



The financing of farms: common features and specificities with SMEs

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The Financing of Farms: Common Features and Specificities with SMEs

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Date: 15 June 2020

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**Master 2
Advances in Finance and Accounting
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Research Dissertation

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ABSTRACT

The purpose of this study is to investigate the similarities and differences between the financing of farms and SMEs. Previous studies have analysed these categories of firms independently by explaining their capital structure, the determinants of their capital structure, and their financing choices, but no concrete study about making a comparative analysis between the two have been done. This study intends to fill this gap by making a comparative analysis between the two by providing a broad literature review on the theories and capital structure determinants that have been used to study farms and SMEs. Subsequently, some empirical analyses are made to investigate these determinants based on theories.

The study uses a dataset of 1, 675 observations from 2016 to 2018 that are obtained from a collaboration with Crédit Agricole. The empirical methods are based on the Analysis of Variance(ANOVA) and the partial adjustment model.

The ANOVA results demonstrate a significant difference between the level of indebtedness of farms and SMEs. However, the results show a similar debt level for some categories of farms and SMEs. The regression results reveal that both farms and SMEs adjust to their target debt level, but with a different speed of adjustment. Furthermore, the results demonstrate that profitability, size, and asset tangibility are positively correlated with the indebtedness of SMEs, but insignificant for farms.

KEYWORDS: Farm Finance, Farm Business, SMEs, Bank Loans, Trade-Off Theory, Pecking-Order Theory, Signalling Theory

RÉSUMÉ

L'objet de cette étude est d'examiner les similitudes et les différences entre le financement des fermes et des PME. Des études précédentes ont analysé ces catégories d'entreprises de manière indépendante en expliquant leur structure du capital, les déterminants de leur structure du capital et leurs choix de financement. Cependant, aucune étude spécifique n'a été réalisée sur la réalisation d'une analyse comparative entre les deux. Cette étude entend combler cette lacune en proposant une vaste revue de la littérature sur les théories et les déterminants de la structure du capital qui ont été utilisés pour étudier les fermes et les PME. Par la suite, sont effectuées certaines analyses empiriques pour étudier, sur la base des théories, ces déterminants.

L'étude utilise un ensemble de données de 1675 observations, provenant du Crédit Agricole, de 2016 à 2018. Les méthodes empiriques sont basées sur l'analyse de variance (ANOVA) et le modèle d'ajustement partiel.

Les résultats de l'ANOVA montrent une différence significative entre le niveau d'endettement des fermes et des PME. Cependant, les résultats montrent un niveau d'endettement similaire pour certaines catégories de fermes et de PME. Les résultats de la régression révèlent que les exploitations agricoles et les PME s'adaptent à leur niveau d'endettement cible, mais avec une vitesse d'ajustement différente. De plus, les résultats démontrent que la rentabilité, la taille et la tangibilité des actifs sont positivement corrélées avec l'endettement des PME, mais insignifiantes pour les exploitations agricoles.

MOTS CLÉS: Financement Agricole, Exploitations Agricoles, PME, Endettement, Théorie du Trade-Off, Théorie du Pecking Order, Théorie du Signal

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Introduction

Background of Study

Both the agricultural economics and corporate finance literature have focused independently on explaining the capital structure choice, its determinants, and financing decisions of farms and other Small and Medium-Sized Enterprises (SMEs) separately using well-established theories such as trade-off theories and pecking order theory. However, much attention has not been given to make a comparative study between the financing behaviours of farms and SMEs. Contrary to most corporate firms (SMEs in our case) with a separation between ownership and management in general, farms have no separation between ownership and management because farm businesses, in general, are managed by family members which has made their decision-making constituent smaller compared to SMEs. Subsequently, farms are often dependent on government subsidies to stabilize their incomes (Zhengfei & Lansink, 2006) which is not always the case for SMEs. This characteristic of farm businesses may lead to different approaches when dealing with capital structure decision making (Tamirat et al., 2017). Additionally, the funding of SMEs, particularly farms, has been an indispensable topic in both the literature of entrepreneurship and agricultural economics. Several studies (Tamirat et al., 2018; Serrasqueiro et al., 2016; Daniel et al., 2018; Akudugu, 2016, Briozzo et al., 2016; Cheng & Katchova, 2018) have discussed the contemporary issues about capital structure, its determinants, and the impacts of capital structure decisions on both SMEs and farms.

Several distinguishing factors exist between farms and SMEs such as their legal forms (*i.e.* farms, in general, have no legal entity). Nonetheless, this can also be considered as a similarity between the two if the SME is owned and managed by one person. This implies that in a case of financial default on debts, farm owners and the sole proprietor owners of SMEs are solely liable to this financial misfortune whereas SMEs with multiple owners can be considered as legal entities and in a case of default, only the firm is sued. Furthermore, the issue of legal entity also applies to French farms and farms in developed countries. Additionally, farm businesses are known to have a limited access to the equity market (*i.e.* it is almost impossible for farm businesses to sell shares) (Cheng & Katchova, 2018) this is mainly due to the fact that farms are mostly sole proprietorship in nature or family-owned. Therefore, the issue of new equity is an aspect of financing where farmers are still lagging. Another factor is that the seasonal nature of farm businesses has resulted in discrepancies between cash inflow and outflow.

There are some similarities between farm business and other corporate firms (SMEs). For instance, SMEs are less indebted since they tend to be financially constrained by creditors. They

are more volatile and vulnerable to bankruptcy. Therefore, they depend more on internal funds and short-term debt (Lopez-Gracia & Sogorb-Mira, 2008). These aforementioned characteristics of SMEs are also applicable to the farm business yet factors such as business life cycle, the association of family members, government subsidy, and liability status and legal form make farm business distinct from other corporate firms (Ahrendsen et al., 1994). These differences can in effect lead to a different decision-making pattern associated with capital structure and different performance of the capital structure choice (Zhengfei & Lansink, 2006, p. 644).

Another important factor to be considered is information asymmetry. Both the literature on agricultural economics and entrepreneurship have shown that information asymmetry problems exist for both farms and SMEs in different nature depending on what fracture we want to investigate. For instance, when using the theory of information to compare and contrast between farms and SMEs, one can argue that farms have lesser information asymmetry because of its ownership structure but when it comes to external financing, one can assume that SMEs have lesser information asymmetry problems compared to farms because farmers can independently decide to manipulate their financial statements which makes it difficult for banks to effectively assess the financial state and performance of farms before giving out loans whereas SMEs have shareholders and stakeholders and their financial statements are often liable to a third party (auditing for example) which increases the credibility of their financial statements, therefore, banks may face lesser information asymmetry problems with SMEs compared to farms. However, this difference may not apply to all farms depending on countries. For example, most farms in France have accountants and this might eliminate the issue of credibility with their financial statements and depending on the size or ownership structure of SMEs, they can also share this characteristic in terms of information asymmetry when external financing is needed. In summary, SMEs seem to have equal information asymmetry problems with farms depending on their ownership structure and size.

Another difference between farm businesses and SMEs is farm businesses (*i.e.* if we consider farm businesses as having the same elements such as “ownership structure” with family businesses) tend to be more conservative and obtain less external finance even if this means losing an opportunity for growth. Blanco-Mazagatos et al. (2007) argue that family businesses tend to do this to avoid dilution of family control. Finally, Calvo (2017), found empirical evidences that show the leverage ratio of family businesses (which can be considered as farms or having the same elements as farm businesses) being different from that of non-family

businesses (i.e. family firms are more indebted than non-family ones) arguing that family businesses have lower transaction costs, which leads to a strong preference of debt compared to equity financing for a family business.

Problem Statement

The significance of the agricultural sector in the economic development of a nation has been widely discussed in an enormous amount of study, however, the lack of access to financial services such as bank loans has an adverse impact on farming activities and performance (Miller et al., 2010; Salami et al., 2011; World Bank, 2013). According to the study of Salami et al. (2011), agricultural loans from commercial banks have been issued at a low level compared to loans provided to trade, manufacturing, and other service sectors. The empirical evidence of Blancard et al. (2006) demonstrate that financially unconstrained farmers are larger, perform better, and tend to take advantage of a “virtuous circle” where access to financial markets allows better fruitful choices. Therefore, comparing farm businesses to other SMEs will contribute to a better understanding of why these different financial constraints exist for farm businesses. Furthermore, this comparison can be used to analyse whether farm businesses can be explained by the financing patterns of SMEs.

Farm capital structure can simply be defined as the way in which a farm business finances its investment through some mixture of debt and equity (Tamirat et al., 2018) while agricultural finance means studying and analysing the financial side of a farm business. This financial side of farm financing encompasses the ownership structure (Zhengfei & Lansink, 2006), asset tangibility, wealth, risk attitude, economies of scale, adjustment costs (Barry et al., 2000), farm risk management strategies (Featherstone et al., 2005), optimal capital structure choice (Schorr & Lips, 2019), earnings volatility and growth opportunity (Tamirat et al., 2018). In addition to this, several studies have analysed the applicability of different capital structure theories to farm businesses (see Feng & Myers, 2014; Cheng & Katchova, 2018; Enjolras & Sanfilippo, 2018; Brewer & Featherstone, 2017).

All these previously mentioned studies have considered farm finance in several contexts, but to the best of the researcher's knowledge, no concrete study has specifically reviewed and analysed the common points between the funding of SMEs and farms. This study intends to fill this gap by making a comparative study between SMEs and farms financing. That is, the focal point underlying the study is to critically compare and contrast financing decisions concerning SMEs and farms. Consequently, the need for better understanding the financing behaviour of

farm businesses and how it relates and differs from that of SMEs is of paramount advantage because SMEs in general play an extremely important role in all economies. Moreover, this cannot be effectively done or achieved without critically understanding how farms and SMEs relate and differ, particularly, the similarities and differences between their capital structures' choices, determinants, and other important mechanisms underlying their financing behaviours and decisions.

Research Questions

In summary, the objectives of this study include the following:

1. To make a comparative analysis of the literature related to the financing of farms and other SMEs in order to check for the similarities and differences that exist between them.
2. Compare and contrast the variables used in the empirical and qualitative analyses of farm businesses and SMEs in order to check for the differences in their respective debt levels.

Significance of Study

With regards to making a comparative analysis on how SMEs can explain farms' capital structure, SMEs are important because they play significant roles in the economic development and sustainability in both developing and developed countries. For instance, SMEs account for approximately 55.2% of value-added to the GDP of France which is almost close to the average of 56.8% in the European Union, they also account for 61.6% of the labour force in France (SBA, 2018). In developing countries like Turkey, SMEs account for 78% of all employment and constitute 55% of GDP (Sidika & Aysegul, 2017).

Concerning the significance of this study to farm finance, it is very important because bank loans allow farmers to purchase new inputs such as fertilizers, seeds, pesticides etc. and new equipment, which are very necessary for the growth of agricultural productivity and income because a higher productivity will lead to higher income. Additionally, agricultural finance enables farmers in land improvement, and it can also be used as a tool for better management of risk and crisis. Furthermore, agricultural finance (especially bank loans) can be utilized for marketing agricultural products which increases sales. Therefore, farmers not having access to credit lowers agricultural productivity (Briggeman et al., 2009).

Another motivating factor underlying this study is that the proportion of bank loans to the agricultural sector is lower compared to other sectors. In 2008, the proportion of financial

leverage in the European Union (EU) increased from 14.1% to 17.9% which indicates an increase in the number of debts (Pietola et al. 2011). The average amount of farm debt across the EU jumped from £39,118 in 2007 to £50,002 in 2008, and in all, the total liabilities for both the EU-15 and EU-N10 augmented by about 50% between 2004 and 2012 (European Commission, 2015). However, the portion of debts to the agricultural sector compared to SMEs is relatively low. In addition to this, Dodson and Ahrendsen (2016) figured out that the ratio of farm debt utilised by farmers with less than \$100,000 in production decreased from 32% in 1996 to 22% in 2014, however, the study also shows that there was an increase in farm debt from 13% in 1996 to 32% in 2014 for farmers with over \$2 million in production. Therefore, studying this topic may produce results that can be beneficial for the assessment of credit to the agricultural sector, the mitigation of credit constraints etc. for example, the average global Agricultural Orientation Index (AOI) shows a decreasing trend from 0.38 in 2001 to 0.21 in 2015 (United Nations, 2015), and public policies towards the agricultural sector. In addition to this, the engagement of banks in lending is relatively low across the World and with a decline in farm incomes, it is very beneficial to know what factors affect farm credit (Doye, 2016) and how they relate and differ from other SMEs.

Outline of Study

The thesis is structured as follows: Chapter 1 gives a broad literature review about the main capital structure theories and their relevance to the study of farm businesses and SMEs. The chapter starts by discussing the origin of farm credits and an overview of French farms and agriculture is given. Additionally, a brief review is given on farms and SMEs' access to credit. Chapter 2 is a continuation of the literature review that discusses the main variables that have been used to test the different capital structure theories and each variable is followed by a hypothesis development. Chapter 3 is about the methodology. Chapter 4 discusses the main findings of the study. The chapter is followed by a discussion of the results, implications, research limitations, and future research. Finally, chapter 5 is about the conclusion.

CHAPTER 1: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter is a broad literature review. The chapter starts by discussing the origin of farm credits and an overview of French farms and agriculture. Then, it is followed by a brief discussion of farms' and SMEs access to credit. The selected capital structure theories and their relevance to the topic is discussed. Finally, the chapter ends with a summary table of some selected articles that are pertinent to the study.

1.1 Origin of Farm Credits and Overview of French Farms and Agriculture

With regards to farm financing, one of the earliest institutions created to counter-attack the nonfulfillment of agricultural credit markets is the US Federal Farm Loan Act of 1916 which was established as a government-sponsored program to ease farmers' accessibility to stable and long-term funding with lower interest rates which are applicable to the features of agricultural production (Denis et al., 2017). However, it is worth mentioning that some policies existed to finance the agricultural sector prior to the development of the Federal Farm Loan Act of 1916, one of these is the “Green Sprout Policy” in China which enabled farmers to obtain loans to meet their needs in wheat and millet cultivation, the loan was given when the “seeds put forth green sprouts and the loan was repaid after harvest in either monetary terms or by grains” (Turvey, 2017). From this policy, one can argue that credit risk or default risk has been considered as a major determinant of credit issuance to farmers. Furthermore, the Green Sprout Policy only financed farmers whose harvest had demonstrated a potential to be feasible i.e. growth opportunity was an imperative factor in credit granting during this period. This is supported by a result from (Erdogan, 2019), who found that Turkish firms that make a breakeven or profit perceive it to be easier to obtain bank loans compared to firms that make a loss. However, the pecking order theory disagrees with this (Tamirat et al., 2018) which sees no positive link between leverage and growth opportunity. In addition to this, the Green Sprout Policy also demonstrates a sectorial preference because mainly millet and wheat were financed, this has been empirically demonstrated by Enjolras and Madies (2019), who found that farms dealing with fruit and wine production are more likely to receive grants. Finally, the Green Sprouts Policy led to the inventiveness behind “financial aid society, credit associations, and credit cooperatives” (Fu & Turvey, 2016).

