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Post-listing performance and private sector regulation: The experience of London's Alternative Investment Market[☆]

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ABSTRACT

We investigate the experience of companies listing and raising capital on the AIM, which is privately regulated and relies on Nominated Advisors who compete for listings and provide regulatory oversight. AIM firms underperform newly listed firms on traditionally regulated exchanges based on post-listing returns and failure rates, comparable to firms listing on the unregulated US Pink Sheets, and exhibit abnormally high pre-listing accruals and post-listing reversals. "High quality" auditors and Nomads partially mitigate underperformance, suggesting that AIM firms have limited ability to bond through more stringent oversight. Underperformance is particularly pronounced for firms with higher proportions of retail investors.

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1. Introduction

Traditionally, major exchanges around the world have been subject to centralized governmental oversight characterized by stringent and relatively inflexible regulatory requirements. Increasingly, countries are considering alternative regulatory structures to lower the cost associated with raising capital and permit customization in requirements to fit the needs of specific companies' situations. A primary concern with alternative regulatory structures is that companies can take advantage of limited oversight to exploit investors by raising capital at inflated prices ([Securities and Exchange Commission, 2012](#)).

A leading example of an alternative regulatory approach is the London Stock Exchange's (LSE) Alternative Investment Market (AIM). The AIM provides an interesting regulatory approach for several reasons. First, it aspires to reduce the cost of raising capital by providing customized regulation administered through the private sector. Compared to centrally-regulated

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exchanges such as the NYSE or LSE Main Market, which are typically expensive and inflexible, or unregulated markets such as the Pink Sheets, which may lack investor protection and credibility, the AIM is designed to use private sector regulation to provide oversight comparable to more traditional markets, but with greater flexibility and at a lower cost. Primary oversight is entrusted to Nominated Advisors (“Nomads”) who are chosen by firms and registered with the LSE. As discussed by [Mendoza \(2008\)](#), Nomads “play simultaneously the part of gatekeepers, advisors, and, ultimately, regulators of the AIM.” Explicit listing, regulatory, and disclosure requirements on the AIM are limited relative to other major markets. Moreover, firms have the option to “comply or explain” to their Nomad in order to customize the limited rules to their specific circumstances (for further details, see [Appendix A](#)). Nomads provide flexibility in helping firms decide on which rules to comply with and the manner in which they should be met. Nomads, in turn, face potential disciplinary action from the LSE and the potential loss of reputational capital.

Second, the AIM is designed to attract retail investors. Regulators such as the SEC have traditionally limited alternative regulatory approaches for capital raising to qualified institutional buyers through markets such as the Rule 144a market. These restrictions reflect the presumption that institutional investors are more sophisticated and therefore less reliant on regulatory oversight. The AIM, on the other hand, is designed with the retail investor in mind, including reduced capital gains tax rates for retail investors. The goal is to provide investors with access to “smaller growing companies,” thereby increasing the pool of available capital.

Third, the AIM has been very successful in attracting listings, with over 1700 initial public offerings since 1995. In 2006 firms raised more capital through initial public offerings on the AIM than on the NASDAQ (\$16.2 billion versus \$12.8 billion). Furthermore, a number of US firms have even chosen direct AIM listings, thereby bypassing the US capital markets and securities regulations.

Fourth, the AIM’s success in attracting listings has spawned the launch of similar markets and put pressure on regulators to consider alternative regulatory structures in other countries. For example, “AIMItalia” was launched in Italy in December 2008 and “Tokyo AIM” was launched in Japan in April 2009. Moreover, in April 2012, the US passed the Jumpstart Our Business Startups (JOBS) Act, which significantly altered regulatory oversight for US firms with under \$1 billion of sales. Similar to the AIM, the “CROWDFUND” provision of the JOBS Act exempts many smaller firms from SEC public reporting requirements and, instead, entrusts oversight responsibilities to accredited web portals, much like the Nomads in the AIM market.

The notion of flexible private sector regulation has conceptual appeal. Researchers in law and economics have long debated the benefits of private sector oversight as opposed to centralized regulation (see, for example, [Stigler, 1963](#) and [Peltzman, 1976](#)). More recently, legal scholars such as [Mendoza \(2008, 2011\)](#) and [Litvintsev \(2009\)](#) have argued that there are potential benefits of markets like the AIM arising from increased flexibility and reduced costs of raising capital. However, it is an empirical question how effectively a structure like the AIM’s functions in practice. Oversight on the AIM relies heavily on the Nomads, who compete for listings and are chosen and paid for by the firms, thereby creating potential conflicts of interest. The LSE relies on the threat of fines and other sanctions, as well as potential reputational concerns on the part of Nomads to create incentives for oversight. But sanctions appear to be rare in practice.

Our goal is to provide descriptive evidence on the experience of the AIM by carrying out an empirical analysis of the performance of firms that list and raise capital on the AIM. Following prior literature such as [Stigler \(1963\)](#), [Jarrell \(1981\)](#) and [Simon \(1989\)](#), we focus on capital raising and post-listing performance because a primary goal of securities regulation is investor protection.¹ A concern with unregulated markets is that managers can exploit a lack of oversight to raise capital at elevated prices, resulting in substantial subsequent losses for less sophisticated investors.² Our evidence is necessarily circumstantial with respect to the effect of regulation because, as with the prior literature, we cannot observe the outcome under a different AIM regulatory environment. Further, we recognize that it is dangerous to draw strong inferences from a single exchange. Nevertheless, we believe the AIM is worthy of study, because it provides a unique and interesting setting in which to examine the experience with an alternative regulatory structure.

To construct as complete a sample as possible, we gather data from a variety of sources and address two basic questions: (1) How does AIM post-listing performance compare to traditionally regulated exchanges? (2) What drives cross-sectional variation in AIM firm performance?

We benchmark AIM firms to a matched sample of similar firms that contemporaneously list and raise capital on more traditionally regulated exchanges (i.e., the NASDAQ and OTC Bulletin Board [OTCBB] in the US and the LSE Main Market in the UK). We use a range of comparison venues to ensure that particular types of firms or economic environments do not drive our results. We also control for a range of factors including size, market-to-book, leverage, age, profitability, growth,

¹ The notion that lack of oversight can result in the sale of systematically overpriced securities to unsophisticated investors was inherent in the formation of the SEC and in the regulation of the OTCBB in 1999. Experimental research such as [Forsythe et al. \(1999\)](#), [Bloomfield et al. \(2009a\)](#), and [Bloomfield et al. \(2009b\)](#) suggests that, in the absence of disclosure oversight, investors tend to systematically overpay for securities.

² While post-listing returns are only one potential measure for investigating regulatory oversight, we believe they are a relevant starting point for several reasons. First, regulators clearly care about returns subsequent to capital raising because their primary mandate is investor protection and, absent investor losses, it is difficult to argue that investors have been harmed. Second, investigating regulatory effectiveness by examining returns has a long history in the law and economics literature (see, for example, [Stigler, 1963](#); [Jarrell, 1981](#); [Simon, 1989](#)). Third, returns can be measured consistently across markets, whereas the incidence of identified financial improprieties and scandals will vary based on detection mechanisms and media attention. The disadvantage of using post-listing returns is that the underlying cause is more difficult to infer.

industry, and year of listing. In addition, we split our sample between local listings, foreign listings, and US direct listings into London to shed light on the concern that non-US, non-UK, and even US firms choose the AIM in lieu of listing on US exchanges. Finally, we examine the results year-by-year to ensure that particular economic cycles do not drive our results.

Overall, our results suggest striking underperformance by firms listing and raising capital on the AIM relative to more traditionally regulated exchanges. Controlling for a variety of factors, AIM firms' post-listing returns are significantly lower than the post-listing returns of our benchmarked sample of firms listing on traditionally regulated exchanges.³ This underperformance is economically substantial and is consistent relative to each of our comparison exchanges (LSE Main Market, NASDAQ and OTCBB) and for both domestic and foreign firms. AIM firms underperform the control firms for 13 of the 14 years in our sample period, suggesting that the results are pervasive and not unique to specific macroeconomic cycles.⁴

While the preceding suggests that AIM firms perform poorly on average, the possibility exists that the AIM market provides access to an unusually large pool of “high-flier” stocks. In particular, some commentators assert that the AIM provides small investors with the opportunity to gain access to a significant number of high performance firms that might otherwise be available only to venture capitalists (for a discussion, see [Litvintsev, 2009](#)). Inconsistent with this explanation, compared to our benchmark sample, we find that the AIM has significantly fewer firms that increase substantially in price following the IPO.⁵

Proponents of the AIM also assert that it is a stepping stone to more established markets such as the LSE's Main Market (e.g., [Arcot et al., 2007](#)). Conversely, we find that firms are far more likely to move down from the Main Market to the AIM than the reverse. More generally, we investigate, across exchanges, the frequency with which firms delist after substantial stock price increases. To the extent that a particular exchange has a larger number of successful stocks graduating to higher profile exchanges or being acquired at a premium, we expect a higher frequency of positive returns prior to delisting. Relative to the AIM, we find that firms in our benchmark sample are significantly more likely to delist following positive returns. Further, controlling for other potential determinants of delisting, we find that AIM firms are much more likely to fail than are firms on other markets.

Next, we examine whether the observed underperformance of AIM firms could reflect limited regulatory oversight. In particular, we benchmark AIM firms to firms listing on the “Pink Sheets” market in the US. Firms on the Pink Sheets are not required to be SEC registrants, are limited in terms of permitted capital raising and share ownership, and are viewed as “among the riskiest investments” by the SEC (<http://www.sec.gov/answers/pink.htm>). We find that AIM firms perform slightly worse than even Pink Sheets firms, which again suggests that the AIM registration process provides limited oversight. We also compare our results to the findings in prior research on venture capital and private equity ([Harris et al., 2012](#)). Comparisons with results in [Harris et al. \(2012\)](#) indicate that AIM firms significantly underperform relative to private equity and venture capital, suggesting that the performance we document is not simply endemic to risky, early-stage firms.

We also examine changes in performance on the AIM around changes in AIM regulation. In particular, the AIM tightened regulatory oversight of “cash shells” in 2005 and of Nomads in 2007. We find that the performance of cash shells improved following the tighter regulation in 2005, and that the overall performance of AIM IPOs improved following the improved oversight of Nomads in 2007. However, even after these improvements, AIM IPOs continue to underperform the matched sample.

We next explore a variety of factors that can provide insight into the causes and consequences of AIM firms' poor post-listing performance. First, we compare AIM firms that list and raise capital to firms that list without raising capital. While there are also incentives for non-capital raising firms to increase share price (e.g., to allow blockholders to exit positions through the secondary market), incentives to inflate price are likely to be particularly pronounced if a firm raises capital as part of the listing. Consistent with underperformance being related to the stronger incentives to increase share price faced by capital raising firms, we find that AIM firms that raise capital as part of the listing process significantly underperform AIM firms and benchmark firms that do not raise capital, and that the underperformance for capital raising firms on the AIM is significantly more pronounced relative to firms on other exchanges.

Second, we examine discretionary accruals around the IPO. Prior literature suggests that firms manage accruals around capital raising (e.g., [Teoh et al., 1998a](#)). Our results suggest that, relative to the control sample, AIM firms are more likely to

³ Systematic negative post-listing returns on the AIM are consistent with the notion that AIM firms issue shares at inflated prices. This could be either because of self-selection (i.e., firms pass themselves off as stronger than they actually are) or adverse selection (i.e., managers take unanticipated post-listing actions that are not in the shareholders' best interests). In either case, underperformance suggests that investors are systematically “fooled,” which is consistent with the combination of limited oversight and the prevalence of small, unsophisticated investors on the AIM. While it may seem surprising that such underperformance can persist, similar underperformance is observed in unregulated environments in other settings (e.g., the “Pink Sheets” in the US) and is a major motivation for regulation (e.g., the formation of the SEC and its regulation of the OTCBB in 1999) ([WSJ, 9/4/1997](#); [WSJ, 12/9/1997](#)). There is a substantial body of empirical literature suggesting that individual investors systematically underperform and that that behavior persists over time (see, for example, [Forsythe et al., 1999](#); [Barber and Odean, 2008](#)) because learning may be incomplete and new investors continue to enter the market.

⁴ It is important to note that fundamental attributes of firms choosing the AIM (e.g., profitability, risk, etc.) should not explain the return underperformance absent mispricing. First, with sufficient information, investors should price firms appropriately given their fundamentals and, if anything, riskier firms should yield higher average returns. Second, results are robust to controls and matching on a wide variety of fundamental attributes (size, industry, profitability, leverage, age, growth, etc.) suggesting that underperformance reflects mispricing rather than fundamental differences in firm characteristics.

⁵ This finding mitigates the concern that our results reflect the possibility that investors prefer assets with lottery-like payoffs ([Thaler and Ziemba, 1988](#)). Our results suggest that traditional exchanges are a better bet even for investors who prefer a small probability of a large payoff.

record positive discretionary accruals at the IPO, and that there is a significantly larger accrual reversal subsequent to the IPO (Dechow et al., 2012). Further, the extent of post-IPO returns underperformance is more strongly correlated with increases in discretionary accruals for AIM firms than for the control sample, suggesting that AIM firms exploit limited oversight to manage earnings.

Third, we examine whether firms are able to voluntarily bond to greater oversight through their choice of Nomad and auditor. One argument in favor of a private regulatory structure is that it offers firms the opportunity to substitute private, potentially less expensive, oversight for more formal regulation. We split AIM firms on several characteristics including whether the Nomad is the firm's market maker and the performance of the Nomad's prior listings. Our results suggest that performance is better in cases in which the Nomad's prior listings have performed well and that "Big-5" auditors play a particularly important oversight role on the AIM relative to other exchanges. However, our results suggest that the oversight is incomplete and that even firms with high quality auditors and Nomads underperform firms on traditionally regulated exchanges, suggesting that oversight choices by firms only partially substitute for centralized regulatory oversight.

