# THE RELATIONSHIP BETWEEN INNOVATION AND THE FINANCIAL STRUCTURE WITH CONSIDERATION OF THE MODERATING ROLE OF THE GENERATIONAL STAGE OF FAMILY BUSINESSES

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## Abstract

This research aims to empirically test the relationship between the financial structure and innovation in family businesses. The notion of innovation is, indeed, a sustainability factor for family businesses which favors the conceptual incorporation into the capital structure of family businesses. This paves us the way to analyze the relationship by mobilizing the theory of resources. This research also enables us to verify the moderating role of the generational stage in this relationship. The model estimates are based on a sample of panel data collected over the period 2003-2012 for 100 unlisted French Family firms. The main results indicate that all the traditional determinants of the financial structure, except ROA, play an important role in the financing policy of these firms. We can perceive that innovation can affect the choice of financing and can, also, play a significant role in the choice of debt maturity. Moreover, the financial structure of these family businesses slowly but surely converges towards its target level.

## 1. INTRODUCTION

Ever since the result of neutrality obtained by (Modigliani & Miller, 1958), the differences in financial structure between firms have been the subject of an extensive literature. First, this literature explains the choice of the debt ratio which often summarizes the financial structure by an arbitration between the tax advantage of the debt and the increase in the induced costs of bankruptcy (trade-off theory) before putting the emphasis on the existence of information asymmetries between the leaders and the capital contributors (Jensen & Meckling, 1976, 1979; Myers & Majluf, 1984). These asymmetries, however, generate financial constraints due to the agency costs or debt and equity reporting. According to Myers (1984), once the costs are minimized, they create a hierarchy between the different modes of financing ranging from self-financing to safe and, then, risky debts and ending with the issuing of shares (pecking order theory).

The issue of the influence of the organizational form also arouses particular attention in the analysis of the financing behavior, since the family business aggregates characteristics that may be out of line with the paradigms prevailing in conventional firms. Indeed, to understand the conceptual framework of family entities, we need to introduce the notions of family control and family continuity (Casson, 1999).

The criticisms related to the financial structure of the family business are various and are most often related to its determinants and also to its impact on the value of the firm. The abundance of literature about these topics is an emblem of their relevance whether for the scientific community or for all the stakeholders of the company. Despite this huge volume of knowledge, there is little theoretical and even less empirical consensus on these issues between researchers in management sciences. Even though the components of the financial structure have been apprehended in order to explain their financing attitudes (Gallo & Vilaseca, 1996), few studies have apprehended the question according to a comparative logic (López-Gracia & Sánchez-Andújar, 2007). However, the characteristics of family businesses, such as risk aversion (Gallo & Vilaseca, 1996) and the sustainability of activities associated with the desire for transmission and the maintenance of family control (Hirigoyen, 1982; Kenyon-Rouvinez & Ward, 2004), must influence their financial behavior.

This leads to new alternative explanations for the choice of the financing structure of family businesses; here, we mean innovation (Rajan & Zingales, 1995). This research is involved in this context to seek the impact of innovation on the evolution of the financial structure of family businesses.

In the literature interested in the family business, three different and predominant theories examine the mechanisms by which the family influences the financial structure of the family business. The first theory rests on the idea that the goals of the family firm diverge (De Massis

et al., 2015) and that the owner-managers are more likely to use their power and information asymmetry for the family benefits (Breton Miller & Miller, 2006). According to this perspective, the owner-managers act to maximize their own interests and seek to protect their personal interests at the expense of other stakeholders in the company (Miller et al., 2009).

However, the second theory, the Stewardship Theory, suggests that the goals of the family and the business converge and that the owner-managers tend to invest in order to maximize their profits and those of all the stakeholders. Based on this theory, risk aversion is more pronounced within the family entities as well as the fear of the loss of control by the family members seem to urge this type of organization to opt for a hierarchy in its means of financing (Zellweger et al., 2013).

The third theory, the resource-based approach, suggests that family businesses with valuable, scarce, hard to imitate, and non-substitutable resources and skills gain a sustainable competitive advantage (Barney, 1991). Based on the resource-based approach, the family business provides a context that strengthens the financing of innovation (Heck & Trent, 1999; Zahra, 2005). Many researchers state that the family business adopts low innovation funds compared to the non-family businesses (Miller et al., 2009) and is more risk-averse(De Falco & Vollero, 2015).

Hence, the motivations of the family business to adopt a specific financial structure no longer depend only on the agency costs and the problem of information asymmetry, but also on the sustainability factors linked to the maintenance of the family control and the activity sustainability; namely, innovation (Mignon, 2009).

This article presents two contributions in the literature on family businesses. First, to our knowledge, this paper is the first that shows the impact of innovation on the financial structure of the family business, justifies this specific financial structure, and studies the moderating role of the generation transmission in this relationship. The choice of the intergeneration transmission variable as a moderating variable in the relationship between innovation and the capital structure is reinforced by the fact that the results of the previous research that examined the role of the sale generation in determining the level of innovation in the family business are mixed (McConaughy, 2000). Second, what makes this paper distinctive from the others is its use of a sample of unlisted family businesses. Indeed, this type of companies faces a number of financial constraints. They need to be helped in their financing process to ensure their sustainability through a specific model adapted to each context.

This article is organized as follows. Section 2 presents a literature review on innovation and the financial structure of the family business. It also focuses on the effect of innovation on the financial structure of family businesses. Section 3 presents the sample and the variables studied. Section 4 is interested in the methodology. Section 5 presents the results and discussions. Lastly, the paper is concluded in Section 6.

## 2. LITERATURE REVIEW

A few studies have shown interest in the relationship between innovation and financial structure in the family business context (O'Brien, 2003). The previous researches have emphatically highlighted the fact that companies benefit from novelty, dynamism and audacity (Rauch et al., 2009). Throughout the literature, one can perceive that innovation is more likely to lead to low levels of debt. Nevertheless, it is worth being noted that the results, despite their scarcity, that have scrutinized the relationship between innovation and debt are mitigated.