According to the global economy, the GDP share of agriculture in France was 1.62% in 2018 with an average of 3.85% from 1960-2018. This figure is low compared to the world average of 10.43%, however, France has been one of the most dominant agricultural centres in the world. Additionally, France leads Europe in agriculture, excluding the Russian Federation and according to the EU Farm Structure Survey (FSS, 2010), there were almost 490,000 agricultural holding in metropolitan France in 2010. In 2010, France was among the EU member states with the highest number of holdings employing about 970,000 people which represents 3.3% of the French job (FSS, 2010).

Crédit Agricole, which is the principal bank that lends money to farmers in France, came to existence as a result of the difficulties faced by farmers in obtaining loans from commercial lenders during the late 19th Century. The Crédit Agricole provides both long and short-term debts to French farms and it also “provides loans to 9 farms out of 10, representing a total of £7.2 billion in 2014” (Crédit Agricole, 2015, as cited in Enjolras & Madies, 2019). In addition to this, Crédit Agricole operates as a savings bank so that bank deposits have a long-term nature. At the local level, it also serves as an adviser to farmers in terms of financial plans related to loan application and gives general advice throughout a new investment (Neveu, 1996). According to Benjamin and Phimister (2002), Crédit Agricole may also decrease the rate of financial constraints faced by farmers because of its partnership with the French agricultural community which may reduce administrative costs concerning the loans. Benjamin and Phimister (2002) found some differences when they tried to investigate whether factors such as information costs and structure in French and British agricultural credit markets influence access to credit. The authors argued that the differences in capital market structure are probable to have a variety of possible influences in information costs and other costs associated with credits in the two countries. For instance, the nature of Crédit Agricole and its association with the agricultural community might lower the cost of information while its conventional role as an agent of the government might also lower administrative cost. The results of the article are relevant to the hypothesis that the different capital markets’ structures introduce contrasting patterns in almost all investment that are sensitive to cash flow.

Concerning French farms, a decreasing rate is observable for the number of farms and an increasing rate is observable for farm size. According to Agreste (2012), the number of small farms (farms with less than £25,000) has reduced from approximately 47% to 36%, while the number of farms with more than £100,000 has increased from 147,000 to 162,000. According to Legrand (2016), the debt ratio of French farms has increased by almost 6% from 1990 to

2010 and farmers resort more to credit in order to purchase new agricultural machinery (Legrand, 2016).

According to Statista (2020), more than 44% of French farms has a debt level of £400,000 or more, while 3.3% has a debt level of £50,000 or less. Also, Statista (2019) shows that winegrowers were the best paid with an average monthly income of £2,790, while sheep and horse breeders were the lowest paid with an average monthly income of £620, which is below the poverty line estimated to be £867 per month in 2020. Furthermore, the descriptive statistics of Enjolras and Sanfilippo (2018) show that 59% of the capital structure of French farms is based on equity.

1.2 Access to External Financing

One major issue with external financing is its sources which is principally divided into two main categories: the formal and informal source of credit. In the agricultural sector, farmers often know where to get a loan without going directly to the bank (Kamp, 2017). This shows the importance of the informal source of credit. For instance, in 2001, the World Bank estimated that about 80% of the World's population was dependent on an informal source of financing (World Bank, 2001). In Africa, the number has been estimated to be about 75% (African Development Bank, 2013). Subsequently, In India, farmer household financial obligation demonstrated informal lending to be the largest source of external financing in 2014 (Basavaraj & Bhattacharjee, 2014). One explanation for this is that people in developing countries mostly depend on informal lending because of trust issues, administrative processes, or the perceived risks of clients with regards to formal credit. For example, farmers applying for farm loans are often required to provide collaterals, which the bank often use to compensate for the risks it is taking in case of default. On the other hand, informal lending in some developing countries such as some West African countries do not require collaterals because the money lenders are often family members or close friends. In some communities in West Africa, arranged marriage between the client and money lender or the client naming a new-born relative after the moneylender is often seen as a way of mitigating or compensating the credit default, it can also be considered as a gratitude to the moneylender for accepting the credit as a bad debt. All these arguments are of paramount relevance because they show that external financing is a major contributor to the capital structure of small businesses especially farm businesses.

However, one of the most significant challenges they encounter is the difficulty in accessing bank loans (Carbo-Vervede et al., 2016). Additionally, Hill et al. (2017) argue that SMEs in emerging markets face more barriers in accessing bank loans compared to SMEs in developed countries. Several studies have tackled the obstacles SMEs face when considering bank financing. For example, Bernini and Montagnoli (2017), show that the informational opaqueness of SMEs and the difficulty that banks encounter in assessing their corporate proficiencies are pinpointed as the principal causes for the bank financing barriers that SMEs experience. In another study, Akter and Alauddin (2016), found that the PCBs in Bangladesh are unwilling to finance SMEs due to the fact of risk avoidance, lack of collateral, and proper documentation and monitoring. This is particularly true for SMEs in the agricultural field which are often susceptible to these mentioned factors that hinder loan allowance. To mitigate these obstacles, Taiwo et al. (2016), proposes that the government should be able to devise policies for the growth and development of SMEs by aiding through soft loans at low-interest rate and other fiscal incentives.

1.3 Theoretical Framework

Different theories have been developed to explicate the firm's capital structure choice comprising the trade-off theory (Miller, 1977), the pecking order theory (Myers, 1984), the agency theory (Jensen & Meckling, 1976), and the market timing theory (Baker & Wurgler, 2002) and a well-documented finding in the literature is that capital structure choice impacts firm value and performance. The principal cause of these impacts includes information asymmetry and agency problems and costs (Jensen & Meckling, 1976; Douglas, 2002), tax impacts (Myers, 1984; Graham, 2000), bankruptcy costs (Kim, 1978; Myers, 1984) etc. However, given the differences between the farm business and other cooperatives, these theories are not very relevant in describing the capital structure of farms (Feng et al., 2014, p. 2). The results of Feng et al. (2014) when they sought to give a unified theoretical framework that explains farms' capital structure, demonstrate that growth potential, firm profitability, and land tenure significantly impact farm capital structure choice at nearly all levels of leverage, while farm size, risk attitude, legal form of ownership, and fixed assets solely show impacts over specific leverage ranges.

Since 1950, capital structure has developed into a contentious research field in the literature of corporate finance (Forte et al., 2013). The capital structure choice of a firm is of high importance because firms are not self-sufficient, i.e. they need continuous financing to grow (Seadin and Besa, 2015). The capital structure theories fail to critically study the financing decisions of farm

businesses mainly because of its ownership structure and its limited access to external finance such as equity which is not always the same for other SMEs. Nevertheless, debts (especially bank loans) can be considered as one of the few formal sources available to farmers. Since most capital structure theories are mainly focused on debt and equity, one can argue that they can help in explaining the financial structure of farms and other SMEs.

In corporate finance theory, the mixture of debt and equity date back to the theorem of Modigliani and Miller (MM) (1958) who proposed that the financing mix or source of finance does not influence a firm's capital structure. They argued that in a perfect market without taxes and transaction cost, the financing choice does not impact the firm's value. The theory of MM was developed based on the following assumptions: 1. No taxes, 2. No transaction costs, 3. No bankruptcy costs, 4. Equal borrowing costs for both companies and investors, 5. Market information should be symmetrical, and 6. No effect of companies earnings before interests and taxes (EBIT). The 1963 paper of MM gives an insight that taxes are important by arguing that debt usage leads to the advantage of tax shields and it has been empirically demonstrated by several studies that the issuance of equity gives a bad signal to the market. Therefore, when a firm issues out new equity, its stock prices decreases. The MM theory has been highly criticised because of its unrealistic assumptions that a levered firm has more value than an unlevered one because of tax shield and the theory of MM has little to say about the optimal capital structure choice of a firm. Contrary to this theory, Stiglitz (1969) argues that the higher the level of debt, the higher the cost of bankruptcy which lowers the value of the firm. In conclusion, the relationship between debt and profitability for SMEs is both positive and negative.

The corporate finance literature also emphasizes the significance of asymmetric information, agency costs and problems, taxation etc. in determining whether to choose debt or equity. The literature has also argued the financial costs and benefits of these choices, and the optimal capital structure choice of a firm including farms will largely depend on the trade-offs between these financial costs and benefits. This leads us to the following capital structure theories that have been widely used in the study of farms and SMEs' financing decisions: agency theory, trade-off theory pecking order theory, and signalling theory.

1.3.1 The Agency Theory

Another well-established theory is the agency theory, which argues that SMEs face lower agency problems and costs between managers and shareholders mainly because of their small nature, but agency costs and problems can arise when external financing is needed. Agency costs emerge as a consequence of the nexus between managers and shareholders (Jensen &

Meckling, 1976). Hence, higher leverage may diminish conflicts between managers and shareholders pertaining to the investment choice (Myers, 1984). The agency theory proposes that capital structure choices should be taken in order to mitigate agency conflicts. One imperative issue is the conflict of interest between shareholders and debtholders. According to Jensen and Meckling (1976), the agency theory is “a contract under which one or more individuals (i.e. the principals) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent.” In the case of farm financing, the agency theory specifically deals with the relationship between a farmer and bank loans provider. A difference of objectives between this two will lead to agency costs and conflicts. These conflicts and costs arise because of the informational gap between them. Regarding French farms, such problems may exist between farmers and Crédit Agricole because, as stated before, Crédit Agricole also play the role of an adviser to the French farming community. Playing the roles as the main lender and adviser on a new investment may bring a divergence in objectives and this may cause agency conflicts and costs. In support of this, the regression results of Benjamin and Phimister (2002) demonstrate that despite French main lending institution’s association with local communities, overall information costs are higher in France due to higher lenders’ perceived risks.

With full regards to farm businesses, the agency theory highlights the monitoring costs of borrowers by lenders. These costs are likely to be transferred to borrowers which makes high indebted borrowers to be less efficient because of the high cost. According to Brewer and Featherstone (2017), agency costs emerge when “stakeholders of a farm manage their farm differently to obtain debt which results in inefficiencies” and they further state that the agency costs propose that the production decisions of farm may be impacted by its capital structure choice. Furthermore, Brewer and Featherstone (2017) used a non-stochastic cost frontier to investigate how debt financing affects the cost structure of Kansas farms. Their results reveal the existence of agency problems and costs linked to debt which negatively affect farm efficiency. Consequently, the results demonstrate that an extra addition of debt decreases the economic, allocative, and technical efficiency of the farms.

Although all these theories have all tried to describe a firm’s capital structure, nonetheless, a model to ascertain the optimal capital structure choice is still a popular field among researchers (Gill et al., 2011), but the principal goal of this study is not to provide a unified theory or an optimal capital structure choice but to see how farm businesses and SMEs relate and differ based on these theories.

1.3.2 The Trade-Off Theory

A simplistic definition of the trade-off theory (TOT) says that firms are partly debt-financed and partly equity-financed whereas the capital structure choice is carried out based on cost-benefit analysis. The TOT suggests that when firms want to be debt-financed, they should consider both the tax benefits (tax shields) and the bankruptcy and financial distress costs associated with it. If the tax benefits exceed the bankruptcy and financial distress costs, then it is good to use debt and vice versa. Bankruptcy costs may be higher for SMEs compared to larger firms (Abeywardhana, 2015) and according to Brealey and Myers (1992), the cost related to the probability of bankruptcy (i.e., administrative and legal costs) would augment with the level of debt thereby decreasing the value and probability of the firm. Briozzo et al. (2016) argue that the tax savings and the financial costs emerging from the risk of default are expected to be larger if firms become indebted. Hence, the TOT suggests the avoidance of “extreme use of leverage and rationalizes the indebtedness indexes” (Brealey et al., 2006). Based on this definition, one can highlight a very important difference between farm businesses and other SMEs which is the tax advantage of debt usage. Most farms are small household businesses and even if they use debt, they do not benefit from the tax shield provided by debt usage whereas this is not the general case of other SMEs, however, SMEs, especially farms already benefit from a low tax rate that might at some point limit any leverage policy conditional on repayment of interest charges (Ang, 1991). Additionally, in some countries and geographical regions, farm businesses are exempted from taxation while SMEs are not.

1.3.3 The Pecking Order Theory

The pecking order theory (POT) stipulates that firms should be financed from an order of safer to riskier (*i.e.* the theory suggests that internal financing is better compared to external financing). There is no target debt ratio in the pecking order theory. The POT arises as a consequence of information asymmetry present in the market. The main argument is that corporate management generally have better and more quality information about the financial state of the firm than outside investors. The order predicted by the POT is hierarchically based on sources with less information costs and less risks. In line with this theory, the most important aspect of a firm’s financing choice is the amount of internal fund available and the existence of a profitable investment opportunity. According to the theory, the first source of financing should be internal, and the last source should be equity. The theory was introduced as an alternative to the TOT by Myers (1984), in his paper “The Capital Structure Puzzle”, Myers suggests that the order of financing firms is internal capital, debt capital, and equity capital as the last source. The main tenet underlying POT is the problem of information asymmetry. In

order to mitigate or eliminate this, Myer and Majluf (1984) suggest that companies abide by a hierarchy of financing due to asymmetrical and signalling problems.

Several studies such as (Chen et al., 2014; Ma et al., 2017) argue that family firms, in general, follow the predictions of the pecking order theory because their costs of external financing are more “sensitive to informational opacity”. However, it is worth reminding that SMEs can be family owned too but one of the earliest arguments of this study states that the main difference between SMEs and farm businesses is their ownership structure. To reinforce this argument on how the characteristics of family businesses are aligned with the predictions of the POT and how it relates more to farm businesses than SMEs is that farms are mostly family-owned and the owner often plays the role of the manager. This specificity of farm businesses (*i.e.* owner-manager) often leads to a desire to “minimise interference and avoid the discipline inherent to the use of external funds” (Koropp et al., 2014). In addition, the majority of farm businesses around the world are single entity owner-manager systems (Nuthall & Old, 2017).

