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Firm Financing and Accounting Discretion
A study of income smoothing in Sweden

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Abstract
Income smoothing is the reduction of inter-temporal variation in earnings. A smooth earnings path has been documented as an important consideration for managers. This study investigates the relationship between a firm's sources of financing and the use of accounting discretion for income smoothing. A version of the Jones (1991) model is used to estimate discretionary accruals and a cross-sectional regression with several control variables is performed to test the hypotheses. There are two main findings of the study. First, it is found that firms smooth earnings to a lesser extent when insiders hold a larger share of equity capital. Second, it is found that, contrary to the hypothesis presented, a higher degree of supplier financing is associated with a higher level of income smoothing. The results can be of interest to standard setters for broadening the view of the factors that impact discretionary accounting decisions. The results can also be of interest to investors who seek to judge business risk based on reported earnings.

Keywords:
Income smoothing, earnings smoothing, accounting discretion, trade credit,
insider ownership.

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1 Introduction

1.1 Background

Companies prepare financial statements to communicate financial information that is useful to a wide range of users (IAS 1 2013). The preparation process involves estimates (IAS 8 2013) that afford managers a degree of discretion over the reported financial information. There is evidence to suggest that managers may employ discretion to alter the level of reported earnings (Healy & Wahlen 1999; Subramanyam 1996). In particular, discretion over reported earnings can be used as a tool to obtain a 'smooth earnings path'. Smooth earnings has been documented as an objective for managers, see for example Healy & Wahlen 1999 and Graham, Harvey & Rajgopal 2005. Graham, Harvey & Rajgopal (2005) find that smooth earnings are deemed important enough by managers that they are willing to sacrifice economic value to achieve them.

Theorized motivations for income smoothing[1] are abundant, many of which are related to a company's sources of financing. Studies have found that the expectations of capital market investors drive managers to smooth earnings (Francis et al. 2004; Gebhardt, Lee & Swaminathan 2001). Other research argues that the degree of insider ownership has an impact on a manager's decision to smooth income (Smith 1976; Carlson & Bathala 1997). It has also been suggested that income smoothing is the result of managers' attempts to avoid breaching debt covenants (Sweeney 1994). Yet other studies maintain that, under certain circumstances, supplier-customer relationships can provide an impetus for managers to smooth income (Raman & Shahrur 2008; Dou, Hope & Thomas 2013).

1.2 Overview of Study

The aim of this study is to investigate how different forms of firm financing impact discretionary accounting decisions. Some previous studies focus on the impact of specific sources of financing. Smith (1976) and Carlson & Bathala (1997) study the relationship between equity and income smoothing while Trueman & Titman (1988) study the impact of debt financing on income smoothing. This study takes a more general approach and considers several of the primary sources of financing in turn and ultimately focuses on two sources of financing, namely supplier financing and insider financing. Furthermore, no study on the relationship between financing and income smoothing has, to the authors' knowledge, been conducted on Swedish data.

[1] Income smoothing and earnings smoothing are used interchangeably in this study.

The question asked in this study is:

"To what extent do different sources of financing motivate managers to smooth earnings?"

Two main hypotheses are put forth. First, while equity capital markets can motivate managers to engage in income smoothing, this motivation is diminished when insiders hold a large share of equity capital. Second, it is hypothesized that supplier financing is a weaker motivation for smoothing than other sources of financing. Increased supplier financing would then lead to lower income smoothing. Naturally, as firms' total assets are taken to be constant, both hypotheses concern the relative effects between sources of financing.

The hypotheses are tested by a regression analysis of a measure of the extent to which discretionary accruals are used for income smoothing on variables for different sources of financing. The measure of income smoothing is based on the modified Jones model that partitions accruals into discretionary and non-discretionary components.

The results of this study support the first hypothesis that firms engage in income smoothing to a lesser extent when insiders own a large share of equity capital. However, the results do not support the second hypothesis that a greater reliance on supplier financing yields less income smoothing. These results are robust to adjustments to the sample, for example changing the years considered and removing outliers, as well as changing the specification of the income smoothing measure used. However, there are several validity issues related to the measurement of income smoothing that could provide alternative explanations for the results.

The findings of this study suggest that the capital and voting rights in equity, rather than equity in its entirety, determine the extent of income smoothing. Furthermore, the findings suggest that the theory presented is an inadequate explanation for the relationship between supplier financing and income smoothing in the Swedish setting.

The study is structured as follows. Section 2 presents theory on income smoothing as well as prior literature on its prevalence and relationship with different sources of financing. Section 3 summarizes the test logic and general hypotheses formed in the study. Section 4 provides a

comprehensive description of the method employed. An analysis and discussion of empirical results is carried out in Section 5. Section 6 concludes the study.

1.3 Limitations of the Study

The study is limited to Swedish listed companies, excluding financial firms because they have different reporting requirements (Prencipe et al. 2011). The study focuses on income smoothing using accounting discretion as opposed to real economic actions. Furthermore, no investigation is made into which accounting items are used when exercising discretion. Limiting the scope to accounting discretion is interesting because it allows a study of how accounting standards can be applied differently based upon the nature of the relation between a company and its investors. Additionally, no inference is attempted regarding the effect of debt because disentangling the counteracting effects of debt financing warrants a more comprehensive study.

2 Theory and Previous Research

In this section, a theoretical background and discussion of related literature is given to provide a foundation for the study. The first part defines income smoothing and presents approaches to its measurement. This serves to aid the reader's understanding of the subsequent part that discusses prior findings on the prevalence of income smoothing as well as its relationship with different sources of financing.

2.1 Income Smoothing

This section provides a theoretical background and resulting considerations that factor into the selection of an appropriate definition of income smoothing for the purpose of this study. Two approaches to measuring income smoothing are then presented; the accruals-based approach and the income-sales variation approach. The accruals-based approach is presented in greater detail, as it is the more appropriate choice for this study.

2.1.1 Definition of Income Smoothing

This thesis considers only artificial income smoothing, which is defined as *"the use of reporting discretion to make a firm's reported income stream appear smoother than the real underlying income stream."*

Central to this definition are two key underlying points. First, implicit in this definition of income smoothing is the distinction between real and artificial smoothing as made by Albrecht & Richardson (1990). On the one hand, the authors introduce real smoothing,

referring to actions taken to structure the economic events of the organization to produce a smooth income stream, and on the other, artificial smoothing, which they define as manipulation the of "the timing of accounting entries to produce a smooth income stream". In contrast, this distinction is not made in Beidleman (1973), cited in Tucker & Zarowin (2006), who defines income smoothing as ''an attempt on the part of the firm's management to reduce abnormal variations in earnings to the extent allowed under sound accounting and management principles''. Instead Beidleman (1973) notes that both economic decision-making of the firm and accounting choices can play a role in income smoothing. The distinction is important because this study concerns earnings smoothing through the use of accounting discretion.

The second important point is that the definition distinguishes between reported earnings and real underlying earnings. In a study on earnings quality, Francis, Olsson & Schipper (2006) point out that artificial income smoothing must be discussed in relation to what they term a "value-relevant construct". The value-relevant construct is a choice of what reported earnings ought to capture. Francis, Olsson & Schipper (2006) point to several measures of accruals quality that imply disparate ideas of what reported earnings should capture. Examples of value-relevant constructs include current period, last period and future period cash flows and a permanently sustainable level of earnings. To avoid implying a value relevant construct it is stated that the real underlying income stream is used. Income smoothing measures must then avoid capturing smoothing of the real underlying income stream.

Beneish (2001) presents two perspectives on income smoothing that offer an interesting context to this study but that are not directly relevant. The opportunistic perspective maintains that managers seek to mislead investors for personal gain whilst the information perspective holds that managers use income smoothing to better communicate their expectations about the firm's future cash flows. This thesis and the definition used do not attempt to identify instances where one explanation might be more applicable than the other.

2.1.2 Measurement of Earnings Smoothing

In order to investigate the question posed in this thesis it is necessary to find a suitable measure of income smoothing. Several approaches to measuring income smoothing have been proposed. Two that have been used in similar studies will be brought up in this section. Thorough reviews of different models can be found in Dechow, Sloan & Sweeney (1995) and

Francis, Olsson & Schipper (2006), although the latter does not primarily deal with income smoothing.

2.1.2.1 Accruals-Based Models

The accruals-based approach makes the assumption that a firm's economic process generates an underlying pre-managed income stream and a corresponding 'normal' level of non-discretionary accruals. The essence of the approach is then to estimate this normal level of non-discretionary accruals and to classify all extraordinary accruals as discretionary. Healy (1985), cited in Dechow, Sloan & Sweeney (1995), estimates non-discretionary accruals by taking the average of total accruals over a time period. However, Jones (1991) notes that these non-discretionary accruals may vary between years and introduces a more sophisticated model that attempts to control for factors that can affect the level of non-discretionary accruals.

The Jones model incorporates the estimation of the regression

$$TA_{it} = \beta_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{Sales_{it} - Sales_{it-1}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + u_{it},$$

where TA_{it} are total accruals for firm *i* and year *t*. The total accruals are equal to net income less cash flow from operations. The non-discretionary accruals, NDA_{it}, are captured by the fitted values and the residuals u_t are then used as a proxy for the discretionary accruals, DAP_{it}. Dechow, Sloan & Sweeney (1995) compare different models for the measurement of income smoothing and find that a modified version of the Jones model has the most power in detecting earnings smoothing. The original Jones model assumes that revenues are non-discretionary (Dechow, Sloan & Sweeney 1995). The modified Jones model uses $\Delta Sales_{it} - \Delta Receivables_{it}$ as a control for the firm's economic circumstances to exclude discretion in the recognition of revenues. Taking this point into account instead gives the regression

$$TA_{it} = \beta_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{\Delta Sales_{it} - \Delta Receivables_{it}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + u_{it}. \qquad (1)$$

Note that the variables included are the same as in the previous model bar the inclusion of the change in receivables, $\Delta Receivables_{it}$.

Dechow, Sloan & Sweeney (1995) propose that it is important to control for financial performance when estimating the Jones model. Kothari, Leone & Wasley (2005) investigate a specification of the Jones model that controls for financial performance by including a return on assets variable. The results of the study suggest that controlling for performance improves the reliability of the Jones model as a measure of earnings smoothing. The proposed measure is applied in Tucker & Zarowin (2006).

Once an accruals regression has been chosen, it can be estimated either on a cross-industry, a within-industry or a within-firm sample. Tucker & Zarowin (2006) investigate the relation between earnings smoothing and earnings informativeness using a within-industry sample to estimate non-discretionary accruals. When the Jones (1991) model, or a modification thereof, is estimated on a cross-sectional sample of firms, as in Tucker & Zarowin (2006), the model controls for variation in non-discretionary accruals between firms.

Tucker and Zarowin (2006) use the discretionary accruals proxy (DAP) to calculate the pre-discretionary income. The pre-discretionary income is $PDI = NI - DAP$ where NI denotes Net Income. Tucker and Zarowin (2006) gauge the extent of earnings smoothing by estimating the within-firm correlation between the pre-discretionary income and the discretionary accruals proxy across multiple years. That approach gives an observation of the extent to which income is smoothed for each firm *i* as $IS_i = Corr(\Delta PDI_{it}, \Delta \mathrm{DAP}_{it})$.

