



# The relation between earnings management and the firms' borrowing capability. Evidence for French farms

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**Internship Thesis**

# **The relation between earnings management and the firms' borrowing capability - Evidence for French farms**

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Preface:

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**Abstract**

This paper aims to examine whether farms use income-increase earnings management to obtain bank loans and investigate the relation of the degree of earnings management and farm's borrowing capability. We adopt four existing earnings management models to check if the farms involve earnings management behavior: Jones model, Modified Jones model, Cash-Flow model and Performance-Matching model. Using data from the Farm Accountancy Data Network (FADN) database from 2000 to 2019, we show the result that farms increase their profitability through accruals earnings management before they apply to a bank loan. A dynamic least squares model is also applied to study if farms increase their borrowing capacity through earnings management. The results indicate that as farms increase their earnings management, their ability to borrow also increases. These implications should be taken into account by banks. This study also extends a growing research stream on the relationship between borrowing capability and earnings management for agribusinesses.

**Keywords:** Accrual earnings management, Bank loans, Borrowing capacity, SMEs, Farms.

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## 1. Introduction

As a basic industry of the economy, agriculture has important significance and influence to its development. The agricultural sector is the backbone of the economy, providing the basic ingredients for humanity and now the raw materials for industrialization (Praburaj, 2018). Agriculture is a very critical economic activity in the European Union (EU). The regional bloc estimates that 22 millions of its citizens are dependent on primary agricultural activities for their livelihoods. The organization of agricultural activities in the EU ranges from small family-owned and family-run farms to larger and commercialized farms which produce on a sizeable scale. Apart from that, agriculture also supports 44 million jobs in value addition activities such as food processing, food retail, and other food-related activities. Further, the EU relies on food exports for upwards of €130 billion in export revenues each year, further underlining the importance of this sector (European Commission, 2015).

France's agricultural finance market has been steadily expanding in recent years, with total outstanding loans in the sector increasing from 47.7 billion euros in 2015 to 52.7 billion euros in 2018. However, investment rates in the sector have been volatile over the same period, with a slightly declining trend, and productivity growth has stagnated (Fi-compass, 2020).

The French agriculture sector is a dominant force within the EU 28, accounting for 18% of EU 28 agricultural output in 2018. With 456,500 farms, the French agriculture sector also accounted for 3.9% of the total employment in the EU 28 in 2018. The value of French agricultural production reached EUR 76.6 billion in 2018. Farm structures provide French agriculture with a competitive edge. Nearly half of French farms (43%) are categorized as medium-sized family farms (20-100 ha)<sup>1</sup>. According to the latest census, the average farm size was 63 ha in 2016, which is significantly higher than the EU 28 average of 16.6 ha<sup>2</sup>. There has been a process of structural change towards an expansion in farm size over the last two decades, with a loss of small sized farms and a growth in the number of medium-sized farms (from 25% in 2000 to 43% in 2016) and large sized farms. Consequently, investments in land and infrastructure have also been growing.<sup>3</sup>

The demand for finance is driven by a growing number of medium and large-sized farms, and their objective to expand capacity, invest in the modernization of machinery and input technologies, as well as climate change adaptation measures and risk management practices.

<sup>1</sup> Eurostat: Farm Structure Survey 2016.

<sup>2</sup> Agreste Primeur, 2018, Enquête sur la structure des exploitations agricoles, n° 350 (Figure 2, p. 2).

<sup>3</sup> fi-compass, 2020, Financial needs in the agriculture and agri-food sectors in France, Study report, 78 pages.

The main source of finance for French farmers is bank lending. According to the fi-compass survey, 45% of French farms applied for bank finance in 2017, which was three times higher than the EU 24 average of 13%. Private finance, such as from family or friends, is almost non-existent, with only 0.5% of respondents seeking this type of support.

The overall access to credit in France is favorable thanks to a healthy banking sector and low interest rates. In addition, French farmers can count on a group of financial intermediaries with a high level of sector specialization and a long tradition in lending to agriculture. However, these specialized intermediaries have a strong control of the markets, with one bank alone accounting for almost 70% of the market, and four intermediaries together accounting for almost the entire market. Although no major constraints emerge in the supply of finance, this level of market concentration may allow banks to be very selective in their financing decisions. (Fi-compass, 2020)

The development of agricultural enterprises is of great significance to the long-term development of agricultural economy, and financing is a way for agricultural enterprises to obtain operating funds. Therefore, the analysis of financing problems of agricultural enterprises is helpful to optimize the cost structure of agricultural enterprises, and realize the scale expansion, cost reduction and efficiency increase of farms.

As for any small and medium enterprises (SME), farms need to get an access to bank loans. Borrowing as a method of financing operations and investments has usually represented an attractive way of gathering funds insofar as interest rates have been subsidized for farms over time in many countries. Ciaian and Pokrivcak (2012) examine the impact of agricultural subsidies granted under the European Union's Common Agricultural Policy (CAP) on bank loans extended to farms. They find out that big farms tend to use subsidies to increase long-term loans, whereas small farms tend to use subsidies to obtain short-term loans. However, access to bank loans may be challenging.

Ryan examines the extent to which bank market power alleviates or magnifies SME credit constraints using a large panel dataset of more than 118,000 SMEs across 20 European countries over the period 2005-2008. Their results strongly support the market power hypothesis, namely, that increased market power results in increased financing constraints for SMEs. Therefore, the effect of bank market power on financing constraints increases in financial systems that are more bank dependent (Ryan et al., 2014).

Access to financing is a considerable challenge for small businesses in any industry. The same is true for small-scale farmers, especially young ones, who find it difficult to obtain financing from local commercial banks. Financial institutions shunned them because they



were considered risky and not worth investing in. This is a double tragedy for these people, because they also often lack the necessary collateral that would have helped them secure bank financing (Jankulovski et al., 2018). Loan acceptance is associated with key parameters which are accounting figures, credit scoring, collateral and banking relationship. Farms with a good capital structure, wealth and feasible projects have a higher probability of getting the required loans because they represent the bank's guarantee. The analyst's overall opinion appears to play a key role in the outcome of the lending process, with the number of positive pros and cons strongly influencing the probability of acceptance and rejection, respectively (Enjolras and Madiès, 2019).

There is no doubt that agriculture is considered to have a higher level of risk than other sectors of the economy, but this may be partly because financiers have not taken the time to understand the sector more deeply. One of the main problems with agriculture and the challenges it faces in accessing credit is that it involves long production cycles, leading to operational and economic risks. The fluctuation of production from agricultural activities also presents a challenge for agricultural operations. The fluctuations in productivity and the potential for losses make it difficult to insure the operations and assets of agricultural enterprises. This reduces the likelihood that agricultural operations will be seen as collateral for corporate financing. Agricultural entities face difficulties in financing from the resources they already possess, and they are unable to verify the value of their businesses, making them less attractive to financiers (Jankulovski et al., 2018).

It is therefore plausible that farms manage their earnings to ameliorate their accounting portrait, thus achieving a better borrowing capacity and increasing their chance to obtain a loan. Earnings management already broadly used in all the firms, most of the researches focus on the big company or listed company. Few studies pay attention on the small and medium-size firm. Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers (Healy and Wahlen, 1999).

Moreover, in a transfer perspective, farms may be tempted to use earnings management as a way to increase farm value. The argument is that a fundamental method for farm valuation relies on discounted cash flows. By increasing available cash flows, farmers may increase the potential value of the whole farm. This paper aims to explore whether earnings management can alleviate the financing difficulties of small and medium-sized agricultural enterprises. It is widely believed that small companies are very likely to practice earnings management because they do not have those restrictions which limit the large listed and/or

unlisted companies. However, this has not yet been demonstrated sufficiently. Therefore, the exploration of earnings management practiced by small companies has great relevance.

Our study aims to enrich the understanding of small-sized farm' earnings management practices, exploring those undertaken in the France setting. In France, the relatively low level of protection afforded to creditors' rights as part of French collective proceedings might prove particularly costly in a post-crisis context in which the balance sheets of financial institutions are being downsized. Lenders become more unwilling to finance entities that report evidence of financial deterioration (Plantin et al., 2013). This situation would potentially create stronger incentives for firms, in general, to engage in earnings manipulation strategies. Under this background, the farms access to loans may be challenging.

We collect the data from FADN from 2000 to 2019. Available data representing the oldest and most recent years available on French FADN at the time of data collection. We adopt four existed models to test if farms engaged in earnings management activities which are Jones model, Modified Jones model, Cashflow model and performance matching model. The empirical result suggest that farms usually will take the earnings reducing strategy, however the farms will manipulate earnings upwards before they require the loan from bank. We further test that if earnings management can help the farms get more financial support from the bank. We use regression model to examine the relation between the degree of earnings management and the loan amount, the result again shows a significant positive relation between earnings management and loan amount.

The rest of the dissertation is organized as follows. In the second section, we will perform a literature review on earnings management. In the third section, we describe the research hypotheses. In the fourth section, we provide the methodology. In the fifth section, we report the results of the empirical analysis. The sixth section presents our conclusion and the limitation as well as the perspectives of this study.

## 2. Literature review

### 2.1. Earnings management

Earnings management is a very popular topic in the current academic world. Earnings are the profits of a company. Investors and analysts look to earnings to determine the attractiveness of a particular stock. Companies with poor earnings prospects will typically have lower share prices than those with good prospects, and also earnings management is a strategy used by the management of a company to deliberately manipulate the company's earnings so that the figures match a pre-determined target (Mulford and Comiskey 2002). Therefore, it is reasonable to conclude that earnings quality is a measure of the ability of earnings numbers to reflect a company's true performance, earnings and value (Dechow and Schrand, 2004). Hereby, investing in companies with high earnings quality tends to be more profitable and sustainable than companies with low earnings quality, which is mainly caused by earnings management. Hence, earnings management is regarded as one of the main indicators of earnings quality.

#### 2.1.1. Definition of earnings management

Regarding the definition of earnings management, there are several definitions from different angles in the literature. Researchers offered different explanations in the past decades, defining earnings management primarily as the manipulation of financial reporting to achieve specific goals. Here we present some of the most common definitions of earnings management in chronological order.

Healy and Wahlen (1999, p.368) focus on the issue of altering financial reporting to mislead stakeholders and achieve contractual benefits where:

*“Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers.”*

Mulford and Comiskey (2002, p. 3) emphasize the discretion of management to achieve earnings targets, which may be set by internal or external parties. In this sense, they define earnings management as follows:

*“The active manipulation of earnings toward a predetermined target, which may be set by management, a forecast made by analysts, or an amount that is consistent with a smoother,*

*more sustainable earnings stream.”*

Ronen and Yaari (2008, p. 27) later provide a comprehensive definition for earnings management that distinguishes between the two main activities to manipulate earnings—real vs. accrual—and shows that such activities are not necessarily bad all the times whereby, *“Earnings management is a collection of managerial decisions that result in not reporting the true short-term, value-maximizing earnings as known to management. Earnings management can be beneficial: it signals long-term value; pernicious: it conceals short- or long- term value; neutral: it reveals the short-term true performance. The managed earnings result from taking production/investment actions before earnings are realized or making accounting choices that affect the earnings numbers and their interpretation after the true earnings are realized.”*

However, the previous definitions always focus on one aspect of earnings management. Therefore, in this context, this paper applies the definition as (El Diri, 2018): *“Earnings management as the within GAAP management discretion over external financial reporting by abusing some contracting deficiencies, stakeholders’ bounded rationalities, and information asymmetry in the market, through some economic decisions, a change in the accounting treatment, or other sophisticated methods. The purpose of management is to present earnings in a way different (up or down) from what is known to them to achieve private benefits while misleading the stakeholders; although such discretion may not always be harmful to them.”*

In El Diri (2018)’s definition above, he explains the motivations for earnings management and how different approaches can lead to different results. It is important to note that all actions taken by managers are within the scope of GAAP, which makes a clear distinction between earnings management and accounting fraud. Despite Perols (2011) pointed that previous earnings management is associated with a higher likelihood that firms that meet or beat analyst forecasts are committing fraud.

### **2.1.2 Accruals earnings management versus Real earnings management**

All literature agree that earnings management activities can be divided into two different types. The first group is accrual earnings management (AEM) which involves the within-GAAP manipulation of accruals through the discretionary choices of accrual accounting, e.g., depreciation rates, inventory valuation methods, and bad debt calculation. Therefore, accrual earnings management does not influence the firm's underlying economics but involves the change in the accounting presentation of these economics.