Finally, we examine differences in AIM firm performance based on a measure of retail investor ownership. To the extent that individual investors are, on average, unsophisticated, we would expect underperformance to be most pronounced for firms with a greater proportion of retail investors. Further, regulators tend to be particularly focused on protecting retail investors because they have limited resources and sophistication to evaluate the merits of potential investments. Using data on ownership through brokerage accounts, we find that post-listing performance is particularly poor for AIM firms with higher levels of retail investor ownership.

It is important to be clear about what can and cannot be taken away from our results. We believe that the AIM is an interesting regulatory setting for academics and policy makers, and therefore worthy of study. Yet, it is important to emphasize that the AIM is a unique setting and it is dangerous to draw broader inference. For example, one might argue that a similar venue in the US would perform differently because litigation risk would further discipline Nomads. Furthermore, drawing a causal link from regulation to performance is difficult because we cannot observe the counterfactual outcome. We attempt to carefully control for other factors, but in the end our results should be viewed as descriptive.

In the next section we provide background information on the AIM, followed by a discussion of the related literature. We then discuss our sample and results and, finally, provide conclusions and caveats.

2. Background

While several countries have experimented with low-regulation markets, the experience has been mixed. For example, prior to the SEC's increased regulation, the penny stock market was perceived to be marred by frequent fraud and asset expropriation (Goldstein et al., 1992) leading many legitimate companies to avoid the market altogether. Similarly, many of the European "New Markets" failed in the wake of the technology bubble (Goergen et al., 2003).

The design of the AIM differs from these previous exchanges in that its goal is not to reduce oversight, but rather to shift it to the private sector by enhancing the role of gatekeepers. As discussed in Litvintsev (2009), the AIM is an "Exchange Regulated Market," meaning that it is regulated by its parent organization, the LSE, rather than a formal regulatory agency.⁶ As a consequence, the LSE establishes the regulatory structure of the AIM independent of the EU Investment Services Directive that provides the regulatory structure for traditional European exchanges.⁷ In place of standardized regulatory requirements, the LSE delegates oversight of AIM firms to Nomads who in turn determine the appropriate level of oversight. Nomad reputations are potentially at stake, as well as their ability to continue to oversee firms because they can be decertified by the LSE. As a result, it is up to the Nomad, in conjunction with the firm, to provide an appropriate degree of oversight (Mendoza, 2008).

This regulatory structure can be cost effective for the firm in several ways. First, in terms of direct costs, the Nomad can relax disclosure, auditing, and governance standards as it deems appropriate.⁸ Consequently, public disclosure and oversight can be customized for the specific firm. Second, indirect costs can be lower than on traditional exchanges because public disclosure of proprietary information can be limited, as can the amount of time and effort required by management in obtaining the listing. At least in theory, public disclosure can be replaced by private disclosure to the Nomads who publicly attest to firm quality.

On the other hand, the lack of a formal regulatory structure means that the effectiveness of oversight hinges on the role of the Nomad. The Nomad relationship is complicated by the fact that the Nomad is hired and paid by the listing firm. Furthermore, the requirements for admission as a Nomad are quite light. Hence, it is unclear how much oversight Nomads

⁶ The Main Market of the London Stock Exchange, on the other hand, is a traditionally regulated exchange, falling under the jurisdiction of the UK's Financial Services Authority (FSA).

⁷ This exemption from the EU Investment Services Directive generated controversy in Europe. The Europeans have noted that the AIM's exemptions appear inconsistent with the push toward regulatory harmonization in the EU, while the chief executive of the LSE accused Europe of "jealousy" (Armitstead, 2010).

⁸ For example, Mendoza (2008) estimates that the initial costs of a \$50 million public offering would be about \$4,472,000 on the NASDAQ versus \$3,426,300 on the AIM and, more importantly, the ongoing annual costs would be \$2,017,500 on the NASDAQ relative to \$147,300 on the AIM, with the difference primarily attributable to reduced ongoing regulatory compliance costs.

provide in practice. As noted by Taylor (2009), “in AIM’s 14-year existence, only four companies quoted on the market have been publicly censured, with just one fined.”

In theory, Nomads can be fined for a lack of due diligence, but such fines are also rarely imposed. The first fine was in 2007 for £250,000 for the Nomad Nabarro Wells for failing to undertake the necessary level of due diligence in bringing Crown International to market. Crown International claimed £365 million of cash, which did not exist. The only other fine we are aware of was in 2009 for £225,000 in the case of the Nomad Blue Oar Securities, related to the AIM listing of the Worthington Nicholls Group, which was found to have made deceptive statements.⁹ Nevertheless, major commercial banks (e.g., Citigroup, Credit Suisse, Deutsche Bank and ING), major investment banks (e.g., Merrill Lynch, Morgan Stanley and Goldman Sachs) and affiliates of major audit firms (e.g., PricewaterhouseCoopers, Deloitte and KPMG) serve as Nomads, so reputational concerns may, at least for some Nomads, provide incentives for greater oversight.

In the end, the effectiveness of the AIM’s regulatory structure is an open empirical question. Given the lower level of mandated regulation and disclosure, unscrupulous managers might be attracted by the prospect of being able to raise capital at an inflated price. On the other hand, given that the Nomads’ and the LSE’s reputations are potentially at stake, and that Nomads ostensibly require access to private information, the AIM might attract high quality firms for whom the costs associated with standardized disclosure are prohibitive.

3. Related literature

While there is substantial discussion of the pros and cons of the AIM’s regulatory environment in the business press and legal literature, there is little large sample empirical evidence and most of the existing research focuses on limited contexts. There are, however, several related streams of literature.

First, several studies discuss broad regulatory issues related to US competitiveness and, in particular, the underperformance of US exchanges relative to the AIM in attracting listings. For example, in its report on “The Competitive Position of the U.S. Public Equity Market,” the Committee on Capital Markets Regulation argues that the US’s public market share of global offerings has decreased over time and discusses potential reasons for the decline, including regulatory hurdles (Committee on Capital Markets, 2007). Similarly, the report commissioned by US Senator Charles Schumer and New York City Mayor Michael Bloomberg, “Sustaining New York’s and the US’s Global Services Leadership,” provides evidence that the US’s leading role in financial services has waned, arguing that it has been, at least in part, due to regulatory issues (Bloomberg and Schumer, 2007). However, neither of these reports directly examines the characteristics or relative performance of firms choosing to list on various exchanges and private markets.

Piotroski and Srinivasan (2008) and Doidge et al. (2009) provide empirical evidence on the cross-listing choices by non-US, non-UK firms to address the question of whether the US lost listings to the UK markets due to SOX. The general conclusion of these papers is that, overall, there is relatively little evidence that SOX affected cross-listing choices by firms choosing between the Main Market of the LSE and the major U.S. exchanges (NYSE and NASDAQ). Piotroski and Srinivasan (2008), however, provide evidence that some small firms may have chosen the AIM over US exchanges. These studies only consider listing choices by non-US, non-UK firms on US versus UK exchanges and do not focus on the performance of firms choosing the AIM relative to other markets.

Bauer and Boritz (2006) discuss the history and performance of the AIM in attracting listings and compare it to the Toronto Stock Exchange, with a particular emphasis on Canadian stocks that listed on the AIM. Vismara et al. (2012) explain the motivation for Europe’s “second markets” and why many of them have failed, and document that the probability of takeover for firms listed on these exchanges is higher but also that the long run performance is weak. Campbell and Tabner (2011) and Jenkinson and Ramadorai (2008) both document that AIM stocks moving to the Main Market experience positive returns when the decision is announced, opposite to stocks moving in the other direction, consistent with greater bonding on the Main Market. Espenlaub et al. (2008) examine determinants of survival times for firms listed on the AIM and find that survival probability is lower for firms that are young, small and in high technology industries. Overall, this research neither directly compares the characteristics and outcomes for firms opting to list on the AIM relative to matched samples of firms listing on the LSE or in the US, nor examines the causes and mitigating factors for underperformance or the differential effects of underperformance between different investor clienteles, which are primary focuses of our study.¹⁰

More generally, there is limited research on regulatory environments and investor protection outcomes (in fact, Healy and Palepu (2001) conclude that “empirical research on the regulation of disclosure is virtually non-existent”). Stigler (1963) and Jarrell (1981) examine changes in post-listing returns around the Securities Act of 1933 and argue that there is limited evidence of improvements following SEC regulation. Using short event windows, Greenstone et al. (2006) document positive returns for firms most affected by the 1964 amendments to the Securities Act, and Bushee and Leuz (2005) document positive returns and increases in liquidity for firms newly compliant with the 1999 requirement that OTCBB firms

⁹ Critics of the AIM’s regulatory structure include John Thain, former chief executive of the NYSE, who stated that the AIM “did not have any standards at all and anyone could list,” and SEC commissioner Roel Campos who commented that the AIM included “issuers who can’t even meet the standards of our over-the-counter, or pink sheet, situations. They’re hoping that they’ll get lucky and investors will look at this lower-standard exchange” (Bawden and Waller, 2007).

¹⁰ Other papers examining markets for early-stage firms find mixed evidence. Mahéroul and Belletante (2004) and Locke and Gupta (2008) provide evidence of underperformance for early-stage listings in France and New Zealand, respectively, but Carpentier et al. (2010) finds no evidence of underperformance for early-stage listings in Canada.

register with the SEC. Relative to that literature, our contribution is in documenting differences in post-listing performance for the AIM relative to more traditionally regulated markets and assessing factors which help to mitigate underperformance.

4. Research design and sample

Our main set of analyses compares our sample firms with firms listing on three other regulated markets, the LSE Main Market, NASDAQ and the OTCBB. We focus on these three markets because we are interested in benchmarking AIM firms with firms that choose to list on exchanges that have more traditional regulatory environments.¹¹ We choose exchanges in the UK and US because of their similar underlying economics and regulation and because they constitute much of worldwide turnover. In addition, the US and UK are primary competitors for listings. The inclusion of the LSE Main Market helps ensure that our results for the AIM do not simply reflect UK-specific effects. We exclude the NYSE/AMEX because there is relatively little overlap with the AIM in terms of firm characteristics.

4.1. Sample construction

We construct our sample from a variety of publically available sources, depending on the exchange. To collect our sample of AIM firms, we first obtain a comprehensive historical list of all firms listing on the AIM from the inception of the market on June 27, 1995 until December 31, 2008 from the LSE's website (www.londonstockexchange.com/statistics/companies-and-issuers). The LSE's comprehensive "Admissions Summary" shows 1751 firm IPOs (692 non-capital raising initial listings) on the AIM during our sample period. We eliminate 64 (10) issuances that are not equities, 17 (45) firms we were unable to identify on Datastream, 10 (35) duplicate listings, and 59 (29) firms that have missing or incomplete Datastream returns data. Overall, of the 1677 unique equity IPOs on AIM (647 non-capital raising initial listings) during our sample period, we include in our sample 1601 (573) firms for a coverage rate of 95.5% (88.6%).

We focus on listings that involve capital raising because capital raising creates unique incentives. Specifically, the incentives to inflate share price are particularly pronounced around capital raising events because the existing shareholders benefit directly from higher proceeds. Further, regulators are clearly interested in capital raising events because money is being directly invested by the public and, as a consequence, special regulatory constraints are typically applied to capital raising firms.

To provide a basis for comparison, we next construct a sample of firms that listed and raised capital on the LSE Main Market and the NASDAQ over the period from June 1995 through the end of 2008 and on the OTCBB over the period January 1999 through the end of 2008. To compile the sample of LSE Main Market firms, we use procedures similar to those used to construct our AIM sample. We use Thomson Reuter's Datastream database to compile our sample of NASDAQ and OTCBB firms. This sample includes all available firms listing for the first time and raising capital on these exchanges with the necessary data to calculate the descriptive statistics in Table 2. Data requirements lead to a set of 3406 firms (LSE Main Market, 323 firms; NASDAQ, 2487 firms; OTCBB, 596 firms).

4.2. Listings and capital raising

Table 1 presents descriptive statistics for new listings that raised capital on the AIM. This table illustrates why the AIM intrigues regulators and exchanges around the world. In particular, there has been a strong trend of increased listing on the AIM over time. There was an almost four-fold increase in new listings that raised capital between 2003 and 2004 (62–224).

Table 1 also presents descriptive statistics for listings on the other exchanges. Compared to the LSE Main Market, there are more new listings on the AIM in every year. Compared to the NASDAQ, there are generally fewer new listings on the AIM for the first part of the sample (1995–2003). However, starting in 2004, each year there are more new listings on the AIM than on NASDAQ. Listings on the regulated OTCBB begin in 1999. For every year except 1999 and 2008, new listings on the AIM exceed those on the Bulletin Board.

In addition, Table 1 compares the capital raised for new issues on the AIM with the capital raised for new issues on the LSE Main Market, NASDAQ and the OTCBB. In terms of total capital raised on the AIM, the first year of the exchange is the lowest (\$102 million) and 2006 is the highest (\$14.2 billion). The year 2008 shows a sharp drop in total capital raised, likely reflecting the effects of the worldwide financial crisis. The total capital raised by new listings on the AIM is higher in 2006 than the amount raised on NASDAQ (\$14.2 billion versus \$12.8 billion) and higher than the total capital raised on the LSE Main Market (\$9.3 billion versus \$8.7 billion) in 2005. With respect to the OTCBB, for the latter period of 2000–2007, total capital raised is higher for the AIM.¹²

The preceding descriptive evidence illustrates a surge in AIM listings and demonstrates why the AIM has attracted increased attention over time. Although firms listing on the AIM are relatively small compared to firms listing on the LSE Main Market and NASDAQ, similar amounts of total capital have been raised on the AIM in recent years.

¹¹ While firms in our sample are choosing to list on the AIM, it is not our intent to imply that alternatives the firms might consider are limited to the exchanges in the control sample. For example, for a small young UK firm, the choice may be listing on the AIM as opposed to seeking venture capital. Rather, our intent is to examine whether firms that list on the AIM underperform relative to firms listing on exchanges with more traditional regulation.

