the average profitability per industry per year (2011 to 2015). For example, we calculate the average profitability of the firms within the Chemicals industry for the year 2011, which is 9.52% ***(Appendix 4J, p.81)***. We then subtract this average profitability to the performance of every individual firm from this industry for this year, and we obtain a value, neutral of the effects induced by the industry of the organizations. We repeat this operation for each industry and for each year, and we proceed to the same tests.

- **One-Way ANOVA**

We run the analysis using the newly computed "corrected profitability" and obtain the following results:

Descriptives

Profitability(%)Corrected

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Totally diversified	235	1.1153	11.37231	.74185	-.3463	2.5768	-114.24	24.02
Industrially diversified	707	-.4826	10.80963	.40654	-1.2807	.3156	-102.56	48.61
Geographically diversified	189	.9510	8.28083	.60234	-.2372	2.1392	-19.05	24.03
Total	1131	.0890	10.57080	.31432	-.5277	.7057	-114.24	48.61

When neglecting the industry effect, we see that totally diversified firms seem to be more profitable than their counterparts diversified on a single dimension. We can also see that the

hypothesis of homogeneity of variances is confirmed ***(Appendix 4K, p.81)*** and that the differences between the means of the three groups are not significant at the 5% level ***(Appendix 4L, p.81)***. Therefore, we do not need to run any post-hoc test for H4c.

- **Linear Regression**

Even though there are no significant differences between the means of the three groups (according to the ANOVA test), we will still run a linear regression to confirm our findings. We run the same test as for H4a and H4b, with our corrected profitability as dependent variable.

The R^2 value ***(Appendix 4M, p.82)*** indicates that 3.1% of the total corrected profitability's variability is explained by the variables included in the regression.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.396	2.593		-.538	.590
	dummy variable for product diversified firms	-1.416	.816	-.065	-1.735	.083
	dummy variable for geographically diversified firms	.672	1.040	.024	.646	.518
	Dummy variable for EMEA firms	-2.831	.762	-.128	-3.717	.000
	Dummy variable for APAC firms	-4.192	.800	-.178	-5.242	.000
	LnSales	.469	.266	.053	1.760	.079

a. Dependent Variable: Profitability(%)Corrected

This table indicates that:

- Geographically diversified companies appear to have a better corrected profitability than their totally and industrially diversified counterparts. However, these variables are not significant.
- Corrected profitability is positively correlated with the organizations' size. Once again, this variable is not significant.

- American businesses outperform their EMEA and APAC counterparts.
- The constant (-1.396) is not statistically significant; it has a p-value of 0.590.

Our regression model for H4c is the following:

$$\boldsymbol{Profitability(\%)corrected = -1.396 - 1.416 * ProductDiversified + 0.672 * GeographicallyDiversified - 2.831 * EMEA - 4.192 * APAC + 0.469 * lnSales}$$

Since our results for these two tests differ from one another, and that they are not statistically significant, we cannot draw any conclusion for H4c.

3.4.4. Summary of H4 and discussion

Once again, results lead to different conclusions when we look at the profitability in percentage and in millions of euros. While totally diversified companies appear to have the biggest profits, they are however outperformed by geographically diversified institutions when we consider the profitability in percentage as dependent variable. This difference is interesting and means that while they earn the most, totally diversified firms also have the most expenses. This probably reflects the increased costs and difficulty of managing a business that is diversified on both product and geographical dimensions. We can argue that since being totally diversified is more complex, only the biggest multinationals, who have the biggest amounts of money to spend, manage to be successfully diversified on both geographical and industrial dimensions. This could explain why totally diversified organizations appear to have the most profits, and the related costs explain why they are not necessarily the most profitable ones (in percentage).

The only things we can conclude from these tests are that industrially diversified firms are consistently the worst performers, regardless of the factor analysed (profits or profitability). Additionally, the region of origin seems to be very impactful on the companies' profits and

profitability: American firms showed the best performances in every test we ran, followed by EMEA and APAC companies.