A study by Ohman and Yazdanfar (2017) with the objective of explaining the determinants of short- and long-term debts of Swedish SMEs show that Swedish SMEs depend relatively more on internal than external financing. Subsequently, the estimation results of Enjolras and Sanfilippo (2018) reveal that French farmers are more likely to use short-term debts compared to long-term debts which are relevant to the hypothesis of the pecking-order theory and the study of Jennifer et al. (2015) found that the Federal Crop Insurance (FCI) scheme is related to an increase in the application of short-term debt, but not long-term debt. Furthermore, Cosh and Hughes (1994) argue that SMEs including (farms) can be better described by the pecking order approach due to the fact that they are mostly affected by information asymmetry problems such as adverse selection and moral hazards. Consequently, Sardo and Serrasquero (2017) argue that the lack of disclosure has made the problem of information asymmetry and moral hazards larger for SMEs. However, these problems have created financial restrictions for SMEs in the credit market. These constraints that SMEs face are mainly caused by the problem of information asymmetry. Additionally, Zhao et al. (2008) argued that farms can finance their short-term financial need by internal resources. Furthermore, the owners of SMEs may not want to access credit to avoid the risk and problems of dilution. This is especially true for farm businesses. Finally, the transaction costs associated with external financing seem to be higher for SMEs due to their lack of efficient management and organizational power in the credit market.

1.3.4 Signalling Theory

The advent of the signalling theory is a result of the works of information economics under the stipulations where buyers and sellers deal with information asymmetry when interacting in the market (Spence, 1974). This theoretical framework has been substantially utilised in the study of information flow between buyers and sellers, management and stakeholders, producing as a consequence of knowledge disparity, in a range of business and organizational settings (Stigliz, 2002). Getting accurate and credible information is an extremely important factor that influences the decision-making processes of individuals and firms (Connelly et al., 2011). Therefore, the core motive of the signalling theory is to reduce information asymmetry between parties. Signalling theory has 3 main elements which are 1. Signaller, 2. Signal, and 3. Receiver. According to this theory, the signallers are insiders such as managers and executives that acquire information about an organization (Ross, 1977) that outsiders are unaware of. Signals are the information often sent and receivers are the outsiders. Insiders prefer to give out positive information, therefore, the goal of the signalling theory is to give out positive information to outsiders which are the stakeholders. However, it is worth noting that how the receiver interprets information is very crucial because they may misinterpret the information of the actual signal sent out (Perkins & Hendry, 2005).

Debt issuance sends out positive information about the firm that the stock price is undervalued, and that the investment is profitable. This may apply to some SMEs depending on the size, industry, and access to the equity market, but this does not apply to farm businesses. Debt issuance does not send out any positive or negative information about farms, however, one can argue that it may increase their chances of obtaining more debt with different banks if they are able to repay and in finance, the signalling theory deals with information asymmetry between a firm's financial leverage and cash flow by arguing that the theory suggests a positive relationship between the two (Katchova et al., 2004) and according to them, there is an information asymmetry problem between farmers and lenders pertaining an investment and farmers try to send out good and positive information about their future performance and profitability. Credit lenders then judge these signals and decide to issue loans or not. Their study finds that both pecking order theory and signalling theory is applicable to farm businesses by emphasizing that as corporate firms can use leverage to send out positive signals, farms with larger size and good historical records of income and profitability are more likely to obtain loans, hence, one can assume that these serve as good signals for farm businesses.

Dealing with information asymmetry is very crucial for creating a strong signalling environment with signals fluxing effectively and efficiently between a firm and its stakeholders (Saud, 2016). The findings of this study postulate that creating a strong signalling space demands to comprehend how “best to deal with negative signals, the roles of feedback in the signalling process, and the importance of signal precedence”. Furthermore, the simulation results of Zhao et al. (2008) show financial scenarios with signalling techniques predominate both the trade-off and pecking order theory. They argued that low credit risk borrowers with lower bank rate can take advantage of the signalling effect between borrowers and lenders. Consequently, it can aid lending institutions to differentiate borrowers at different credit risk levels.

The fundamental cause of SME's financial restrictions lies in the information asymmetry between financing institutions such as banks and SMEs. The lack of relevant information between SMEs and financial institutions has adverse effects on decision-making processes and may lead to inefficiency in resource allocation. In adverse selection, the borrowers of financial resources have a relative information advantage compared to lenders. Moral hazards on the other hand occurs after the borrower have already obtained loans. Additionally, information asymmetry can increase transaction costs, especially for farms. This happens when the lenders have less information about the farm and investments, lenders tend to search for information which they need to evaluate before granting loans. Lenders can decide not to give out a loan if this transaction cost is high. Having this in mind, another difference between farm businesses and SMEs that can be explained by information asymmetry is transaction costs. Due to farms' ownership structure and their high susceptibility to information asymmetry problems, one can argue that banks face higher transaction costs with farms than SMEs, thus this makes it easier for banks to grant more loans to SMEs compared to farms. Based on this, the financial institutions are on a disadvantage therefore, they may automatically increase their interest rates for farm businesses.

Table 1. Summary of Relevant Articles

Author's name(s)/year	Country	Theoretical Framework	Methodology	Variables used	Results	Remarks and Notes
Tamirat et al., (2018)	Netherlands	PO and ST	A panel of 1,500 Dutch Farms from 2001 to 2015 Dynamic Partial Adjustment The Sample of Dutch Farms was divided into 4 groups: Dairy Farms, Field Crop, Horticulture, Livestock	Dep. Variables Leverage Ind. Variables Leverage (1) Asset Tangibility Farm Size Profit (ROA) Growth Opportunity Earnings Volatility (2) Debt of GDP Inflation Employment	<i>Farm profit</i> +(ST) for dairy farms. – (PO) for other groups (3). <i>Asset tangibility</i> +(ST and PO) for dairy farms. Not supported for others. <i>Farm size</i> +(PO and ST) for dairy farms and Livestock. Not supported for others. <i>Growth opportunity</i> +(ST) for all. <i>Earnings volatility</i> not supported for dairy farms. –(PO) for others.	(1). A lagged leverage variable. The change in leverage represents the speed of adjustment and the distance between lagged leverage. (2). Earnings volatility was also referred to as risk and it was measured based on the standard deviation of ROA. (3). The pecking order predicts a negative relationship between profitability and leverage. However, there was a positive correlation between dairy farms and leverage which is used by the authors as a signalling sign. For the others (Field Crop, Horticulture, and Livestock) the pecking order hypothesis was confirmed.

Lopez-Gracia and Sogorb Mira (2008)	Spain	TOT and PO	Panel data methodology 3,569 Spanish SMEs from 1995 to 2004 Dynamic model and GMM	Dep. Variables Debt ratio Cash flow Ind. Variables Effective tax rate Non-debt tax shields Growth opportunity Profitability (ROA) Size Age	(<i>ETR</i>) statistically not significant. Rejects (TOT) <i>NDTS</i> significant +(TOT) Growth opportunity Negative and statistically significant rejects both (TOT) and (POT) Profitability negative Rejects (TOT) -(PO) (1) Size positive & statistically significant. Supports (TOT) and rejects (PO) Age negative & statistically insignificant. Supports (PO) rejects (TOT)	(1). The pecking order theory predicts a negative relationship between profitability and cash flow or debt ratio. Therefore, the results for profitability are in line with the theory but it rejects the trade-off hypothesis of profitability.
Cheng and Katchova (2018)	U.S.A	TOT and PO	A panel dataset of U.S Agricultural cooperatives with 708 cooperatives and 2,443 cooperative year observations from 2011 to 2015. Generalized Method of Moments Simultaneous Equation Models	Dep. Variables Investment (1) Ind. Variables Patronage refund Change in short term debt (sd) Change in long term debt (ld), Cash flow, Size, Year, Sales growth	<i>Cashflow</i> positive relationship between debt and cash flow. -(PO) <i>Patronage</i> relationship between debt and patronage not significant. -(PO) <i>Size</i> positive relationship +(TOT) <i>sd</i> +(TOT)(2) <i>ld</i> was partially supported by TOT	(1). The change in investment from one year to the next. (2). Cooperatives will adjust its short and long-term debt to maintain its optimal debt ratio.

Enjolras and Sanfilippo (2018)	France	TOT and ST	Data from French Farm Accountancy Data Network (FADN) from 2000-2014 3 Stage Least Squares	Dep. Variables Variation of investment (vinv) Ind. Variables Stock long-term debt Variation of long-term debt Stock short-term debt Variation of short-term debt Value of annual cash flows ROA Fixed effects Year effects	Statistically significant negative coefficients on the lagged stock long and short-term debt. French farms have long, and short-term debt and they partially adjust to them. + (TOT) PO accepted because of a positive relationship between long-term, short-term debt, and investment. Consequently, negative relationship cash flows and investment. Lagged cash flows were found to have a positive and significant influence on the level of investments. Cashflows are the most pertinent positive signal (ST), the authors also found that past borrowings convey a negative signal	
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Kalusova and Badura (2017)	Czech Republic and Slovak Republic		Data from Czech and Slovak Agricultural Enterprises Regression and Correlation analysis	Dep. Variable Debt ratio Ind. Variables GDP growth Harmonized Inflation rate, Interest rate, Tax rate, ROA, Size, Risk Liquidity, Assets structure, NDTs, Age	GDP growth + Inflation rate – Interest + (1) ROA - -(PO) Size - -(PO) Risk – Assets structure + +(PO) NDTS + rejects (TOT) (2) Age - -(PO)	(1). Showed negative for non-perennial crops. The positive advantage took advantage of the interest tax shield (2). For Czech agricultural enterprises *Slovak agricultural enterprises are significantly more indebted than the Czech ones
Serrasqueiro and Caetano (2015)	Portugal	TOT and PO	Data on 53 Portuguese SMEs with a total of 371 observations from 1998 to 2005 Least Squares Dummy Variable Corrected (LSDVC) GMM	Dep. Variable Debt level Ind. Variables ETR NDTS Growth opportunities Asset tangibility Profitability Age Risk (1)	ETR – rejects (TOT) NDTS – supports (TOT) Growth opportunities statistically insignificant rejects both (TOT) and (PO) Asset tangibility statistically insignificant rejects both (TOT) and (PO) Profitability negative statistically significant rejects (TOT), supports (PO) Size + and statistically significant supports both (TOT), (PO) Age - and statistically insignificant rejects (TOT), supports (PO) Risk + and statistically significant rejects (TOT)	(1). Absolute value of percentage change of earnings before interest, taxes, and depreciation

Adair and Adaskou (2015)	France	TOT and PO	2,370 French SMEs selected from DIANE database from 2002 to 2010. Panel data analysis	Dep. Variable Debt ratio Ind. Variables Size Age Industry Profitability Growth opportunities (2) Trade credit (1) Guarantees	Size not confirmed (3) Age significant and negatively correlated with debt ratio -(PO) Profitability negative and significant at 10% rejects (TOT) Supports (PO) Growth opportunities positive and significant supports both (TOT) and (PO) Guarantees significant and positively related to debt ratio supports (TOT) rejects (PO)	(1). Measured as account payable/total liabilities (2). Measured as intangible assets/total assets (3). The coefficient on dummy micro-enterprises is positive but not significant, dummy medium is negative but not significant
Ohman and Yazdanfar (2017)	Sweden	PO	Data of 15,897 limited liability SMEs in 5 industries from 2009 to 2012 OLS Estimation Regression Model	Dep. Variables Short-term debt (STD) Long-term debt (LTD) Ind. Variables Size Age Growth Profitability Liquidity Asset tangibility NDTS Industry variable (1)	Size +STD +(TOT) -LTD Age -STD -(PO) +LTD +(TOT) Growth +STD and LTD +(TOT), +(PO) Profitability -STD and LTD -(PO) Liquidity + STD and LTD +(TOT), -(PO) Asset tangibility +LTD, -(PO) NDTS -STD, +LTD +(PO) Industry variable (1) -STD and LTD -(TOT)	(1). Just a control variable

Daskalis et al., (2014)	Greece	TOT and PO	Panel data of 1,018 Greek SMEs during the period of 2003-2007 (1)	Dep. Variable Debt ratio Ind. Variables Profitability Asset Structure Size Growth Opportunity	Profitability - -(PO) rejects (TOT) Asset Structure – rejects both (TOT) and (PO) <i>Size</i> significant and positively correlated to the debt ratio for all cases. Supports both (TOT) and (PO) <i>Growth Opportunity</i> is statistically significant and positively correlated to the debt level. Supports both (TOT) and (PO).	(1). The dataset was divided into 3 subgroups which is composed of 120 micro firms, 642 small firms, and 256 medium firms. (2). Similar determinants of capital structure were observed for the three subgroups.
Zhao et al., (2004)	U.S.A	PO and ST	1419 data from Illinois Farm Business Farm Management (FBFM) Simultaneous dynamic equation system GMM approach to estimate simultaneous equation	Dep. Variables Cash flow Leverage Investment Ind. Variables Lagged cash flow variable Lagged investment variable ROA Size	Cash flow negative coefficient with leverage supports (PO) (1) Profitability farm businesses adopt cash flow and profitability (ROA) as a signal (ST) Positive for <i>size supports (ST)</i> Investment negative relationship between farm's investment and cash flow supports (PO) Leverage coefficient for young operators are larger than for old operators supports (PO) (2)	(1). The coefficient on lagged leverage shows an insignificant relationship with cash flow. This does not support that leverage is used as a signal (ST) Significant negative sign between cash flow and leverage supports (PO) (2). The lagged leverage and future cash flow have an insignificant relationship for old farmers and young farmers, therefore, no signalling implication

Source: author's process

Table 1 above summarizes some of the articles that have applied capital structure theories to explain the financing decisions and approaches of both farm businesses and other SMEs. In addition, most of the variables used in the next chapter to develop the hypothesis have been inspired by some of these studies.

CHAPTER 2: MAIN VARIABLES AND HYPOTHESES DEVELOPMENT

This section discusses our main variables and our main hypotheses development. The hypotheses developed here are mainly based on the trade-off and pecking order theory. However, the predictions of the signalling theory have also been highlighted where necessary for some variables.

2.1 Profitability

With regards to profitability, the POT opposes the static trade-off theory by demonstrating a negative relationship between profitability and capital structure. The theory holds that the most profitable firms borrow less in general. This is principally due to the fact that they do not often depend on external money for financing their activities because they have sufficient retained earnings from their previous business operations. And if a firm has no sufficient internal sources of finance, the firm seeks debt which reduces its profitability because the borrowing would create financial distress cost and lower the return. Booth et al. (2001) argued the negative impacts of profitability on leverage, therefore, supporting the pecking order theory. This demonstrates that leverage does not lead to higher performance as described by the information asymmetry theory. The study of Abeywardhana (2015) found that there is a significantly negative relationship between capital structure and profitability, however, the result shows firm's size appears to play a more significant role in determining profitability for SMEs in the U.K.

