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Real and accrual earnings management and IPO failure risk

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This paper analyses the relationship between real and accrual earnings management activities and IPO failure risk. While the association between accrual earnings management and IPO failure has been researched in a limited setting, to date, there has been no work that analyses the impact of real activities-based manipulation on the probability of IPO failure. Based on a sample of 570 UK IPO firms that went public over the period 1998–2008, we find evidence that IPO firms manipulate earnings upward utilising real and accrual earnings management during the IPO year. We also find that IPO firms with high levels of real and/or accrual earnings management during the IPO year have a higher probability of IPO failure and lower survival rates in subsequent periods. In addition, we find that IPO firms experience a higher probability of IPO failure and lower survival rates in the post-IPO period when greater real earnings management takes place during the IPO as compared to accrual earnings management. While our work contributes to the growing literature on real and accrual earnings management around IPOs, the majority of our failed IPO events are from the Alternative Investment Market and occur during the financial crisis. Future research, therefore, should consider whether these results are generalisable to more developed firms and less turbulent economic environments.

Keywords: initial public offerings; IPO failure; earnings management; real activities; accounting accruals; accounting choices

1. Introduction

The failure of an IPO is an important event in markets and has significant consequences not just for the IPO firm, but also for other market participants, such as investors, lenders and financial institutions. Fama and French (2004) document that the survival rates of IPO firms sharply declined in the 1980s and 1990s due to the changing characteristics of IPO firms. IPO firms are now characterised by low profitability and high growth that are both driven by the lower cost of equity in the market. Consistent with the importance of IPOs and the impact of their failure, prior research has investigated several factors that are associated with the survivability of IPOs, such as the presence of venture capitalists (VC) (Jain and Kini 2000), prestigious

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underwriters (Schultz 1993), prestigious auditors and an audit report (Willenborg and McKeown 2000, Weber and Willenborg 2003, Jain and Martin 2005), and under-pricing, size and firm age (Hensler et al. 1997). Despite the increased interest in IPO failure research, just one paper (Li and Zhou 2006) has examined whether accrual earnings management is associated with IPO failure risk and survivability.

In this paper we extend the literature by analysing the consequences of real (in addition to accrual) earnings management on the probability of IPO failure and survivability in subsequent periods. Prior literature has found that IPO and seasoned equity offering (SEO) firms manipulate earnings upwards utilising real and accrual earnings management around the offer year (Aharony et al. 1993, Friedlan 1994, Rangan 1998, Teoh et al. 1998a, 1998b, DuCharme et al. 2001, Elder and Zhou 2002, Roosenboom et al. 2003, Gramlich and Sorensen 2004, Chen et al. 2005, Morsfield and Tan 2006, Chang et al. 2010, Ahmad-Zaluki et al. 2011, Lee and Masulis, 2011, Wongsunwai 2012). IPO firms have very strong incentives to manipulate reported earnings upward at the end of the IPO year to maintain high stock prices. Teoh et al. (1998a) indicate that the lock-up restriction on managerial share selling post-IPO, avoiding future litigation risks due to an abnormal reduction in stock prices post-IPO, executive compensation and meeting earnings forecasts are among the strong incentives to manage earnings upward at the end of the IPO year. However, prior literature also shows that real and accrual earnings management have severe negative consequences for post-IPO and SEO stock returns and operating performance (Rangan 1998, Teoh et al. 1998a, Roosenboom et al. 2003, Fan 2007, Cohen and Zarowin 2010, Kothari et al. 2012).

Although the relationship between accrual earnings management and IPO failure and survival rates has been recently examined (Li and Zhou 2006), no study to date has examined the effect of real activities-based manipulation on the probability of IPO failure and survivability in subsequent periods. Real earnings management activities have been found to have severe negative consequences for subsequent stock returns and operating performance, and the consequences have been found to be greater than the consequences of accrual earnings management (Cohen and Zarowin 2010, Kothari et al. 2012). There is a growing body of research that shows that firms engage extensively in real earnings management (Roychowdhury 2006, Cohen et al. 2008, Gunny 2010, Zang 2012), notably during the IPO year to manage reported earnings upward (Darrough and Rangan 2005, Singer and Fedyk 2011, Wongsunwai 2012).

While accrual-based earnings management occurs within the bounds of Generally Accepted Accounting Principles and has no consequences for cash flows, manipulating real activities represents managerial decisions that have direct consequences for the current and future cash flows of the firm (Roychowdhury 2006). Prior literature indicates that managers prefer to engage in the manipulation of real activities rather than accrual-based activities for the following reasons. First, real earnings management is less susceptible to the scrutiny of regulators and auditors, while high levels of accrual manipulation are likely to be detected and discovered by auditors and regulators (Graham et al. 2005). Second, accrual earnings management occurs at the end of the fiscal year or at the end of a quarter, while real earnings management occurs throughout the year. If managers decided to manage earnings solely using accrual-based manipulation, and the amount being manipulated fell short of the desired threshold, there may be insufficient time to utilise real earnings management during the rest of the year (Roychowdhury 2006). Finally, the balance sheet accumulates all the prior changes of accounting methods (Barton and Simko 2002). Therefore, firms that utilised accrual earnings management extensively in previous years are likely to switch to manipulating real activities in the current period, if they have a continued motivation to manipulate earnings (Gunny 2010).

Overall, we expect, therefore, IPO firms with high levels of real and/or accrual earnings management during the IPO year to have an increased probability of failure and lower survival rates in
subsequent periods. Moreover, we expect where higher levels of real activities manipulation occur, that this will further lead to a higher probability of IPO failure and to a lower survival rates relative to higher levels of accrual earnings management. Consistent with these hypotheses, we find evidence that IPO firms manage earnings upward by manipulating both real activities and accruals during the IPO year, and that IPO firms with high levels of real and/or accrual earnings management during the IPO year, have a higher probability of failure and lower survival rates in subsequent periods. Further, we find that real activities-based manipulation is associated with a higher probability of IPO failure and lower survival rates in the subsequent periods compared to accrual-based manipulation that takes place during the IPO year. This finding is consistent with recent literature that shows that real and accrual earnings management activities are negatively associated with subsequent performance, and that real activities have more severe negative consequences for future operating and return performance compared to accrual-based manipulation (Cohen and Zarowin 2010, Kothari et al. 2012). However, extrapolating our results to the Main Market of the London Stock Exchange should be undertaken with caution as the majority of our IPO sample list on Alternative Investment Market (AIM). Specifically, 213 out of the 317 IPOs delisted from AIM, with 49 out of 60 doing so for negative reasons, while 193 out of the 253 IPOs that survive listed on the AIM market.

This study contributes to the earnings management literature by providing a more complete picture of how real and accrual earnings management are associated with IPO failure and survival. First, to the best of our knowledge, ours is the first study to examine whether real activities-based manipulation, which takes place during the IPO year, is associated with IPO failure and survival post-IPO. By using models developed by Roychowdhury (2006) and as applied by Cohen et al. (2008), Cohen and Zarowin (2010), Wongsunwai (2012) and Zang (2012), this study estimates real activities-based manipulation (sales-based and discretionary expenses-based) to measure real earnings management that takes place during the IPO year. Thus, this study shows exactly which type of real activity has been manipulated during the IPO year to manage earnings upwards, and shows how this manipulation impacts IPO failure/survival.

Second, this study is the first to consider both real activities-based and accrual-based manipulations that occur during the IPO year to provide a more comprehensive view of earnings management and IPO failure. Prior research presents an incomplete picture of this association; for example, Li and Zhou (2006) only examine the association between accrual manipulation and IPO failure. Recent literature shows that firms simultaneously manage real activities and accruals to manipulate earnings upwards, and that real activities-based manipulation has a greater negative impact on future operating and return performance compared with accruals-based manipulation (Cohen and Zarowin 2010, Kothari et al. 2012). Thus, this study presents the first evidence that compares the relative impact of real activities manipulation and accrual earnings management on the probability of IPO failure and survival in the subsequent periods.2

Third, our findings have important economic consequences given that most of our IPOs sample is from the AIM market, which is designed to fit the needs of small and medium-size firms and, therefore, increases the growth in the economy. Our results show that the AIM market experiences a higher probability of failure and a lower likelihood of survival due to earnings management, and as such will have a negative impact on economic growth. Therefore, market regulators should pay close attention to mitigate and prevent such earnings management activities.

We examine the UK for at least two reasons. First, Ball and Shivakumar (2008) found that firms listing in the UK tend towards earnings conservatism based on their prospectuses and annual reports prior to listing. However, Lo (2008) stated that the conclusion of ‘no earnings management’ might not hold. This is because as Ball and Shivakumar (2008) only considered accrual earnings management it cannot be discounted that real earnings management is being undertaken.
In addition, Ball and Shivakumar (2008) used a restrictive sample selection process such that their results may not be generalisable to all UK listings. Moreover, recent evidence by Gerakos et al. (2013) finds that IPO firms on AIM suffer from poor stock returns, but again this paper only considers accrual earnings management. As a result of the mixed evidence as to whether UK firms manipulate their earnings around an IPO, we examine both real and accrual earnings management and their impact on IPO failure and survivability.

Second, the UK is a useful setting in which to examine real and accrual earnings management around IPOs more generally. London is one of only two truly global financial centres in the world, and is the largest in Europe. In addition, London attracts the largest share of IPO activity of any single market in Europe, with it attracting 35% of all IPOs in Europe over the period 1995–2010.3 Furthermore, as Vismara et al. (2012) state, the success of the AIM market in the UK has led to other EU economies creating second markets for small firms along similar lines. However, of the 11 markets created, there are only three other significant markets for small firms in Europe that exist today, and these markets have not attracted large numbers of IPOs over the period in question (Vismara et al. 2012). Finally, by focusing on only one country, it gives a natural control for the listing requirements, and the bankruptcy and insolvency laws that firms would be subjected to in the event of failure. As such, we, therefore, have a cleaner test of the impact of real and accrual earnings management on IPOs.

The study proceeds as follows. Section 2 reviews the related literature, offers an underpinning theoretical framework and presents our hypotheses. Section 3 discusses our empirical methodology. Section 4 presents the sample selection process and descriptive statistics. Section 5 presents our empirical evidence on the use of real and accrual earnings management around IPOs and its impact on IPO failure. Section 6 presents additional analysis and Section 7 concludes.

2. Theoretical framework, literature review and hypotheses development

In developing our hypotheses and predictions for the relationships we expect between real and accrual earnings management and IPO failure, we need a theoretical foundation to underpin our work. It is common within the earnings management literature to use agency theory and incomplete contracting to motivate earnings management research in accounting (see, e.g. Warfield et al. 1995; Darrough and Rangan 2005, Wongsunwai 2012). In a ‘positive’ agency setting, conflicts between managers and shareholders, and shareholders and debt holders exist due to incomplete contracting (Jensen and Meckling 1976). However, agency theory as a theoretical foundation for earnings management is not wholly appropriate in every situation. Moreover, as Walker (2013, p. 450) states ‘At a minimum, whenever researchers claim to find strong evidence of EM, they should try to explain their results in terms of a breakdown in one or more of the assumptions of the Revelation Principle’.

The Revelation Principle for earnings management states that managers will not be able to benefit from earnings management if a number of perfect market conditions hold (Walker 2013). First, there needs to be perfect and costless contracting and contract enforcement. Whereby, there are complete contracts between principals and agents and that these contracts can be continuously enforced. Second, there is perfect Bayesian rationality concerning managers and investors, and so each group is fully rational and utility wealth maximising. Third, there exists common knowledge, such that everyone involved understands the structure of the game and the quality of managerial information is known to everyone. Fourth, managerial communication is costless, and, therefore, has no third party effects and so any communication is achieved with zero cost.

One of the first studies to identify the Revelation Principle, and its relevance to earnings management, was Dye (1988) who stated that it ‘is a nemesis to the study of earning management’
(Dye 1988, p. 200). However, as Arya et al. (1998, 2003) show, if one or more of the key assumptions underpinning the Revelation Principle is relaxed, then, earnings management is no longer irrelevant. Within the context of IPOs, there is a large amount of literature to suggest that the condition of common knowledge does not hold. Moreover, an IPO is an ideal example of an ‘overlapping generations’ scenario as illustrated by Dye (1988) and is a setting where the existence of limited commitment as described by Arya et al. (1998) may also be present.