2.1.2.2 Criticisms of Accrual-Based Models

The accruals-based approach has received criticism from several authors. An inherent problem of the accruals-based approach is the unobservable nature of the non-discretionary and discretionary accruals that it attempts to quantify (Young 1999). Unable to directly measure either, the estimation of an expected level of non-discretionary accruals imposed on total accruals can lead to systematic error and in turn bias, if discretionary accruals are not properly isolated (Young 1999).

Although the model attempts to control for factors that affect the level of non-discretionary accruals, there might be factors that are omitted from the model. Young (1999) criticizes income smoothing models in general and finds that all the models studied, including the Jones (1991) model, induce systematic measurement error because of cash flow performance, sales growth and asset structure. Francis, Nanda & Olsson (2008), cited in Francis, Olsson &

Schipper (2006), report several more innate factors that can explain part of the discretionary accruals estimated by accruals-based approaches. The criticism highlights the importance of including appropriate control variables, such as return-on-assets as mentioned above, when estimating the level of non-discretionary accruals.

Dechow, Sloan & Sweeney (1995) analyse five modelling procedures for discretionary accruals and conclude that the power of the tests produced is low for earnings management of economically plausible magnitudes.

2.1.2.3 Income-Sales Variation Model

Another approach to measuring income smoothing involves comparing the variability of sales with the variability of income. First presented by Eckel (1981), the model has been widely used in other studies. Examples include Carlson & Bathala (1997), Albrecht & Richardson (1990) and Prencipe et al. (2011).

The model compares the variability of income to the variability of sales using a ratio of the coefficients of variation,

$$ISRatio = \frac{CV_{\Delta I}}{CV_{\Delta S}},$$

where ΔI is the one period change in income,
ΔS is the one period change in sales and

$$CV_X = \frac{SD[X]}{E[X]},$$

where SD denotes the standard deviation and E the expected value.

The model is based on the premise that the variation of a firm's reported earnings should be larger than that of its reported sales when it does not engage in earnings smoothing.[2] However, if earnings smoothing takes place, there is a dampening in the fluctuations in income over time. Using the ratio defined above, a firm is then classified as an income smoother if the measure is smaller than one.

[2] A deduction of this proposition can be found in Eckel (1981).

Albrecht & Richardson (1990) use the model on four different income measures; EBITDA, EBIT, income before extraordinary items and net income. They classify a firm as an income smoother if the *ISRatio* is smaller than one for any of the four income measures. The Eckel (1981) model results in a dichotomous classification of firms as income smoothers, unlike the Jones (1991) model, which gives a continuous scale of income smoothing.

2.2 Related Studies

This section aims to provide an overview of literature that is relevant to the question asked in this thesis. The overview is split into two parts. The first part presents studies that have documented the existence and extent of income smoothing, using the models mentioned in the previous section, among others. The second part summarises important results on the interplay between income smoothing and the different sources of financing used by a company.

2.2.1 Income Smoothing and Earnings Management

The prevalence of income smoothing is demonstrated by several studies that use different approaches. One approach used is to employ quantitative models on large sets of firms. DeFond & Park (1997) study the use of discretionary accruals to obtain smoother earnings in a set of 13,297 firm-year observations and find that firms use accruals to "borrow" earnings from the future if current performance is poor and reduce current earnings if future performance is expected to be poor. Chaney, Jeter & Lewis (1998) form predictions, consistent with the hypothesis of income smoothing, regarding the direction of discretionary accruals in a given year by comparing pre-discretionary earnings in the current year to reported earnings in the previous year. They find that they can correctly predict the direction of discretionary accruals in 85% of the firms in their sample. Both of the aforementioned studies use samples of US companies but studies have also been conducted in Europe and Asia. Burgstahler, Hail & Leuz (2006) use multiple models to investigate earnings management by firms with domicile in one of 13 of the 15 EU member states as of 2003. The authors find indications of income smoothing as the public firms studied have a low variability of income compared to the variability of cash flow from operations.

Qualitative approaches to investigate income smoothing have also been undertaken. Graham, Harvey & Rajgopal (2005) survey over 400 CFOs and conduct in-depth interviews, finding evidence that an overwhelming majority (96.9%) of CFOs prefer a smooth earnings path.

Furthermore, they discover that 78 % of CFOs are willing to sacrifice economic value for a smoother earnings path.

Mattsson & Tidholm (2006) document the prevalence of earnings management in Sweden. In their thesis the authors use histograms and statistical methods to examine the distribution of reported earnings. Using this approach the authors find that firms avoid reporting small losses.

2.2.2 Income Smoothing and Sources of Financing

2.2.2.1 Equity

Numerous studies point to the pressures and expectations of capital market investors as being the source of many possible motivations for managers to smooth income (Burgstahler, Hail & Leuz 2006; Prencipe et al. 2011). Graham, Harvey & Rajgopal (2005) suggest that managers have widely held beliefs that external equity investors react to reported financial information, and that in response to these beliefs, make earnings management and disclosure decisions.

Theorized market-born motivations for earnings smoothing are abundant. One such motivation is that income smoothing can be a means of signalling private information to capital markets (Chaney & Lewis 1995). Other studies find that managers believe that income smoothing can reduce investors' perception of business risk leading to the desired effect of a lower cost of capital (Gebhardt, Lee & Swaminathan 2001; Francis et al. 2004) as well as a higher share price (Trueman & Titman 1988). Other explanations include manager share-based compensation contracts (Bergstresser & Philippon 2006) and managerial concerns related to maintaining one's reputation by meeting earnings figures.

In their survey of 407 financial executives, Graham, Harvey & Rajgopal (2005) offer a study that explicitly attempts to identify incentives for income smoothing, and find strong support for smoothing related to capital markets financing or "the risk premium idea" (Graham, Harvey & Rajgopal 2005, p. 44). The strongest reasons the authors find for managers' preference for smooth earnings path are that (i) a smooth earnings path is perceived as less risky by investors (88.7%)[3] and (ii) it is easier for investors to predict future earnings (79.7%). More moderately scored factors include (iii) assuring customers of a stable business

[3] Indicates the percentage of financial executives, as defined by Graham, Harvey & Rajgopal (2005), who respond positively ("agree" or "strongly agree") to a factor as contributing to their preference for a smooth earnings path.

(66.2%), (iv) reducing the return demanded by investors (57.1%), (v) promoting a reputation for transparent and accurate reporting (46.5%), (vi) conveying future growth prospects (46.3%) and (vii) preserving a desired credit rating. They find that CFOs do not agree that they prefer a smooth earnings path because it clarifies true economic performance (24.3%) or increases bonus payments (15.6%).

2.2.2.2 Insider Equity

A portion of equity financing can be provided by investors who have access to non-public information about the firm's performance. This section highlights studies that investigate the relationship between income smoothing and insider financing.

One form of insider equity is when managers themselves have substantial shareholdings. Carlson & Bathala (1997) use *agency theory* to argue that a greater degree of managerial ownership of a firm may reduce income smoothing through the *alignment effect*. Agency theory concerns the relationship between an agent (managers) and a principal (shareholders). The theory predicts that asymmetric information and misalignment of the agent's interests from those of the principal can lead to undesired behaviour on the part of the agent. Carlson & Bathala (1997) suggest that managers act as agents of shareholders when managers have small equity holdings and specifically that their optimal accounting choices may differ from those of shareholders. For example, a manager may attempt to portray earnings in the most favourable manner possible to avoid shareholder unrest to protect his job (Salamon & Smith 1979, cited in Carlson & Bathala 2007). However, as managerial ownership increases, the firm moves from being manager-controlled to owner-controlled. The result is a closer alignment of manager and shareholder interests and a convergence of optimal accounting choices (Carlson & Bathala 1997, p. 181). In this scenario, managers have less incentive to smooth income as a job-preserving strategy given that they themselves own a non-trivial portion of a company's equity. Warfield, Wild & Wild (1995) also study the alignment effect and find that discretionary accruals are used to a larger extent when managerial ownership is low.

An alternative form of insider equity is when blocs of external shareholders are large enough to gain informational advantages over other market participants. Smith (1976) argues that these large owners constrain income smoothing. Specifically, the study distinguishes between owner-controlled and manager-controlled firms, classifying the former as one in which a single owner controls more than 10% of the company's voting stock. The proposed

explanation is that large owners have access to more complete information regarding the decision-making process, and are less likely to be "fooled" by income smoothing, effectively making any attempt to do so redundant.[4]

Despite the empirical evidence to suggest that a larger amount of insider equity will result in less income smoothing, one must be wary of other theories. In their study on the subject, Fan & Wong (2002) present the *entrenchment effect*, describing how a divergence of voting rights (control) and cash flow rights (share of equity capital) leads controlling owners to manage earnings. In the entrenchment scenario, a shareholder who has relatively little equity may have substantial voting rights, effectively mirroring the aforementioned shareholder-manager dilemma. Prencipe et al. (2011) argue that the impact of insider ownership is different between family-controlled and non-family-controlled firms. The authors argue that *stewardship theory* and *agency theory* predict that family-controlled firms will smooth earnings to a lesser extent than non-family-controlled firms. The study uses a sample of Italian firms and finds that smoothing is indeed less likely to occur in a family-controlled firm.

2.2.2.3 Debt

Counteracting effects have been suggested for the relationship between debt and income smoothing. On the one hand, debt has been associated with increased income smoothing as firms seek to avoid debt covenant violations (Sweeney 1994; Kirschenheiter & Melumad 2002; Prencipe et al. 2011). Carlson & Bathala (1997) specifically suggest that firms with higher levels of debt have more stringent debt covenants and are more likely to smooth income. Conversely, debt financing has also been associated with less income smoothing. Burgstahler, Hail & Leuz (2006) argue that bank-based financial systems support relationship lending, where some information is privately communicated. In other words, smoothing might not have any bearing in relationship-based institutional lending.

2.2.2.4 Supplier Financing

Suppliers can provide a non-trivial portion of financing for some firms. This section considers two studies that offer insight into how supplier financing might be less likely to motivate managers to smooth income than other sources of financing; first, a study in the economic literature by Giannetti, Burkart & Ellingsen (2011), which suggests that suppliers can have

[4] Prencipe et al. (2011) points out that the findings should be looked at with caution as they are based on a univariate analysis.

different criteria for financing a customer than other external investors, and second, a study by Graham, Harvey & Rajgopal (2005), which makes it plausible that external capital markets is a stronger motivation for income smoothing than concerns for suppliers.

Giannetti, Burkart & Ellingsen (2011) try to find explanations for differing volumes of trade credits between firms. The literature presented in the study suggests several advantages that suppliers may have in the provision of financing. The authors present the *diversion vulnerability* theory and the *collateral liquidation* theory. Diversion vulnerability refers to the ease with which provided goods or capital can be diverted for unintended purposes. According to the theory it is harder to divert goods and services than cash, giving suppliers an advantage over other external investors. The second theory, collateral liquidation, hypothesizes that some suppliers have a comparative advantage over banks in liquidating assets in the case of default. These financing advantages suggest that suppliers might be comparatively less concerned about the financial health of a firm that they finance and that they may have criteria that differ from those of other investors in a firm.

