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Article:

Alhadab, M, Clacher, I and Keasey, K (2016) A Comparative Analysis of Real and Accrual Earnings Management around Initial Public Offerings under Different Regulatory Environments. *Journal of Business Finance & Accounting*, 43 (7/8). pp. 849-871. ISSN 0306-686X

<https://doi.org/10.1111/jbfa.12201>

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A Comparative Analysis of Real and Accrual Earnings Management around Initial Public Offerings under Different Regulatory Environments

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ABSTRACT

While earnings management around IPOs has been researched in a number of settings, there has been a relative absence of work that analyses the impact of the regulatory environment on such activities. We find that the regulatory environment does impact the real and accrual earnings management activities of IPO firms. Our results show that IPO firms listing on the lightly regulated UK Alternative Investment Market (AIM) have higher (lower) levels of accrual based and sales based (discretionary expenses based) earnings management around the IPO than firms listing on the more heavily regulated Main market in the UK.

Keywords: Earnings Management; Regulatory Environment; Initial Public Offerings; Accounting Choices

1. Introduction

This paper reports the results of a comparative investigation into the impact of the regulatory environment on both the real and accrual earnings management activities of IPO firms. Specifically, we examine real and accrual earnings management activities around IPOs for firms listing on both the heavily regulated Main market of the London Stock Exchange, and the more lightly regulated Alternative Investment Market (AIM). The UK stock market provides a unique environment to test directly the effect of the regulatory environment on earnings management. All UK listed firms are governed by the same legal regime, accounting standards, and general economic environment, but are subject to differing listing requirements and monitoring depending on whether they list on the Main market or the AIM market.

The findings of this paper contribute to the literature by showing that IPO firms engage in both real and accrual earnings management around IPOs, and more specifically, that the regulatory environment matters. IPO firms on the AIM market engage in higher levels of sales-based and accrual-based, and lower levels of discretionary expenses based manipulations compared to IPO firms on the Main market.

Prior studies have presented evidence that IPO firms manipulate earnings using accrual earnings management around IPOs (e.g., Friedlan, 1994; Teoh et al., 1998a; Gramlich and Sorensen, 2004; Morsfield and Tan, 2006). However, little research has examined real earnings management and IPOs. Analyzing real earnings management is important as manipulating real activities represents managerial decisions that deviate from normal business practice, such as reducing research and development (R&D) expenses or increasing sales by offering greater price discounts and/or more lenient credit terms (Roychowdhury, 2006).

Moreover, and given the increasing interest in real earnings management, recent research finds evidence that stronger regulation has a direct impact on managers' tendency to choose between real and accrual earnings management. Ewert and Wagenhofer (2005) provide

evidence that the level of real earnings management increases after accounting standards are strengthened. In line with the evidence of Ewert and Wagenhofer (2005), Cohen et al. (2008) investigate the effect of the 2002 Sarbanes-Oxley Act (SOX) on real and accrual earnings management, and document that US firms switch from accrual-based manipulation pre-SOX, to manipulating real activities post-SOX. The evidence of Cohen et al. (2008) suggests that more stringent regulation mitigates accrual-based earnings management leading to a greater use of real earnings management. Further, Zang (2012) finds evidence that managers substitute real and accrual based manipulation to manage reported earnings. This is consistent with the survey results of Graham et al. (2005) that managers prefer real over accrual earnings management to avoid the scrutiny of regulators. Therefore, and in the light of previous evidence, levels of real and accrual earnings management are likely to differ depending on the regulatory environment in which a firm operates.

In the UK, the London Stock Exchange comprises two different regulatory environments; that is, the Main market and the AIM market. While IPO firms on the Main market are monitored and regulated by the UK Listing Authority (UKLA), IPO firms on the AIM market have to appoint and retain a Nominated Adviser (Nomad), who undertakes the role of regulator. Nomads are private companies that play the role of adviser and regulator for IPO firms on the AIM market. Compared with the Main market, and other developed markets such as those in the US, the AIM market requires lower levels of corporate governance, disclosure and transparency, and a lighter set of listing requirements. For example, while IPO firms on the Main market are required to comply with the UK Corporate Governance Code, the AIM market only requires listing firms to have appropriate corporate governance and, therefore, there is a lower requirement for corporate governance mechanisms as compared to

the Main market.¹ However, whether these different regulatory burdens (restrictive versus lighter) lead to different impacts on the disclosure system and financial reporting quality and, therefore, the level of earnings management by companies listed on these markets is still an open question.

Prior literature indicates that a lower quality disclosure system and lower quality financial reporting in the capital markets are associated with agency conflict (Jensen and Meckling, 1976; Watts and Zimmerman, 1986) and information asymmetry (Trueman and Titman, 1988; Schipper, 1989; Dechow and Skinner, 2000; Healy and Palepu, 2001) and these can lead to managers engaging in earnings management. For example, a higher level of information asymmetry around IPOs can lead to two types of agency problems; adverse selection and moral hazard (Ritter and Welch, 2002; Bruton et al., 2009). Adverse selection implies that managers have better information about the firm and, therefore, they may not reveal all they know about the firm to outsiders e.g. shareholders (e.g. Bruton et al., 2009). Moral hazard meanwhile, implies that managers may not perform their duties efficiently in line with the interests of shareholders, due to information asymmetry between managers and shareholders (Nygaard and Myrtveith, 2000). Thus, and as predicted by agency theory, this conflict between managers and shareholders may lead managers to engage in certain activities (e.g. earnings management) to obtain a private gain and that these activities may decrease the shareholders' wealth (Jensen and Meckling, 1976).

Recent research examines the effect of the lighter AIM regulation compared to the more restrictive regulations of the Main market and other developed markets. For example, Campbell and Tabner (2011) and Jenkinson and Ramadorai (2010) find firms that move from the AIM market to the Main market experience positive returns on the announcement day of the move, while negative returns are found for firms that move from the Main market to the

¹ The UK Corporate Governance Code, formerly known as the Combined Code, is a set of standards and principles of good corporate governance practice concerning the board of directors, remuneration, shareholders, audit, accountability, etc.

AIM market. In addition, Gerakos et al. (2013) presents evidence that firms listed on the AIM market have higher levels of information asymmetry, lower levels of liquidity,² higher failure rates, and higher levels of post-listing return underperformance compared with firms listed on the Main market of the London Stock Exchange and US markets.

Though prior research has extensively examined accrual based manipulation around IPOs, few studies have extended their scope to examine whether IPO firms engage in the manipulation of real activities. Moreover, no study to date has examined whether lighter regulation provides IPO firms with greater flexibility to utilize real and accrual earnings management techniques around IPOs. This study, therefore, progresses the earnings management literature by examining real and accrual based earnings management around IPOs under the different regulatory environments of the AIM and Main markets in the UK. We contribute to the earnings management literature by showing that IPO firms on the lightly regulated AIM market are found to have higher (lower) levels of accrual based and sales based (discretionary expenses based) earnings management around the IPO than firms listing on the more heavily regulated Main market.

The rest of the paper is organized as follows. Section 2 provides a brief overview of UK stock markets. Section 3 reviews the related literature and presents our hypotheses. Section 4 discusses the data and empirical methodology. Section 5 discusses the empirical evidence on the use of real and accrual earnings management around IPOs under different regulatory environments, while Section 6 offers conclusions.