Consistent with the need to identify conditions that violate the assumptions of the Revelation Principle to explain the existence of earnings management, there is a large amount of empirical research to suggest that at IPO common knowledge does not exist, and that managers are permitted to manipulate earnings to improve the likelihood of a successful IPO. The IPO process, for example, involves a large number of participants (many of whom will be unknown to each other before the IPO) who may not fully understand the structure of the game, and the quality of managerial information may not be known to everyone. One key part of the IPO process is information gathering and sharing, and this suggests that knowledge is far from common. Further, the participants in the IPO process come from different professional backgrounds and have different levels of experience and financial skills. Therefore, it seems probable that at IPO differential levels of information will exist between the IPO firm, banks, underwriters, entrepreneurs and investors (Ritter and Welch 2002). If there are differences in common knowledge, between managers and investors for example, then this could lead to an adverse selection problem for investors, if managers are overly optimistic about the firm’s revenue (Bruton et al. 2009). On the face of it, this seems like a standard agency conflict proposition; it is, however, a more complex violation of the Revelation Principle as managers are overstating earnings to benefit one generation of shareholders over a future generation, consistent with the model of Dye (1988) and Arya et al. (1998).

The IPO setting is analogous to an ‘overlapping generations’ situation as modelled by Samuelson (1958), as there is a partial transfer of ownership from one generation of investors to another via the stock market. In this setting, the demand for earnings management results from the current owners of the firm wishing to impress the next generation of investors based on the past performance of the firm (Dye 1988). In addition, as Arya et al. (1998) highlight, managers generally have ‘at-will’ contracts where the exact conditions for resignation by the manager cannot be known, nor can the exact conditions in which a manager will be dismissed. As a result, managers may overstate earnings to benefit one generation of shareholders at the cost of another generation. This occurs as the current generation of owners wish to make the firm attractive to the next generation of shareholders, and so managers are allowed by the current owners to undertake earnings management. Moreover, from the perspective of managers a successful IPO and firm listing is important, as it secures their future employment prospects with the newly listed firm. In particular, this will change their labour market profile as they are involved in running a public company, and they will also benefit from the types of remuneration package that exist in listed companies, but not in private firms.

IPOs are, for many investors and managers, the first occasion where they can access a substantial cash return on their investment in the firm, whether financial or through time and effort in building and growing a successful firm (Bruton et al. 2009). As such, the IPO is an ideal setting for limited commitment as described by Arya et al. (1998) to impact on the behaviour of managers, as managers have contracts that are not continuously enforceable, and the exact conditions for dismissal are unknown ex-ante. Moreover, the cost of enforcement of the employment contract across generations of shareholders is high. In the IPO setting, limited commitment and ‘at-will’ employment contracts are efficient from the perspective of the managers and the financial backers of the private firm, as earnings management is desirable. By allowing earnings management to occur, this will increase the value of the issue, through a combination of price and take-up
of the issue. A successful IPO will allow sufficient finance to expand the firm going forward and to realise a return on their investment. Such an effect would in part explain why managers at an IPO often leave ‘money on the table’ on the day of the IPO (Loughran and Ritter 2002). If the ‘at-will’ contract of managers permits earnings management to ensure full subscription of the IPO, then the goal is not to achieve the ‘correct’ price reflecting the long-term value of the firm. The goal is to generate sufficient interest from a new generation of shareholders to maximise the value to the current owners of the (private) firm by ensuring a full subscription. If the subsequent long-term performance of the share is below the expectations of the new investors, that is, they have overpaid, then this is a clear case of managing earnings to the benefit of one generation of owners and investors at a cost to another. Such a scenario is a clear violation of the Revelation Principle, as there is imperfect contracting and differential knowledge between the current generation of investors and the incoming generation of shareholders in the newly listed company.6

It is with this theoretical underpinning to our work and prior empirical evidence that we now set out our hypotheses concerning both real and accrual earnings management around IPOs and the impact of such on the probability of IPO failure.

2.1. Real and accrual earnings management around IPOs

Prior literature finds evidence that IPO firms engage in accrual manipulation to increase reported earnings around the IPO (Aharony et al. 1993, Friedlan 1994, Teoh et al. 1998a, 1998c). In addition to presenting evidence that IPO firms engage in accrual earnings management during IPOs, research has also shown that IPO firms who engage in such activities experience a decline in stock returns in the period following the IPO. Teoh et al. (1998a), for example, find US IPO firms utilise accrual earnings management to manipulate reported earnings during the IPO year, and that declines in post-IPO stock returns were the greatest, where the level of accrual earnings management was the highest. Consistent with this, Roosenboom et al. (2003) show that Dutch IPO firms with high levels of accrual-based earnings management experience declines in stock returns in the year following the IPOs.

Other studies have, however, questioned 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 artefact of the mispricing of operating cash flows. Ball and Shivakumar (2008) meanwhile examine accruals accounting during the year pre IPO for 171 UK IPOs, which have similar information and characteristics in the financial reports and the prospectuses, over the period 1995–1999. Ball and Shivakumar (2008) present evidence 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) points out the possibility that Ball and Shivakumar (2008) may exclude the IPO firms that managed earnings because their sample is restricted to firms that present similar information and categorisation 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 that 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, as Lo (2008) notes, IPO firms may manage earnings by undertaking real earnings management rather than accrual earnings
management. As a result, the conclusion of Ball and Shivakumar (2008) of no earnings management may not hold.

Despite the extensive research on accrual earnings management and IPOs, there has been little research examining whether IPO firms engage in manipulating real activities. Darrough and Rangan (2005) for example show IPO firms reduce research and development (R&D) expenses during the IPO year to increase reported earnings. They find that the reduction in R&D is motivated by managerial share selling as managers believe investors place greater emphasis on current earnings. Consistent with this view, Graham et al. (2005) provide evidence that executives are more willing to undertake real as opposed to accrual earnings management to manipulate reported earnings. The results of their survey show that 80% of the executives surveyed admitted to engaging in the manipulation of real activities such as reducing R&D, advertising, and maintenance expenses to meet earnings targets. Over 50% of executives also expressed a willingness to postpone starting a new project as long as the impact on economic value was not too large. More recently, Cohen and Zarowin (2010) find evidence that firms undertaking an SEO engage in real earnings management. In addition, they show that the decrease in post-SEO performance where the manipulation of real activities has taken place is greater than the decline in operating performance due to accrual management. Compared to accrual-based manipulation, real earnings management is harder for auditors, regulators, investors, etc. 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 utilise accrual earnings management for the current year because the balance sheet accumulates all the previous changes of 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 accrued 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 at this time of the year to meet the earnings target. Consistent with this, Zang (2012) finds managers engage in real earnings management activities throughout the fiscal year and accrual earnings management is utilised at the end of the fiscal year to adjust earnings to meet the desired threshold. A recent paper by Cohen and Zarowin (2010) finds that SEO firms engage simultaneously in real and accrual earnings management during the offering year, while prior literature focused extensively on accrual-based manipulation around the SEO year.

Bringing together the existing empirical evidence and our theoretical framework, we have the prediction that managers will manage earnings around the IPO as they are allowed to do so by the current owners of the firm. Earnings management in this situation maximises the likelihood of a successful IPO and allows the current generation of investors to realise a return on their investment through the IPO by ensuring a future generation of shareholders invests. Moreover, as a successful IPO improves the managers’ status and wealth, they are also predicted to benefit from ensuring a full subscription and will, therefore, manage earnings to achieve this goal. Based upon the balance of empirical evidence, and the clear theoretical predictions as to why earnings management would be expected at IPO, we examine if IPO firms engage in real and accrual earnings management around the IPO. Our first hypothesis is, therefore, as follows:7

H1: IPO firms in the UK exhibit evidence of accrual-based and real activities-based manipulations during the IPO year.
2.2. Earnings management and IPO failure risk

Our second objective is to examine the effect of real and accrual earnings management on the probability of future failure risk. We, therefore, present prior evidence on earnings management and failure and set out three separate hypotheses to capture the different elements of failure risk and survivability that we expect to occur. As the IPO setting violates the Revelation Principle for earnings management, we expect the observed levels of earnings management to vary from being conservative, where the IPO has a high likelihood of success, to IPOs where managers will undertake much more aggressive levels of earnings management to maximise the likelihood of a successful listing. As a result, where managers are more aggressive in their use of earnings management, we predict that this increases the probability of failure after the listing of the firm. We now provide evidence from prior empirical studies to set out our hypotheses for an increased probability of failure and lower rates of survivability where higher levels of earnings management occur.

Prior research shows that real and accrual earnings management, which occur during the offer year, have negative consequences for post-IPO and SEO operating and returns performance (Rangan 1998, Teoh et al. 1998a, 1998b, 1998c, DuCharme et al. 2001, Roosenboom et al. 2003, Gramlich and Sorensen 2004, Morsfield and Tan 2006, Fan 2007, Chang et al. 2010, Cohen and Zarowin 2010, Kothari et al. 2012). For example, Teoh et al. (1998a) find that IPO firms that engage in accrual earnings management during the IPO year experience post-IPO stock returns underperformance. Moreover, by comparing post-IPO returns underperformance across their IPOs sample, Teoh et al. (1998a) show that the greatest underperformance occurs for IPO firms with the highest level of accrual manipulation during the IPO year. Roosenboom et al. (2003) and Fan (2007) also find similar evidence that IPO firms with the highest level of accrual manipulation during the IPO experience a decline in post-IPO performance.

Rangan (1998) meanwhile finds that SEO firms that manage accruals upward during the offer year experience inferior post-SEO operating and returns performance. Teoh et al. (1998b) focus on accrual accounting during the year prior to the SEO and find evidence that SEO firms inflate reported earnings utilising accrual earnings management. Teoh et al. (1998b) also find that the level of accruals prior to the offer year predicts post-SEO return underperformance. More recently, Cohen and Zarowin (2010) examine both real and accrual earnings management activities for SEO firms and find evidence of earnings manipulations during the offer year. Cohen and Zarowin (2010) also find that real and accrual earnings management, which takes place during the offer year, have negative consequences for post-SEO operating performance and that real activities have the most severe negative consequences. Kothari et al. (2012) examine the effect of real and accrual earnings management activities for post-SEO returns performance and find similar evidence to Cohen and Zarowin (2010). Consistent with this, Kothari et al. (2012) find evidence that SEO firms manage earnings upward during the offer year utilising real and accrual earnings management, and real earnings management activities have the most severe negative consequences for post-SEO stock returns.

Thus, if both real and accrual earnings management activities have severe negative consequences for future operating and returns performance, then it is more likely that these activities will be associated with a higher probability of failure in the following periods. Consistent with this view, Li and Zhou (2006) examine whether IPO firms that manage accruals upward during the IPO year have a higher probability of performance failure in the following periods. Li and Zhou (2006) find evidence that IPO firms with high levels of accrual manipulation during the offer year have a higher probability of delisting from the stock exchange for negative reasons in the following periods. Moreover, Li and Zhou (2006) find firms with high levels of accrual
earnings management during the IPO year survive for a shorter time than other IPO firms in the following periods.

Other research has examined further factors that are related to IPOs. For example, Willenborg and McKeown (2000) examine the association between the auditor report and IPO failure and find evidence that IPO firms with an audit qualification about going-concern during the IPO have a higher probability of delisting from the stock exchange for negative reasons within two years of listing. Further, Weber and Willenborg (2003) find evidence that big N audit firms screen out risky firms when they choose their clients, and that big N auditor reports on smaller IPO firms are more predictive of post-IPO negative delisting. Demers and Joos (2007) present evidence that for high-tech IPO firms, the presence of high-quality auditors in the year prior to the IPO year, is associated with a lower probability of IPO failure. While for both high-tech and non-tech firms they find a higher degree of leverage and lower IPO offer prices during the year prior to the IPO year are associated with a higher probability of IPO failure.

We, therefore, expect IPO firms that have higher levels of accrual-based and real activities-based manipulations during the IPO year to have a higher probability of failure in the subsequent periods. Our second hypothesis is as follows:

H2a: IPO firms that report high levels of real and/or accrual earnings management during the IPO year, ceteris paribus, will have a higher probability of failure in the post-IPO periods.