¹² OTCBB firms are only allowed to directly raise \$1 million through a listing. They are, however, allowed to raise capital with a concurrent private placement. Given that we measure capital raised using data from cash flow statements, we capture such private placements.

Table 1

Comparison of new listings.

This table presents new listings and total capital raised by firms that listed and raised capital on the AIM, the LSE Main Market, and the NASDAQ over the period June 1995 through December 2008 and on the OTC Bulletin Board over the period during which it was regulated by the SEC (January 1999 through December 2008). Total capital raised is denominated in millions of US dollars.

Year	AIM		LSE Main Market		NASDAQ		OTCBB	
	Listings	Capital (\$)	Listings	Capital (\$)	Listings	Capital (\$)	Listings	Capital (\$)
1995	15	102	10	1068	163	5576	0	0
1996	87	743	36	4833	355	15,254	0	0
1997	64	450	39	7292	293	11,500	0	0
1998	33	216	27	8821	239	9516	0	0
1999	52	385	18	4569	377	34,092	133	2297
2000	165	1978	51	10,283	267	33,499	36	746
2001	87	599	8	9347	61	3582	36	53
2002	56	637	14	4983	70	4102	39	64
2003	62	1552	7	3281	64	3799	33	286
2004	224	4232	20	4707	167	13,249	46	306
2005	311	9257	21	8668	132	9703	75	340
2006	249	14,157	33	27,167	141	12,838	76	372
2007	164	9824	34	21,503	136	15,669	73	341
2008	32	1096	5	4927	22	1943	49	87
Total	1601	45,228	323	121,449	2487	174,322	596	4892

4.3. Matched sample

To benchmark the performance of AIM firms, we follow the approach recommended in Barber and Lyon (1997) and match each AIM firm to a similar firm that listed for the first time and raised capital on the LSE Main Market, the NASDAQ, or the OTCBB. We use a one-to-one matching algorithm that selects for each AIM firm, from the universe of possible control firms (i.e., the full population of firms from the LSE Main Market, NASDAQ and OTCBB), the firm that is the closest match based on size and listing date.¹³ We require that each benchmark firm have a market value of listing within \pm \$25 million and a listing date \pm 1 year from its corresponding matched AIM firm. We exclude AIM firms without a valid match from the sample. We successfully match 1241 out of the total 1601 AIM firms.¹⁴

4.4. Descriptive statistics

Our first set of primary analyses compares post-listing returns for firms that listed and raised capital on the AIM relative to the other regulated markets. Barber and Lyon (1997) suggest that, in order to eliminate potential biases in the calculation of long-window abnormal returns, assessments of long-window abnormal return performance should be based on a matched pairs approach. This approach entails estimating a firm's abnormal return performance by taking the difference between the buy-and-hold return for a sample firm and a control firm matched on firm characteristics. To measure post-IPO performance, we calculate 12-, 18- and 24-month buy-and-hold returns and base our inferences on the difference between AIM firms and the benchmark sample. To ensure our performance measures are not influenced by extreme return observations, we winsorize firm-level returns at the 99th percentile of AIM returns.¹⁵ Because our primary data source for returns (Datastream) does not provide delisting returns, we set all delisting returns equal to -100% .¹⁶

¹³ Barber and Lyon (1997) also recommend matching based on market-to-book. As discussed later, we replicate our analysis using a variety of alternative matching criteria, including: relative size, market-to-book, leverage, and propensity matching based on a variety of firm-specific characteristics, with very similar results. However, matching based on these additional variables significantly reduces our sample size. To better facilitate a comprehensive assessment of the performance of AIM firms, we match based only on size and listing date in our primary analysis.

¹⁴ In untabulated tests, we compare the AIM firms that we are able to match with the firms that we are unable to match. While the matched firms are larger than the unmatched firms, there are no significant differences at either the mean or the median between the two groups with respect to subsequent return performance.

¹⁵ We chose to limit the influence of these extreme return observations because they likely represent errors in our primary data source (Datastream) and we were unable to find an alternate source to crosscheck returns. Note that, because it explicitly prohibits benchmark firms from having a return larger than the largest AIM firm return in our sample, winsorizing at the 99th percentile of the distribution of AIM firm returns biases against finding underperformance on the AIM. Results are robust to alternative levels of winsorizing (2.5% and 5%), not winsorizing, winsorizing only the benchmark firms, and to using log returns. Throughout our analyses when we refer to "robust" or "similar" results, we mean that the relations remain statistically significant with comparable coefficient estimates.

¹⁶ Results are robust to setting delisting returns equal to -55% as per Shumway and Warther (1999), 0%, or eliminating delisting days entirely. Our approach should bias against finding underperformance on the AIM because it assumes that reasons for delisting are similar between AIM and control

Table 2 Panel A presents descriptive statistics for the entire AIM sample. In general, AIM firms are relatively small with a mean (median) market value at listing of \$79.6 million (\$32.3 million) and have negative return performance at both the mean and median over the 12-, 18-, and 24-months after listing. Table 2 Panel B compares the matched sample of AIM and control firms. In terms of size, AIM firms are not significantly different from the control group at both the mean (\$91.3 million versus \$91.5 million) and median (\$35.3 million versus \$34.5 million). AIM firms significantly underperform the control group at all three return windows at both the mean and median.¹⁷

In terms of matching, the 1241 AIM firms are matched with 71 firms that listed on the LSE Main Market, 688 firms that listed on the NASDAQ, and 482 firms that listed on the OTCBB. With respect to performance, untabulated results indicate that AIM firms underperform their benchmark firms on each of the three control exchanges (LSE Main Market, NASDAQ, and OTCBB) at the mean and the median, suggesting that the conclusions for the sample as a whole are not sensitive to the exchange match chosen or the portion of the distribution considered. These results suggest that the AIM firm underperformance is not driven by firm size, country factors or other exchange-specific features (other than overall regulatory environment).

5. Performance compared to the benchmark sample

5.1. Multivariate returns analysis

Our returns analysis is motivated both by regulatory concerns and by the literature on IPO long run performance summarized in Ritter and Welch (2002). While the specific reason for systematic returns underperformance by firms following listings is not well understood, it appears to be related to managerial incentives to artificially increase the offering share price in order to reduce cost of capital. A substantial body of research (see Ritter and Welch, 2002, for a summary) suggests that post-IPO underperformance is mitigated by effective oversight. These findings are consistent with the notion that, absent significant oversight, managers are able to raise capital at inflated prices, leading to subsequent underperformance. This is clearly a concern to regulators, particularly in markets with significant retail investor participation.

We test for differences in performance between the matched sample of AIM and control firms using ordinary least squares regressions in which the dependent variable RET_i is the 12-, 18- or 24-month (depending on the specification) buy-and-hold return calculated from the price at the end of the firm's first day of trading through the end of the specified return window. For control variables, we include $\ln(\text{Market Value at Listing})$, Market-to-Book , and Leverage . We also include year and industry fixed effects in all specifications to control for general macroeconomic and industry-wide return trends but, for parsimony, do not report the coefficients.

Table 3 Panel A reports results for the multivariate comparisons of the 12-, 18- and 24-month post-IPO buy-and-hold returns for the matched sample. The first three columns present results that include only the log of market value at listing as a control variable (which permits a broader sample of firms) and the last three columns include in addition the market-to-book ratio and the leverage ratio. For the sample as a whole, large firms underperform small firms, so results are unlikely to be driven by the fact that AIM firms are, on average, small firms (although not smaller than their matched counterparts). In addition, industry effects are controlled by inclusion of fixed effects, so results should not reflect differences in industry concentration.

Most importantly, in terms of our primary comparisons of interest, the coefficient on the AIM indicator suggests that post-IPO returns for firms listed on the AIM are significantly lower than returns for the control sample. After 12 months, AIM firms underperform benchmark firms by 28.6–33.5 percentage points. Moreover, this underperformance continues out to 24 months after listing (42.7–46.2 percentage points). While the underperformance in Table 3 Panel A is substantial, the magnitude is consistent with that reported in Vismara et al. (2012) (Table 5). They report underperformance for AIM IPOs of 27.5 percentage points in the three years after issuing and of 45.7 percentage points in the five years after issuing, using the FTSE Euromid index as a benchmark.

Table 3 Panel B depicts the performance of the AIM relative to the benchmark sample on an annual basis by plotting the coefficient on the AIM indicator variable from our primary regression specification (Table 3 Panel A, column 5) estimated for each sample year. AIM firms underperform the benchmark sample in 13 of 14 years and the underperformance shows little evidence of pronounced trends or waves in performance over our sample period.¹⁸

(footnote continued)

firms when, as our subsequent analysis indicates, AIM firms are more likely to delist for "bad" reasons (i.e., failure and following periods of negative return performance).

¹⁷ Although the positive average returns for our benchmark sample might seem surprising in light of prior research that, in a U.S. context, finds IPO firms underperform (e.g., Ritter, 1991), it is important to emphasize that the returns reported in Table 2 are unadjusted. For illustrative purposes, we compare the returns of our benchmark sample to an updated version of the 3-year post-IPO buy-and-hold return for U.S. firms from Ritter and Welch (2002) reported on Jay Ritter's website: (<http://bear.warrington.ufl.edu/ritter/IPOs2012Statistics.pdf>). The average unadjusted 3-year post-IPO buy-and-hold return for our benchmark sample is 5.9% (untabulated). Over the same horizon (1995–2008), Ritter reports average unadjusted IPO returns of 13.0%. Using a market-adjustment based on the CRSP value-weighted index of AMEX, NASDAQ and NYSE, Ritter reports an average market-adjusted 3-year post-IPO buy-and-hold return of –8.6%. Using the same market returns, the average market-adjusted 3-year post-IPO buy-and-hold return for our Benchmark sample is –15.8%. Differences between returns for our control sample and the Ritter sample likely reflect our matching criteria. However, the fact that returns for our control firms are lower than those in the Ritter analysis biases against finding underperformance for the AIM firms.

¹⁸ The only year the AIM does not underperform the benchmark sample is 2008. Given that the sample size for 2008 is only 32 firms (less than 2% of our sample) and the post-listing period includes the financial crisis, we are hesitant to draw strong inferences from 2008. In addition, although there does appear to be some improvement in the relative performance of the AIM from 2005–2008, it is difficult to discern a pattern over the full history of the AIM

Table 2

Descriptive statistics for characteristics of firms that listed and raised capital.

This table presents descriptive statistics for the full sample of firms that listed and raised capital on the AIM over the period June 1995 through December 2008, the matched sample of AIM firms that raised capital and the matched firms that listed and raised capital on the LSE Main Market, the NASDAQ, and the OTC Bulletin Board over the period during which it was regulated by the SEC (January 1999 through December 2008). Panel A presents descriptive statistics for the full sample of AIM firms. Panel B presents descriptive statistics for the AIM and pooled sample of benchmark firms, where the benchmark sample is constructed using a one-to-one matching algorithm. This procedure selects for each AIM firm, from the universe of possible control firms (i.e., the full population of firms from the LSE Main Market, NASDAQ and OTC Bulletin Board exchanges) the firm that is the closest match based on size and listing date. We require that each benchmark firm have a market value of listing within \pm \$25 million and a listing date \pm 1 year from its corresponding matched AIM firm. AIM firms without a valid match are excluded from the sample. We winsorize the buy-and-hold returns at the 99th percentile of the AIM returns and set delisting returns equal to -100% . Market value at listing is the market value of the firm's common equity at the end of the first day of trading and is in millions of US dollars. Market-to-Book is the firm's market value of common equity divided by its book value of common equity, calculated as of the end of the prior fiscal year. Leverage is the firm's total liabilities divided by total assets, calculated at the end of the prior fiscal year. Brokerage Ownership is the percentage of shares outstanding held in "Execution Only" and "Full Service" stockbroker accounts immediately after the public offering.

Panel A: AIM full sample							
Exchange	Variable	N	Mean	Std. dev.	25th Pct.	50th Pct.	75th Pct.
AIM	12 month return	1601	-0.130	0.629	-0.552	-0.185	0.130
	18 month return	1601	-0.211	0.774	-0.775	-0.377	0.066
	24 month return	1601	-0.305	0.832	-0.906	-0.559	-0.012
	Market Value at listing	1601	79.560	146.991	13.054	32.279	73.257
	Market-to-Book	1358	4.188	4.408	1.554	2.743	4.904
	Leverage	1358	0.314	0.258	0.093	0.251	0.482
	Brokerage Ownership	507	7.480	9.636	1.738	4.280	9.926
Panel B: Matched sample							
Exchange	Variable	N	Mean	Std. dev.	25th Pct.	50th Pct.	75th Pct.
AIM	12 month return	1241	-0.126	0.634	-0.555	-0.180	0.123
	18 month return	1241	-0.216	0.772	-0.776	-0.385	0.047
	24 month return	1241	-0.308	0.835	-0.908	-0.566	-0.028
	Market Value at listing	1241	91.315	156.647	14.120	35.313	95.030
	Market-to-Book	1016	4.126	4.324	1.534	2.739	4.785
	Leverage	1016	0.319	0.255	0.098	0.252	0.497
	Matched sample	12 month return	1241	0.212	0.893	-0.365	0.028
18 month return		1241	0.197	1.066	-0.542	-0.034	0.566
24 month return		1241	0.158	1.121	-0.660	-0.111	0.510
Market Value at listing		1241	91.456	157.288	12.260	34.490	99.030
Market-to-Book		1016	4.797	6.653	0.952	1.822	5.031
Leverage		1016	0.971	2.257	0.233	0.600	0.886

5.2. Robustness tests

We next evaluate the sensitivity of these results to a battery of alternative specifications and estimation windows. The results presented in Table 3 are limited to AIM firms for which we could find matches. In Table 4 Panel A, we re-estimate the regressions including all 1601 AIM firms and all potential benchmark firms. The point estimates and significance on all of the AIM coefficients are almost identical to those for the matched sample.