The TOT argues that a profitable business is expected to be highly leveraged to compensate for corporate tax. This is consistent with the agency problems formulated by Jensen (1986) that agency problems associated with free cash flows drive profitable firms to use higher leverage so that they can pay out more excess cash. Furthermore, Abel (2017) argues that the relationship between optimal borrowing and profitability is based on whether the TOT is operative. Fama and French (2002) argue that there should be a positive relationship between profitability and the level of debt. This is also supported by the study of Jensen et al. (1992).

In further support of the predictions of the TOT, the estimations of Denis et al. (2017) show that a 1000 dollars loan by the Farm Credit System (FCS) is linked to an additional farm income of approximately \$200, and farm output of \$300 thus, showing a positive correlation between lending by FCS and both farm income and output. Featherstone et al. (2005) argued that debt financing is necessary in order to maintain farm productivity and effectiveness by taking technological innovation that is needed to augment or ameliorate farm efficiency. Studies have

also shown that financial leverage may impact the technical efficiency of farms by influencing the production decision of farms (Margaritis & Psillaki, 2007; Lambert & Bayda, 2015). Gadanakis et al. (2019) used the SBV CRS DEA model to measure the efficiency of farm output for Italian cereal farms and to investigate the relationship between farm efficiency and farm capital structure during the upsurge of cereal price instability in the years 2008 to 2014. Their empirical results demonstrate that the nexus between farm efficiency and leverage is statistically insignificant for all years except for 2010. This is because cereal prices dropped by nearly 30% in 2009. However, Michaelas et al. (1999) found a negative relationship for SMEs. Tamirat et al., (2018) found profitability to be related to the debt ratio of Dutch dairy farms but found it to be negatively correlated with Dutch field crop, horticulture, and livestock agricultural enterprises. Several studies such as Lopez-Gracia and Sogorb-Mira (2008) for Spanish SMEs, Adair and Adaskou (2015) for French SMEs, Kalusova and Badura (2017) for Czech and Slovak agricultural enterprises, and Ohman and Yazdanfar (2017) for Swedish SMEs, have also found a negative correlation between profitability and indebtedness.¹ Therefore, the first hypothesis is formulated as follows:

Hypothesis 1: Profitability is positively correlated with indebtedness for both French farms and SMEs

2.2 Non-debt Tax Shields (NDTS)

The advantages and disadvantages of debt usage have been widely discussed in the literature, one of the major advantages of debt usage is the tax shield it provides which increases firm value and performance, while the major disadvantage concerning leverage is the emergence of bankruptcy and distress costs, which are very costly for firms. DeAngelo and Masulis (1980) argued that the structure of corporate tax is presumed to be more complicated and the existence of non-debt tax shields (NDTS) such as tax credits and depreciation might affect the optimal capital structure decision. Firms appear to be less interested in using debt as they increase NDTS. This is known as the income-substitution effect (Lopez-Gracia & Sogorb-Mira, 2008). As previously stated, SMEs particularly farms receive special treatments from taxation. Hence, the impacts of NDTS is of tremendous importance for SMEs. Kalusova and Badura (2017) found a positive relationship between NDTS and debt ratio for Czech agricultural enterprises

¹ It is necessary to emphasize that the pecking order theory predicts a negative relationship between profitability and cashflow or debt ratio. These studies have found a negative relationship which contradicts the trade-off theory but in line with the predictions of the pecking order theory. Therefore, no further hypothesis is created to test for the relationship between profitability and indebtedness. The results obtained from hypothesis 1 will determine which theory is more relevant.

but a negative relationship for Slovak agricultural enterprises. Ohman and Yazdanfar (2017) found a negative correlation for both long and short-term debt and NDTs. Furthermore, Serrasqueiro and Caetano (2015) found a negative relationship between debt ratio and NDTs. This leads us to the second hypothesis:

Hypothesis 2: There is a negative relationship between non-debt tax shields and indebtedness for both French farms and SMEs

2.3 Effective Tax Rate

The use of debt as a financing tool has an advantage of decreasing income tax and while an extra debt does not create any significant intrinsic costs of financial distress, firms will decide to strengthen their debt ratio. Therefore, the TOT predicts a positive link between the effective tax rate and indebtedness (Fama & French, 2002; DeAngelo & Masulis, 1980). The results of Kalusova and Badura (2017) found tax rate to be positively related to debt ratio. However, the studies of Lopez-Gracia and Sogorb-Mira (2008) found no significant relationship between the effective tax rate and debt level for Spanish SMEs and the findings of Serrasqueiro and Caetano (2015) also show a negative relationship between effective tax rate and debt level. All these arguments lead us to the third hypothesis:

Hypothesis 3: There is a positive link between the effective tax rate and indebtedness of both French farms and SMEs

2.4 Growth Opportunity

Another conflicting result based on the POT and TOT is the issue of growth opportunity. According to Myers (1977), firms with high leverage ratio and significant growth opportunities often encounter an underinvestment problem which leads them to relinquish their investments with a positive net present value. Myers (1977) further argued that based on the agency theory, the nexus between debt level and growth opportunity should be negative due to moral hazards. Therefore, the TOT predicts a negative relationship. In support of this prediction, Smith and Watts (1992) found a negative relationship between leverage and growth opportunity. However, the pecking order predicts a positive nexus between debt level and growth opportunity because high growth firms often need a large amount of money to finance their growth (Mac an Bhaird & Lucey, 2014; Hall et al., 2004). Michaelas et al. (1999) argued that firms with high growth potentials will tend to seek external financing and their empirical results based on a sample of U.K SMEs found a positive link between growth opportunity and debt level. Similar results are also found by Eriotis (2007) on Greek firms. Additionally, Tamirat et al. (2018) found a positive

link between the two for Dutch farms, Adair and Adaskou (2015) found a positive link for French SMEs, and Ohman and Yazdanfar found a positive link for both short and long-term debt with growth opportunity for Swedish SMEs. Based on these arguments, the fourth hypothesis is constructed as follows:²

Hypothesis 4: There is a positive link between growth opportunities and indebtedness for both French farms and SMEs

2.5 Asset Tangibility and Collateral

One of the most important determinants of SMEs' capital structure is the structure of their assets. The probability of a firm's default reduces if it has more tangible assets since this increases the liquidation of the firm (Cassar & Holmes, 2003). The tangibility ratio of a firm is expected to impact its capital structure choice (Daskalis & Psillaki, 2008; Mac an Bhaird & Lucey, 2014). The probability of a firm with high tangibility ratio to borrow funds from banks and other financial institutions increases (Titman & Wessels, 1988) because this serves as having a large amount of collateral-based assets. From the perspective of the POT, firms with high liquidity are expected to be less leveraged (Proenca et al., 2014) since such firms are likely to be less dependent on debt due to an increased availability of liquidity generated by retained earnings (De Jong et al., 2011). However, it is worth reminding that tangibility and liquidity have been used interchangeably in some literature while some studies have used and measured them differently. Some studies that have considered asset tangibility equivalent to collateral have predicted a positive relationship between tangibility and debt level based on the pecking order perspective. For instance, Berger and Udell (1998); Michaelas et al. (1999) have argued a positive link.

High tangibility has been associated with providing collateral, which has been considered as a main requirement from donors in the credit relationship (Lopez-Gracia & Sogorb-Mira, 2008) because it has been argued to reduce agency costs. Furthermore, Titman and Wessels (1988) argue that firms possessing assets that may constitute collateral are more leveraged.

² Growth opportunity is a very complex variable in testing capital structure theories. The trade-off theory and agency theory predict a negative nexus between leverage and growth opportunity, but the pecking order theory predicts a positive relationship. Additionally, the signalling theory stipulates that growth opportunity can be used as a positive signal to encourage creditors to give out loans. This has been empirically tested by Tamirat et al., (2018). However, the hypothesis here is developed based on the assumption of the pecking order theory because the majority of empirical study demonstrate a positive association. The outcome of this hypothesis will further determine if French farms and SMEs are best explained trade-off or pecking order theory with regards to growth opportunity. The result will also determine if growth opportunity can be used as a positive signal.

Using the pecking order perspective, Tamirat et al. (2018) found a positive nexus between tangibility and leverage for Dutch dairy farms but the results proved negative for other groups. Their results further argued that tangibility can be used by farmers as a positive signal to the credit market. Serrasqueiro and Caetano (2015) rejected both the TOT and POT perspective for Portuguese SMEs because their result for tangibility was statistically insignificant. Ohman and Yazdanfar (2017) found tangibility to be negatively correlated with short-term debt and positively correlated with long-term debt for Swedish SMEs. Our next hypothesis based on tangibility is formulated as follows:

Hypothesis 5a: There is a positive relationship between asset tangibility and indebtedness for both French farms and SMEs

Commercial banks frequently impose constraining loan contract terms on SMEs to avoid defaults because of the informational gap that exists between them (Garcia-Tervel et al., 2014) and as Boot et al. (1991) state, the imposition of collateral demand on loan contract by banks is a traditional practice to remove information asymmetry and to “align the interest of banks with that of borrowers”. Boot et al. (1991) further suggest that collateral can eliminate adverse selection problem and moral hazard problems because it can act as a signalling mechanism for banks to distinguish risky borrowers from less risky ones. In literature, this compartmentalisation of borrowers according to their perceivable credit quality is called the observed risk hypothesis which states that banks classify borrowers based on their risk profile which consequently leads risky borrowers to pledge higher interest rates and collateral.

In terms of collateral requirements by credit lenders, SMEs and farms can be very related compared to large farms, which often have more tangible assets. The ownership structure of SMEs and farms can also explain how they relate in terms of collateral demands. However, they operate differently, and this difference can lead to various loan characteristics such as loan size, interest rates, or maturity. Therefore, collateral requirements for farms and SMEs may vary because different classes of loans have specific risk characteristics (Rahman et al., 2017). Furthermore, farms and SMEs can be very different in terms of what determines their collateral demand and what they pledge as collateral or how bank access it. For instance, land title serves as an indispensable collateral for farmers because one can assume that a large number of farms, on which farmers operate on, belong to them, however, this might not serve as a concrete collateral for banks depending on the quality of the land or the location of the land, especially in rural areas. Additionally, it is very difficult to ascertain the credibility of land titles in rural

areas because lands in such places can be collectively owned and even if banks can evaluate the credibility of the land titles, their geographical location or their proximity from the banks make it difficult for them to be accepted as collaterals. This is probably one of the reasons Domeher and Abdulai (2012) argue that the association between legal and secure property rights cannot simply be related to improved access to credit across Africa.

On the other hand, SMEs can be family owned or similar to farms, but most SMEs operate on lands that do not belong to them. That is, other SMEs can emerge as just business ideas that can operate anywhere without them necessarily operating on their lands. Moreover, the size of the land for SMEs are generally smaller compared to farms, but it is worth reminding that the geographical location of the SME can give more value to the land irrespective of its size. Consequently, SMEs can have other quality tangible assets which can be used as a collateral compared to farms. Therefore, one can argue that land title as collateral is more applicable to farm businesses. In support of this, Soontaree and Jourdain (2016) found that the lack of land title, whether fully or partially transferable, significantly reduces the involvement to the formal credit market and loan size in Thailand. Carter and Olinto (2003) argue that complete property rights over land can escalate investment by means of an increased demand for credit, while augmenting supply of credit by strengthening the value of the collateral. Furthermore, land title can be different depending on the country. For example, in France, tenant farming is very common, especially in the North. The tenant farming statue in France gives the farmer a guaranteed long-term land access. These arguments lead to our next hypothesis:

Hypothesis 5b: There is a positive relationship between land title and indebtedness for French farms

Pertaining to the above hypothesis, it can also be argued that land title can serve as a positive signal that farmers can send to the credit market because they serve as a collateral.

2.6 Earnings Volatility

Earnings volatility has also been argued to be an important determinant of the capital structure choice of both farm businesses and other SMEs. Barry et al. (2000) argue that “a higher variability of earnings increases the risk that farms will not be able to fulfil their interest and principal payment obligation. Based on information asymmetry and adverse selection, the signalling theory suggests a positive association between debt level and risk (measured as the volatility of earnings). The signalling theory postulates that firms with high-income volatility tend to apply for loans (Flannery & Rangan, 2006; Hang et al., 2017). Therefore, the theory

predicts a positive link between earnings volatility and indebtedness. Subsequently, one can argue that earnings volatility is a significant determinant of farm capital structure because of the seasonal nature of farm businesses. Furthermore, both the TOT and POT predicts a negative relationship between earnings volatility and debt ratio. Tamirat et al. (2018) found earnings volatility to be negatively correlated to debt ratio for Dutch field crops, livestock, and horticulture enterprises, however, the results did not find a negative association with Dutch dairy farms. Serrasqueiro and Caetano (2015) found earnings volatility to be negatively linked with the debt level of Portuguese SMEs. Our next hypothesis is formulated as follows:

Hypothesis 6: Earnings volatility is negatively linked to the indebtedness of French farms and SMEs

2.7 Age

Before proceeding to the main objective of this section, it is important to explain another common theory that is highly documented which is the growth cycle of Berger and Udell (1998). The theory stipulates that the financial structure of a firm changes in proportion to its size and age. This theory states that companies prefer internal sources such as their funds, funds from families or friends (love money) when they are in a young stage mainly because they are less transparent in terms of financial information. Nonetheless, companies use external financing when they experience other stages (Lisana et al., 2018). Furthermore, the objectives of a business changes throughout its life cycle and consequently the manager's age is probable to be a factor in debt decisions (Hirsch & Walz, 2011).

Kay and Edwards (1994, p. 218-219) argue that the life cycle of family farms is equivalent to the life cycle of farm operators. The life cycle discussed comprises three stages: entry, expansion and consolidation, and exit or divestment. This theory is also supported by the studies of (Boehlje & Eidman, 1984; Boehlje, 1992). In summary, this theory postulates that debt level is high for farm business during the entry and expansion stage but decreases in the consolidation stage because, during this period, farm performance augments after the adjustment period and accumulation of experience. In support of this, Calvo (2017, p. 98) found that the leverage ratio of younger family firms is higher than that of older family businesses. Also, the results of Phillips and Katchova (2004) show that agricultural credit ratings were more likely to ameliorate during the expansions and deteriorate during recessions periods of the business life cycle. This life cycle is not very much associated to other SMEs because of the contrasting life cycle they have. In contrast to this, Mac an Bhaird and Lucey (2011) provide evidence that

SMEs are following the business life cycle theory in the financial decisions of their investments, however, the study of Gregory et al. (2005) contradicts this by arguing that SMEs are not likely to have a single life cycle model.