Our third objective is to conduct a survival analysis to examine whether real and accrual earnings management, which occurs during the IPO year, is associated with IPO survivability in the subsequent periods. Survival analysis has been used extensively in prior studies to examine whether IPO firm characteristics are associated with IPO survivability (Hensler et al. 1997, Jain and Kini 2000, Chadha 2003, Fama and French 2004, Jain and Martin 2005, Li and Zhou 2006, Carpentier and Suret 2011, Gerakos et al. 2013, Espenlaub et al. 2012). For example, by conducting survival analysis Jain and Kini (2000) find that IPO firms backed by VCs have a higher probability of survival in the following years than non-VC backed IPOs.

In addition, Fama and French (2004) examine the characteristics of IPO firms that went public over the period 1973–2001. They find evidence that the survival rate for IPO firms has sharply declined due to the changing characteristics of firms that go public over time, which are characterised by lower profitability and higher growth. They suggest that these changes in the characteristics of IPO firms are a consequence of the lower cost of equity in the market. Similarly, for the UK, Gerakos et al. (2013) find evidence that firms listed on the AIM, which in general have lower profitability/higher growth, have higher failure rates compared with firms listed on the Main market and other developed US markets.

In line with the increasing interest in survival analysis, accounting research has also examined whether accounting items are associated with IPO firm survivability (Jain and Martin 2005, Li and Zhou 2006). For example, Jain and Martin (2005) examine the association between audit quality and IPO survival rates. They find that IPO firms audited by high-quality auditors survive longer in the subsequent periods. Moreover, they also find that the impact of audit quality on IPO survivability holds after controlling for the presence of other determinants that have been found to affect the survival rates of IPO firms. In addition, Li and Zhou (2006) examine whether accrual earnings management is associated with IPO survivability using survival analysis and find that IPO firms that engage in aggressive accruals earnings management during the IPO year have lower survival rates in subsequent periods.

Given the previous research we undertake a survival analysis to examine whether real and accrual earnings management activities during the IPO year are associated with IPO firm
survivability in the following periods. We expect IPO firms that aggressively manage earnings upward during the IPO year, utilising real and accrual earnings management, to have lower survival rates in the subsequent periods. Hence, our next hypothesis is as follows:

**H2b:** IPO firms that report high levels of real and/or accrual earnings management during the IPO year, ceteris paribus, will have lower survival rates in the post-IPO period.

Further, prior research shows that real activities manipulation has greater negative consequences for subsequent operating and return performance compared to accrual earnings management. Accrual-based manipulation represents implementing accounting choices that occur at the end of the fiscal year before the issuance of the financial statements, and, therefore has no direct impact on operating cash flows (Dechow and Skinner 2000). Specifically, at the end of the fiscal year managers are likely to know whether or not earnings will meet or miss the desired threshold and, therefore, reported earnings are adjusted utilising accruals accounting to meet the desired threshold (Roychowdhuury 2006, Gunny 2010). For example, managers can engage in accrual earnings management through delaying the recognition of expenses, accelerating the recognition of revenues, decelerating depreciation policies, reducing deferral tax and realising unusual gain.

In contrast with accrual earnings management, real earnings management represents managerial decisions that deviate from normal business practices, such as the unexpected reduction of R&D and selling, general, and administrative (SG&A) expenses (Roychowdhuury 2006). Further, real earnings management provides managers with more flexibility, as activities can be manipulated throughout the fiscal year (Roychowdhuury 2006, Gunny 2010). However, it may lead to negative consequences for future performance. For example, if an IPO firm spends less than expected on R&D and SG&A expenses compared to its counterparts in the same industry and market, then it is expected that this underinvestment in discretionary expenses will have a negative impact on the competitive position of the firm in the market. This in turn will lead to a decrease in its market share of sales and, therefore, result in a lower level of operating cash inflows. Within a few years, therefore, the problems caused by real activities-based manipulation, with the resultant lower level of operating cash inflows due to lower sales and the increase in the cost of borrowing due to the increased risk, will have a negative impact on the operating and stock return performance of the firm, and may even lead to bankruptcy.

Thus, it is expected that real activities-based manipulation will have greater negative consequences for future performance compared to accrual-based manipulation. Consistent with this view, Cohen and Zarowin (2010) and Kothari et al. (2012) examine real activities and accrual earnings management that take place during the SEO year and find evidence that SEO firms engage in both real activities-based and accrual-based manipulation to manage reported earnings upward during the offer year. Further, Cohen and Zarowin (2010) and Kothari et al. (2012) find that real earnings management activities, which take place during the offer year, have the most negative consequences for subsequent operating and stock return performance compared to accrual-based manipulation. Therefore, it is expected that IPO firms will experience a higher probability of failure and lower survival rates in the subsequent periods due to real activities manipulation that take place during the IPO year compared to the impact of accrual earnings management. Hence, the final hypothesis is as follows:

**H2c:** IPO firms that report high levels of earnings management during the IPO year, ceteris paribus, will have a higher probability of failure and lower survival rates in the post-IPO period due to real activities-based manipulation as compared to accrual earnings management.
3. Methodology, data and sample description

3.1. Methodology

As we are implementing the standard models used to measure real and accrual earnings management, our methodology is described in detail in the appendix. Our accruals earnings management metrics are based on the work of Dechow et al. (1995) and use a cross-sectional adaptation of the modified Jones model to estimate discretionary accruals (Peasnell et al. 2000). While for real earnings management we estimate our models based on those developed by Dechow et al. (1998) and applied by Roychowdhury (2006) as well as later researchers such as Cohen et al. (2008), Cohen and Zarowin (2010), and Zang (2012). For our real earnings management activities, we focus on sales manipulation and reducing discretionary expenses. 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 (Roychowdhury 2006). Discretionary expenses meanwhile represent the sum of R&D expenses, advertising expenses, and SG&A expenses. Reducing discretionary expenses in the current period will boost reported earnings in the current period.

3.2. Sample selection

Our sample consists of 571 IPO firms that went public on either the Main or AIM markets between January 1998 and December 2008. Out of 571 UK IPOs, 317 IPOs are delisted prior to December 2012, of which 90 IPOs are delisted for negative reasons. Following prior research (Li and Zhou 2006, Demers and Joos 2007) we define IPO failure as those IPO firms that delisted from the stock exchange for negative reasons, that is, they delisted involuntarily through administration, receivership, liquidation, winding up, and bankruptcy within five years of the IPO date. After imposing this restriction, we are left with 60 IPOs that are delisted for negative reason within 5 years of the IPO date. The other 30 firms that delisted for negative reasons did so outside of the 5-year period. We also distinguish IPO firms delisted for mergers and acquisitions, company request (go private), and other delisting reasons.

Consistent with prior research (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) our sample covers all non-financial IPO firms with available prospectuses and the necessary data to allow us to analyse 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. Again, we follow prior research by excluding from our control sample any group of firms with less than six observations for each two-digit SIC code industry-year group. The IPO year (0) is defined as the fiscal year during which the IPO occurs. We estimate our accrual measures based on the cash flow approach as suggested by Hribar and Collins (2002) rather than on the 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 capitalisation, 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 and, therefore, IPO prospectuses were downloaded from the Thomson One Banker database and all missing financial data
were manually collected from IPO prospectuses; (5) the DataStream database was used to collect the stock prices for our sample of IPOs and their matched firms and the delisted dates; and (6) the Fame database was used to collect the reasons of delisting from the stock exchange and the date of delisting. These were cross-matched with the delisted dates that we obtained from DataStream. Further, we double-checked the delisted reasons that we obtained from Fame with the reasons recorded by Companies House.

3.3. Descriptive statistics

Table 1 presents a breakdown of delisted IPO firms by the reason for delisting and shows that 28.39% (90 IPOs) are delisted for negative reasons, 44.16% are delisted as a result of acquisition, 21.46% are delisted at company request, and 5.99% are delisted for other reasons. As noted earlier, we impose a 5-year restriction, resulting in a final delisted sample of 60 out of 90 IPOs that are delisted for negative reasons.

Table 2 (Panels A–C) presents descriptive statistics for our IPO samples. The mean market capitalisation for the pooled, delisted, and survivor samples are approximately £114 m, £33 m, and £141 m, respectively. This large difference in market values between IPO firms delisted for negative reasons and IPO firms delisted for other reasons suggests that the small IPO firms have a higher probability of performance failure in the subsequent periods.

Table 3 (Panel A) reports the distribution of IPOs over the period from 1998 to 2008 and shows that years 2000, 2004, 2005, and 2006 account for more than 60% of the sample. Consistent with the dotcom bubble the highest number of IPOs (102 IPOs) in the sample is in 2000. These statistics confirm the view that IPO firms usually time their offerings to take advantage of hot markets (Ibbotson and Jaffe 1975, Lowry and Schwert 2002). While the lowest number of IPOs in our sample is in 2008, which is a consequence of the recent global financial crisis. Moreover, it is also clear that the financial crisis has had a large impact on the number of companies that delist with 141 out of 317 delisting events occurring during 2007 and 2008, which represents 40% of the delisted sample. In addition, for companies that delist for negative reasons, 24 out of 60 take place in 2007 and 2008.

Table 3 (Panel B) presents the frequency of IPOs relative to the industry standard classification, measured by two-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 similar percentages of IPOs ranging from 1% to 10%.

Table 4 presents descriptive statistics of the characteristics of the IPO sample over the period from 1998 to 2008. It shows that the percentage of IPO firms delisted for negative reasons that are audited by big N audit firms is lower than the percentages for survivor IPO firms. The presence of
more reputable accounting firms is found to be associated positively with IPO survival rates in the following periods (Jain and Martin 2005). Further, Table 4 presents that IPO firms delisted for negative reasons have higher levels of under-pricing and Chairman/CEO duality, and smaller boards than survivor IPO firms.

4. Results

4.1. Empirical evidence on earnings management around IPOs

Table 5 presents time-series profiles of mean and median aggregate real earnings management, abnormal cash flows from operations (sales-based), abnormal discretionary expenses, and discretionary accruals for two years prior to the IPO, and the IPO year which is 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 presents that IPO firms in the UK engage extensively in real and accrual-based earnings management during the IPO. By examining the overall level of manipulation via real earnings management, Table 5 presents that the median aggregate measure of real earnings management during the IPO year is positive and statistically significant indicating that in
Table 3. Time and industry distribution.


<table>
<thead>
<tr>
<th>Year</th>
<th>Freq</th>
<th>%</th>
<th>Total delisted – based on the delisted date</th>
<th>Freq</th>
<th>%</th>
<th>Survivors – based on the IPO year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>35</td>
<td>6.14</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>8</td>
</tr>
<tr>
<td>1999</td>
<td>29</td>
<td>5.09</td>
<td>2</td>
<td>0.63</td>
<td>–</td>
<td>6</td>
</tr>
<tr>
<td>2000</td>
<td>102</td>
<td>17.89</td>
<td>7</td>
<td>2.21</td>
<td>–</td>
<td>29</td>
</tr>
<tr>
<td>2001</td>
<td>43</td>
<td>7.54</td>
<td>10</td>
<td>3.15</td>
<td>–</td>
<td>19</td>
</tr>
<tr>
<td>2003</td>
<td>23</td>
<td>4.04</td>
<td>23</td>
<td>7.26</td>
<td>–</td>
<td>8</td>
</tr>
<tr>
<td>2004</td>
<td>97</td>
<td>17.02</td>
<td>9</td>
<td>2.84</td>
<td>–</td>
<td>47</td>
</tr>
<tr>
<td>2005</td>
<td>94</td>
<td>16.49</td>
<td>19</td>
<td>5.99</td>
<td>–</td>
<td>42</td>
</tr>
<tr>
<td>2006</td>
<td>70</td>
<td>12.28</td>
<td>19</td>
<td>5.99</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
<td>2007</td>
<td>40</td>
<td>7.02</td>
<td>45</td>
<td>14.2</td>
<td>14</td>
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<tr>
<td>2008</td>
<td>2</td>
<td>0.35</td>
<td>51</td>
<td>16.09</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>45</td>
<td>14.2</td>
<td>–</td>
<td>2</td>
<td>3.33</td>
<td>–</td>
</tr>
<tr>
<td>2010</td>
<td>42</td>
<td>13.25</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2011</td>
<td>24</td>
<td>7.57</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2012</td>
<td>7</td>
<td>2.21</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>100.00</td>
<td>317</td>
<td>100</td>
<td>–</td>
<td>253</td>
</tr>
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</table>

