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Do personal taxes affect investment decisions and stock returns?

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Abstract

This paper studies the causal effects of personal investment taxes on stock demand, stock returns, and the financial decisions of companies. I exploit a change in legislation in 2013 which allowed stocks listed on the Alternative Investment Market, a sub-market of the London Stock Exchange, to be held in capital gains and dividend tax-exempt investment accounts for the first time. Using a difference-in-differences and factor model approach, I find that stock demand temporarily doubled, excess stock returns decreased by their pre-legislation change effective tax rate, dividends increased by a quarter, and that the capital structure and shareholder composition changed post-legislation.

Key words: Personal investment taxes, tax capitalisation, dividend policy, capital structure.

JEL classification: G11, G12, G18, G32, G35, H24.

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1. INTRODUCTION

Taxes are a fundamental part of the financial decision making process for both investors and companies. For risky investments, the tax rate on investment proceeds is often the only component which is known with certainty beforehand. Therefore, rational economic agents will mitigate their tax liability wherever possible through efficient tax planning. While this is well understood, there is a paucity of empirical evidence which is able to establish a causal link between the personal tax rate on investment proceeds, and the effect this has on an asset's demand and returns (Poterba (2001), Graham (2003)). A good understanding of investor tax clienteles can help us to better explain the cross-sectional heterogeneity of asset returns, as well as the investment and payout decisions of companies who are influenced by their shareholders.

In this paper, I study how the tax rate faced by retail investors on the proceeds of their stock investments affects the investor's demand for stocks, the stock returns, and the financial decisions of companies. I do this by exploiting a change in legislation in 2013 which allowed stocks listed on the Alternative Investment Market (AIM), a sub-market of the London Stock Exchange (LSE) designed for small growing companies, to be held in capital gains and dividend tax-exempt Individual Savings Accounts (ISAs) for the first time. Main market LSE stocks have always been eligible for ISAs, which therefore warrants their potential use as a control group. Using a difference-in-differences and factor model approach, I exploit the variation in taxation across both time and assets, and find that a reduction in capital gains and dividend taxes caused stock demand to temporarily double, excess stock returns to decrease in-line with their pre-legislation change effective tax rate of 0.9 percentage points per month, dividend payments to increase by 26%, and the number of shares issued and leverage ratios to increase by 24% and 22% respectively.

The main novelty of this paper is to provide the first causal evidence that personal taxes jointly affect investment decisions and stock returns by exploiting a unique quasi-

natural experiment.[1] While numerous theories predict the existence of tax clienteles (Miller and Modigliani (1961) is an early example), the empirical evidence is not conclusive. Michaely, Thaler, and Womack (1995) do not find evidence for tax clienteles in their analysis of dividend initiations and omissions, whereas Graham and Kumar (2006) do find evidence by showing that older and lower-income investors are more likely to hold dividend paying stocks in their portfolios.[2] Moreover, while there is time series descriptive evidence that personal tax rates affect stock returns (Poterba and Summers (1984), Sialm (2009)), there is no causal evidence to support this finding. By using a difference-in-differences methodology which compares AIM companies to a propensity score matched[3] Financial Times Stock Exchange All-Share Index (henceforth FTSE[4]) control group, I am able to identify the tax effect on stock demand and returns, and therefore clearly demonstrate that taxes are capitalized into stock prices. This has been a considerable challenge in other settings due to endogeneity issues, since tax changes are often related to macroeconomic factors.

My first finding is that AIM stock demand, relative to a matched FTSE control group, jumped upwards as turnover doubled for six months after the legislation announcement. This is consistent with the idea of tax clienteles and investors rationally basing their investment decisions on their tax liabilities, supporting the suggestive evidence of Graham and Kumar (2006), Sialm and Starks (2012), and Giglio, Maggiori, Stroebel, and Utkus (2021). This result contributes to the evidence of tax clienteles in financial markets by clearly showing that a reduction in AIM personal investment taxes caused investors to increase money flows into AIM stocks. Using shareholder data, I show that retail investors immediately in-

[1] Compared to IRAs in the US, ISAs have no withdrawal penalties before retirement, and withdrawals are not liable for income tax. In 2013, ISAs exempted investors from a 37.5% and 28% dividend and capital gains tax, and over three million adults in the UK owned a Stocks and Shares ISA (around 6% of the adult population) with a total market value of approximately £200 billion ($300 billion). I apply £1 = $1.5 in this paper.

[2] Most tax clientele studies have focused on the preference of lower-income and older investors to hold dividend paying stocks because their potential dividend income tax liability is relatively less. See Feenberg and Poterba (1991) for an analysis of tax-exempt municipal bonds and their high-income investor base and Babina, Jotikasthira, Lundblad, and Ramadorai (2021) for a more recent study on the same topic.

[3] The propensity score covariates used are firm size, age, sector, book-to-market ratio, and market beta.

[4] The FTSE All-Share Index is the most comprehensive stock index of the main market LSE.

creased their ownership of AIM stocks after the legislation change, shortly followed by institutions who invest on behalf of retail investors. Furthermore, I observe an increase in short term AIM stock prices alongside an increase in fund flows and the number of AIM companies included in a UK focused small-cap ETF.

My second finding is that excess AIM stock returns decreased by at least 0.9 percentage points per month after the legislation change, a magnitude which the data does not reject as equalling the average monthly effective tax rate of AIM stocks in the decade before the tax cut. Looking deeper into the heterogeneity within AIM stocks, this result is further reinforced by showing that AIM stocks with the highest and the lowest effective tax rates in the decade before the tax cut experienced commensurate falls in their excess stock returns in the decade after. This finding is in-line with the tax capitalization hypothesis of Brennan (1973) which assumes that stock returns efficiently adjust to reflect the tax burden faced by the marginal investor. The result holds when using a factor model approach and a difference-in-differences set-up, which ensures that the results are not being driven by the control group. My results support the findings of Poterba and Summers (1984) who study the relationship between dividends and stock price movements during different tax regimes, and find that *"tax changes can affect security returns"*, and Sialm (2009) who shows that US investors were compensated for their dividend tax burden between 1912 and 2006. My results compliment these earlier findings which used time-series regressions by providing causal evidence that taxes influence stock returns, and therefore they address concerns that the correlation between taxes and stock returns is being driven by endogenous macroeconomic factors. My results also relate to Schulz (2016) who shows that personal taxes can help to explain asset prices and address potential puzzles in the literature.

I also explore the role of liquidity premia and information costs as additional mechanisms through which the tax cut might have effected AIM stock returns. While I do not find a statistically significant change in the bid-ask spread of AIM stocks relative to FTSE stocks,

which is contrary to a liquidity premium explanation of my results (Amihud and Mendelson 1986), I do find that the analyst coverage of AIM stocks, as a proxy for information costs, increased by 18% after the legislation change, which can help to explain why in some specifications the reduction in AIM excess stock returns is more than the prior effective tax rate.[5]

My third finding is that after the legislation change, AIM companies increased their dividend payments by 26% compared with their payout level before. This is consistent with Chetty and Saez (2005) and Desai and Jin (2011), who find that the payout policy of companies is influenced by the tax-based preferences of their shareholders. My study differs from Chetty and Saez (2005) as I explore the effects of a complete elimination of dividend taxes, not just a reduction, and unlike their study, I can make comparisons to a group of companies which did not receive a tax cut during the sample period and therefore provide causal evidence, an advantage that their setting does not provide. In contrast to Desai and Jin (2011), my focus is on retail investors whereas their focus is on institutional investors. I also find that the number of AIM companies in my sample who re-purchased shares went from zero before the legislation change to six after, and that the there was a 12% increase in the number of AIM companies paying dividends after the tax cut.

My fourth and final finding is that AIM companies also responded to the tax cut by issuing both more equity and debt. On average, compared to the matched control group, the number of shares issued and the debt-to-asset ratios of AIM companies increased by 24% and 22% respectively. Both of these decisions are likely to be indirect effects of the tax cut which resulted in relatively higher stock prices. These results provide further evidence that the capital structure decision of companies is affected by the personal taxation level of their investors (Graham (1999), Lin and Flannery (2013)) .

The remainder of this paper is organized as follows. Section 2 outlines the setting of this study, Section 3 presents the results, and Section 4 concludes.