To further bolster the comprehensiveness of our AIM sample coverage, we hand collect monthly prices from data provided on the LSE's website for an additional 42 of the 76 missing firms (increasing our coverage to 98% of all unique AIM IPOs over our sample period). Results including these additional firms (untabulated) are very similar to those in Table 4 Panel A. However, because the variable measured in this data source differs from that used in our main analysis and it is not possible to correct for dividends, splits and share repurchases, we do not include these firms in our primary analyses.

Table 4 Panel B presents several alternative regressions that further explore the specification and estimation window presented in Table 3. Ritter (1991) examines IPO performance for three years after the IPO. Column (1) therefore presents our baseline regression using 36 months of returns after the IPO. For this regression, the coefficient on AIM is similar in magnitude (-0.415) to the estimates presented in Table 3.

In our matching algorithm, we required that matched firms be within \pm \$25 million in size. In column (2), we examine whether our results are sensitive to matching based on relative size, as suggested in Barber and Lyon (1997). To do so, we

(footnote continued)

that suggests investors might be "learning" about the persistent underperformance over time. One potential reason for the consistent underperformance is that new retail investors are continually entering the market and the underperformance of the AIM has not yet been well documented.

Table 3

Multivariate comparison of returns.

This table presents estimates of ordinary least squares regressions that compare the buy-and-hold returns for firms that listed and raised capital on the AIM versus the benchmark sample of firms from the LSE Main Market and the NASDAQ over the period June 1995 through December 2008 and from the OTC Bulletin Board over the period during which it was regulated by the SEC (January 1999 through December 2008). Panel A presents results using a pooled regression specification. Panel B plots the coefficient of the AIM indicator in an annual regression of 18-month buy-and-hold returns on an AIM indicator and controls for Market Value at Listing, Market-to-Book, Leverage and industry fixed effects. In all specifications, the benchmark firm indicator is the omitted variable. We winsorize returns to the 99th percentile of AIM returns and set delisting returns equal to -100% . $*p < 0.10$, $**p < 0.05$, $***p < 0.01$ (two-sided test). In Panel B, bars with a solid fill indicate that the coefficient on the AIM indicator is statistically significant ($p < 0.10$).

Panel A: Matched sample buy-and-hold returns						
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	−0.096*** (0.013)	−0.099*** (0.016)	−0.082*** (0.016)	−0.075*** (0.014)	−0.089*** (0.018)	−0.067*** (0.018)
Market-to-Book				0.020*** (0.004)	0.009** (0.005)	0.009* (0.005)
Leverage				0.020 (0.016)	0.009 (0.021)	0.017 (0.022)
AIM	−0.335*** (0.032)	−0.428*** (0.038)	−0.462*** (0.040)	−0.286*** (0.036)	−0.399*** (0.044)	−0.427*** (0.047)
Intercept	0.961*** (0.116)	1.071*** (0.153)	1.056*** (0.192)	0.660*** (0.176)	0.751*** (0.144)	0.788*** (0.146)
Observations	2482	2482	2482	2032	2032	2032
Adjusted R-squared	0.158	0.168	0.168	0.155	0.155	0.162
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Matched sample by year						
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Relative AIM Performance by Year

Year	Relative AIM Performance (%)
1995	-30.0
1996	-35.0
1997	-55.0
1998	-38.0
1999	-33.0
2000	-42.0
2001	-58.0
2002	-33.0
2003	-55.0
2004	-28.0
2005	-62.0
2006	-38.0
2007	-22.0
2008	8.0

match based on size relative to the mean AIM firm, require that matches are within 10%, and present results for the 18-month return window.¹⁹ Once again the coefficient on AIM (-0.377) is similar in magnitude to the coefficients presented in Table 3.

Next, we examine whether our results are robust to estimating the regressions based on the median instead of mean. In column (3) we present results for a median regression using the 18-month return window. Once again, we find AIM firms significantly underperform (-0.249).

In columns (4) and (5) we examine whether the firm's country of incorporation relates to performance. In column (4) we include fixed effects for the country of incorporation.²⁰ For this specification, the coefficient on AIM is negative and similar in magnitude to the coefficients presented in Table 3 (-0.434). In column (5), we split the listings between foreign and domestic based on the firm's country of incorporation. Both domestic and foreign AIM listings perform significantly worse than domestic

¹⁹ For parsimony, the remaining robustness analyses in this panel, as well as those in Panel C, are based on 18-month return windows. We find similar results over the 12- and 24-month windows.

²⁰ Country of incorporation for firms listed on the AIM and the LSE Main Market is based on data obtained directly from the LSE's website. Country of incorporation for the NASDAQ and the OTCBB markets is based on Datastream's *NATION* variable.

Table 4

Robustness analyses.

Table 4 presents results for additional analyses and robustness tests. Unless otherwise indicated, the benchmark firm indicator is the omitted variable. In all analyses, we winsorize returns at the 99th percentile of AIM returns and set delisting returns equal to -100% . Table 4 Panel A presents estimates of ordinary least squares regressions that compare the buy-and-hold returns for the full sample of firms that listed and raised capital on the AIM versus the full sample of firms from the LSE Main Market and the NASDAQ over the period June 1995 through December 2008 and from the OTC Bulletin Board over the period during which it was regulated by the SEC (January 1999 through December 2008). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

Panel A: Full sample analysis						
	Buy-and-hold returns					
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	-0.074*** (0.009)	-0.077*** (0.010)	-0.076*** (0.011)	-0.072*** (0.009)	-0.078*** (0.011)	-0.077*** (0.012)
Market-to-Book				0.033*** (0.003)	0.023*** (0.003)	0.015*** (0.003)
Leverage				0.065*** (0.025)	0.047 (0.029)	0.060** (0.030)
AIM	-0.343*** (0.028)	-0.420*** (0.034)	-0.449*** (0.036)	-0.271*** (0.030)	-0.360*** (0.036)	-0.387*** (0.039)
Intercept	0.859*** (0.079)	0.878*** (0.093)	1.051*** (0.106)	0.664*** (0.081)	0.746*** (0.098)	0.980*** (0.113)
Observations	5007	5007	5007	4683	4683	4683
Adjusted R-squared	0.121	0.124	0.137	0.165	0.136	0.142
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B presents results for general robustness tests where the test modification is indicated in the column header. In the first column, we compute buy-and-hold returns over a period of thirty-six months. In the second column, we construct an alternative benchmark sample using a matching procedure based on relative size and year. In the third column, we estimate a median regression. In the fourth column, we include country fixed effects based on the firm's country of incorporation. In the fifth column, we separately compare foreign versus domestic firms that listed and raised capital on the AIM versus the benchmark sample of control firms (domestic benchmark firms comprise the omitted category). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

Panel B: Robustness—general					
	Buy-and-hold returns				
	36 months	Relative size	Median reg.	Country FE	Foreign listings
Ln(Market value at Listing)	-0.052** (0.022)	-0.086*** (0.018)	0.002 (0.014)	-0.092*** (0.018)	-0.092*** (0.018)
Market-to-Book	0.001 (0.005)	0.013*** (0.005)	0.002 (0.004)	0.009* (0.005)	0.009* (0.005)
Leverage	-0.010 (0.017)	0.020 (0.025)	-0.014 (0.013)	0.009 (0.021)	0.009 (0.021)
AIM	-0.415*** (0.054)	-0.377*** (0.047)	-0.249*** (0.043)	-0.434*** (0.097)	
AIM Domestic					-0.420*** (0.047)
AIM Foreign					-0.287*** (0.069)
Benchmark Foreign					-0.030 (0.225)
Intercept	1.050*** (0.304)	0.881*** (0.246)	0.313 (0.294)	0.687*** (0.194)	0.758*** (0.143)

and foreign listings on the matched exchanges. The consistency of results across foreign and domestic firms is important for at least two reasons. First, it suggests that the AIM's underperformance is not driven solely by listings from a single source. Second, the underperformance by AIM firms relative to US foreign listings is informative about the performance of international listings that the US loses to the AIM. While the jury is still out on whether the US lost foreign listings to the AIM due to SOX and other regulatory issues, our results suggest that foreign firms choosing an AIM listing tend to underperform comparable firms.

In addition, we carried out several untabulated tests. First, in addition to following the approach recommended by Barber and Lyon (1997), we also evaluate the robustness of our results using the approach in Fama (1998) and Mitchell and Stafford (2000), and calculate performance using calendar time portfolios to address the possibility that cross-sectional correlations affect our abnormal return tests. To do so, we create equally weighted portfolios for AIM and control firms and then difference the monthly returns between the two portfolios. To match the tests presented earlier in the paper, an AIM or control firm enters the respective portfolio in the month after IPO and we keep the firm in the portfolio for 12-, 18-, and 24-month windows.

For the calendar time portfolios, we find that the mean differences in monthly returns between the AIM and control portfolios are: -1.84% at 12-months; -1.37% at 18-months; -2.02% at 24-months. All differences are statistically significant at the 0.02 level using two-sided tests. We find similar results when we calculate and test for differences in median monthly portfolio returns. Overall, these differences in calendar time portfolios (on an annualized basis) are similar in magnitude and statistical significance to the results for the Barber and Lyon (1997) approach.

Second, it is also potentially interesting to examine the performance of US domestic firms that list directly on the AIM. Commentators have noted that some US firms bypassed US listings entirely, apparently to avoid the US regulatory environment. A reasonable question is how the firms that chose an AIM listing compare with those that list on US markets. To address this question, we directly compare US incorporated firms that listed on US regulated exchanges to US firms that listed on the AIM. Our analysis is limited by the fact that only 40 US firms chose a direct AIM listing. Because there is a wide set of potential comparison firms on US markets, we identify the US listed firms most similar to US AIM listed firms using matching based on size and the year of listing. To facilitate direct, rather than relative, assessment of the variables of interest, we implement univariate comparisons. To assure that differences between the exchanges are not driven by differences in industry composition, population-level industry effects are removed from the return variables. In untabulated analyses, we compared the 12-, 18- and 24-month post-IPO buy-and-hold returns for US AIM firms to the matched set of US incorporated firms listed on US regulated exchanges. Tests are based on bias-corrected bootstrap confidence intervals that use 1000 repetitions. Across all three return windows, US AIM-listed firms have significantly lower returns (and higher failure rates) than their US-based counterparts. While it is difficult to draw normative conclusions, these results suggest that US firms listing directly on the AIM perform poorly relative to firms listing on US exchanges.

To further evaluate whether our results are driven by macroeconomic factors, we replicated all post-IPO performance tests using firm returns that are adjusted for market returns. Our primary analysis does not explicitly include a control for the market return because year fixed effects effectively lead to within time period comparisons. Nonetheless, to ensure that unmodeled macroeconomic factors do not affect our results we rerun our analyses using market-adjusted returns. We do so in two ways. First, we adjust returns by the MSCI World Index return prior to calculating buy and hold returns. Second, we adjust returns prior to calculating buy and hold returns based on country and exchange. We use the Russell 2000 for the NASDAQ, the Russell 3000 for the OTCBB, the FTSE 350 for the LSE Main Market, and the FTSE Small Cap for the AIM. Our inferences are identical using both sets of market-adjusted returns.

Matching on size, industry and year and including controls for other variables in an ordinary least squares regression may not be sufficient in that such a specification imposes a linear structure. To address this issue, we propensity score matched each AIM firm with a firm from a regulated exchange using as additional matching variables in the first stage probit model the control variables from the cross-sectional tests (size, market-to-book, leverage, industry, and year). We next differenced post-IPO performance for each match and tested whether the distributions of differences differ from zero using 1000 bootstrap repetitions and bias corrected standard errors. For all windows, the differences are highly significant in the direction of underperformance by AIM firms. We find similar results when we include additional control variables (return on assets, closely held shares, and age) in the first stage probit regression.²¹

To ensure that skewness does not drive our returns results, we re-ran each return regression using the natural logarithm of one plus the return as the dependent variable. Results using log returns lead to identical inferences.

The return performance tests presented in Table 3 Panel A compare the AIM to the pooled benchmark sample of control firms. To provide further insight into the performance of the AIM relative to each of the comparison exchanges, we conducted an additional analysis including indicators for each of the exchanges (simultaneously) for both the full and matched samples. Consistent with the univariate results discussed earlier, we find that the AIM significantly (p -value < 0.01) underperforms the LSE Main Market (by between 27–44 percentage points), the NASDAQ (by between 31–56 percentage points), and the OTCBB (by between 18–61 percentage points) over all three return windows. This result is reassuring because it suggests that our conclusions are not driven by the particular exchange, country, size of firm or our matching procedure.

²¹ Because our interest is in inferring mispricing based on post-listing returns, the form of self-selection that concerns us most is that AIM firms may be systematically less risky than firms on other exchanges (since that would affect expected returns). In our regression analyses, we control for factors shown by prior literature to be important determinants of expected returns. Admittedly, there may be other forms of self-selection at work (e.g., opportunistic managers seek out the AIM because limited oversight permits capital to be raised at inflated prices). However, these types of self-selection are consistent with regulation performing an important screening role and are therefore consistent with our primary motivation and empirical interpretations.

Finally, as noted previously, until April 2008, AIM-listed firms were subject to a special tax treatment on capital gains known as taper relief. Given that the tax position of the marginal investor can potentially affect the pricing of securities (because tax-advantaged investors would demand lower pre-tax returns) we assess our results on a tax-adjusted basis. Given that we do not know the tax rates of the investor clientele or the effects of taxes on pricing in this context, we take a simple (but conservative) approach. Our approach assumes that all else is equal but that capital gains rates are 8 percentage points lower for AIM firms (the magnitude of the taper relief benefit) than for other sample firms (essentially assuming that all investors are retail). We then estimate “equivalent” pretax rates by boosting positive returns to AIM firms to reflect the pretax effect of the tax advantage. Overall, the effect on the results is minor because most AIM firms do not have capital gains and because the tax rate difference is relatively small compared with the overall return differences. Results are very similar including these tax-adjusted returns.