(Continued)
Table 3. Continued


<table>
<thead>
<tr>
<th>Industry</th>
<th>Two-digit SIC</th>
<th>Freq</th>
<th>%</th>
<th></th>
<th>Freq</th>
<th>%</th>
<th>Freq</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and gas extraction</td>
<td>13</td>
<td>26</td>
<td>4.56</td>
<td>2</td>
<td>3.33</td>
<td>17</td>
<td>6.72</td>
<td></td>
</tr>
<tr>
<td>Food products</td>
<td>20</td>
<td>11</td>
<td>1.93</td>
<td>1</td>
<td>1.67</td>
<td>4</td>
<td>1.58</td>
<td></td>
</tr>
<tr>
<td>Printing and publishing</td>
<td>27</td>
<td>13</td>
<td>2.28</td>
<td>1</td>
<td>1.67</td>
<td>6</td>
<td>2.37</td>
<td></td>
</tr>
<tr>
<td>Chemicals and allied products</td>
<td>28</td>
<td>37</td>
<td>6.49</td>
<td>5</td>
<td>8.33</td>
<td>16</td>
<td>6.32</td>
<td></td>
</tr>
<tr>
<td>Industrial machinery</td>
<td>35</td>
<td>16</td>
<td>2.81</td>
<td>2</td>
<td>3.33</td>
<td>6</td>
<td>2.37</td>
<td></td>
</tr>
<tr>
<td>Electronic equipment</td>
<td>36</td>
<td>36</td>
<td>6.32</td>
<td>6</td>
<td>10</td>
<td>19</td>
<td>7.51</td>
<td></td>
</tr>
<tr>
<td>Instruments and related products</td>
<td>38</td>
<td>22</td>
<td>3.86</td>
<td>2</td>
<td>3.33</td>
<td>9</td>
<td>3.56</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>48</td>
<td>27</td>
<td>4.74</td>
<td>1</td>
<td>1.67</td>
<td>12</td>
<td>4.74</td>
<td></td>
</tr>
<tr>
<td>Electric, gas, and sanitation</td>
<td>49</td>
<td>10</td>
<td>1.75</td>
<td>1</td>
<td>1.67</td>
<td>5</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>Durable goods</td>
<td>50</td>
<td>11</td>
<td>1.93</td>
<td>–</td>
<td>–</td>
<td>2</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Eating and drinking establishments</td>
<td>58</td>
<td>15</td>
<td>2.63</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>Retail</td>
<td>59</td>
<td>8</td>
<td>1.40</td>
<td>–</td>
<td>–</td>
<td>3</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Business services</td>
<td>73</td>
<td>182</td>
<td>31.93</td>
<td>19</td>
<td>31.67</td>
<td>76</td>
<td>30.04</td>
<td></td>
</tr>
<tr>
<td>Media and entertainment</td>
<td>78</td>
<td>8</td>
<td>1.40</td>
<td>1</td>
<td>1.67</td>
<td>5</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>Amusement and recreation</td>
<td>79</td>
<td>27</td>
<td>4.74</td>
<td>7</td>
<td>11.67</td>
<td>8</td>
<td>3.16</td>
<td></td>
</tr>
<tr>
<td>Engineering and management services</td>
<td>87</td>
<td>58</td>
<td>10.18</td>
<td>1</td>
<td>1.67</td>
<td>28</td>
<td>11.07</td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td>–</td>
<td>63</td>
<td>11.05</td>
<td>8</td>
<td>13.36</td>
<td>32</td>
<td>12.64</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>100.00</td>
<td></td>
<td>60</td>
<td>100.00</td>
<td>253</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Notes: This table reports time and industry distributions for the pooled IPO sample, IPOs delisted for negative reasons and survivor IPO firms. Panel A presents the time distribution, while Panel B presents the industry distribution.
Table 4. Distribution of IPO firms’ characteristics during the IPO year based on the listing status.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pooled sample</th>
<th>Delisted for negative reasons within 5 years post-IPO</th>
<th>Survivors</th>
<th>Delisted – survivors differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (median)</td>
<td>Mean (median)</td>
<td>Mean (median)</td>
<td>t-Statistics</td>
</tr>
<tr>
<td>Age</td>
<td>1.047 (3.368)</td>
<td>3.990</td>
<td></td>
<td>-0.565</td>
</tr>
<tr>
<td>LnSize</td>
<td>113.93 (33.340)</td>
<td>140.799</td>
<td></td>
<td>-2.376***</td>
</tr>
<tr>
<td>AIM</td>
<td>0.757 (0.817)</td>
<td>0.763</td>
<td>0.893</td>
<td></td>
</tr>
<tr>
<td>Offer Price</td>
<td>1.163 (0.765)</td>
<td>1.145</td>
<td></td>
<td>-2.629***</td>
</tr>
<tr>
<td>Under Pricing</td>
<td>0.209 (0.671)</td>
<td>0.150</td>
<td>1.981**</td>
<td></td>
</tr>
<tr>
<td>Underwriter</td>
<td>0.187 (0.183)</td>
<td>0.174</td>
<td>0.172</td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>0.221 (0.150)</td>
<td>0.209</td>
<td>-1.038</td>
<td></td>
</tr>
<tr>
<td>Big N</td>
<td>0.468 (0.267)</td>
<td>0.439</td>
<td>-2.456**</td>
<td></td>
</tr>
<tr>
<td>BHAR 3</td>
<td>-0.140 (-0.498)</td>
<td>0.021</td>
<td>-3.834***</td>
<td></td>
</tr>
<tr>
<td>BHAR 5</td>
<td>-0.175 (-0.548)</td>
<td>-0.245</td>
<td>-3.109***</td>
<td></td>
</tr>
<tr>
<td>Cash flows</td>
<td>6.247 (-0.254)</td>
<td>11.228</td>
<td>-1.802***</td>
<td></td>
</tr>
<tr>
<td>Lev</td>
<td>0.353 (0.452)</td>
<td>0.371</td>
<td>0.787</td>
<td></td>
</tr>
<tr>
<td>Chrm/CEO</td>
<td>0.082 (0.200)</td>
<td>0.071</td>
<td>3.085***</td>
<td></td>
</tr>
<tr>
<td>BrdSize</td>
<td>5.708 (4.867)</td>
<td>5.822</td>
<td>-3.965***</td>
<td></td>
</tr>
<tr>
<td>OutDirectors</td>
<td>0.452 (0.453)</td>
<td>0.455</td>
<td>-0.113</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>570 (60)</td>
<td>253</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Differences in medians are tested using the Wilcoxon Signed Rank test and differences in means are tested using t-tests. This table reports sample descriptive statistics of pooled IPOs sample, IPO firms delisted for negative reasons and survivor IPO firms. Where (Size) is the market capitalisation for IPO firms immediately after the listing, (AIM) is a dummy variable that equals 1 if the IPOs are AIM firms and zero otherwise, (Age) is the IPO firm age in years where the IPO firm’s age is calculated as the difference between the founding date of the IPO firm and the date of its IPO, (Offer Price) is the IPO issue price, (Under Pricing) is the percentage difference between the offer price and the closing price on the first day of trading, Underwriter = 1 if the IPO is underwritten by a prestigious underwriter and 0 otherwise, (VC) = 1 if the firm is backed by a VC and 0 otherwise, Big N = 1 if the firm is audited by a big N auditor and 0 otherwise, (BHAR) is the mean 3-year buy-and-hold abnormal returns for IPOs sample (adjusted to matched sample based on size and book-to-market ratio) where the holding period is 4–40 months after the IPO date, (Cash flows) is cash flows from operations, (Lev) is leverage ratio measured as total debt/total assets, ..., (Chrm/CEO) is a dummy variable equalling 1 if the Chairman and the CEO is the same director and zero otherwise, (BrdSize) is the number of directors on the board, and (OutDirectors) is the percentage of outside directors on the board. For our binary variables such as Underwriter, VC, Big N and Chair/CEO duality, we only present the mean as the median figure is not meaningful.

*Significantly different from zero at the 10% level.
**Significantly different from zero at the 5% level.
***Significantly different from zero at the 1% level.
aggregate, IPO firms are manipulating real earnings upwards. Table 5 also reports that the median abnormal cash flows from operations during the IPO year are significant and positive. This is consistent with income increasing real earnings management being undertaken.

However, Table 5 presents that IPO firms do not manage earnings upward using discretionary expenses manipulation. The fact that we do not find any evidence of earnings management utilizing discretionary expenses is an intuitive finding. If IPO firms are manipulating sales to improve their abnormal cash flows from operations, such actions will not be costless, that is, it is difficult to increase sales while at the same time significantly reducing advertising and SG&A. In addition, the disclosure of significantly higher abnormal cash flows from operations and significantly lower abnormal discretionary expenses is likely to attract the attention of underwriters and auditors. In contrast to abnormal discretionary expenses, sales manipulation is harder to detect and discover given that IPO firms are expected to be on an upwards trajectory in terms of performance. However, if a company were to report significantly higher levels of sales on a base of significantly lower costs this would in all likelihood raise questions from auditors and underwriters and may deter potential investors.

Finally, and consistent with previous studies (Friedlan 1994, Teoh et al. 1998a, Morsfield and Tan 2006) we find evidence of significant positive discretionary accruals during the IPO year. IPO firms, therefore, manage earnings upward using accrual-based earnings management during the IPO year. We also confirm the findings of Ball and Shivakumar (2008) that IPO firms in the UK do not manage earnings upward in the run-up to the IPO. We find that the mean and median discretionary accruals are approximately zero during the year prior to the IPO. Ball and Shivakumar (2008) indicate that IPO firms report more conservatively during the year before the IPO due to the expected high demand for high-quality financial reporting by the market participants, for example, investors, regulators, analysts, etc.
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 during the IPO year.

4.2. Differences in real and accrual earnings management based on the delisting status

Table 6 reports descriptive statistics of differences in real and accruals earnings management during the IPO year between IPO firms delisted for negative reasons and survivors. Table 6 presents that IPO firms delisted for negative reasons have higher levels of real activities-based and accrual-based manipulations during the IPO year than survivor IPO firms. The differences in the mean and median aggregate measure of real earnings management are statistically significant at the 1% level. For abnormal cash flows from operations, the differences in mean and median values are statistically significant at the 5% level. While for discretionary accruals, the differences in mean (median) values are statistically significant at the 10% (1%) level. However, Table 6 presents that the difference in discretionary expenses-based manipulation between the two samples is not statistically significant, confirming our results in Table 5 that IPO firms do not exhibit evidence of discretionary expenses-based manipulation during the offer year.

In summary, Table 6 presents preliminary evidence that IPO firms delisted for negative reasons exhibit higher levels of real and accruals earnings management during the IPO year than survivor IPO firms.

4.3. Real and accrual earnings management and IPO failure

We now examine our hypotheses 2a and 2c that firms that undertake high levels of real and/or accrual earnings management at IPO have a higher probability of failure in post-IPO periods, and that real activities-based manipulation is associated with a higher probability of IPO failure compared to accrual earnings management. Consistent with prior research (Li and Zhou 2006),

Table 6. Difference in real and accruals earnings management during the offer year between IPO firms delisted for negative reasons and survivor IPO firms.

<table>
<thead>
<tr>
<th></th>
<th>Delisted for negative reasons</th>
<th>Survivors</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (median)</td>
<td>Mean (median)</td>
<td>Mean (median)</td>
</tr>
<tr>
<td>Aggregate real earnings management</td>
<td>0.420** (0.229)***</td>
<td>−0.037 (−0.006)</td>
<td>0.457 (0.235)</td>
</tr>
<tr>
<td>Abnormal cash flows from operations</td>
<td>0.186*** (0.101)***</td>
<td>0.034 (0.014)</td>
<td>0.152 (0.087)</td>
</tr>
<tr>
<td>Abnormal discretionary expenses</td>
<td>0.108 (0.049)*</td>
<td>0.019 (0.012)</td>
<td>0.089 (0.037)</td>
</tr>
<tr>
<td>Discretionary accruals</td>
<td>0.110*** (0.120)***</td>
<td>0.019 (0.003)</td>
<td>0.091 (0.117)</td>
</tr>
</tbody>
</table>

Notes: This table reports the difference in mean (t-test) and median (Mann–Whitney test) real and accrual earnings management during the IPO year between IPO firms delisted for negative reasons and survivors. All delisted IPOs are defined as those IPO firms that are delisted within 5 years post the IPO date. All variables are as previously defined.