[5] Easley, Hvidkjaer, and O'Hara (2002) present and test a model which predicts that private information, a substitute for public information, is important in helping to explain the cross-section of equity returns.

2. INSTITUTIONAL DETAILS

This section outlines the institutional details of the legislation change which allowed AIM stocks to be held in ISAs for the first time in 2013. I discuss the AIM stock exchange, the main LSE, ISAs, and the motivation for the legislation change.

2.1. THE AIM AND THE MAIN LSE

The AIM was launched in 1995 and was designed for smaller growing companies who wanted to raise equity more quickly and at a lower price than on the main LSE. The AIM markets itself as the world's most successful growth market, and since opening, as of December 2022 3,988 companies have raised over £130 billion ($195 billion) on the AIM. Doukas and Hoque (2016) find that half of firms who initially list on the AIM could list on the main market, but choose not to because of the lower initial listing fee and lower subsequent cost of raising capital. The financial reporting and accounting requirements are also less stringent on the AIM. While most AIM stocks are small growth companies, there are also many large well established UK businesses listed on the AIM.[6]

The FTSE All-Share comprises around 600 companies and is the aggregation of the FTSE 100 Index, the FTSE 250 Index, and the FTSE Small Cap Index, which are stock indices formed from stocks listed on the main LSE. In terms of market capitalization and age, there is a wide overlap of companies listed on the AIM and the FTSE All-Share Index, with the FTSE All-Share also listing many small and growing companies. I exploit this overlap along with other commonalities when forming my control group. To limit data issues such as stale prices and missing observations, I will focus on the 100 largest companies listed on the AIM which are the more established and the more frequently traded.

[6] Under certain conditions, AIM stocks can also be exempt from a 40% inheritance tax. Section A.5 in the Appendix provides more details.

2.2. Personal Investment Taxes in the United Kingdom

Between 2010 and 2016, a 28% capital gains tax for stocks was due on any profits made during the financial year above the capital gains tax allowance which was £10,900 ($16,350). In the years leading up the legislation change, the capital gains tax rate varied between 40% (2004 to 2008) and 18% (2008 and 2010). Between 2013 and 2016, dividends were taxed up to 37.5% if the investor earned over £150,000 ($225,000). Between 2010 and 2013 the dividend rate was 42.5%, and between 2004 and 2009 it was 32.5%.[7]

2.3. AIM Stocks Become Eligible for ISAs

Individual Savings Accounts (ISAs) allow UK citizens to save and also invest money in qualifying investments up to a certain limit each financial year without being subject to capital gains or dividend tax. The Stocks and Shares ISA limit was £11,520 ($17,280) in the 2013-2014 financial year, £15,000 ($22,500) from July 2014 till April 2017 and £20,000 ($30,000) since then. Similar tax efficient investment accounts exist in France, Canada, Italy, Russia, South Africa, and the Scandinavian countries. Traditional and Roth Individual Retirement Accounts (IRAs) in the US also exempt investors from capital gains and dividend taxes within the IRA, but unlike ISAs, IRAs can face a penalty for withdrawing funds before retirement.[8] In 2013, over three million people held a Stocks and Shares ISA account, which was approximately 6% of the UK adult population. The total value of these investments was over £200 billion ($300 billion) which dwarfs the total 2013 AIM market capitalization in 2013, £76 billion ($114 billion).[9]

On the 3rd of July 2013, the treasury announced that as of August 5th 2013, stocks listed on the AIM could now be held in Stocks and Shares ISAs for the first time. The main

[7] For more information on UK taxes see Section A.5 in the Appendix, https://www.gov.uk/capital-gains-tax, and https://www.gov.uk/tax-on-dividends.

[8] Unlike traditional IRAs, ISA contributions are not income tax deductible, and withdrawals in retirement are not income tax liable. Unlike Roth IRAs, pre-retirement investment earnings withdrawals are not penalised.

[9] As a comparison, the total market cap of the FTSE All-Share at that time was over £1 trillion ($1.5 trillion).

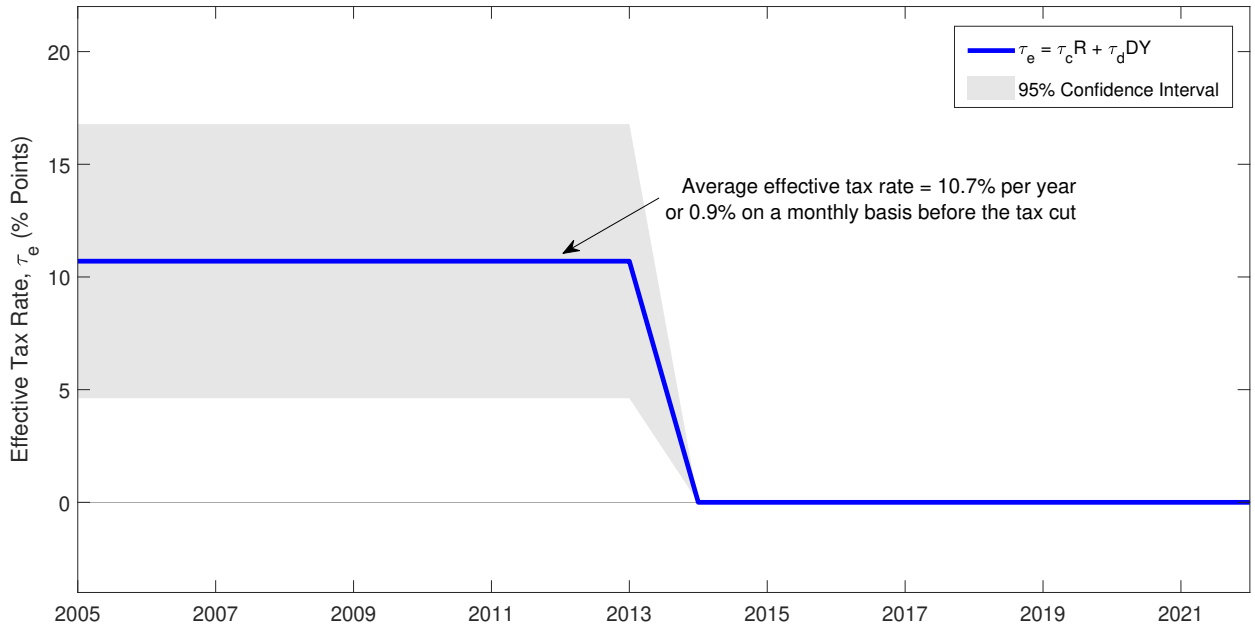

Figure 1: This figure plots the average effective tax rate (τ_e) of the AIM 100 sample before and after the tax cut in 2013 alongside 95% confidence intervals, where τ_e equals the average sum of the effective capital gains tax rate (capital gains tax rate multiplied by net returns) and the effective dividend tax yield (dividend tax rate multiplied by the dividend yield).

cause of the legislation change was an impetus within the UK government to provide more help to smaller growing domestic companies by giving them access to the large pool of ISA capital (also referred to as "patient capital") and therefore reduce their cost of equity. The initiative remains to this day a high priority for the UK governments as they seek to nurture a favourable environment to develop home-grown innovative companies.[10] Furthermore, AIM companies and business lobby groups had been calling for the ISA legislation change for many years. They had argued it would level the playing field for companies looking to raise capital on both exchanges and would therefore provide AIM companies with a potential multi-billion pound pool of finance. Figure 1 shows that in the years before the tax cut came into effect, the average effective personal tax rate of the AIM 100 was equal to 10.7% per year, or 0.9% on a monthly basis compared to 0% for the main market FTSE stocks. Dur-

[10]For further details on the government's motivations and justifications, see the following https://www.gov.uk/government/publications/patient-capital-review.

ing this period, the average top rate capital gains and dividend tax was 29.8% and 36.4% respectively, and the average yearly return and dividend yield for the AIM 100 sample was 32% and 1.1% respectively.[11]

Regarding anticipation of the announcement, news reports show there was some general discussion in the years leading up to the official government announcement, but no reports preceded or predicted the exact date. However, due to the nature of the legislation change, the main effect on asset demand and asset returns is not likely to have been realised before AIM stocks were actually allowed to be held in ISAs as the treatment only affected retail investors and not other financial institutions. Also, the short time between the announcement and the legislation change meant that investors did not have a long time to change their behaviour before the change came into effect. Another restriction to the speed and magnitude of the legislation is that there is an ISA limit each financial year, so if investors have reached their limit for that financial year and do not wish to liquidate their current holdings, they have to wait for the next financial year to add AIM stocks to their ISA. Empirical studies have shown that retail investors exhibit inattention to their portfolios and are slow, or even reluctant to re-balance (Madrian and Shea (2001), Agnew, Balduzzi, and Sunden (2003), and Sialm, Starks, and Zhang (2015))[12]. These factors suggest against any large anticipatory effects of the legislation change.