Pertaining to the age of farm business owners, the dummy variable used by Rusiana et al. (2017) in their regression analysis for younger farm operators was discovered to be statistically significant. Holding all other variables constant, the variable proposes that being a younger farm operator has a lower probability of upgrade compared with more mature farm operators. This suggests that older U.S farm operators are likely to receive loans from the bank. The study of Harris et al. (2009) found the age of the farm manager and the degree of risk aversion play significant roles in describing the patterns of debt in farm businesses. Additionally, the modelling results of the work of Bruce et al. (2019) show that a manager's personal characteristics are highly correlated with debt refund and are very likely to be drivers of debt issuance for New Zealand farm businesses. The results show that the farmer's age impacts debt reduction. One explanation given for this is that the general anxiety factor in the farmer's personality also impacts the debt level. Kalusova and Badura (2017) found age to be negatively correlated with debt level for Czech and Slovak agricultural enterprises. Finally, using an ordered logit model, the study of Howley and Dillon (2012) found that farmer's personal characteristics such as age and education have significant impacts on the probability of accumulating debts (*i.e.* farmers under the age of 45 are 1.83 times more likely to obtain farm debts than farmers who are above 45) in Ireland. This is in line with the life cycle hypothesis which argues that farmers often settle their debts as they age (Katchova, 2005). All these arguments lead to the following hypothesis:

Hypothesis 7a: Debt usage decreases for farm business with the farm holders' age

Concerning SMEs' age, the empirical findings in the literature present a contradictory perspective between financial leverage and firm's age. According to the pecking order perspective, younger firms cannot retain earnings like older firms *i.e.* older firms can save funds and avoid resorting to debt. However, the trade-off perspective on age indicates that older firms face lower agency and bankruptcy costs which demonstrates that they could have been highly leveraged. Therefore, the TOT predicts a positive relationship between age and leverage. The study of Hall et al. (2004) shows that age is negatively correlated with both short and long-term debts for U.K SMEs, but the results show a positive correlation for Spanish SMEs. Yazdanfar and Ohman (2016) argued that there is a negative association between age and both short-term

and total debts for Swedish SMEs, however, their results also indicate a positive association between age and long-term debts. Therefore, we follow the trade-off perspective that leverage is positively correlated with a firm's age. This leads to our next hypothesis:

Hypothesis 7b: There is a positive relationship between French SMEs age and indebtedness

2.8 Size

Several studies have demonstrated a positive relationship between a firm's debt ratio and its size. For instance, Psikillaki and Daskalakis (2009) found a positive correlation between size and debt ratios for Italian, Greek, French, and Portuguese SMEs. Yazdanfar and Ohman (2016) found a positive relationship between size and short-term debt, but a negative relationship for size and long-term debt for Swedish SMEs. In contrast to this, Benkraiem and Calin (2013) found a positive relationship between size and long-term debt, but a negative relationship between size and short-term debt for French SMEs. The principal result of the study of Belas et al., (2018) show that the size of a company measured by the number of employees influence its action to the volume of external and internal resources used in financing its activities. The empirical results also show that business owners with a long time of managing their business have a preference for external capital than their private equity. Additionally, the study of Beck and Demirguc (2006) found that small firms have larger growth limitations and have less access to formal sources of external finance, especially bank loans. Subsequently, the regression analysis of Mostafa and Khairy (2018) demonstrate a positive correlation between firm size and short-term, long-term and total debt ratio. The study of Daskalakis et al. (2014) tried to break down SMEs into two categories: micro-enterprises and small and medium-size, the authors found that size is significant and positively correlated in all cases. Furthermore, their regression results show that a larger firm is more associated with a larger debt ratio.

For farm businesses, Rusiana et al. (2017) found that larger farms are more likely of credit upgrade relative smaller farms for U.S farms and the results of Howley and Dillon (2012) found farm size to be statistically significant in credit use for Irish farms. The cash flow equations of Zhao et al. (2004) found that larger farms follow the pecking order and signalling theory while smaller farms follow the pecking order theory. They argued that the previous cash flows and profitability have high impacts on firms' leverage. In addition to this, the results of Abdul et al., (2018) indicate that an increased farm size helps households to have access to credit when they used endogenous switching regression (ESR) to compare the Savanna and Transitional zones of Ghana. In contrast to this, Feng et al. (2014) used a quantile regression model to check

for the relationship between size and credit, the results indicate that farm size has no significant impact on leverage at almost all quantiles. Finally, the study of Dodson and Ahrendsen (2017) argue that larger U.S farms (measured in monetary terms) are more “dependent on FSA credit programs for their credit needs because of the variability and tight profit margin”. Hence, they suggest that these large sizes of farm groups may be susceptible to credit constraints. All these arguments have provided contradictory views on the relationship between size and leverage, this is mainly because size has been measured using different approaches. However, one can argue that most of the results present a positive perspective. This leads us to another hypothesis:

Hypothesis 8: There is a positive relationship between a firm's size and indebtedness for both French farm businesses and other SMEs

2.9 Adjustment to the Optimal Debt Level

Frank and Goyal (2005) categorizes Myer's earlier work on TOT into two separate parts: 1. The static trade-off theory which stipulates that a firm's leverage is ascertained by a single period trade-off, and 2. target-adjustment, which argues that firm's leverage gradually adjust to the optimal capital over time and the dynamic trade-off theory postulates that firms adjust their current level of debt towards the target debt level (Taggart, 1977). Nonetheless, firms can deviate from the target debt ratio because of transaction costs and agency costs (Hovakimian et al., 2001; Oztekin & Flannery, 2012). During this deviation from the target debt ratio, the capital structure decisions of a firm may follow the predictions of the pecking order theory (Titman & Tsyplakov, 2007). Drobetz et al. (2015) further argued that the choice of capital structure is the function of the optimal debt proportion and the cost and benefits of adjustment and costs of deviation from the target debt ratio. In general, these adjustment costs are related with the costs' external capital market transactions and with other constraints in acquiring external finance (Oztekin & Flannery, 2012) and the results of Heshmati (2001) indicate that “Swedish SMEs adjust their debt levels slowly, concluding that the deviation costs from the optimal debt level are not sufficient enough to justify the costs of external capital market transactions”. Moreover, Lopez-Gracia and Sogorb-Mira (2008) highlight that SMEs aim to achieve an optimal debt level, which Dufour and Molay (2010) argue to give the best description of French SMEs' capital structure. In support of SMEs adjusting their debt level to the target debt level, Cheng and Katchova (2018) found that U.S agricultural cooperatives adjust their short and long-term debt to maintain their optimal debt ratio. Enjolras and Sanfilippo (2018) found that French farms have both long and short-term debt and they partially adjust to them. The results of Jose and Francisco (2008) show that Spanish SMEs can be explained by both trade-off theory and

pecking order theory. Their results further demonstrate that greater trust is placed on SMEs that try to adjust to an optimal leverage structure even though the majority of the firms follow the predictions of the pecking order theory. The study of Barry et al. (2000) shows that farms generally adjust to long-term financial targets for equity, debt, and leasing when they apply the pecking order theory and partial adjustment theories to farm. Their results also demonstrate that farms with high information asymmetry problems follow the predictions of the pecking order theory when additional financing is needed. This leads to our next hypothesis:

Hypothesis 9: Both French farms and SMEs adjust their debt level towards the optimal debt level

2.10 Differences in activities and specializations

Several similarities and differences between farm businesses and SMEs have been identified in this study. One of the recurrent similarities is the issue of credit access. In the external financial markets, both farms and SMEs tend to be financially constrained by creditors because they are more volatile and vulnerable to bankruptcy. The study of Hill et al. (2017); Bernini and Montagnoli (2017) etc. have all discussed this. However, Salami et al. (2011) argued that agricultural loans from commercial banks have been issued at a low rate compared to loans provided to trade, manufacturing, and other service sectors. The study also identified that the issue of legal entity does not differentiate farm businesses from SMEs, particularly French farms and farms in developed countries. Moreover, depending on the ownership structure of the SME, the owner is solely liable to the financial misfortunes in a case of default if it is a sole proprietorship. The seasonal nature of farm businesses also differentiates their financing decisions and capital structure from that of SMEs. One can assume that this seasonal nature of farm businesses makes them apply for loans or change their capital structure during specific times.³

Furthermore, farms are often dependent on government subsidies to stabilize their earnings (Zhengfei & Lansink, 2006) which is not always the case for SMEs. This feature of farm businesses may lower their dependency on other external finances such as bank loans. Cheng and Katchova. (2018) argued that farms have limited access to the equity market which can also differentiate them from other SMEs (depending on the type).

³ This study is limited to this; therefore, the study cannot ascertain this for sure.

Finally, it is worth stating that the dataset used in this study is composed of different types of farm businesses and SMEs, that is, the differences and similarities can depend on the industry. Therefore, this leads to the next hypothesis:

Hypothesis 10: French farm businesses have different debt levels compared to French SMEs

The table below gives a summary of the expected relationships between the independent variables and leverage depending on the theories.

Table 2. Expected Relationships between the Variables and Leverage

	Variables	TOT		POT		ST	
		Farms	SMEs	Farms	SMEs	Farms	SMEs
1	Profitability	+	+	-	-	+	
2	Non-Debt Tax Shields	-	-	+/-	+/-		
3	Effective Tax Rate	+	+	+/-	+/-		
4	Growth Opportunity	+	+	+	+	+	
5	Asset Tangibility and Collateral	+	+	+	+	+	
6	Earnings Volatility	-	-	-	-	+	+
7	Age		+	-			
8	Size		+			+	

Source: author's process

CHAPTER 3: METHODOLOGY

3.1 Data Description

The data analysed in this study was obtained from a collaboration with Crédit Agricole which is the second-largest commercial bank in France that gives loans to 90% of French farms. The dataset encompasses 1,675 observations for both farms and SMEs between the periods of 2016-2018. A total number of 1,045 farms (62.39% of the total observation) and 630 SMEs (37.61%) situated in Auvergne-Rhône-Alpes region of France are used in this study. The dataset consists of information for different varieties of farms and SMEs. For instance, information is provided for farms dealing in field crops, wine-growing, livestock, mixed crops, and cattle, and for SMEs in restauration/hotel, craft, liberal profession, sell of goods/services, and building construction. The largest number of farm category in the dataset is that of mixed crops and cattle, which represent 17.95% of the total observations followed by wine-growing, which represents 17.71%. The largest observations for SMEs are from sell of goods/services, representing 13.63% of the total observations. The data were collected randomly from the regional branch headquarters, with the service administering bank loans. For analytical purposes, the dataset has been anonymized and no information concerning the precise location of the farms and SMEs or the age and gender of the business owner have been provided.

3.2 Variables

The variables used in this study have been inspired by previous studies on the financing decisions of both farm businesses and SMEs. The dependent variable and most of the independent variables have been used in the work of Tamirat et al. (2018); Lopez-Gracia and Sogorb-Mira (2008); Kalusova and Badura (2017); Ohman and Yazdanfar (2017); Zhao et al. (2004) etc.

3.2.1 Dependent Variable

In general, the indicators of indebtedness depict the financial state of a firm (both farms and SMEs). for this reason, the indebtedness ratio acts as the dependent variable in the regression model. Indebtedness can simply be defined as the ratio of total debts divided by the total assets. The study of Daskalis et al. (2014); Kalusova and Badura (2017); Tamirat et al. (2018) etc. have all used this method of computing debt ratio as a depended variable on which different determinants of capital structure can be checked on for both farms and SMEs. Therefore, in this study indebtedness is measured as the ratio between debts and total assets.

3.2.2 Independent Variables

The first independent variable used in this study is profitability (*ROA*), which have been measured as earnings before interests and taxes divided by total assets as proposed and measured by Fama and French (2002). However, the study of Ohman and Yazdanfar (2017) measured it as earnings after interest and tax divided by total assets. Zhao et al. (2004) measured profitability by the return on market value assets and Tamirat et al. (2018) measured profitability as the ratio between net farm income and total assets. In this study, profitability is measured as the ratio between debt and equity

The second independent variable is tangibility (*TANG*), which is commonly measured as the ratio between tangible assets and total assets. This variable is important because the assets of a firm should serve as a collateral if a large ratio of the assets are tangible. Thus, tangibility has a significant impact on debt. Both Serrasqueiro and Caetano (2015) and Tamirat et al. (2018) measured tangibility as the ratio between fixed assets and total assets, while the study of Kalusova and Badura (2017) measured it as the ratio between tangible fixed assets and total assets. In this study, tangibility is measured as the ratio between fixed assets and total assets.

The next independent variables are growth opportunity (*GO*), effective tax rate (*ETR*), and non-debt tax shields (*NDTS*). Tamirat et al. (2018) measured growth opportunity as the ratio between total investments and total assets. The study of Cheng and Katchova (2018) measured it as sales growth rate. Both Michaelas et al. (1999) and Serrasqueiro and Caetano (2015) have measured growth opportunity as the ratio between intangible assets and total assets, while Ohman and Yazdanfar (2017) measured it as the percentage change in sales. Thus, growth opportunity is measured in this study as the percentage change in sales. The effective tax rate (*ETR*) has been measured as the ratio between tax paid and earnings before tax (EBT) (see Lopez-Gracia & Sogorb-Mira, 2008). However, Kalusova and Badura (2017) measured it as the difference between EBT and profit divided by EBT which has also been employed by Bauer (2004). Most studies have measured (*NDTS*) as the ratio between depreciation and total assets (see Ohman & Yazdanfar, 2017; Lopez-Gracia & Sogorb-Mira, 2008; Kalusova & Badura, 2017). Finally, Tamirat et al. (2018) measured earnings volatility as the standard deviation of profit (*ROA*). Hence, earnings volatility (*VOL*) is measured by taking the standard deviation of profit.

3.2.3 Control Variables

The first control variable is Size (*SIZE*). The most common proxy for the measurement of size is the natural logarithm of sales revenue (Titman & Wessels, 1988). This measurement is often utilised because of the huge discrepancies among the firm's size that may arise. The studies of Daskalis et al. (2014); Zhao et al. (2004); Lopez-Gracia and Sogorb-Mira (2008); and Tamirat et al. (2018) have all measured size based on the natural logarithm of sales revenue. Hence, size is measured in this study as the natural logarithm of sales. The next control variable is age (*AGE1*), which is frequently measured as the natural logarithm difference between the first year of observation and registration date (see Michaelas et al., 1999; Ohman & Yazdanfar, 2017; Serrasqueiro & Caetano, 2015). Kalusova and Badura (2017) measured age as the number of years since the establishment of the company to the observation date. Therefore, age is measured in this study as the natural logarithm of the number of years since the firm's establishment to the year of observation. In addition to this, another variable exists for age (*AGE2*), which is measured based on the age of the farm owner.