The fact that the differences between the means in profits and profitability of the three groups were not statistically significant once we neutralized the industry effect (H4c) indicates that this variable has a big impact on corporate performance. It reminds us that we must keep in mind that there are other factors which might impact our results and, if the effects of these factors were neglected, we might find other results, leading to different conclusions.

Overall, we were not able to confirm Sambharya's conclusion. Indeed, we are more interested in profitability than in profits for the topic of this paper, and our results for H4b indicated that geographically diversified enterprises outperformed industrially and totally diversified firms in terms of profitability. Therefore, we can attest that product diversification coupled with international diversification does not necessarily translate into better profitability; the economies of scale and scope and the resource sharing across business units that totally diversified firms benefit from isn't such a big advantage for these companies, at least not in terms of profitability.

Finally, we can also mention that we were not able to make a distinction between related and unrelated diversification for the institutions of this sample, and therefore we couldn't test this dimension of Sambharya's findings. We might have found different results if there had been a way to take the factor of relatedness into account. This might be the topic of further research, that would focus on this point more precisely.

Conclusion

The purpose of this paper was to identify whether global diversification (industrial, geographical and total diversification) had a significant impact on firms' profitability, and if it is always valuable for companies to expand their activities in terms of location, products, or on both dimensions at the same time. Our results allow us to draw a few conclusions regarding the various effects of different types of global diversification on firms' performances.

According to our statistical tests, product diversification hinders corporate performance in every case; whether firms are geographically diversified or not, the added impact of industrial diversification turns out to reduce the profitability and the profits of the concerned institutions. While the impact of industrial diversification on profits is limited, the effect on profitability is more substantial; this can be translated by increased expenses due to the difficulty of managing an industrially diversified company, without any remarkable increase in the profits in return.

Geographical diversification, on the other hand, seems to be a better alternative; this dimension of diversification seems to have a positive effect on firms' profitability and profits. We must note, however, that bi-regional companies earn more profits and are more profitable than global companies. This could indicate that an intermediary level of geographical diversification is optimal and that institutions trespassing this optimum might see their financial performances decrease accordingly.

In addition, the combined effects of geographical and industrial diversifications appear to tremendously increase corporate profits; on average, their profits are 66% higher than industrially diversified companies and 37.6% superior to geographically diversified enterprises. Totally diversified enterprises are however not the ones displaying the best profitability; this reflects that while they earn the most money, totally diversified firms are incurred with a lot of costs related to the difficulty of managing such complex firms.

What should be remembered from these results is that if a non-diversified firm is willing to expand the scope of its activities, with an intention to increase its profits and profitability, the organization is statistically more likely to succeed by choosing to diversify on the geographical dimension rather than the product dimension. In other words, being specialized in a certain domain or activity and expanding internationally appears to be more profitable than diversifying into multiple activities while staying within the firm's home-region.

There are however some limitations to our study, and our results should be taken with a grain of salt. Some of these limitations have already been mentioned in the empirical part of this paper, we will summarize them before indicating what future research might focus on.

The first limitation is related to our database, the sample itself: the distribution of the data is not normalized, and although it is probably not too important since the tests we have used are robust, it might have an influence on the results we obtained. Also, the number of observations for each of the four types of institutions varies greatly (1025 entries for home-region, 262 for global, 208 for host-region and 167 for bi-regional enterprises).

The second limitation lies in the indicators and classification we used for some of our tests. We were sometimes confronted with many potential indicators and had to choose one that was relevant, but also usable with the data included in our database. To measure product diversification, we used the Herfindahl index rather than Jacquemin-Berry's entropy measure, since we were missing information regarding the relatedness of activities. Concerning the classification, we supposed that the degree of geographical diversification was related to the number of regions a firm is significantly active in, but we could also have used a continuous measure such as the DOI (degree of internationalization). Would we have used other indicators or classification, we might have ended up with different results.