Regarding confounding events, no other events occurred during 2013 which affected AIM stocks specifically or ISAs. In 2014 (many months after the AIM legislation), there were two additional events. Firstly, for the same reasons that permitted AIM stocks to be held in ISAs, i.e. to encourage capital flows into smaller growing businesses, stamp duty tax was abolished on AIM stock purchases on the 28th of April 2014. The tax was however

[11] See Equation 3 for estimation details. Negative returns and non-dividend paying companies were included in the effective personal tax rate calculations. The sample period also includes the global financial crisis which negates the hypothesis that this was an uncharacteristically bullish period for equities.

[12] For a theoretical demonstration see Abel, Eberly, and Panageas (2007), Huang and Liu (2007), and Abel, Eberly, and Panageas (2013).

small, only 0.5%, and was not therefore economically important to the vast majority of retail investors who buy and hold. Secondly, the yearly ISA limit increased from £11,520 ($17,280) to £15,000 ($22,500) in July 2014.[13] The legislation change set the effective personal tax rate of AIM stocks from 10.7% per year to 0% when held in tax efficient investment accounts, and therefore the magnitude of the tax cut provides an ideal setting to study whether personal taxes affect investment decisions and stock returns.

3. Empirical Analysis

In this section I first describe my data sources and then I discuss my main empirical strategy where I match AIM stocks to FTSE stocks based on a propensity score matching methodology in order to accurately estimate the effects of the tax cut using a difference-in-differences methodology.[14] I also explore the effect of the tax cut on AIM dividend payments, equity issuance, and debt issuance.

3.1. Data

The main data sources for this study are Refinitiv Datastream and Bloomberg. I obtain the following data for all companies listed on the the AIM 100 and the FTSE All-Share: total return indices, market capitalization, sector, exchange listing date, incorporation date, turnover (volume × price), trading volume, number of analyst earnings forecasts, shares outstanding, debt-to-assets ratio, market-to-book ratio, market beta, price to earnings ratio, return on equity, and the daily close, high, and low price. Five monthly European factor portfolios (Fama and French 2015) covering the whole sample period and a European mo-

[13] As a precaution, I checked and found that the increase in turnover and the decrease in stock returns held up until the 28th of April 2014. With regards to the ISA limit increase, the limit increase affected both the AIM and FTSE stocks and is not therefore an issue for a difference-in-differences analysis.

[14] In Appendix A.6 I pursue a traditional CAR event study analysis as well as the Fama-Macbeth procedure to investigate the effect on abnormal returns post announcement. I explain why for longer term effects, a difference-in-differences methodology is more appropriate.

mentum factor (Carhart 1997) are obtained from Kenneth French's website, and a global liquidity factor (Pástor and Stambaugh 2003) is obtained from the website of Robert Stambaugh which ends in December 2021. For AIM shareholder data, I use the FactSet database which collects data mainly from the UK Share Register (UKSR), as well as the Regulatory News Service (RNS) which contains all the disclosures of institutions who own over 3% of a publicly listed UK company. ETF fund flow and high frequency tick data is obtained from Refinitiv Eikon and Refinitiv Datascope respectively. The main analysis is conducted between 2004 and 2022, providing equal time either side of the event.[15]

3.2. The FTSE All-Share as a Control Group

The ideal control group in this setting would be a similar group of AIM companies which did not receive the tax cut. However, as the legislation change affected all AIM stocks this is not possible. The next best option is to create a control group from the main LSE which is as similar as possible to the AIM sample so that the parallel trends conditions holds. Creating a control group which is as similar as possible to the treatment group reduces the likelihood that changes in outcome variables are being driven by confounding factors.

Many AIM companies could list on the main market if they wanted to. Both FTSE and AIM stocks are LSE constituents, they operate mainly in the UK, and they compete within the same economic sectors. As a consequence, they will have similar customers and risk exposures. Furthermore, FTSE stocks have always been allowed to be held in ISAs and did not experience a change in their tax treatment during the time period studied. A big difference between AIM and FTSE stocks however is their average size and age, as seen in Table 1. The AIM mostly consists of young, small to medium sized companies, whereas the FTSE contains older, small to very large sized companies. Therefore, the average FTSE company is much older and larger than the average AIM company.

[15] An earlier draft of this paper looked at a shorter time horizon either side of the tax cut.

The observation that smaller capitalization stocks systematically earn different returns to larger capitalization stocks was one of the first and most important documented in the asset pricing literature (Banz 1981). Stock turnover and dividend policy is also strongly associated with company size. To address the potential effect that company size, age, and other important asset pricing characteristics might have on the pre-trends between AIM and FTSE stock prices, I create a control group from the FTSE All-Share index by using a propensity score matching methodology with the following covariates: company size, age, sector, market-to-book ratio (value), and market beta. These characteristics were chosen as they are well established drivers of company valuations and behaviour.[16]

Table 1 displays the following observable characteristics of the AIM sample, the FTSE matched sample, and the full FTSE All-Share sample: market capitalization, age, market-to-book ratio (value), market beta[17], Dimson Beta, price to earnings ratio, return on equity, and trading volume. Firstly, the last column of Table 1 shows that the AIM and full FTSE All-Share sample and indeed very different across all characteristics, with the difference in sample averages for six out of eight characteristics highly statistically different from zero. This is in stark contrast to the propensity score matched control group in the second to last column, with the differences in sample averages across all characteristics statistically insignificant, and therefore on average, the AIM and the matched FTSE sample are statistically indistinguishable at the 99% confidence level. As a further check, I estimate Dimson (1979) Betas[18] which correct for infrequent trading. While the average beta sizes increased for both the AIM stocks and the matched FTSE sample (0.72 and 0.77 respectively), the two samples are still statistically indistinguishable.

In summary, the AIM and the propensity score matched FTSE All-Share samples are very similar across multiple characteristics which have been highlighted in the financial

[16] The data are as of just before the legislation announcement.

[17] Bloomberg uses the FTSE 100 to calculate the CAPM beta for UK stocks. Since both the stock samples include many small-cap stocks, the average betas are low on average.

[18] The estimation used an additional four lagged market excess returns with two years of daily data.

Table 1

This table displays the sample averages of relevant observable characteristics before the legislation change for the AIM 100 sample, the matched FTSE sample, and the full FTSE All-Share sample. The absolute difference in sample averages between the AIM sample and the FTSE samples are also displayed, along with their statistical significance. The observable characteristics are log market capitalization, age, market value of equity to book value of equity, CAPM beta relative to the FTSE 100, Dimson Beta with 4 lags, price to earnings ratio, return on equity, and log volume. Where an exchange listing date is missing, the incorporation date of the company is used. Sector codes were used in the matching procedure but sector averages are not displayed due to a lack of economic meaning. Data is winsorized at the 95% level to limit the effect of outliers on sample averages. Standard errors are in parentheses below sample averages. Stars denote whether sample averages are statistically different at the following confidence intervals: *** p < 0.01, ** p < 0.05 , * p < 0.1.