2. Background of UK Stock Markets and Earnings Management

The AIM and Main markets of the London Stock Exchange represent examples of relatively flexible versus restrictive regulatory environments. Jenkinson and Ramadorai (2010) present a detailed review and discussion of the major differences between the AIM and Main markets.

² Mendoza (2008) also presents evidence that the AIM market has liquidity problems.

Crucially, the regulatory environment of the Main market is much more restrictive, and similar to other developed stock markets, while the AIM market has lighter and more flexible regulation. This difference in the regulatory environment is due to the underlying purpose of the AIM market. AIM was established in 1995 to provide small and medium sized firms with greater opportunities to raise capital from the public earlier in the lifecycle of the firm. As a result, the market has a less restrictive regulatory environment to reduce compliance and listing costs.

Comparing the listing requirements, IPO firms on the AIM market are not required to have previous financial records before going public or to have a minimum market capitalization.³ Hence, IPO firms on the AIM market can go public within a short period of commencing trading. In contrast, IPO firms on the Main market should have, at least three years of financial records, at least 25% of their capital should be in public hands prior to going public, a minimum market capitalization, and at least 75 percent of their business should be supported by a revenue earning record.

In addition, prospectuses for IPO firms on the AIM market are not pre-vetted by the UKLA. In contrast, this is a mandatory requirement for IPO firms listing on the Main market, as all IPO firms on the Main market are monitored and regulated by the UKLA. AIM listed firms, however, are monitored and regulated by a Nominated Adviser (Nomad). Nomads play the key role in monitoring and advising firms listed on the AIM market and are crucial in ensuring the integrity of the AIM market. Further, while the Main market requires all listed firms to comply with the UK Corporate Governance Code, the AIM market only requires listing firms to have appropriate corporate governance. However, while Nomads play an important role in advising AIM firms on appropriate corporate governance practices, in general, these firms are likely to have less effective corporate governance mechanisms than

³ This restriction does apply for some companies such as those engaged in scientific research, London Stock Exchange at <http://www.londonstockexchange.com/home/homepage.htm>

firms on the Main market. One consequence of the lighter regulatory regime of the AIM market is that it has attracted many national and international firms with more than 3,100 IPO firms raising over £67 billion since its launch in 1995.⁴ Table 1 presents a summary of the main differences between the two markets.

[Insert Table 1 here]

Recent research confirms the negative impact of AIM lighter regulatory environment on disclosure systems and financial reporting quality of firms listed on the AIM market, and on the negative impact of less reputable Nomads on AIM firms' future performance. For example, Jenkinson and Ramadorai (2010) and Campbell and Tabner (2011) find firms that move from the Main market to the AIM market experience negative returns on the announcement day of the move, suggesting that investors react negatively to this news. Gerakos et al. (2013) find firms listed on the AIM market have higher levels of information asymmetry, higher failure rates, higher post-listing return underperformance, and lower levels of liquidity. Mendoza (2008) indicates that the AIM market has liquidity problems. Espenlaub et al. (2012) investigate whether the future performance of firms listed on the AIM market is affected by the reputation of their Nomads and find evidence that lower quality Nomads have a negative impact on the survivability of AIM firms.

Thus, and based on the above discussion, it is more likely that IPO firms on the AIM market will exhibit higher levels of information asymmetry and agency conflict and, therefore, managers of AIM IPO firms will have strong incentives and more flexibility to manage earnings upward utilizing real and accrual earnings management to support high stock prices.

⁴ A Guide to AIM, page 6, available at: <http://www.londonstockexchange.com/home/homepage.htm>

3. Related Literature and Hypotheses Development

We first review the literature on real and accrual earnings management around IPOs. Second, we discuss how earnings management might differ according to the nature of the regulatory regime. We discuss the existing evidence and research in each of these areas and build on this evidence to state our hypotheses.

3.1 Real and Accrual Earnings Management around IPOs

To allow us to analyze the impact of the regulatory environment on earnings management by listing firms, we first examine whether IPO firms undertake real and accrual earnings management around IPOs. An IPO is one of the most important events in a firm's life cycle and, therefore, IPO firms have very strong incentives to manage earnings upward around IPOs (e.g. Aharony et al., 1993; Friedlan, 1994; Roosenboom et al., 2003). For example, IPO firms may engage in earnings management prior to the IPO to increase the offer price. Brau and Fawcett (2006) surveyed more than 300 executives about IPOs and found evidence that historical earnings represent the most important positive signal that executives attempt to send to outside investors. Consistent with this view, prior literature finds evidence that IPO firms engage in accrual manipulation to increase reported earnings around the IPO (e.g., Aharony et al., 1993; Friedlan, 1994; Teoh et al., 1998a; Teoh et al., 1998c).

Further, IPO firms have strong incentives to manage earnings upward at the end of the IPO year (at the end of the first year of being public firms) to maintain high stock prices. For example, Teoh et al. (1998a) examine earnings management around IPOs and argue that IPO firms are likely to manage earnings at the end of the IPO year to maintain high stock prices for the following reasons. First, entrepreneurs usually are restricted by the lock-up period from selling their shares immediately post IPO and, therefore, any reversal of performance of earnings would have a negative impact on stock prices and eventually the entrepreneurs'

investment.⁵ Consistent with this, Darrough and Rangan (2005) find evidence that managers reduce R&D expenses at the end of the IPO year to manage earnings upward, and this reduction in R&D expenses was motivated by managerial share selling, as managers believe investors place greater emphasis on current earnings. Second, IPO firms face a high litigation risk especially when the firms manage earnings upward prior to the IPO, and that their reported earnings post-IPO decline compared with the pre-IPO period. This in turn suggests, and as indicated by Teoh et al. (1998a), that IPO firms which manage earnings upward pre-IPO are likely to manage the first reported earnings post IPO. Third, IPO firms may provide earnings forecasts in the prospectuses and, therefore, they are under pressure to meet their earnings forecast to maintain good relations with investors, underwriters, analysts, and to avoid any reputational damage or any future litigation risks by shareholders due to a reversal of earnings in the post-IPO period. Gramlich and Sorensen (2004) find evidence that IPO firms engage in accrual manipulation at the end of the IPO year (the first reported earnings after the date of IPO) to meet earnings forecasts. Teoh, et al. (1998c) also added that executive compensation is considered a strong incentive to manage earnings upwards.

Other studies have, however, provided evidence that questions the existence of accrual earnings management during IPOs. For example, Armstrong et al. (2009) find that the previous negative association between accrual-based manipulation and subsequent stock return performance is an artifact of the mispricing of operating cash flows. Cecchini et al. (2012) examine the allowance for uncollectable accounts and bad debt expenses and find evidence that IPO firms manage earnings downward using more decreasing allowances. Moreover, Ball and Shivakumar (2008) examine accrual accounting during the year prior to the IPO for 171 UK IPOs, which have similar information and financial report characteristics

⁵A commitment to a lock-up period by IPO managers is considered as a positive signal about the IPO firm's quality (Courteau, 1995; Brau et al., (2005). However, a long lock-up period may lead managers to manage earnings upward in the months immediately post IPO to maintain high stock prices. For the UK IPO sample that is examined in this paper, the average lock-up is 14 months after the IPO date; this in turn implies that post-IPO, poor stock returns will have negative consequences for insiders' wealth.

and prospectuses, over the period 1995-1999. Their evidence suggests that UK IPO firms provide high quality reporting, tending towards accounting conservatism, rather than accounting manipulation. They argue that IPO firms report conservatively in response to the expected demand for high quality reporting, which is enforced by efficient players in the capital market.