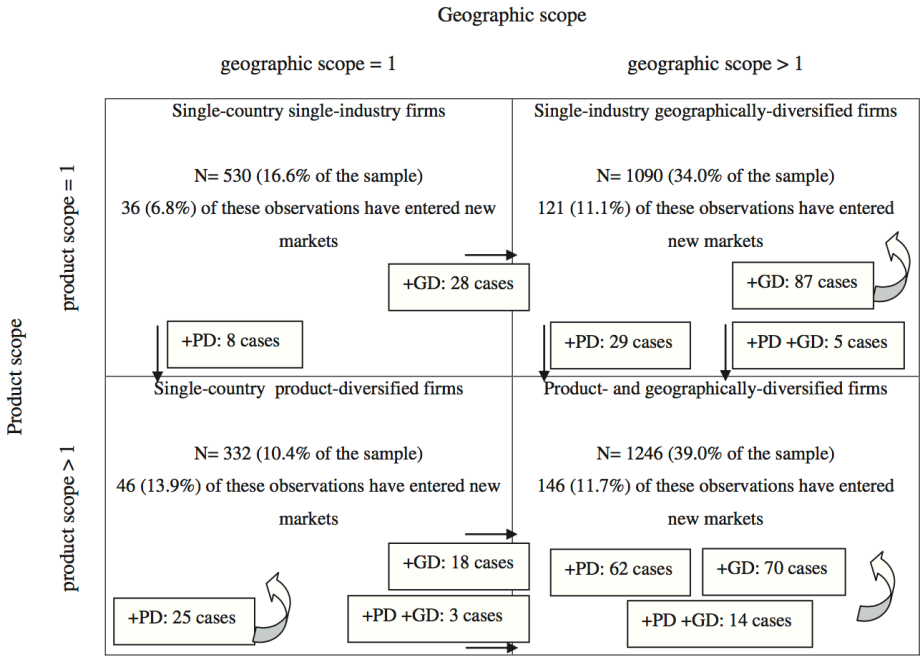
Furthermore, we need to keep in mind that there are many other variables that have an influence on corporate profits and profitability. Whereas some of them were included in our models as control variables, there are certainly other factors that have a big influence on these two variables, such as the firms' industry, capital expenditures, or even factors that were not included in our database and are hardly measurable, such as brand image for example. It is

therefore impossible to measure the impact of the diversification alone on profitability and profits, without any influence from other factors.

Finally, we need to ask ourselves the following question: do firms always diversify with the intent to increase their profits and profitability? Or are there other reasons why institutions might be willing to expand the range of their activities? Indeed, since industrial diversification seems to reduce corporate profitability, we could imagine that there are other motivations. This might be the topic of future research; even though this paper focused on a purely financial dimension of global diversification (i.e. the profitability), it might be interesting to focus on other incentives that may encourage enterprises to get out of their comfort zone by expanding the range of their activities. One example might be firms willing to defend their market shares against other competitors. Even if it is not strictly profitable, they might still make the decision to diversify their activities to prevent other companies from capturing these market shares. These cases are specific, but it might be interesting to analyse them more in-depth in order to have a better comprehension of the global diversification phenomenon, its drivers, and outcomes.

Appendices

Appendix 1: Entry moves into new markets. Source: Ref (2015)



Appendix 2: SPSS output for Hypothesis 2.

Hypothesis 2a:

Appendix 2A

Test of Homogeneity of Variances

Profits€m

Levene Statistic	df1	df2	Sig.
4.823	3	1650	.002

Appendix 2B

Robust Tests of Equality of Means

Profits€m

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	4.869	3	666.904	.002

a. Asymptotically F distributed.