*Two-tailed tests significantly different at the 10% level.
**Two-tailed tests significantly different at the 5% level.
***Two-tailed tests significantly different at the 1% level.
IPO failure is defined as those IPO firms that delist from the stock exchange for negative reasons (involuntary delisted), namely administration, receivership, liquidation, winding up, and bankruptcy within five years of the IPO year, and we follow Li and Zhou (2006) by estimating the following Logit model:

\[
\text{Failure}_{i,t} = a_0 + \beta_1 \text{EM}_{i,t} + \beta_2 \text{BigN}_{i,t} + \beta_3 \text{VC}_{i,t} + \beta_4 \text{Underwriter}_{i,t} + \beta_5 \ln(\text{Size}_{i,t}) + \\
\beta_6 \text{Underpricing}_{i,t} + \beta_7 \text{OfferPrice}_{i,t} + \beta_8 \text{BM}_{i,t} + \beta_9 \ln(1 + \text{age})_{i,t} + \\
\beta_{10} \text{Lev}_{i,t} + \beta_{11} \text{ROA}_{i,t} + \beta_{12} \text{Abs(CFO)}_{i,t} + \\
\text{IND} + \text{Year}. \tag{1}
\]

Following prior research (Schultz 1993, Hensler et al. 1997, Jain and Kini 2000, Willenborg and McKeown 2000, Weber and Willenborg 2003, Jain and Martin 2005, Li and Zhou 2006, Charitou et al. 2007), we include a number of control variables which might affect the probability of failure, namely audit quality (Big N); venture capitalists (VC); underwriters (Underwriter); firm size (LnSize); IPO under-pricing (Underpricing); offer price (OfferPrice); book-to-market ratio (BM); age [\ln(1 + \text{age})]; leverage ratio (Lev); profitability (ROA); and the absolute value of cash flows from operations [Abs(CFO)]. We further include controls for industry (IND) and year (Year).

Jain and Martin (2005) find evidence that IPO firms audited by high-quality auditors survive longer. Jain and Kini (2000) find evidence that IPO firms backed by VC have a higher probability of surviving in the following years than non-VC backed IPOs. Schultz (1993) meanwhile finds evidence that the presence of more reputable underwriters is positively associated with IPO survivability. Thus, the model includes (Big N), which is a dummy variable that equals 1 if the IPO firm’s auditor is a Big N audit firm and zero otherwise,\(^{14}\) (VC) which is a dummy variable that equals 1 if the IPO firms backed by VC and zero otherwise, and (Underwriter) a dummy variable equaling 1 if the IPO firms have high-profile underwriters and zero otherwise.\(^{15}\)

The possible impact of a size effect is controlled for by adding the natural logarithm of market value (LnSize) to the model, calculated as natural logarithm of the offer price multiplied by the number of outstanding shares on the first day of listing. While IPO under-pricing (Underpricing), defined as the percentage difference between the offer price and the closing price on the first day of trading, the offer price (Offer-price), and a leverage ratio (Lev) are added to the model, as suggested by previous studies (Schultz 1993, Hensler et al. 1997, Li and Zhou 2006). Schultz (1993), for example, finds evidence that offer size, age, initial returns, and underwriters that are more prestigious are positively associated with IPO survivability. Demers and Joos (2007) meanwhile find evidence that a higher leverage ratio is positively associated with the probability of failure, while IPO firms with higher offer prices are less likely to fail.

In order to control for growth opportunities the model includes the book-to-market (BM); calculated as the book value of equity divided by the market value of equity. IPO firm age [\ln(1 + \text{age})] measured as the natural logarithm of 1 + IPO firm age, where firm age is calculated as the difference between the founding date of the firm and the date of its IPO (Rangan 1998, Teoh et al. 1998a, Roosenboom et al. 2003, Cohen and Zarowin 2010). Further, as the focus of this paper is to examine failure, and following prior research (Li and Zhou 2006), the model controls for profitability, which is proxied by return on assets (ROA) and the possible impact of operating cash flows [Abs(CFO)], which is defined as the absolute value of cash flows from operations. Finally, dummy variables are added to the model to control for industry (IND) and year (Year) effects.

Table 7 reports the results for our analysis of whether real and accrual earnings management activities of IPO firms during the offer year are associated positively with probability of IPO failure in the subsequent periods. We find a positive coefficient of 0.478 (\(P < 0.01\)) for the
Table 7. Logistic regression estimation: prediction failure within five years of IPO.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1 Logit Regression Failure = 1</th>
<th>Model 2 Logit Regression Failure = 1</th>
<th>Model 3 Logit Regression Failure = 1</th>
<th>Model 4 Logit Regression Failure = 1</th>
<th>Model 5 Logit Regression Failure = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate real earnings</td>
<td>0.478 (2.747)**</td>
<td>0.392 (2.059)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal cash flows from</td>
<td>0.833 (2.373)**</td>
<td>0.164 (0.662)</td>
<td>1.115 (2.275)**</td>
<td>0.699 (1.303)</td>
<td></td>
</tr>
<tr>
<td>operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal discretionary expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discretionary accruals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big N</td>
<td>−0.895 (−2.318)**</td>
<td>−0.333 (−0.795)</td>
<td>−0.502 (−1.182)</td>
<td>−0.436 (−0.999)</td>
<td>−0.361 (−1.069)</td>
</tr>
<tr>
<td>VC</td>
<td>−0.418 (−0.999)</td>
<td>−0.418 (−0.883)</td>
<td>0.436 (0.129)</td>
<td>0.469 (0.034)</td>
<td>0.336 (−0.121)</td>
</tr>
<tr>
<td>Underwriter</td>
<td>0.469 (1.118)</td>
<td>0.444 (1.051)</td>
<td>0.444 (0.002)</td>
<td>0.444 (1.051)</td>
<td>0.375 (−1.099)</td>
</tr>
<tr>
<td>LnSize</td>
<td>0.007 (0.274)</td>
<td>0.007 (0.034)</td>
<td>0.007 (0.001)</td>
<td>0.007 (0.034)</td>
<td>0.007 (0.034)</td>
</tr>
<tr>
<td>Underpricing</td>
<td>0.005 (0.274)</td>
<td>0.005 (0.034)</td>
<td>0.005 (0.001)</td>
<td>0.005 (0.034)</td>
<td>0.005 (0.034)</td>
</tr>
<tr>
<td>Offer-price</td>
<td>−0.361 (−1.069)</td>
<td>−0.361 (−1.099)</td>
<td>−0.361 (−1.099)</td>
<td>−0.361 (−1.099)</td>
<td>−0.361 (−1.099)</td>
</tr>
<tr>
<td>BM</td>
<td>0.900 (1.849)*</td>
<td>0.982 (2.012)**</td>
<td>0.982 (2.012)**</td>
<td>0.982 (2.012)**</td>
<td>0.982 (2.012)**</td>
</tr>
<tr>
<td>Ln(1 + age)</td>
<td>0.032 (0.177)</td>
<td>−0.033 (−0.190)</td>
<td>−0.033 (−0.190)</td>
<td>−0.033 (−0.190)</td>
<td>−0.033 (−0.190)</td>
</tr>
<tr>
<td>Lev</td>
<td>0.426 (1.907)*</td>
<td>0.482 (2.156)**</td>
<td>0.482 (2.156)**</td>
<td>0.482 (2.156)**</td>
<td>0.482 (2.156)**</td>
</tr>
<tr>
<td>ROA</td>
<td>0.031 (0.604)</td>
<td>0.052 (0.941)</td>
<td>0.052 (0.941)</td>
<td>0.052 (0.941)</td>
<td>0.052 (0.941)</td>
</tr>
<tr>
<td>Abs(CFO)</td>
<td>−0.027 (−0.683)</td>
<td>−0.025 (−0.621)</td>
<td>−0.025 (−0.621)</td>
<td>−0.025 (−0.621)</td>
<td>−0.025 (−0.621)</td>
</tr>
<tr>
<td>Constant</td>
<td>−18.56 (−0.016)</td>
<td>−18.316 (−0.017)</td>
<td>−18.316 (−0.017)</td>
<td>−18.316 (−0.017)</td>
<td>−18.316 (−0.017)</td>
</tr>
<tr>
<td>Year and industry dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N failures within 5 years</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>N total observations</td>
<td>567</td>
<td>567</td>
<td>567</td>
<td>567</td>
<td>567</td>
</tr>
<tr>
<td>Log-likelihood</td>
<td>−159.21649</td>
<td>−160.24011</td>
<td>−163.09245</td>
<td>−160.48576</td>
<td>−158.33157</td>
</tr>
<tr>
<td>Pseudo $R^2$</td>
<td>0.1684</td>
<td>0.1631</td>
<td>0.1482</td>
<td>0.1618</td>
<td>0.1731</td>
</tr>
<tr>
<td>chi$^2$</td>
<td>64.50</td>
<td>62.46</td>
<td>56.75</td>
<td>61.96</td>
<td>66.27</td>
</tr>
<tr>
<td>Prob $&gt;\chi^2$</td>
<td>0.0012</td>
<td>0.0021</td>
<td>0.0085</td>
<td>0.0024</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

Notes: This table reports the results of Logistic regression estimates. The dependent variable (Failure) is a dummy variable equals to 1 if the IPO firms delisted for negative reasons within 5 years after the IPO date and 0 otherwise. Where (Size) is the market capitalisation for IPO firms immediately after the listing, BM is the book-to-market ratio calculated as the book value of equity divided by the market value of equity, and Abs(CFO) is the absolute value of cash flows from operations. All other variables are as previously defined.

*Two-tailed tests significantly different at the 10% level.

**Two-tailed tests significantly different at the 5% level.

***Two-tailed tests significantly different at the 1% level.
aggregate measure of real earnings management in the first model, confirming that IPO firms with high levels of real earnings management during the IPO year have a higher probability of failure in the subsequent periods. Further, we find a positive coefficient of 0.833 \((P < 0.05)\) for abnormal cash flows from operations (sales manipulation) in the second model. Again, this result suggests that IPO firms with high levels of abnormal cash flows from operations during the IPO year have a higher probability of IPO failure.

However, Table 7 presents no evidence that discretionary expenses-based manipulation is associated with IPO failure in the following periods. The coefficient for abnormal discretionary expenses in the third model is not statistically significant. This result is consistent with our previous results in Table 5 that IPO firms in the UK do not exhibit evidence of discretionary expenses manipulation during the IPO year. Further, Model 4 shows that accrual-based manipulation is positively associated with the probability of IPO failure in the subsequent periods, as we find a positive coefficient of 1.115 \((P < 0.05)\) for discretionary accruals. This result is consistent with Li and Zhou (2006) who find evidence that accrual-based manipulation during the IPO year is associated with an increased likelihood of IPO performance failure in the subsequent periods.

Finally, Table 7 (Model 5) reports the results where all earnings management activities are included, namely the aggregate measure of real earnings management (a combination between sales-based and discretionary expenses-based manipulation) and discretionary accruals. Model 5 provides evidence that real earnings management activities are considered as significant determinants of IPO failure after controlling for the impact of accruals manipulation, confirming the recent literature that real activities have more severe negative consequences for future performance compared to accrual earnings management (Cohen and Zarowin 2010, Kothari et al. 2012).17

In summary, the results reported in Table 7 (Models 1, 2, 3 and 4) support our hypothesis 2a that IPO firms with high levels of real and/or accrual earnings management during the IPO year have a higher probability of failure (delisted for negative reasons) in the following years. Moreover, the results of Model 5 in Table 7 support our hypothesis 2c that high levels of real activities manipulation lead to a higher probability of IPO failure compared to accrual earnings management.