5.3. Differences in growth and investment opportunities

Another potential concern is the possibility that AIM firms are more like “growth” firms than are the benchmark firms. Prior research finds that “growth” firms underperform “value” firms (e.g., Lakonishok et al., 1994; Fama and French, 1995). In our main analysis presented in Table 3 we include market-to-book ratios, leverage ratios, and industry fixed effects to control for differences in growth and investment opportunities. But, as shown in the descriptive statistics presented in Table 2, there are differences in terms of market-to-book and leverage between the AIM and benchmark firms. We therefore carry out a battery of additional tests to evaluate whether differences in growth and investment opportunities explain our empirical results. Results for these tests, based on 18-month windows, are presented in Table 4 Panel C.

Column (1) presents results for tests in which we included market-to-book in the matching criteria. We required that the market-to-book ratios for AIM and benchmark firms are at least as close in absolute value as 0.55. For these matches, there are no significant differences at either the mean or median in terms of size and market-to-book. Once again, the coefficient on AIM is negative and significant. Columns (2) and (3) present similar tests that are based on matches that include leverage and both leverage and market-to-book. For each match criteria there are no significant differences in the variable(s) used to match between AIM and the benchmark firms at either the mean or median. Again, in the performance regressions, the coefficients on AIM are negative and significant.

Column (4) presents results that include return on assets, percentage of closely held shares and the age of the firm at listing as additional control variables to control for differences in growth and investment opportunities. Results are very similar, in both magnitude and significance, to those presented in Table 3.²²

To more directly address potential differences in growth options across the two groups of firms, for firms with available data we calculated realized sales growth and profitability growth for the five years post-IPO. To do so, we regressed both the log of sales and the log of one plus ROA on a time trend for firms with a minimum of three years of data. We use the coefficient on the time trend as our measure of growth. At both the mean and the median, there are no significant differences between AIM and control firms for both growth measures. We re-estimated the post-IPO performance tests using this sample and including the growth measure as an explanatory variable. We present the results for these tests in columns (5) and (6). Once again, the coefficients on AIM are similar to those presented in our main analysis and suggest that differences in future growth options do not explain our results.

In addition to the results presented in Table 4 Panel C, we carried out two additional tests. First, we included the price-to-earnings ratio as an additional measure of growth versus value. Once again, we find significant underperformance for AIM firms across all windows. Second, we included industry as a match criterion. Although matching based on industry leads to a significant drop in sample size, we once again find significant underperformance of AIM firms across all windows.

6. Additional performance tests

In this section, we discuss a series of analyses to assess the incidence of extreme positive performance and failure on the AIM.

6.1. Extreme returns and returns prior to delisting

The analyses in the preceding section suggest that AIM firms underperform on average after listing relative to firms on other exchanges. Although AIM firms underperform on average, these firms may nevertheless be attractive to investors because of the possibility of extreme positive performance. For example, it is possible that the AIM is more like a venture capital market in that the average firm performs poorly, but the market includes firms with unusually promising upsides (Litvinsev, 2009).

²² Because we measure returns from the listing date, we are unable to estimate betas over a prior period to control for systematic risk. Industry fixed effects should mitigate the impact of differences in underlying economics. Results are robust to controls for industry betas and for firm-level betas estimated following the listing date.

Table 5

Extreme returns and returns prior to delisting.

This table presents estimates of OLS regressions that compare the propensity of returns greater than 200% and the propensity of positive returns prior to delisting for firms that listed and raised capital on the AIM and the benchmark sample of control firms. In all specifications, the benchmark firm indicator is the omitted variable. Panel A presents regressions in which the dependent variable is an indicator variable coded as one if the firm's buy-and-hold return is greater than or equal to 200% over the first 12, 18, or 24 months, and zero otherwise. Panel B presents regressions in which the dependent variable is coded as one if the firm's buy-and-hold return over the 20, 40, or 60 trading days prior to delisting is positive, and zero otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

Panel A: Homerun analysis						
	Buy-and-hold returns					
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	−0.043*** (0.005)	−0.033*** (0.004)	−0.029*** (0.004)	−0.040*** (0.005)	−0.032*** (0.005)	−0.024*** (0.005)
Market-to-Book				0.006*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
Leverage				0.009* (0.005)	0.006 (0.005)	0.010* (0.006)
AIM	−0.072*** (0.009)	−0.063*** (0.009)	−0.057*** (0.010)	−0.063*** (0.010)	−0.061*** (0.011)	−0.050*** (0.011)
Intercept	0.229*** (0.028)	0.251*** (0.043)	0.279*** (0.054)	0.177*** (0.033)	0.197*** (0.033)	0.185*** (0.033)
Observations	2482	2482	2482	2032	2032	2032
Adjusted R-squared	0.144	0.098	0.086	0.155	0.097	0.085
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Positive delistings						
	Buy-and-hold returns					
	20 days	40 days	60 days	20 days	40 days	60 days
Ln(Market value at Listing)	0.028*** (0.010)	0.034*** (0.010)	0.028*** (0.010)	0.028** (0.012)	0.039*** (0.012)	0.037*** (0.012)
Market-to-Book				−0.003 (0.004)	0.000 (0.004)	0.000 (0.004)
Leverage				−0.019 (0.053)	0.012 (0.050)	−0.006 (0.050)
AIM	−0.292*** (0.036)	−0.278*** (0.035)	−0.259*** (0.035)	−0.281*** (0.043)	−0.269*** (0.042)	−0.271*** (0.042)
Intercept	0.724*** (0.117)	0.698*** (0.113)	0.721*** (0.117)	0.648*** (0.168)	0.667*** (0.166)	0.518*** (0.168)
Observations	1146	1146	1146	916	916	916
Adjusted R-squared	0.098	0.094	0.073	0.100	0.100	0.089
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

In our next set of analyses, we explore the possibility that there is a subset of AIM firms that experience unusually stellar performance. Because we do not know of an objective means to quantify stellar performance, we use a cutoff of an increase in share price by 200% over our primary return windows. Table 5 Panel A presents ordinary least squares regressions in which the dependent variables are indicators coded as one if the buy-and-hold return over 12-, 18-, and 24-months is greater than or equal to 200%, and zero otherwise.²³ Over all three horizons, AIM firms are significantly less likely to have extreme positive outcomes than firms listing on the other exchanges.

A related issue is that firms potentially use the AIM as a stepping stone to a more established exchange. To evaluate this possibility, we first compare, for the full sample, the number of firms moving from the AIM to the LSE's Main Market to those moving in the opposite direction based on statistics obtained from the LSE's website. In terms of promotions from the AIM to the Main Market, there were only 76 cases from 1998–2008, versus 271 that moved in the other direction. More notably, since 2000, only 24 firms moved from the AIM to the Main Market, versus 222 that moved from the Main Market to

²³ We estimate a linear probability model to provide easily interpretable coefficients. We find similar results using logit, "rare events" logit, and probit estimations, and when we extend the estimation window to 36- and 48-months. Results are consistent if we use other return cutoffs to quantify stellar performance (e.g., 50%, 100% or 400%).

Table 6

Survival analysis.

This table compares failure rates for firms that listed on the AIM versus the benchmark sample of control firms. Failure rates are estimated using maximum likelihood, assuming a log normal distribution. In all specifications, the benchmark firm indicator is the omitted variable. The parameter estimates for the exchange indicator represent ratios of instantaneous times to failure for the mean firm on the exchange relative to the instantaneous time to failure for the mean benchmark firm and statistical tests are therefore against one instead of zero. Failure is identified as the combination of a suspension of trading and a negative cumulative return over the 60 trading days prior to delisting. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

	Accelerated failure times	
	(1)	(2)
Ln(Market value at Listing)	1.050** (0.020)	1.083*** (0.023)
Market-to-Book		1.013** (0.006)
Leverage		1.133* (0.074)
AIM	0.364*** (0.025)	0.393*** (0.031)
Observations	2482	2032
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

the AIM. In other words, the AIM appears to be more of a landing pad for struggling firms than a launching pad for highfliers.

The preceding analysis only examines moves between the AIM and the Main Market. It is possible that highflying AIM firms leave the exchange through acquisitions, transitions to other exchanges or other transactions. To broaden our investigation, we assume that favorable upgrades or acquisitions are accompanied by positive returns prior to delisting and assess the frequency of delisting for “good” reasons across our comparison set of exchanges. We calculate cumulative returns for 20, 40 and 60 trading days prior to delisting and then create indicator variables that are coded as one if the cumulative return over each period is positive, and zero otherwise. Table 5 Panel B presents regressions for the matched sample that uses these indicators as dependent variables. Over all three windows AIM firms are significantly less likely to have positive returns prior to delisting than are firms on the other exchanges. Overall, we find no evidence that highflying firms use AIM listing as a stepping stone to positive outcomes.

6.2. Survival analysis

We next compare the AIM to the other exchanges in terms of survival rates. Survival rates are potentially interesting because of the controversy generated by an SEC Commissioner who compared the AIM to a casino based on its alleged 30% failure rates.²⁴ The LSE responded by asserting that the failure rate was closer to 3% and comparable to other exchanges (Quinn, 2007). However, it is unclear what (if any) analysis underpinned these conflicting claims.

To provide empirical evidence on this point, we identify failure as a suspension of trading on the relevant exchange in combination with a negative cumulative return over the 60 trading days prior to delisting. While this is admittedly a crude measure, it likely captures firms that leave the exchange through bankruptcy or other financial distress.²⁵

Table 6 presents parameter estimates from the maximum likelihood estimation of an Accelerated Failure Time model (Klein and Moeschberger, 2003). In this analysis, we assume that failure rates are log normally distributed so that the parameter estimates represent ratios of instantaneous times to failure relative to the instantaneous time to failure for the mean benchmark. Coefficients closer to one indicate failure rates that are lower. These results indicate that AIM firms have significantly higher instantaneous failure rates than firms in the benchmark sample. In terms of economic significance, the time to failure for an AIM firm is approximately 60% shorter than the time to failure for the mean benchmark firm. Overall, these results are consistent with the results from the returns analysis.

7. What factors contribute to underperformance?

We next examine factors that could contribute to the underperformance of firms that list and raise capital on the AIM. This analysis serves two purposes. First, to this point our tests have been of the general post-listing performance of AIM firms. However, it is also important to provide insight into causes for the underperformance and to explore potential links

²⁴ In particular, Roel Campos, an SEC commissioner, asserted, “I’m concerned that 30 percent of issuers that list on AIM are gone in a year. That feels like a casino to me” (Bawden and Waller, 2007).

²⁵ The LSE’s AIM website provides a stated reason for delisting for some firms; however, the stated reason for over half of the reported delistings is “At the request of the company.” Given the ambiguous nature of these disclosures, we are hesitant to use the AIM stated delisting reason to differentiate “good” delistings from “bad” delistings.

Table 7

Comparison of AIM to unregulated markets and analysis of changes in regulation.

This table compares firms that listed and raised capital on the AIM with firms that listed and raised capital on an unregulated exchange and examines performance around changes in regulation on the AIM itself. Panel A compares AIM to the OTC Pink Sheets over the period June 1995 through December 2008. Panel B compares AIM prior to and following changes in regulations in 2007 for all listed firms and in 2005 for cash shell companies with the benchmark sample. 12-month return, 18-month return, and 24-month return are buy-and-hold returns starting at the end of the firm's first day of trading. We winsorize the buy-and-hold returns at the 99th percentile of AIM returns and set delisting returns equal to -100% . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

Panel A: Comparisons to the Pink Sheets						
	Buy-and-hold returns					
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	−0.108*** (0.010)	−0.117*** (0.014)	−0.120*** (0.016)	−0.110*** (0.011)	−0.121*** (0.015)	−0.128*** (0.017)
Market-to-Book				0.025*** (0.003)	0.021*** (0.004)	0.014*** (0.004)
Leverage				−0.007 (0.020)	−0.015 (0.024)	−0.044** (0.022)
OTC Pink Sheets	0.157*** (0.035)	0.112*** (0.042)	0.105** (0.047)	0.114*** (0.038)	0.077 (0.047)	0.082 (0.053)
Intercept	0.596*** (0.100)	0.588*** (0.129)	0.659*** (0.146)	0.503*** (0.107)	0.536*** (0.139)	0.694*** (0.154)
Observations	3215	3215	3215	2943	2943	2943
Adjusted R-squared	0.115	0.112	0.110	0.142	0.128	0.119
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Changes in AIM Regulation		
	Buy-and-hold returns	
	18 months	18 months
Ln(Market value at Listing)	−0.089*** (0.018)	−0.128*** (0.028)
Market-to-Book	0.010** (0.005)	0.016*** (0.006)
Leverage	0.009 (0.021)	−0.069 (0.043)
AIM Pre-Reg	−0.424*** (0.047)	
AIM Post-Reg	−0.221** (0.087)	
AIM Non-Cash Shell		−0.337*** (0.067)
AIM Cash Shell - Pre		−0.525*** (0.099)
AIM Cash Shell - Post		−0.350*** (0.103)
Intercept	0.764*** (0.143)	1.112*** (0.310)
AIM Pre-Reg=AIM Post-Reg	0.02	
AIM Non-Cash Shell=AIM Cash Shell - Pre		0.02
AIM Non-Cash Shell=AIM Cash Shell - Post		0.45
AIM Cash Shell - Pre=AIM Cash Shell - Post		0.08
Observations	2032	1263
Adjusted R-squared	0.156	0.158
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

to lack of oversight on the AIM. If lack of oversight is important in this market, underperformance should be correlated with incentives to inflate share price and with alternative forms of oversight. Second, it is interesting to understand, more generally, the types of factors that mitigate underperformance in markets with alternate regulatory structures, which have not, to our knowledge, been examined in prior research.

7.1. Comparison of AIM to unregulated markets and analysis of changes in regulation

To this point our comparisons of the AIM with other venues focused on regulated exchanges. However, unregulated markets also represent a potentially interesting comparison set. If Nomad oversight is binding and, consequently, the AIM serves a significant screening function, we would expect AIM listings to outperform listings on unregulated markets. In our next set of analyses, we compare the AIM to an unregulated US markets: the Pink Sheets market.