On the contrary, Graham, Harvey & Rajgopal (2005) find that managers rank stakeholder assurance, which includes supplier assurance, as a relatively important determinant in their preference for a smooth earnings path. However, worth noting is that private firms rank this factor significantly higher than public firms. One way to interpret this result is that the stakeholder assurance factor, which is present for both private and public firms, is crowded out by factors related to external capital markets for the public firms. The motivation to smooth would then be weaker for firms that rely relatively more on suppliers for financing. Graham, Harvey & Rajgopal (2005) also test firms' propensity to sacrifice economic value for smoother earnings which could support the "crowding out" argument made above but they do not get significant results on the measures that would allow differentiation between private and public firms.

3 Test Logic and General Hypotheses

To test the relationship between income smoothing and the abovementioned sources of financing, a cross-sectional linear regression of an income smoothing measure on the sources of financing presented above is performed. In the regression a number of controls are used to reduce noise and remove biases. The controls are presented in the method section.

The theory presented above motivates the postulation of the following hypotheses.

H_{A0}: There is no difference in income smoothing behaviour between firms where insiders own different shares of the equity capital.
H_{A1}: Firms where insiders own a higher share of the equity capital smooth earnings to a lesser extent than firms where insiders own a lower share of the equity capital.

H_{B0}: There is no difference in income smoothing behaviour between firms with different levels of supplier financing.
H_{B1}: Firms with a higher level of supplier financing smooth earnings to a lesser extent than firms with a lower level of supplier financing.

No hypotheses are presented for other sources of financing as they either lack a clear theory, as is the case for tax liabilities, or have theories that are not possible to test using the available data, such as debt. Details on the treatment of these other sources of financing are presented in the method section.

The hypotheses are evaluated using two-sided significances as it is possible that the effect is different from the one hypothesized.

4 Method

4.1 Sample

The sample used in this study consists of 182 companies listed on the Stockholm Stock Exchange (OMXS) sometime during the time period 2000-2012. A number of companies were not listed during the entire time period. For these, the regression is performed on the years for which there are data.

Sample	Number of firms
Initial sample	261
No Worldscope data	-9
Financials	-44
Industries with <10 firms	-15
No Insider Data	-11
Final sample	182

The table above shows the steps in which firms are excluded from the sample. Firstly, companies for which data is missing in the Worldscope database are excluded. Secondly, financial companies are excluded because their IFRS reporting differs from non-financial firms (Prencipe et al. 2011). The codes excluded are (Datastream: INDM) "Banks", "Investment Services", "Speciality Finance" and (Datastream: TR1N) "Financials". Thirdly, industries with less than ten remaining firms are excluded as in Kothari, Leone & Wasley (2005) and Tucker & Zarowin (2006). The excluded industries are Telecommunication Services, Utilities and Energy. Finally, companies for which there are no data on insider shareholdings in the SIS Ägarservice database are excluded.

Data from financial statements are collected from DataStream (WorldScope). Financial information is taken from annual reports as opposed to quarterly reports. Evidence suggests that firms smooth end-of-year earnings more than earnings in other quarters (Jacob & Jorgensen 2007; Das, Shroff & Zhang 2009). Data on insider stock ownership and voting rights are obtained from the SIS Ägarservice database. It is worth noting that the SIS Ägarservice database has a broad definition of insiders[5] and that the data obtained regards consolidated insider shareholdings, which requires an assumption of cooperation between insiders to obtain control.

It is necessary to be wary of possible biases in the sample used. When dividing observations by industry, the broad classification "economic sector" is used (Datastream: TR1N). This is necessary to ensure a sufficiently large subsample for a majority of the industries but it could also imply that not all differences between sub-sectors are controlled for. Care should also be taken if extending any conclusions to the Financial, Utilities, Telecommunication Services and Energy economic sectors as they are excluded from the initial sample. The sample is restricted to listed Swedish companies implying that inference should be limited to these companies.

4.2 Operationalization of Variables

To test the hypotheses put forth it is necessary to operationalize income smoothing and the explanatory effects as dependent and independent variables to be used in a linear regression. Below, the dependent and then the independent variables are operationalized.

[5] The definition is not explicitly stated in the database used but in this study it is assumed to be the same as the one used by Finansinspektionen, see (Finansinspektionen n.d.).

4.2.1 Income Smoothing Measure

The primary income smoothing measure chosen in this thesis is the modification of the Jones (1991) measure specified in equation (1). An accruals-based measure is chosen instead of an income-sales variability approach. This choice is made because the artificial smoothing captured by the accruals-based measure is unlikely to be included in any definition of the real underlying income stream. The income-sales variability approach, on the other hand, might capture some sources of smoothness that arise from manipulating the real underlying income stream. Modified Jones is chosen over the Jones (1991) model due to the Dechow, Sloan & Sweeney (1995) finding that it has more power in detecting earnings smoothing. A ROA control is not included as the modified Jones model has not been tested with that control in the literature. An alternative specification of the Jones model is also tested as a robustness check.

The regression specified by equation (1) is run on all within-industry firm years. This differs from the regressions run in Tucker & Zarowin (2006) as that study runs one regression for every industry-year subsample. The authors motivate the division by year out of necessity to control for time effects. There are two reasons for deviating from that approach here. First, time-effects are deemed unlikely to cause a big difference in the accruals regression as it controls for changes in economic circumstances through the change in sales. Second, the subsamples become very small, with as little as ten observations to estimate the regression, when dividing by both industry and year.

Once the residuals from the regression specified in equation (1) have been obtained, the steps from Tucker & Zarowin (2006) outlined in the theory section are followed. The measure of income smoothing is obtained as

$$IS_i = Corr(\Delta PDI_{it}, \Delta \mathrm{DAP}_{it}).$$

4.2.2 Supplier Financing

Supplier financing is measured by accounts payable of the firms in the sample. The actual accounts payable are scaled by same-year assets and averaged over the entire time period. The measure for firm i is

$$\text{APAYAB}_\text{i} = \frac{1}{\text{T}}\sum_{\text{t=1}}^{\text{T}} \frac{\text{Accounts Payable}_\text{it}}{\text{Assets}_\text{it}},$$

where T is the number of years in the time period.

The theories presented suggest that suppliers have comparative advantages in financing and can take a different view on risk than other investors. Supplier financing is thus introduced as the share of the total balance sheet financed by suppliers. An increased proportion of supplier financing invariably leads to a decrease in the proportion of other sources of financing.

4.2.3 Insider Equity

There are several hypothesized effects due to insider financing for the sample of Swedish firms considered in this study. This section will present an operationalization that allows for separation of the effects. Following is a short summary of these effects as presented in the theory section. Agency theory and the alignment effect as well as the reduced need to signal private information predict lower income smoothing when an insider holds a relatively larger share of equity capital. The entrenchment effect suggests increased income smoothing because an inside owner obtains a relatively larger share of control than capital. Estimating a regression using only the capital fraction of insiders or the vote fraction of insiders will lead to a coefficient that is biased towards zero if there indeed exist several counteracting effects.

In order to operationalize insider financing in such a way that the proposed hypotheses can be tested it is necessary to include variables for all the effects. A possible specification is then to include the insider capital fraction, INSCAP, the insider vote fraction, INSVOTE, and the interaction effect between the two, $\text{INSCAP} \cdot \text{INSVOTE}$ in the regression. The interaction effect is included to account for the possibility that the effect of votes depends on the level of capital. For example, an insider with a large share of votes might be entrenched if the capital share is low. However, a higher capital share might mitigate this effect.

Two possible criticisms of the specification proposed above are that, first, the variables included are collinear and thus the effects cannot be separated, and second, entrenchment occurs when there is a divergence between insider control and insiders' share of equity capital, so the divergence between votes and capital should be measured. The first point is not necessarily a problem because multiple share classes with different voting rights exist in Sweden. Whether or not sufficient variation between the variables exists to estimate the model can be gauged by investigating the data. The second issue is mitigated by the fact that there can exist a divergence between capital and control even though there is no divergence between capital and votes. For a subsample of the firms it is possible that an insider with a lower share of votes than 50% has obtained effective control of the firm. In such a case the insider vote share implies a divergence between capital and control even though the insider vote share is the same as the insiders' share of equity capital. By measuring the vote share separately it is possible to capture such effects in the sample, should they exist, while a measure of divergence between votes and capital would not capture such effects. The specification is deemed superior to measuring the divergence between insiders' share of votes and insiders' share of equity capital but it is still a superficial way to measure divergence between insider control and insiders' share of equity capital.

The above operationalization uses the insiders' share of equity capital instead of the proportion of total company financing provided by insider equity. The reason for doing so is that cash flows are deemed more relevant to the motivations related to equity capital markets than the share of a firm's assets financed by insiders.

4.3 Control Variables

This section presents and motivates the control variables used in the regression. There is also a discussion of additional variables that ideally would be controlled for but for which data are not available.

4.3.1 Debt

As discussed in the related literature section of this study, research has pointed to conflicting relations between debt and income smoothing. On the one hand, debt can increase income smoothing because of strict debt covenants and pressures from participants in debt capital market. On the other hand, debt can decrease income smoothing because banks are able to obtain non-public information about their clients. Debt is likely to correlate with all other types of financing because an increase in debt invariably implies a decrease in the total of all

other sources of financing. Because of the likely association with both income smoothing and other sources of financing it is reasonable to control for the level of debt.

4.3.2 Size

Prencipe et al. (2011) argue that large companies may smooth earnings because they are more closely scrutinized by the public. Carlson & Bathala (1997) propose that larger firms have a wider array of discretionary expenditures and non-recurring items that could facilitate income-smoothing behaviour. A control for size is introduced to avoid bias and noise.

4.3.3 Deferred Tax Liabilities

Deferred tax liabilities can arise due to taxable temporary differences, such as accelerated tax depreciation of assets. No clear theory has been encountered that expounds the impact of deferred tax liabilities on income smoothing behaviour. Lacking such a theory, this study uses the variable as a control as deferred tax liabilities can finance a portion of assets and any impact such financing has on income smoothing behaviour would otherwise constitute noise in the regression.

Following is a description of control variables that would be of great relevance to this study but for which Worldscope data is either incomplete or unavailable or for which there is a risk of over-controlling when including the variables.

4.3.4 Corporate Governance and Incentives Schemes

Differences in the quality of corporate governance between firms is likely to affect the degree of income smoothing because it impacts a manager's ability to make self-serving accounting choices. Similarly it is likely that incentives schemes can have an impact on accounting choices, even though this is not found in Graham, Harvey & Rajgopal (2005). However, including these control variables risks over-controlling as insider shareholders may improve corporate governance. The specification was not tested because the data in the Worldscope database is incomplete.