### 2.1. The impact of innovation on the financial structure of family businesses

Some studies conclude that family businesses are conservative and are keen to reduce the risks in order to keep the family ownership. For instance, McConaughy et al. (2001) think that family businesses adopt a less risky capital structure because the managers seem to be more risk-averse and are afraid of losing the business. Similarly, Carney (2005) says that family businesses are inclined towards a cautious resource allocation by avoiding large investments. On the other side of the coin, other authors argue that family businesses emphasize the need to take the risk in order to remain competitive and maintain the continuity of the family business across generations. (Gómez-Mejía et al., 2007) reveal that family businesses are increasingly for risk-taking to maintain the family's socio-emotional wealth. This socio-emotional wealth reflects the non-financial aspects of the family firm especially those that meet the emotional needs of the family members. This means that the owners have a strong will to take the risk so that the control and wealth of the family business remain within the reach of the family (Gómez-Mejía et al., 2007). In addition, Memili et al. (2010) consider the image of the family business and the risk-taking as mediating variables in the relationship between the family ownership and the family expectations on the one hand, and the performance of the business on the other hand. Yet, the results show that risk-taking is positively related to the growth of the family business.

This is to confirm that the family business is increasingly eager to take the risk to ensure its sustainability over time. They also show a positive relationship between family expectations and risk-taking. The authors believe that the family's high expectations urge the leaders to be immersed in high-risk activities that positively impact the firm's performance.

Many other studies try to understand how certain characteristics specific to family businesses favor or oppose innovation.

Indeed, Zahra (2005) could prove that family businesses which involve several generations are more innovative than other companies. Hence, family businesses need to integrate family members from different generations into business to foster innovation which is a

prerequisite for the improvement of corporate performance. Equally important, Bresciani et al. (2013) state that, thanks to their idiosyncratic nature and structure, family businesses are the most likely to innovate.

Thus, the act of financing an innovative project can take a long time before it starts producing. In this context, if a company wishes to exploit increased opportunities, it cannot have the internal resources needed to cover the total cost of such investment because of innovation. However, in a world characterized by information asymmetry, the risks of bankruptcy and agency conflicts, external financing can be very expensive; thus, the investment behavior of the firm can be determined by the availability and cost of financing. Theoretically speaking, the high risk, which is inherent in innovative projects, can increase information frictions between the stakeholders (managers or entrepreneurs) and outsiders (investors or creditors). In this respective, a coherent part of the literature has investigated the relationship between the financial factors and the investment decisions of a firm (Fazzari, Hubbard, & Petersen, 1988).

It has been argued that the financial constraints should influence the R & D investment more severely because of the high degree of uncertainty in the production of innovation. The financial constraints are strongly tied to the innovation activity of the companies. On the one hand, the innovation expenditure can be difficult to finance because of the information asymmetry between the company and the stakeholders as well as the great uncertainty in the success of innovation. It is almost impossible to alleviate the bottleneck of guarantees because innovation often involves intangible assets, such as capable R & D employees, which cannot be given in lateral collaboration. Also, the high capacity for innovation can create large financial needs that are sometimes difficult to meet. (Gallo & Vilaseca, 1996) find that family businesses work with lower levers than their non-family counterpart (Lodh, Nandy, & Chen, 2014) report that the financial constraints of family businesses depend on the degree of the corporate transparency (Andres, 2011) shows that the German family companies, which are the founders of family businesses, do not present specific internal financing compared to their non-family peers which used to finance innovation.

Using a large sample of Spanish companies, (Nieto, Santamaria, & Fernandez, 2015) show that family businesses are less innovative and less inclined to resort to external sources of funding for innovation, such as collaboration and debt, compared to non-family businesses. Finally, family businesses are more likely to achieve incremental innovations than radical innovations. Similarly, Schäfer, Stephan, and Solórzano Mosquera (2015) show that both family and non-family businesses rely on their internal funds to finance innovation but they use less external funds such as bank loans. This means that the costs of external financing are higher for family businesses. Finally, these same authors conclude that family firms rehearse less radical innovations but are generally more efficient in dealing with incremental innovations. This may be the

fruit of a better alignment of the owner-manager interests resulting from the most efficient use of resources (Jensen & Meckling 1976).

In a world dominated by the access to hierarchical order for financing, companies should initially finance innovation through internally generated cash flows and then external funds (first debt and equity). However, the existing empirical results do not provide a clear picture of the situation.

As such, a study of industrial firms in the United Kingdom during the period 1990-2002 (Aghion & Cohen, 2004) gives controversial results. Although firms performing R & D tend to use more debts than firms without R & D activities, the use of debt decreases with the size of the innovation effort. Since some intensive R & D firms tend to issue shares, this signifies that there is a possible non-linear relationship between innovation and debt financing.

Indeed, the problems that affect the financing of innovative firms can be even more serious in the case of smaller and younger companies in which the dominance of the hierarchy of the hierarchical order is perhaps more difficult to verify.

These companies may have fewer internal resources for innovative project financing. They may be more affected than larger companies by information asymmetry because of bad reputation or because of the difficulties faced by foreigners in evaluating their history. In addition, small and young businesses are likely to bear higher costs of bankruptcy because of their lack of material assets that can be given as collateral. In addition, the institutional financial factors can play a crucial role in shaping the path of innovation because of the strong relationship between industry and the banking system; although there is evidence that bank development can affect the company's innovation process and can financially reduce the constraints faced by small firms investing in fixed capital (Benfratello, Schiantarelli, & Sembenelli, 2008). Casillas and Moreno (2010) also show that innovation is positively associated with the growth of the family firm. Similarly, several studies show that there is a positive relationship between innovation and performance (Aktan et al., 2008; Rauch et al., 2009; Lechner & Gudmundsson, 2014; Kellermanns et al., 2012, Soares, Duarte, & Borges, 2018).

## 2.2 Transgenerational: A moderating role in the relationship between innovation and the financial structure

The term Transgenerational refers to the number of generations of the family simultaneously involved in the management of the family firm (Chirico et al., 2011). Kellermanns and Eddleston (2007) suggest that the first generation family businesses are those in which more than a family member of the first generation who founded the firm is involved in the business. The second generation companies are those in which the family members belonging to the second generation are also involved in the ownership and management of the firm. In addition, they consider that the family businesses, in which the family members belonging to the

third generation or more own the property of the firm and are involved in its management, are multi-generation enterprises.