However, Lo (2008) in his discussion of Ball and Shivakumar's (2008) paper highlights the possibility that they may exclude the IPO firms that managed earnings because their sample is restricted to firms that present similar information and categorization between the financial reports and the prospectuses. In the UK, IPO firms have the right to restate their financial reports for the periods before the IPO year, but they should mention this restatement in their prospectuses. Lo (2008) argues IPO firms that managed earnings are more likely to provide different information and categorisation between the prospectus and the financial reports in order to make it harder for the outside investors to discover and detect any earnings manipulation. In addition, Lo (2008) indicates that IPO firms can manage earnings utilizing real earnings management activities, which were not examined by Ball and Shivakumar (2008).

In summary, although some recent research questions the existence of accrual earnings management around IPOs, the majority of prior studies find evidence that IPO firms engage in accrual-based manipulation around the IPO event.

Despite the extensive research on accrual earnings management around IPOs, there has been limited research examining whether IPO firms engage in manipulating real activities. Darrough and Rangan (2005) for example show IPO firms reduce R&D expenses during the IPO year to increase reported earnings. They find that managerial share selling motivates the reduction in R&D, as managers believe investors place greater emphasis on current earnings. Wongsunwai (2012) examines the role of venture capitalists in mitigating real and accrual earnings management around IPO lock-up expiration. He finds evidence that IPO firms

manage earnings during the IPO year, and that IPO firms backed by reputable venture capitalists exhibit a lower level of real activities-based and accrual-based manipulations. Graham et al. (2005) meanwhile provide evidence that executives are more willing to undertake real as opposed to accrual earnings management to manipulate reported earnings. Compared to accrual-based manipulation, real earnings management is harder for auditors, regulators, and investors to detect (Graham et al., 2005; Roychowdhury, 2006; Cohen et al., 2008). Further, firms that have engaged extensively in accrual-based manipulation in previous years have limited flexibility to utilize accrual earnings management for the current year, because the balance sheet accumulates all the previous changes in accounting methods (Barton and Simko, 2002). Therefore, IPO firms that undertook extensive accrual-based manipulation in previous years are more likely to switch to real earnings management in the current period (Gunny, 2010).

One final factor that must be considered is that accrual earnings management is a relatively risky means of meeting earnings targets as it occurs at the end of a fiscal year or quarter (Roychowdhury, 2006). If managers decided to manage earnings using accrual manipulation alone, and the amount being manipulated fell short of the desired threshold, there would be insufficient time to manage real activities to meet the earnings target. A recent paper by Cohen and Zarowin (2010) finds that SEO firms engage simultaneously in real and accrual earnings management during the offering year. Given the limited research examining real earnings management around IPOs, but based upon the evidence above, we examine whether IPO firms in the UK engage in real and accrual earnings management around the IPO year. Our first hypothesis, in alternative form, is therefore as follows:⁶

H1: IPO firms in the UK exhibit evidence of real and accrual earnings management around the IPO year.

⁶ It is worth noting that Hypothesis 1 is not new to the literature and it has been already addressed by prior research based on IPOs setting e.g. Teoh et al. 1998a; Wongsunwai, 2012. However, we test this to establish whether real and accrual earnings management are present in a UK setting.

3.2 Earnings Management around IPOs and the Regulatory Environment

Our primary objective is to examine the effect of the regulatory environment on real and accrual earnings management. While the Main market in the UK imposes restrictive regulation on IPOs, the AIM market has fewer requirements and imposes lighter regulation. For example, while the Main market requires firms to comply with the UK Corporate Governance Code, the AIM market requires listing firms to have an appropriate corporate governance mechanism. The Nomad advises IPO firms about their corporate governance to ensure the integrity of the market. Therefore, whether an AIM firms meets the requirements of effective corporate governance is evaluated by the appointed Nomad.

The role of corporate governance in mitigating the agency conflict between managers and shareholders (Healy and Palepu, 2001) and, therefore, preventing real and accrual earnings management has been extensively researched (e.g., Yang and Krishnan, 2005; Cornett et al., 2008; Laux and Laux, 2009). Specifically, the literature finds evidence that the proportion of outside directors on the board, the existence of an audit committee, and the separation of the roles of CEO and chairman are the most effective monitoring and mitigating factors on real and accrual earnings management (e.g., Klein, 2002; Peasnell, et al., 2005; Osma, 2008). More recently, Gerakos et al. (2013) by comparing firms listed on the AIM market with firms listed on the Main market and US markets, find evidence that firms listed on the AIM market have higher levels of information asymmetry, failure rates, post-listing underperformance as well as lower liquidity.

Trueman and Titman (1988), Schipper (1989), and Dechow and Skinner (2000) indicate that the existence of high levels of information asymmetry is one of the motivations for managers to engage in earnings management. Richardson (2000) explores the effect of information asymmetry on accrual earnings management and finds evidence that firms with higher levels of information asymmetry have higher levels of accrual-based manipulation.

Moreover, Mendoza (2008) indicates that the AIM market has liquidity problems, and recent research finds evidence that firms with lower levels of liquidity have higher levels of earnings management (see Chung et al., 2009).

Given the above evidence that the AIM market is likely to exhibit higher levels of agency conflict and information asymmetry, it is expected that IPO firms on the AIM market will have strong incentives and more flexibility to engage in real and accrual earnings management than IPO firms on the Main market. Therefore, the second hypothesis is as follows:

H2: IPO firms on the AIM market exhibit higher levels of real and accrual earnings management than IPO firms on the Main Market.

4. Data and Methodology

4.1 Sample Construction

Our sample consists of 571 IPO firms that went public on either the Main or AIM markets between January 1998 and December 2008.⁷ All financial IPO firms are excluded from the sample due to differences in their financial reporting and disclosure requirements (e.g., Teoh et al., 1998a; 1998c; Chen et al., 2005; Morsfield and Tan, 2006; Fan, 2007; Chang et al., 2010; Lee and Masulis, 2011; Chahine et al., 2012; Wongsunwai, 2012). We restrict the sample to all non-financial IPO firms with available prospectuses and the necessary data to allow us to analyze real and accrual earnings management. This restriction results in the sample consisting of larger and more successful firms, and as noted by Cohen et al. (2008) and Cohen and Zarowin (2010), a more conservative test of earnings management. Further, we follow prior research by excluding from our control sample any group of firms with less than 6

⁷The London Stock Exchange provides information about IPOs on the Main market starting from 1998 while information about IPOs on the AIM market starts from 1995. Therefore, and to be consistent, our sample covers the period 1998 - 2008.

observations for each 2-digit SIC code industry-year group.⁸ The IPO year (0) is defined as the fiscal year during which the IPO occurs.⁹ We estimate our accrual measures based on the cash flow approach as suggested by Hribar and Collins (2002), rather than a balance sheet approach, as the latter can lead to a higher magnitude and frequency of measurement errors.