4.3.5 Shareholder Dispersion

It is likely that increased shareholder dispersion increases income smoothing. Burgstahler, Hail & Leuz (2006) argue that dispersed ownership of a firm implies the presence of a multitude of small investors that are more likely to rely on "simple heuristics" than more sophisticated private investors, for example banks, which gives rise to income smoothing. However, controlling for shareholder dispersion can bias the estimated effect of insider shareholdings because large shareholders can be insiders (the relevant Swedish regulatory

authority, Finansinspektionen n.d., defines any shareholder controlling more than 10% of votes as an insider). It would, however, be desirable to control for dispersion of insider shareholders but no such data has been obtained.

4.3.6 Family Control

Prencipe et al. (2011) find that there is a difference in income smoothing behaviour between family-controlled firms and non-family-controlled firms. Their results on Italian firms may well be applicable to Swedish firms and therefore controlling for family ownership could be of interest to reduce the risk of bias. No data has been obtained to control for family ownership so the control has not been added.

4.4 Main Regression

The above considerations motivate the following main regression to test the hypotheses.

$$IS_i = \beta_0 + \beta_{APAYAB}APAYAB_i + \beta_{INSCAP}INSCAP_i + \beta_{INSVOTE}INSVOTE_i + \beta_{INSCV}INSCAP \cdot INSVOTE_i + \beta_{DEBT}DEBT_i + \beta_{\log(A)}\log(A_i) + \beta_{DTL}DTL_i + u_i$$

where the subscripts "i" represent each firm and

IS is the income smoothing measure derived, as outlined above, from the modified Jones regression specified in equation (1),

APAYAB is accounts payable, scaled by same-year assets, averaged over the entire time period,

INSCAP is the proportion of equity held by insiders as of 2013,

INSVOTE is the proportion of voting rights of insiders as of 2013,

DEBT is total debt, scaled by same-year assets, averaged over the entire time period,

A denotes same-year assets and

DTL is deferred tax liabilities, scaled by same-year assets, averaged over the entire time period.

4.5 Method Summary

As it can be challenging to grasp the model used in the study in its entirety, the following conceptual summary is provided.

Modified Jones Regression

$$Total\ Accruals_{it} = \beta_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{\Delta Sales_{it} - \Delta Receivables_{it}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + u_{it}$$

Non-Discretionary Accruals (NDA_{it})

Discretionary Accruals Proxy (DAP_{it})

Pre-discretionary Income (PDI_{it}) = Net Income (NI_{it}) - DAP_{it}

Income Smoothing (IS_i) = Corr (ΔPDI_{it}, ΔDAP_{it})

Main Regression

$$IS_i = \beta_0 + \beta_{APAYAB} APAYAB_i + \beta_{INSCAP} INSCAP_i + \beta_{INSVOTE} INSVOTE_i + \beta_{INSCV} INSCAP \cdot INSVOTE_i + \beta_{DEBT} DEBT_i + \beta_{log(A)} \log(A_i) + \beta_{DTL} DTL_i + u_i$$

Explanatory Variables

$$APAYAB_i = \frac{1}{T}\sum_{t=1}^{T} \frac{\text{Accounts Payable}_{it}}{\text{Assets}_{it}}$$

INSCAP = insiders' share of equity capital

INSVOTE = insiders' share of votes

Control Variables

$$DEBT_i = \frac{1}{T}\sum_{t=1}^{T} \frac{\text{Debt}_{it}}{\text{Assets}_{it}}$$

A = Geometric mean of assets

$$DTL_i = \frac{1}{T}\sum_{t=1}^{T} \frac{\text{Deferred Tax Liabilities}_{it}}{\text{Assets}_{it}}$$

4.6 Robustness Checks

To test the robustness of the results derived from the regression, several alterations are made to the model. This section presents these alterations and motivates why they reduce uncertainty regarding the results of the main regression.

First, the time period over which the regression is conducted is changed from 2000-2012 to considering only the years 2006-2012. Selection of this period allows for a comparison across more uniform accounting information given the post-2005 mandatory adoption of IFRS. As per Prencipe et al.'s (2011) suggestion, this avoids potentially biased results due to artificially increased data variability. Furthermore, companies with missing values in the shorter time period are removed from the sample. Thus any impact of missing values is also tested in this regression by requiring that full data series be available for the companies included.

Second, it has been claimed that that managers sometimes under-report earnings by a large amount for sufficiently bad earnings news, a behaviour known as taking a big bath (Kirschenheiter & Melumad 2002). Big bath accounting would lead to large negative discretionary accruals when pre-discretionary income is negative and thus give a *positive* correlation between the change in discretionary accruals and the change in pre-discretionary income. As such, a relevant step would be to exclude observations for which net income is sufficiently negative. Practically, this is achieved by excluding all observations where reported income is lower than -5% of sales.

Third, discretionary items available to a company and thus the size of discretionary accruals may vary with industry. Thus the model is also evaluated per industry to test for such differences.

Fourth, for comparison, the variables of the main regression are winsorized to three standard deviations as is done in Tucker & Zarowin (2006).

Fifth, the model is tested using the original Jones model when controlling for ROA, as described in the theory section.

5 Empirical Results

This section begins by presenting the estimation of the income smoothing measure. Subsequently the main regression and its variables are considered. Following the main tests is

a section discussing the results of several robustness checks. Finally, there is a discussion and wider interpretation of the results.

The final sample on which the model is evaluated consists of 182 firms of which 41 are in the Technology sector, 24 in the Healthcare sector, 10 Consumer Non-Cyclicals, 37 Consumer Cyclicals, 53 Industrials and 17 in the Basic Materials sector.

5.1 Estimating the Income Smoothing Measure

In this section the regression to estimate the income smoothing measure is considered. First, there is an overview of the constituent variables in the different Jones model specifications. Second, descriptive statistics are shown for the coefficients of the primary Jones model specification used in this study. Then the coefficients of the model are compared with an alternative specification and previous literature. Finally, the results of the estimation are presented, in the form of the discretionary accruals proxy and pre-discretionary income and the resulting income smoothing measure.

Descriptive Statistics for Dependent and Independent Variables for Discretionary Accruals Models

	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum	Observations
ACCR	-1.437	-0.079	-0.038	-0.040	0.001	2.162	1896
DSALES	-2.989	-0.025	0.070	0.138	0.218	22.950	1894
GPPE	0.000	0.124	0.310	0.417	0.617	5.425	1851
DREC	-0.479	-0.015	0.009	0.030	0.045	6.695	1897
DSALREC	-2.546	-0.033	0.055	0.108	0.187	16.250	1890
ROA	-2.749	-0.011	0.050	0.016	0.100	2.552	1899

Table 1. ACCR are total accruals, DSALES is the difference in sales, GPPE is gross property, plant & equipment, DREC is the difference in receivables, DSALREC is difference in sales less difference in receivables. The aforementioned variables are all scaled by lagged assets. ROA is the return on assets. The number of observations pertains to firm-years[6].

Table 1 shows the values assumed by the variables used when estimating discretionary accruals with the Jones as well as modified Jones model and allows for an inspection of the data used in the model. For each of the variables almost 1900 firm-year observations are available out of the maximum possible, $12 \cdot 182 = 2184$. A closer inspection yields that missing values typically occur in earlier years because the firms were not listed at that time.

When it comes to values of the variables it can be noted that the interquartile range of all the variables seems reasonable. For example, the first quartile of ROA is -1.1% and the third is 10%. Furthermore, the first quartile of change in sales, including receivables, as a proportion

[6] Firm-year refers to the observation of accounting items for a given firm in a given year.

of assets is -2.5% and the third is 21.8%. Thus the sample seems to mostly contain firms with 'normal' financial performance. The maximum and minimum values of the variables seem quite extreme. This is because no outliers have been removed from the initial sample. There are reasons for why some firms experience extraordinary performance. One reason for extreme values is that scaling by lagged assets implies that infant firms or firms that receive substantial capital injections can experience major changes from one year to the next. A closer analysis (see appendix for details) shows that very few of the firm-years have values comparable to the extremes and should thus have minimal impact on the regression given the large total number of observations. To test this, a robustness check is performed and presented in the appropriate section below.

Descriptive Statistics for Modified Jones Model Regression Coefficients

	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
1/A	-1754	-1546	-1105	-448	111	2453
DSALREC	-0.027	-0.012	0.005	0.019	0.023	0.119
GPPE	-0.075	-0.069	-0.065	-0.064	-0.061	-0.045
R-square	0.047	0.130	0.199	0.175	0.212	0.282

Table 2. Shows descriptive statistics for the estimated coefficients across 6 within-industry regressions. A denotes assets. For descriptions of the other variables, see **Table 1**.

GPPE has a negative coefficient in all regressions as illustrated by Table 2, which is reasonable, as it should reflect depreciation. R-square between the first and third quartile is .130 and .212 respectively. This R-square would imply that most of the variation in total accruals between firm-years consists of discretionary accruals, as they are captured by the residuals. It can be questioned whether such a large share of the variation actually represents discretionary accruals. The theory section deals with several critiques of income smoothing measures. In particular, authors have suggested that the Jones model fails to capture all the variables that affect the motivated level of non-discretionary accruals. The low R-square obtained could be an indication that the critique is correct in that the model overestimates discretionary accruals.

The following table compares the mean coefficients presented in Table 2 with the original Jones model when controlling for ROA. The mean coefficients obtained in Tucker & Zarowin (2006) are also included for comparison.

Coefficients for Discretionary Accrual Measures

	1/A	DSALES	DSALREC	GPPE	ROA	R-square
Jones Model with ROA	700	-0.009	-	-0.070	0.238	0.305
Tucker and Zarowin 2006 - Jones Model with ROA	0.112	0.013	-	-0.074	0.457	0.642
Modified Jones Model	-448	-	0.019	-0.064	-	0.175

Table 3. Comparison of mean coefficients between models and studies. Note that the value of inverse assets depends on the currency used (in this study kSEK).

Table 3 shows that the mean R-square from an estimation of comparable regressions with the data used in this study is just half of the mean R-square obtained by Tucker & Zarowin (2006). GPPE corresponds well to the previous study and ROA has the same sign although the effect is of smaller magnitude. DSALES is included as a control for economic circumstances (see theory section) and has the opposite sign of that obtained by Tucker & Zarowin (2006).

Descriptive Statistics for DAP and PDI per Industry

Industry		Min.	1st Quartile	Median	Mean	3rd Quartile	Max.	Obs.
Basic Materials	DAP	-0.275	-0.043	-0.005	-0.006	0.025	0.465	176
	PDI	-0.312	-0.018	0.037	0.035	0.091	0.384	176
Consumer Cyclicals	DAP	-0.460	-0.046	-0.009	-0.010	0.027	0.816	355
	PDI	-0.429	0.037	0.077	0.093	0.137	0.825	355
Consumer Non-Cyclicals	DAP	-0.358	-0.042	0.004	0.003	0.041	0.492	99
	PDI	-0.430	-0.043	0.029	0.033	0.131	1.164	99
Healthcare	DAP	-0.582	-0.081	-0.023	-0.030	0.028	0.630	218
	PDI	-2.124	-0.182	0.004	-0.104	0.084	0.950	218
Industrials	DAP	-0.312	-0.036	-0.004	-0.004	0.025	0.368	571
	PDI	-0.816	0.013	0.062	0.048	0.104	0.291	571
Technology	DAP	-1.400	-0.100	-0.032	-0.041	0.024	0.817	419
	PDI	-1.394	-0.038	0.069	0.050	0.151	3.270	419

Table 4 Descriptive statistics for the estimated discretionary accruals proxy and pre-discretionary income for all industries.