The goal of this paper is to explore the propensity toward inter-organizational cooperation in small- and medium-sized family businesses as compared to non-family businesses and to assess the factors that could influence the establishment of collaborative agreements at the family-business level. We apply transaction governance theories and resource-based views as theoretical perspectives to analyze a sample of 272 Italian family and non-family small- to medium-sized enterprises. Results suggest that family firms are less likely to establish cooperation agreements as compared to non-family firms. Among family firms, cooperation propensity is influenced both by the generation in charge and by the stage of the succession process. Our results contribute to the family business literature, indicating that the inter-organizational strategies of family firms are influenced both by the dynamics of trust formation and by the characteristics of the family-business resource configuration. Moreover, the intergeneration transmission of the family in the company leads to different behaviors within the family business. In other words, the number of generations involved in the enterprise creates a strong heterogeneity of knowledge and experiences of family members (Chirico, Sirmon, Sciascia, & Mazzola, 2011). It is important to note that knowledge and experiences tend to be more different for multi-generation family members than for those from the same generation (Sciascia et al., 2013; Chirico, Sirmon, Sciascia, & Mazzola, 2011). Through intergeneration transmission, the family business can benefit from a variety of individual contributions and perspectives which are deemed as valuable factors for innovative ideas (Kellermans et al., 2008). In the same context, Zahra (2005) also says that intergeneration transmission in the family business has a positive influence on innovation through the new ideas and experiences of younger generations. The participation of several generations in the management of the company promotes the identification and pursuit of entrepreneurial opportunities (Salvato, 2004). Indeed, Cruz and Nordqvist (2012) think that the behaviors in a first-generation family firm heavily depend on the founder (Gersick, Davis, Hampton, & Lansberg, 1997).

At the beginning, the founder faces uncertainties and is ready to take risks but, over time, he becomes conservative in order to keep the company's assets in the hands of the family (Kellermanns & Eddleston, 2006). In addition, the founder of the first-generation family enterprises maintains a major position and this gives him the legitimacy to generate behaviors influenced by his own vision (Gedajlovic et al., 2004).

The founder usually meets difficulties to realize innovative ideas (Salvato, 2004), but the members of the subsequent generations advocate changes and are more likely to develop entrepreneurial behaviors (Casillas et al., 2011). The first-generation family businesses are less

likely to take risks associated with innovative projects than those with multiple generations (Kellermanns & Eddleston, 2006). The first-generation family businesses stick to the status quo because they lay more emphasis on kinship-oriented family values than the next-generation businesses (Pittino & Visintin, 2011). However, if the family businesses seek to sustain their continuity across the generations, they need to set up entrepreneurial activities (Cruz & Nordqvist, 2012) and focus on their growth (Eddleston, Otondo, & Kellermanns, 2008). This underscores the importance of intergeneration transmission to ensure the innovation of the family business that is critical to its survival over time (Sciascia et al., 2013.).

Innovation is a key issue to ensure the continuity and growth of the family business across generations and, as a result, it guarantees employment and income for the new generations (Eddleston et al., 2008). For this reason, the influence of innovation on growth seems to be greater in family businesses of descendant generations than in those of the first generation (Casillas et al., 2010). It should be noted that younger generations are a determining factor of change and that intergeneration transmission in the family business stimulates innovative behaviors (Kellermanns et al., 2008).

More importantly, the previous researches assert that intergeneration transmission has a great influence on the family business's innovation process, its financial structure and its sustainability across generations. In addition, the literature highlights the importance of examining the effect of the moderating variables on the relationship between entrepreneurial orientation and performance (Lumpkin & Dess, 1996; Rauch et al., 2009; Saeed et al., 2014) particularly those stemming from the specificities of the family business (Kellermanns & Eddleston, 2006; Casillas & Moreno, 2010).

The sustainability of the family business can contribute to better performance of the family businesses (Lumpkin et al., 2010). On the other hand, the involvement of younger generations allows the company to be oriented towards the external environment (Casillas et al., 2010). Orientation to the external environment provides a dynamic work environment that promotes creativity and innovation (Cameron & Quinn, 1999; Valencia et al., 2010; Zahra et al., 2004).

In addition, the presence of several generations in the firm generates new knowledge and experiences that foster the development of innovative projects (Kellermanns et al., 2008; Zahra, 2005) focusing on the long-term value creation and growth of the family firm (Casillas & Moreno, 2010). Family members from different generations are interested in encouraging the company to innovate because the profitability of their firm improves their wealth (Zahra, 2005). We can, thus, deduce the following hypothesis:

*H1: Transgenerational has a moderating effect on the relationship between innovation and the financial structure of the family business.*

## 3. DATA AND THE VARIABLE MEASUREMENTS

The sample is made up of 100 unlisted French family companies. The data has been extracted from the financial database "Diane" but the data of the patents and the brands are taken from these two websites (https://www.wipo.int/branddb/fr/#) for the collection of brands and (https://register.epo.org/regviewer?lng=en) for patent collections and patent citations during the period 2003 -2012.

The independent variables derived from the collected information are the total debt (TD) ration (Rajan & Zingales, 1995, Titman & Wessels, 1988) and the dependent variables are related to the measurement of innovation. Table 1 shows the following variables: The latter was measured by determining the generation managing the business. The dummy variable that takes on the value of one if the company is managed by the second or third/later generation, respectively, and zero if it is managed by the first generation. The control variables are fixed assets, growth, size, ROA, and volatility.

According to the definition of (Allouche &Amann, 2008), the family business is the enterprise in which one or more identifiable families collectively possess a share of the capital which is large enough to confer on the family holding unit. Accordingly, the sample of the enterprises is the status of the principal shareholder.

The correlation matrix is given in Table 2 allows us to detect the links between the explanatory variables taken in pairs. The coefficients measuring the correlation between the independent variables relatively have low values. This is translated by an almost complete linear independence which, therefore, discards any correlation problem.