	Sample Averages			Sample Differences	
Characteristic	AIM	Matched FTSE	Full FTSE	AIM/Matched	AIM/Full
Log(Size)	18.86	19.02	20.22	0.17	1.36***
	(0.08)	(0.08)	(0.06)		
Age	11.90	14.29	27.10	2.38	15.20***
	(1.19)	(1.21)	(1.20)		
Value (P/B)	1.37	1.65	1.07	0.28	0.30
	(0.17)	(0.23)	(0.07)		
Beta	0.38	0.42	0.68	0.04	0.30***
	(0.04)	(0.04)	(0.02)		
Dimson Beta	0.72	0.77	0.87	0.05	0.15***
	(0.05)	(0.04)	(0.02)		
Price/Earnings	32.02	25.55	25.19	6.47	6.84
	(5.02)	(4.10)	(1.56)		
ROE	6.76	7.60	14.32	0.85	7.57**
	(2.44)	(2.10)	(1.04)		
Log(Volume)	12.20	12.44	12.81	0.23	0.61***
	(0.19)	(0.13)	(0.07)		

economics literature as factors which are important determinants of both stock price valuations and company financial decisions. Furthermore, as a precaution and to account for any possible fundamental differences in the AIM and the matched FTSE sample which may affect the trends in outcomes, I include the main risk factors documented in the literature in the regression analysis, and I present results for the unmatched control group too when analysing stock returns. Finally, for my analysis of stock returns, I also estimate a factor model to ensure that my results are not dependent on the FTSE control group.

3.3. Hypothesis Design

Before presenting the empirical results of this study, I briefly discuss the potential effects of the tax cut under certain hypotheses.

Hypothesis 1: a cut in personal taxes will increase retail investor's demand for a stock.

If investor tax clienteles exist (Miller and Modigliani 1961), i.e. groups of investors exist which base their investment decisions on their tax liability, then after the tax cut, we should see demand for AIM stocks increase because investors who were previously averse to paying investment taxes can now hold AIM stocks in their tax efficient ISA investment account which is exempt from capital gains and dividend taxes. Additionally, we should observe an increase in the shareholdings of retail investors, and retail investor focused institutions after the tax cut. Alternatively, if tax clienteles do not exist, we should not see any change in the demand for AIM stocks.

Hypothesis 2: a cut in personal taxes will reduce the expected excess return of a stock.

If stock returns compensate investors for their tax liability (Brennan 1973), we should ob-

serve a permanent decrease in AIM excess stock returns after the legislation change as investors no longer need to be compensated for their tax liability if they hold stocks in their ISAs. Alternatively, if investors are always able to offset their tax liabilities (Miller and Scholes 1978), we should not observe any change in AIM stock returns.

Hypothesis 3: a cut in personal taxes will increase the dividend payments of a stock.

If company management take the personal taxes of their investors into account when deciding on payout policy (Chetty and Saez 2005), we should observe an increase in dividend payments after the dividend tax cut. Alternatively, if dividend decisions are only dependent on retained earnings ("new view"), we should not observe a change in AIM dividend payments.

Hypothesis 4: a cut in personal taxes will affect the capital structure of a company.

If personal taxes affect the trade-off between debt and equity capital (Miller 1977), we should observe a change in the capital structure of companies after the tax cut. Alternatively, if frictions such as taxes do not matter for company decisions, we should observe no change in the capital structure of AIM companies.

3.4. Did Demand for AIM Stocks Increase after the Tax Cut?

In order to investigate what happened to the demand for AIM stocks after the legislation change, I focus on the asset's turnover. Changes in turnover (volume × price) will indicate not only if trading volume increased, which in itself could mean a negative increase in demand (people selling), but also what direction the change in demand was as turnover is also a function of price. In other words, if volume increased because investors were selling,

we would generally not expect to see a large positive spike in turnover because the value of those trades would also be falling, and therefore turnover can be interpreted as flows of money into a company's equity. Figure 2 plots the coefficient estimates of the following dynamic difference-in-differences equation:

$$\text{Turnover}_{i,t} = \alpha_i + \alpha_{s,t} + \sum_{k=t_0, k\neq j}^{T} \beta_k \, \text{Treated}_i \times \mathbb{1}(k = t) + \epsilon_{i,t}, \tag{1}$$

where $\text{Turnover}_{i,t}$ is the turnover of stock i at month t, α_i are company fixed effects, $\alpha_{s,t}$ is an interaction between company i's sector and time fixed effects, $\mathbb{1}$ is an indicator function for month t, j is the baseline month before the policy announcement, and Treated_i is a dummy variable which equals one if the stock is an AIM stock. β_k captures the period t specific effect for the treatment group relative to the control group, with respect to the baseline period before the legislation announcement j. Company fixed effects are included to control for any company specific time-invariant characteristics which may bias the treatment effect estimation, and the interaction between sector and month is included to control for any sector specific variability in a given month which may bias estimation of the treatment effect.[19]

Figure 2 shows that the parallel trend condition is satisfied as the coefficient estimates are not significantly different from zero before the announcement. Immediately after the legislation announcement, we see a doubling in AIM stock turnover which is statistically significant at the 95% confidence level. This elevated level of demand persisted for around six months, after which it reverted back to a higher level than before the legislation change. Figure A.1 in the Appendix plots the raw data and shows that the sharp increase in AIM turnover occurred both relative to its own time-series, but also relative to the matched

[19] Standard errors are clustered at the stock level. All missing observations are dropped from the sample in every analysis. Assignment to treatment is fixed and therefore results are for an intention to treat analysis. Results hold when dropping stocks which switched exchange during sample period (see Section A.7 in the Appendix for more information).

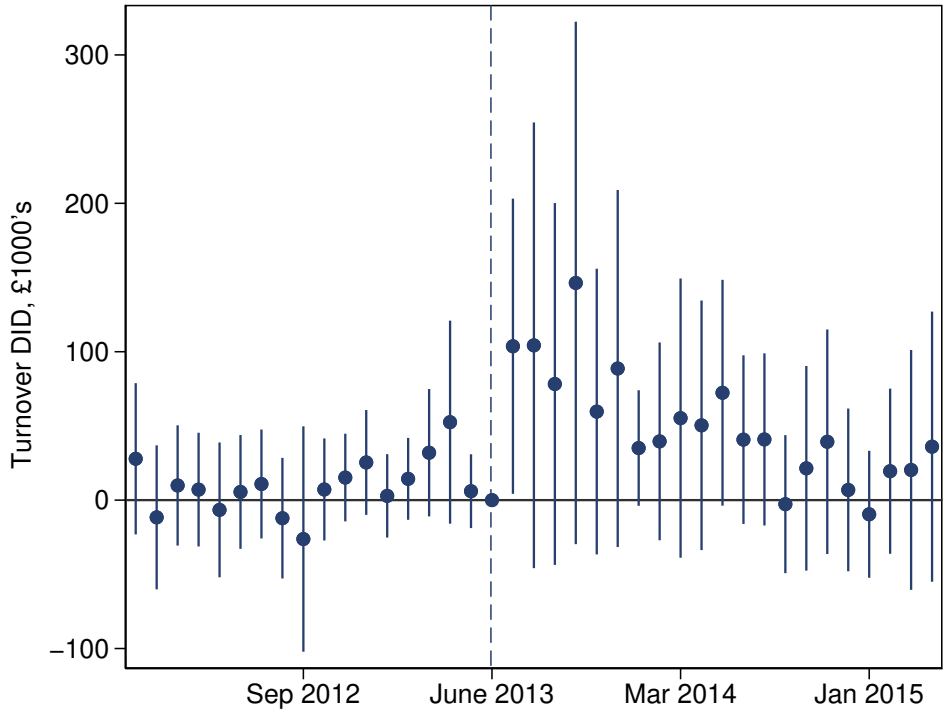

Figure 2: This figure plots the coefficient estimates of the dynamic difference-in-differences (DID) for monthly average turnover of the AIM sample against the FTSE matched sample (Equation 1). 95% confidence intervals are displayed vertically and standard errors are clustered at the firm level. Firm fixed effects and a sector × month interaction are included.