The second group is real earnings management (REM) which involves economic decisions like accelerating sales through more lenient credit terms and higher discounts to the clients, timing the sale of long-term assets and investments in periods of low earnings, overproduction to decrease the fixed cost per unit and ultimately the unit cost and the cost of sales, manipulating discretionary expenses like research and development, advertising, selling and administrative expenses. Gunny (2009) documents a positive effect of real earnings management on future performance when it is used by a firm through operational discretion to attain benefits that ultimately improves its reputation in the market.

To detect earnings management, Healy (1985) was the first to introduce discretionary accruals. It was presumed discretionary accruals fall subject to managerial discretion while non-discretionary accruals are the expected level of accruals in the firm provided there is no manipulation of earnings. A more precise definition that non-discretionary accruals is a mandatory expense/asset that is recorded within the accounting system that has yet to be realized. An example of this would be payroll taxes. In contrast, discretionary accruals are a non-mandatory expense/asset that is recorded within the accounting system that has yet to be realized and the managers can choose within the flexibility of accounting regulations to adjusting a firm's cash flows. Discretionary accruals as the unobserved part of total accruals left when the estimated non-discretionary accruals are deducted from total accruals which mainly impact on earnings quality.

However, the accrual earnings management attracted more attention than real earnings management in academic filed. Sometimes the manager will choose one of the operations to manipulate earnings sometimes both. Considering real earnings management is more difficult to detect than accrual-based earnings management, thereby making it easier for firms to mask gains generated. Especially after 2002 release the Sarbanes Act in USA that strength the accounting principle. Real activities manipulation increases due to the higher level of scrutiny of accounting practice after the passage of Sarbane-Oxley. The accrual-based earning management is more difficult to operate. Companies gradually change their strategy to alter earnings management from AEM to REM. Zang (2012) investigated the trade-off between

real activities manipulation and accrual-based earnings management. She confirmed that companies with higher costs associated with accrual earnings management would rather use real earnings manipulation, but when costs associated with real earnings manipulation were higher, companies use relatively more accrual earnings management. Companies with less accounting flexibility use more actual activity manipulation due to accrual manipulation in previous years or shorter operating cycles. The empirical evidence also shows a direct substitution relationship between real and accrual income management. It can be observed that if the real activities manipulation results in the year are unexpectedly high (low), managers will use less (more) accrual-based earnings management, which means that there is a negative correlation between accrual-based earnings management and the real activities manipulation of the unexpected amount. Kothari and Natalie (2016) tested if companies choosing different earnings management methods will bring different consequences at the time of a seasoned equity offering. They selected 2,107 firms with 3,353 SEOs between 1970 and 2012. The empirical evidence showed that SEO overvaluation is primarily driven by managers' attempts to overstate earnings via their real actions; accruals management is successful in misleading investors only when accompanied by real manipulation.

Managers would like to decrease the annual report readability by accruals or real activities earnings management. (Lo et al., 2017) finds that firms are likely to have managed earnings to meet or just beat the benchmark of prior year's performance on average by making more complex MD & A reports. The investor cannot get the full picture of the company so as to affect their decision-making process. (Kim et al., 2017) also argues that firms in countries with weak future-time reference (FTR) languages are likely to engage in less earnings management than firms in countries with strong FTR languages.

There is an interesting finding that firms with a higher number of female and independent female directors tend to adopt more conservative accounting policies compared with those companies with lower number of female and independent female directors (Arun et al., 2015). The author found that the number of females and independent females on the board is positively related to earnings management.

### **2.1.3 The motivation behind earnings management**

The managers take different actions when they have different incentives to manipulate the earnings management. It is therefore necessary to fully understand managers' manipulative motivations if outsiders want to predict whether they will move profits up or down. Most of the motivation to manage earning can be explained by three theories: Contracting theory, bounded rationality theory, and information asymmetry theory (El Diri, 2018).

### 2.1.3.1 Contracting theory

First, according to contracting theory, contractual motives exist based on the contract terms between the firm and its stakeholders that are linked to firm performance. Managers will to get a higher compensation and longer turnover if the number of financial reports looks friendly (Coughlan and Schmidt, 1985). The financial report also represents managerial ability. The managerial ability is higher the manager's future is better. In the case mentioned above the manager prefer to upward earnings management. Stocks and options that also will change the risk-taking behavior of managers. When the company award managers with stocks and options, the incentives of manager to upward manipulate earnings is much stronger. In addition, managers enjoy limited liability and can influence the decision of compensation which is made by the board of directors and not directly by the shareholders.

The manager will manipulate the earnings management when the company needs external financial support. Our paper focus on the relation between debt and earnings management. The situation will be more complicated when it comes to debt. Rodríguez-Pérez and Hemmen(2010) investigated the relation between leverage and earnings management in Spanish firms, his results show that generally the debt have a negative impact on the income increasing discretionary accruals management. Because the firms have high leverage will receive tighter supervision from their creditors.

However, Jaggi and Lee (2002) argue that the firm whether will choice income-increasing or income-decreasing discretionary accruals is related to the severity of financial distress and whether this choice is also influenced by the creditors' waivers of debt covenant violations. They selected 216 firms and classified them into technical default and debt-restructuring firms. The firms with debt covenant violations are further categorized into waiver and non-waiver firms, and permanent and temporary waivers firms. They find evidence that if financial distress is of a temporary nature and debt covenant violations do not truly reflect the firm's financial strength, managers would use income-increasing (positive) discretionary accruals to strengthen their arguments for a waiver from creditors for debt covenant violations. if financial distress is severe in nature, managers will have to prepare themselves to renegotiate debt covenants with creditors or to seek refinancing from other sources. In this situation, managers are likely to highlight the firm's financial difficulties by decreasing discretionary accruals so that they can obtain better loan terms and/or favorable limits for debt constraints.

Later Jha (2013) discovered more details about the firm's attitude to the earnings management during violation. He chooses 193,803 firm-quarters and 8,804 firms that span

from the second quarter of 1996 to the fourth quarter of 2007 and finds out that managers do indeed manipulate earnings upward in the last eight quarters preceding a violation. In the quarter with the violation when they realize the loss is unstoppable, they manage earnings downward to show their financial stress to the creditors and try to get a wavier or loose contract terms.

(Saleh et al., 2005) further examine the accruals earnings management of distressed firms during debt renegotiation. Their result is consistent with the explanations by Jaggi and Lee (2002) that firms have significantly negative accruals during the negotiation periods and they further compared discretionary accruals with other poorly performing firms which have not undertaken debt renegotiation with their lenders and find that firms which have undertaken debt restructuring have significantly more negative discretionary accruals than their other poorly performing counterparts. Roychowdhury (2016) again finds the evidence that the presence of debt, the stock of inventories and receivables, and growth opportunities are positively associated with real activities manipulation.

### **2.1.3.2 Bounded rationality theory**

Second, bounded rationality theory implies the inefficiency of the market and thus suggests the existence of capital market motives that influence firms' stock values. Capital market motives including the stock performance in the stock market, company issuance of equity, new listing and cross-listing, mergers and acquisitions, insider trading, management buyouts, meeting or beating a benchmark, or comply with the analysts.

Louis (2004) explained what is the market's efficiency in processing manipulated accounting reports by testing earnings management and the market performance of acquiring firms. There is strong evidence suggesting that acquiring firms report significant positive abnormal accruals in the quarter preceding stock swap announcements and there is no evidence that the market reaction over the three days around a stock swap announcement is correlated with prior earnings management. The acquirer firm aims to improve its stock price in order to decrease the number of stocks transferred to the target firm in case of stock mergers and acquisitions, hence avoids the dilution of the current shareholders' ownership. Acquiring firms also tend to manage earnings to sell their shares at a higher price so that they can finance a cash acquisition with a lower cost.

Mao and Renneboog (2015) contrast earnings management in management buyouts (MBOs) with that in institutional buyouts (IBOs) and non-buyout firms. Evidence shows that different earnings management operation in different situations. Strong negative earnings management via both accrual and real earnings activities in MBOs supporting that managers



intending to purchase their company by means of a levered buyout transaction manipulate earnings in order to buy their firm on the cheap price. Modest negative accrual management and insignificant real earnings manipulation in IBOs compared with MBOs due to the less incentive to managers self-dealing. and positive earnings management in non-buyout firms which comply with other literature indicate that the manager would like to upward earnings to make the financial report look better.

Managers of these companies strategically exercise their financial reporting discretion to maintain and extend their companies' earnings string. Previous literature found that the earnings of the companies reporting the earnings string changed less, and they showed an unusually strong negative correlation between their cash flows and their accounting accruals, consistent with the fact that these accruals were used to smooth the reported earnings (Myers,1984).

Meeting or beating a benchmark is expected to have a positive influence on firms' stock prices. Managers use positive discretionary accruals to manage reported earnings upward when earnings would otherwise fall below management's earnings forecasts and more positive stock price changes at the time of, and subsequent to, forecast issuance and greater analyst following are associated with larger income-increasing discretionary accruals (Kasznik, 1999) .

### **2.1.3.3 Information asymmetry theory**

Information asymmetry always been a problem between the external and the internal of the company. External (third-party) motives arise from parties that have current or future interests in the firm and thus interfere in the way it communicates information to the stakeholders. Third parties need the accounting information to make decisions related to directly entering into business transactions with the firm or indirectly revising the structure of the environment where the firm is operating.

The third-parties can be the competitors. Industry which earnings management activities of a firm are correlated with the levels of comparable activities in the same industry. Like accounting choices available to the managers in an industry may allow the use of earnings management practices specific to each sector.

Regulators may accelerate earnings management as well, company may downwards their EM in case of the regulator come up with more strict regulations. (Duh et al., 2013) find that firms with foreign direct investment ratios near the limit (near-limit firms) are more likely to engage in income-increasing earnings management to shore up their shareholders' equity, thus

reducing their propensity to breach government policy by using the regulatory setting in Taiwan, where the government has placed a cap on FDI in China for listed firms. Or the company will upwards they EM in case they are failure to meet some requirements from regulators , and their company will be shut down. (Leuz et al., 2003) find the evidence in 31 countries prove that weak outsider protection and private control benefits create incentives to manage earnings, earnings management decreases in legal protection because, when investor protection is strong, insiders enjoy fewer private control benefits and consequently incentives to mask firm performance are moderated. However, (Chen et al., 2018) finds some evidence in China showed that the government involved with firm's earnings management. Based on the Chinese special situation that the local government is the shareholder of a company and also the regulator of the market. China where local governments provide subsidies to assist local listed SOEs (state-owned enterprises) to meet the central government's regulatory requirements for rights offering and delisting.

Economic environment, some literature come up with firms in countries with common laws use less earnings smoothing than firms in countries with code laws. Accounting standard which the empirical evidence shows that the influence of the mandatory adoption of IFRS differs in different countries and managers develop the skills to manipulate the new accounting standards over time; hence there is a continuous need for updating the accounting regulation. Jha (2013) finds that those post- Sarbane-Oxley managers shift from accrual management to real earnings management. Since real earnings management is more difficult to detect than accrual earnings management. In European, Mafrolla and D'Amico (2017) reveal that a positive and systematic impact of earnings management (both ex post and ex ante) on the amount of bank loans, as well as some positive impact on the cost of bank loans in the period following the enactment of the Basel II regulation.

Customers and suppliers, the firm that extensively relies on specific suppliers or customers is more inclined to manage earnings in order to influence their perception of its performance. Auditors are expected avoid earnings management to protect their reputations and avoid the costly litigation. auditors may fail to detect and report earnings management because of some uncontrollable factors like the increased complexity of business transactions in the modern firms. Alzoubi (2018) presents the initial evidence regarding the relationship between audit quality, debt financing, and earnings management in Jordan. Results suggested that audit quality (auditor tenure, size, specialization, and independence) and debt financing (low debt) diminish the potential of earnings management, and, in turn, enhance the financial reporting quality. Invariably, high debt would raise earnings management risk.

### 2.1.4 EM in large firms versus EM in SMEs

Most research are focus on earnings management for listed or large company. This could be due to two factors. First, big companies carry heavy weight in those countries where most of the studies have explored earnings management practices. Second, access the necessary data for the survey is more difficult for small companies than for large companies. But small companies represent the majority of the companies in several countries, especially European ones.