**Table 1.** Variable definitions

| Variables | Definitions |
|---|---|
| *Dependent variables* | |
| Total debt (*TD*), of short (*STD*) and of long term (*LTD*) | The total debt ratios, of short and long term to the total assets |
| *Innovation* | |
| INTANG | The percent ratio of intangible assets to total assets |
| Brand | Number of brands granted between 2003 and 2012 |
| Patent | Number of patents granted between 2003 and 2012 |
| Citation of patent | Number of citations patents granted between 2003 and 2012 |
| Transgeneration transmission | Binary variable equal to 1 if one of the firms is the first generation 2 is the second generation or later. |
| *Company characteristics* | |
| Fixed assets | Fixed assets to total assets |
| Growth | The growth rate neperian logarithm relative to the total assets |
| Size | Neperian logarithm of the total assets |
| ROA | Results before interest and tax to total assets |
| Volatility | Profitability volatility |

**Table 2.** Correlation matrix

|  | *Prof* | *Size* | *Tang* | *cfgo* | *Vol* | *Growth* | *Inn §Patent* | *Inn §citation patent* | *Inn §Brand* |
|---|---|---|---|---|---|---|---|---|---|
| Prof | 1.0000 | | | | | | | | |
| Size | 0.0409 | 1.0000 | | | | | | | |
| Tang | 0.0026 | -0.1990* | 1.0000 | | | | | | |
| Cfgo | 0.0134 | -0.0930* | 0.2373* | 1.0000 | | | | | |
| Vol | -0.0946* | -0.0821* | 0.0011 | -0.0306 | 1.0000 | | | | |
| Growth | -0.1225* | -0.0449 | -0.076* | -0.0057 | -0.0226 | 1.0000 | | | |
| Inn §Patent | -0.0221 | -0.0636* | 0.0585* | 0.0992* | -0.0292 | -0.0345 | 1.0000 | | |
| Inn §citation patent | 0.1328* | -0.1269* | -0.022 | -0.374* | -0.0000 | -0.013 | -0.063* | 1.0000 | |
| Inn §Brand | 0.0631* | -0.0251 | -0.132* | -0.053* | -0.0836* | -0.054* | 0.2207* | 0.3564* | 1.0000 |

Table 3 presents the descriptive statistics. The average debt of French family businesses is 0.47. In addition, this average is divided into long-term debt and short-term debt with average values of 0.272 and 0.181, respectively. Accordingly, the French family businesses rely much more on long-term financing to finance the investments.

The average growth opportunity ratio is -0.037 and this means that the companies in the sample do not really benefit from the growth opportunities. The standard deviation which is 0.312 reflects the disparity of the values around this average. The average size is 15,796 with a standard deviation of 2,983; this indicates that this average has a large deviation in the sample elements. The average profitability is 0.047 and it is a good approximation since the standard deviation is only 0.176.

**Table 3.** The descriptive statistics

| *Variable* | *Obs* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|---|
| DT | 1000 | 0.453 | 0.271 | 0 | 0.999 |
| Dlt | 1000 | 0.272 | 0.162 | 0 | 0.599 |
| Dct | 1000 | 0.181 | 0.108 | 0 | 0.399 |
| ROA | 1000 | 0.047 | 0.176 | -0.930 | 0.953 |
| Size | 1000 | 15.796 | 2.983 | 6.814 | 20.461 |
| Tang | 1000 | 0.432 | 0.280 | 0 | 1.014 |
| CFGO | 1000 | 2.291 | 1.741 | 0 | 4 |
| Vol | 1000 | 1.067 | 2.998 | 0 | 39.231 |
| Growth | 1000 | -0.037 | 0.312 | -0.999 | 5.048 |
| Inn§Patent | 1,000 | 0.885 | 0.408 | 0 | 9 |
| Inn§citation patent | 1,000 | 6.821 | 16.018 | 0 | 118 |
| Inn§Brand | 1,000 | 2.607 | 6.280 | 0 | 35 |
| Inn§INT | 1,000 | 0.0869 | 1.805 | -0.00849 | 3.535 |

## 4. METHODOLOGY

The methodology consists of a dynamic panel regression to test the impact of innovation on debt. The study of innovation is done in four measures. The first is to measure innovation by intangible assets. By adopting this measure, the model to estimate is as follows:

$$DT_{i,t} = \alpha + \beta_1 Prof_{it} + \beta_2 SIZE_{it} + \beta_3 Tang_{it} + \beta_4 Growth_{it} + \beta_5 Vol_{it} + (1 - \delta)DT_{i,t-1} + \beta_6 CFGO_{it} + \vartheta_i + \vartheta_t + \omega_{it} \tag{1}$$

Where (i) designates the French family firms and (t) refers to the period of study.

With, $Yit$ is respectively the total debt ratio (TD), of long term (LTD) and of short term (STD), Prof: profitability; Size: the size of the business; Tang: the tangible asset; Growth: the growth rate; Vol: earning volatility; CFGO: the variable of interaction between growth and the cash flow.

The second measure of innovation focuses on the number of brands

$$DT_{i,t} = \alpha + \beta_1 Prof_{it} + \beta_2 size_{it} + \beta_3 Tang_{it} + \beta_4 Growth_{it} + \beta_5 Vol_{it} + (1 - \delta)DT_{i,t-1} + \beta_6 CFGO_{it} + \beta_7 Inn\S marque + \vartheta_i + \vartheta_t + \omega_{it} \tag{2}$$

The third measure of innovation is the number of patents and the fourth is the number of patent citations:

$$DT_{i,t} = \alpha + \beta_1 Prof_{it} + \beta_2 size_{it} + \beta_3 Tang_{it} + \beta_4 Growth_{it} + \beta_5 Vol_{it} + (1 - \delta)DT_{i,t-1} + \beta_6 CFGO_{it} + \beta_7 Inn\S brevet + \vartheta_i + \vartheta_t + \omega_{it} \tag{3}$$

Then,

$$DT_{i,t} = \alpha + \beta_1 Prof_{it} + \beta_2 Size_{it} + \beta_3 Tang_{it} + \beta_4 Growth_{it} + \beta_5 Vol_{it} + (1 - \delta)TD_{i,t-1} + \beta_6 CF_{it} + \beta_7 Inn\S patentcitation + \vartheta_i + \vartheta_t + \omega_{it} \tag{4}$$

The effect of time is taken into account by introducing the annual time indicators ($\vartheta_t$) which incorporate the specific effect of the years (2003-2012). The fixed individual effect for family businesses is represented by the term ($\vartheta_i$). Finally, the error term, which is independent and identically distributed (i.i.d), is designated by the term ($\omega_{it}$).