FTSE sample. The unusually high turnover period persists for around six months with trade flows at least double their pre-legislation rate. This suggests that after the legislation change, investors added AIM stocks to their portfolios as they became more attractive due to their relative reduction in taxes. This evidence is consistent with the existence of tax clienteles as investors invest in stocks depending on their tax liability, which supports the theory of Miller and Modigliani (1961) and the findings of Graham and Kumar (2006) who provide evidence for the existence of dividend tax clienteles. It also supports the findings of Sialm and Starks (2012), and Giglio, Maggiori, Stroebel, and Utkus (2021) who show through their use of survey data and retail investor portfolio holdings that personal taxes, among other factors, influence portfolio allocation.[20]

These results therefore help to address a previous lack of empirical evidence which

[20] Other clienteles have also been explored in the literature, such as age, and socioeconomic groups (Kumar 2009).

establishes a clear link between personal taxation and investor behaviour, as noted by Poterba (2001). While the point estimates after the tax cut are substantially larger than zero, the confidence intervals are also very wide during this period. This suggests that there is a lot of heterogeneity in the increased demand for AIM firms, and that some stocks experienced much more demand than others.[21]

Figure A.1 in the Appendix shows that there was not a relative drop in demand (selling pressure) for the matched FTSE sample. This is reassuring for the use of the matched FTSE sample as a control group because if there were to be spillover effects of the treatment onto the control group then its use for comparisons post event might be compromised. Why do we not see a reduction in demand for the matched FTSE sample if it is in a sense a substitute for AIM stocks? In reality, there are many risky asset groups in which investors participate in and the increase in demand for AIM stocks may have been funded by investors drawing on their uninvested savings, or from a general reduction in all other portfolio holdings which would make the general equilibrium effect of the tax cut negligible.

Where did the increase in demand come from? Recent literature such as Koijen and Yogo (2019), and Koijen, Richmond, and Yogo (2021) explores the heterogeneity in investor types across different stocks, and the resulting implications on the stock price dynamics. By using the same shareholdings data as these studies, I can investigate how the shareholder composition of AIM stocks changed after the legislation change. This is a particularly useful exercise in this study as the tax cut only directly affected retail and not institutional investors.

FactSet records shareholder ownership and designates each shareholder into an investor group. For UK listed stocks, the main source of this data is the UK shareholder register (UKSR). FactSet only records information on the UKSR if the investor has assets under management (AUM) over £20 million and if the investor is not registered offshore. Additionally,

[21] Section A.4 in the Appendix explores this heterogeneity further in a by-sector analysis of AIM stocks, and Section 3.5 exploits the heterogeneity in the pre-legislation change effective tax rate of AIM stocks to see how the excess stock returns of each quartile changed after the tax cut.

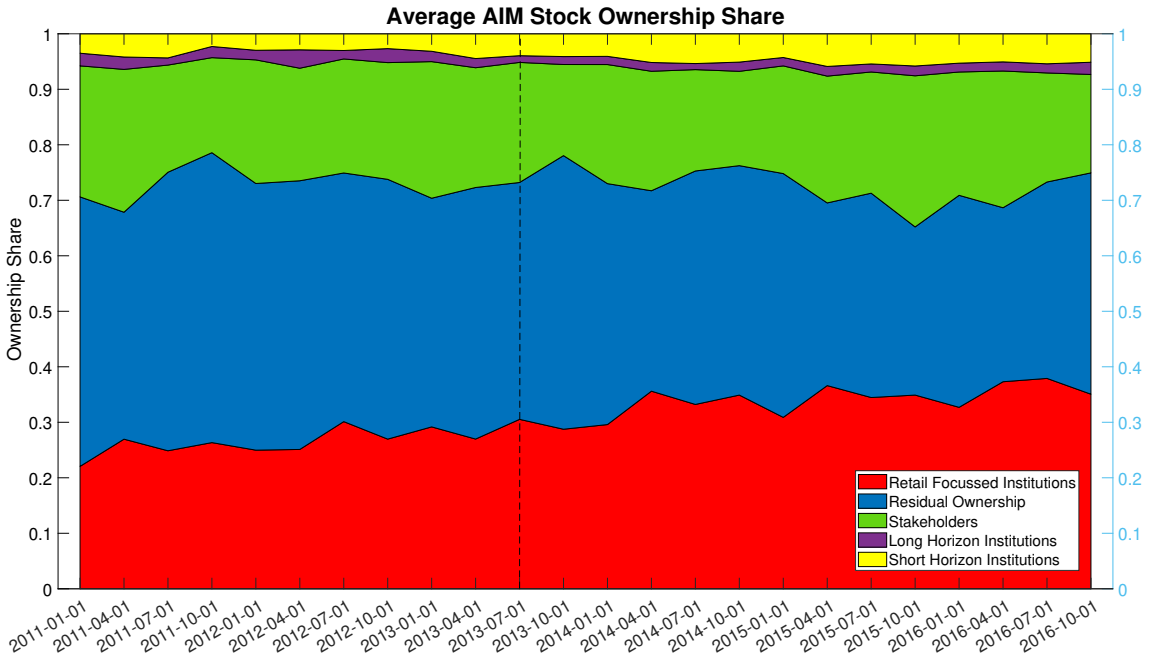

Figure 3: This figure displays the ownership share of the AIM stock sample broken down into short horizon institutions, long horizon institutions, stakeholders, retail focused institutions, and the residual ownership share which includes retail investors.

FactSet also collects data from the Regulatory News Service (RNS), and it calculates the sum of funds held across its database to fill in any gaps if they exist. Figure 3 displays the ownership share of AIM stocks before and after the legislation change at a quarterly horizon. I group investors into short horizon investors, long horizon investors, stakeholders, retail focused institutions, and residual ownership investors.[22] The residual ownership therefore includes retail investors, institutions with less than £20 million under management, and institutions registered offshore. Koijen and Yogo (2019), who use US data which has a lower recording threshold of $10 million AUM, refer to the residual group as the household sector.

Two main observations can be made from Figure 3. Firstly, in the quarter immediately after the tax cut, the residual ownership of AIM stocks, which is likely to comprise

[22] Short horizon investors includes hedge funds, bank investment divisions, brokers, fund of hedge funds, market makers, real estate hedge funds, stock borrowers, and venture capitalists. Long horizon investors includes pension funds, insurance companies, endowments, sovereign wealth funds, and research firms. Stakeholders includes mostly the founders and early investors of a company. Retail focused institutions includes mutual funds, family offices, investment advisors, private banking, and fund of funds.

mostly of retail investors, increased by 6.62 percentage points. The equivalent reduction in ownership came mostly from stakeholders (includes founders and early investors) who reduced their ownership by 5.21 percentage points. This suggests that in the first quarter after the tax cut, retail investors bought up AIM stocks, and stakeholders (founders and early investors) sold them. This is consistent with the idea of tax clienteles and investors responding to tax incentives.

The second observation is that after the initial quarter, retail focused institutions substantially increased their ownership of AIM stocks. Comparing the ownership before and after the legislation change, retail focused institutions increased their ownership by 7.23 percentage points.[23] Interestingly, this increase in ownership came at the expense of the residual ownership which decreased by 7.75 percentage points over the sample. One possible explanation for this is that retail investors moved their stock ownership into the control of investment managers, or institutions which specialise in ISA account management.[24]

Did AIM ETF fund flows increase too? While no specific AIM ETF exists, Section A.2 in the Appendix looks at the fund flows for the iShares MSCI UK Small Cap UCITS ETF, a popular UK small cap ETF which invests in both AIM and small cap main market stocks. In summary, positive fund flows were observed shortly after the legislation change, the ETF value became permanently higher, the number of AIM stocks in the ETF increased, and finally the relative value of AIM stocks within the portfolio increased shortly after the legislation change, and then fell back, consistent with Figure 2. Section A.3 in the Appendix shows how the intraday AIM stock prices jumped up on both the announcement day, and the day of the legislation change. Eight months after the tax cut announcement, the average stock price of the AIM 100 sample increased by over 23%. Looking deeper into the heterogeneity within AIM stocks, the price of AIM stocks in the highest (lowest) effective tax rate quartile

[23] The FactSet data sample begins in the first quarter of 2011 and ends in the last quarter of 2016.

[24] It is noteworthy that the ownership of short and long term investors did not substantially change after the tax cut.

in the decade before the legislation change increased by 47% (2%) over the same time horizon, which suggests that demand was concentrated among those companies who stood to benefit most from the tax cut.

3.5. The Effect of the Legislation Change on Stock Returns

The previous section established that there was an increase in the demand for AIM stocks after they were allowed into tax efficient investment accounts. In this section, I examine whether AIM stock returns were also affected by the tax cut.