4.4. Real and accrual earnings management and IPO survival rates

4.4.1. Measuring the survival rates

To test our hypothesis 2b that increased real and accrual earnings management is associated with lower post-IPO survival rates, we examine the survivability of IPO firms using the Kaplan–Meier estimator and the Cox proportional hazard model, as developed by Cox (1972). In the first step, we estimate the survival function of IPO firms using the Kaplan–Meier estimator, which allows us to make an inference whether our earnings management proxies are significant determinants of IPO survival rates in the subsequent periods. The Kaplan-Meier estimator is defined as

\[
\hat{S}(t) = \prod_{n_i < t} \frac{n_i - d_i}{n_i},
\]

where \(n_i\) is the number of IPO firms that are still at risk at time \(t_i\) and \(d_i\) is the number of firms that actually delisted (failed) at time \(t_i\).18 We use the log rank test to examine whether IPO firms relative to a specific stratum share the same curve of the Kaplan–Meier estimator. The strata are our variables of interest, namely real and accrual earnings management activities.
In the second step, we estimate the Cox proportional hazard model as developed by Cox (1972) as follows:

\[
h(t) = h_0(t) \exp[\beta_1 EMD_{i,t} + \beta_2 Big\,N_{i,t} + \beta_3 VC_{i,t} + \beta_4 Underwriter_{i,t} + \beta_5 \ln\text{Size}_i, t \\
+ \beta_6 \text{UnderPricing}_{i,t} + \beta_7 \text{OfferPrice}_{i,t} + \beta_8 BM_{i,t} + \beta_9 \ln(1 + \text{age})_{i,t} \\
+ \beta_{10} \text{Lev}_{i,t} + \beta_{11} \text{ROA}_{i,t} + \beta_{12} \text{Abs}(\text{CFO})_{i,t} + \text{IND} + \text{Year}],
\]

where \( h_0(t) \) is the base-line hazard function, \( t \) is duration to the date of an event (failure), (EMD) represents a dummy variable of our different measures of real and accrual earnings management [REM_Index, ABNCFO, ABNDEXP, and DISACC]. For each of our regressions, EMD is a dummy variable based on a different measure of earnings management. For example, EMD in our first regression is a dummy variable that is equal to 1 if the level of the aggregate real earnings management (REM_Index) during the IPO is greater than zero indicating income increasing real earnings management and 0 otherwise. The control variables that may affect IPO survivability are the same variables that are included in the Logit model (model 7). All other variables are as previously defined.

4.4.2. Earnings management and the survivability of IPO firms

In order to investigate the impact of earnings management on the survivability of IPO firms, we construct the survival function curve of Kaplan–Meier for our IPO sample based on the level of real and accrual earnings during the IPO year. Specifically, we divided the IPO sample into two groups (conservative and aggressive) based on the level of real and accrual earnings management during the IPO year. The conservative group represents IPO firms where the level of earnings manipulation is less than zero during the IPO year and the aggressive group represents IPO firms with earnings management proxies that are greater than zero. We expect the survival function curve for the conservative group to be above that of the aggressive group, therefore implying that IPO firms with lower levels of earnings management during the IPO have higher survival rates in the subsequent periods.

Figure A2 in the appendix presents the survival functions for our IPOs based on the aggregate level of real earnings management during the IPO year. As predicted, the survival function curve for conservative IPO firms is above that of the aggressive group, indicating that IPO firms with the lower levels of real earnings management during the IPO year survive longer than other IPO firms in the following periods. Table 8 (Panel A) reports the test of equality across strata (the log-likelihood test) and shows that the survival function for the conservative group is significantly different from that of the aggressive group.

Figure A3 in the appendix shows the survival functions for our IPO sample based on the level of abnormal cash flows from operations during the IPO year. Figure A3 presents similar evidence to Figure A2 that IPO firms with lower levels of abnormal cash flows from operations during the IPO year experience higher survival rates. Specifically, the survival function curve for the conservative group is above that of the aggressive group. Table 8 (Panel B) reports the test of equality across IPOs groups and this shows that the survival function for the conservative group is significantly different from that of the aggressive group.

The survival function curves for our IPO samples based on the level of abnormal discretionary expenses during the IPO year are shown in Figure A4 in the appendix. Specifically, the survival function curves for the conservative and aggressive groups overlap, indicating that discretionary expenses manipulation is not a significant determinant of IPO survivability. In addition, the log-likelihood test results given in Table 8 (Panel C) indicate that there is no statistically significant
difference between the survival functions for the two groups. This result is consistent with our previous results in Table 5 that IPO firms in the UK exhibit no evidence of discretionary expenses manipulation during the IPO year and, therefore, it is not expected to impact post-IPO survivability. Moreover, this result confirms the results of the Logistic regression given in Table 7 that discretionary expenses manipulation is not associated with the probability of IPO failure in the following periods.

Finally, we present the survival function curves for our IPO sample based on the level of discretionary accruals during the IPO in Figure A5 in the appendix. Consistent with our evidence in Figures A2 and A3, we find the survival function curve for the conservative group is above that of the aggressive group. This result indicates that IPO firms with lower levels of accrual-based manipulation during the IPO year experience higher survival rates in the following periods than IPO firms with higher levels of accrual earnings management. The test of equality across these groups is presented in Table 8 (Panel D) and shows that the survival function for the conservative group is significantly different from that of the aggressive group. Thus, IPO firms that engage in lower levels of accrual manipulation during the IPO year experience higher survival rates in the post-IPO period.

In summary, the above results provide preliminary evidence for hypothesis 2b that high levels of both real and/or accrual earnings management during the IPO year are associated with a lower

Table 8. Non-parametric analysis of IPO firms survivability.

<table>
<thead>
<tr>
<th>Panel A: Aggregate real earnings management (REM_Index)</th>
<th>Number of firms</th>
<th>Number survivors (survival rate)</th>
<th>Log rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>REM_Index &lt; 0 (conservative IPOs)</td>
<td>227</td>
<td>147 (64.75)% (0.0026)</td>
<td></td>
</tr>
<tr>
<td>REM_Index &gt; 0 (aggressive IPOs)</td>
<td>343</td>
<td>164 (47.81)%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Abnormal cash flows from operations (ABNCFO)</th>
<th>Number of firms</th>
<th>Number survivors (survival rate)</th>
<th>Log rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABNCFO &lt; 0 (conservative IPOs)</td>
<td>251</td>
<td>118 (47.01)% (0.0615)</td>
<td></td>
</tr>
<tr>
<td>ABNCFO &gt; 0 (aggressive IPOs)</td>
<td>319</td>
<td>135 (42.31)%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Abnormal discretionary expenses (ABNDEXP)</th>
<th>Number of firms</th>
<th>Number survivors (survival rate)</th>
<th>Log rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABNDEXP &lt; 0 (conservative IPOs)</td>
<td>268</td>
<td>121 (45.14)% (0.3906)</td>
<td></td>
</tr>
<tr>
<td>ABNDEXP &gt; 0 (aggressive IPOs)</td>
<td>302</td>
<td>132 (43.70)%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel D: Discretionary accruals (DISACCR)</th>
<th>Number of firms</th>
<th>Number survivors (survival rate)</th>
<th>Log rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISACCR &lt; 0 (conservative IPOs)</td>
<td>255</td>
<td>124 (48.62)% (0.0162)</td>
<td></td>
</tr>
<tr>
<td>DISACCR &gt; 0 (aggressive IPOs)</td>
<td>315</td>
<td>129 (40.95)%</td>
<td></td>
</tr>
</tbody>
</table>

Notes: This table reports the results of the log rank test across the conservative and aggressive IPO groups based on their level of real and accrual earnings management (REM_Index, ABNCFO, ABNDEXP, and DISACCR) during the IPO year. For example, (REM_Index < 0) represents the conservative IPO group as their level of the aggregate measure of real earnings management during the IPO year is less than zero, (REM_Index > 0) represents the aggressive IPO group as their level of the aggregate measure of real earnings management during the IPO year is greater than zero. For each measure of earnings management, if it is less than zero we classify the firm as conservative in its use of that earnings management proxy and if it is greater than zero we consider the firm to be aggressive. All other variables are as previously defined.

*Significantly different from zero at the 10% level.
**Significantly different from zero at the 5% level.
***Significantly different from zero at the 1% level.
likelihood of survival in the post-IPO period. Our results show that IPO firms with lower levels of aggregate real earnings management, abnormal cash flows from operations, and discretionary accruals during the IPO year survive longer compared to IPO firms with higher levels of these earnings management activities at IPO.

4.5. IPO survivability, earnings management, and the impact of higher levels of real earnings management

To test further our hypotheses 2b and 2c, that high levels of earnings management around the IPO decreases the likelihood of survival, and that a greater use of real earnings management further reduces the likelihood of survival, we estimate a number of Cox proportional hazard models, which are presented in Table 9. Here the dependent variable is the logarithm of the hazard rate, which is based on the delisting event. Thus, a positive (negative) coefficient implies that an increase in the independent variable leads to an increase (decrease) in the probability of delisting in the subsequent periods (Carpentier and Suret 2011).

Table 9 (Model 1) reports the results based on the aggregate level of real earnings management. We find a positive coefficient of 0.710 ($P < 0.01$) for REM_Index, implying that IPO firms with high levels of the aggregate measure of real earnings management during the IPO year have lower survival rates in the following periods. This result is consistent with our previous evidence in the non-parametric analysis shown in Figure A2, that, IPO firms with high levels of aggregate real earnings management during the IPO year survive for a shorter period than other IPO firms. The risk ratio (2.034) suggests that the failure risk of IPO firms with high levels of aggregated real earnings management (REM_Index > 0) is 203% of the failure risk for IPO firms with low levels of aggregated real earnings management (REM_Index < 0).

Table 9 (Model 2) presents the results based for the level of abnormal cash flows from operations during the IPO year and shows similar evidence to the result reported from Model 1. We find a positive coefficient of 0.606 ($P < 0.05$) for ABNCFO, indicating that the IPO firms with higher levels of abnormal cash flows from operations during the IPO year survive a shorter time. The risk ratio (1.832) suggests that the failure risk of IPO firms with high levels of abnormal cash flows from operations (ABNCFO > 0) is 183% greater than the failure risk for IPO firms with low levels of abnormal cash flows from operations (ABNCFO < 0). Taken together, these results are consistent with our earlier non-parametric analysis (Figure A3) that, the higher the level of abnormal cash flows from operations during the IPO year the higher the probability of failure (a shorter time to survive).

The results based on the level of discretionary expenses manipulation are reported in Table 9 (Model 3). We find a positive coefficient of 0.041 for ABNDEXP, but it is statistically insignificant. This evidence confirms the non-parametric analysis (Figure A4) that discretionary expenses manipulation is not associated with IPO survivability. In addition, this evidence is consistent with the reported results in Table 5 that IPO firms exhibit no evidence of discretionary expenses manipulation during the IPO year and with the results of Table 7 that discretionary expenses manipulation is not associated with the probability of IPO failure.

Further, Table 9 (Model 4) presents the results based on the level of accrual-based manipulation during the IPO year. We find a positive coefficient of 0.687 ($P < 0.01$) for DISACCR, suggesting that IPO firms with higher levels of accruals manipulation during the IPO year experience lower survival rates in the following periods. The risk ratio (1.989) indicates that the failure risk of IPO firms with high levels of accrual-based manipulation (DISACCR > 0) is 199% of the failure risk of IPO firms with low levels of accrual-based manipulation (DISACCR < 0). Further, these results are consistent with our non-parametric analysis (Figure A5) that IPO firms with high
Table 9. Coefficient estimates from multivariate Cox hazard models, time to failure.

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. (P-value)</td>
<td>[HR]</td>
<td>Coeff. (P-value)</td>
<td>[HR]</td>
<td>Coeff. (P-value)</td>
</tr>
<tr>
<td>REM_Index</td>
<td>0.710*** (0.006)</td>
<td>[2.034]</td>
<td>0.571** (0.032)</td>
<td>[1.770]</td>
<td></td>
</tr>
<tr>
<td>ABNCFO</td>
<td>0.606** (0.020)</td>
<td>[1.832]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABNDEXP</td>
<td></td>
<td></td>
<td>0.041 (0.868)</td>
<td>[1.042]</td>
<td></td>
</tr>
<tr>
<td>DISACCR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big N</td>
<td>−0.577** (0.039)</td>
<td>[0.562]</td>
<td>−0.572** (0.038)</td>
<td>[0.564]</td>
<td>−0.535* (0.051)</td>
</tr>
<tr>
<td>VC</td>
<td>0.186 (0.509)</td>
<td>[1.204]</td>
<td>0.242 (0.390)</td>
<td>[1.274]</td>
<td>0.205 (0.466)</td>
</tr>
<tr>
<td>Underwriter</td>
<td>0.212 (0.528)</td>
<td>[1.236]</td>
<td>0.189 (0.568)</td>
<td>[1.208]</td>
<td>0.175 (0.600)</td>
</tr>
<tr>
<td>LnSize</td>
<td>0.034 (0.821)</td>
<td>[1.034]</td>
<td>−0.089 (0.560)</td>
<td>[0.915]</td>
<td>−0.011 (0.940)</td>
</tr>
<tr>
<td>Underpricing</td>
<td>−0.160 (0.673)</td>
<td>[0.852]</td>
<td>−0.102 (0.788)</td>
<td>[0.903]</td>
<td>−0.133 (0.730)</td>
</tr>
<tr>
<td>Offer-price</td>
<td>−0.302 (0.204)</td>
<td>[0.739]</td>
<td>−0.195 (0.408)</td>
<td>[0.823]</td>
<td>−0.256 (0.282)</td>
</tr>
<tr>
<td>BM</td>
<td>0.587 (0.138)</td>
<td>[1.799]</td>
<td>0.681* (0.073)</td>
<td>[1.975]</td>
<td>0.709* (0.071)</td>
</tr>
<tr>
<td>Ln(1 + age)</td>
<td>0.077 (0.551)</td>
<td>[1.081]</td>
<td>0.033 (0.803)</td>
<td>[1.033]</td>
<td>0.036 (0.779)</td>
</tr>
<tr>
<td>Lev</td>
<td>0.263 (0.105)</td>
<td>[1.301]</td>
<td>0.295* (0.064)</td>
<td>[1.343]</td>
<td>0.270* (0.090)</td>
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<tr>
<td>ROA</td>
<td>−0.028 (0.421)</td>
<td>[0.973]</td>
<td>−0.011 (0.763)</td>
<td>[0.990]</td>
<td>−0.030 (0.377)</td>
</tr>
<tr>
<td>Abs(CFO)</td>
<td>−0.026 (0.264)</td>
<td>[0.974]</td>
<td>−0.021 (0.339)</td>
<td>[0.979]</td>
<td>−0.026 (0.264)</td>
</tr>
</tbody>
</table>

(Continued)
Table 9. Continued.