Appendix 2C

Multiple Comparisons

Dependent Variable: Profits€m

Games-Howell

(I) Home_Host_Bi_Global	(J) Home_Host_Bi_Global	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bi-regional	Home-region	1272.0365*	480.692841	.043	26.7488138	2517.32417
	Host-region	736.898202	562.936940	.558	-717.09604	2190.89244
	Global	270.072141	547.163727	.960	-1143.4361	1683.58039
Home-region	Bi-regional	-1272.036*	480.692841	.043	-2517.3242	-26.748814
	Host-region	-535.13829	358.829937	.444	-1462.2725	391.995939
	Global	-1001.964*	333.540206	.015	-1862.5130	-141.41575
Host-region	Bi-regional	-736.89820	562.936940	.558	-2190.8924	717.096036
	Home-region	535.138290	358.829937	.444	-391.99594	1462.27252
	Global	-466.82606	443.938577	.719	-1611.6197	677.967540
Global	Bi-regional	-270.07214	547.163727	.960	-1683.5804	1143.43610
	Home-region	1001.9644*	333.540206	.015	141.415746	1862.51296
	Host-region	466.826061	443.938577	.719	-677.96754	1611.61966

*. The mean difference is significant at the 0.05 level.

Appendix 2D

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.507[a]	.257	.254	4197.11044

a. Predictors: (Constant), LnSales, global, Dummy variable for APAC firms, biregion, hostregion, Dummy variable for EMEA firms

Hypothesis 2b:

Appendix 2E

Test of Homogeneity of Variances

Profitability(%)

Levene Statistic	df1	df2	Sig.
5.369	3	1644	.001

Appendix 2F

Robust Tests of Equality of Means

Profitability(%)

	Statistic[a]	df1	df2	Sig.
Welch	9.759	3	459.145	.000
Brown-Forsythe	11.281	3	737.926	.000

a. Asymptotically F distributed.

Appendix 2G

Multiple Comparisons

Dependent Variable: Profitability(%)

Games-Howell

(I) Home_Host_Bi_Global	(J) Home_Host_Bi_Global	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bi-regional	Home-region	2.85712655	1.13587241	.060	-.08222303	5.79647614
	Host-region	-2.1603743	1.37518159	.397	-5.7104496	1.38970097
	Global	.617717785	1.18947375	.954	-2.4575727	3.69300828
Home-region	Bi-regional	-2.8571266	1.13587241	.060	-5.7964761	.082223026
	Host-region	-5.017501*	1.00915694	.000	-7.6236634	-2.4113383
	Global	-2.239409*	.736288756	.013	-4.1360760	-.34274157
Host-region	Bi-regional	2.16037432	1.37518159	.397	-1.3897010	5.71044962
	Home-region	5.0175009*	1.00915694	.000	2.41133830	7.62366345
	Global	2.7780921*	1.06913021	.048	.018655315	5.53752890
Global	Bi-regional	-.61771778	1.18947375	.954	-3.6930083	2.45757271
	Home-region	2.2394088*	.736288756	.013	.342741567	4.13607597
	Host-region	-2.778092*	1.06913021	.048	-5.5375289	-.01865531

*. The mean difference is significant at the 0.05 level.

Appendix 2H

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.201[a]	.040	.037	13.3830528

a. Predictors: (Constant), LnSales, global, Dummy variable for APAC firms, biregion, hostregion, Dummy variable for EMEA firms

Appendix 3: SPSS output for Hypothesis 3.

Appendix 3A

Frequencies

Statistics

Product Diversification

N	Valid	1667
	Missing	0
Mean		.467959711
Median		.524243929
Mode		.000000000

Hypothesis 3a:

Appendix 3B

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Profits€m	Equal variances assumed	.163	.687	-.549	1657	.583	-131.01972	238.663293	-599.13311	337.093671
	Equal variances not assumed			-.549	1647.925	.583	-131.01972	238.673802	-599.15561	337.116168

Appendix 3C

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.499[a]	.249	.247	4216.15802

a. Predictors: (Constant), Dummy variable for APAC firms, Product Diversification, LnSales, Dummy variable for EMEA firms

Hypothesis 3b:

Appendix 3D

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Profitability(%)	Equal variances assumed	54.866	.000	4.265	1651	.000	2.84599755	.667336124	1.53708322	4.15491189
	Equal variances not assumed			4.264	1506.116	.000	2.84599755	.667460959	1.53674597	4.15524914

Appendix 3E

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.200[a]	.040	.038	13.3768448

a. Predictors: (Constant), Dummy variable for APAC firms, Product Diversification, LnSales, Dummy variable for EMEA firms

Appendix 4: SPSS output for Hypothesis 4.