Assume that the equilibrium rate of return for stocks follows the below generalized version of Brennan (1973),

$$\mathbb{E}(R_i - R_f) = \tau_i + \beta_i' \mathbb{X}, \tag{2}$$

where $\mathbb{E}(R_i - R_f)$ is the expected equilibrium pre-tax excess rate of return for stock i, τ_i is the tax premium which provides compensation for capital gains and dividend tax less the risk-free rate, $\mathbb{X}$ contains a matrix of priced risk factors for which investors require compensation, and β measures the sign and magnitude of the required compensation for stock i. In a world where asset returns are perfectly explained by Equation 2, the estimated tax premium should equal the effective tax rate of the marginal investor. If we assume that retail investors are the marginal investor for AIM stocks, we can estimate the effective tax yield that they faced before the tax cut and hence the AIM tax premium. Even if investors do not re-balance every year, the capital gains component of the annual effective tax yield is still relevant since returns compound over time. Figure 1 displays an estimate of τ_i for my sample of AIM stocks in the pre-legislation change period, with the average annual effective tax rate equal to 10.7%, or 0.9% on a monthly basis. I estimate the effective tax rate $\hat{\tau}_i$ with the following equation,

$$\hat{\tau}_{\mathrm{i}} = \frac{1}{T}\sum_{t=1}^{T}\left(\frac{1}{I}\sum_{i=1}^{I}\left(\tau_{\mathrm{c,t}}R_{i,t} + \tau_{\mathrm{d,t}}DY_{i,t}|t\right)\right) = 10.7\%, \tag{3}$$

where $\tau_{\mathrm{c,t}}$ is the capital gains tax rate in year t, $R_{i,t}$ is the annual net stock return of company i in year t, $\tau_{\mathrm{d,t}}$ the dividend tax rate in year t, and $DY_{i,t}$ the dividend yield of company i in year t. Negative stock returns and non-dividend paying companies are both included in the sample. The time period used in the estimation is July 2004 to end of June 2013.

Equation 2 therefore provides a simple framework to test the effect of the tax cut, or equivalently the effect of setting $\tau_i = 0$, on AIM stock returns. Consider the following econometric version of Equation 2 which we can estimate using OLS,

$$\bar{R}_{i,t} - R_{f,t} = \alpha_i + \beta'_{1,i}\mathbb{X}_t + \mathbb{1}_{(t\geq 7/13)}\left(\gamma_i + \beta'_{2,i}\mathbb{X}_t\right) + \epsilon_{i,t}, \tag{4}$$

where $\bar{R}_{i,t} - R_{f,t}$ is the average realized excess return of asset group i at time t, α_i is a constant for asset i, $\mathbb{X}_t$ is a matrix of tradeable risk factors, $\beta_{1,i}$ is a vector of coefficient estimates for the risk factors for asset i, $\mathbb{1}_{(t\geq 7/13)}$ is an indicator function which equals 1 if the observation is during or after July 2013 (the month of the announcement), γ_i is the coefficient estimate of the indicator function for asset i, $\beta_{2,i}$ is a vector of coefficient estimates of the risk factors interacted with the indicator function for asset i, and $\epsilon_{i,t}$ is an error term. α_i will capture any tax premium before the tax cut, and γ_i will capture the effect on stock returns after the tax cut and after controlling for systematic risk. I calculate average returns using three groups of stocks: the AIM 100 sample, the propensity score matched FTSE sample, and the full FTSE All-Share sample. For priced risk factors, I use the market return, size, value, profitability, investment, momentum, and liquidity.[25] If taxes are capitalized into asset prices and Equation 2 is an accurate representation of asset returns, we can make the following predictions for each of the above equally weighted portfolios: after controlling for

[25] See Section 3.1 for more information on the factor portfolios. Stock return outliers are removed from the sample before calculating portfolio averages.

systematic risk, excess AIM stock returns should have a positive and statistically significant constant equal to 0.9% before the tax cut (Figure 1 and Equation 3). After the tax cut and after controlling for systematic risk, the tax premium AIM stocks previously commanded to compensate investors for their tax liability should be eliminated, and therefore we should estimate a negative and statistically significant γ equal to -0.9%. When estimating the regression only on excess stocks returns after the legislation change, the constant should not be statistically significant from zero since no premium is demanded. The same logic applies to the spread between AIM and matched FTSE stock returns, as well as the spread between the AIM and the full FTSE since no tax premium is commanded by FTSE stocks before or after legislation change.

Table 2 displays the regression results of Equation 4. The null hypothesis values assuming tax capitalization are not rejected by the stock return data for nearly all return specifications (AIM stocks alone, the spread between AIM stocks and their matched FTSE counterparts, and the spread between AIM stocks and the unmatched FTSE sample). The only exception is the estimate of α for the AIM sample, which at 1.6% is somewhat larger than 0.9% and therefore rejects the null hypothesis at the 90% confidence level. However, the estimate of γ for the AIM sample alone does not reject the null hypothesis value of tax capitalization. For the spreads between AIM and FTSE stock returns, we see that both estimates of α and γ are very close in magnitude to 0.9% and therefore do not reject the hull hypothesis of tax capitalization at any meaningful confidence level. In summary, by failing to reject the null hypotheses of tax capitalization in all specifications, Table 2 provides very strong and clear evidence that taxes are capitalized into asset prices and hence affect stock returns. Before the legislation change, excess AIM stock returns earned a positive and significant return premium of at least 0.9 percentage points per month, even after controlling for an extensive list of priced risk factors which have been shown in the empirical asset pricing literature to capture systematic risk and after comparing AIM stock returns to the

Table 2

This table displays the coefficient estimates of α and γ in the return factor model (Equation 4) for the AIM sample, the propensity score matched FTSE sample, and the full FTSE sample across the full sample period, and before and after the legislation change separately. AIM - Matched FTSE refers to the average monthly returns of the AIM sample subtracted by the average monthly return of the matched FTSE sample, and likewise for the AIM - Full FTSE. Newey-West standard errors are displayed below coefficient estimates in parentheses. The sample period is between 2004 and 2022. The null hypothesis value of α and γ assuming tax capitalization is stated in each table segment. Stars denote whether coefficient estimates reject their H_0 values at the following confidence intervals: *** p < 0.01, ** p < 0.05 , * p < 0.1.

	Full Time Series		
	H_0: $\alpha_i = 0.9\%$, $\gamma_i = -0.9\%$		
i	AIM	AIM - Matched FTSE	AIM - Full FTSE
α_i	0.016*	0.008	0.006
	(0.004)	(0.003)	(0.003)
γ_i	-0.015	-0.011	-0.009
	(0.005)	(0.004)	(0.004)
Months	210	210	210
Adj R-squared	0.68	0.13	0.20
	Before		
	H_0: $\alpha_i = 0.9\%$		
i	AIM	AIM - Matched FTSE	AIM - Full FTSE
α_i	0.016*	0.008	0.006
	(0.004)	(0.003)	(0.003)
Months	108	108	108
Adj R-squared	0.69	0.15	0.23
	After		
	H_0: $\alpha_i = 0\%$		
i	AIM	AIM - Matched FTSE	AIM - Full FTSE
α_i	0.001	-0.003	-0.003
	(0.003)	(0.003)	(0.003)
Months	102	102	102
Adj R-squared	0.66	0.01	0.11

already treated FTSE stocks. After the legislation change, excess AIM stock returns became at least 0.9 percentage points lower per month than they were, completely removing the tax premium they once commanded by investors. The middle and bottom panels of Table 2 confirm this result by showing that before the tax cut, there was a positive and statistically significant return premium for AIM stocks, but after the tax cut, this premium disappears and there is no longer a statistically significant constant being priced into excess AIM stock returns. The regressions have also permitted factor betas to change after the tax cut, which dismisses the argument that changes in asset returns were due to changes in systematic risk exposure.