Hope et al., (2013) highlight two competing hypotheses in relation to differences in the earnings management behaviors of listed and unlisted firms. The first, called the “demand” hypothesis, assumes that listed firms engage in lower earnings management practices than unlisted companies because they need to provide their numerous stakeholders with reliable financial information. The demand for better-quality information is also driven by the presence of higher agency costs due to the separation between ownership and control and to the regulations that limit private communication between listed entities and their stakeholders. On the other hand, the stakeholders of unlisted firms, which are typically banks and capital providers, have greater access to internal information and therefore rely less on institutional annual reports . A second hypothesis, called the “opportunistic behavior” hypothesis, instead states that listed firms have higher incentives than unlisted entities to manipulate earnings because of market and stakeholder pressure to meet earnings expectations as well as the presence of equity-based compensation. In his investigation based on sample of US private firms, the result is consistent with the “demand” hypothesis. Their empirical evidence suggests that public firms have on average significantly higher accrual quality than do private firms.

Givoly et al (2008) also set up a research in US context and the result consistent with the “opportunistic behavior” hypothesis, private equity firms have higher quality accruals and a lower propensity to manage income than public equity firms. However, in the bank industry, Beatty et al (2002) find that public banks report fewer small declines in earnings and more small increases in earnings than expected. In contrast, private banks report only marginally fewer small declines in earnings than expected.

According to the paper written by Wang L and Wang Y (2007), they studied the degree of earnings management in listed and unlisted companies in China (for the purpose of avoiding loss), and found that the frequency of earnings management in listed companies was three times that of unlisted companies, while the management amplitude was 13 times. In the opposite, Veronica (2015) analysis the effect of firm size on earnings management in Indonesia. The research demonstrates when the size of the company increases earnings

management decreases.

Campa and Camacho-Miñanob (2014) analyses that unlisted bankrupt in Spain tend to manage earnings more in the years leading up to insolvency proceedings than non-bankrupt. Campa (2019) makes the search of the earnings management strategies during financial difficulties and conduct a comparison between listed and unlisted French companies. The findings of their paper suggest that the degree of financial distress of both listed and unlisted companies is associated with high income-increasing earnings management through actual activity manipulation rather than accrual manipulation. In addition, the finding support that listed companies with deteriorating financial conditions use income-increasing earnings management practices more extensively than unlisted entities, particularly when debt levels are high.

Poli (2013) who sets up his study of earnings management in small size companies in Italy finds that these companies may manage their earnings to achieve two earnings level targets. One is that companies with negative earnings manage earnings upwards to slightly above the zero. The other is that those who have positive returns manage them down to near zero.

Coppensa and Peekb (2005) investigated earnings management in European private firms. The empirical evidence suggests that in absence of capital market pressures, firms still have incentives to manage earnings, private firms would like to avoid reporting small losses. However, some private firms like those in France where tax regulation strongly influences financial accounting do not avoid reporting small losses. Later on, Mafrolla and D'Amico (2017) find out the positive impact of borrowers' earnings management activity on the amount and costs of their private loans both at the time of lending (ex post earnings management) and before a lending agreement is made (ex-ante earnings management) in Europe.

The discussion about earnings management among listed, big size company and unlisted small size company is diversified. The research based on the small and medium size firm still did not get much attention. Previous study focused earnings management on all types of industries, most of them analysing listed firms. There are fewer researches that keep the eye on agribusinesses. Trejo-Pech et al (2014) examines both accrual-based earnings management (AEM) and real-based earnings management (REM) in U.S. listed agribusinesses and they reveal that the earnings management in agribusinesses are broadly used. Further research conducted by Li (2017) shows that the degree of earnings management in agricultural industry is greater than that in other industries in China. That is because the valuation of biologic assets leaves discretionary space to managers. The use of fair value to measure the worth of biological assets allows discretionary choices when using discounted cash flow in the absence

of an active market, influencing the quality of accounting information. Silva et al (2015) measure different biological assets valuation, they find out higher EM levels for companies that use discounted cash flow and for those that are less compliant with the disclosure requirements of CPC 29<sup>4</sup>. So far all the research questions about earnings management in agribusinesses are conducted on the listed company. Research on earnings management of unlisted farms has not been discussed. This dissertation aim to discover how the earnings management strategy used by small and medium sized farms and the impact on their borrowing capability after they take action.

## **2.2. Earnings management models**

### **2.2.1. Accrual earnings management models**

According to the literature review, earnings management is mostly measured by discretionary accruals of companies (Dechow et al., 1995; Dechow et al., 2010). Based on Hribar and Collins (2002) total accruals of companies is the difference between net income and cash flow from operation. Moreover, the total accruals are composed of two components, including non-discretionary accruals and discretionary accruals (Jones, 1991). Non-discretionary component is accruals stemming from firm's normal operation whereas discretionary component is accruals stemming from management's earnings manipulation (Jones, 1991).

Although there are many research methods for earnings management, they generally include total accrued earnings method, specific accrued item method and distribution detection method. And relevant models are generally developed around these three research methods. Here I will briefly discuss the different models that were introduced in the literature.

#### **2.2.1.1. Healy model**

Healy (1985), as a pioneer of empirical research on earnings management, first constructs a model to measure non-discretionary accruals. Healy believes that non-discretionary accruals were related to total accruals and total assets, and earnings management could be tested by comparing the total average accruals of different samples. It is assumed that systematic earnings management occurs in any accounting period and that non-discretionary accruals are equal to the average of the ratio of total accruals ( $TA_t$ ) and lagging total assets ( $A_{t-1}$ ) during the valuation period.

<sup>4</sup> CPC 29: Brazilian Biological Assets and Agricultural Products (issued by the Accounting Pronouncements Committee - CPC), which requires use of fair value less selling cost to measure biological assets. equivalent to IAS 41.

Therefore, the non-discretionary accruals ( $NDA_t$ ) of year  $t$  should be:

$$NDA_t = \frac{1}{n} \sum_{i=t-n}^t \frac{TA_i}{A_{i-1}} \quad (1)$$

Discretionary accruals are calculated as the difference between a firm's total accruals and normal accruals from the previous equation:

$$DA_t = TA_t - NDA_t \quad (2)$$

Where,  $NDA_t$  represents the non-discretionary accruals adjusted for total assets at time  $t$ ,  $n$  represents the number of estimated years, and  $t$  represents the estimated years.

#### 2.2.1.2. DeAngelo model

DeAngelo (1986) proposes a random walk model, which assumed that the non-discretionary accruals of the current period were only related to the non-discretionary accruals of the previous period, and the actual profit of the previous year was taken as the non-discretionary accruals of the current year. In order to eliminate the influence of enterprise size, each item in the model is divided by the total assets at the end of the previous year. Thus, non-discretionary accruals are equal to the total accruals of the previous period ( $TA_{t-1}$ ) adjusted by lagging total assets ( $A_{t-1}$ ). Therefore, the model for calculating the non-discretionary accruals should be:

$$NDA_t = \frac{TA_{t-1}}{A_{t-1}} \quad (3)$$

Where  $NDA_t$  represents the non-discretionary accruals,  $TA_{t-1}$  is the lagged total accruals.  $A_{t-1}$  represents the lagged assets. This model can be regarded as a special example of Healy's (1985) model, except that the estimated period here is  $t-1$ . DeAngelo (1986, 1988) studies consider last year's total accruals as a measure of normal accruals and hence any change in accruals this year compared to the previous year is considered discretionary.

### 2.2.1.3. Jones model

Jones (1991) believes that it was difficult to hold the assumption that non-discretionary accruals in Healy (1985) and DeAngelo (1986) remained unchanged from period to period, and the actual situation was that non-discretionary accruals in each period changed all the time, so it was necessary to find a new measurement method to estimate non-discretionary accruals. According to Jones, changes in sales revenue can be used as control variables for economic growth, while property, plant and equipment can be used as replacement control variables for depreciation expense. Therefore, Jones proposed a time-series model that takes into account the effects of changes in sales and the total amount of depreciable assets on non-discretionary accruals. It is no longer limited to the assumption that discretionary accruals will not change.

It starts by measuring the following regression for the total accruals of the firms in the estimation period per year-industry:

$$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} + \varepsilon_t \quad (4)$$

The formula for discretionary accruals is as follows:

$$\frac{NDA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} \quad (5)$$

Discretionary accruals are calculated as the previous equation (2).

$A_{t-1}$  represents the lagged assets;  $\Delta REV$  represents changes in revenues;  $PPE$  represents the gross value of property, plant, and equipment;

#### 2.2.1.4. Modified Jones model

Dechow (1995) argues that the change in primary operating income in the Jones model is subject to human manipulation as an influencing factor. If the Jones model is adopted to measure the discretionary accruals, in fact, it is possible to underestimate the earnings management, and the change of accounts receivable should be excluded from the primary operating income.

It again starts by measuring the following regression for the total accruals of a firm in the estimation period:

$$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t - \Delta AR_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} + \varepsilon \quad (6)$$

In this model, the non-discretionary accruals in the event period (the period of earnings management) can be estimated as:

$$\frac{NDA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t - \Delta AR_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} \quad (7)$$

$\Delta AR$  represents changes in accounts receivable;  $\Delta REV$  represents changes in revenues;  $PPE$  represents the gross value of property, plant, and equipment;  $A_{t-1}$  represents the lagged assets.

Discretionary accruals are calculated as the previous equation (2).



### 2.2.1.5. Cash-Flows Model

Dechow and Dichev (2002) believe that the current accrual level of an enterprise was negatively correlated with the operating cash flow of the same period and positively correlated with the past and future operating cash flows. Accruals separate the time when cash flows are generated from the time when accounting is recognized, so the quality of accruals depends on errors in accruals in forecasting cash flows. so the cash flows of three consecutive years were added into the Jones model. The model for TA and NDA as follow:

$$\frac{TA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{\Delta REV_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 * \frac{CFO_{t-1}}{A_{t-1}} + \beta_4 * \frac{CFO_t}{A_{t-1}} + \beta_5 * \frac{CFO_{t+1}}{A_{t-1}} + \varepsilon_t \quad (8)$$

$$\frac{NDA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{\Delta REV_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 * \frac{CFO_{t-1}}{A_{t-1}} + \beta_4 * \frac{CFO_t}{A_{t-1}} + \beta_5 * \frac{CFO_{t+1}}{A_{t-1}} \quad (9)$$

CF is operating cash flow. Others as same as before.  $\Delta REC$  is the change of accounts receivable; PPE is property, plant, and equipment;  $A_{t-1}$  represents the lagged assets. DA id the difference in equation (8) and (9).

### 2.2.1.6. The Performance-Matching Model

Kothari et al. (2005) consider the correlation between corporate performance and accruals. They take companies with similar asset-liability ratios in the same industry as reference samples. By matching companies with reference samples, the reference samples were used to determine the degree of earnings management of the companies. If the earnings management level of the reference sample is assumed to be normal, then the company that exceeds the earnings management level of the reference sample is the company that has carried out earnings management. There are two approaches to control the correlation between performance and accruals. One is to find an enterprise whose performance matches each sample enterprise. Another approach is to introduce a performance variable (ROA) into the traditional Jones.

Here we describe the second way as follow:

$$\frac{TA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{\Delta REV_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 \frac{ROA_t}{A_{t-1}} + \varepsilon_t \quad (10)$$

$$\frac{NDA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{\Delta REV_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 * \frac{ROA_t}{A_{t-1}} \quad (11)$$

ROA is the return on assets to control for firm performance. Others remain the same. DA is the difference in equation (10) and (11).

### 2.2.1.7. Forward-Looking Model

Dechow et al. (2003) point out that three adjustments were needed to modify the Jones model. First, part of credit sales is normal marketing behavior, and this part of normal credit sales should be deducted from the change of accounts receivable, which is realized by estimating the parameter  $k$  (slope coefficient of changes in accounts receivable on sales revenue).

$$\Delta REC = a + k\Delta Sales + \varepsilon \quad (12)$$

Second, total accruals are autocorrelated, so lagged total accruals should be added into the model. Thirdly, the variable of sales growth should be added to the model, because the increase in inventory and the increase in total accruals brought about by sales growth are managers' rational responses to future sales growth. The function hereby:

$$\frac{TA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{(1+k)\Delta Sales_t - \Delta AR_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 \frac{TA_{t-1}}{A_{t-1}} + \beta_4 * \frac{GR - Sales_{t+1}}{A_{t-1}} + \varepsilon_t \quad (13)$$

In this model, the non-discretionary accruals in the event period (The logic is similar to the Jones model) can be estimated as:

$$\frac{NDA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{(1+k)\Delta Sales_t - \Delta AR_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 * \frac{TA_{t-1}}{A_{t-1}} + \beta_4 * \frac{GR\_Sales_{t+1}}{A_{t-1}} \quad (14)$$

$\Delta Sales$  is the change in sales from the previous accounting period;  $\Delta AR$  is the change in account receivables from the previous accounting period;  $PPE$  is property, plant, and equipment; and  $GR\_sales$  is the change in sales compared to the previous year.  $\Delta REC$  is the change of accounts receivable;  $A_{t-1}$  represents the lagged assets.  $DA$  is the difference in equation (13) and (14).