Table 3. Description of the main variables

<i>Variables</i>	<i>Explanation</i>
Dependent Variable	
<i>Indebtedness (Lev)</i>	Ratio between debts and total assets
Independent Variables	
<i>Profitability (ROA)</i>	Ratio between debt and equity
<i>Tangibility (TANG)</i>	Ratio between fixed assets and total assets
<i>Volatility (VOL)</i>	measured by taking the standard deviation of profit
<i>Growth (GO)</i>	Measured as the percentage change in sales
<i>Effective tax rate (ETR)</i>	Measured as the ratio between tax paid and earnings before tax
<i>(NDTS)</i>	
<i>Collateral (LAND)⁴</i>	Measured as the average of the percentage of acreage owned by farmer
<i>salaries</i>	Measured based on the number of employees
Control Variables	
<i>Size (SIZE)</i>	Measured as the natural logarithm of sales revenue
<i>Age (AGE1)</i>	Measured as the natural logarithm of the number of years since the firm's establishment to the year of observation
<i>Age (AGE2)</i>	Measured as the natural logarithm of the age of the farm owner

⁴ The one used for measuring land title

The independent variables of effective tax rate, non-debt tax shields, and volatility cannot be measured in this study due to the lack of sufficient information in the computations of these variables.

3.3 Model Specifications

3.3.1 ANOVA

Firstly, the analysis of variance (ANOVA) will be used to ascertain the significant differences in the indebtedness level of farm businesses and SMEs. The use of ANOVA in this kind of comparative study is extremely significant. With ANOVA, we can make a comparison between multiple populations and even subsets of those populations. Basically, the test is all about the variability between sample means. In this analysis, we are interested in knowing if all these means come from a common population, therefore, we are talking about the relative distance between these means.

In financial analysis, ANOVA could be used for investigating how two or more groups interact with each other quantitatively by analysing if there is a difference between/within them or not. The null hypothesis is given as: $H_0: \mu_1 = \mu_2$

While the alternative hypothesis state that there is a difference in the mean. In capital structure analysis, several studies have used ANOVA to check for differences in indebtedness between several groups and other studies have used ANOVA to check for differences in other variables (see Graham et al. 2004; Riportella & Papis, 2001; Acedo-Ramirez et al. 2017; Agwan, 2017). In line with this study, we are interested in the differences in leverage ratios between farms and SMEs. To do this, both one-way and two-way ANOVA are used. However, most of the analysis are based on the one-way ANOVA. For instance, it used for checking the differences between the leverage ratios. Then, the differences between the segmented groups (*i.e.* the different types of farms and SMEs in our dataset) are checked separately. After, segmented groups (both different types of farms and SMEs) are combined to see if some farms and SMEs types have similar leverage ratio. Finally, the Bonferroni test for multiple comparison is performed to see where the differences come from and their significance level.

3.3.2 Regression Model

Once, this has been achieved, the dataset will be segmented according to the firm (farm businesses or SMEs). By doing this, the indebtedness of both categories can be explained by analysing the impacts of the independent variables. Hence, the intended multiple regression

model used in this study can be estimated using the dynamic partial model which can be written as:

$$\begin{aligned} \text{Lev}_{it}^* = & \beta_1 + \beta_2 \times \text{ROA}_{it} + \beta_3 \times \text{TANG}_{it} + \beta_4 \times \text{SIZE}_{it} + \beta_5 \times \text{AGE}_{it} \\ & + \beta_6 \times \text{AGE2}_{it} + \beta_7 \times \text{VOL}_{it} + \beta_8 \times \text{GO}_{it} + \beta_9 \times \text{LAND}_{it} \end{aligned} \quad (1)$$

In a frictionless economy without any transaction costs, firms would generally adjust to their target level of indebtedness by increasing or decreasing their resources. Therefore, let indebtedness of firm i in period t , denoted as: $\text{Lev}_{it} = \text{Lev}_{it}^*$

The idea with a partial adjustment model is that the value of Lev_{it} (which we can actually observe) differs from its equilibrium value (Lev_{it}^*), that is: $\text{Lev}_{it} - \text{Lev}_{it-1}$

The assumption underlying this is that a change in Lev_{it} is given by some parameter (λ) multiplied by the difference between the true equilibrium value of indebtedness and what it was in the previous period. This can be rewritten as:

$$\text{Lev}_{it} - \text{Lev}_{it-1} = \lambda (\text{Lev}_{it}^* - \text{Lev}_{it-1}), \quad 0 < \lambda < 1 \quad (2)$$

Where, Lev_{it-1} is a lagged leverage variable which is incorporated to build a dynamic specification that “allows for the potential effect of the autoregressive process and adjustment costs” (Byoun, 2008, as cited in Tamirat et al., 2018), λ depicts the convergence rate or the speed of adjustment from Lev_{it} to Lev_{it}^* . The smaller the λ , the smaller the adjustment and speed of adjustment. There is an inverse relationship between transactions costs and λ which can be denoted as $1 - \lambda$. If ($\lambda=1$), the speed of adjustment is high, that is, firms will automatically adjust their indebtedness level to the target one and vice versa if ($\lambda=0$) (i.e. firms prefer to do nothing: $\text{Lev}_{it} - \text{Lev}_{it-1}$). Thus, firms will adjust their level of indebtedness to the target debt level in a direct way according to the adjustment speed if the adjustment speed is at an intermediate level $0 < \lambda < 1$ (Drobetz & Wanzenried, 2006).

Heshmati (2001) argued that when there are no transaction costs, “the inferred association will undergo a specification error when the observed firm indebtedness is regressed on the determinants of capital structure solely”. Therefore, to eschew this specification error, equation (2) may be rewritten as follows:

$$\text{Lev}_{it} = (1 - \lambda) \text{Lev}_{it-1} + \lambda (\text{Lev}_{it}^*) + \varepsilon_{it} \quad (3)$$

By integrating equation 1 and 3, the following equation is obtained:

$$\text{Lev}_{it} = \alpha + (1-\lambda) \times \text{Lev}_{it-1} + \beta_1 \times \text{ROA}_{it} + \beta_2 \times \text{TANG}_{it} + \beta_3 \times \text{SIZE}_{it} + \beta_4 \times \text{AGE}_{it} + \beta_5 \times \text{AGE2}_{it} + \beta_6 \times \text{GO}_{it} + \beta_7 \times \text{LAND}_{it} + \beta_8 \times \text{SECTOR}_{it} + \varepsilon_{it} \quad (4)$$

Where, ε_{it} is the error term.

Since the same model will be used for checking the determinants of leverage for SMEs, the model for SMEs can be formulated as follows:

$$\text{Lev}_{it} = \alpha + (1-\lambda) \times \text{Lev}_{it-1} + \beta_1 \times \text{ROA}_{it} + \beta_2 \times \text{TANG}_{it} + \beta_3 \times \text{SIZE}_{it} + \beta_4 \times \text{AGE}_{it} + \beta_5 \times \text{AGE2}_{it} + \beta_6 \times \text{GO}_{it} + \beta_7 \times \text{salaries}_{it} + \beta_8 \times \text{SECTOR}_{it} + \varepsilon_{it} \quad (5)$$

Where salaries are the number of employees of SMEs used as the equivalent of land ownership to check for collateral for SMEs.

According to the literature of econometrics, it is conventional to use panel data estimation techniques for a dataset that encompasses cross-sectional and time-series data. There are some underlying assumptions that must be met for the estimated coefficients to be valid and reliable when dealing with panel data. However, in this first empirical analysis, the researcher's focus is on the pooled ordinary least squares. With regards to some previous studies that are based on the determinants of capital structure such as Margaritis and Psillaki (2010), the OLS estimation model is used in this study. OLS is a widely accepted regression model utilised for investigating the nexus between different variables and according to Park (2011), the OLS gives efficient and consistent parameter estimates if there is no cross-sectional or time-specific effect on a data (*i.e.* the absence of individual heterogeneity). Park (2011) further states that if individual effects are not zero in the panel data, then heterogeneity might impact the assumptions of non-autocorrelation and exogeneity, which will lead to biased and inconsistent parameter estimates. Therefore, the random effect or fixed effect estimates should be used. However, this first empirical analysis is entirely based on the pooled OLS, thus the common underlying assumptions of the OLS (*i.e.* normality, heteroskedasticity, multicollinearity, and autocorrelation), and then panel data effects should be checked. (See appendix B for a full analysis of the mentioned OLS assumptions).

CHAPTER 4: FIRST EMPIRICAL RESULTS AND ANALYSES

4.1 Descriptive Statistics

The descriptive statistics of the sample taken into consideration are presented in Table 4. The analyses show that the average leverage of French farms is higher than that of French SMEs. The average leverage ratio of SMEs is 0.186, which is almost twice as low as that of farms. The leverage ratio of farms is 0.373, which is greater than the combined mean value of 0.322 for both farms and SMEs. Several reasons could explain this disparity in indebtedness between farms and SMEs. For instance, the data used is from Crédit Agricole, which was initially established to provide loans to farmers. However, it has deviated from this objective by providing external finances to other sectors. This shows that farmers are more likely to receive loans compared to SMEs. Farm limited access to the equity market could also possibly explain why they are more indebted than SMEs. The standard deviation for leverage for both farms and SMEs is 0.327, which is higher than the mean value. This signifies that both farms and SMEs have negative leverages. This eventuates when borrowed resources used for purchasing new investment have a higher cost or interest rate compared to the investment's returns. Furthermore, the standard deviation of farms' indebtedness is 0.348, while that of SMEs is 0.211. this shows that farm businesses display a degree of variability and dispersion compared to SMEs. The minimum and maximum values of indebtedness also demonstrate the likelihood of some possible outliers. For instance, the maximum leverage ratio of farms is 6.357, which is higher than that of SMEs.

The average profitability and tangibility for both categories of firms are 1.437 and 0.523, respectively. Farms have a mean value of 1.691 for profitability and 0.563, while SMEs on the other hand have an average profitability of 0.764 and tangibility of 0.460. This could probably explain why farms are more indebted because these factors increase their chances of receiving loans. However, the profitability of farm businesses has a standard deviation of 19.51, which is higher than the standard deviation of profitability for both categories of firms combined. This high variability of the profitability in farms could explain that there is a greater profitability range among farm businesses compared to SMEs. Furthermore, a higher dispersion in profitability could show that the profitability of farm businesses is deviating from the expected mean return. SMEs also have a high standard deviation for profitability.

Table 4. Descriptive Statistics

	Obs	Mean	Std.Dev.	Min	Max
Leverage	1,264	.3220	.3269	-.0219	6.357
SMEs	345	.1856	.2106	-.0219	.8783
Farms	919	.3732	.3475	0	6.357
Profitability	1,257	1.437	16.81	-171	529
SMEs	345	.7642	4.805	-41	60.6
Farms	912	1.691	19.51	-171	529
Tangibility	889	.5229	.2443	0	1.170
SMEs	345	.4603	.3019	0	1.170
Farms	544	.5627	.1892	0	1.136
Size	1,306	5.567	.9669	0	9.389
SMEs	357	5.987	1.081	.6931	9.389
Farms	949	5.409	.8699	0	8.040
Growth	1,021	-.0229	.7333	-18	1
SMEs	308	-.0151	.5951	-8.172	1
Farms	713	-.0264	.7859	-18	.9158
Age1	1,375	2.543	.9732	0	3.912
SMEs	433	1.915	1.115	0	3.784
Farms	942	2.833	.7393	0	3.912
Age2	1,165	3.769	.2570	2.944	4.407
SMEs	573	3.718	.2641	3.044	4.407
Farms	592	3.819	.2397	2.944	4.382
Collateral	888	.4095	.3326	0	1.184

Size measured based on sales shows that SMEs are larger than farms but the difference in their mean values is not far from each other. SMEs have an average size of 5.987 with a standard deviation of 1.081, while farms have 5.409 with a standard deviation of 0.869. In addition, the maximum sales value for both categories of firms is not far from each other with that of SMEs being relatively higher. The descriptive statistics further show that farm businesses are older than SMEs. The average age of farms is approximately 21 years, while that of SMEs is approximately 7.7 years. Additionally, farm owners appear to be older than SMEs owner. The mean age of farm owners is approximately 47 years, while that of SMEs owner is approximately 43 years. The maximum age of SMEs owner is 82 years, while that farm owner is 80 years. The standard deviation of the owners age follows similar patterns for both firms, but that of SMEs is relatively higher.

The descriptive statistics of Table 5. further show that field crops (with a mean value of 0.427) are the most indebted category of firms for both farms and SMEs. For SMEs, the most indebted category of firms is restaurant and hotels (with an average debt level of 0.259). The least indebted of farm categories is wine-growing farms (with an average leverage of 0.312), which is higher than the most indebted SMEs group.

4.2 ANOVA Results

The ANOVA results show that there is a significant difference between the mean leverage level of farms and SMEs (with an F-test score of 88.30). Furthermore, the results demonstrate that the mean debt level of farms businesses are different (with an F-test score of 5.29). Similar results are also observable for SMEs. To check for where these differences arise, the Bonferroni test for comparison (see appendix A for the Bonferroni test) shows that there are significant differences between the debt level of field crops and wine-growing, wine-growing and livestock, mixed crops/cattle and field crops, and wine-growing and mixed crops/cattle. The results further demonstrate that there is a little difference between the indebtedness of livestock and field crops, and between livestock and mixed crops/cattle. For SMEs, significant differences are observable between restaurant and craft, restaurant and sell of goods/services, restaurant and building construction, craft and liberal profession, craft and sell of goods/services, and between liberal profession and building construction. Little differences in indebtedness were found between restaurant and liberal profession, craft and building construction, liberal profession and sell of goods/services, and sell of goods/services and building construction.

Table 5. Summary Statistics of firms and ANOVA results

	Firms	Mean	Std.Dev.	Obs.	ANOVA (P-Value)
Panel A: Business type (Farms and SMEs)					
Lev	Farms	.3732	.3475	919	88.30*** (0.000)
	SMEs	.1856	.2106	345	
Panel B: Categories of SMEs and Categories of Farms					
Lev (Farms)	Field crops	.4377	.6264	204	5.29*** (0.0013)
	Wine-growing	.3125	.2022	263	
	Livestock	.3937	.1930	173	
	Mixed crops and Cattles	.3699	.2059	272	
Lev (SMEs)	Restaurant and Hotels	.2589	.2295	75	5.42*** (0.0003)
	Craft	.1327	.1889	91	
	Liberal Profession	.2501	.2792	19	
	Sell of goods/Services	.1917	.2073	120	
	Building construction	.1198	.1353	40	

Note: Significance level at 5%.