We collect data using the following sources: (1) IPO firms are identified using the list of IPOs on the London Stock Exchange website for UK firms that were admitted to the AIM and Main markets during the period 1998-2008. This list provides information about IPOs such as, issue price, the date of an IPO, market capitalization etc; (2) the ICC Plum and Lexis-Nexis databases were used to obtain information about the company identifier for IPO firms, such as the WorldScope and ISIN codes; (3) financial data for the IPO firms and for our control sample of all UK non-IPO firms were obtained from the WorldScope database; (4); WorldScope, however, does not provide all the required financial data for our sample of IPO firms, therefore, IPO prospectuses were downloaded from the Thomson One Banker database and all missing financial data were manually collected from IPO prospectuses.

Table 2 presents descriptive statistics for our AIM and Main IPO samples. The mean market capitalization for IPO firms on the AIM market is approximately £28 million and for IPO firms on the Main market is approximately £384 million. This large difference in market values between IPO firms on the AIM and Main markets is consistent with the view that the AIM market is dominated by small, growing firms that list earlier in the lifecycle of the company. However, the range of market values shows that some IPO firms with larger market values have listed on the AIM market.

⁸ We also repeated our analysis using 10 observations for each industry-year group and the results are qualitatively similar but this restriction leads to a large decrease in our sample size and we therefore follow Rosner, (2003), Iqbal et al. (2009) and Athanasakou et al. (2011) and use 6 observations.

⁹ To overcome any misspecification of the financial year-end, the financial data we obtained from WorldScope are crosschecked with the financial data in the prospectus and the results are qualitatively similar.

[Insert Table 2 here]

Table 3 reports the distribution of IPOs over the period 1998 to 2008 and shows that the years 2000, 2004, 2005, and 2006 account for more than 60% of the sample. In addition, one consequence of the recent global financial crisis is that the lowest number of IPOs in our sample is in 2008. Table 4 shows the frequency of IPOs relative to the industry standard classification, measured by 2-digit SIC codes. Except for the clustering in the Business Services industry, which accounts for 31% of the total sample, the majority of other industries have percentages of IPOs ranging from 1% to 7.4%.

[Insert Table 3 here]

[Insert Table 4 here]

4.2 Measuring Accrual-Based Earnings Management

Following prior research in earnings management, we use the Dechow, et al. (1995) cross-sectional adaptation of the modified Jones model to estimate discretionary accruals.¹⁰ Ball and Shivakumar (2008) point out estimating discretionary accruals for IPO firms using lagged total assets to scale accrual variables may inflate the measure of accruals in the current year. They argue that lagged total assets are qualitatively smaller than total assets at the end of the IPO year because IPO firms tend to use proceeds to invest in assets. In order to overcome this problem, we follow Armstrong et al. (2009) and scale all variables by average total assets rather than lagged total assets.¹¹ We run a cross sectional regression for each year for all non-IPO firms for each 2-digit SIC industry category. This approach, in part, controls for changes in economic conditions that influence total accruals across different industry groups, but

¹⁰ Prior research examines quarterly discretionary accruals around the IPO since this allows an examination of the exact incentive to manage earnings upward e.g. whether IPO firms manage earnings upward in the quarter pre IPO date to increase the offer prices or in the quarter post IPO date to meet various incentives resulted from being a public firm such as meeting analysts' forecasts (e.g., Wongsunwai, 2012). However, and due to data limitations, we are unable to examine quarterly earnings management.

¹¹ We also repeated the analysis scaling all variables by lagged total assets and the results are qualitatively similar to those reported in the paper.

allows coefficients to vary through time (Cohen and Zarowin, 2010, Kasznik, 1999; DeFond and Jiambalvo, 1994). We also add return on assets to the model as suggested by Kothari, et al. (2005) in order to control for extreme operating performance, as this can bias the estimation of discretionary accruals. We then take these estimated coefficients to estimate discretionary accruals for the IPO firm. Normal accruals are, therefore, estimated using the following model:¹²

$$\frac{TA_{it}}{AvAssets_{it}} = \alpha_0 + \beta_1 \frac{1}{AvAssets_{it}} + \beta_2 \frac{\Delta SALES_{it}}{AvAssets_{it}} + \beta_3 \frac{PPE_{it}}{AvAssets_{it}} + \beta_4 ROA_{it} + \varepsilon_{it} \quad (1)$$

Where TA_{it} is total accruals defined as earnings before extraordinary items minus cash flows from operations; $AvAssets_{it}$ is the sum of total assets at the beginning of the year and the total assets at the end of the year divided by 2; $\Delta SALES_{it}$ is the change in sales during a year scaled by average total assets; PPE_{it} is the gross value of property, plant and equipment scaled by average total assets; and ROA_{it} is return on assets calculated as earnings before extraordinary items scaled by average total assets.

The coefficient estimates from equation (1) are used to estimate normal accruals (NA_{it}) for all IPO firms in each year and industry as follows,

$$NA_{it} = \hat{\alpha}_0 + \hat{\beta}_1 \frac{1}{AvAssets_{it}} + \hat{\beta}_2 \frac{\Delta SALES_{it} - \Delta REC_{it}}{AvAssets_{it}} + \hat{\beta}_3 \frac{PPE_{it}}{AvAssets_{it}} + \hat{\beta}_4 ROA_{it} \quad (2)$$

ΔREC_{it} is the change in receivables during the year scaled by average total assets. Discretionary accruals (DA_{it}) are measured as the difference between total accruals and fitted normal accruals where,

¹² To take account of extreme values all variables are Winsorized at 1% and 99%.

$$DA_{it} = \left(\frac{TA_{it}}{AvAssets_{it}} \right) - NA_{it} \quad (3)$$

For robustness we also repeat this analysis using performance-matched discretionary accruals following Kothari et al. (2005). We, therefore, match each IPO firm with a non-IPO firm based on year, 2-digit SIC industry code and the closest return on assets (+/- 0.20 of IPO firms' return on assets). Our results where we apply performance-matched discretionary accruals are qualitatively similar to those reported where we control for return on assets. The imposition of the above restriction, however, reduces our sample by 20% as we can only find appropriate matches for 80% of our IPO sample. As our results are qualitatively similar, we report the results based on the larger sample size that simply controls for return on assets.

4.3 Measuring Real Earnings Management

Following prior research we estimate our real earnings management proxies based on models of real earnings management developed by Dechow, et al. (1998) and applied by, Roychowdhury (2006), Cohen et al. (2008), Cohen and Zarowin, (2010), and, Zang (2012).