### 2.2.1.8. Total accruals

Total accruals usually are measured by the two following methods:

1. TA is calculated based on the balance-sheet-approach.(Jones, 1991)

$$TA_t = \frac{\Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STD_t - \Delta Dep_t}{A_{t-1}} \quad (15)$$

$\Delta CA$ : change in current assets.  $\Delta CL$ : change in current liabilities.  $\Delta CASH$ : change in cash and equivalents.  $\Delta STD$ : change in short-term debts.  $A_{t-1}$  is the lagged assets. This model is broadly accepted in all research papers.(Campa, 2019; Rodríguez-Pérez et al., 2010)

2. TA is calculated based on the cash-flow-statement-approach (Dechow et al.,1995) as following equation:

$$TA_t = NI_t - CFO_t \quad (16)$$

TA is the total accruals in the year t. NI is the net income in year t. CFO is the cash flow from operation in the year t. The cash flow statement approach is easier than the balance sheet approach, It is also quite popular in research papers (Chansarn, 2016; Saleh, 2005 etc).

**Table 1. Summary on the accrual earnings management models**

Model	Function	Main features
Healy Model (1985)	$NDA_t = \frac{1}{n} \sum_{i=t-n}^t \frac{TA_i}{A_{i-1}}$	The company's non-discretionary accrued earnings is stable ever year; The sum of discretionary accruals for each year of the estimation period is zero. But the impact of changes in the company's economic environment on non-discretionary accruals is not considered.
Deangelo Model (1986)	$NDA_t = \frac{TA_{t-1}}{A_{t-1}}$	The effect of changes in company's economic environment on accrued earnings is excluded. The estimated period of non-discretionary accruals is one year.
Jones Model (1991)	$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} + \varepsilon$	An improvement was made on Healy's model, adding two independent variables, operating income and fixed assets. Total accruals take into account the effects of normal operations and expansion of assets.
Modified Jones Model (1995)	$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t - \Delta AR_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} + \varepsilon$	A further improvement is made on Jones's model to increase the impact of main business income on earnings management. The company can change the credit policy, so as to change the time of revenue recognition, is a means of manipulating the profit and loss.
Cash-Flow Model (2002)	$\frac{TA}{A_{-1}} = \beta_0 + \beta_1 * \frac{\Delta REV}{A_{-1}} + \beta_2 * \frac{PPE}{A_{-1}} + \beta_3 * \frac{CFO_{-1}}{A_{-1}} + \beta_4 * \frac{CFO}{A_{-1}} + \beta_5 * \frac{CFO_{-1}}{A_{-1}} + \varepsilon$	Accruals separate the time when cash flows are generated from the time when accounting is recognized, so the quality of accruals depends on errors in accruals in forecasting cash flows. This model focuses on short-term accrued profit and does not consider long-term accrued profit.
Performance-Matching Model (2005)	$\frac{TA_t}{A_{t-1}} = \beta_0 + \beta_1 * \frac{\Delta REV_t}{A_{t-1}} + \beta_2 * \frac{PPE_t}{A_{t-1}} + \beta_3 * \frac{ROA_t}{A_{t-1}} + \varepsilon$	ROA was added into the dependent variable of the Jones model, and cross-sectional regression was conducted for the samples by industry and year.
Forward-Looking Model (2003)	$\Delta REC = a + k \Delta Sales + \varepsilon$ $\frac{TA}{A_{-1}} = \beta_0 + \beta_1 * \frac{(1+k) \Delta Sales - \Delta R}{A_{-1}} + \beta_2 * \frac{PPE}{A_{-1}} + \beta_3 * \frac{TA_{-1}}{A_{-1}} + \beta_4 * \frac{GR_{Sales_1}}{A_{-1}} + \varepsilon$	In the measurement of earnings management, the model further separates discretionary accruals from revenue, and takes into account the influence of business decision changes that may produce part of abnormal accruals, as well as the factor of sales growth rate, which improves the validity of the model test.

### 2.2.2. Real earnings management model

From the macro environment analysis, the increasingly strict regulator environment and the increase of litigation risks lead to the shrinking space of accrual earnings management, which provides conditions for the rise of real earnings management. There are few econometric models on real earnings management. At present, Roychowdhury's real earnings estimation model has been widely used (Campa 2014, Trejo-Pech, 2014). He believes that real earnings management can increase production, delay credit maturity and reduce expenses during the period (research and development expenses, sales expenses and administrative expenses), generally through these three means to achieve expectations, avoid financial reporting losses and meet expert forecasts.

#### 2.2.2.1. Roychowdhury Model

Based on the study of Dechow et al. (1995), Roychowdhury (2006) develop a model that represents one of the most commonly used measures of real earnings management in the non-financial sectors and consists of three components (Cohen et al. 2008; Walker 2013). The first component represents the decrease in operating cash flows as a result of sales discounts and flexible credit terms in order to increase the sales volume and improve earnings in a specific period. Therefore, the model starts by establishing the normal level of operating cash flows based on sales level and changes in sales according to the following regression.

$$\frac{CFO_t}{A_{avg}} = \alpha + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 * \frac{Sales_t}{A_{avg}} + \beta_2 * \frac{\Delta Sales_t}{A_{avg}} + \varepsilon_t \quad (17)$$

Where CFO represents operating cash flows; Sales<sub>t</sub> represents the sales for the current period; ΔSales<sub>t</sub> represents the change in sales during the current period. The abnormal operating cash flows are calculated as the difference between the normal operating cash flows and the actual operating cash flows.

The second component of real earnings management according to Roychowdhury model (2006) is the decrease in discretionary expenses in order to improve earnings and current cash flows. Discretionary expenses include research and development (R&D), advertising, and selling, general, and administrative (SG&A) expenses. The model starts by establishing the normal level of discretionary expenses based on sales level according to the following regression.

$$\frac{DiscExp_t}{A_{avg}} = \alpha + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 * \frac{Sales_{t-1}}{A_{avg}} + \varepsilon_t \quad (18)$$

DiscExp<sub>t</sub> represents discretionary expenses that include research and development (R&D), advertising, and selling, general, and administrative (SG&A) expenses; Sales<sub>t-1</sub> represents the sales of the previous period which is used rather than the current period sales (Sales<sub>t</sub>) to avoid the mechanical decrease in discretionary expenses in case of managing sales upwards during the current period. The abnormal discretionary expenses are calculated as the difference between the normal discretionary expenses and the actual discretionary expenses.

The third component of real earnings management according to Roychowdhury model (2006) is the increase in operating costs like the increased inventory production in order to decrease the cost of goods sold and ultimately improve earnings. The model again starts by establishing the normal level of production costs based on sales level and changes in sales according to the following regression.

$$\frac{Prod_t}{A_{avg}} = \alpha + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 * \frac{Sales_t}{A_{avg}} + \beta_2 * \frac{\Delta Sales_t}{A_{avg}} + \beta_3 * \frac{\Delta Sales_{t-1}}{A_{avg}} + \varepsilon_t \quad (19)$$

Prod<sub>t</sub> represents the production costs which includes the costs of goods sold (COGS) in addition to the change in inventory ( $\Delta Inv$ ) during the period; Sales<sub>t</sub> represents the sales for the current period;  $\Delta Sales_t$  represents the change in sales during the current period;  $\Delta Sales_{t-1}$  represents the change in sales. The abnormal production costs are calculated as the difference between the normal production costs and the actual production costs.

### 2.2.2.2. Gunny Model

Gunny's Model (2010) for real earnings management measures four types of real earnings management activities. These include decreasing discretionary research and development expense (REMRD), decreasing discretionary selling, general, and administrative expense (REMSGA), timing of fixed asset sales to report gain (REMA sale), and overproduction (REMP rod) to cut prices or decrease the cost of goods sold (COGS) (Gunny 2010).

$$\frac{RD_t}{A_{avg}} = \alpha_0 + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 MV_t + \beta_2 Q_t + \beta_3 * \frac{INT_t}{A_{avg}} + \beta_4 * \frac{RD_{t-1}}{A_{avg}} + \varepsilon_{tR \& D} \quad (20)$$

$$\frac{SGA_t}{A_{avg}} = \alpha_0 + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 MV_t + \beta_2 Q_t + \beta_3 * \frac{INT_t}{A_{avg}} + \beta_4 * \frac{\Delta S_t}{A_{avg}} + \beta_5 * \frac{\Delta S_t}{A_{avg}} * DD + \varepsilon_{tSG \& A} \quad (21)$$

$$\frac{GainA_t}{A_{avg}} = \alpha_0 + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 MV_t + \beta_2 Q_t + \beta_3 * \frac{INT_t}{A_{avg}} + \beta_4 * \frac{ASale_t}{A_{avg}} + \beta_5 * \frac{ISales_t}{A_{avg}} + \varepsilon_{tAsset} \quad (22)$$

$$\frac{PROD_t}{A_{avg}} = \alpha_0 + \alpha_1 * \frac{1}{A_{avg}} + \beta_1 MV_t + \beta_2 Q_t + \beta_3 * \frac{St}{A_{avg}} + \beta_4 * \frac{\Delta S_t}{A_{avg}} + \beta_5 * \frac{\Delta S_{t-1}}{A_{avg}} + \varepsilon_{tPr oduction} \quad (23)$$

The previous equations are initially used to calculate normal real earnings management, where RD represents R&D expense; SGA represents selling, general and administrative expense; GainA represents income from asset sales; PROD represents COGS plus change in inventory; A represents total assets; MV represents the natural logarithm of market value calculated as the number of common shares outstanding multiplied by the share price; Q represents Tobin's Q calculated as the sum of the market value of common shares, the book value of preferred shares, long term debt and current debt divided by total equity and liability; INT represents internal funds calculated as the sum of income before extraordinary items, research and development expense, and depreciation and amortization expenses; DD represents an indicator variable that reflects the sticky cost behavior for the intentional reduction in SG&A when the demand drops, which equals 1 when total sales decrease between t-1 and t, and zero otherwise; ASales represents the sales of long-lived assets; and ISales represents the sale of long-lived investment.

### 3. Research hypotheses

In this dissertation, we aim to measure the existence of earning managements for farms and to examine the relationship between earnings management and borrowing behavior in farms. From the motivation analysis of earnings management of farms, firstly, the weak nature of the agricultural industry is affected by both the natural environment and the market, and its dependence on the natural conditions is much higher than that of other industries. However, due to the different valuations of biology assets leave more place for manager to manipulated. Additionally, firms engage in income-increasing earnings management in the period prior to a new private debt issuance. (Ater and Hansen, 2020) provides insight into how managers' balance competing incentives to use income-increasing earnings management to obtain more favorable lending terms, and to use income-decreasing earnings management to reduce the risk of a future debt covenant violation. As cited before, farms will encounter financing difficulties, forcing agricultural companies to carry out earnings management to achieve the purpose of financing. Farms are mainly rely on bank loans for their development and especially French banks that provides most farms with loans (Enjolras and Madiès, 2020).

*Hypothesis 1: Farms manage their earnings through earnings management before they apply for a bank loan.*

Attia (2019) finds out the firms with a high-level of earnings management have a significant higher level of borrowing capacity (BC) than firms with a low-level of earnings management. Earnings management will harm the company's reputation which is a important factor of company's BC. Setiawan and Hermawan (2017) shows that earnings management practice has a significant negative association with corporate reputation, while corporate reputation has a significant positive association with corporate borrowing capacity. The results of his research also show that there is a significant positive association between corporate reputation estimated by earnings management practice and borrowing capacity. Borrowers manage earnings to signal better quality to lenders and to ameliorate their borrowing capacities, Mafrolla and D'Amico (2017) reveals the relation between earnings management and company BC in the southern EU economies. Their research implied a positive and systematic impact of earnings management (both ex post and ex ante) on the amount of bank loans, as well as some positive impact on the cost of bank loans in the period following the enactment of the Basel II regulation. Hence, we further examine if farm upwards earnings management will strength their borrowing capacity.