Furthermore, a comparison was made combining the different categories of farm businesses and SMEs, the Bonferroni results show that there are little differences in the indebtedness level of wine-growing and liberal profession, wine-growing and restaurant, mixed crops/cattle and liberal profession, and livestock and liberal profession. The comparison between the other groups shows a statistically significant different debt level among them.

4.3 Correlation Analysis

The correlation analysis shows that the problem of collinearity will not be an issue in this study. Gujarati and Porter (2010) argue that the problem of collinearity is not of particular relevance if the correlation coefficients among the independent variables are not above 50%.

Table 6. Correlation Matrix

	Lev	Lev_1	ROA	TANG	SIZE	AGE1	AGE2	GO	LAND
Lev	1								
Lev_1	0.915***	1							
ROA	-0.0102	0.0254	1						
TANG	0.244***	0.305***	0.0769	1					
SIZE	-0.115	-0.162**	0.0407	-0.213***	1				
AGE1	0.0277	0.00544	0.0368	0.0161	0.172**	1			
AGE2	-0.00768	-0.00785	0.0839	-0.0687	0.145*	0.454***	1		
GO	0.0357	0.0382	0.0428	-0.00831	0.211***	-0.0700	-0.0770	1	
LAND	0.0419	0.0391	0.0377	-0.00104	0.134*	0.0260	0.107	0.0303	1

Note: Significance level at 10% *, 5% **, 1% ***

However, a positive significant correlation can be found between leverage and lagged leverage, this is possible since there are no significant changes in the level of indebtedness of the precedent year and the year of study. Furthermore, leverage is a dependent variable, therefore, the issue of collinearity is not relevant to this study.

4.4 Regression Results

The diagnostic tests identified the issue of heteroskedasticity (see appendix B2). Therefore, the regression is based on the heteroskedasticity-corrected standard errors. The regression results show that farms have an R² of 0.843, which is larger than that of SMEs (0.667). The R² of 0.843 for farm businesses signifies that 84.3% of the variation in farms indebtedness is being described by the independent variables while 15.7% (1-0.843) of the variation is being explained by the residuals. However, the root of mean square error (MSE) for farms is larger compared to SMEs. Farms have an MSE of 0.222, which indicates how much on average is each observation missing the prediction. SMEs on the other hand have 0.116. The higher the MSE, the worst fitting the regression model seems to be.

4.4.1 Interpretation of Regression Coefficients

The coefficient for farm profitability (-0.005) indicates that there is a negative nexus between leverage and profitability for farm businesses, however, the result is not significant. This implies that a 1% increase in profitability measured by the ratio between debt and equity will lead to a 0.005 percentage point decrease in farms' indebtedness. On the other hand, profitability is positively (0.005) linked to the indebtedness level of SMEs, implying a 1% increase in SMEs' profitability will lead to a 1% percentage point increase in its leverage. Since a significant relationship was not found for farms and SMEs, hypothesis1 cannot be validated. The regression coefficient of tangibility for farms and SMEs is -0.092 and 0.100, respectively. The model predicted a negative relationship between asset tangibility and leverage for farms,

but the finding is not significant, nonetheless, it shows a positive and statistically significant relationship for SMEs. Since the finding does not provide any significant evidence for farms, hypothesis5a cannot be fully validated. The same also goes for hypothesis 5b, which argues a positive relationship between land ownership and leverage, the model predicts a positive association of 0.030, but the result is not significant.

Farm and SMEs size measured based on the natural logarithm of sales revenue predicts a coefficient of 0.021 for farms and 0.041 for SMEs. These findings are strongly significant for SMEs, but not significant for farms. The results support the predictions of both the trade-off theory and signalling theory. The same cannot be said for farms, therefore, hypothesis8 cannot be fully validated.

Table 7. Regression results

	Farms	SMEs
Lev_1	1.581*** (0.202)	0.644*** (0.096)
Profitability(ROA)	-0.005 (0.004)	0.005 (0.006)
Asset Tangibility	-0.092 (0.092)	0.100*** (0.038)
Size	0.021 (0.019)	0.041*** (0.012)
Age1	0.018 (0.024)	0.001 (0.009)
Age2	-0.035 (0.048)	-0.011 (0.034)
Growth Opportunity	0.002 (0.010)	0.012 (0.012)
Land Ownership	0.030 (0.038)	
Salaries		-0.001 (0.001)
_cons	-0.159 (0.227)	-0.199 (0.125)
Obs.	279	235
R-squared	0.843	0.667
Sector Dummy	YES	YES

Standard errors are in parenthesis

Note: Significance levels at 10%*, 5% **, 1%***

The age of the firms measured based on the natural logarithm of the difference between the firm's establishment year and the year of observation shows that AGE1 is positively associated with leverage for both farms and SMEs, however, the results are not significant. This positive correlation contradicts the predictions of the growth cycle of Berger and Udell (1998). Therefore, 7a cannot be validated. The age (AGE2) of the farm holder and SMEs owner

measured based on the natural logarithm of age shows a negative correlation between leverage and age for both farms and SMEs, supporting the growth cycle of Berger and Udell (1998) and Katchova (2005) for farms. Nevertheless, the hypothesis7b cannot be validated since there is no strong significance. The coefficient of growth opportunity on indebtedness for farm businesses and SMEs shows a positive association but the results are not significant. Number of employees (salaries) as a measure of collateral for SMEs shows a negatively insignificant relationship between the number of employees and leverage for SMEs.

4.4.2 Robustness Checks

Table 8. Large VS Small (Farms and SMEs)

	Large Farms	Small Farms	Large SMEs	Small SMEs
Lev_1	1.825*** (0.110)	0.835*** (0.073)	0.804*** (0.055)	0.502*** (0.139)
Profitability (ROA)	0.005* (0.003)	-0.002 (0.004)	0.000 (0.002)	0.036*** (0.013)
Asset Tangibility	0.034 (0.131)	0.101* (0.062)	0.065 (0.055)	0.095* (0.056)
Size	0.021 (0.025)	-0.017 (0.024)	0.048** (0.018)	0.055*** (0.021)
Age1	-0.025 (0.024)	0.018 (0.024)	-0.009 (0.010)	0.005 (0.015)
Age2	0.069 (0.070)	-0.088 (0.055)	-0.016 (0.043)	0.017 (0.057)
Growth Opportunity	0.105 (0.129)	-0.010 (0.008)	0.019** (0.007)	0.002 (0.017)
Land	0.145* (0.082)	-0.042 (0.036)		
Salaries			0.001 (0.001)	0.011 (0.018)
_cons	-0.638* (0.353)	0.374* (0.213)	-0.229 (0.205)	-0.380* (0.202)
Obs.	104	175	98	114
R-squared	0.942	0.681	0.796	0.637
Sector Dummy	YES	YES	YES	YES

Standard errors are in parenthesis

Note: Significance level at 1% *** 5% ** 10% *

To check for the results' robustness in size, the sample used in this study is split and the regression model is re-estimated. For this, the number of hectares of land was used for farms and the number of employees (salaries) were used for SMEs. According to this estimation, the mean land size is 84 hectares. Farms greater than 84 hectares are considered large farms while farms lesser than 84.01 are considered to be small farms. For SMEs, the mean number of employees is 3. Large SMEs are greater than 3 while small SMEs are lesser than 3.01.

The results are similar to the estimations of the regression model, however, some significant differences and similarities regarding profitability, asset tangibility, size, growth opportunity, and land ownership, which all have a positive significant relationship with indebtedness, were found to be different between large and small farms, and SMEs.

4.5 Discussion of the Results

This section of the study explains the main significant findings of each variable and their theoretical implications based on the two regression results provided above.

4.5.1 Profitability

The robustness check results based on large and small firms shows a positively significant relationship between profitability and large farms, a strongly positive significant relationship between profitability and small SMEs, and a negatively insignificant association between small farms. This implies that the result follows the predictions of the trade-off theory, which stipulates that profitability is positively associated to debt level. The results contradict the findings of Daskalis et al. (2014) for Greek firms, Ohman and Yazdanfar (2017) for Swedish firms, Adair and Adaskou (2015) for French firms. Similar negative results are also obtained by Mac an Bhaird and Lucey (2010) for Irish firms, and Psillaki and Daskalis (2009) for Greek, French, and Italian SMEs. However, the result is consistent with the findings of Tamirat et al. (2018) for Dutch dairy farms. In addition to this, the result also provides support for the signalling theory (*i.e.* small SMEs and large farms can send out a positive signal to loan providers based on their profit). A possible reason for this conflictual result between SMEs and farms is that farm businesses are often seasonal which may affect their profitability, while SMEs, on the other hand, operate on a daily basis. In this case, large farms may be very similar to SMEs because they can generate more cash earnings since they can produce more, store and sell at later days, which increases their equity compared to small farms.

4.5.2 Tangibility

The results demonstrate a positive nexus between tangibility and leverage for small farms and small SMEs which supports the predictions of the trade-off, pecking-order, and signalling theory. This is in line with the findings of Ohman and Yazdanfar (2017) for Swedish SMEs short-term debts and Adair and Adaskou (2015) for French SMEs. Tangibility being positively significant for SMEs could imply that banks often place greater emphasis on the asset structure and liquidity of SMEs since they do not possess many physical assets like farms. For instance, similar results are found for small farms that do not have a large amount of land that can be considered as a collateral. Moreover, land ownership shows a positive and significant relationship with indebtedness for large farms, showing support that large farms can use their farmland size as a collateral, while small farms can use asset tangibility as collateral, which is also the same for SMEs. This is further supported by the insignificant nexus between large farms and asset tangibility because they already possess large farmlands that can be used as a collateral for credit granting. In this regard, SMEs compliment farm businesses in that their lack of land (in general) often make their tangibility ratio an important determinant of leverage which is also applicable to small farm businesses.

4.5.3 Size

Size based on sales also shows a positively significant correlation with leverage for both large and small firms which is in line with the size hypothesis of trade-off and signalling theory, but insignificant negative association is observed for small farms. The positive and significant association between size and leverage is also consistent with the findings of Lopez-Gracia and Sogorb-Mira (2008) for Spanish SMEs and Daskalis et al. (2014) for Greek firms. This signifies that size based on sales is an important determinant of leverage for SMEs. One reason for this difference is that size is measured in this study based on sales and given that farm businesses are often seasonal, they are not expected to generate sales like SMEs, which operate on daily basis. This is further supported by the descriptive statistics that show that SMEs on average have higher sales value than farms.

4.5.4 Growth Opportunity

The results show that there is a positive and significant relationship between growth opportunity and small SMEs. This is consistent with the findings of Daskalis et al. (2014) for Greek firms, Ohman and Yazdanfar for both long and short-term debt of Swedish SMEs(2017), Tamirat et al. (2018) for Dutch agricultural enterprises, and Adair and Adaskou (2015) for French SMEs. However, the results of Serrasqueiro and Caetano (2015) for Portuguese SMEs, and Lopez-Gracia and Sogorb-Mira (2008) for Spanish SMEs, show a negative association between leverage and growth opportunity. The positive relationship between leverage and growth opportunity is consistent with the predictions of trade-off, pecking-order, and signalling theory. The results found no significant relationship with indebtedness for large farms, small farms, and small SMEs. However, a positive correlation is observable for large farms, which may imply that sales as argued before plays an important factor for both large farms and SMEs. This is because large farms and SMEs generate more cash which makes them take more new investment opportunities as they arise.

4.5.5 Adjustment to the Target Debt Level

The regression coefficients for adjustment to the target level of indebtedness based on the lagged leverage demonstrate a positive and strongly significant relationship. The coefficient for SMEs is 0.644, which means that the speed of adjustment to the target debt level for SMEs is 35.6% (1-0.644). This signifies that SMEs adjust to their target level, however, this low parameter of adjustment is due to transaction costs (Myers, 1984). This shows that SMEs face higher transaction costs, which impedes them from adjusting to their target debt level. Similar results are found by Lopez-Gracia and Sogorb-Mira (2008) who found the adjustment speed to be 36% for Spanish SMEs. However, Serrasqueiro and Caetano (2015) found a higher speed of adjustment of approximately 60% for Portuguese SMEs. The adjustment result for farms is 1.581, which also demonstrate some levels of adjustment to the target level. As seen in the study of Tamirat et al. (2018), if the adjustment coefficient is greater than 1, the firm adjust but still not at the target level of indebtedness. Therefore, hypothesis9 is validated. One main difference in this adjustment speed between farm businesses and SMEs is that farms have received substantial loan compared to SMEs in the past few years. For instance, Crédit Agricole and EIB pledged a £300 million finance programme for Mid-Cap Agriculture and SMEs (Prêt PME et Mid-Cap Agriculture II) in 2016 (European Union, 2019).⁵ The last tranche was released last

⁵ See European Union Newsroom.(2019). France: EUR 100 million loan in support of farmers – EIB and Crédit Agricole Group officially launch third tranche of their programme. European Union.

year (2019). Based on the years the dataset was collected, one can argue that a substantial amount of this loan has been provided to the agricultural sector. The difference in adjustment speed can also explain that SMEs face higher transaction costs compared to farms due to information asymmetry.

The results for adjustments based on large and small size show significant differences between large and small firms for the adjustment to the target debt level. The coefficient for adjustment for large farms is 1.825 and that small farms is 16.5% (1-0.835), which provides evidence that both farms adjust, but the speed of adjustment for small farms is slow, probably due to high transaction costs small farms face. Therefore, one can argue that banks provide more loans to larger farms. This result further supports the trade-off theory that size is positively related to indebtedness level. The result also provides evidence for the signalling theory that large farms can use their size to send out positive information to the external financial markets. For adjustment of SMEs, contradictory results are obtained. The speed of adjustment for large SMEs is 19.6% while that of small SMEs is 49.8%, providing evidence that small SMEs adjust at a faster rate compared to large ones.

Table 9. Verified Relationships between the Variables and Leverage

Variables	TOT		POT		ST	
	Farms	SMEs	Farms	SMEs	Farms	SMEs
1 Profitability	+	+			+	
2 Non-Debt Tax Shields						
3 Effective Tax Rate						
4 Growth Opportunity		+		+		
5 Asset Tangibility and Collateral	+	+	+	+	+	
6 Earnings Volatility						
7 Age						
8 Size		+		+		

Source: author's process

4.6 Similarities and Differences between Farms and SMEs

The most significant difference found between farms and SMEs in these first empirical results is based on the findings of both the ANOVA analysis and regression analysis. The ANOVA analysis shows that there is a significant difference between the indebtedness of farms and SMEs. This difference could be explained by the large amount of money that has been pledged to the agricultural sector recently and farmers limited access to the equity market. In addition, when the sample is divided to check for size effect, the result shows that tangibility is positively

correlated to indebtedness for small farms and large SMEs. This is probably due to the fact that collateral is an important determinant of leverage. The result shows that small farms cannot pledge their land ownership as collateral, however, the finding is not significant, large farms, on the other hand, can use land ownership as collateral, which does not apply to SMEs since they can always operate on places they want. Therefore, the issue of tangibility is more pertinent to SMEs compared to farms. In this regard, SMEs can explain small farms since they share similar characteristics with them.