The residuals from the modified Jones within-industry regressions are classified as the discretionary accruals proxy. The non-discretionary income is calculated as described in the theory section. The variation in the estimated variables is described in Table 4 above.

The mean DAP values are quite close to zero, which is reasonable, assuming that discretionary accruals have to even out over time. The most profitable industry as measured by pre-discretionary income is consumer cyclicals and the least profitable appears to be

healthcare. The interquartile range of DAP is similar across industries, suggesting that the extent of discretion is similar between industries.

By calculating the correlation between the change in the discretionary accruals proxy and the change in pre-discretionary income presented in Table 4 the main income smoothing measure is obtained. In Table 5 below the variation of the income smoothing measure is shown.

Correlation Between Change in DAP and Change in PDI Across All Industries

	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
Corr (ΔPDI, ΔDAP)	-1.000	-0.879	-0.660	-0.557	-0.355	0.965

Table 5. The table shows descriptive statistics for the correlation between change in the discretionary accruals proxy and change in the pre-discretionary income.

The extreme maximum and minimum values in Table 5 likely result from few observations for within company estimation of the correlation. At most 11 years are available to calculate the correlation for each company. Therefore, considerable uncertainty and variation in individual estimates is expected.

It is worth noting that the obtained income smoothing measure suggests that there is considerable income smoothing in the average company. -0.557 is quite a strong correlation and up to the fourth quartile the correlations are stronger than -0.355. If modified Jones correctly captures discretionary accruals, the IS measure implies that average firms smooth income quite considerably and that the majority of firms smooth income to some extent. However, it is possible that the model leads to strong negative correlations that at least partly reflect other effects than income smoothing. The income smoothing measure can still properly capture the difference in income smoothing between firms but while being an unreliable indicator of the extent of income smoothing. For more details and a deduction, see the appendix.

5.2 Main Regression

In this section the main regression to test the hypotheses is performed. Before the regression is presented the characteristics of the constituent variables are considered.

Descriptive Statistics for Dependent and Independent Variables of the Main Regression

	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
IS	-1.000	-0.879	-0.660	-0.557	-0.355	0.965
APAYAB	0.005	0.056	0.081	0.104	0.131	0.758
INSCAP	0.000	0.039	0.195	0.226	0.377	0.784
INSVOTE	0.000	0.050	0.293	0.308	0.481	0.860
INSCV	0.000	0.002	0.052	0.115	0.182	0.615
DEBT	0.000	0.021	0.100	0.125	0.199	0.487
log(A)	9.202	12.660	13.670	14.010	15.020	19.420
DTL	-0.321	-0.013	0.005	-0.001	0.021	0.151

Table 6. Descriptive statistics for the variables included in the main regression. As this is the main model the IS measure has been calculated using the modified Jones model. APAYAB is accounts payable scaled by same-year assets, INSCAP is insiders' share of capital, INSVOTE is insiders' share of votes, INSCV is $INSVOTE \cdot INSCAP$, DEBT is scaled by same-year assets, log(A) is the natural logarithm of assets and DTL are deferred taxes scaled by same-year assets.

As indicated in Table 6 supplier financing, APAYAB, constitutes 10.4% of total financing on average, which is only a marginally lower proportion than the 12.5% of debt financing, DEBT. This gives weight to the idea that supplier financing is a significant alternative for financing. The interquartile ranges of 0.178 for DEBT and 0.075 for APAYAB suggest that debt is used for financing to a more varying degree than accounts payable. One interpretation of the difference in variation is that it might be easier for companies to choose the degree of debt as supplier financing is a byproduct of operations rather than the result of financing activities.

On average it appears that the firms in the sample have relatively dispersed ownership with an INSCAP value of 22.6%. Insiders maintain a relatively higher proportion of control, however, with a mean INSVOTE value of 30.8%. The interquartile range shows that at least a fourth of the companies have less than 4% insider ownership as measured by cash flow rights. Furthermore, the higher share of votes than capital is sustained up to the fourth quartile.

The deferred tax liabilities take negative values because the net of deferred tax liabilities and deferred tax assets is used for the variable. On average the net deferred tax represents a miniscule portion of financing.

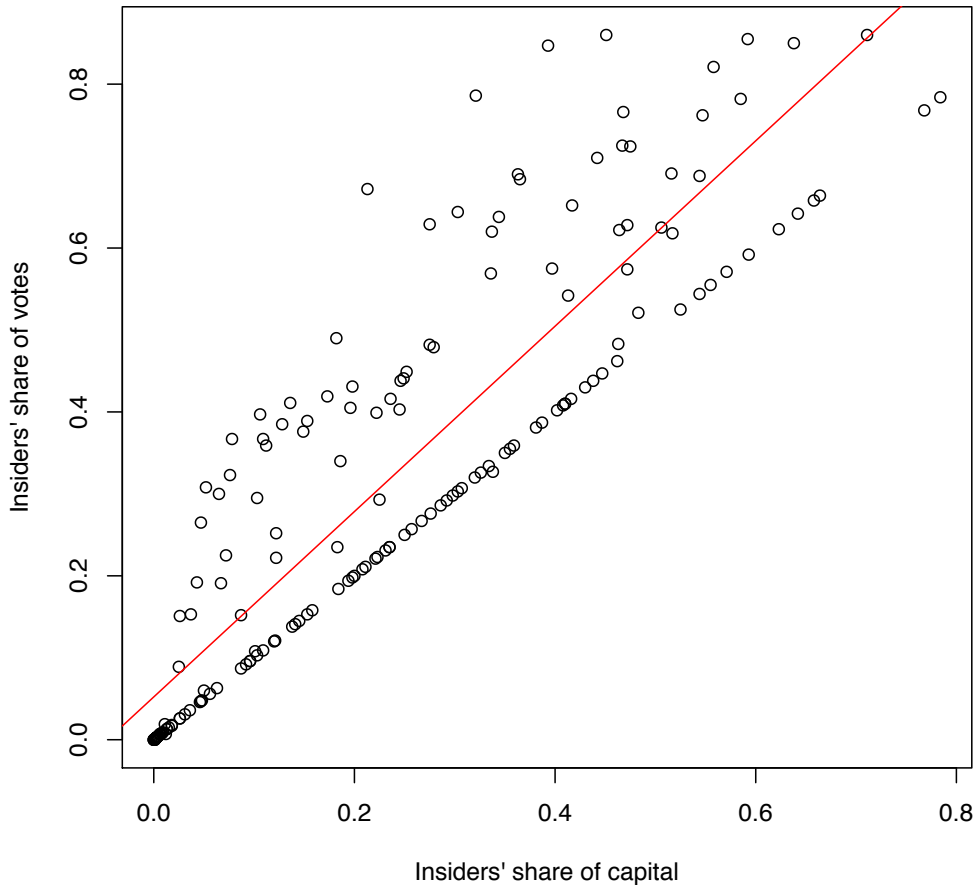


Figure 1. The figure shows the insiders' share of capital and votes for every firm in the sample. A regression line is shown in red.

The method section discusses the need to have sufficient variation between the variables that measure insiders' share of equity capital and the insiders' share of control in order to estimate the regression specification proposed. Figure 1 shows that there are indeed a large number of firms for which the share of equity capital is equal to the share of votes. The figure also highlights, however, that there is quite substantial variation between the variables for a number of firms, due to different share classes. The regression line deviates somewhat from the perfect collinear relationship on the diagonal, suggesting that the variation between share of votes and share of capital might be sufficient. Examining Table 6 also shows that the mean of insiders' share of votes is considerably higher than the mean of insiders' share of equity capital.

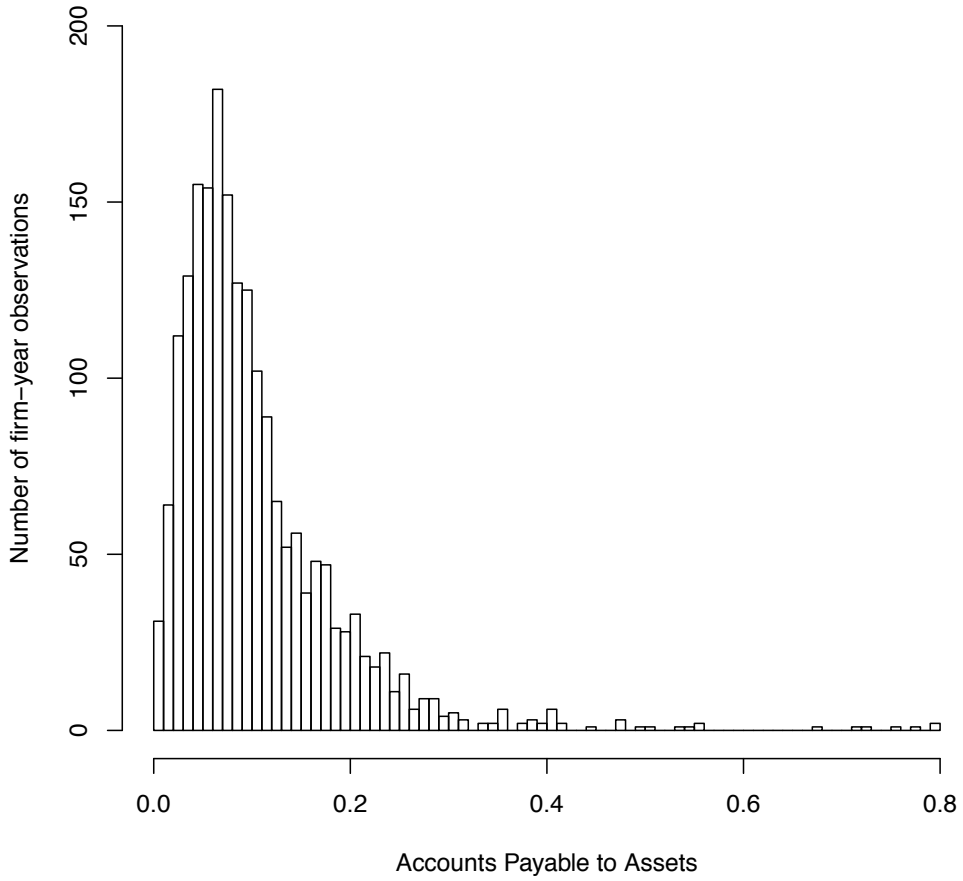


Figure 2. Histogram of the accounts payable to same-year assets for all firm-years in the sample.