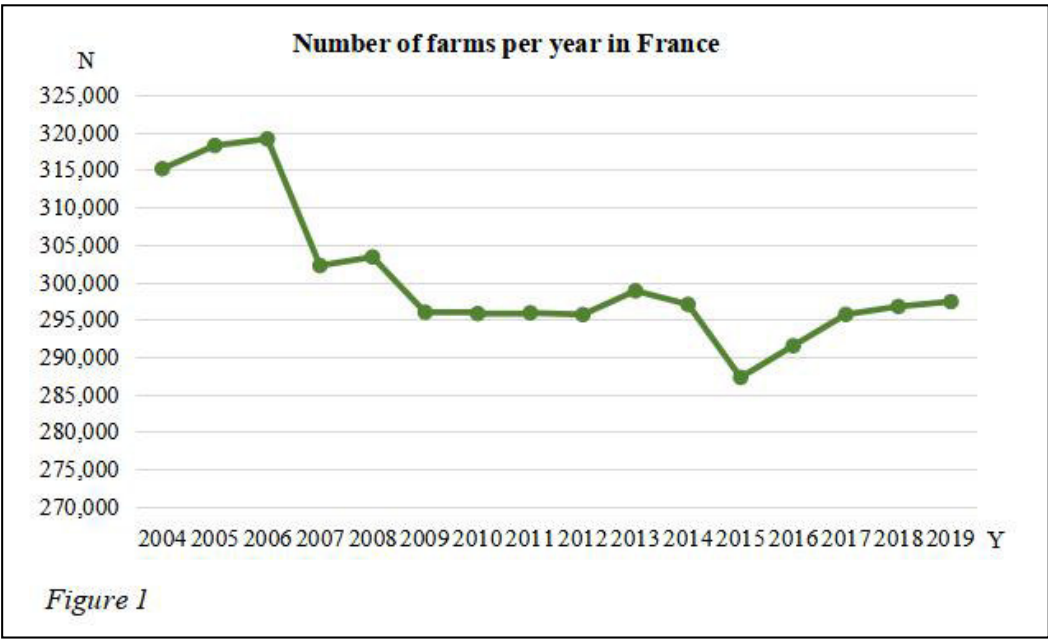
*Hypothesis 2: The farms' borrowing capacity increases as their holder upwards manipulate earnings management.*



4. Methodology

4.1. Data

The hypotheses presented in the previous section are tested on the sample of small and medium active farms, operating in France, which have been selected using the French Farm Accountancy Data Network (FADN) database. This database contains accounting and structural information on a sample of French farms that are representative of productions and regions, which makes it completely suitable for calculating farms’ economic parameters. A management committee guides the FADN. The committee is known as the FADN Committee and consists of representatives of the Liaison Agencies of the Member States. Farmers participating in the FADN sample are eligible for a grant, given that the data provided are accurate(Markou, 2004). Data are collected through personal interviews. All the farms’ financial information will be recorded unless the farm stays less two years in the database. The time series covers the period from 2000 to 2019, representing the oldest and most recent years available on French FADN at the time of data collection. As we can see the number of farms is reducing year by year in Figure 1. From 2004 to 2008, the number of farms is over 300,000. But the number of farms dropped under 300,000 after 2008 till 2019.



Data source: Farm Accountancy Network Data (FADN) for years 2004-2019

## 4.2. Research methods

We test earnings management based on several accrual measures. This method seems to be more adapted to our topic compared to real measures. Indeed, discretionary expenses which include research and development (R&D), advertising, and selling, general, and administrative (SG&A) expenses are of little importance to farms.

### 4.2.1 Research method for hypothesis 1

In order to test hypothesis 1, we use two models which are the Jones model (Jones, 1991) and Modified Jones model (Dechow, 1995). Two accrual models, which are the Cash-Flow model (Dechow, 2002) and the performance-matching model (Kothari, 2003), are used to test the robustness of the Jones model and Modified Jones models.

As the normal operation and expansion of asset will affect total accruals, we consider the Jones model to test the degree of earnings management.

Step 1: Computation of the total accruals based on the cash-flow-statement approach as following the following equation :

$$TA_t = NI_t - CFO_t \quad (24)$$

Where: TA is the total accruals in the year t. NI is the net income in year t. CFO is the cash flow from operations in year t.

Step 2: Total accruals of a company also can be presented as the sum of non-discretionary accruals and discretionary accruals.

$$TA_t = NDA_t + DA_t \quad (25)$$

Step 3: After a normalization of all accruals (divided by lagged assets), the subsequent regression is performed.

$$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t}{A_{t-1}} + \alpha_3 * \frac{PPE_t}{A_{t-1}} + \varepsilon_t \quad (26)$$

Where:  $\alpha_1$ ,  $\alpha_2$  and  $\alpha_3$  are the estimated coefficients and  $\varepsilon$  is the error term.

Step 4: Treated under this model, the magnitude of DA of a specified company is computed as the residual variables, as assessed with this equation :

$$\frac{TA_t}{A_{t-1}} = \alpha_1 * \frac{1}{A_{t-1}} + \alpha_2 * \frac{\Delta REV_t}{A_{t-1}} + \alpha_3 \frac{PPE_t}{A_{t-1}} + \frac{DA_t}{A_{t-1}} \quad (27)$$

Where:  $\frac{DA_t}{A_{t-1}} = \varepsilon_t$  (28)

Step 5: Having assessed DA, the NDA amount for company for year t is computed as the following equation :

$$\frac{NDA_t}{A_{t-1}} = \frac{TA_t}{A_{t-1}} - \frac{DA_t}{A_{t-1}} \quad (29)$$

The company can change their credit sales policy, so as to change the time of revenue recognition, is a means of manipulating the profit and loss. We further employ the modified Jones model to test the degree of the earnings management. We follow the same logic of the Jones model. We take the same action as step 1 and step 2 in Jones model, in step 3 we substitute equation (26) with equation (6), the magnitude of DA of a specified company is computed as the residual variables.

By increasing available cash flows, farmers may increase the potential value of the whole farm. Cash is the key factor of farms regarding earnings management. We adapt the Cash-Flow model to improve the reliability of last two model. We estimate equation (8) and obtain the estimated coefficients and get the value of discretionary accruals. The non-discretionary accruals as the difference of the total accruals and the discretionary accruals, other steps are similar with Jones model.

Likewise, the discretionary accruals in the performance-matching (Kothari) model are measured by the part which can be explained by the regression equation (10), The non-discretionary accruals as the difference of the total accruals and the discretionary accruals, other steps are similar with Jones model.

#### 4.2.2 Research method for hypotheses 2

The following two regressions test hypothesis 2 to explore the relationship between the farms' borrow capability and earnings management. We measure ex-ante earnings management activity as that which occurs in the year before the measurement of borrowing capacity. Mafrolla and D'Amico (2017) find out borrowers manage earnings to ameliorate their borrowing capacity among SMEs from southern EU economies. We also control other proxies for creditworthiness (Return on assets, Size, Liquidity). Ahn and Choi (2019) find out the performance in terms of the profitability among borrowers and borrowers' liquidity which can will affect borrowers' earnings management. Therefore, following Mafrolla and D'Amico's research we use the following simultaneous equation model:

$$\begin{aligned} LoanAmount_{it} = & \beta_0 + \beta_1 Earningsmanagement_{it} + \beta_2 LoanCost_{it} + \beta_4 ROA_{it} + \beta_5 Size_{it} + \\ & \beta_6 Liquidity_{it} + \beta_7 Leverage_{it} + \beta_8 Coverage_{it} + \beta_9 AltmanZ_{it} + \beta_{10} Year_i + \varepsilon_{it} \end{aligned} \quad (30)$$

$$\begin{aligned} LoanCost_{it} = & \beta_0 + \beta_1 Earningsmanagement_{it} + \beta_3 LoanAmount_{it} + \beta_4 ROA_{it} + \beta_5 Size_{it} + \\ & \beta_6 Liquidity_{it} + \beta_7 Leverage_{it} + \beta_8 Coverage_{it} + \beta_9 AltmanZ_{it} + \beta_{10} Year_i + \varepsilon_{it} \end{aligned} \quad (31)$$

Where: LoanCosts and LoanAmount are proxies of farm's borrowing capability. Return on assets (ROA) is measured as operating profits scaled by lagged total assets for firm *i* in year *t*, in the model. Firm size measured by using the logarithm of total assets (Size) for firm *i* in year *t*. Cash Flow, which is measured as cash flow from operations scaled by lagged total assets for firm *i* in year *t*, in the model. Finally, we include three other independent variables to control for borrowers' financial health conditions, which can also affect borrowers' earnings management (Ahn and Choi, 2009): Leverage, which is total debt deflated by net equity; Coverage, which is the portion of interest and financial expenses covered by operating income; and Altman's Z, which is the Z-score measured by using the formula elaborated by Altman (1968) to predict firm bankruptcy.

## 5. Empirical Results

### 5.1. Descriptive statistics

Table 2 presents the descriptive statistics for the variables used in the study.

Variable	Obs	Mean	Std. Dev.	Min	Max
NDA-Jones	126,675	-0.0688	0.0377	-2.2141	2.6109
NDA-Modified Jones	126,675	-0.0683	0.0577	-3.5049	2.6094
NDA-Cashflow model	126,675	-0.0687	0.0690	-2.5196	2.8142
NDA-performance-matching model	108,044	-0.0676	0.0799	-8.3652	9.9464
Leverage	147,980	0.4253	0.4670	0.0000	75.7760
Log_TotalAssets	147,963	12.6772	0.8550	-31.1916	16.6102
Scaled_OperatingCash	126,675	0.2026	0.2564	-3.8795	23.3150
ROA	126,675	0.1492	0.2559	-3.6670	30.8097
Total liabilities	147,980	187,258.7	255,676	0.0000	1,210,000
Loan_Cost	145,582	0.0289	0.0176	0	0.1000
Coverage	147,980	0.1091	0.4547	-4.9775	4.9991
Altman's Z	147,946	1.5198	1.3492	-21.4064	99.4937

Note: Computations are made for all the years 2000-2019.

We use four different models to estimate non-discretionary accruals, and all the results showed a high degree of uniformity which are around -0.068. We further noticed that the leverage (debt-to-assets ratio) of farms is approximately 42.53%. This indicator is directly related to financial risks and it impacts farm growth. The average loan amount is 187,258 euro. When comparing the ROA with the interest rate (which is cost of loan), the business's ROA is 14.92% and the interest rate on its debt is 2.8%, the business's net gain on its debt capital is 12.12% more than what it is paying in interest. ROA tells investors whether the company's performance stacks up. If a company is squeezing out less from its investments than what it's paying to finance those investments, that's not a positive sign. By contrast, an ROA that is better than the cost of debt means that the company is pocketing the difference. The Altman Z-score<sup>1</sup> is a formula for determining whether a company, notably in the manufacturing space, is headed for bankruptcy.

<sup>1</sup> The formula takes into account profitability, leverage, liquidity, solvency, and activity ratios. An Altman Z-score close to 1.8 suggests a company might be headed for bankruptcy, while a score closer to 3 suggests a company is in solid financial positioning.