In order to exploit the benefits of this unique difference-in-differences set-up, I now proceed to investigate the effect on AIM stock returns using individual observations instead of portfolio averages. Doing so will allow to control for stock, sector, and time fixed effects which might be important in explaining the empirical results so far. I also include individual stock level proxies for liquidity and public information to account for additional mechanisms which might have arisen after the tax cut. The difference-in-differences specification is:

$$R_{i,t} - R_{f,t} = \alpha_i + \alpha_{s,t} + \beta \,\text{Treated}_i \times \text{Post}_t + \gamma' \,\text{Controls}_{i,t} + \epsilon_{i,t}, \tag{5}$$

where $R_{i,t} - R_{f,t}$ is the monthly excess return of stock i in month t, Post_t is equal to one from July 2013 on-wards, and controls refers to the inclusion of the factor portfolios (market, size, value, investment, profitability, momentum, and liquidity) which were used in the previous portfolio analysis. To capture liquidity and information effects which might result from AIM stocks being permitted into ISA's for the first time, I also include the following additional controls for each stock: trading volume, turnover, and the number of professional analysts making earnings forecasts. I include stock fixed effects to absorb any time invariant characteristics of individual stocks, a sector and month interaction, and the factor portfo-

lios to ensure that the difference in returns is not being driven by systematic risk sources (a higher market beta for example). As before, I interact the factor portfolios with a treated, post, and treated times post dummy which permits time-varying loadings, and I state the null hypothesis value for the interaction term assuming tax capitalization in the table above the coefficient estimate. Column's (1) and (2) test against a null hypothesis of $\beta = -0.9\%$ for the whole AIM sample against the matched FTSE sample in the first column, and the whole AIM sample against the unmatched FTSE sample in the second column. Column's (3) and (4) dissect the AIM sample by looking at the highest and lowest effective tax rate quartile's in the pre-legislation change period separately, and hence test against the null hypotheses of $\beta = -1.9\%$ and $\beta = -0.03\%$, the respective average effective tax rates for the highest and lowest quartiles. Looking at these subsets of AIM stocks separately allows us to test whether those stocks with the highest (lowest) effective tax rate experienced the largest (smallest) reduction in their excess stock returns.[26]

In the first column, $\hat{\beta} = -0.012$ implies that after the legislation change and after controlling for systematic risk factors as well as stock level proxies for liquidity and information, AIM share returns relative to the matched FTSE control group were around 1.2 percentage points less per month than they would have been had they not been allowed to be held in tax efficient ISA accounts, a magnitude which the data does not reject as equalling the effective tax rate in the pre-legislation change period.[27] In column (2) where the control group is the unmatched FTSE sample, $\hat{\beta} = -0.009$, an amount which exactly equals the effective tax rate in the pre-legislation change period. In column's (3) and (4) the null hypothesis values for tax capitalization are also not rejected, and hence the magnitude of the tax cut effect is not statistically significant from each individual quartiles effective tax rate

[26] To calculate the effective tax rate quartiles, I rank AIM stocks based on their average yearly effective tax rate in the decade before the tax cut.

[27] I cluster standard errors at the firm level because my sample was selected based on the 100 largest AIM stocks and therefore not all AIM stocks have been represented. However, the results remain qualitatively and quantitatively similar when clustering standard errors at the more conservative sector level. See Abadie, Athey, Imbens, and Wooldridge (2017) for a discussion of when and at what level clustering is appropriate.

Table 3

This table displays the treated × post coefficient estimates for the monthly differences-in-differences regressions, Equation 5, which compares monthly AIM stock returns against the propensity score matched and the unmatched monthly FTSE stock returns, before and after the legislation change. Fixed Effects refers to the inclusion of company and a month-sector interaction fixed effect. Controls refers to the inclusion of the five Fama-French factors, momentum, and liquidity, all interacted with a post and treated dummy variable. Stock level proxies for public information and liquidity are also included as controls. The sample period is between 2004 and 2022. Standard errors are in parentheses below coefficient estimates, and are clustered at the firm level. The null hypothesis value for β assuming tax capitalization is stated above the corresponding column. Column (1) uses the matched FTSE sample as a control group, and column (2) uses the unmatched FTSE control group. Column (3) uses AIM stocks in the highest effective tax rate quartile from the pre-legislation period and column (4) uses the lowest quartile. Stars denote whether coefficient estimates reject their H_0 values at the following confidence intervals: *** p < 0.01, ** p < 0.05 , * p < 0.1.

	Dependent Variable: Monthly Return			
	$H_0: \beta = -0.9\%$		$H_0: \beta = -1.9\%$	$H_0: \beta = -0.03\%$
	(1)	(2)	(3)	(4)
Interaction	-0.012	-0.009	-0.022	-0.002
	(0.004)	(0.003)	(0.008)	(0.006)
Fixed Effects	Yes	Yes	Yes	Yes
Clustered SE's	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Months	210	210	210	210
Observations	23,361	85,968	77,866	77,116
Adj R-squared	0.17	0.23	0.24	0.25

in the pre-legislation period, a striking result. This within AIM heterogeneity strongly reinforces the main results by showing that even within the AIM stock sample, stock returns decreased commensurately with their effective tax rate in the pre-legislation change period.

The results in Table 2 and Table 3 show that after AIM stocks were permitted to be held in tax efficient ISA savings accounts, their average excess stock returns decreased by amounts equal to their effective tax rates in the pre-legislation period, as predicted by asset pricing models of tax capitalization. This is important as it shows very clearly the effect that different levels of taxation have on the returns of assets. The economic intuition of these results is that after the tax cut, the equilibrium rate of return decreased for retail investors as their tax liability was reduced by the previously demanded tax premium. This meant the instantaneous stock price was cheaper than its new equilibrium price, and retail investors therefore bought the stock until the new more expensive price reflected the new permanently reduced rate of return. For institutional investors, the required rate of return for AIM stocks did not change after the legislation change, and it is possible that they sold their AIM holdings after the initial rally in order to profit from their positions.

These findings are in-line with Sialm (2009) and Litzenberger and Ramaswamy (1979)[28] who find that asset returns compensate investors for their tax burden and also provides empirical evidence for the theoretical tax-CAPM model of Brennan (1973). They are also in-line with Schulz (2016) who highlights the importance of taking into consideration the effect of taxes and other frictions when addressing perceived asset pricing puzzles.[29] These results contribute to the small body of empirical research which establishes a link between personal taxes and stock returns, as noted by Graham (2003). The contribution to previous studies however is that I have provided evidence for tax clienteles and stock return compensation in a causal regression framework which is more robust than a time-series analysis because it

[28] Litzenberger and Ramaswamy (1979) tested a modified version of Brennan (1973)'s after-tax CAPM by examining the relationship between pre-tax returns and dividend payments. Dai, Maydew, Shackelford, and Zhang (2008) also find evidence in an event study that tax changes can affect stock demand and returns.

[29] See Binsbergen and Koijen (2016) for a challenge of the tax estimates used in Schulz (2016).

addresses potential endogeneity issues which may bias the effect of personal taxes on stock returns. By using a factor model approach and a difference-in-differences set-up, this study has provided the strongest evidence to date that personal investment taxes affect stock returns by utilizing variation both across time and across assets.[30]

To investigate how the liquidity and public information of AIM stocks changed after the legislation change, I directly analyse the bid-ask spread (see Amihud and Mendelson (1986) and Pástor and Stambaugh (2003) for the link between liquidity and stock returns) and analyst coverage (see Hong, Lim, and Stein (2000) for the link between analyst coverage and stock returns and Easley, Hvidkjaer, and O'Hara (2002) for information risks) of AIM stocks before and after the legislation change following the methodology outlined in Equation 5. I calculate the bid-ask spread following Abdi and Ranaldo (2017) using daily close, high and low prices, and do not find a statistically significant change in the bid-ask spread of AIM stocks relative to the matched FTSE control group.[31] As a proxy for public information and hence information costs, I look at the number of analysts making earnings forecasts and find that there was an 18% increase in the analyst coverage of AIM stocks relative to the matched FTSE control group after the legislation change. If public information is a substitute for private information, this change in analyst coverage reduces information costs and hence the premium investors demand to compensate them for gathering their own information, which can help to explain why in some specifications the magnitude of the tax cut effect on stock returns was larger than 0.9%, albeit not statistically larger. [32] [33]

[30] Figures A.2 and A.3 in the Appendix show the dynamic difference-in-differences for yearly excess AIM stock returns without any control variables for the matched and unmatched FTSE samples respectively. We observe firstly that the parallel trends condition holds, and secondly the permanent reduction in excess AIM stock returns relative to both the matched and unmatched FTSE samples.