By facing the problems of endogeneity in the estimation equation related to the causality of the independent variables towards the endogenous variable (debt), the classical econometric methods, such as (MCO, fixed effect and quasi-generalized least squares) ) do not allow us to reach relevant estimates. So, to solve this problem, we will use the GMM-SYS method (Arellano & Bover, 1995). This method can provide solutions to the problems of simultaneity bias, inverse causality (especially between debt and the sustainability factors) and any omitted variables. In addition, it controls the specific, individual and temporal effects.

## 5. RESULTS

### 5.1. The effect of innovation on the financial structure of family businesses

The results obtained in Table 4 show that the innovation variables are significant and robust. In addition, the lagged and leveled variables that are used as instruments are valid and the second order autocorrelation test (Arellano & Bover, 1995) does not reject the hypothesis of the absence of a second-order autocorrelation. (P-value AR(2)= between 0.897 and 0.892).

In general, innovation plays a decisive role in ensuring the sustainability of the family business across generations (Chirico & Nordqvist, 2010; Rogoff & Heck 2003; Marchisio, Mazzola, Sciascia, Miles, & Astrachan, 2010). Indeed, our study aims to examine the effect of each innovation measure on the financial structure of the family business and to study the moderating role of the inter-generation transmission in each of these relationships. First, the results of our study indicate that the four measures of innovation do not affect the financial structure of the family business in the same way. This confirms that the measure of innovation is multidimensional. Secondly, we find that the first measure of innovation by intangible assets is positively related to the total debt of the family business, which supports hypothesis 1. This confirms the findings of (Frank & Goyal, 2009; Titman & Wessels, 1988) which show that innovation has a positive influence on the use of debt. In addition, the results support the fact that the family business focuses on innovation to ensure its long-term survival (Cassia, De Massis, & Pizzurno, 2012; Gundry, Ofstein, & Kickul, 2014). They enhance the idea that this variable should be considered as a proxy for the hierarchical order mechanism rather than an indicator of the bankruptcy risk of a company.

It is wise to think that a company that has succeeded in innovating would have generated internal resources to finance the future of its activities. But if the internal product flow is insufficient, when the size of the project's investment increases, the external financing will be necessary.

What is more, the results of our study show a positive relationship between innovation and the use of debt which confirms hypothesis 1. It should be emphasized that family businesses tend to increase the number of patents in order to protect the reputation of the family (Zellweger et al., 2012) and to ensure sustainability (Lumpkin et al., 2010; Casillas & Moreno, 2010). The results of our study, thus, reinforce the idea that the French family firms finance their patent submission with external financing. Indeed, the patents are essential elements in the development of activity. This is the sign that will differentiate its offer from those of its competitors. As a result, the family firms face significant

financial risks as a result of the investments needed to develop and launch new products (Michon et al., 2010). This is why these investments are financed by their internal cash flow to avoid the costs of distress and, then, debt in order to avoid the dilution of control.

Moreover, according to the results obtained for the other two measures of innovation, we find a positive result but not significant.

Concerning the determinant variables, the results obtained in Table 5 show that the variables fixed assets and growth are significantly and negatively related to debt. Indeed, the fixed assets can be liquidated if the firm is unable to repay all of its borrowings and, thus, the losses incurred by creditors will be reduced (Williamson, 1988; Shleifer & Vishny, 1992). Similarly, the firms with high growth opportunities exhaust their self-financing capacity and prefer debt to raise funds (Bessler et al., 2011).

**Table 4.** The effect of innovation on the financial structure of family businesses

| Variables | (1) TDebt | (2) LTDebt | (3) STDebt | (4) TDebt | (5) LTDebt | (6) STDebt | (7) TDebt | (8) LTDebt | (10) STDebt | (12) TDebt | (13) LTDebt | (14) STDebt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Convergence of debt | | | | | | |
| DT = L | 0.714*** | | | 0.716*** | | | 0.722*** | | | 0.718*** | | |
| DLT = L | | 0.714*** | | | 0.716*** | | | 0.722*** | | | 0.718*** | |
| DCT = L | | | 0.714*** | | | 0.716*** | | | 0.722*** | | | 0.718*** |
| | | | | | | Firm characteristics | | | | | | |
| Prof | -0.0231 | -0.0139 | -0.00925 | -0.0247 | -0.0148 | -0.00989 | -0.0251 | -0.0151 | -0.0101 | -0.0255 | -0.0153 | -0.0102 |
| Size | 0.011*** | 0.00658*** | 0.00439*** | 0.0120*** | 0.00718*** | 0.00478*** | 0.0108*** | 0.00650*** | 0.00434*** | 0.0109*** | 0.00655*** | 0.00437*** |
| Tang | -0.112*** | -0.0673*** | -0.0448*** | -0.105*** | -0.0632*** | -0.0421*** | -0.110*** | -0.0663*** | -0.0442*** | -0.110*** | -0.0662*** | -0.0441*** |
| CF | -0.029*** | -0.0137*** | -0.00914*** | -0.0224*** | -0.0134*** | -0.00894*** | -0.021*** | -0.0127*** | -0.00846*** | -0.022*** | -0.0132*** | -0.0879*** |
| Volatility | 0.0091** | 0.000546** | 0.000364** | 0.00092** | 0.000595** | 0.000397** | 0.000795* | 0.000477* | 0.000318* | 0.000854* | 0.000513* | 0.000342* |
| Growth | -0.035*** | -0.0207*** | -0.0138*** | -0.0353*** | -0.0212*** | -0.0141*** | -0.035*** | -0.0212*** | -0.0141*** | -0.035*** | -0.0212*** | -0.0141*** |
| | | | | | | Innovation measure | | | | | | |
| Inn§INT | 0.038*** | 0.0185*** | 0.0123*** | | | | | | | | | |
| | (0.0102) | (0.00613) | (0.00409) | | | | | | | | | |
| Inn§Brand | | | | 0.000340 | 0.000204 | 0.000136 | | | | | | |
| | | | | (0.000668) | (0.000401) | (0.000267) | | | | | | |
| Inn§Patent | | | | | | | 0.0037*** | 0.00226*** | 0.00151*** | | | |
| | | | | | | | (0.00137) | (0.000825) | (0.000550) | | | |
| Inn§citation patent | | | | | | | | | | 0.000222 | 0.000133 | 8.89e-05 |
| | | | | | | | | | | (0.000139) | (8.32e-05) | (5.54e-05) |
| Constant | 0.0576 | 0.0346 | 0.0231 | 0.0347 | 0.0208 | 0.0139 | 0.0505 | 0.0303 | 0.0202 | 0.0453 | 0.0272 | 0.0181 |
| | (0.0380) | (0.0228) | (0.0152) | (0.0424) | (0.0254) | (0.0170) | (0.0385) | (0.0231) | (0.0154) | (0.0405) | (0.0243) | (0.0162) |
| Observations | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 |
| Number of firms | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Sargan | 44.386 | 42.386 | 43.021 | 44.048 | 43.354 | 44.386 | 43.625 | 44.386 | 45.235 | 45.587 | 45.021 | 44.987 |
| p-value sargan | 0.3714 | 0.27 | 0.2514 | 0.3849 | 0.3368 | 0.3714 | 0.3604 | 0.354 | 0.3874 | 0.250 | 0.3987 | 0.3254 |
| Ar1 | -4.759 | -4.009 | -4.524 | -4.874 | -4.254 | -4.759 | -4.778 | -4.825 | -4.542 | -4.639 | -4.875 | -4.021 |
| Ar2 | -0.1351 | -0.1001 | -0.187 | -0.153 | -0.136 | -0.1351 | -0.129 | -0.1351 | -0.1874 | -0.206 | -0.1875 | -0.1987 |
| P-value AR(2) | 0.8925 | 0.8005 | 0.875 | 0.878 | 0.882 | 0.858 | 0.897 | 0.887 | 0.8925 | 0.836 | 0.8925 | 0.8925 |
| Test de Wald(v$_t$) | 22.94 | 22.94 | 22.94 | 23.90 | 23.90 | 23.90 | 23.25 | 22.58 | 22.25 | 21.33 | 21.62 | 21.58 |
| P-value | 0.0034 | 0.0034 | 0.0034 | 0.0024 | 0.0024 | 0.0024 | 0.0024 | 0.0052 | 0.0087 | 0.0065 | 0.0025 | 0.0027 |