Appendix 4A

Totally_Diversified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally diversified	238	14.3	20.8	20.8
	Industrially diversified	715	42.9	62.5	83.3
	Geographically diversified	191	11.5	16.7	100.0
	Total	1144	68.6	100.0	
Missing	System	523	31.4		
Total		1667	100.0		

Hypothesis 4a:

Appendix 4B

Test of Homogeneity of Variances

Profits€m

Levene Statistic	df1	df2	Sig.
5.184	2	1137	.006

Appendix 4C

Robust Tests of Equality of Means

Profits€m

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	7.374	2	550.578	.001

a. Asymptotically F distributed.

Appendix 4D

Multiple Comparisons

Dependent Variable: Profits€m

Games-Howell

(I) Totally_Diversified	(J) Totally_Diversified	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Totally diversified	Industrially diversified	1480.0070*	372.571689	.000	603.236956	2356.77709
	Geographically diversified	1015.19790	515.293103	.121	-197.06871	2227.46450
Industrially diversified	Totally diversified	-1480.007*	372.571689	.000	-2356.7771	-603.23696
	Geographically diversified	-464.80913	428.716539	.525	-1475.3006	545.682338
Geographically diversified	Totally diversified	-1015.1979	515.293103	.121	-2227.4645	197.068712
	Industrially diversified	464.809128	428.716539	.525	-545.68234	1475.30059

*. The mean difference is significant at the 0.05 level.

Appendix 4E

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.551[a]	.303	.300	4045.36135

a. Predictors: (Constant), LnSales, dummy variable for geographically diversified firms, Dummy variable for APAC firms, Dummy variable for EMEA firms, dummy variable for product diversified firms

Hypothesis 4b:

Appendix 4F

Test of Homogeneity of Variances

Profitability(%)

Levene Statistic	df1	df2	Sig.
2.744	2	1131	.065

Appendix 4G

ANOVA

Profitability(%)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1430.430	2	715.215	5.363	.005
Within Groups	150824.722	1131	133.355		
Total	152255.153	1133			

Appendix 4H

Multiple Comparisons

Dependent Variable: Profitability(%)

Bonferroni

(I) Totally_Diversified	(J) Totally_Diversified	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Totally diversified	Industrially diversified	1.90396930	.867844169	.085	-.17672771	3.98466630
	Geographically diversified	-.80909385	1.12722997	1.000	-3.5116804	1.89349274
Industrially diversified	Totally diversified	-1.9039693	.867844169	.085	-3.9846663	.176727705
	Geographically diversified	-2.713063*	.945342348	.013	-4.9795657	-.44656063
Geographically diversified	Totally diversified	.809093849	1.12722997	1.000	-1.8934927	3.51168044
	Industrially diversified	2.7130631*	.945342348	.013	.446560633	4.97956566

*. The mean difference is significant at the 0.05 level.

Appendix 4I

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.237[a]	.056	.052	11.2871373

a. Predictors: (Constant), LnSales, dummy variable for geographically diversified firms, Dummy variable for APAC firms, Dummy variable for EMEA firms, dummy variable for product diversified firms

Hypothesis 4c:

Appendix 4J

T1671 =AVERAGE(T218,T233,T509,T514,T519,T656,T763,T871,T971,T986,T1058,T1174,T1324,T1359,T1380,T1402,T142

	year	Wo	Company	Co	Industry	Profits€m	P	Profitability(%)	Profitability(%)Corrected
218	2011	69	BASF	Germ	Chemicals	8939.00	###	12.16	2.93
233	2011	38	BAYER	Germ	Chemicals	3969.00	###	10.87	1.64
509	2011	84	DOWCHEMICAL	USA	Chemicals	2867.30	###	6.18	-3.05
514	2011	243	DSM	TheN	Chemicals	931.00	###	10.13	0.90
519	2011	78	DUPONT	USA	Chemicals	3693.48	###	12.59	3.36
656	2011	291	GIVAUDAN	Switz	Chemicals	365.52	###	11.37	2.14
763	2011	447	INTERNATIONALFLAVORS	USA	Chemicals	333.38	###	15.47	6.24
871	2011	390	L'AIRLIQUIDE	Franc	Chemicals	2314.20	###	16.01	6.78
971	2011	82	MITSUBISHICHEMICAL	Japan	Chemicals	1196.85	###	3.75	-5.48
986	2011	271	MITSUICHEMICALS	Japan	Chemicals	86.10	###	0.60	-8.63
1058	2011	339	NITTODENKO	Japan	Chemicals	529.55	###	8.76	-0.47
1174	2011	263	PPGINDUSTRIES	USA	Chemicals	1344.77	###	11.69	2.46
1324	2011	255	SHIN-ETSUCHEMICAL	Japan	Chemicals	1426.39	###	13.69	4.46
1359	2011	467	SOLVAY	Belgi	Chemicals	749.00	###	9.24	0.01
1380	2011	88	SUMITOMOCHEMICAL	Japan	Chemicals	567.73982	58	2.931026695	-6.298973305
1402	2011	120	SYNGENTA	Switz	Chemicals	1585.13	###	15.46	6.23
1422	2011	286	TEIJIN	Japan	Chemicals	312.54	###	3.68	-5.55
1492	2011	189	TORAYINDUSTRIES	Japan	Chemicals	1068.88	###	6.77	-2.46
1671								9.52	

Appendix 4K

Test of Homogeneity of Variances

Profitability(%)Corrected

Levene Statistic	df1	df2	Sig.
.752	2	1128	.472

Appendix 4L

ANOVA

Profitability(%)Corrected

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	618.907	2	309.454	2.778	.063
Within Groups	125649.317	1128	111.391		
Total	126268.224	1130			

Appendix 4M

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.176[a]	.031	.027	10.42921

a. Predictors: (Constant), LnSales, dummy variable for geographically diversified firms, Dummy variable for APAC firms, Dummy variable for EMEA firms, dummy variable for product diversified firms

Appendix 5: Alternative test for H2

This is an additional test for hypothesis 2, where we consider home- and host-region firms to be one single group, i.e. the single-region group. Thus, we classify the companies in function of the number of region in which they are significantly active in. This leaves us with 3 groups: single-region, bi-regional and global enterprises.

Dependent variable: profits

- ANOVA:

Our ANOVA for this new variable leads us to the following results:

Descriptives

Profits€m

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Single-region	1226	2246.90623	4685.13231	133.806320	1984.39129	2509.42117	-23012.734	65426.6809
Bi-regional	167	3428.58903	5916.38327	457.823483	2524.68169	4332.49638	-5193.9672	39765.0510
Global	261	3158.51689	4840.87745	299.642792	2568.48128	3748.55250	-2382.0000	41868.2750
Total	1654	2510.06912	4865.29540	119.630374	2275.42608	2744.71215	-23012.734	65426.6809

There is no big difference for this test, we still see that bi-regional companies have the most profits, followed by global firms and finally single-region businesses.

Test of Homogeneity of Variances

Profits€m

Levene Statistic	df1	df2	Sig.
5.706	2	1651	.003

The hypothesis of homogeneity of variances is violated (p-value = 0.003 < 0.05)

Robust Tests of Equality of Means

Profits€m

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	5.899	2	432.024	.003

a. Asymptotically F distributed.

The robust test shows that there are statistically significant differences between the means of the three groups (p-value = 0.003 < 0.05).

Dependent Variable: Profits€m

Games-Howell

(I) DegreeOfGeographicalDiversification	(J) DegreeOfGeographicalDiversification	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Single-region	Bi-regional	-1181.683*	476.976386	.037	-2308.1648	-55.200778
	Global	-911.6107*	328.161445	.016	-1683.8273	-139.39398
Bi-regional	Single-region	1181.6828*	476.976386	.037	55.2007783	2308.16482
	Global	270.072141	547.163727	.874	-1018.6536	1558.79786
Global	Single-region	911.61066*	328.161445	.016	139.393977	1683.82734
	Bi-regional	-270.07214	547.163727	.874	-1558.7979	1018.65358

*. The mean difference is significant at the 0.05 level.