Figure 2. Trend of discretionary accruals (DA) between 2000 and 2019

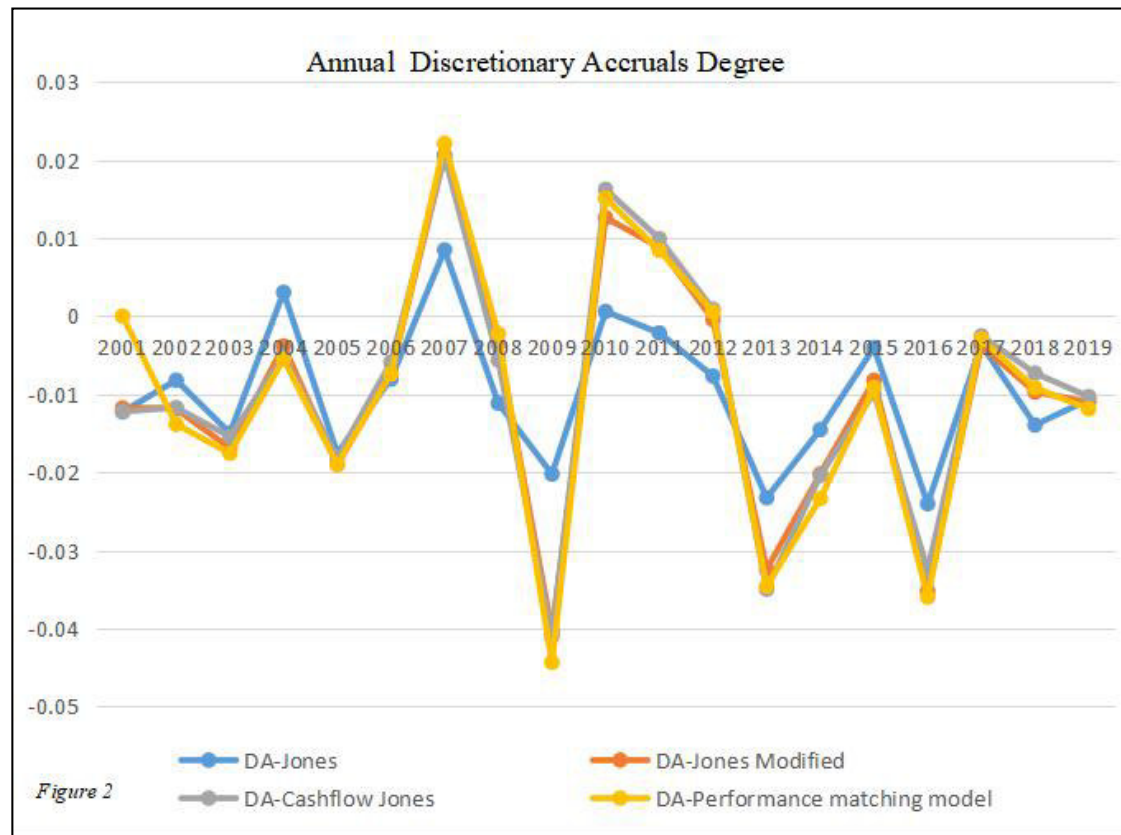
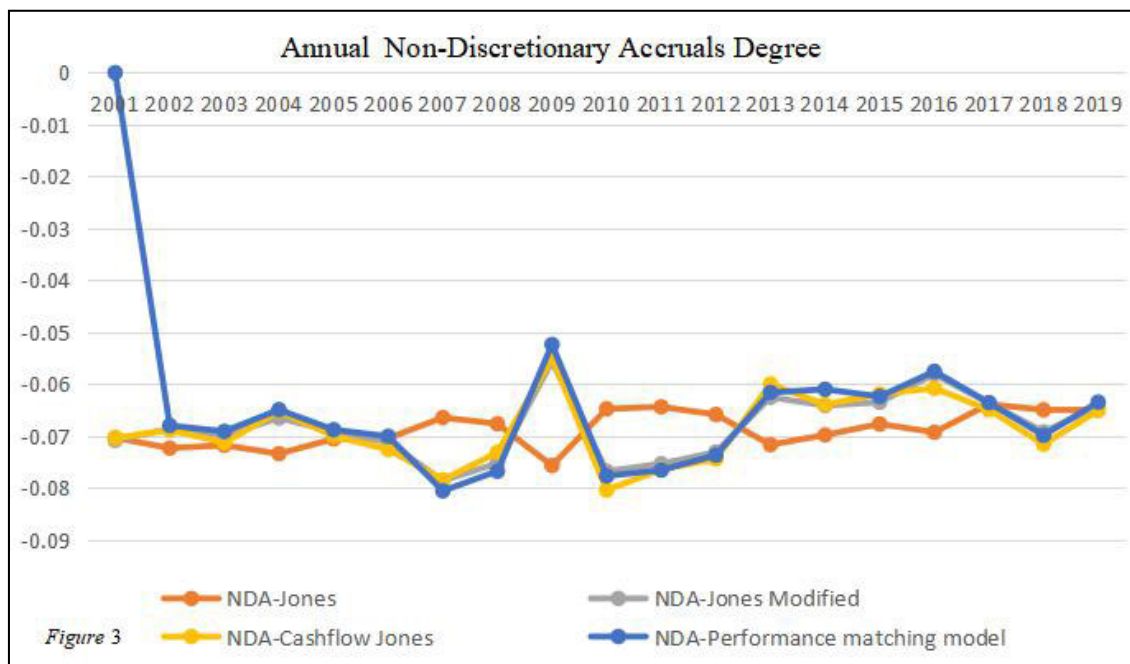


Figure 2 summarizes the situation regarding earnings management as measured by four models which their results are strongly consisted with each other. we also noticed that in all sample years, the manager of farms will downsize the earnings excepted 2007 (0.0085, Jones; 0.0206, Modified Jones; 0.0205, Cash-flow model; 0.2210, Performance-matching model) and 2010 (0.0006, Jone; 0.0126, Modified Jones; 0.0162, Cash-flow model; 0.0151, Performance-matching model). In 2007-2008, as we all know financial crisis breakout, also known as the global financial crisis (GFC), was a severe worldwide economic crisis. it was considered by many economists to have been the most serious financial crisis since the Great Depression. Both positive earnings management are followed by the financial crisis. That explained in the way that the farms face more challenge borrowing situation during the financial crisis, they need alleviate their financial report which can present a good performance image to creditor. The need of credit is much stronger compare with other normal year. From above chart, the degree of earnings management is similar at the beginning sample's year and the end of sample's year which are near -0.01. The biggest changes were from 2006 to 2013. The economic situation is relatively turbulent. This result is consistent with Campa's (2019) findings which indicated the level of firms' financial difficulties is positive related to higher income-increasing earnings management.

Figure 3. Trend of non-discretionary accruals (NDA) between 2000 and 2019.



We can notice from Figure 3 that non-discretionary accruals are negative all the time from 2000 to 2019. Non-discretionary accruals are a mandatory expense/asset that is recorded within the accounting system that has yet to be realized. The non-discretionary accrual expenses are always bigger than non-discretionary accrual assets in the French farms.

Table 3: The Pearson and Spearman correlation matrix between variables.

	DA- Jones Model	DA- Modified Jones Model	DA- Cashflow Model	DA- Performance Matching Model	NDA- Jones Model	NDA- Modified Jones Model	NDA- Cashflow Model	NDA- Performance Matching Model	Leverage	Coverage	Scaled Total Accruals
DA-Jones Model	1										
DA-Modified Jones Model	0.8803***	1									
DA-Cashflow Model	0.8506***	0.9641***	1								
DA-Performance Matching model	0.8173***	0.9279***	0.8914***	1							
NDA-Jones Model	-0.1176***	0.1874***	0.1691***	0.1096***	1						
NDA-Modified Jones Model	0.3323***	-0.0838***	-0.0834***	-0.0923***	-0.1267***	1					
NDA-Cashflow Model	0.4044***	0.0779***	-0.0702***	0.0643***	-0.0548***	0.8293***	1				
NDA-Performance Matching Model	0.4629***	0.1932***	0.1849***	-0.0685***	0.0274***	0.7453***	0.6505***	1			
Leverage	-0.1041***	-0.1352***	-0.1346***	-0.1456***	-0.0467***	0.0363***	0.0191***	0.0364***	1		
Coverage	-0.001	-0.0012	-0.0011	-0.0014	-0.0005	0.0001	-0.0002	0	0.001	1	
Scaled Total Accruals	0.9691***	0.9253***	0.8911***	0.8475***	0.1312***	0.3003***	0.3901***	0.4714***	-0.1156***	-0.0011	1

Note: Table 3 presents correlation coefficient of independent variable and control variables. Leverage, which is total debt deflated by total asset; Coverage, which is the portion of interest and financial expenses deflated by operating income; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels respectively.



Table 3 reports the Pearson-Spearman correlation matrix between variables. The highest correlation coefficient is 0.9691 between total accruals and discretionary accruals in Jones model, which indicates that farm discretionary accruals leverage increases its total accruals. The second highest absolute correlation coefficient is 0.9641 between DA-Modified Jones model and DA-CashFlow model, suggesting that our results are robust, all the result of fours models being strongly connected. From table 4 and table 5, we draw the conclusions which are farms use income increase earnings management to get attention from creditors. After they obtained the loan, the creditor will monitor farm's operation which can reduce the earnings management behaviors.

## 5.2. Descriptive statistics

In this paper, we adopt a linear regression analysis performed with the Stata software. We use four models to test hypothesis 1. The result are showed in table 4 and table 5. We split the sample into two different groups according to their loan amount. If their debt increases more than 30% during a given year, the farm is marked by “Yes”, otherwise it is marked by “No”. Then we make the comparison between earnings management in the year indebtedness increases and earnings management in the year before. In table 4, we noticed that in the group “No”, all the models show a negative earnings management degree in both time periods. Discretionary accruals in the Modified Jones model (Jones, 1991) and Cash-Flow model (Dechow, 2002) are at the same level of -0.36% in the group “No” in the debt year. The result emphasizes that farms manage their profit downward if they do not require additional debt. In the group “Yes”, in the event year the average of discretionary accruals is -0.55%. However, the year before indebtedness increases, all discretionary accruals are positive in the four models. The Jones model and Modified Jones model show 0.77% and 0.55% respectively, Cash-Flow model has the similar result with Modified Jones model at around 0.54%. It means that farms overstate their earnings to improve their profitability, further increasing the borrowing capacity. In our paper, we find that usually farms understate their profit. However, we make a comparison within the different time periods: the event year (increased indebtedness) and the year before. The results show that farm managers upward the earnings in an aggressive way in the year before debt year, in order to obtain the financial support from potential creditors. Jha (2013) has a similar result with our paper, he finds out managers do indeed manipulate earnings upward in the last eight quarters preceding a debt-renegotiation.

**Table 4: Summary statistics: means of the degree of discretionary accruals and non-discretionary accruals. By categories of: change 30%**

Change	Lag_DA	Lag_DA	Lag_DA	Lag_DA	DA	DA	DA	DA
30%	Jones	Modified	Cashflow	Performance	Jones	Modified	Cashflow	Performance
	Model	Jones	Model	Matching	Model	Jones	Model	Matching
		Model		Model		model		Model
No	-0.0113	-0.0112	-0.0108	-0.0116	-0.0025	-0.0036	-0.0036	-0.0042
Yes	0.0077	0.0055	0.0054	0.0041	-0.0586	-0.0552	-0.0519	-0.0550
t-test	***	***	***	***	***	***	***	***
Total	-0.0088	-0.0090	-0.0087	-0.0095	-0.0098	-0.0103	-0.0099	-0.0108

Note: Lag denotes a variable lagged by one year and Change30 whether the farm's indebtedness increased by at least 30% between the current and the previous year. T-test is a comparison of means using a Student's test. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels respectively.

We further increase the change on the debt, split the sample into two different groups according to their loan amount: if their debt increases more than 50% it is marked as "Yes", and otherwise marked by "No". The result is more significant than in table 4. In table 5, the group "No" showed negative earnings management the year before the debt was considered. In the group "Yes", which increases more than 50% debt, the degree of income-increase management before the debt year is more aggressive than the debt year. Discretionary accruals (DA) are around -0.6% in the debt year, 0.50% in the year before. The DA change from positive related in the debt year before to negative related in the debt year. It further confirms our hypothesis 1, that farms upward manage earnings before they require a bank loan.

**Table 5: Summary statistics: means of the degree of discretionary accruals and non-discretionary accruals. By categories of: change 50%**

Change	Lag_DA	Lag_DA	Lag_DA	Lag_DA	DA	DA	DA	DA
50%	Jones	Modified	Cashflow	Performance	Jones	Modified	Cashflow	Performance
	Model	Jones	Model	Matching	Model	Jones	Model	Matching
		Model		Model		Model		Model
No	-0.0110	-0.0109	-0.0105	-0.0112	-0.0054	-0.0064	-0.0063	-0.0069
Yes	0.0157	0.0118	0.0117	0.0096	-0.0601	-0.0550	-0.0505	-0.0548
t-test	***	***	***	***	***	***	***	***
Total	-0.0088	-0.0090	-0.0087	-0.0095	-0.0098	-0.0103	-0.0099	-0.0108

Note: Lag denotes a variable lagged by one year and Change50 whether the farm's indebtedness increased by at least 50% between the current and the previous year. T-test is a comparison of means using a Student's test. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels respectively.

### 5.3. Regression analysis

Tables 6 and 7 report the simultaneous regression results respectively based on equations (30) and (31) on the effect of earnings management practices on the bank loan amount and bank cost. We attached the robustness result in Appendix. Tables 8 to 10 are the result of regression equation (30) and tables 11 to 13 are the result of regression equation (31). The econometric analysis is undertaken by using dynamic least squares models (OLS) estimation procedures.