The ANOVA analysis also shows that there are some differences between farm and SME categories. That is, some farms are entirely different with regards to debt ratio. The same also applies for SMEs. However, some similarities in indebtedness are observed in the leverage ratio of some categories of firms. Liberal profession and restaurant seem to share some characteristics with some types of farm businesses.

The literature also highlighted farms and SMEs have limited access to credit. Based on the descriptive statistics, all the categories of firms have a debt level below 50%. Several reasons could explain this. For instance, the ownership structure of farms and SMEs may play a role here. If the firm is based on the owner-manager system, the entrepreneur may resort to less debt to be conservative and avoid the dilution of ownership.

The issue of information asymmetry is also observable for small farms because they adjust slowly to their target debt level due to transaction costs as argued by Myers (1984). However, this is almost the same for large and small SMEs. One can argue here that the problem of information asymmetry is almost the same for farm businesses and SMEs. Therefore, loan providers demand collateral because land ownership is significant and large farms have better adjustment compared to the others.

4.7 Limitations and Future Research

The researcher has demonstrated several similarities and differences between farms and SMEs in this study. These differences have been identified based on the extensive literature review and the empirical analysis. However, the first limitation to this first empirical analysis is that only the OLS regression technique has been used. The researcher strongly believes that more efficient panel data analysis may provide more efficient or similar results. Due to time constraint, the researcher could not test for all the underlying assumptions and determine the most relevant and efficient model. Therefore, a panel data analysis based on the random effect, fixed effect, or the generalized method of moments (GMM) of the similarities and differences

between farms and SMEs finance may produce a more consistent or similar results. The dataset employed in this study is immensely rich in different classes of information concerning the financing of farms and SMEs. However, the researcher observed that there a lot of missing values when the variables used for testing the hypotheses were generated. Therefore, changing the measurement techniques of some variables may generate beneficial results too.

Secondly, the hypotheses were tested based on total debts. A lot of studies have differentiated between short- and long-term debt in the study of capital structure and how these categories of debts determine their capital structure, therefore, it will be important to perform a study like this based on short- and long-term debts. That is, making a comparative analysis between the short and long-term financing patterns of SMEs. Additionally, one advantage of the dataset is that it provides information for different classes of farms and SMEs and the ANOVA results show some similarities and differences between farm businesses and SMEs. Therefore, segmenting the sample and performing an empirical study based on the different categories of farms and SMEs may generate better results for comparing the financing decisions and capital structure of the firms.

The farms and SMEs studied are situated in the Auvergne-Rhône-Alpes region of France, therefore, conducting a study by comparing different regions may generate results that show if geographical differences impact the financing of farms and SMEs. In addition to this, the researcher has found interesting and useful results, but a cross-country analysis will also enable academics to ascertain if country differences impact the financial structure of farm businesses and SMEs.

Finally, the dataset consists of a lot of interesting financial ratios that might be utilized to determine the optimal capital structure of farms and SMEs. Therefore, future research can conduct an empirical and comparative analysis on the optimal capital structure of farm businesses and SMEs, to see if they follow similar or different optimal capital structure choice, and to determine the amount of debt and equity mixing that yields the maximum profit and minimum costs for their respective businesses.

CONCLUSION

This study is conducted with the aim of making a comparative analysis between farm businesses and SMEs. The comparison encompasses the capital structure choice, determinants, and financing choices of both categories of firms. Besides, the study employed the main capital structure theories (agency theory, trade-off theory, pecking order theory, and signalling theory), and how these theories complement each other and differ in terms of describing SMEs (including farms).

The main significance of this study is that it includes a wide range of literature from agricultural economics and entrepreneurship to corporate finance. Previous studies have independently studied the financing decisions of farms and SMEs separately, however, to the best of the researcher's knowledge, no specific study has been done to compare and contrast farms and SMEs. Therefore, the purpose of this study is to fill this gap by comparing farm businesses to SMEs and see how they differ and relate. Furthermore, the study seeks to understand if the financing patterns of SMEs can explain farm.

Both primary and secondary sources have been utilised in this study. The main secondary sources are the articles reviewed, while the main primary sources are the rich information provided by the dataset, which was obtained from Crédit Agricole, the second-largest commercial bank in France. Subsequently, the dataset provides information for multiple comparisons to be done between farms and SMEs because it includes farms and SMEs of different categories. The first empirical analysis made use of both the analysis of variance (ANOVA) and the partial dynamic model based on the pooled OLS estimation method, the model enables the test for the adjustment to the target level of indebtedness.

Based on the literature, interesting similarities and differences were found among both categories of firms. One of the main similarities between farm businesses and SMEs is that they all face the problem of financial restriction in the credit market. For instance, the descriptive statistics show that French farms and French SMEs have a debt level below 50% with French farms demonstrating more debts than SMEs. This is probably due to the recent amount of financial resources that have been pledged to the agricultural sector and farmers limited access to the equity market which makes them seek bank loans as their main source of external financing. Additionally, the issue of legal entity appears not to play a dominant role in differentiating between SMEs and farms. That is, in the case of financial default, both farm

businesses and SMEs can be sued because they all have legal entities. Furthermore, the regression analysis found that farms have lesser information asymmetry problems compared to SMEs. The adjustment coefficients of both categories of firms demonstrate this by showing that farms have higher speed of adjustment compared to SMEs. A lower speed of adjustment represents higher transaction costs, which makes firms to resort less to debt, given that farm businesses demonstrate having a higher speed of adjustments compared to SMEs, one can argue the existence of more information asymmetry problems in SMEs.

One other interesting result that is found in this study is that SMEs can complement farms if they have the same ownership structure. Farms, in general, tend to be based on the owner-manager system, while SMEs, on the other hand, can be based on this system or can have a separation between ownership and management. For instance, the ANOVA analysis shows no significant differences between the debt level of liberal professions and wine-growing farmers, mixed crop farmers and liberal professions, wine-growing and restaurant/hotel, and livestock and liberal professions. Given that farm businesses are based on sole proprietorship, one can argue that ownership structure plays a significant role because of the similarities they show with liberal professions. Furthermore, the regression results show that profitability is positively correlated to the indebtedness of both farms and SMEs, showing support for the trade-off theory. However, this significant correlation was found for only large farms and small SMEs. Therefore, it can be argued that profitability is an important determinant of leverage for both farms and SMEs.

A significant difference that was found between farms and SMEs is based on collateral demand and asset tangibility. Land ownership shows a positive and significant correlation with the indebtedness of large farms, while asset tangibility shows a positively significant nexus with the indebtedness of small farms and SMEs. One possible explanation for this is that large farms can use their farmland size as collateral, while bank access the tangibility of asset for small farms which is also the same for small SMEs. No significant relationship was found between asset tangibility and the debt level of large farms, showing support that the farmland ownership is a substantial and sufficient collateral that they can use to demand loans, while small farms mostly focus on the other fixed assets they possess. Furthermore, growth opportunity has a positively significant relationship with the indebtedness level of large SMEs. But the results show an insignificant result for farms. Growth opportunity was measured based on the percentage change in sales and the descriptive analysis show that SMEs generate more sales than farms. This is also supported by the ANOVA results, which demonstrate significant

negative differences between the sell of goods/services and every other type of farm business studied in the dataset. This is further supported by the regression results that demonstrate a significantly positive relationship between size (measured based on sales) and the indebtedness level for both small and large SMEs. In this case, size seems to have no significant effect on the debt level of farm businesses. This is probably because farm businesses are often seasonal, and their sales can vary depending on the time of harvest which is not the same for most SMEs since they operate daily.

To the researcher's surprise, both farms and SMEs seem to be following the predictions of the trade-off theory and signalling theory, which is contradictory to the study of Cosh and Hughes (1994) who argued that SMEs including (farms) can be better described by the pecking order approach due to the fact that they are mostly affected by information asymmetry problems such as adverse selection and moral hazards. However, the results support the presence of information asymmetry, which is observable in the adjustment coefficients, but most of the hypothesis tested in this study, shows support for the trade-off theory. For instance, profitability shows significant support for the trade-off theory. The pecking order states that a firm tends to stay away from debt when they are profitable. This makes them use their retained earnings and other cash for new investment opportunities, but the positive relationship between profitability and leverage may indicate that firms tend to use more debt because profitability might decrease their risk and cost of bankruptcy, which makes them resort to more debt. A profitable firm can also be innovative, and they may resort to debt to execute their innovative ideas. Furthermore, since another similarity between farms and SMEs is a legal entity, profitable firms might take more debts when they think the new investment is risky. This can be seen as a way of mitigating risk because putting their own money in such risky investment may cost them all the cash they have in hand, however, since the firm has a legal entity, the owners and operators are not liable to financial defaults. This may also explain why farmers and SMEs owner lack adequate access to credit.

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APPENDIX

Appendix A: Post hoc Tests for ANOVA

Table A1. Bonferroni comparison of leverage by SMEs type

Row Mean Col Mean	Restaurant/Hotels	Craft	Liberal Profession	Sell of goods/Services
Craft	-.126177 (0.001)			
Liberal Profession	-.008771 (1.000)	-.117406 (0.240)		
Sell of goods/Services	-.067222 (0.268)	.058956 (0.397)	-.05845 (1.000)	
Building Construction	-.139097 (0.006)	-.01292 (1.000)	-.130326 (0.234)	-.071876 (0.561)

Note: significance level at 5%

Table A2. Bonferroni comparison of leverage by Farm type

Row Mean Col Mean	Field crops	Wine- growing	Livestock
Wine-growing	-.125226 (0.001)		
Livestock	-.043999 (1.000)	.081227 (0.099)	
Mixed crops/cattle	-.067747 (0.207)	.057478 (0.327)	-.023749 (1.000)

Note: significance level at 5%

Table A3. Bonferroni comparison of leverage for farms and SMEs

Row mean Col mean	Restaurant & Hotel	Craft	Liberal profession	Sell of goods/services	Building	Field crops	Wine-growing	Livestock
Craft	-.1262							
		0.359						
Liberal prof.	-0.009	.1174						
	1.000	1.000						
Sell of goods/services	-.0672	.0586	-.0585					
	1.000	1.000	1.000					
Building	-.1391	-.0129	-.1303	-.0719				
	0.849	1.000	1.000	1.000				
Field crops	. -1788	.305	.1876	.2460	.3179			
	0.001	0.000	0.458	0.000	0.000			
Wine-growing	0.0535	.1797	.06233	.12078	.1927	-.1252		
	1.000	0.000	1.000	0.017	0.011	0.001		
Livestock	.1348	.2609	.1436	.2020	.2739	-.0439	.0812	
	0.069	0.000	1.000	0.000	0.000	1.000	0.296	
Mixed crops	.1110	.2372	.1198	.1782	.2501	-.0677	.05747	-.023749
	0.241	0.000	1.000	0.000	0.000	0.712	1.000	1.000

Note: Significance level at 5%

Appendix B: Diagnostic Tests

Four main tests are conducted to check for the underlying assumptions of normality, heteroskedasticity, multicollinearity, and autocorrelation in the OLS model.

B1: Normality

It is imperative to have in the residuals so that valid hypothesis testing can be conducted because this guarantees us that the p-values for t-statistics and F-test are consistent and reliable. One of the most common ways to test for normality is to conduct a skewness/kurtosis test (sktest), which measures skewness and excess kurtosis for normality. The null hypothesis of a sktest indicates that there is no significant variation from normality in the data.

Table B1. Skewness/Kurtosis tests for Normality for Farms and SMEs

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
r1 (Farms)	279	0.000	0.000	71.280	0.000

The null hypothesis is accepted which shows the presence of normality in the data.

B2: Heteroskedasticity

The assumption of heteroskedasticity simply states that the variance of the errors is constant (Hill et al., 2012). To test for this issue, the Breusch-Pagan test is performed.

Table B2 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of Lev (Farms)	Variables: fitted values of Lev (Farms)
chi2(1) = 919.8 Prob > chi2(1) = 0.000	chi2(1) = 57.40 Prob > chi2(1) = 0.000

The null hypothesis cannot be rejected which demonstrate the presence of heteroskedasticity. There are several methods for correcting heteroskedasticity (such as taking the logarithm of the dependent variable, the weighted least squares, or the heteroskedasticity-robust standard error estimates). Therefore, the regression model used in this study corrects for heteroskedasticity by conducting the heteroskedasticity-robust standard error estimates presented by White (1980).

B3: Multicollinearity

Multicollinearity problem is one of the most important assumption underlying the OLS. It stipulates that the explanatory variables in the model should not be multi-correlated with each other, that is “to be orthogonal to each other” (Chris, 2008). The variance inflation factor test for farms and SMEs is performed to see if this issue can be detected.

Table B3. VIF Test for Farms and SMEs

Variable (Farms)	VIF	1/VIF	Variable (SMEs)	VIF	1/VIF
Lev_1	1.16	0.862	Lev_1	1.25	0.798
ROA	1.02	0.977	ROA	1.04	0.958
TANG	1.23	0.812	TANG	1.74	0.576
SIZE	1.22	0.819	SIZE	1.67	0.599
AGE1	1.32	0.756	AGE1	1.18	0.850
AGE2	1.31	0.762	AGE2	1.16	0.860
GO	1.12	0.894	GO	1.13	0.888
LAND	1.28	0.779	salaries	1.41	0.708
Mean VIF	1.21		Mean VIF	1.32	

The mean of the variance inflation factor is below 10, therefore, the issue of multicollinearity does not exist for both farms and SMEs.

B4: Autocorrelation

Autocorrelation in the regression model can be identified by utilizing the Breusch-Godfrey (also known as the LM test for serial correlation). The null hypothesis indicates the non-existence of a first-order autocorrelation.

Table B4. Breusch-Godfrey LM test for Autocorrelation

Number of gaps in sample: 121

	lags(p)	chi2	df	Prob>Chi2
Farms	1	0.522	1	0.470
SMEs	1	0.009	1	0.9260

H0: no serial correlation

The observed p-value is greater than 0.05, therefore, no problem of autocorrelation in the data used.