We examine two real earnings management activities; sales manipulation and reducing discretionary expenses.¹³ Sales manipulation leads to lower levels of cash flows from operations, and can be managed through offering more price discounts and/or more lenient credit terms (see Roychowdhury, 2006). Discretionary expenses meanwhile represent the sum of research and development expenses (R&D), advertising expenses, and selling, general and administrative expenses (SG&A). Reducing discretionary expenses in the current period will boost reported earnings in the current period. In addition, where discretionary expenses are paid for in cash, any reduction in these expenses will increase cash flows in the current period (Cohen and Zarowin, 2010). Similar to the estimation of our measures of accrual earnings

¹³ We do not consider production cost manipulation within our analysis of real earnings management as this is a method that can only be fully utilized by manufacturing companies (Roychowdhury, 2006) and manufacturing companies make up just 21.1 % of our AIM market sample and just 5.5% of our Main market sample.

management we scale all variables by average total assets.¹⁴ We first estimate the normal level of cash flows from operations using the following cross sectional regression for each industry and year for all non-IPO firms:

$$\frac{CFO_{it}}{AvAssets_{it}} = a_0 + \beta_1 \frac{1}{AvAssets_{it}} + \beta_2 \frac{SALES_{it}}{AvAssets_{it}} + \beta_3 \frac{\Delta SALES_{it}}{AvAssets_{it}} + \varepsilon_{it} \quad (4)$$

Where CFO_{it} is cash flows from operations for firm i at period t . The abnormal CFO for IPO firms is calculated as actual CFO minus the normal level of CFO estimated using the coefficients from regression (4).

The normal level of discretionary expenses can be expressed as a linear function of contemporaneous sales where,

$$\frac{DISX_{it}}{AvAssets_{it}} = a_0 + \beta_1 \frac{1}{AvAssets_{it}} + \beta_2 \frac{SALES_{it}}{AvAssets_{it}} + \varepsilon_{it} \quad (5)$$

Roychowdhury (2006) and Cohen and Zarowin (2010) point out, however, that estimating a normal level of discretionary expenses as specified in regression (5) can lead to poor estimation where firms manage sales upwards to increase reported earnings during any year. If a firm has managed sales upwards, this will result in unusually low residuals from running the regression as specified above. In order to overcome this problem, discretionary expenses are estimated as a function of lagged sales. We, therefore, follow Roychowdhury (2006) and estimate the normal level of discretionary expenses for the IPO firms as follows,

$$\frac{DISX_{it}}{AvAssets_{it}} = a_0 + \beta_1 \frac{1}{AvAssets_{it}} + \beta_2 \frac{SALES_{it-1}}{AvAssets_{it}} + \varepsilon_{it} \quad (6)$$

¹⁴ We also repeated the test by scaling all the variables by lagged assets and the results are qualitatively similar to those reported in the paper.

$DISX_{i,t}$ is, therefore, calculated as the sum of, SG&A, R&D, and advertising expenses for firm i at period t . $SALES_{i,t-1}$ is sales during the previous year. The abnormal level of discretionary expenses for IPO firms is calculated as actual discretionary expenses minus the normal level of discretionary expenses estimated using the coefficients from regression (6).

In order to measure the total effect of real earnings management, and following Cohen et al. (2008) and Zang (2012), we combine the abnormal level of cash flows from operations and the abnormal level of discretionary expenses to compute an aggregated measure of real earnings management. Specifically, abnormal cash flows from operations and abnormal discretionary expenses are multiplied by -1, and then calculated as one aggregated measure. A higher amount of this aggregate measure implies that IPO firms are more likely to be manipulating sales and cutting discretionary expenses to increase reported earnings.

5. Empirical Results on Real and Accrual Earnings Management Around IPOs

5.1 Empirical Evidence on Earnings Management around IPOs

Table 5 presents time-series profiles of mean and median discretionary accruals, abnormal cash flows from operations (Sales), abnormal discretionary expenses, and aggregate real earnings management for years -2 to the IPO year (year 0). We interpret our results on the basis of median values. For discretionary accruals, a significant and positive coefficient indicates income-increasing accrual-based earnings management. As noted above, to allow our measures of real earnings management to have the same interpretation as our measure of accrual-based earnings management, we multiply both abnormal cash flows from operations and abnormal discretionary expenses by -1. A significant and positive coefficient for abnormal cash flows from operations or abnormal discretionary expenses can, therefore, be interpreted as being consistent with income-increasing real earnings management. In addition, a significant and positive coefficient on our measure of aggregate real earnings management also indicates income-increasing real earnings management.

Table 5 shows that IPO firms in the UK engage extensively in real and accrual-based earnings management during the IPO year. Consistent with previous studies (e.g., Friedlan, 1994; Teoh et al., 1998a; Morsfield and Tan, 2006), we find evidence of significant positive discretionary accruals. IPO firms, therefore, manage earnings upward using accrual-based earnings management during the IPO year. However, we do not find evidence on accrual-based manipulation during the year prior to the IPO.¹⁵ In addition, Table 5 reports the median abnormal cash flows from operations during the IPO year is significant and positive. This is consistent with income-increasing real earnings management being undertaken.

Table 5 also shows that IPO firms do not manage earnings upward using discretionary expenses. For the sample as a whole, it would seem that firms are choosing accruals and sales based manipulations to manage earnings. The later analysis shows, however, that this result is composed of different forces when the sample is split into the AIM and Main markets.

Finally, examining the overall level of manipulation via real earnings management, Table 5 shows that the median aggregate measure of real earnings management during the IPO year is positive and statistically significant indicating that in aggregate, IPO firms are manipulating upwards using real earnings management.

Collectively, the results presented in Table 5 support our first hypothesis that IPO firms manage earnings upward utilizing both real and accrual-based earnings management techniques. Our accrual-based earnings management results are consistent with prior research that reports evidence on accrual earnings management during IPOs (see Teoh et al., 1998a; Fan, 2007; Chang et al., 2010). Further, our results show that IPO firms also engage in sales

¹⁵ There is a large body of evidence that explains the finding of no accrual-based earnings management in the year prior to the IPO. For example, IPO firms usually time their offerings to take advantage of hot markets (e.g., Ibbotson and Jaffe, 1975; Lowry and Schwert, 2002). This in turn may not allow sufficient time to undertake accrual-based manipulation and so any target could be missed (Roychowdhury, 2006). Moreover, Ball and Shivakumar (2008) indicate that IPO firms report more conservatively during the year prior to the IPO to improve the quality of their financial reporting, thereby meeting the market demand of high quality financial reporting during the IPO year.

manipulation during the IPO year. While prior research focuses on accrual manipulations around IPOs, we provide evidence to the literature that IPO firms engage in real activities during the IPO to manage earnings upward.

Table 6 shows the correlations between discretionary accruals, abnormal cash flows from operations, and abnormal discretionary expenses during the IPO year. Similar to prior research, we find a significant positive correlation between discretionary accruals and abnormal cash flows from operations (sales). This high positive correlation can be explained by IPO firms engaging in accrual-based and sales-based manipulations at the same time (Roychowdhury, 2006). In addition, the correlation coefficient between abnormal cash flows from operations and abnormal discretionary expenses is negative and statistically significant. This negative correlation is consistent with prior literature where a significant negative correlation between real earnings management activities has been found (e.g., Cohen et al., 2008; Cohen and Zarowin, 2010).