From table 6 and table 8 to 10 in Appendix, we notice that bank loans are strongly positively associated with earnings management activity.  $\beta_1$  is 0.3691 in Modified Jones model, 0.3482 in Jones model, 0.3352 in Performance-matching model, 0.2938 in Cashflow model by order. All the P value of those results are less than 0.01. Surprisingly, Loan Costs are also positively affected by earnings management (in table 7 and table 11 to 13 in attached appendixes,  $\beta_1$  is bigger than zero and p-value under 0.01.  $\beta_1$  is 0.0052 in Cash flow model, 0.0049 in Modified Jones model, 0.0046 in the performance-matching model, 0.0034 in Jones model by order. We can notice from the table 5 that ROA is positive related with loan amount. The return of assets presents the company's profitability. Therefore, the higher the ROA, the higher the loan amount. Bank willing to issue the loan to the company which has good image and higher profitability. From table 7, we can find out that the ROA has a negative effect on loan cost. An increased loan cost paid to their creditors reduces their earnings.

Table 6: The effect of EM practices on the bank loan amount (Performance-Matching model)

Loan amount	Coef.	Std. Err.	z	P>z	[95% Conf	Interval]
DA_Performance Matching Model	0.3352	0.0048	70.39	0.00	0.3258	0.3445
Loan Cost	0.0000	0.0000	0.49	0.62	0.0000	0.0000
ROA	0.0710	0.0041	17.33	0.00	0.0630	0.0790
Log_Total Assets	0.0534	0.0008	65.27	0.00	0.0518	0.0550
Scaled_Operating Cash Flow	0.1304	0.0038	33.95	0.00	0.1229	0.1379
Leverage	0.8667	0.0018	492.68	0.00	0.8632	0.8701
Coverage	0.0000	0.0000	-0.89	0.38	0.0000	0.0000
Altmanz	-0.0066	0.0001	-51.15	0.00	-0.0069	-0.0064
Year						
2003	0.0028	0.0023	1.24	0.22	-0.0017	0.0073
2004	0.0061	0.0023	2.66	0.01	0.0016	0.0107
2005	-0.0022	0.0023	-0.95	0.34	-0.0068	0.0024
2006	0.0024	0.0024	1	0.32	-0.0023	0.0070
2007	-0.0052	0.0024	-2.18	0.03	-0.0099	-0.0005
2008	0.0013	0.0024	0.54	0.59	-0.0034	0.0060
2009	0.0041	0.0024	1.76	0.08	-0.0005	0.0088
2010	-0.0066	0.0024	-2.82	0.01	-0.0112	-0.0020
2011	-0.0131	0.0024	-5.52	0.00	-0.0177	-0.0084
2012	-0.0101	0.0024	-4.25	0.00	-0.0147	-0.0054
2013	-0.0057	0.0024	-2.41	0.02	-0.0104	-0.0011
2014	-0.0075	0.0024	-3.15	0.00	-0.0122	-0.0028
2015	-0.0068	0.0024	-2.85	0.00	-0.0115	-0.0021
2016	-0.0066	0.0024	-2.78	0.01	-0.0113	-0.0020
2017	-0.0179	0.0024	-7.43	0.00	-0.0226	-0.0132
2018	-0.0150	0.0024	-6.16	0.00	-0.0197	-0.0102
2019	-0.0140	0.0024	-5.74	0.00	-0.0188	-0.0092
_cons	-0.6313	0.0105	-59.8700	0.00	-0.6519	-0.6106

Note: Table 6 The performance matching model (10)

The discretionary accruals measured by Performance-Matching Model (Kothari, 2005) positively affects on the loan amount with a coefficient of 0.3352 at a significant level.

Table 7: The effect of EM practices on the bank loan cost (Performance-Matching model)

Loan cost	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
DA_Performance Matching Model	0.0046	0.0004	10.74	0.00	0.0037 0.0054
Loan Amount	-0.0087	0.0002	-39.97	0.00	-0.0092 -0.0083
ROA	-0.0032	0.0004	-8.54	0.00	-0.0039 -0.0024
Log_Total Assets	0.0000	0.0001	-0.21	0.84	-0.0002 0.0002
Scaled_Operating Cash Flow	0.0006	0.0003	1.93	0.05	0.0000 0.0013
Leverage	0.0059	0.0002	31.18	0.00	0.0055 0.0063
Coverage	0.0000	0.0000	1.96	0.05	0.0000 0.0000
Altmanz	0.0004	0.0000	10.37	0.00	0.0003 0.0005
Year					
2003	-0.0017	0.0002	-8.08	0.00	-0.0021 -0.0013
2004	-0.0046	0.0002	-22.14	0.00	-0.0050 -0.0042
2005	-0.0053	0.0002	-25.19	0.00	-0.0058 -0.0049
2006	-0.0067	0.0002	-31.09	0.00	-0.0071 -0.0063
2007	-0.0071	0.0002	-32.5	0.00	-0.0075 -0.0067
2008	-0.0070	0.0002	-31.96	0.00	-0.0074 -0.0066
2009	-0.0075	0.0002	-34.25	0.00	-0.0079 -0.0070
2010	-0.0090	0.0002	-41.56	0.00	-0.0095 -0.0086
2011	-0.0100	0.0002	-45.54	0.00	-0.0104 -0.0095
2012	-0.0113	0.0002	-51.21	0.00	-0.0117 -0.0108
2013	-0.0129	0.0002	-58.27	0.00	-0.0133 -0.0124
2014	-0.0140	0.0002	-63.38	0.00	-0.0145 -0.0136
2015	-0.0166	0.0002	-74.58	0.00	-0.0170 -0.0161
2016	-0.0191	0.0002	-85.51	0.00	-0.0195 -0.0186
2017	-0.0213	0.0002	-94.58	0.00	-0.0217 -0.0208
2018	-0.0229	0.0002	-100.42	0.00	-0.0233 -0.0224
2019	-0.0240	0.0002	-103.95	0.00	-0.0244 -0.0235
_cons	0.0409	0.0014	30.0700	0.00	0.0383 0.0436

Notes: Table 7 The performance matching model (10)

The discretionary accruals measured by Performance-Matching Model (Kothari, 2005) positively affects on the loan cost with a coefficient of 0.0046 at a significant level.

These results show that the adoption of active earnings management by farms significantly and positively increased the amount of their bank loans, but did not systematically reduce their loan costs. Hence, the need for bank loans seemingly motivates borrowers to engage in earnings management regardless of the excessive loan costs. This result supports out hypothesis 2 according to which the farm's borrowing capacity increases

as the farm manager upward manipulates earnings. This also supports the idea that farms in need of money have a greater incentive to resort to external bank financing, even though it is expensive. It thus confirms the supervisory effect of debt and bankruptcy risk on the borrower's earnings management. This finding is consistent with previous research that demonstrates the primary goal of private firms that decide to manage earnings is to obtain larger loan amounts, regardless of how costly such loans are in terms of interest and other financial expenses (D'Amico and Mafrolla 2017).

## 6. Conclusion

Agriculture is a very important activity in the European Union (EU). Almost half of all French farmers (48.5%) applied for bank loans according to the fi-compass survey, with investment loans with medium and long-term maturities the most commonly selected. The total unmet credit demand for the French agriculture sector is estimated at EUR 6.2 billion. The rejection rate for farmers' bank loan applications ranges from 1% to 3%, depending on the finance product, and is lower than the EU 24 average. About 6% to 8% of farmers did not apply for a loan due to a fear of possible rejection. The main reason for rejection is based on banking policy, with investment risk assessed as too high. For innovative projects, a lack of collateral and business history also leads to unmet finance demand.

Additionally, earnings management is a common strategy used by companies to change their financial results in order to achieve specific goals. This topic already been broadly discussed within the large and listed firms under different situations. The results are mixed. Some studies applied that earnings management activity will be less in big firms compared to small firms, because big firm are closely monitored by regulators and market participants. Some studies held the opposite opinion, they find evidence that big firms have more complicated accounting systems, thus leaving a bigger space to managers to use their discretionary power. Accordingly, the incentive for small and medium sized firms to manipulate earnings increases when they are under financial stress. However, few studies focus on earnings management in small and medium-sized enterprises and no one considers specifically farms.

This dissertation aimed to examine whether farms use income-increase earnings management to obtain bank loans and if earnings management can help farms increase their borrowing capacity.

We collect all the available data in the Farm Accountancy Data Network (FADN) database from 2000 to 2019 to test our hypotheses. We adopt four acknowledged earnings

management models - Jones model, Modified Jones model, Cash-Flow model and Performance-Matching model - to check whether farms have earnings management behavior. Whatever the measure, the result showed that farms increase their profitability through accruals earnings management before they apply for a bank loan.

A dynamic least squares models is then applied to study if farms increase their borrowing capacity through earnings management. The results indicate that as farms increase their manipulation of earnings, their ability also increases significantly. This study also extends a growing research stream on the relationship between earnings management and the borrowing capacity of farms. In addition, the implications of this study should be taken in to account by banks. The bank should aware that the farm's financial report are not truly represent their economic situation, and should check the background of farm more closely.

This study faces some limitations, which are also avenues for future research. We only tested the accrual-earnings management behavior. Because farms barely have R&D or advertise expenses, we could not examine their real earnings management activities. Future research should shed more light on this aspect. Further, additional studies can investigate the long-term impacts and costs of earnings management on SMEs. Finally, It should be interesting to test whether the use of earnings management is beneficial in the long run for farms and more broadly for SMEs.

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## Appendix:

Table 8: The effect of EM practices on the bank loan amount (Jones model)

Loan amount	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DA_Jones Model	0.3482	0.0050	69.34	0.00	0.3383	0.3580
Loan Cost	0.0000	0.0000	0.31	0.76	0.0000	0.0000
ROA	0.0204	0.0045	4.52	0.00	0.0115	0.0292
Log_Total Assets	0.0591	0.0007	78.88	0.00	0.0576	0.0606
Scaled_Operating Cash Flow	0.2231	0.0049	45.94	0.00	0.2136	0.2327
Leverage	0.8611	0.0016	527.06	0.00	0.8579	0.8643
Coverage	0.0000	0.0000	-0.74	0.46	0.0000	0.0000
Altmanz	-0.0069	0.0001	-53	0.00	-0.0071	-0.0066
Year						
2002	-0.0010	0.0022	-0.47	0.64	-0.0053	0.0032
2003	0.0007	0.0022	0.32	0.75	-0.0036	0.0050
2004	0.0046	0.0022	2.08	0.04	0.0003	0.0090
2005	-0.0017	0.0022	-0.75	0.45	-0.0061	0.0027
2006	0.0033	0.0023	1.46	0.14	-0.0011	0.0077
2007	0.0011	0.0023	0.5	0.62	-0.0033	0.0056
2008	0.0035	0.0023	1.54	0.12	-0.0010	0.0079
2009	-0.0036	0.0023	-1.61	0.11	-0.0081	0.0008
2010	-0.0014	0.0023	-0.6	0.55	-0.0058	0.0031
2011	-0.0096	0.0023	-4.22	0.00	-0.0140	-0.0051
2012	-0.0084	0.0023	-3.69	0.00	-0.0129	-0.0040
2013	-0.0107	0.0023	-4.68	0.00	-0.0152	-0.0062
2014	-0.0110	0.0023	-4.81	0.00	-0.0155	-0.0065
2015	-0.0081	0.0023	-3.54	0.00	-0.0126	-0.0036
2016	-0.0124	0.0023	-5.41	0.00	-0.0169	-0.0079
2017	-0.0173	0.0023	-7.45	0.00	-0.0218	-0.0127
2018	-0.0143	0.0023	-6.14	0.00	-0.0188	-0.0097
2019	-0.0161	0.0023	-6.91	0.00	-0.0207	-0.0116
_cons	-0.7022	0.0097	-72.66	0	-0.7211	-0.6833

Table 9: The effect of EM practices on the bank loan amount (Modified Jones model)