It is also interesting to consider the distribution of accounts payable. If supplier financing is a miniscule part of the balance sheet it would be unlikely that it has an economically significant impact on income smoothing. Figure 2 shows how accounts payable as a share of assets are distributed in the sample. While suppliers appear to finance a relatively small share of assets for most firms there are still a number of firm-years for which the share is in excess of 0.2.

Pearson Correlation Matrix - All Sample Companies (N=182)

	APAYAB	INSCAP	INSVOTE	INSCV	DEBT	DTL
IS	-0.214***	-0.072	-0.116	-0.124*	-0.048	-0.090
APAYAB		0.103	0.038	0.056	-0.072	-0.007
INSCAP			0.890***	0.938***	0.006	0.143*
INSVOTE				0.900***	-0.011	0.212***
INSCV					-0.015	0.173**
DEBT						0.130*

*** p< 0.01, ** p<0.05, * p<0.1

Table 7. Pearson correlation matrix for the variables included in the main regression. For variable descriptions, see **Table 6**.

Table 7 presents the Pearson correlation matrix for the variables used in the main regression. Firstly, it is interesting to note that APAYAB has a negative correlation with IS. In other words, income smoothing is increasing in the measure of supplier financing.

As expected, INSCAP, INSVOTE and INSCV are strongly correlated. For a large subset of the observations the relationship is perfectly collinear, as is illustrated by Figure 1. This could be a problem if collinearity is too strong between the explanatory variables.

5.2.1 Testing the Hypotheses

Main regression with robust standard errors						Main regression with centering[7]	
	Exp. sign	Estimate	Std. Error	t-value	VIF	Estimate	VIF
(Intercept)	-	-0.397	0.251	-1.578	NA	-0.318	NA
APAYAB	+	-1.197***	0.275	-4.357	1.044	-1.197***	1.044
INSCAP	+	1.087**	0.444	2.447	10.004	0.678*	5.912
INSVOTE	-	-0.242	0.292	-0.828	6.010	-0.542**	5.218
INSCV	-	-1.328**	0.652	-2.035	10.254	-1.328**	1.288
DEBT	+/-	-0.239	0.281	-0.848	1.335	-0.239	1.335
log (A)	-	-0.002	0.017	-0.108	1.521	-0.002	1.521
DTL	+/-	-0.310	0.547	-0.568	1.161	-0.310	1.161
R-square	0.097					R-square	0.097
Adj. R-square	0.061					Adj. R-square	0.061
F-statistic	2.668					F-statistic	2.668
p-value	0.012					p-value	0.012

*** p< 0.01, ** p<0.05, * p<0.1

Table 8. The estimated regression model using the main regression specified in the method section. Supplementary regression using centering for insiders' share variables, see footnote for more details. For variable descriptions, see **Table 6**.

The main results of this study are presented in Table 8. The R-square value of 0.097 implies that the regression is only able to explain 9.7% of the variation in the sample. The coefficient of APAYAB is significant at the 1% level whilst the coefficients of INSCAP and INSCV are significant at the 5% level.

The signs for the set of explanatory variables capturing insider financing, namely INSCAP, INSVOTE and the interaction term INSCV are in accordance with hypothesis H_{1A}. Given the

7 The main regression was performed with INSVOTE and INSCAP centered. This reduces VIF for the variables considerably but such a reduction does not necessarily lead to model improvement, see Echambadi & Hess (2007).

choice to integrate an interaction effect, as motivated in the method section, the partial effects of INSCAP and INSVOTE are analysed. The regression allows for an analysis of how the effect of INSCAP is dependent upon the level of INSVOTE and vice versa.

For analysis of the interaction term, first note that the partial effect of INSCAP is $1.087 - 1.328 \cdot INSVOTE$, which is positive for the full range of sample values of INSVOTE. In other words, income smoothing is decreasing in insiders' share of equity capital, which supports hypothesis H_{1A}, although part of the effect may be attributable to reduced divergence between INSCAP and INSVOTE.

As an example of the above effect, the median INSVOTE value of 0.293, the partial effect of INSCAP is a coefficient of approximately 0.7. Increasing INSCAP by 10% thus contributes a 0.07 decrease in income smoothing, which corresponds to approximately 13% of the IS interquartile range. This is in line with the theory that a larger proportion of insider equity may be associated with the alignment effect and that large insider shareholdings constrain income smoothing behaviour. The example also shows that INSCAP can affect IS to an economically significant extent but the effect is reduced for high levels of INSVOTE, see Table 13.

Second, the partial effect of INSVOTE is given by $-0.242 - 1.328 \cdot INSCAP$, which is negative for the full range of sample values of INSCAP. For example, for the median INSCAP value of 0.195, the partial effect of INSVOTE is a coefficient of approximately -0.5. Thus, income smoothing is increasing in the proportion of insider votes. However, given that the value of INSCAP never exceeds the value of INSVOTE in the sample, as illustrated in Figure 1, this partial effect allows for an analysis of the divergence of the two variables as a means of testing the entrenchment effect. Table 13 in the appendix illustrates that income smoothing increases as INSVOTE increases if INSCAP is held constant. The table also shows that the effect is stronger for higher levels of INSCAP. This supports the theory that managerial entrenchment may in fact lead to increased income smoothing but it should be noted that the coefficient of INSVOTE is non-significant.

The sign for the explanatory variable APAYAB is negative, implying that increased supplier financing increases income smoothing. This contradicts the expected result based on arguments presented in the theory section, and it thus contradicts hypothesis $H_{1B.}$ A 10 %

increase in APAYAB is associated with an effect on smoothing of -0.1197 or approximately 23% of the IS interquartile range.

VIF and a centered regression are included with the main regression, as the examination of the insider ownership variables above indicates that there might be a collinearity problem. The variance inflation factor (VIF) measures the extent of interdependence between the independent variables. A higher VIF signals a stronger interdependence. Significance levels of the main regression are calculated using robust standard errors. A Breusch-Pagan test against homskedasticity gives a p-value of 0.17, which means that it is quite probable that the data exhibit heteroskedasticity.

The regression performed with centering[8] of the insider ownership variables shows a considerably lower VIF and improves the significance of the insider ownership effects. Largely, however, the results are the same as for the non-centered regression.

8 Centering here refers to subtraction of the mean from a stochastic variable.

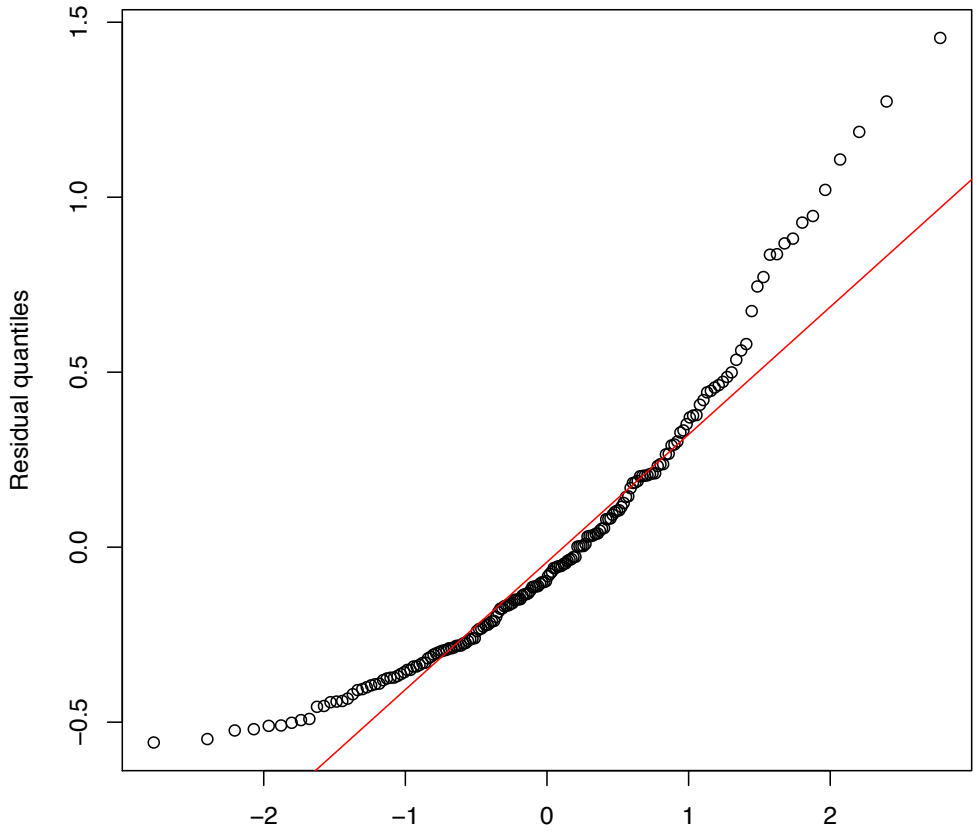


Figure 3. Quantile-to-quantile plot of regression residuals against a theoretical normal distribution for investigation of the assumption of normality of residuals. The quantiles of normally distributed residuals would follow the red line.

In order for inference to be possible, the residuals of the regression must be normally distributed. Figure 3 allows the examination of how the residuals of the regression are distributed compared to a normal distribution. The residuals are not extremely far from normally distributed but it can hardly be stated that they are normally distributed either. A method that is less dependent on assumptions regarding the model is bootstrapping of the regression. In light of the residuals distribution a bootstrapping approach has been tried for the main regression and the results are presented in the appendix. The significances obtained with bootstrapping are largely the same as those obtained using the normality assumption.

5.3 Robustness Checks and Additional Controls

This section first presents the results of robustness checks motivated by the choice of model (for motivations, see the method section) and then proceeds to present the results when removing a single outlier as is motivated by the data (see the discussion in the section dealing with estimation of the income smoothing measure).

	Main Regression 2006-2012 with robust standard errors			Jones ROA Regression		
	Exp. sign	Estimate	Std. Error	Exp. sign	Estimate	Std. Error
(Intercept)	-	0.040	0.318	-	-0.435*	0.233
APAYAB	+	-1.011***	0.349	+	-1.245***	0.320
INSCAP	+	0.769	0.540	+	0.968**	0.432
INSVOTE	-	-0.359	0.319	-	-0.263	0.357
INSCV	-	-0.899	0.674	-	-1.065	0.815
DEBT	+/-	0.057	0.352	+/-	-0.122	0.312
log (A)	-	-0.034	0.020	-	0.002	0.016
DTL	+/-	0.841*	0.462	+/-	-0.678	0.576
R-square	0.086			0.086		
Adj. R-square	0.042			0.050		
F-statistic	1.982			2.349		
p-value	0.061			0.026		

*** p< 0.01, ** p<0.05, * p<0.1

Table 9. Table of results for the robustness checks using a shorter time period with complete data series and using the original Jones model with a ROA control for financial performance. For variable descriptions, see **Table 6**.

The above table shows that the results are largely the same when using the original Jones model with ROA as a control. When using the shorter time period, 2006-2012, and requiring that complete data be available for all companies, the significance of the results for insider shareholdings is lost but the sign is still the same. The result for accounts payable is maintained.