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. (P-value)</td>
<td>Coeff. (P-value)</td>
<td>Coeff. (P-value)</td>
<td>Coeff. (P-value)</td>
<td>Coeff. (P-value)</td>
</tr>
<tr>
<td>Industry Dm</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year Dm</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chi-square</td>
<td>65.7</td>
<td>63.03</td>
<td>57.46</td>
<td>65.25</td>
<td>70.11</td>
</tr>
<tr>
<td>Chi-square test Prob</td>
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<td>0.0013</td>
<td>0.0052</td>
<td>0.0007</td>
<td>0.0003</td>
</tr>
<tr>
<td>N</td>
<td>567</td>
<td>567</td>
<td>567</td>
<td>567</td>
<td>567</td>
</tr>
</tbody>
</table>

Notes: $P$-value appears between parentheses and hazard ratio appears between brackets. This table reports the results for Cox proportional hazard models. Models 1–5 report the results where the dependent variable is the logarithm of the hazard rate, which is based on the delisting event. Where (REM_Index) is a dummy variable equalling to 1 if the level of the aggregate measure of real earnings management during the IPO year for an IPO firm is greater than zero (positive) and 0 otherwise, (ABNCFO) is a dummy variable equalling to 1 if the level of the abnormal cash flows from operations during the IPO year for an IPO firm is greater than zero and 0 otherwise, (ABNDEXP) is a dummy variable equalling to 1 if the level of the abnormal discretionary expenses during the IPO year for an IPO firm is greater than zero and 0 otherwise, and (DISACCR) is a dummy variable equalling to 1 if the level of the discretionary accruals during the IPO year for an IPO firm is greater than zero and 0 otherwise. The time to failure is measured as the number of months elapsed between the IPO month and the month in which the firm is delisted from the stock exchanges for negative reasons. The hazard ratio (HR) is calculated as the exponential of the estimated coefficient, $\exp (\beta)$. All other variables are as previously defined.

*Significantly different from zero at the 10% level.
**Significantly different from zero at the 5% level.
***Significantly different from zero at the 1% level.
levels of accruals-based manipulation during the IPO year experience lower survival rates in the following periods.

Finally, Table 9 (Model 5) reports the results where the aggregate measure of real earnings management (a combination of sales-based and discretionary expenses-based manipulations) and discretionary accruals are included into one model and shows similar evidence that real and accrual earnings management are significant determinants of IPO survivability, and that real activities have a more negative impact on IPO survivability in the subsequent periods as compared with accrual earnings management.23

In summary, the reported results in Table 9 (Models 1–4) confirm our hypothesis 2b, that IPO firms that engage in high levels of real and/or accrual earnings management during the IPO year are expected to have a lower likelihood of survival in the subsequent periods. Moreover, our results from Model 5 in Table 9 confirm our hypothesis 2c that real activities-based manipulation leads to a lower likelihood of survival as compared to accrual-based manipulation. Further, the reported results of the Cox model are consistent with the earlier non-parametric analysis and the Logistic regressions.

4.6. A broader definition of IPO survivability

For robustness, we re-estimate the Cox model where IPO firms are considered as ‘right censored’ if they have not delisted from the stock exchanges by the end of December 2012 (they are still trading on the stock exchanges). In other words, non-survivor IPO firms are defined as those IPO firms who delisted from the stock exchanges for any reason, such as negative reasons, mergers and acquisition, at the request of the company, and any other delisted reasons over the period from January 1998 to December 2012.

Table A1 reports the results and shows qualitatively similar results concerning the impact of sales-based and accrual-based manipulations to those reported in Table 9. Overall, these results confirm that IPO firms with high levels of real and/or accrual earnings management during the IPO year survive for a shorter time than other firms. Further, these results confirm the conclusions of the recent literature (Cohen and Zarowin 2010, Kothari et al. 2012) that real and accrual earnings management have a negative impact on future performance.

5. Conclusions

We examine whether IPO firms undertake real and accrual earnings management activities during the IPO year and whether these activities are associated with the probability of IPO failure and survivability in the subsequent periods.

We contribute to the growing literature on earnings management by providing the following evidence. First, we find that IPO firms in the UK engage in real earnings management activities during the IPO year. While there has been limited inconclusive research examining accruals-based manipulation around IPOs in the UK (Ball and Shivakumar 2008, Lo 2008, Chahine et al. 2012), our paper is the first study to examine real activities-based manipulation around IPOs in the UK. Second, we find that both real and/or accrual earnings management that take place during the IPO year are associated with increased levels of IPO failure and a lower likelihood of IPOs in the UK. Second, we find that both real and/or accrual earnings management that take place during the IPO year are associated with increased levels of IPO failure and a lower likelihood of survival in the subsequent periods. Specifically, IPO firms with high levels of real and/or accrual earnings management during the IPO year have a higher probability of delisting from the stock exchange for negative reasons in subsequent periods. Third, we show that real earnings management activities that take place during the IPO year are associated with a higher probability of IPO failure and lower IPO survival rates in subsequent periods as compared to accrual-based manipulation.

As we have noted, the majority of our failed IPO events are from the AIM and occur during the financial crisis. Future research, therefore, should consider whether these results are
generalisable to more developed firms and less turbulent economic environments. That said, our findings have important economic consequences given that most of the failures that we observe are on the AIM market. AIM firms are generally smaller and such firms are key drivers of economic growth. As a result, where high levels of earnings management occur at IPO, then this leads to a higher likelihood of failure and a lower likelihood of survival, and as such must have a negative impact on economic growth. Earnings management at IPO is, therefore, something that market regulators may wish to pay close attention to in the future, given the fundamental position that small firms hold within growth economies.

In summary, our evidence contributes to the IPO literature by showing that real and accrual earnings management are significant determinants of IPO failure and survivability, and our evidence confirms the findings of the recent accounting literature that real earnings management activities have a greater negative impact on future firm performance compared to accrual-based manipulation. Finally, given our focus is solely on the UK, future research should consider whether these findings persist across other markets and legal regimes, as this will further enhance knowledge as to what factors mitigate or propagate earnings management in the IPO context.

Acknowledgement

We thank Martin Walker, Igor Filatotchev, and Steve Toms for their helpful comments and suggestions. We are also grateful for the comments and feedback from the participants at the European Accounting Association-Annual Conference (2013, Paris). Mohammad Alhadab acknowledges the financial support he has received from Al albayt University, Mafraq, Jordan. We thank the associate editor and two anonymous reviewers for their constructive and helpful comments on our work. All errors remain our own.

Notes

1. Consistent with prior research (Li and Zhou 2006) we define IPO failure as those IPO firms who delisted from the stock exchange for negative reasons (involuntary delisted) within 5 years post the IPO date.
2. It is worth mentioning that Demers and Joos (2007) examine the association between several variables and IPO failure risk. However, they do not examine the association between real and accrual earnings management and IPO failure. As such, there is a significant difference between the approach of the current piece to estimate real activities manipulation and the work of Demers and Joos (2007).
3. Data are taken from Bloomberg and cover IPOs across the EU and the UK, including financial firms.
4. There are secondary markets for small firms in France, Germany and Italy. However, over the period these markets have been subjected to considerable change, fragmentation and consolidation, for example, the introduction of Euronext in 2005. AIM, however, has existed without similar disruption since 1995.
5. The revelation principle is analogous to the approach of Modigliani and Miller (1958) to set out the irrelevance of capital structure, and of Miller and Modigliani (1961) for the dividend irrelevance theorem.
6. The role of the underwriter is also an important consideration given our theoretical framework; more specifically, it suggests that the underwriters align their interests with those of the management/current owners. Owners/managers and underwriters share the common goal of the successful flotation of the firm. The failure of a flotation is clearly detrimental to the current owners/managers and equally it will damage the value and reputation of the underwriter. Thus, while underwriters have a responsibility to ensure the accuracy of the information in IPO prospectuses, they have obvious incentives to ensure a successful flotation.
7. It is worth noting that Hypothesis 1 is not new to the literature and it has been already addressed by prior research in the IPO setting (Teoh et al. 1998a, Wongsunwai 2012). However, it is necessary to examine this for consistency with the prior literature.
8. Li and Zhou (2006) define failure as delisting for negative reasons (involuntary delisting). IPO firms that delisted from the stock exchange within 5 years after the IPO date and have delisted codes between
400 and 600, excluding the following codes: 501, 502, 503 and 573 are classified as failed. Whereas codes 501, 502 and 503 denote those firms that switch from one stock exchange to another, code 573 denotes firms that choose to go private.

9. The 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.

10. From those 60 delisted IPOs for negative reasons, 35 went into administration, 22 into liquidation, 2 into receivership and 1 into winding up. Further, the definition of failure is consistent with Garcia Lara et al. (2009) who examined earnings quality for failed firms in the UK and defined failure as those firm delisted for administration, liquidation and receivership.

11. Our control sample consists of all UK active and dead firms over the sample period to avoid survivorship bias. 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, therefore, we follow Rosner (2003), Athanasakou et al. (2009), Iqbal et al. (2009) and Athanasakou et al. (2011) and use six observations.

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

13. For those IPO listed in 2007–2008 we apply the same criteria as for all of our earlier IPOs. As the end of our study period is December 2012, we have a 5-year post IPO period to ensure that we capture all firms in our IPO sample. It is worth noting that there were 42 IPOs in 2007–2008. Out of these, just nine firms delisted and these nine IPOs were delisted for non-negative reasons. Over the following 5 years, of the 9 delisted IPOs, 4 registered as private companies, 3 were taken over 1 firm no longer met the listing conditions and reverted to being a private company; and 1 firm delisted as a company request.

14. 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 & Young and KPMG.

15. Prestigious underwriters are those global investment banks as defined by Derrien and Kecskes (2007), while VC are those investors who hold more than 3% of a firm’s shares and appear in the list of VC provided by the British Venture Capitalist Association. Specifically, data are collected from the prospectuses about all the shareholders who hold more than 3% of the total shares and then a shareholder’s name is matched with a list of VC, which is obtained from the British Venture Capitalist Association.

16. This approach of incorporating the aggregate measure of real activities (a combination of two real activities) and discretionary accruals into one model is consistent with recent research that investigates earnings management (Wongsunwai 2012, Zang 2012).

17. As our proxy for size is insignificant in our regressions, we re-run the models by including just earnings management proxies and the size effect variable. The result shows that the size effect predicts the probability of failure, confirming the view that small IPO firms have a higher probability of failure as compared to large firms. However, when we add more explanatory variables into the model the size effect disappears. This suggests that there are many variables the correlate with firm size and, therefore, can be used as a proxy of size.

18. Firms at risk represent firms that are still listed on the market but there is a probability that these firms may fail in the future for any reason.

19. Compared with other hazard models, the Cox (1972) model has the advantage that no assumption is required to be made about the distribution of event dates.

20. This process is the same for all of our earnings management proxies.

21. We also re-estimate the model by adding a dummy variable for high-tech industries and the results are qualitatively similar to those reported in the paper.