5.2 OLS Regressions of Earnings Management during IPOs under Different Regulatory Environments

We further test differences in real and accrual earnings management of IPO firms across the AIM and Main markets using the following OLS regression¹⁶:

$$EM = a + \gamma * Market.Listing + \beta * X + \varepsilon \tag{7}$$

Where (EM) is our different proxies for real and accrual earnings management during the IPO year and ($Market.Listing$) is a dummy variable equalling 1 if the IPO firms listed on AIM

¹⁶ Executive compensation is also a significant driver of earnings management (Cheng and Warfield, 2005). As a robustness test, we include directors' remuneration into the model as a control variable. This reduces our sample size by 50% as this variable (directors' remuneration) is not available for the whole sample. After including directors' remuneration as an explanatory variable, we find consistent evidence that IPO firms on the AIM market exhibit higher levels of accruals earnings management than IPO firms on the Main market. Further, we find the coefficient of directors' remuneration is positive and statistically significant at 10% level when the abnormal cash flows from operations is the dependent variable. This confirms the view that executives' equity compensation is associated positively with earnings manipulation (Cheng and Warfield, 2005). We also find a positive coefficient of directors' remuneration when both the aggregate measure of real earnings management and discretionary accruals are the dependent variable; however, the relation is not statistically significant.

market and zero for firms listed on the Main market. X represents a vector of control variables that are found to be associated with real and accrual earnings management.¹⁷

Following prior research (e.g., Teoh et al., 1998a; Fan, 2007; Cohen et al., 2008; Chi, et al. 2011), we control for the possible impact of a size effect by adding the natural logarithm of market value ($LnSize$) to the model, calculated as the offer price multiplied by the number of outstanding shares on the first day of listing.

Fan (2007) finds evidence that retained ownership is associated with earnings management during the IPO. Thus, we control for equity retention (*Retained Ownership*) measured as the percentage of retained ownership by insiders. We also control for profitability by adding a loss dummy (*Loss*) as prior evidence shows that firms that have reported a loss are more likely to manage earnings (e.g., Roychowdhury, 2006).

Further, as DeFond and Jiambalvo (1994) show, firms that have a higher level of debt have higher incentives to manage earnings; therefore, we control for leverage (*Lev*) measured as total debt_t/total assets_{t-1}. In order to control for growth opportunities, we include the book-to-market ratio (*BM*); calculated as the book value of equity divided by the market value of equity (e.g., Rangan, 1998; Teoh et al., 1998a; Roosenboom et al., 2003; Cohen and Zarowin, 2010).

Prior literature finds that IPO firms that are backed by venture capitalists or have a high profile underwriter have lower levels of real and accrual earnings management (e.g., Morsfield and Tan, 2006; Lee and Masulis, 2011; Wongsunwai, 2012). Therefore, we add venture capitalist (*VC*) and underwriter (*Underwriter*) dummy variables to control for the monitoring

¹⁷ In the above OLS regression we multiply abnormal cash flows from operations and abnormal discretionary expenses by -1. Thus, all our real and accrual earnings management proxies have the same directional interpretation. Further, we follow Gerakos et al. (2013) and use the percentile rank of all variables (dependent and independent) in our regression models to avoid the influence of outliers.

effect that these financial intermediaries may have on the earnings management activities of the firm.

In addition, we also control for audit quality as prior research has found evidence that higher quality auditors play a significant monitoring role in detecting and mitigating accrual-based earnings management (e.g., Becker, et al., 1998; Balsam et al., 2003; Krishnan, 2003) and that this effective monitoring of accrual-based earnings management leads firms to engage in a higher level of real earnings management (Cohen and Zarowin, 2010; Chi et al., 2011). We, therefore, control for auditor quality by adding (*Big N*) which is a dummy variable that equals 1 if the IPO firm's auditor is a Big N audit firm and zero otherwise¹⁸.

Finally, and following prior research which finds that effective corporate governance constrains real and accruals earnings management activities (e.g., Klein, 2002; Osma, 2008), we include controls for the governance structure of our sample of IPO firms. (*OutDirectors*) is measured as the percentage of outside directors on the board, (*BrdSize*) is the number of directors on the board, and (*Chrm/CEO*) is a dummy variable equalling 1 if the chairman of the board and the CEO is the same individual and zero otherwise.

Table 7 reports the results and presents evidence that IPO firms on the AIM market exhibit higher levels of abnormal cash flows from operations (sales) and accruals earnings management and lower levels of abnormal discretionary expenses than IPO firms on the Main market. Specifically, we find positive coefficients on our (*Market.Listing*) dummy variable of 0.100 (P <0.05) where abnormal cash flows from operations (sales) is the dependent variable and 0.097 (P<0.05) where discretionary accruals is the dependent variable. Further, we find a negative coefficient of -0.084 (p<0.10) on (*Market.Listing*) in the abnormal discretionary

¹⁸ The classification for audit firms as big 8, big 6, big 5, and big 4 has changed over time after a series of mergers to become the 'big 4' audit firms. Thus, an audit firm is classified as big N if it is considered as one of the big 4 audit firms, namely PricewaterhouseCoopers, Deloitte Touche Tohmatsu, Ernst and Young, and KPMG.

expenses regression. This evidence suggests that IPO firms on the AIM market exhibit a lower level of discretionary expenses manipulation than IPO firms on the Main market.

The results in Table 7 suggest, therefore, that the regulatory environment has an impact on the earnings management activities of IPO firms. In comparative terms, lighter regulation (AIM market) seemingly allows IPO firms to manage earnings by the relatively easy but transparent routes of accruals and sales based manipulations. Further, once these routes have been chosen there may be insufficient need to manage via discretionary expenses and there is also the added complication that if earnings are being managed upwards via sales manipulations, then to further manage earnings by reducing discretionary expenses is likely to attract the attention of auditors and underwriters. In contrast, Main Market IPOs have comparatively higher levels of earnings via discretionary expenses manipulation. While this route is likely to be more difficult to effect given the relative fixity of cost structures and R&D budgets as compared to sales targets, it is far less likely to attract attention than the manipulation of top line revenues and accruals.

5.3 Limitations

The goal of this paper is to examine how different regulatory environments affect the earnings management behaviour of IPO firms. However, the decision to list on the AIM or Main markets is not necessarily a random outcome as IPO firms choose the market on which they list. Consequently, it is possible that the set of IPO firms that choose either the AIM or Main markets for an IPO have the same characteristics, and it is these characteristics that explain the observed differences in real and accrual earnings management between the two markets. In this case, the residuals in Model 7 would be correlated with the listing choice of the firm (*Market.Listing*) and this in turn would introduce bias into the coefficient estimates of our regressions. To address the possibility of endogeneity, there are two commonly used methods

in the accounting literature, the propensity score matching approach of Rosenbaum and Rubin (1983) and the Heckman (1979) two-step approach.

With respect to propensity score matching, this should be applied to mitigate selection bias due to observables (Tucker, 2011). However, the decision to list on a particular market will be influenced by a wide range of unobservable factors, as the managerial information set goes beyond observable firm characteristics. Consequently, the propensity score matching approach is not appropriate.