Table 7 Panel A presents the results of tests comparing the AIM with the Pink Sheets. In all specifications the AIM is the omitted venue. Overall, there is no evidence that AIM firms outperform Pink Sheets firms. In fact, Pink Sheets firms generally have higher returns, although the difference is not statistically significant in all specifications.²⁶ As expected, the differences are smaller relative to the exchange-traded firms in the earlier analyses indicating that regulated exchanges outperform the Pink Sheets. While conclusions should be drawn with caution, these results are interesting because they compare AIM firms to firms that fall outside much of the normal regulatory process in the US. If the self-regulatory environment on the AIM constituted significant oversight, one would expect AIM firms to outperform firms in unregulated environments. However, the results suggest that AIM firms are no better (in terms of returns) and are potentially worse than even the typical unregulated firm.

Another relevant comparison sample is firms that raise capital through private equity and venture capital. In particular, it has been suggested that the AIM provides retail investors access to investments that would otherwise only be available to private equity and venture capital funds. Further, private equity and venture capital provide a potential comparison set of early stage capital-raising firms comparable to AIM firms and, in fact, firms may be choosing between venture capital and AIM listing. While we do not have access to data for private equity or venture capital, we can compare our results to those in the prior literature. Harris et al. (2012) evaluate returns to private equity and venture capital funds relative to a variety of benchmarks including the S&P 500, the Russell 3000 and the NASDAQ using a new more-comprehensive dataset sourced from institutional investors which helps to address issues in the prior research.

Overall, Harris et al. (2012) document that private equity and venture capital investments, net of fees, in general outperform all of the benchmark exchanges. While the performance of venture capital funds is weaker in the 2000s, both private equity and venture capital tend to perform at least as well as the benchmarks over our sample period. More importantly, they outperform our AIM sample by at least a comparable margin to that reported earlier for our control sample. While it is dangerous to draw strong conclusions given that we do not have access to the private equity and venture capital data, the comparisons suggest that the underperformance that we document is not characteristic of private equity or venture capital investments. Further, the results indicate that the AIM does not, on average, provide retail investors with returns earned by venture capital firms. Taken in conjunction with our earlier analysis, this comparison suggests that unregulated markets are not necessarily poor investments, but that investor sophistication is particularly important, suggesting that these types of investments may be less appropriate for retail investors such as those on the AIM.

As a further attempt to provide evidence on the role of regulation in AIM firm performance, we examine two changes in regulation on the AIM. In early 2007, in response to increasing concern about the efficacy of its overall regulatory structure and the quality of Nomad oversight, the AIM instituted a new rulebook for both firms and Nomads. In the case of the Nomads, the purpose of the new rulebook was to codify Nomad “best practices” and eliminate any room for misunderstanding about the LSE’s expectations while still leaving some room for interpretation. The new rules clarified what Nomads “should usually do.” Examples of these clarifications include a requirement to have sufficient expertise in-house or access to specialists in order to make their assessments about the suitability of a firm for listing on AIM, and a recommendation to have appropriate knowledge of the applicant’s area of business, taking into account its country of incorporation and operation. In the case of the firms, the main change brought about by the new rulebook was a requirement for all firms to have a website and post all core management and financial information including: admission documents, annual reports, all regulatory news service announcements for the last 12 months, director biographies, and information on its business strategy and other listings.

To investigate the effects of this regulatory change, we separately examine the performance of AIM firms prior to the above mentioned rulebook update (prior to March 2007) and after the update (post March 2007) relative to the full sample of benchmark control firms. Our results in column (1) of Table 7 Panel B suggest that while AIM firms still performed worse than the control firms following the rulebook update, their performance improved significantly (p -value 0.02) following this rulebook update. While this result is reassuring because it provides some additional evidence that the observed poor performance of AIM firms is related to a lack of regulatory oversight, given the timing of the rulebook update relative to the 2008 financial crisis, caution should be given to this interpretation of the results.

Separate from the 2007 rulebook change discussed above, in 2005 the AIM instituted new rules for cash shells (i.e. companies whose assets are composed almost solely of cash with the ostensible intention of using that cash to acquire preexisting entities). This change occurred in April of 2005 in response to widespread accusations that many existing cash shells were raising funds, failing to make acquisitions, and siphoning off cash through management fee distributions to the

²⁶ The fact that the AIM market underperforms the Pink Sheets may seem surprising because the Pink Sheets do not require any explicit form of oversight, including Nomads. However, it is important to note that the US legal environment tends to be more litigious than that in the UK, which likely provides another level of oversight beyond securities regulation (Seetharaman et al., 2002). The results are also consistent with the assertion of the SEC’s Roel Campos mentioned earlier that the AIM includes “issuers who can’t even meet the standards of the over-the-counter, or pink sheet, situations” (Bawden and Waller, 2007).

Table 8

Comparison with AIM firms that did not raise capital.

This table compares the post-IPO performance of AIM firms that listed and raised capital with AIM firms that listed but did not raise capital (Columns 1–3) and the post-IPO performance of AIM firms that listed and raised capital with the full sample of capital and non-capital raising firms (Columns 4–6). 12-month return, 18-month return, and 24-month return are buy-and-hold returns starting at the end of the firm's first day of trading. In all specifications, non-capital raising firms are the omitted group. We winsorize the buy-and-hold returns at the 99th percentile and set delisting returns equal to -100% . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

	Buy-and-hold returns					
	AIM-only			Including benchmark exchanges		
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	0.010 (0.012)	0.018 (0.015)	0.013 (0.018)	-0.103*** (0.007)	-0.115*** (0.008)	-0.113*** (0.009)
Capital Raising Firm	-0.109*** (0.036)	-0.117** (0.047)	-0.166*** (0.051)	0.045 (0.032)	0.007 (0.039)	0.002 (0.042)
AIM				-0.259*** (0.043)	-0.369*** (0.054)	-0.371*** (0.058)
AIM*Capital Raising Firm				-0.119** (0.047)	-0.098* (0.058)	-0.120* (0.062)
Intercept	0.466*** (0.115)	0.615*** (0.164)	0.767*** (0.204)	0.901*** (0.065)	1.059*** (0.080)	1.183*** (0.089)
Observations	2174	2174	2174	7012	7012	7012
Adjusted R-squared	0.089	0.115	0.121	0.137	0.139	0.147
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

shells' founders. The new rules required that any existing cash shell raising more than £3 million had to make an acquisition within the subsequent 12 months or be delisted. These new rules also imposed greater scrutiny of proposed operating plans of cash shells listing after the rule change.

In column (2) of Table 7 Panel B, we investigate the effect of this rule change by creating separate indicators for AIM Non-Cash Shells, AIM Cash-Shells prior to the rule change and AIM Cash Shells following the rule change and comparing their 18-month post-IPO performance to our benchmark sample of control firms. We define a cash shell as having a cash-to-total assets ratio in the top 25th percentile of AIM firms (greater than 0.63). Note that the requirement to have cash and assets data available limits our sample of firms.

In column (2), several comparisons are of interest. First, we find that AIM Cash Shells significantly underperformed AIM Non-Cash Shells prior to the rule change (p -value 0.02). Second, following the rule change, there is no significant difference in performance between the cash shells and the non-cash shells (p -value 0.45). Finally, we find that there was a significant improvement in the performance of cash shells following the rule change. Taken together, these results suggest that the AIM rule change regarding cash shells had a significant effect on their return performance and provides some additional evidence suggesting that lax regulatory oversight may explain the observed post-listing performance of AIM firms.

7.2. Capital raising analysis

To this point, we have implicitly assumed that incentives to inflate share price are particularly pronounced for an IPO because of a desire to raise capital at an attractive rate. As a result, we would expect worse post-listing performance for AIM firms that list and raise capital relative to firms that listed without raising capital. In the next set of analyses, we examine the post-listing return performance of AIM capital and non-capital raising firms, as well as the performance of capital raising firms on the AIM relative to capital and non-capital raising firms on other exchanges.

In the first three columns of Table 8, we regress post-listing returns for 12-, 18-, and 24-months on a control for size and an indicator for whether or not an AIM firm raised capital. Consistent with our prediction, the coefficient on whether the firm raised capital is negative and significant in all three specifications. In the final three columns, we additionally include the full-sample of capital raising and non-capital raising firms from the comparison exchanges as well as an indicator for whether the firm lists on AIM and an interaction term between the AIM and capital raising indicators. Again consistent with our prediction, the coefficient on both the AIM indicator and the interaction between AIM and capital raising are significantly negative over all three return windows, suggesting that capital raising firms on the AIM perform worse than capital raising firms on other exchanges. Interestingly, the capital raising indicator itself is insignificant, suggesting that the underperformance of capital raising firms on the AIM is not evidence of a more general phenomenon.

In terms of economic magnitude, firms that raised capital on the AIM underperformed similar firms on the AIM that did not raise capital by between 11 and 17 percentage points, while firms that raised capital on the AIM incrementally (relative to the general underperformance of firms on the AIM) underperformed the other capital and non-capital raising firms by

Table 9

Discretionary accruals analysis.

This table compares the magnitude of the change in discretionary accruals from the year prior to listing to the year of listing (Pre-List), the magnitude of the change in discretionary accruals from the year of listing to the subsequent year (Post-List) and the relation between pre-listing accruals and future performance for firms that listed and raised capital on the AIM with the benchmark sample of control firms. Δ Discretionary Accruals is calculated as the percentile rank of the change (from fiscal year-end prior to listing to the fiscal year following listing) in the residual value from the regression specified below:

$$Accruals_{i,t} = \beta_1 Inverse\ Total\ Assets_{i,t} + \beta_2 \Delta Total\ Sales_{i,t} + \beta_3 PPE_{i,t} + \beta_4 CFO_{i,t} + \beta_5 DCFO_{i,t} + \beta_6 CFO_{i,t} * DCFO_{i,t} + \sum_{a=1} \alpha_a Industry_i + \sum_{b=1} \alpha_b Year_t + \varepsilon_{i,t}$$

where accruals are calculated as $(\Delta total\ current\ assets - \Delta cash) - (\Delta total\ current\ liabilities - \Delta short-term\ debt - \Delta taxes\ payable) - depreciation\ expense$, inverse total assets is calculated as $1/total\ assets$, $\Delta total\ sales$ is the annual change in total sales, and PPE is the net value of plant, property and equipment as of the end of the fiscal year. CFO is cash flow from operations and DCFO is an indicator variable coded as 1 if CFO is negative, and zero otherwise. Industry and year fixed effects are also included in the model. To preserve sample size, missing values of short-term debt and taxes payable are set equal to zero. Reversal Period is an indicator for the year of listing to the subsequent year. All variables (excluding inverse total assets) are scaled by lagged total assets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

	Δ Discretionary Accruals			Buy-and-hold returns		
	Pre-list	Post-list	Combined	12 months	18 months	24 months
Ln(Market value at Listing)				-0.115*** (0.021)	-0.128*** (0.028)	-0.132*** (0.032)
Market-to-Book				0.022*** (0.005)	0.015*** (0.006)	0.011 (0.007)
Leverage				-0.029 (0.033)	-0.063 (0.043)	-0.037 (0.051)
Δ Discretionary Accruals				0.137 (0.125)	0.250 (0.166)	0.382** (0.187)
AIM	0.038** (0.018)	-0.060*** (0.015)	0.031* (0.017)	-0.075 (0.083)	-0.127 (0.107)	-0.178 (0.118)
Reversal Period			-0.013 (0.017)			
AIM*Reversal Period			-0.095*** (0.022)			
AIM* Δ Discretionary Accruals				-0.288** (0.141)	-0.454** (0.182)	-0.484** (0.206)
Intercept	0.920*** (0.050)	0.397*** (0.046)	0.916*** (0.038)	0.760*** (0.174)	1.334*** (0.277)	1.461*** (0.333)
Observations	1263	1137	2400	1263	1263	1263
Adjusted R-squared	0.282	0.415	0.332	0.174	0.161	0.158
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

between 10 and 12 percentage points. These findings are consistent with the argument that incentives to inflate share price are particularly pronounced for firms raising capital on the AIM.

7.3. Accruals analysis

To provide further evidence on factors that could explain inflated IPO share prices of AIM firms, we next examine discretionary accruals around the IPO. Although some have suggested alternative explanations, prior literature suggests that IPO firms have incentives to engage in earnings management in order to increase the amount of capital raised and decrease the cost of capital (e.g., Teoh et al., 1998a). To the extent that limited oversight provides opportunities to engage in earnings management, we would expect to see more aggressive use of earnings-increasing accruals to inflate earnings for AIM firms relative to our benchmark sample, as well as more pronounced post-IPO accrual reversals. Furthermore, to the extent that earnings management helps explain post-listing performance, we would expect the post-listing returns to be significantly correlated with the extent of earnings management at the IPO.

To investigate whether AIM firms' IPOs are associated with more income-increasing accruals, we compare changes in discretionary accruals of AIM firms that listed and raised capital with changes in discretionary accruals for the matched firms that listed and raised capital on the traditional exchanges. Our approach is similar to Teoh et al. (1998b) except that we examine changes in discretionary accruals from the year before to the year of the IPO. The sample size drops by about half compared to Table 3 because of the data requirements necessary to calculate discretionary accruals.