The other controls suggested in the method section yield results very similar to those of the main regression. Controlling for big bath accounting by removing firm-year observations where a loss of more than 5% of sale is recorded gives the same signs of coefficients but reduces the significance of the INSCAP coefficient to the 10% level. Winsorizing the variables in the main regression to three standard deviations does not produce a notable change in the results.

Main Regression performed per Industry

	Technology	Healthcare	Consumer Non-Cyclicals	Consumer Cyclicals	Industrials	Basic Materials
(Intercept)	-1.454**	0.202	-0.901	-0.010	-0.439	-1.501
APAYAB	-1.481***	3.954	0.119	-0.899	-0.941*	-0.836
INSCAP	3.375**	0.494	-0.377	-0.397	0.644	-0.354
INSVOTE	0.090	-2.413***	1.448	0.980	-0.021	1.299
INSCV	-4.489**	2.615	-2.323	-1.999	-0.942	-0.835
DEBT	-0.222	-0.251	-1.335	0.753	0.042	-1.994
log (A)	0.062	-0.040	0.034	-0.038	-0.009	0.095
DTL	-0.604	1.959	-6.299	-0.040	0.238	-4.104
R-square	0.27	0.36	0.47	0.29	0.10	0.44
Number of firms	41	24	10	37	53	17

*** p< 0.01, ** p<0.05, * p<0.1

Table 10. Estimated coefficients, with significance coding, when performing the main regression industry by industry.

Table 10 shows that most of the coefficients obtained when estimating the main regression by industry are not significant. This is due to the much smaller number of observations available within industries than for the entire sample. All of the significant coefficients in Table 10 do have the same sign as the corresponding coefficients in Table 8 of the main regression performed on the entire sample.

The section above that deals with the estimation of the income smoothing measure discusses the presence of extreme values for some variables, as illustrated by Table 1. A closer analysis yields that the same firm-year observations represent outliers in several of the variables, which is exemplified by the illustration of DSALES and ROA in Figure 4 and Figure 5 in the appendix. In particular, Addnode 2002/2003 is a considerably more extreme outlier than any other observation Thus, the main regression is re-estimated and presented below when Addnode is removed from the sample of firms. It should be noted that Digital Vision and Aerocrine are retained, as they are outliers in ROA. ROA is not included as a control in the modified Jones model used for the main regression in this study.

Main Regression performed without Addnode

	Exp. sign	Estimate	Std. Error	t-value	VIF
(Intercept)	-	-0.265	0.243	-1.090	NA
APAYAB	+	-0.991***	0.302	-3.278	1.045
INSCAP	+	0.850**	0.402	2.117	9.980
INSVOTE	-	-0.264	0.294	-0.899	5.987
INSCV	-	-1.076*	0.620	-1.734	10.241
DEBT	+/-	-0.099	0.261	-0.381	1.336
LA	-	-0.012	0.016	-0.752	1.520
DTL	+/-	-0.112	0.451	-0.249	1.162
R-square	0.090				
Adj. R-square	0.053				
F-statistic	2.436				
p-value	0.021				

*** p< 0.01, ** p<0.05, * p<0.1

Table 11. Regression coefficients and significance levels obtained when performing the main regression with Addnode excluded from the sample of firms. For variable descriptions, see **Table 6**.

Removing Addnode changes the results and significances somewhat as is seen by comparing Table 11 with Table 8. Removing a single outlier thus has a non-negligible impact on the final results, so the results should be viewed with some caution. With a view to the criticism of the Jones model one could really question how well the model predicts an accurate level of non-discretionary accruals for companies where some of the control variables take outlier values, as is the case of Addnode in 2002/2003 (see appendix). Removing the outliers effectively alleviates prediction problems for outlier companies but it might be somewhat naïve to believe that outliers are the only type of companies for which the income-smoothing model fails to successfully model non-discretionary accruals.

5.4 Discussion

The results of this study can be viewed in a wider context than individual firms' smoothing of income. The results on insider shareholdings agree with theory whereas the results for accounts payable are contrary to theory. Below, the results are discussed, beginning with insider shareholdings.

5.4.1 The Effect of Insider Equity

Income smoothing is decreasing in the proportion of insider equity, which agrees with the theory that more insider equity capital can lead to an alignment of interests and a reduced need to signal private information. Income smoothing is also increasing in insider voting rights, which supports the entrenchment theory. The analysis of how large the effects on

income smoothing are shows that the results are also quite economically significant. This result can be of interest to several different parties. First, it can be of interest to standard setters to broaden the view of the factors that impact discretionary accounting decisions. Second, the results can be of interest to academics studying corporate governance. Third, the results can be of interest to investors who try to judge business risk based on reported earnings.

Analysing the interaction term requires care because of the multiple effects hypothesized. The analysis, details of which can be found in the appendix, shows the change in income smoothing when insiders' share of equity capital and insiders' share of voting rights are changed in the same proportion. It is found that increasing both the insider equity and votes in the same proportion leads to decreased income smoothing for low levels of insiders' share of voting rights but for higher levels of insider voting rights the effect is the opposite. The first result is probably more reliable due to the relatively small number of observations where insiders' share of voting rights is high. However, a possible interpretation of both results is that the entrenchment effect dominates the income smoothing reducing effects when insiders' share of voting rights is high.

5.4.2 Sign of Accounts Payable

The sign of accounts payable is negative, implying more smoothing when a larger share of assets are financed by insiders. The effect is the opposite of the one hypothesized and it is very robust to the checks and controls used above. It is thus integral to the study to consider whether the specification used is a valid test of the interaction between the proposed theories and income smoothing. There are several plausible effects that might cause the negative sign. First of all, the interpretation of Graham, Harvey & Rajgopal (2005) that suppliers are crowded out by external capital markets might not be correct because the survey covers stakeholders (including suppliers) as a group. Even though that group can be a less important motivation for income smoothing than others, it is still possible that supplier financing, when considered on its own, is a stronger motivation for income smoothing.

Two other possible explanations are that first, suppliers might be the least sophisticated of the firm's investors and thus be the most susceptible to smoothing. Second, suppliers themselves might not be the motivation for smoothing but they might contract to have exclusive right to unpaid-for goods in the case of default (Swe. Återtagandeförbehåll). This could inspire more risk aversion in other investors, who effectively become subordinated in this situation.

The abovementioned reasons, while possible, are not considered the most likely explanations of the negative sign by the authors. The reason deemed most likely among those the authors have come upon is that the test would be invalid because accounts payable and income smoothing both might correlate with *savvy management*. Working capital management is an area where well-managed firms might try to improve. However, the managers of such firms might also be well aware of any benefits of income smoothing. Such an explanation seems more plausible if income smoothing is indeed a way to communicate private information to the capital markets.

5.4.3 Reliability

The results of this study have been shown to be robust to several different test specifications and data sets. The results are therefore likely to be reliable. The high significance obtained also points to reliable results, although the reduction in significance as a result of removing just one observation highlights a possible problem with reliability. Another possible reliability issue is that some variables have a variance inflation factor of more than 5 even after centering, which might indicate that there is a multi-collinearity problem. Multi-collinearity can lead to large differences in estimated coefficients when using a different data sets. Votes as a proxy for control as well as the insider definition can also lead to reliability issues. An additional issue is that in the Swedish institutional setting it is possible that vote share is an unreliable predictor of control due to cross-holdings.

5.4.4 Validity

The bigger issue with this study is validity. It is inherently hard to measure smoothing of reported earnings by using data from financial statements, and the measure used in this study is quite elaborate. This makes interpretation of results hard and it is uncertain where biases may have entered the procedure. Consider the discussion of bias in the income smoothing measure in the appendix. While that discussion does not imply bias in the relative level of income smoothing, it is still possible that correlations between non-modelled non-discretionary accruals and variables of the main regression can cause biased results.

Further validity issues include the insider shareholdings specification and omitted control variables. Insider shareholdings may correlate with other variables (such as firm age) that may also correlate with income smoothing. The method section discusses several control variables that might be beneficial to validity but that are ultimately omitted.

6 Conclusions

This study has aimed to investigate how a firm's choice of financing impacts smoothing of reported income. After consideration of appropriate theory, two principal sources of financing have been investigated. First, insider shareholdings, for which several counteracting effects have been hypothesized and second, supplier financing, which has been hypothesized to reduce income smoothing.

The results suggest that the strongest effect for insider shareholdings is that firms smooth income less when insiders hold a large share of equity capital. The weaker effect suggests that income smoothing increases when insiders hold a large share of voting rights. The result obtained for supplier financing is opposite to the hypothesized effect and several possible explanations have been proposed.

The results can be of interest to standard setters, academics studying corporate governance, investors and to those studying the economic relationship between a firm and its suppliers. The effect of insider capital may be particularly interesting, as it appears to be a significant factor impacting income smoothing. Some caution is warranted when applying and interpreting the results, as there are several possible validity problems associated with the study.

Several possible avenues of future research exist. First, the increase of income smoothing when there is supplier financing could be further investigated. Second, the approach used to obtain per-firm income smoothing estimates could be examined. In particular, it may be of interest to investigate how to obtain an unbiased measure of income smoothing when discretionary accruals are imperfectly modelled. Third, an attempt could be made to identify research designs or special situations that allow for the investigation of additional sources of financing, of which debt would be particularly interesting.

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8 Appendix

8.1 Bootstrapping of the Main Regression

Bootstrapping is a technique that can be used to approach the estimation of some parameter that depends on stochastic variables. The bootstrapping technique is based on resampling of observations with replacement to perform many estimations of the parameter of interest. There are at least two ways of performing bootstrapping for linear regressions (Davison & Kuonen 2002). For resampling it is possible to estimate the regression and use the residuals to compute a new observation of the dependent variable for every observation of the independent variables. Another possibility is to resample with replacement from the original set of observations. The approaches are not equivalent, as highlighted in Davison & Kuonen (2002), and results of both approaches are presented in the table below. Error resampling refers to the first approach and case resampling to the second.

Main Regression	100 000 case resampling	100 000 error resampling
	Estimate	Estimate
(Intercept)	-0.391	-0.396
APAYAB	-1.232***	-1.197***
INSCAP	1.075**	1.084**
INSVOTE	-0.222	-0.240
INSCV	-1.349**	-1.327**
DEBT	-0.241	-0.237
log (A)	-0.002	-0.002
DTL	-0.428	-0.308

Table 12. Results of performing bootstrapping to estimate the main regression coefficients and their significance level in

8.2 Partial Effects of Insider Financing in Main Regression

Level of INSVOTE or INSCAP	Partial Effect of INSCAP on IS	Partial Effect of INSVOTE on IS
0.1	0.954	-0.375
0.2	0.821	-0.508
0.3	0.689	-0.640
0.4	0.556	-0.773
0.5	0.423	-0.906
0.6	0.290	-1.039
0.7	0.157	-1.172
0.8	0.025	-1.304

Table 13. Shows the partial effect of INSCAP and INSVOTE obtained using the coefficients of the main regression, when holding one of the variables constant. The value at which INSCAP or INSVOTE is held constant is displayed in the first column.