22. We also report the hazard ratio which is computed as the exponentiated coefficient for each variable. For a dichotomous variable, the risk ratio is the ratio of the estimated hazard for firms with ‘1’ to the estimated hazard ratio for firms with ‘0’ (Jain and Martin 2005, Carpentier and Suret 2011). While the interpretation of the hazard ratio for a continuous variable is that (hazard ratio – 1)*100 represents the percentage of changes in hazard for each unit increase in the variable (Allison 1995, Jain and Martin 2005). Following prior research (Teachman 1983, LeClere 2000, Jain and Martin 2005), risk ratios greater than 1, equal 1 and less than 1 are interpreted as follows; rapid time to failure, no impact on failure and slower time to failure, respectively.

23. Specifically, in Table 9 (Model 5) we find a positive coefficient of 0.571 ($P < 0.05$) and hazard ratio of 1.77 for the aggregate measure of real earnings management (REM_Index), while we find a positive
coefficient of 0.542 \((P < 0.05)\) and hazard ratio of 1.72 for accrual earnings management (DISACCR). It is worth noting that the magnitude of the difference in our coefficients and hazard rates for Table 9 is small but consistent with prior evidence. However, if the results of Model 5 in Tables 7–9 are taken in combination, then while the magnitude of the coefficients varies depending on model specification, it is clear that real earnings management clearly is more dominant than accrual earnings management.

References


Appendix

Methodology and earnings management metrics

Accrual-based earnings management

In undertaking our estimates of discretionary accruals, we address the comments of Ball and Shivakumar (2008) and Armstrong et al. (2009) to avoid any measurement error. For example, we use the cash flow approach to estimate discretionary accruals rather than the balance sheet approach. Ball and Shivakumar (2008) provide evidence that using the balance sheet approach to estimate discretionary accruals leads to measurement errors. Further, Ball and Shivakumar (2008) point out that prior research uses lagged total assets as a deflator in accruals models and this inflates discretionary accruals. They argue that IPO firms use IPO proceeds to invest in assets and, therefore, using lagged total assets would lead to bias in the accruals estimation. Thus, to overcome this problem we follow Armstrong et al. (2009) and scale all variables by average assets rather than lagged assets. Finally, Armstrong et al. (2009) find the negative association between discretionary accruals and post-IPO return performance is an artefact of cash flows mispricing. Thus, we control for the absolute value of cash flows from operations when we examine the impact of real and accrual earnings management for subsequent return performance.

Following prior research in earnings management, we use the Dechow et al.’s (1995) cross-sectional adaptation of the modified Jones model to estimate discretionary accruals (Peasnell et al. 2000). We run a cross-sectional regression for each year for all non-IPO firms for each two-digit SIC industry category. This approach, in part, controls for changes in economic conditions that impact on total accruals across different industry groups but allows for coefficients to vary through time (DeFond and Jimbalvo 1994, Kasznik 1999, Cohen and Zarowin 2010). We also add ROA 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 our sample of IPO firms. Normal accruals are, therefore, estimated using the following model:

\[
\begin{align*}
\frac{TA_{i,t}}{AvAssets_{i,t}} &= a_0 + \beta_1 \frac{1}{AvAssets_{i,t}} + \beta_2 \frac{\Delta SALES_{i,t}}{AvAssets_{i,t}} + \beta_3 \frac{PPE_{i,t}}{AvAssets_{i,t}} + \beta_4 ROA_{i,t} + e_{i,t},
\end{align*}
\]

(A1)

where \(TA_{i,t}\) is total accruals defined as earnings before extra-ordinary items minus cash flows from operations; \(AvAssets_{i,t}\) 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; \(\Delta SALES_{i,t}\) is the change in sales during a year scaled by average total assets; \(PPE_{i,t}\) is the gross value of property, plant, and equipment scaled by average total assets; and \(ROA_{i,t}\) return on assets, which is earnings before extra-ordinary items scaled by average total assets. In addition, we Winsorize all variables at 1% and 99% to take account of extreme values.

The coefficient estimates from Equation (A1) are used to estimate normal accruals (\(NA_{i,t}\)) for all IPO firms in each year and industry as follows,

\[
NA_{i,t} = \hat{a}_0 + \hat{\beta}_1 \frac{1}{AvAssets_{i,t}} + \hat{\beta}_2 \frac{\Delta SALES_{i,t}}{AvAssets_{i,t}} + \hat{\beta}_3 \frac{PPE_{i,t}}{AvAssets_{i,t}} + \hat{\beta}_4 ROA_{i,t} + \epsilon_{i,t},
\]

(A2)

\(\Delta REC_{i,t}\) is the change in receivables during the year scaled by average total assets.

Discretionary accruals (\(DA_{i,t}\)) are measured as the difference between total accruals and fitted normal accruals, where

\[
DA_{i,t} = \left(\frac{TA_{i,t}}{AvAssets_{i,t}}\right) - NA_{i,t}.
\]

(A3)

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, two-digit SIC industry code, and the closest ROA (± 0.20 of IPO firms’ ROA). Our results where we apply performance-matched discretionary accruals are qualitatively similar to those reported where we control for ROA. 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 ROA.
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). Later researchers such as Cohen et al. (2008), Cohen and Zarowin (2010), and Zang (2012) also apply these models to estimate real earnings management activities.

We examine two real earnings management activities; sales manipulation and reducing discretionary expenses. 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 (Roychowdhury 2006). Discretionary expenses meanwhile represent the sum of R&D, advertising expenses, and SG&A expenses. 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). We do not consider production cost manipulation within our analysis of real earnings management as this is a method that can only be fully utilised by manufacturing companies (Roychowdury 2006) and manufacturing companies make up just 26.6% of our total sample. Similar to the estimation of our measures of accrual earnings management we scale all variables by average total assets. 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.

$$\frac{CFO_{i,t}}{AvAssets_{i,t}} = a_0 + \beta_1 \frac{1}{AvAssets_{i,t}} + \beta_2 \frac{SALES_{i,t}}{AvAssets_{i,t}} + \beta_3 \frac{\Delta SALES_{i,t}}{AvAssets_{i,t}} + \epsilon_{i,t},$$  \hspace{2cm} (A4)

where CFO$_{i,t}$ 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 (A4).

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

$$\frac{DISX_{i,t}}{AvAssets_{i,t}} = a_0 + \beta_1 \frac{1}{AvAssets_{i,t}} + \beta_2 \frac{SALES_{i,t}}{AvAssets_{i,t}} + \epsilon_{i,t},$$  \hspace{2cm} (A5)

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,

$$\frac{DISX_{i,t}}{AvAssets_{i,t}} = a_0 + \beta_1 \frac{1}{AvAssets_{i,t}} + \beta_2 \frac{SALES_{i,t-1}}{AvAssets_{i,t}} + \epsilon_{i,t},$$  \hspace{2cm} (A6)

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 (A6).

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 flow 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. In addition, we Winsorize all variables at 1% and 99% to take account of extreme values.
Table A1. Coefficient estimates from multivariate Cox Hazard models, time to failure.

<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>(P-value)</td>
<td>(HR)</td>
<td>(P-value)</td>
<td>(HR)</td>
<td>(P-value)</td>
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<tr>
<td>REM_Index</td>
<td>0.189</td>
<td>0.113</td>
<td>0.258**</td>
<td>-0.024</td>
<td>0.308**</td>
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<td></td>
<td>(0.125)</td>
<td>(0.377)</td>
<td>(0.046)</td>
<td>(0.845)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>ABNCFO</td>
<td>0.258</td>
<td>-0.024</td>
<td>0.069</td>
<td>0.069</td>
<td>0.308**</td>
</tr>
<tr>
<td></td>
<td>∗∗</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABNDEXP</td>
<td>-0.024</td>
<td>0.069</td>
<td>0.308**</td>
<td>0.069</td>
<td>0.766</td>
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<tr>
<td>DISACCR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Big N</td>
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<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
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</tr>
<tr>
<td></td>
<td>(0.577)</td>
<td>(0.108)</td>
<td>(0.256)</td>
<td>(0.108)</td>
<td>(0.256)</td>
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<tr>
<td>VC</td>
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<tr>
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<tr>
<td></td>
<td>(0.632)</td>
<td>(0.108)</td>
<td>(0.658)</td>
<td>(0.108)</td>
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<tr>
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<tr>
<td></td>
<td>(0.543)</td>
<td>(0.108)</td>
<td>(0.658)</td>
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<tr>
<td>Underpricing</td>
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<td></td>
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<td>(0.866)</td>
<td>(0.464)</td>
<td>(0.864)</td>
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<td>Offer-price</td>
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<td>-0.131</td>
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<td>(0.251)</td>
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<td>(0.216)</td>
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<td></td>
<td>(0.515)</td>
<td>(1.162)</td>
<td>(0.443)</td>
<td>(1.191)</td>
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<tr>
<td>Ln(1 + age)</td>
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<tr>
<td></td>
<td>(0.679)</td>
<td>(0.971)</td>
<td>(0.653)</td>
<td>(0.965)</td>
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<tr>
<td>Lev</td>
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<td>(0.939)</td>
<td>(1.008)</td>
<td>(0.830)</td>
<td>(1.023)</td>
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<td>(0.280)</td>
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<td>(0.993)</td>
<td>(0.216)</td>
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<td>Yes</td>
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<tr>
<td>Year Dm</td>
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<td>0.0223</td>
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<tr>
<td>N</td>
<td>567</td>
<td>567</td>
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</table>

Notes: P-value appears between parentheses and the Hazard ratio appears between brackets. This table reports the results for Cox proportional hazard models. Models 1–4 report the results where the dependent variable is the logarithm of the hazard rate, which is based on the delisting event. All other variables are as previously defined. The time to failure is measured as the number of months elapsed between the IPO month and the month in which the firm is delisted from the stock exchanges for negative reasons, mergers and acquisitions, at the request of the company, and any other delisted reasons. The hazard ratio (HR) is calculated as the exponential of the estimated coefficient, exp (β).

*Significantly different from zero at the 10% level.
**Significantly different from zero at the 5% level.
***Significantly different from zero at the 1% level.
This study examines the impact of real and accrual earnings management activities that take place at the end of the IPO year on the probability of IPO failure and survivability in subsequent periods IPO.

**IPO failure** is defined as those IPO firms who delisted from the stock exchange for negative reasons (involuntary delisted) within 5-years post the IPO date.

**Notes:** Figure A1 depicts the time periods when real and accrual earnings management are estimated. IPO failure is defined as those IPO firms that delisted from the stock exchange for negative reasons (involuntary delisted); namely, administration, receivership, liquidation, winding up, and bankruptcy within five years of the IPO year.

**Figure A2.** Survival functions by the aggregate real earnings management (REM_Index).

**Notes:** Figure A2 depicts the survival functions for the IPO sample based on the level of the aggregate measure of real earnings management during the IPO year. Where (REM_Index < 0) represents the conservative IPO group where the aggregate measure of real earnings management during the IPO year is less than zero, and (REM_Index > 0) represents the aggressive IPO group where the aggregate measure of real earnings management during the IPO year is greater than zero.
Figure A3. Survival functions by the abnormal cash flows from operations (ABNCFO).
Notes: Figure A3 depicts the survival functions for the IPO sample based on the level of abnormal cash flows from operations during the IPO year. Where (ABNCFO < 0) represents the conservative IPO group where abnormal cash flows from operations during the IPO year are less than zero, and (ABNCFO > 0) represents the aggressive IPO group where abnormal cash flows from operations during the IPO year are greater than zero.

Figure A4. Survival functions by the abnormal discretionary expenses (ABNDEXP).
Notes: Figure A4 depicts the survival functions for the IPO sample based on the level of abnormal discretionary expenses during the IPO year. Where (ABNDEXP < 0) represents the conservative IPO where abnormal discretionary expenses during the IPO year are less than zero, and (ABNDEXP > 0) represents the aggressive IPO where abnormal discretionary expenses during the IPO year are greater than zero.
Figure A5. Survival functions by discretionary accruals (DISACCR).
Notes: Figure A5 depicts the survival functions for the IPO sample based on the level of discretionary accruals during the IPO year. Where (DISACCR < 0) represents the conservative IPO where discretionary accruals during the IPO year are less than zero, and (DISACCR > 0) represents the aggressive IPO group where discretionary accruals during the IPO year are greater than zero.
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