We start with total accruals, which we calculate as $(\Delta total\ current\ assets - \Delta cash) - (\Delta total\ current\ liabilities - \Delta short-term\ debt - \Delta taxes\ payable) - depreciation\ expense$. To preserve sample size, we set missing values of short-term debt and taxes payable equal to zero. We scale all variables (excluding inverse total assets) by lagged total assets. We then follow Ball

and Shivakumar (2008) and estimate the following regression to obtain discretionary accruals²⁷:

$$\begin{aligned} \text{Accruals}_{i,t} = & \beta_1 \text{Inverse Total Assets}_{i,t} + \beta_2 \Delta \text{Total Sales}_{i,t} + \beta_3 \text{PPE}_{i,t} + \beta_4 \text{CFO}_{i,t} \\ & + \beta_5 \text{DCFO}_{i,t} + \beta_6 \text{CFO}_{i,t} * \text{DCFO}_{i,t} + \sum_{a=1} \alpha_a \text{Industry}_i + \sum_{b=1} \alpha_b \text{Year}_t + \varepsilon_{i,t} \end{aligned}$$

This specification combines the traditional discretionary accruals regression with cash flow variables to capture conditional conservatism. We then calculate the change in discretionary accruals as the percentile rank of the difference between the error terms for the year after and the year before the IPO.

To provide further evidence on the extent to which AIM firms potentially manipulate accruals around the IPO, we also examine the change in discretionary accruals from the year of the IPO to the following year. Dechow et al. (2012) argue that, because of the inherent properties of accrual accounting, any accrual manipulation in one period must necessarily reverse in a subsequent period.

Table 9 presents results for the discretionary accruals analyses. Column (1) compares changes in discretionary accruals for AIM firms prior to the IPO date with changes in discretionary accruals for the benchmark firms prior to the IPO. Consistent with the notion that the AIM's regulatory environment provides opportunities for greater earnings management, changes in discretionary accruals for AIM firms prior to the IPO date are significantly higher than changes in discretionary accruals for the matched sample. Column (2) compares changes in discretionary accruals for AIM firms in the period following the IPO date with changes in discretionary accruals for the benchmark firms following the IPO date. Consistent with the argument that managed accruals reverse in subsequent periods, changes in discretionary accruals for AIM firms subsequent to the IPO date are significantly lower than changes in discretionary accruals for the matched sample. Column (3) presents results consistent with columns (1) and (2) combining the pre- and post-listing period. These results suggest that AIM firms increase accruals prior to listing more aggressively than do firms on other exchanges, leading to larger accrual reversals in the period following the IPO.

Columns (4) through (6) present regression results in which the dependent variables are 12-, 18-, and 24-month post-IPO returns. As with the analysis presented in columns (1)–(3), we estimate these regressions relative to the matched sample. As control variables, we include $\ln(\text{Market value at Listing})$, Market-to-Book , and Leverage . The variables of interest are the change in discretionary accruals ($\Delta \text{Discretionary Accruals}$), an indicator for AIM firms (AIM), and an interaction between AIM and $\Delta \text{Discretionary Accruals}$. Consistent with discretionary accruals being positively correlated with growth and investment opportunities (for a discussion, see Ball and Shivakumar, 2008), the coefficient on $\Delta \text{Discretionary Accruals}$ for the control firms is positive in all three regressions and statistically significant at 24-months suggesting that, on average, firms with increases in accruals perform well following listing. However, the relation between the change in discretionary accruals and performance switches sign when we examine AIM firms. For all three regressions, the coefficient on the interaction between AIM and $\Delta \text{Discretionary Accruals}$ is negative and significant, suggesting that part of the reason for the negative returns post-listing relates to discretionary accruals around the IPO. Furthermore, the fact that the coefficients for AIM firms are incremental to the control firms is consistent with the notion that the quality of the accruals is lower for AIM firms than for the matched sample. Results (untabulated) including accruals reversals in the post-listing period similarly suggest significant incremental underperformance by AIM firms. Taken together, the results suggest that AIM firms manage discretionary accruals around the IPO and that this accruals management is associated with post-IPO underperformance relative to firms traded on regulated exchanges.²⁸

8. Are AIM firms able to bond?

While the lack of regulatory hurdles for an AIM listing limits explicit oversight, it is possible that firms are able to find substitutes for traditional regulatory oversight. Firm-level oversight choices can be particularly important for the AIM given the limited explicit regulatory requirements. In the extreme, it could be the case that, for some firms, firm-level oversight substitutes entirely for the lack of exchange-level bonding, and perhaps at a lower cost because of the ability to customize the level of oversight.

Although there are numerous ways AIM firms could bond, we consider two that are likely to be particularly important on the AIM: the choice of Nomad and the choice of auditor. The customizable nature of the regulatory framework on the AIM provides the opportunity for firms to distinguish themselves by their choice of Nomad. Because the Nomad is responsible for providing oversight, it is possible that some Nomads develop reputations for providing higher quality screening, permitting bonding through enhanced oversight. However, if Nomads view their role as simply attesting to minimal AIM standards with limited reputational or other risk, it is not clear that there would be strong incentives for differential standards across Nomads.

²⁷ Given data constraints, we are unable to implement several of the suggestions of Ball and Shivakumar (2008) such as using the cash flow statement to calculate total accruals and using changes in individual working capital accounts. The fact that our comparisons are based on accruals relative to IPOs on other exchanges rather than simply the level of accruals and that our AIM firms are similar to the control firms on other dimensions should help to mitigate concern about other factors driving our results.

²⁸ An alternate approach to detecting earnings misstatement in research such as Dechow et al. (2011) is to use regulatory enforcement actions by, for example, the SEC. Given the AIM's unique regulatory structure, it is difficult to compare enforcement actions with more traditionally regulated exchanges. Further, regulatory actions against AIM firms and Nomads are typically not made public. Media coverage of AIM firms is quite limited, especially in the early period of our sample, so it is difficult to gather a consistent sample of alleged malfeasance. To the extent we could find media coverage of AIM firms, we searched for mentions of malfeasance. While we were unable to conduct a formal statistical analysis, Appendix B provides examples of press allegations against AIM firms.

Table 10

Comparison across Nomad characteristics and auditor.

This table presents estimates of ordinary least squares regressions that compare the 18-month buy-and-hold returns for firms that list and raise capital on the AIM. The table also includes measures of the characteristics of the Nomad that brought the AIM firm to market and whether the firm used a Big-5 auditor. Nomad is Market Maker is an indicator for whether the Nomad is also the broker for the AIM firm's shares. Nomad Prior Performance is the average 12-month return for all of the firms brought to market by a particular Nomad prior to the current listing. Big 5 Auditor is an indicator for whether the firm uses one of the largest five international auditing firms. We winsorize returns at the 99th percentile and set delisting returns equal to -100% . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

	Buy-and-hold returns				
	(1)	(2)	(3)	(4)	(5)
Ln(Market value at Listing)	0.037 (0.024)	0.044 (0.028)	0.017 (0.025)	0.017 (0.033)	-0.128*** (0.020)
Market-to-Book	0.016*** (0.005)	0.013** (0.006)	0.019*** (0.006)	0.016*** (0.006)	0.014*** (0.005)
Leverage	-0.092* (0.049)	-0.092* (0.050)	-0.097** (0.049)	-0.094* (0.052)	0.023 (0.022)
Nomad is Market Maker	0.023 (0.055)			0.007 (0.067)	
Nomad Prior Performance		0.457*** (0.097)		0.420*** (0.099)	
Big 5 Auditor			0.264*** (0.059)	0.288*** (0.070)	0.156** (0.068)
AIM					-0.544*** (0.057)
AIM*Big 5 Auditor					0.219*** (0.078)
Intercept	-0.063 (0.197)	0.034 (0.206)	0.143 (0.220)	0.248 (0.198)	0.893*** (0.156)
Observations	1241	964	1180	920	2484
Adjusted R-squared	0.114	0.131	0.137	0.153	0.171
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes

Because it is unclear ex ante what would constitute a high quality Nomad, we examine whether the performance of AIM firms varies based on two characteristics of the Nomad. We obtain data for identifying AIM firms' Nomads from the LSE's website. Our first Nomad variable is an indicator, *Nomad is Market Maker*, which takes the value of one if the firm's Nomad also serves as its market maker, and zero otherwise. Serving as a firm's market maker could provide the Nomad with additional private information with which to screen and monitor its clients. Second, to the extent that post-IPO returns are a measure of the quality of oversight on the AIM, we assume that a Nomad that provides effective oversight should have a history of bringing to market firms that perform relatively better. We create a measure *Nomad Prior Performance* measured as the average 12-month return for all firms brought to market by the Nomad up to 12 months prior to the firm's listing date.

In addition, we consider the quality of the firm's auditor. [Fan and Wong \(2005\)](#), among others, argue that large auditors serve an oversight role. Based on their findings, we create an indicator variable, *Big-5 Auditor*, coded as one if the firm's first year financial statements were audited by a Big-5 auditor, and zero otherwise. While this is an admittedly crude measure of auditor quality, it is consistent with the notion that larger auditors have greater reputational risk and greater resources to conduct a thorough audit ([Weber and Willenborg, 2003](#)).

[Table 10](#) presents multivariate comparisons of post-listing returns of AIM firms including the Nomad characteristics and the indicator for whether the firm uses a Big-5 auditor. For parsimony, we tabulate only the results for the 18-month window. Results for the 12- and 24-month windows are very similar. In column (1), the coefficient on *Nomad is Market Maker* is positive, but insignificant, suggesting that acting as a market maker provides the Nomad with limited additional information and/or incentives to monitor the firm. In column (2), the coefficient on *Nomad Prior Performance* is positive and significant, confirming that Nomads whose IPOs have performed well in the past bring to market firms that have better return performance. Finally, the results in column (3) suggest that the use of a *Big-5 Auditor* is associated with better performance. In column (4), we include all of the measures in the regression. For this specification, the coefficients on *Nomad Prior Performance* and *Big 5 Auditor* remain positive and significant.

A related issue is whether firm-level oversight is relatively more important for AIM firms than for firms on other exchanges. For obvious reasons, we cannot assess the incremental impact of Nomad quality across exchanges. However, we can measure the relative importance of obtaining a Big-5 auditor for an AIM firm compared to our benchmark firms from traditionally regulated exchanges. Column (5) presents results for this analysis, including our benchmark sample firms in the regression, an indicator variable for whether the firm is listed on the AIM and an interaction between *AIM* and *Big-5 Auditor*. Consistent with the notion that firm-specific oversight is particularly important for AIM firms, the coefficient on *AIM*Big-5 Auditor* is positive and significant. This suggests that the oversight provided by a Big-5 auditor is more important when exchange-level regulation is limited.

Table 11

Analysis of brokerage investor ownership.

This table compares the magnitude of brokerage investor ownership and future performance for firms that listed and raised capital on the AIM with data available in the Argus Vickers Owners Service Share Register Analysis System. 12-month return, 18-month return, and 24-month return are buy-and-hold returns starting at the end of the firm's first day of trading. Ln(%Brokerage Ownership) is the natural log of the percentage of shares outstanding held by brokerage investors, which is defined as the sum of the percentage of shareholders of record who purchased shares through either an "Execution Only Stockbroker" or a "Full Service Stockbroker" as classified in the Argus Vickers Owners Service Share Register Analysis System. We winsorize the buy-and-hold returns at the 99th percentile and set delisting returns equal to -100% . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-sided test).

	Buy-and-hold returns					
	12 months	18 months	24 months	12 months	18 months	24 months
Ln(Market value at Listing)	0.048** (0.021)	0.073*** (0.026)	0.069** (0.028)	0.052** (0.021)	0.078*** (0.026)	0.076*** (0.028)
Market-to-Book				0.026*** (0.009)	0.028** (0.011)	0.016 (0.010)
Leverage				-0.068 (0.115)	0.017 (0.142)	0.146 (0.168)
Ln(%Brokerage Ownership)	-0.054** (0.024)	-0.055* (0.028)	-0.066* (0.034)	-0.053** (0.024)	-0.053* (0.029)	-0.062* (0.034)
Intercept	-0.211 (0.132)	-0.331* (0.170)	-0.270 (0.173)	-0.329** (0.135)	-0.451** (0.178)	-0.392** (0.181)
Observations	507	507	507	470	470	470
Adjusted R-squared	0.037	0.071	0.094	0.066	0.091	0.110
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Overall, our results suggest that there is some evidence of differences in oversight based on choice of Nomad and auditor. However, the effect does not appear to entirely compensate for the general underperformance of AIM firms. To quantify this effect, we compared the improvement in performance associated with strong firm-level oversight to the average extent of AIM underperformance. Specifically, we use the fitted value from the coefficients on the two firm-specific Nomad and auditor characteristic variables in column (5) to form an aggregate firm-level oversight variable based on the sum of the fitted values for each firm. We then compare the distribution of this aggregate firm-specific oversight variable to the average extent of AIM underperformance. Overall, a firm with firm-level oversight at the 75th percentile has 18-month post-IPO returns 24.7 percentage points higher than the average AIM firm. Given that Table 3 shows that, on average, at 18-months AIM firms underperform benchmark firms by 42 percentage points, an AIM firm in the 75th percentile of firm-level oversight still underperforms the average benchmark firm by about 17.3 percentage points. Given the average magnitude of underperformance for AIM firms documented in Table 3, it appears that, while firm-level bonding can substitute for regulatory bonding, the effect is only partial.²⁹

9. Retail ownership analysis

In our final analysis, we examine the association between the extent to which shares are held by retail investors and the post-listing return performance of AIM firms. There are at least two reasons for being interested in retail investors. First, to the extent that there is potential mispricing on the AIM, it is likely to be most concentrated in firms that have a relatively unsophisticated investor base. Second, protection of retail investors is a priority for regulators. Given that the AIM attracts individual investors, it is potentially interesting to understand the association between retail investor ownership and performance.

We obtain data on share ownership from the Argus Vickers Owners Service Share Register Analysis System (AVSR). In the UK, firms are required to make their share registries available, which, since 2001, have been compiled by AVSR into six mutually exclusive ownership classifications based on the identity of the shareholder and how the ownership stake was acquired: (1) Execution Only Stockbrokers, (2) Full Service Stockbrokers, (3) Private Client Investment Managers, (4) Private Banks, (5) Institutions, and (6) Large Individual and Private Clients. For our sample of 882 firms with IPOs since 2001, 507 have data available from AVSR.