Loan amount	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DA_Modified Jones Model	0.3691	0.0047	77.87	0.00	0.3598	0.3783
Loan Cost	0.0000	0.0000	0.44	0.66	0.0000	0.0000
ROA	0.0305	0.0041	7.41	0.00	0.0224	0.0385
Log_Total Assets	0.0520	0.0007	70.71	0.00	0.0506	0.0534
Scaled_Operating Cash Flow	0.1598	0.0039	41.26	0.00	0.1522	0.1674
Leverage	0.8669	0.0016	539.71	0.00	0.8638	0.8700
Coverage	0.0000	0.0000	-0.75	0.45	0.0000	0.0000
Altmanz	-0.0070	0.0001	-54.38	0.00	-0.0073	-0.0068
Year						
2002	0.0005	0.0022	0.22	0.83	-0.0038	0.0047
2003	0.0023	0.0022	1.05	0.29	-0.0020	0.0066
2004	0.0064	0.0022	2.88	0.00	0.0020	0.0108
2005	-0.0012	0.0022	-0.52	0.60	-0.0056	0.0032
2006	0.0036	0.0023	1.61	0.11	-0.0008	0.0080
2007	-0.0023	0.0023	-1.03	0.31	-0.0068	0.0021
2008	0.0014	0.0023	0.64	0.53	-0.0030	0.0059
2009	0.0028	0.0022	1.26	0.21	-0.0016	0.0073
2010	-0.0046	0.0023	-2.04	0.04	-0.0090	-0.0002
2011	-0.0113	0.0023	-4.99	0.00	-0.0157	-0.0068
2012	-0.0082	0.0023	-3.59	0.00	-0.0126	-0.0037
2013	-0.0054	0.0023	-2.39	0.02	-0.0099	-0.0010
2014	-0.0075	0.0023	-3.27	0.00	-0.0119	-0.0030
2015	-0.0058	0.0023	-2.52	0.01	-0.0102	-0.0013
2016	-0.0071	0.0023	-3.11	0.00	-0.0116	-0.0026
2017	-0.0166	0.0023	-7.2	0.00	-0.0211	-0.0121
2018	-0.0135	0.0023	-5.82	0.00	-0.0180	-0.0089
2019	-0.0135	0.0023	-5.8	0.00	-0.0181	-0.0089
_cons	-0.6026	0.0095	-63.58	0.00	-0.6211	-0.5840

Table 10: The effect of EM practices on the bank loan amount (Cashflow model)

Loan amount	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
DA_Cashflow Model	0.2938	0.0046	64.26	0.00	0.2848 0.3027
Loan Cost	0.0000	0.0000	0.42	0.68	0.0000 0.0000
ROA	0.0918	0.0039	23.55	0.00	0.0842 0.0995
Log_Total Assets	0.0524	0.0007	70.65	0.00	0.0509 0.0538
Scaled_Operating Cash Flow	0.0915	0.0036	25.68	0.00	0.0845 0.0985
Leverage	0.8659	0.0016	535.18	0.00	0.8627 0.8691
Coverage	0.0000	0.0000	-0.79	0.43	0.0000 0.0000
Altmanz	-0.0071	0.0001	-55	0.00	-0.0074 -0.0069
Year					
2002	0.0000	0.0022	-0.01	0.99	-0.0043 0.0043
2003	0.0016	0.0022	0.72	0.47	-0.0027 0.0060
2004	0.0059	0.0022	2.64	0.01	0.0015 0.0103
2005	-0.0022	0.0023	-0.98	0.33	-0.0066 0.0022
2006	0.0025	0.0023	1.11	0.27	-0.0019 0.0070
2007	-0.0023	0.0023	-1.02	0.31	-0.0068 0.0022
2008	0.0013	0.0023	0.58	0.56	-0.0031 0.0058
2009	0.0006	0.0023	0.28	0.78	-0.0038 0.0051
2010	-0.0058	0.0023	-2.55	0.01	-0.0103 -0.0013
2011	-0.0121	0.0023	-5.3	0.00	-0.0165 -0.0076
2012	-0.0093	0.0023	-4.05	0.00	-0.0138 -0.0048
2013	-0.0066	0.0023	-2.87	0.00	-0.0111 -0.0021
2014	-0.0090	0.0023	-3.9	0.00	-0.0135 -0.0045
2015	-0.0070	0.0023	-3.02	0.00	-0.0115 -0.0024
2016	-0.0100	0.0023	-4.33	0.00	-0.0145 -0.0055
2017	-0.0182	0.0023	-7.84	0.00	-0.0228 -0.0137
2018	-0.0153	0.0023	-6.58	0.00	-0.0199 -0.0108
2019	-0.0153	0.0023	-6.53	0.00	-0.0199 -0.0107
_cons	-0.6027	0.0096	-63.0800	0.00	-0.6214 -0.5840

Table 11: The effect of EM practices on the bank loan cost (Jones model)

Loan cost	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DA_Jones model	0.0034	0.0005	7.07	0.00	0.0024	0.0043
Loan Amount	-0.0086	0.0002	-42.46	0.00	-0.0090	-0.0082
ROA	-0.0032	0.0004	-7.32	0.00	-0.0041	-0.0024
Log_Total Assets	0.0001	0.0001	1.28	0.20	-0.0001	0.0003
Scaled_Operating Cash Flow	0.0006	0.0005	1.23	0.22	-0.0003	0.0015
Leverage	0.0057	0.0002	32.82	0.00	0.0054	0.0061
Coverage	0.0000	0.0000	2.2	0.03	0.0000	0.0000
Altmanz	0.0005	0.0000	11.98	0.00	0.0004	0.0005
Year						
2002	-0.0014	0.0002	-7	0.00	-0.0018	-0.0010
2003	-0.0030	0.0002	-14.99	0.00	-0.0034	-0.0026
2004	-0.0059	0.0002	-28.8	0.00	-0.0062	-0.0055
2005	-0.0067	0.0002	-32.45	0.00	-0.0071	-0.0063
2006	-0.0080	0.0002	-38.63	0.00	-0.0084	-0.0076
2007	-0.0083	0.0002	-39.53	0.00	-0.0087	-0.0079
2008	-0.0082	0.0002	-39.25	0.00	-0.0086	-0.0078
2009	-0.0088	0.0002	-42.1	0.00	-0.0092	-0.0084
2010	-0.0102	0.0002	-48.47	0.00	-0.0106	-0.0098
2011	-0.0111	0.0002	-52.42	0.00	-0.0115	-0.0107
2012	-0.0124	0.0002	-58.41	0.00	-0.0129	-0.0120
2013	-0.0141	0.0002	-65.83	0.00	-0.0145	-0.0137
2014	-0.0153	0.0002	-71.28	0.00	-0.0157	-0.0149
2015	-0.0178	0.0002	-82.4	0.00	-0.0182	-0.0173
2016	-0.0203	0.0002	-93.91	0.00	-0.0207	-0.0198
2017	-0.0224	0.0002	-102.78	0.00	-0.0229	-0.0220
2018	-0.0240	0.0002	-109.28	0.00	-0.0245	-0.0236
2019	-0.0250	0.0002	-112.42	0.00	-0.0255	-0.0246
_cons	0.0402	0.0013	31.73	0.00	0.0377	0.0427

Table 12: The effect of EM practices on the bank loan cost (Modified Jones model)

Loan cost	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DA_Modified Jones model	0.0049	0.0004	11.57	0.00	0.0041	0.0058
Loan Amount	-0.0087	0.0002	-43.21	0.00	-0.0091	-0.0083
ROA	-0.0043	0.0004	-10.5	0.00	-0.0051	-0.0035
Log_Total Assets	0.0000	0.0001	0.21	0.83	-0.0002	0.0002
Scaled_Operating Cash Flow	0.0009	0.0004	2.55	0.01	0.0002	0.0016
Leverage	0.0060	0.0002	33.81	0.00	0.0056	0.0063
Coverage	0.0000	0.0000	2.19	0.03	0.0000	0.0000
Altmanz	0.0005	0.0000	11.82	0.00	0.0004	0.0005
Year						
2002	-0.0014	0.0002	-6.91	0.00	-0.0017	-0.0010
2003	-0.0030	0.0002	-14.9	0.00	-0.0034	-0.0026
2004	-0.0058	0.0002	-28.69	0.00	-0.0062	-0.0054
2005	-0.0066	0.0002	-32.41	0.00	-0.0071	-0.0062
2006	-0.0080	0.0002	-38.59	0.00	-0.0084	-0.0076
2007	-0.0083	0.0002	-39.68	0.00	-0.0087	-0.0079
2008	-0.0082	0.0002	-39.31	0.00	-0.0086	-0.0078
2009	-0.0087	0.0002	-41.64	0.00	-0.0091	-0.0083
2010	-0.0102	0.0002	-48.62	0.00	-0.0106	-0.0098
2011	-0.0111	0.0002	-52.46	0.00	-0.0115	-0.0107
2012	-0.0124	0.0002	-58.3	0.00	-0.0128	-0.0120
2013	-0.0140	0.0002	-65.39	0.00	-0.0144	-0.0136
2014	-0.0152	0.0002	-71.01	0.00	-0.0157	-0.0148
2015	-0.0177	0.0002	-82.19	0.00	-0.0181	-0.0173
2016	-0.0202	0.0002	-93.46	0.00	-0.0206	-0.0198
2017	-0.0224	0.0002	-102.71	0.00	-0.0228	-0.0220
2018	-0.0240	0.0002	-109.19	0.00	-0.0244	-0.0236
2019	-0.0250	0.0002	-112.17	0.00	-0.0254	-0.0245
_cons	0.0416	0.0013	32.7	0.00	0.0391	0.0441



Table 13: The effect of EM practices on the bank loan cost (Cashflow model)

Loan cost	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DA_Cashflow Model	0.0052	0.0004	12.83	0.00	0.0044	0.0060
Loan Amount	-0.0086	0.0002	-43.16	0.00	-0.0090	-0.0082
ROA	-0.0043	0.0004	-11.08	0.00	-0.0050	-0.0035
Log_Total Assets	0.0000	0.0001	-0.11	0.91	-0.0002	0.0002
Scaled_Operating Cash Flow	0.0007	0.0003	2.18	0.03	0.0001	0.0013
Leverage	0.0060	0.0002	33.88	0.00	0.0056	0.0063
Coverage	0.0000	0.0000	2.18	0.03	0.0000	0.0000
Altmanz	0.0005	0.0000	12.02	0.00	0.0004	0.0005
Year						
2002	-0.0014	0.0002	-6.92	0.00	-0.0017	-0.0010
2003	-0.0030	0.0002	-14.94	0.00	-0.0034	-0.0026
2004	-0.0058	0.0002	-28.7	0.00	-0.0062	-0.0054
2005	-0.0067	0.0002	-32.45	0.00	-0.0071	-0.0063
2006	-0.0080	0.0002	-38.65	0.00	-0.0084	-0.0076
2007	-0.0083	0.0002	-39.74	0.00	-0.0088	-0.0079
2008	-0.0082	0.0002	-39.28	0.00	-0.0086	-0.0078
2009	-0.0087	0.0002	-41.63	0.00	-0.0091	-0.0083
2010	-0.0102	0.0002	-48.76	0.00	-0.0107	-0.0098
2011	-0.0111	0.0002	-52.52	0.00	-0.0115	-0.0107
2012	-0.0124	0.0002	-58.35	0.00	-0.0128	-0.0120
2013	-0.0140	0.0002	-65.29	0.00	-0.0144	-0.0135
2014	-0.0152	0.0002	-71	0.00	-0.0156	-0.0148
2015	-0.0177	0.0002	-82.18	0.00	-0.0181	-0.0173
2016	-0.0202	0.0002	-93.54	0.00	-0.0206	-0.0198
2017	-0.0224	0.0002	-102.79	0.00	-0.0228	-0.0220
2018	-0.0240	0.0002	-109.29	0.00	-0.0245	-0.0236
2019	-0.0250	0.0002	-112.2	0.00	-0.0254	-0.0245
_cons	0.0420	0.0013	32.9800	0.00	0.0395	0.0445

Table 14: Description of variables

Variables	Description
TA	Total accruals
A	Total assets
NDA	Non-discretionary accruals
$\Delta REV$	Changes in revenues
PPE	The gross value of property, plant and equipment
$\Delta AR$	Changes in accounts receivable
CFO	Operating cash flow
ROA	Return on assets
$\Delta Sales$	Change in sales
GR_sales	Change in sales compared to the previous year
$\Delta CA$	Change in current assets
$\Delta CL$	Change in current liabilities
$\Delta CASH$	Change in cash and equivalents
$\Delta STD$	Change in short-term debts
NI	Net income
DiscExp	Discretionary expenses
Prod	Production costs
RD	Research and development expense
SGA	Selling, general and administrative expense
GainA	Income from asset sales
PROD	COGS plus change in inventory
MV	Natural logarithm of market value calculated as the number of common shares outstanding multiplied by the share price.
Q	Tobin's Q
INT	Internal funds calculated as the sum of income before extraordinary items, research and development expense, and depreciation and amortization expenses
DD	Indicator variable that reflects the sticky cost behavior for the intentional reduction in SG&A when the demand drops, which equals 1 when total sales decrease between t-1 and t, and zero otherwise
ASales	Sales of long-lived assets
ISales	Sale of long-lived investment
Size	Logarithm of total assets
Leverage	Total debt deflated by net equity.
AltmanZ	The Z-score measured by using the formula elaborated by Altman (1968) to predict firm bankruptcy
Liability	Total debt
Coverage	The portion of interest and financial expenses covered by operating income