Finally, Games-Howell's test indicates that the differences in the means are statistically significant between the groups "single-region" and "global", and between the groups "single-region" and "bi-regional".

- Linear Regression:

Our linear regression confirms these results, using "single-region" firms as a reference point, we can see that the coefficients for "bi-region" and "global" are positive. The coefficient for "bi-region" is slightly superior, confirming what we observed in the ANOVA.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-11772.106	654.766		-17.979	.000
	biregion	915.055	351.133	.057	2.606	.009
	global	874.733	292.212	.066	2.993	.003
	Dummy variable for EMEA firms	-1259.301	254.673	-.120	-4.945	.000
	Dummy variable for APAC firms	-1824.503	254.121	-.171	-7.180	.000
	LnSales	1614.546	70.422	.493	22.927	.000

a. Dependent Variable: Profits€m

Dependent variable: profitability

- ANOVA:

Using this classification of only three groups (single-region, bi-regional, global) allows us to draw different conclusions regarding the profitability in percentage.

Descriptives

Profitability(%)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Single-region	1223	10.8574783	14.4204870	.412350663	10.0484846	11.6664721	-110.52213	100.000000
Bi-regional	165	12.8653631	13.3582168	1.03993577	10.8119740	14.9187522	-105.13724	45.8124473
Global	260	12.2476453	9.31016460	.577391898	11.1106651	13.3846256	-64.683008	38.1143759
Total	1648	11.2778329	13.6462887	.336152196	10.6185022	11.9371637	-110.52213	100.000000

Since we are no longer making the distinction between host- and home-region firms, namely the best and the worst performers in terms of profitability (percentage units), we find this time that bi-regional enterprises are the best performers, followed by global companies and single-region firms. These are the exact same results we found using the dependent variable “profits”.

There is, however, an issue regarding the significance of this test.

We can see that the hypothesis of homogeneity of variance is violated, since its p-value is inferior to 5% (0.000).

Test of Homogeneity of Variances

Profitability(%)

Levene Statistic	df1	df2	Sig.
8.577	2	1645	.000

And since our robust tests of equality of means have a value close to 5% (Brown-Forsythe, 4.8%) or even superior to this threshold (Welch, 5.6%), it indicates that there are no statistically significant differences between the means of our three groups.

Robust Tests of Equality of Means

Profitability(%)

	Statistic[a]	df1	df2	Sig.
Welch	2.905	2	381.338	.056
Brown-Forsythe	3.052	2	457.876	.048

a. Asymptotically F distributed.

Linear Regression:

Our linear regression leads to the same results as our ANOVA, that is a superior profitability for bi-regional firms followed by global companies and single-region enterprises.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.540	2.479		4.252	.000
	biregion	2.108	1.130	.046	1.865	.062
	global	1.936	.937	.052	2.066	.039
	Dummy variable for EMEA firms	-3.937	.824	-.134	-4.780	.000
	Dummy variable for APAC firms	-5.394	.819	-.180	-6.589	.000
	LnSales	.322	.269	.030	1.198	.231

a. Dependent Variable: Profitability(%)

Once again, we cannot attest the validity of this test, since our variables "bi-regional" and "global" have a high p-value (close to or superior to the 5% threshold) which indicates that they are not statistically significant.

Summary of the alternative test for H2

Overall, these two additional tests do not allow us to confirm our second hypothesis. Indeed, global firms are slightly outperformed by bi-regional companies, for both variables (profitability in percentage, and profits in millions of euros).

However, when we stop making a distinction between home- and host-region firms and that we consider them as "single-region" companies, we can clearly observe that geographically diversified institutions are more profitable and earn more profits than geographically concentrated firms. Being active in more than one region seems to have a positive effect on profits and profitability.

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