In discussions with Argus Vickers, their analysts indicated that, while retail investors are spread across other ownership categories, the two brokerage categories are the most likely categories to contain a high concentration of retail investors. That conclusion is also consistent with prior research in finance and economics that uses stock ownership through brokerages as a

²⁹ The effect of bonding in this context is unusual relative to the prior literature in that it results in an increase in cost of capital, at least in the short term, because investors appear to be overpaying for shares with poor oversight. That raises the question of why a firm would choose to bond. However, it is not clear that exploiting investors for short term gain will be in the long term best interest of the firm, particularly because the firm may now have disgruntled shareholders and may have to raise subsequent rounds of financing. Also, overall cost of capital will be a function of both initial pricing and longer term equilibrium price, so the net effect is not simply the effect of the initial mispricing.

proxy for retail investor ownership (e.g., Barber and Odean, 2008). Following that literature, we proxy for the percentage of retail investor ownership as the sum of the percentage holdings of investors who acquired their shares through “Execution Only” and “Full Service” stockbrokers.

Table 2 provides descriptive statistics on retail investor holdings through “Execution Only” and “Full Service” stockbrokers. While the mean holding is only 7.5%, it is important to note that retail investors are likely also represented in other ownership categories on the AIM (e.g., Dossa, 2010, estimates that retail investors have traditionally owned more than 50% of shares on the AIM). As with research such as Barber and Odean (2008), we assume that firms with higher ownership through brokerage accounts are also likely to have higher retail investor interest more generally.

In Table 11, we regress post-listing returns for 12-, 18-, and 24-months on controls and the natural log of retail investor ownership determined as nearly as possible after listing (on average 38 days) to capture the identities of the shareholders who likely experienced any share price declines. In the first three columns we control for size and in the final three columns we also include the firm's leverage and market-to-book ratios. Consistent with our prediction, the coefficient on retail ownership is negative and significant in all of the regressions. In terms of economic magnitude, focusing on the 18-month return window, an interquartile shift from the 25th percentile to the 75th percentile of retail ownership is associated with an 8 percentage point reduction in returns. Given the mean return over the 18-month window for the sample of firms with available ownership data is -16% , the 8 percentage point difference across quartiles is economically substantial. Subject to the caveat that we are only able to identify a subset of retail ownership based on brokerage account holdings, the results suggest that retail investors are particularly exposed to the lower returns performance of AIM firms.

10. Conclusion

We provide evidence on the post-listing performance of firms that are attracted to the unique regulatory environment of the AIM relative to traditionally regulated exchanges in the US and UK. Our conclusions are consistent across several classes of performance characteristics including: post-IPO buy-and-hold returns, extreme performance, delisting following positive returns and survival rates. Relative to similar firms that listed and raised capital on the LSE's Main Market, the NASDAQ and the OTCBB, AIM firms underperform in terms of returns and experience a significantly higher probability of failure. Furthermore, AIM firms are unlikely to go on to become high flyers or move to better exchanges. Results are robust to consideration of various subsamples of AIM firms and alternative matching and controls.

Of course, it is difficult to draw normative conclusions from empirical analyses. At a minimum, however, the results suggest that the AIM's regulatory structure may not be a panacea and are consistent with the conclusions of the AIM's critics, such as the SEC and NYSE, who argue that the AIM's relaxed regulatory environment limits its ability to provide effective oversight relative to traditional exchanges. Furthermore, our results suggest that, at least in the context of the AIM, private securities regulation with self-selected oversight may not be a complete substitute for public regulation.

While it is difficult to definitively establish that underperformance by AIM firms is related to limited oversight and regulation, it is striking that the underperformance of the AIM firms is consistent with the unregulated Pink Sheets in the US. Also, the AIM firms appear to significantly underperform investments in private equity and venture capital, suggesting that it is not simply the characteristics of early startup firms that drive our results but, rather, the inability of unsophisticated investors to price protect on the AIM market.

Further, the magnitudes of the effects we document are particularly large for firms raising capital as part of the listing, when incentives to inflate share price are likely to be particularly high. Evidence from abnormal accruals suggests that AIM firms are more likely to manage earnings than control firms, and that abnormal accruals can explain, at least in part, the post-IPO underperformance. While there is evidence that choice of a high quality Nomad and auditor mitigates the post-IPO underperformance, the ability of firm-level oversight to substitute for regulatory oversight appears incomplete.

Our conclusions are subject to several caveats. Most importantly, we can only examine the AIM experience as implemented. Therefore, we cannot draw conclusions about how the markets would perform with differences in, for example, litigation environment or Nomad oversight. Further, there are strong *ceteris paribus* assumptions at work here. In particular, we implicitly assume that other aspects of the economic environment are generally similar across our comparison exchanges. If that is not the case, unobserved correlated variables may influence our results. However, the fact that we include a variety of controls, and that the US and UK are similar economies on a variety of levels, provides some comfort with respect to our comparisons. Moreover, the consistency of our results across a variety of comparison samples mitigates potential concerns that results are driven by a specific comparison set. That being said, conclusions should be drawn with caution.

Appendix A. Institutional background

The AIM provides issuers with a “light touch” exchange-based regulatory environment.³⁰ This environment differs markedly from other exchange-based regulatory venues in that private entities enforce and, to a certain extent, formulate securities regulations. Moreover, these private entities (Nomads) compete to bring new listings to the AIM and to oversee

³⁰ This appendix is based on information obtained from a variety of sources including the LSE's website (<http://www.londonstockexchange.com/companies-and-advisors/aim/aim/aim.htm>), Litvintsev (2009) and Mendoza (2008).

existing listings. Given its structure, the AIM is exempt from virtually all of the UK Listing Authority's and the EU's regulatory provisions that cover mandatory disclosures and corporate governance.

The LSE's "AIM Rules for Companies" determine the minimum level of regulation faced by AIM firms, although Nomads are free to set and enforce higher-levels of regulation for the firms that they cover. To list on the AIM, a firm must engage a Nomad to certify that the firm is suitable for listing. The firm must then issue admission documents that disclose relevant information about the firm. The AIM Rules for Companies require that admission documents contain a statement that the company has, in its directors' opinion, sufficient working capital for at least 12 months from the date of admission. When a company has not been revenue earning or financially independent for two years, its directors and substantial shareholders are restricted from selling their shares for a period of 12 months after admission.

If the firm raises capital on the AIM, it is also required to issue a prospectus that complies with the FSA's prospectus rules. The AIM Rules for Companies, however, provide firms with the option to either "comply or explain" with respect to the prospectus rules. Under this option, firms can choose not to comply with the rules and instead provide an explanation to the Nomad of why they are not complying.

The LSE does not review the admission documents, prospectuses, and/or the explanations for non-compliance. The firm's Nomad has the sole responsibility to review all documents and disclosures made by the firm. Instead of regulating firms, the LSE is responsible for regulating the Nomads to ensure that they maintain the regulations outlined in the AIM Rules for Nominated Advisors. The LSE can sanction or fine Nomads who do not ensure that firms meet the minimum levels of regulation detailed in the AIM rules, although public sanctions and fines are rare.

To maintain an AIM listing, a firm must engage a Nomad at all times. If an AIM listed firm loses its Nomad, the exchange ceases trading in the firm's securities. If within one month of the suspension the firm is unable to engage a new Nomad, the exchange cancels the firm's admission to the AIM. The Nomad's ongoing role is to ensure that the firm makes the required periodic disclosures and that these disclosures are of the minimum quality level in that they are not deceptive and they do not omit "relevant" information. AIM listed firms are required to disclose price-sensitive, non-public information and it is the responsibility of the Nomad to ensure that such disclosures are made. In addition, firms are required to disclose information about substantial transactions, related party transactions, reverse takeovers, and asset disposals that lead to a fundamental change in the business. Moreover, the firm must issue immediate notification of any developments that affect the firm's financial condition, sphere of activity, performance, and expectation of performance, which would likely lead to substantial changes in price. In all cases, it is the responsibility of the firm's Nomad to ensure that such disclosures are made and that they are not deceptive.

AIM listed firms are required to issue semi-annual financial statements and audited annual financial statements. Companies incorporated in the European Economic Area must publish their accounts according to IFRS. Companies incorporated outside of the European Economic Area can use US, Canadian, and Japanese GAAP, or Australian IFRS. If a company in the European Economic Area has no subsidiaries, it can, however, use local GAAP. It is the Nomad's responsibility to ensure that the firm meets the requirements for financial statements and the financial statement filings are not verified by the LSE. The Nomad can also be the firm's auditor. As of February 2007, every AIM company must also maintain a website that contains basic information about its business.

The eligibility requirements to become a Nomad are minimal: be a firm or company, not an individual; have practiced corporate finance for at least the last two years; have acted on at least three relevant transactions during that two year period (for example, initial public offerings); and employ at least four "qualified executives." The Nomad's primary responsibility and duty of care is owed to the LSE and not to investors. According to the AIM Rules for Nominated Advisors, the Nomad must ensure that the admission and conduct of a firm do not impact adversely the reputation and integrity of the LSE. Nomads that violate the AIM Rules are subject to penalties and sanctions outlined in the LSE's AIM Disciplinary Procedures. We have been unable to document any instances of investors successfully suing a Nomad. Further, public fines or sanctions against Nomads by the LSE are rare.

In addition to a Nomad, every AIM firm is required to have at all times a broker, who handles distribution and research. Brokers also maintain relationships between the company and investors in the aftermarket. The broker can also be the firm's Nomad. The Nomad's client is the firm and its dealings with the firm are private. In contrast, the broker's clients are its investors and it is not privy to the confidential communications between the Nomad and the firm.

The AIM's regulatory structure differs markedly from other comparable worldwide exchanges such as the LSE's Main Market, the NASDAQ, the OTCBB, and the Pink Sheets. Firms listing on the Main Market and the NASDAQ are subject to the national securities regulations of the UK and US, which are enforced by the FSA and the SEC. In contrast, firms listing on the AIM are exempt from most of the UK's securities regulations. Potentially more comparable with the AIM are the two major US based quotation systems: the OTCBB and the Pink Sheets. To be quoted by each service, a firm must be covered by a market maker, who submits the application for the fee and pays all relevant fees to the quotation system. However, as of January 1999, firms quoted by the OTCBB are required to be SEC registrants. The Pink Sheets also recently introduced a classification scheme that indicates a quoted firm's level of disclosure and its regulatory status.

Appendix B. Examples of disciplinary actions against AIM Firms, Nomads and Brokers

Given the AIM's unique regulatory structure and limited media following, it is not possible to conduct a rigorous empirical analysis comparing fraud or other misrepresentations by AIM firms relative to the control sample. However, to

provide descriptive evidence on disciplinary actions against AIM firms, we searched Factiva for disciplinary notices related to AIM, using a variety of search terms (“AIM,” “Alternative Investment Market,” “Delisting,” “Fraud,” “Nomad resignation,” etc.). Our search uncovered a variety of allegations against AIM firms.

We found a number of instances in which founders and management of AIM companies had been arrested on criminal charges ranging from racketeering and illegal gambling to share price manipulation and fraud. One of the most prominent examples is BetOnSports, formerly one of the largest online sports gambling websites, whose founder was convicted of racketeering in the US in August 2009 and forced to forfeit \$44 million in illegally obtained revenue (Associated Press, November 2, 2009). When the founder took BetOnSports public in 2004, he raised more than £50 million, which he deposited in a Swiss Bank account. At the time of his sentencing, authorities were still seeking to recover that money. Evolution Beeson Gregory, who served as BetOnSports Broker and Nomad, was questioned by AIM regulators about BetOnSports’ suitability as a public company (The Times, July 21, 2006). Despite “suggestions that it should have disclosed the chequered past of its fugitive American founder, Gary Kaplan,” the AIM regulators determined that Evolution Beeson Gregory “absolutely” fulfilled its obligations in terms of disclosure (The Times, July 21, 2006).

While AIM does not typically publically disclose Nomad censures, there have been two recent public censures of AIM Nomads, and three other private censures that were made public upon acquisition due diligence investigations. One of the most prominent of the public censures was that of Astaire Securities, which was fined £225,000 in June of 2009 over issues related to the flotation of Worthington Nicholls (Financial Times, June 25, 2009). According to the Financial Times, the disciplinary action was based on the fact that “the firm failed in its duties to the exchange to assess Worthington’s appropriateness for AIM at admission...” Corporate Synergy, now known as Astaire, brought Worthington to market in the summer of 2006 and the shares “collapsed” in 2007 (Financial Times, June 25, 2009).

Again, while it is AIM policy to not publically disclose company censures, our search uncovered several examples of firm censures subsequently brought to public knowledge. One particularly interesting case is that of African Minerals, fined £75,000 in January 2008 for putting out “misleading and unrealistically optimistic information” (Financial Times July 18, 2010). The fine was thought to be related to statements in the firm’s prospectus “including a claim that the group had found a ‘significant number’ of rare pink diamonds in Sierra Leone.” A clarifying announcement made by the company in December 2006 disclosed that the stones had failed to retain their pink color when put through an acid cleaning process.” Frank Timis, the executive chairman of African Minerals, was also subject to another fine of £600,000 by AIM regulators two years earlier for issues related to Regal Petroleum. The Financial Times further reported that “the LSE found that Regal had committed numerous and serious breaches of AIM rules.” This censure was not disclosed until the investment agreements of a Chinese acquirer were made public in July of 2010. The Financial Times goes on to note that this was not Frank Timis’s first run in with the law—he had been twice fined for possessing heroin with intent to supply in Australia in the early 1990s (Financial Times July 18, 2010).

Finally, although, as discussed previously, the AIM is not directly subject to regulation by the FSA, our search uncovered several examples of investigations of AIM companies by the FSA that led to fines. The largest of these fines was levied against Evolution Beeson Gregory in November 2004 for “market abuse” (The Times July 21, 2006). The Dow Jones newswire reported that Evolution Beeson Gregory sold short 252% of the issued share capital of Room Service in anticipation of a future equity issuance. The anticipated issuance never occurred and Room Service’s shares were subsequently suspended from AIM.

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