Note : *** Significance at the error level of 1%; ** Significance at the error level of 5%; *Significance at the error level of 10%, The values between parentheses are the standard deviations AR(1) and AR(2) respectively represent the tests of absence of a serial autocorrelation of the 1st and 2nd order residues, where the null hypothesis is the absence of autocorrelation of the residues. The Sargan test is the test of over-identification restrictions. Notes: TDebt, LTDebt and STDebt are, respectively, the total, long- and short-term debt ratios; Brand number of brands granted between 2003 and 2012,Patentnumber of patents granted between 2003 and 2012, Citation of patent number of citations patents granted between 2003 and 2012,Transgeneration transmission Binary variable equal to 1 if one of the firms is first generation 2 is second generation or later., fixed assets = fixed assets/total asset, growth = log ((total asset$_s$-total asse$_{t-1}$)/total asset$_s$), size = log (total asset), ROA = Net income/total

assets, volatility $= EVol_{i,t} = \left| \frac{(ROA_{i,t} - ROA_{i,t-1})}{ROA_{i,t-1}} - \frac{1}{T}\sum_{t=1}^{T} \frac{(ROA_{i,t} - ROA_{i,t-1})}{ROA_{i,t-1}} \right|$

**Table 5.** The effect of innovation on the financial structure of family businesses (robustness)

| Variables | (1) Model 1 | (2) Model 2 | (3) Model 3 | (4) Model 4 | (5) Model 5 | (6) Model 6 | (7) Model 7 | (8) Model 8 | (9) Model 9 | (10) Model 10 | (11) Model 11 | (12) Model 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *The lagged debt ratio* | | | | | | |
| DT = L | 0.712*** | | | 0.711*** | | | 0.722*** | | | 0.719*** | | |
| | (0.0235) | | | (0.0242) | | | (0.0228) | | | (0.0231) | | |
| DLT = L | | 0.712*** | | | 0.711*** | | | 0.722*** | | | 0.719*** | |
| | | (0.0235) | | | (0.0242) | | | (0.0228) | | | (0.0231) | |
| DCT = L | | | 0.712*** | | | 0.711*** | | | 0.722*** | | | 0.719*** |
| | | | (0.0235) | | | (0.0242) | | | (0.0228) | | | (0.0231) |
| | | | | | | *Firm characteristics* | | | | | | |
| Prof | -0.0221 | -0.0132 | -0.00883 | -0.0225 | -0.0135 | -0.00899 | -0.0264 | -0.0158 | -0.0106 | -0.0282 | -0.0169 | -0.0113 |
| | (0.0217) | (0.0130) | (0.00867) | (0.0217) | (0.0130) | (0.00867) | (0.0222) | (0.0133) | (0.00887) | (0.0219) | (0.0132) | (0.00877) |
| Size | 0.0111*** | 0.00667*** | 0.00445*** | 0.0124*** | 0.00741*** | 0.00494*** | 0.0108*** | 0.00646*** | 0.00430*** | 0.0109*** | 0.00655*** | 0.00436*** |
| | (0.00208) | (0.00125) | (0.000834) | (0.00198) | (0.00119) | (0.000791) | (0.00204) | (0.00122) | (0.000815) | (0.00201) | (0.00121) | (0.000806) |
| Tang | -0.111*** | -0.0668*** | -0.0445*** | -0.104*** | -0.0624*** | -0.0416*** | -0.110*** | -0.0658*** | -0.0439*** | -0.112*** | -0.0670*** | -0.0447*** |
| | (0.0334) | (0.0201) | (0.0134) | (0.0329) | (0.0197) | (0.0132) | (0.0331) | (0.0199) | (0.0132) | (0.0329) | (0.0198) | (0.0132) |
| Cfgo | -0.0248*** | -0.0149*** | -0.0093*** | -0.0203*** | -0.0122*** | -0.00813*** | -0.0221*** | -0.0132*** | -0.00882*** | -0.0229*** | -0.0137*** | -0.00916*** |
| | (0.00540) | (0.00324) | (0.00216) | (0.00429) | (0.00257) | (0.00172) | (0.00443) | (0.00266) | (0.00177) | (0.00438) | (0.00263) | (0.00175) |
| Volatility | 0.000823* | 0.000494* | 0.000329* | 0.00111*** | 0.000667*** | 0.000445*** | 0.000799* | 0.000479* | 0.000319* | 0.000795* | 0.000477* | 0.000318* |
| | (0.000431) | (0.000259) | (0.000172) | (0.000420) | (0.000252) | (0.000168) | (0.000434) | (0.000260) | (0.000174) | (0.000439) | (0.000264) | (0.000176) |
| Growth | -0.0346*** | -0.0208*** | -0.0138*** | -0.0357*** | -0.0214*** | -0.0143*** | -0.0357*** | -0.0214*** | -0.0143*** | -0.0361*** | -0.0216*** | -0.0144*** |
| | (0.00846) | (0.00507) | (0.00338) | (0.00842) | (0.00505) | (0.00337) | (0.00817) | (0.00490) | (0.00327) | (0.00819) | (0.00491) | (0.00328) |
| | | | | | | *Innovation measure* | | | | | | |
| Inn§INT #trans(dt) | -0.0260 | -0.0156 | -0.0104 | | | | | | | | | |
| | (0.0617) | (0.0370) | (0.0247) | | | | | | | | | |
| Inn§INT #trans(dIT) | 0.0602 | 0.0361 | 0.0241 | | | | | | | | | |
| | (0.0657) | (0.0394) | (0.0263) | | | | | | | | | |
| Inn§INT #trans(dct) | 0.0602 | 0.0361 | 0.0241 | | | | | | | | | |
| | (0.0657) | (0.0394) | (0.0263) | | | | | | | | | |
| Inn§brand #trans(dt) | | | | -0.00121** | -0.000724** | -0.000483** | | | | | | |
| | | | | (0.000515) | (0.000309) | (0.000206) | | | | | | |
| Inn§brand #trans(dlt) | | | | 0.00303*** | 0.00182*** | 0.00121*** | | | | | | |
| | | | | (0.000933) | (0.000560) | (0.000373) | | | | | | |