For the Heckman two-step approach, the challenge is to identify a suitable instrument or instruments that meet the standard exclusion criteria to allow for the estimation of a probit model to generate the Inverse Mills Ratio. Although the Heckman two-step approach controls for unobservable factors, the need to identify suitable instruments creates a number of challenges within the current paper. First, it is not possible to find instrumental variables that explain the decisions to list and are wholly unrelated to our proxies of earnings management. As Lennox et al. (2012) show, there are a large number of accounting papers that misapply the Heckman two-step approach as they use inappropriate instruments. While variables that would be associated with the IPO decision, such as IPO proceeds or IPO firm age, are unlikely to be related to our proxies for real and accrual earnings management, it is not possible to rule out self-selection because of measurement errors across our different proxies. Moreover, the sensitivity of the Heckman approach, and the difficulties in finding suitable instruments, means that we could arrive at a model that ‘works’, but the decision to accept or reject self-selection bias is sensitive to the choice of instruments.

Another approach to addressing self-selection in this setting is to find an appropriate exogenous shock. Here, the aim is to find an external shock that breaks the correlation between size, age, etc. and listing choice, so that it is actually no longer a choice to list on a particular market. However, while there have been exogenous changes over our sample period,

such as the differential introduction of IFRS for the Main and AIM markets, this shock does not break the correlation between variables such as size, age, and listing choice. For example, having to comply with IFRS for Main market IPOs may affect the listing choice of some firms, however, it is unlikely to make the listing choice random in our sample, and so the choice of market remains.

Overall, while our main result is robust to a number of different tests, given the nature of the IPO firms in our AIM and Main samples, and the fact that appropriate testing for self-selection is not possible, our study is limited by the fact that self-selection cannot be ruled out.

6. Conclusions

In this paper, we undertake a comparative analysis of real and accrual earnings management around IPOs under different regulatory environments. We first present evidence that IPO firms engage in both real and accrual-based earnings management during the IPO year. Second, and most importantly, we show that IPO firms on the lightly regulated AIM market have higher levels of sales based and accrual based earnings management during the IPO compared to those firms that list on the more heavily regulated Main market. Further, IPO firms on the AIM market are found to exhibit lower levels of discretionary expenses based manipulation. Firms on the more lightly regulated AIM market seemingly have the option to manage earnings via relatively easy but transparent mechanisms, while Main market IPOs are seemingly restricted to the more difficult but less transparent route of manipulating expenses and R&D expenditures.

Overall, our findings show that the regulatory environment affects upon the accounting choices of managers. This paper, therefore, adds to the growing evidence (Roychowdhury, 2006; Zang, 2012; Cohen and Zarowin, 2010) that, first, earnings management research needs

to consider real and accrual-based manipulation and second, regulatory environment is an important factor that needs to be considered in future research.¹⁹

¹⁹ It is worth noting that recent research employed a two-stage model to examine the trade-off between real and accrual earnings management (Zang, 2012; Cohen and Zarowin, 2010). However, we are unable to apply such a test due to the data limitation concerning several variables that need to be incorporated into the empirical model. These variables capture the cost that is associated with utilizing real and accruals earnings management e.g. executives' compensation, the number of analysts following the firm, net operating assets, the length of operating cycle, the financial health of the firm proxied by Altman's Z-score, the number of times that the firm meets or beats analysts' earnings forecasts in the previous four quarters, etc.

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Table 1. Differences in admission criteria and continuing obligations for the AIM and Main Markets of the London Stock Exchange

<u>Aim Market</u>	<u>Main Market</u>
No minimum market capitalization	Minimum market capitalization
No trading record requirement	Normally 3-year trading record required
No prescribed level of shares to be in public hands	Minimum of 25% of shares held publically
No prior shareholder approval for most transactions	Prior shareholder approval required for substantial acquisitions and disposals (premium listings only)
Nominated Adviser required at all times	Sponsors needed for certain transactions (premium listings only)
Admission documents not pre-vetted by the Exchange or by the UKLA in most circumstances. The UKLA will only vet an AIM admission document where it is also a Prospectus under the Prospectus Directive	Pre-vetting of prospectus

This table reports the differences in admission criteria and continuing obligations for the AIM and Main markets.²⁰

²⁰ Source: A Guide to AIM, page 6. Available at: <http://www.londonstockexchange.com/home/homepage.htm>

Table 2. Descriptive statistics for sample IPO firms during 1998-2008

	Total assets (£m)	Net income (£m)	Market value (£m)	Money raised (£m)
Panel A: Whole sample (n=571)				
Mean	56.12	1.93	113.93	43.41
Median	4.47	-0.03	25.11	7.00
Std. deviation	233.90	25.38	302.19	136.22
Minimum	0.07	-124.1	1.44	0.14
Maximum	1969.10	397.47	2020.68	1499.85
Panel B: AIM sample (n=433)				
Mean	15.99	-0.15	27.73	10.82
Median	2.73	-0.09	17.83	5.00
Std. deviation	102.53	5.30	32.67	26.43
Minimum	0.07	-12.61	1.44	0.14
Maximum	1969.10	74.25	183.06	388.97
Panel C: Main sample (n=138)				
Mean	182.06	8.47	384.40	145.65
Median	29.86	1.75	151.80	53.21
Std. deviation	416.43	50.35	528.58	247.21
Minimum	0.07	-124.1	6.11	0.55
Maximum	1969.10	397.47	2020.68	1499.85

Table 2 presents sample descriptive statistics for the pooled (Panel A), AIM (Panel B), and Main Market (Panel C) IPO firms over the period 1998-2008. Column 1 presents total assets, which are the beginning of period total assets; Column 2 presents end of period net income; Column 3 presents the market capitalization for IPO firms immediately after the listing; Column 4 presents the money raised from the IPO. Total assets and net income are obtained from the WorldScope database; market value and money raised are obtained from the London Stock Exchange website.

Table 3. Annual IPO Frequency 1998-2008

Year	AIM Market		Main Market		Whole Sample	
	<i>Freq</i>	%	<i>Freq</i>	%	<i>Freq</i>	%
1998	14	3.23	21	15.22	35	6.13
1999	16	3.70	13	9.42	29	5.08
2000	59	13.63	44	31.88	103	18.04
2001	39	9.01	4	2.90	43	7.53
2002	24	5.54	11	7.97	35	6.13
2003	19	4.39	4	2.90	23	4.03
2004	84	19.40	13	9.42	97	16.99
2005	85	19.63	9	6.52	94	16.46
2006	61	14.09	9	6.52	70	12.26
2007	30	6.93	10	7.25	40	7.01
2008	2	0.46	-	-	2	0.35
Total	433	100	138	100	571	100

Table 3 presents the frequency of IPO firms by year over the period 1998-2008. Columns 1 and 2 show the number and frequency of IPOs on AIM, Columns 3 and 4 show the number and frequency of IPOs on the Main Market, and Columns 5 and 6 show the number and frequency of IPOs on both AIM and Main.