8.3 Effect of Increased Insider Financing for Constant Vote-Capital Divergence

The entrenchment theory hypothesizes that divergence between insiders' share of equity capital and insider control leads to income smoothing. One proxy for divergence between control and capital is the divergence between votes and capital. It can therefore be of interest to analyse the effect of increased managerial ownership when the divergence between capital and votes is held constant. Expressed other terms it is the analysis of the effect when insiders buy shares for which the capital-share and the vote-share are equal.

Suppose therefore, that there is divergence, *d*. The vote-share can then be expressed as $INSVOTE = INSCAP + d$. Considering only the relationship between income smoothing and insider financing, the fitted level of income smoothing is then obtained as

$$\mathrm{IS_i} = \beta_{\mathrm{INSCAP}}\mathrm{INSCAP} + \beta_{\mathrm{INSVOTE}}(\mathrm{INSCAP} + \mathrm{d}) + \beta_{\mathrm{INSCV}}\mathrm{INSCAP}(\mathrm{INSCAP} + \mathrm{d})$$
$$= \mathrm{INSCAP}(\beta_{\mathrm{INSCAP}} + \beta_{\mathrm{INSVOTE}} + \beta_{\mathrm{INSCV}}d) + \beta_{\mathrm{INSVOTE}}d + \beta_{\mathrm{INSCV}}\mathrm{INSCAP}^2.$$

Holding *d* constant amounts to changing INSCAP and INSVOTE in the same proportion. To assess the effect of that change one can differentiate the above expression for IS to obtain

$$\frac{\partial \mathrm{IS_i}}{\partial INSCAP} = \beta_{\mathrm{INSCAP}} + \beta_{\mathrm{INSVOTE}} + \beta_{\mathrm{INSCV}}d + 2\beta_{\mathrm{INSCV}}\mathrm{INSCAP}.$$

Table 14 shows the results for $\frac{\partial \mathrm{IS_i}}{\partial INSCAP}$ for some different values of INSCAP and *d*.

	Divergence of INSCAP AND INSVOTE, d			
INSCAP	0	0.1	0.2	0.3
0	0.845	0.712	0.579	0.447
0.1	0.579	0.447	0.314	0.181
0.2	0.314	0.181	0.048	-0.085
0.3	0.048	-0.085	-0.217	-0.350
0.4	-0.217	-0.350	-0.483	-0.616
0.5	-0.483	-0.616	-0.749	-0.881
0.6	-0.749	-0.881	-1.014	-1.147
0.7	-1.014	-1.147	-1.280	-1.413

Table 14. The table shows $\frac{\partial \mathrm{IS_i}}{\partial INSCAP}$, when the divergence is held constant, for different levels of INSCAP and divergence between INSCAP and INSVOTE.

8.4 Extreme Observations

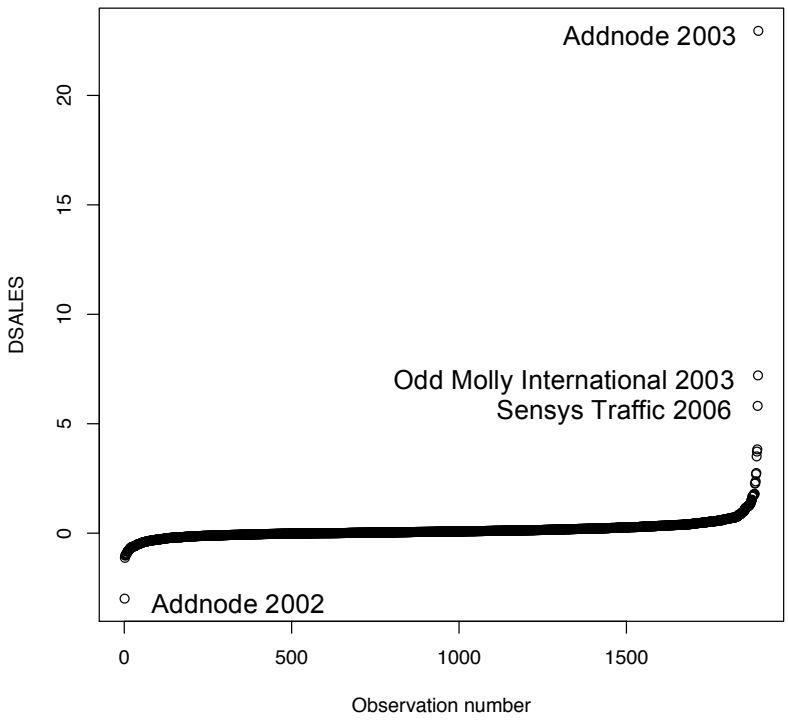


Figure 4. Scatter plot of ordered DSALES firm-year observations to identify possible outliers.

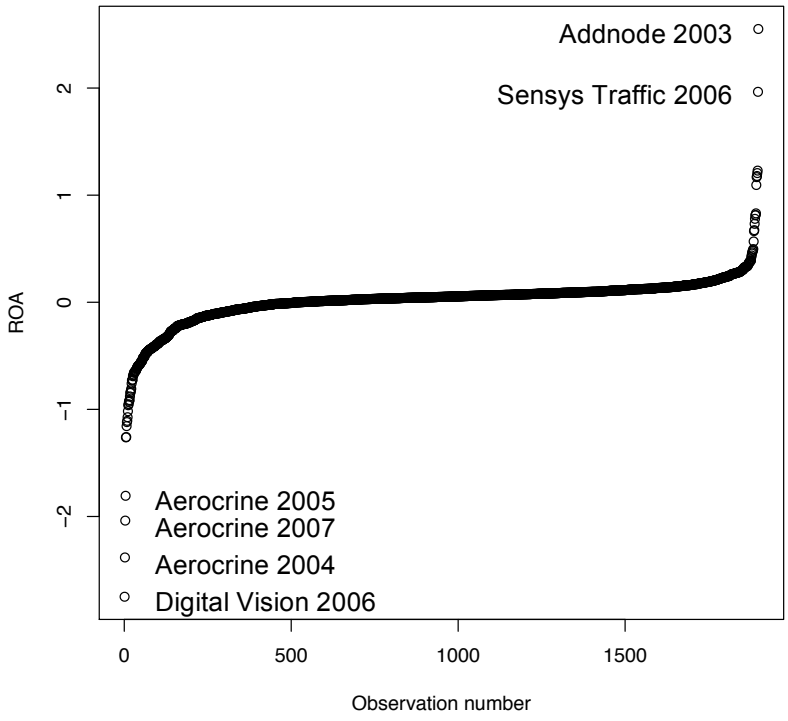


Figure 5. Scatter plot of ordered ROA firm-year observations to identify possible outliers.

8.5 Correlation as a Measure of Income Smoothing

This appendix concerns measurement issues related to discretionary accruals and how they may bias the income smoothing measure used in this study. Subramanyam (1996) points to measurement error as an alternative explanation for results obtained on income smoothing. Measurement error in DAP can make the correlation between change in DAP and change in PDI an unsuitable measure of the absolute level of accruals-based income smoothing. Here, a simple model expounding the issue is presented.

The discretionary accruals proxy is obtained by the assumption that non-discretionary accruals have been correctly modelled and that any residuals pertaining to the model consist of discretionary accruals. Given the simplicity of the Jones models presented in this study, it is likely that not all factors affecting the level of non-discretionary accruals have been captured in the model. Assume, therefore, that DAP_{it} consists of discretionary accruals DA_{it} but also of non-modelled non-discretionary accruals, ε_{it}, so
$DAP_{it} = DA_{it} + \varepsilon_{it}$.

Calculating the pre-discretionary income then yields $PDI_{it} = NI_{it} - DA_{it} - \varepsilon_{it}$. The change in DAP is obtained as $\Delta DAP_{it} = \Delta DA_{it} + \varepsilon_{it} - \varepsilon_{it-1}$ and the change in PDI as
$\Delta PDI_{it} = \Delta NI_{it} - \Delta DA_{it} - \varepsilon_{it} + \varepsilon_{it-1}$.

Assume now, that the non-modelled non-discretionary accruals are uncorrelated over time and uncorrelated with net income and the actual discretionary accruals. It is then possible to calculate the income smoothing measure using the assumptions and expressions above.

$$IS_i = corr(\Delta PDI_{it}, \Delta DAP_{it}) = \frac{COV(\Delta NI_{it} - \Delta DA_{it} - \varepsilon_{it} + \varepsilon_{it-1}, \Delta DA_{it} + \varepsilon_{it} - \varepsilon_{it-1})}{VAR(\Delta PDI_{it})VAR(\Delta DAP_{it})}$$

$$= \frac{1}{VAR(\Delta PDI_{it})VAR(\Delta DAP_{it})}\big(COV(\Delta NI_{it} - \Delta DA_{it}, \Delta DA_{it}) + COV(-\varepsilon_{it} + \varepsilon_{it-1}, \Delta DA_{it}) + COV(\Delta NI_{it} - \Delta DA_{it}, \varepsilon_{it} - \varepsilon_{it-1}) + COV(-\varepsilon_{it} + \varepsilon_{it-1}, \varepsilon_{it} - \varepsilon_{it-1})\big)$$

$$= \frac{COV(\Delta NI_{it} - \Delta DA_{it}, \Delta DA_{it}) + 0 + 0 + COV(-\varepsilon_{it} + \varepsilon_{it-1}, \varepsilon_{it} - \varepsilon_{it-1})}{VAR(\Delta PDI_{it})VAR(\Delta DAP_{it})}$$

where the zeros follow from the assumption of no correlation. Examining the covariance of the non-modelled non-discretionary accruals gives

$$COV(-\varepsilon_{it} + \varepsilon_{it-1}, \varepsilon_{it} - \varepsilon_{it-1}) = COV(-\varepsilon_{it}, \varepsilon_{it}) + COV(-\varepsilon_{it}, -\varepsilon_{it-1}) + COV(\varepsilon_{it-1}, \varepsilon_{it}) + COV(\varepsilon_{it-1}, -\varepsilon_{it-1})$$
$$= -VAR(\varepsilon_{it}) + 0 + 0 + -VAR(\varepsilon_{it-1})$$

where the zeros once again follow from the assumption of no correlation (over time in this instance).

Finally, the income smoothing measure is then

$$IS_i = \frac{COV(\Delta NI_{it} - \Delta DA_{it}, \Delta DA_{it}) - VAR(\varepsilon_{it}) - VAR(\varepsilon_{it-1})}{VAR(\Delta PDI_{it})VAR(\Delta DAP_{it})}.$$

From the above it can be seen that even when the actual discretionary accruals are always zero, implying that $\Delta DA_{it} = 0$ and thus that $COV(\Delta NI_{it} - \Delta DA_{it}, \Delta DA_{it}) = 0$, the income smoothing measure will be biased towards a negative correlation because the variance is positive.

The above example can be used to understand why the absolute level of the income smoothing measure may not accurately reflect actual smoothing even though the assumption of no correlation between non-modelled non-discretionary accruals and other model constituents is overly simplistic. Note, however, that differences between firms may still be valid under appropriate assumptions regarding the form of the non-modelled non-discretionary accruals. No attempt is made to build a more complete model here.