| Variables | (1) Model 1 | (2) Model 2 | (3) Model 3 | (4) Model 4 | (5) Model 5 | (6) Model 6 | (7) Model 7 | (8) Model 8 | (9) Model 9 | (10) Model 10 | (11) Model 11 | (12) Model 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inn§brand #trans(dct) | | | | -0.0076* | -0.00103** | -0.00547** | | | | | | |
| | | | | (0.000933) | (0.000560) | (0.000373) | | | | | | |
| Inn§patent #trans(dt)) | | | | | | | 0.00603** | 0.00362** | 0.00241** | | | |
| | | | | | | | (0.00235) | (0.00141) | (0.000940) | | | |
| Inn§patent #trans(dlt) | | | | | | | -0.00362 | -0.00217 | -0.00145 | | | |
| | | | | | | | (0.00305) | (0.00183) | (0.00122) | | | |
| Inn§patent #trans(dct) | | | | | | | -0.00362 | -0.00217 | -0.00145 | | | |
| | | | | | | | (0.00305) | (0.00183) | (0.00122) | | | |
| Inn§citation-patent#trans (dt) | | | | | | | | | | 0.00685*** | 0.00411*** | 0.00274*** |
| | | | | | | | | | | (0.000259) | (0.000156) | (0.000104) |
| Inn§citation-patent #trans(dlt) | | | | | | | | | | -0.000560* | -0.000336* | -0.000224* |
| | | | | | | | | | | (0.000316) | (0.000190) | (0.000126) |
| Inn§patent-citation #trans(dct) | | | | | | | | | | -0.000560* | -0.000336* | -0.000224* |
| | | | | | | | | | | (0.000316) | (0.000190) | (0.000126) |
| Constant | 0.0597 | 0.0358 | 0.0239 | 0.0239 | 0.0143 | 0.00955 | 0.0444 | 0.0266 | 0.0177 | 0.0571 | 0.0343 | 0.0228 |
| | (0.0385) | (0.0231) | (0.0154) | (0.0405) | (0.0243) | (0.0162) | (0.0393) | (0.0236) | (0.0157) | (0.0382) | (0.0229) | (0.0153) |
| Observations | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 |
| Number of firms | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Sargan | 45.374 | 44.386 | 43.88 | 44.048 | 43.874 | 45.36 | 43.625 | 45.385 | 44.386 | 45. 754 | 44.875 | 42.36 |
| p-value sargan | 0.3854 | 0.3714 | 0.381 | 0.3749 | 0.385 | 0.34 | 0.3604 | 0.458 | 0.3714 | 0.20 | 0.3854 | 0.311 |
| Ar1 | -4.574 | -4.759 | -4.754 | -4.674 | -4.897 | -4. 92 | -4.778 | -4.985 | -4.759 | -4.69 | -4.529 | -4.59 |
| P-value AR(1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Ar2 | -0.158 | -0.1351 | -0.147 | -0.253 | -0.137 | -0.11 | -0.129 | -0.1965 | -0.1351 | -0.286 | -0.1871 | -0.190 |
| P-value AR(2) | 0.8585 | 0.8925 | 0.875 | 0.588 | 0.8985 | 0.85 | 0.897 | 0.8875 | 0.8925 | 0.896 | 0.8875 | 0.888 |
| Test de Wald($v_t$) | 24.44 | 22.94 | 21.68 | 23.874 | 22.025 | 22. 48 | 24.48 | 22.875 | 22.94 | 22.784 | 22.584 | 22.63 |
| P-value | 0.0084 | 0.0034 | 0.0041 | 0.00254 | 0.00564 | 0.0044 | 0.0019 | 0.0054 | 0.0034 | 0.00287 | 0.00254 | 0.0043 |

Notes: Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Also, the size of the company can reduce the problems of information asymmetry and, therefore, favors the use of debt (Rajan & Zingales, 1995; Fama & French, 2002). However, the variable ROA is negatively related to debt. This result shows that the most profitable family business takes on less debt (Harris & Raviv, 1991; Rajan & Zingales, 1995; and Frank & Goyal; 2009). Moreover, the variable Volatility did not yield a significant result.