Table 4. Industry distribution of IPOs 1998-2008

Industry	2-digit SIC	AIM Market		Main Market		Whole Sample	
		Freq	%	Freq	%	Freq	%
Oil and gas extraction	13,29	20	4.62%	6	4.35%	26	4.55%
Food products	20	8	1.85%	3	2.17%	11	1.93%
Paper and paper products	24-27	14	3.23%	1	0.72%	15	2.63%
Chemicals products	28	28	6.47%	9	6.52%	37	6.48%
Manufacturing	30-34	11	2.54%	-	0.00%	11	1.93%
Computer equipment and servicing	35,73	143	33.02%	55	39.86%	198	34.67%
Electronic equipment	36	28	6.47%	8	5.80%	36	6.30%
Transportation	37,39,40-42,44,45	4	0.92%	1	0.72%	5	0.88%
Scientific instruments	38	15	3.46%	7	5.07%	22	3.85%
Communications	48	20	4.62%	7	5.07%	27	4.73%
Electric, gas, and sanitary services	49	9	2.08%	1	0.72%	10	1.75%
Durable goods	50	7	1.62%	4	2.90%	11	1.93%
Retail	53, 54, 56, 57, 59	8	1.84%	8	5.80%	16	2.80%
Eating and drinking establishments	58	13	3.00%	2	1.45%	15	2.63%
Entertainment services	70,78, 79	32	7.39%	5	3.62%	37	6.48%
Health	80	4	0.09%	2	1.45%	6	1.40%
All others	-	69	15.93%	19	13.77%	88	15.41%
Total		433	100.00	138	100.00	571	100.00

Table 4 presents the frequency of IPO firms by industry over the period 1998-2008. Columns 1 and 2 present the industry grouping and 2-digit SIC code. Columns 2 and 3 show the number and frequency by industry of the IPOs on AIM, Columns 5 and 6 show the number and frequency by industry of the IPOs on the Main Market, and Columns 7 and 8 show the number and frequency by industry of the IPOs on both AIM and Main.

Table 5. Time-series profiles of accrual and real earnings management

Year	-2	-1	0
<i>Discretionary accruals</i>			
Median	0.007	0.007	0.018***
Mean	-0.099	-0.051	0.022
<i>Abnormal cash flows from operations (Sales)</i>			
Median	-0.014	0.009	0.037***
Mean	-0.167	0.065	0.061**
<i>Abnormal discretionary expenses</i>			
Median	-0.011	-0.010	0.023
Mean	0.125	-0.088	0.031
<i>Aggregate real earnings management</i>			
Median	0.035	0.013	0.073***
Mean	-0.042	-0.023	0.092***
N	98	159	571

Table 5 presents the time-series profiles of median and mean discretionary accruals, abnormal cash flows from operations, abnormal discretionary expenses and aggregate real earnings management (Column 1) for the pooled sample over the period two years prior to the IPO year (Columns 2 and 3) and the IPO year Column 4. The IPO year is year 0. To avoid the influence of outliers all continuous financial data are Winsorized at 1% and 99%. *Discretionary current accruals* are estimated using the corrected version of the modified Jones (1991) model. *Abnormal cash flows from operations* and *Abnormal discretionary expenses* are estimated using models developed by Dechow et al. (1998) and as implemented by Roychowdhury (2006). Abnormal cash flows from operations and abnormal discretionary expenses are multiplied by minus one to allow real and accrual earnings management proxies to have the same interpretation. The aggregate measure of real activities (*Aggregate real earnings management*) is the sum of abnormal cash flows from operations and abnormal discretionary expenses. Differences in medians are tested using the Wilcoxon Signed Rank test and differences in means are tested using t-tests. *, **, *** denote significantly different from zero at the 10 percent, 5 percent, and 1 percent levels, respectively (two-tailed)

Table 6. Correlation matrix of earnings management proxies

	Discretionary accruals	Abnormal cash flows from operations (Sales)	Abnormal Discretionary expenses	Aggregate real earnings management
Discretionary accruals	1	0.679***	-0.167***	0.386***
Abnormal cash flows from operations (Sales)	0.681***	1	-0.431***	0.379***
Abnormal Discretionary expenses	-0.215***	-0.425***	1	0.670***
Aggregate real earnings management	0.327***	0.313***	0.610***	1

Table 6 presents Pearson (above the diagonal) and Spearman (below the diagonal) correlations between earnings management proxies during the IPO year for the sample of initial public offerings over the period 1998-2008. All other variables are previously as defined. *, **, *** denote significantly different from zero at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 7. Regressions of real and accrual earnings management under different regulatory environment

	Aggregate real earnings management	Abnormal cash flows from operations	Abnormal discretionary expenses	Discretionary accruals
Market.Listing	-0.034 (-0.765)	0.100** (2.485)	-0.084* (-1.904)	0.097** (2.203)
LnSize	-0.051 (-0.766)	0.215*** (3.428)	-0.196*** (-2.977)	0.182*** (2.749)
Retained Ownership	-0.071 (-1.608)	-0.032 (-0.777)	-0.016 (-0.375)	-0.015 (-0.333)
Loss	0.127*** (4.456)	0.254*** (9.450)	-0.092*** (-3.088)	0.133*** (4.531)
Lev	0.056 (1.339)	0.070* (1.772)	-0.003 (-0.061)	0.076* (1.779)
BM	0.163*** (3.685)	0.008 (0.198)	0.142*** (3.259)	0.149*** (3.238)
VC	-0.035 (-1.087)	-0.047 (-1.565)	-0.010 (-0.303)	-0.024 (-0.753)
Underwriters	-0.041 (-1.195)	0.022 (0.681)	-0.062* (-1.784)	0.004 (0.107)
Big N	-0.079** (-2.369)	0.027 (0.913)	-0.084** (-2.567)	-0.026 (-0.763)
OutDirectors	0.022 (0.486)	-0.070 (-1.633)	0.072 (1.579)	-0.014 (-0.309)
BrdSize	-0.058 (-1.266)	0.007 (0.157)	-0.048 (-1.004)	-0.048 (-1.032)
Chrm/CEO	0.002 (0.043)	0.024 (0.565)	-0.057 (-1.094)	0.005 (0.108)
Constant	0.417*** (2.980)	0.091 (0.707)	0.838*** (6.172)	0.055 (0.393)
Year and industry dummies	Yes	Yes	Yes	Yes
N	570	570	570	570
Adj.R²	0.105	0.200	0.136	0.091

Table 7 reports the results of regressions of real and accruals earnings management proxies on the regulatory environments. The dependent variable is our proxies of real and accruals earnings management, while the main independent variable of interest is (*Market.Listing*), a dummy variable = 1 if the IPO firms listed on the AIM market and 0 if the IPO firms listed on the Main market, (*LnSize*) is the natural logarithm of market value, (*Retained Ownership*) is measured as the percentage of retained ownership by insiders, (*Loss*) = 1 if the firm reported a loss during the IPO year and 0 otherwise, (*Lev*) is a leverage ratio that is measured as total debt_{*it*} / total assets_{*it+1*}, (*BM*) is the book-to-market ratio calculated as the book value of equity divided by the market value of equity, (*VC*) = 1 if the firm is backed by a venture capitalist and 0 otherwise, (*Underwriters*) = 1 if the IPO is underwritten by a prestigious underwriter and 0 otherwise, (*Big N*) = 1 if the firm is audited by a big N auditor and 0 otherwise, (*OutDirectors*) is the percentage of outside directors on the board, (*BrdSize*) is the number of directors on the board, (*Chrm/CEO*) is a dummy variable equalling 1 if the Chariman and the CEO is the same director and zero otherwise.

*, **, *** Denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. Robust *t*-statistics (appear in parentheses) are clustered at the firm level as suggested by Petersen (2009).