In addition, a risk of potential default related to high-income volatility encourages risky managers to avoid excessive debt levels (Mazur, 2007).

Regarding the role of the lagged debt variable, it is traditionally considered, according to the Trade-Off theory, as the convergence rate towards the debt target ratio. In general, the adjustment costs remain high for the family firms although this regression tends to decrease slightly (from 0.71 to 0.722).

Nevertheless, a positive relationship between a company debt ratio and its delay clearly shows that the family firms slowly converge towards their target ratios. This result is consistent with the basic assumption of the Trade-Off theory.

## 5.2. The effect of innovation on the financial structure of family businesses: The generational stage.

The results of the moderating effect of the transmission variable on the relationship between each innovation measure and the financial structure of the family business, related to the first measure, are given in the table and indicate that only two interaction effects are significant; namely, the measure of innovation by the number of brands and the number of patent citation. Our study shows that the innovation measured by the number of brands has a more negative effect on debt in family businesses of second generation or more than in those of the first generation. This confirms hypothesis.

Thus, we can deduce, in the first generation, that family businesses tend to be less risk-averse and avoid embarking on projects that improve their performance for fear of losing the family control of the firm (Gomez-Mejia et al., 2007) and in order to protect the reputation of the firm (Lumpkin et al., 2010). This confirms the assumption that the financing choices are strongly affected by the founder (Gersick, Davis, Hampton, & Lansberg, 1997; Gedajlovic et al., 2004; Miller et al., 2009) and this increases the level of financing devoted to innovation. However, the second-generation family businesses or more show a higher level of risk-taking (Zellweger & Sieger, 2012) which does not promote creativity and the use of innovation within the firm (Burgelman, 1983; Lumpkin & Dess, 1996; Lee & Peterson, 2000). This authenticates the obtained result which asserts that the involvement of ascending generations helps to

intensify the positive relationship between innovation and the financial structure. In addition, this work confirms that innovation measured by the patent citation numbers has a negative effect on debt in second-generation and first-generation firms.

The number of patent citations is a measure of the economic and technological situation (Hall, Jaffe, & Trajtenberg, 2005; Lanjouw & Schankerman, 2004; Harhoff, Scherer, & Vopel, 2003), but is also a measure of the radicality of innovations (Dahlin et al., 2005). Our results contribute to the literature of prudential innovation strategies (Bloch, Kachaner, & Mignon, 2012; Mahmoud-Jouini, Bloch, & Mignon, 2010). Actually, the first-generation and second-generation family businesses or more with lower levels of risk-taking (Zellweger et al., 2012) prefer incremental innovation to radical innovation. This reinforces the result which confirms that the involvement of ascending and descending generations helps to ease the relationship between innovation measured by patent citation numbers and debt.

Confirming predictions shared by the trade-off and pecking order models, more profitable firms and firms with fewer investments have higher dividend payouts. Confirming the pecking order model but contradicting the trade-off model, more profitable firms are less levered. Firms with more investments have less market leverage, which is consistent with the trade-off model and a complex pecking order model. Firms with more investments have lower long-term dividend payouts, but dividends do not vary to accommodate short-term variation in investment. As the pecking order model predicts, short-term variation in investment and earnings is mostly absorbed by debt. The traditional determinants show consistent results. The growth opportunities are negatively and significantly related to debt (Soares, Duarte, & Borges 2018). This result is in line with Jensen's (1976) predictions which state that family businesses finance their growth through self-financing. Similarly, size is positively and significantly related to debt. This relationship has been confirmed, in terms of information asymmetry, by (Fama & French, 2002; Rajan & Zingales, 1995) who explain that size can reduce the problem of information asymmetry. On the other hand, profitability is negatively and not significantly related to debt.

## 6. CONCLUSION

This research aims to scrutinize the effect of each innovation measure (intangible asset, patent numbers, brand numbers and patent citation numbers) on the financial structure of the family business and to study the moderating role of the generation involvement in each of these relationships. Although the relationship between innovation and financial structure has attracted the attention of many researchers (Saeed et al., 2014), the study of this relationship in the family

business still requires more research (Hoy, 2006) because it represents a particular context for examining this relationship (Nordqvist, 2008).

It is within this context that we have conducted a survey of 100 unlisted French family companies to test the hypotheses formulated on the relationship between each innovation measure and the financial structure of the family business. Our results show that innovation measured by the brand numbers is positively related to the debt of the family business. They also indicate a negative relationship between the measured innovation and the debt of the family firm.

In addition, through our research, we can confirm that the involvement plays a moderating role in the relationship between risk taking and the family business performance and in the relationship between autonomy and the performance of the family business.

This research comprises several contributions regarding the relationship between innovation and debt. First, by taking into account the independence of the four measures of innovation, we can better understand how these measures do not influence other variables in the same way (Covin & Wales, 2012).

Second, the integration of the generation involvement as a moderating variable in each of the relationships between the four measures of innovation and the debt of the family firm contributes to the literature in terms of innovation. Indeed, the choice of this variable is reinforced by the fact that several authors recommend taking into account family-related factors to examine the relationship between innovation and debt in the context of the family business. (Kellermanns & Eddleston, 2006; Lumpkin & Dess, 1996). The results confirm that the generation involvement exerts a moderating effect on the relationship between innovation and the debt of the family firm. Third, this research sheds light on the fact that family businesses are not homogenous. In other words, the results show that first-generation and second-generation family businesses have different levels of innovation. They also confirm that the presence of descending generations in the company changes the effect of innovation on the financing choice of the family business. Unfortunately, this work has some limitations. The most important is the size of the sample. It would be interesting to test our conceptual model on a larger sample to be able to use the methods of the structural equations to study the cause-and-effect relationships between the different variables simultaneously.

Many variables of capital structure do not show significant results for both innovation, which can be a sign of a relation in the opposite direction. To explore this, further research is needed. This article does not only have implications for the scientific knowledge base but also for policy-makers and managers. With help of this article, managers can optimize their debt by looking at the current arrangement of its innovation. Policy-makers will now have more knowledge on how different industries behave and can align policies to help and support firms in their decision making.

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