[31] Abdi and Ranaldo (2017) showed that their estimate of the bid-ask spread outperformed other well-known measures at the monthly level, such as Hasbrouck (2009) and Corwin and Schultz (2012), especially for less liquid stocks.

[32] On the potential effect that the timing of the sample selection might have had on the magnitude of the results, instead of selecting the AIM 100 stock sample before the legislation change announcement, I selected the AIM 100 sample one, two, and three years before and after the announcement date to see how this affected the main results of this section. The results remained quantitatively and qualitatively similar.

[33] Carletti, De Marco, Ioannidou, and Sette (2021) look at the behaviour of households and also identify large

3.6. Dividend Payout Policy and Capital Structure

In this section I examine the dividend payout policy and the capital structure decisions of the AIM companies after the legislation change. Once AIM stocks could be held in ISAs it became cheaper for retail investors to receive dividends from AIM companies as the dividends no longer faced a potential 37.5% income tax. For company dividend policy, I therefore look at two margins: the size of the dividend paid (intensive margin), and the number of companies paying dividends (extensive margin). From Refinitiv Datastream, I obtain the dividend yield for my AIM and matched FTSE sample, from which I calculate the total amount of dividends paid.[34]

In a related study, Chetty and Saez (2005) investigate the effects of the 2003 US dividend tax cut. Compared to their setting, I observe a complete elimination of dividend taxes when stocks are held in ISAs. Furthermore, unlike Chetty and Saez (2005) who assign their sample of companies to treatment and control groups under the assumption that their control group has no reason to change their dividend payments because of higher institutional ownership, I am able to compare AIM dividend payments to a group of companies which did not experience a tax cut, main-market FTSE stocks, and therefore provide a causal estimate for the effect of a tax cut on company dividend payments without additional assumptions.

To study the effect of the tax cut on company decisions, I estimate Equation 6 below, where Financial Decision refers to the following dependent variables: log of dividends paid (in millions of pounds), a dividend dummy which equals one if the company paid any dividend in a calendar year and zero otherwise, log of shares issued, log of debt-to-assets ratio.[35] In-line with Fama and French (2001), I include the following controls: company profits, company size, book-to-market ratio, the company's total value of assets, and the company's total cash holdings.

tax cut effects.

[34] I use a yearly total because quarterly dividend payments are highly cyclical.

[35] Logged variables result in a more Gaussian distribution and limit the effect of outliers.

Table 4

This table displays the treated × post coefficient estimates for the financial decision's regression, Equation 6, which compares yearly log dividend payments, a dividend dummy, the log of shares issued, and the log debt-to-assets ratio for AIM companies relative to their matched FTSE sample, before and after the legislation change. Fixed Effects refers to the inclusion of a company and a month-sector interaction fixed effect. Controls refers to the inclusion of the following variables: company profits, company size, book-to-market ratio, value of assets, and value of cash holdings. The sample period is between 2004 and 2022 except for log debt to assets which runs between 2009 and ends in 2016 due to data availability. Standard errors are in parentheses below coefficient estimates, and are clustered at the firm level. Stars denote whether sample averages are statistically different from zero at the following confidence intervals: *** p < 0.01, ** p < 0.05 , * p < 0.1.

	Dependent Variable							
	Log Dividends (£'s)		Dividend Dummy		Log Shares Issued		Log Debt/Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interaction	0.58***	0.26**	0.12**	0.07	0.24**	0.06	0.22*	0.25*
	(0.15)	(0.11)	(0.05)	(0.05)	(0.10)	(0.07)	(0.13)	(0.14)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE's	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Years	18	18	18	18	18	18	8	8
Observations	1,824	1,470	3,309	2,299	2,863	2,299	1,206	969
Adj R-squared	0.80	0.84	0.71	0.69	0.84	0.92	0.71	0.70

$$\text{Financial Decision}_{i,t} = \alpha_i + \alpha_t + \beta\,\text{Treated}_i \times \text{Post}_t + \gamma'\,\text{Controls}_{i,t} + \epsilon_{i,t}, \tag{6}$$

Did the legislation change encourage AIM companies who already made dividend payments to payout more of their earnings to their investors? Column's (1) and (2) of Table 4 show that there was a positive and statistically significant increase in the amount of dividends paid, both with and without the controls. The coefficient estimate in column (2) corresponds to an average 26% increase in the amount of dividends paid after the legislation change. Investors who held their shares in an ISA no longer faced a dividend income tax of up to 37.5%, and therefore were able to receive dividend payments without this sizeable tax burden. This sharp increase in dividend payments is consistent with the results of Chetty and Saez (2005) who found that US companies paid out 20% more dividends after dividend taxes were reduced in the US. The results are also in line with Desai and Jin (2011) and Golubov, Lasfer, and Vitkova (2020) who showed that companies alter their payout policies in response to shareholder tax-based preferences, and provides empirical support for the theoretical model of Allen, Bernardo, and Welch (2000).

Did the elimination of dividend taxes for ISA investors encourage more AIM companies to start paying out dividends? Column's (3) and (4) in Table 4 present the coefficient estimates of the linear probability model and show that there was between a 7% and 12% increase in the number of AIM companies paying dividends after the tax cut, with the 12% coefficient estimate statistically significant at the 95% confidence level. This suggests that after the tax cut, an increased number of AIM companies started paying out dividends to their investors, in-line with the evidence provided by Chetty and Saez (2005) who also found an increase at the extensive margin as a result of the 2003 US dividend tax cut.

Share re-purchases are an alternative way for companies to pay out cash to their investors. After AIM stocks became eligible to be held in ISAs, any share re-purchases would

no longer be liable for capital gains tax if investors held the stock in an ISA. Six quarters before the tax cut, there were no share re-purchases recorded, but there were six share re-purchases recorded six quarters after. Were the companies who initiated share re-purchases the same as the dividend paying stocks? Out of the six companies who initiated share re-purchases after the legislation change, five on them were already issuing dividend payments. Why are AIM listed stocks paying dividends? A possible reason is that the companies which are paying dividends have matured enough that they want to signal to existing and potential investors that they are a stable company and a good investment. It also implies that the companies assume the benefits of paying dividends outweigh the reduction in available capital to invest and grow. Perez-Gonzalez (2003) finds evidence that individual shareholders can influence dividend policy, which suggests that after the tax cut, company management were influenced (willingly or not) to increase their dividend payments to shareholders. In Appendix A.8, I discuss how the tax cut might affect the efficiency of capital markets and I also provide a back-of-the-envelope evaluation of the tax cut.

Did the capital structure decision of AIM companies change after the reduction in personal taxes, as hypothesized by Miller (1977)? It is often assumed that companies issue equity when they believe that their stock prices are high, and buy-back when their stock prices are low. Column's (5) and (6) in Table 4 present the difference-in-differences coefficient estimates when the dependent variable is the log of shares issued. Both coefficients are positive, which suggests that more equity was issued after the tax cut, however only the specification without controls is statistically significant at the 95% confidence level. The coefficient in this specification corresponds to a 24% average increase in shares issued by AIM companies after the legislation change.

Another decision which might be influenced by higher stock prices is the leverage ratio of companies. With higher stock prices, companies may have more scope to issue debt and therefore benefit from the interest rate tax-shield without unsettling their shareholder

base. Column's (7) and (8) in Table 4 display the difference-in-differences coefficient estimate with the log debt-to-assets ratio as the dependent ratio.[36] The coefficients are both positive, and statistically significant at the 90% confidence level. In terms of magnitude, the coefficient estimates corresponds to a between 22% and 24% increase in the debt-to-assets ratio for AIM companies who hold debt on their balance sheet after the legislation change. In-line with Faccio and Xu (2015), these two results provide evidence that the capital structure decision of companies is affected by the personal taxation level of their investors, albeit most likely as an indirect consequence of a change in their stock prices.

4. Conclusion

Prior to a legislation change in August 2013, AIM stocks were not permitted to be held in tax efficient Individual Savings Accounts (ISAs) which exempt retail investors from dividend and capital gains tax. I exploited variation across both time and assets in order to study the effect that this tax cut had on the demand for AIM stocks, the returns of AIM stocks, and the financial decisions of AIM companies. My analysis uncovered the existence of tax clienteles who respond to different tax rates, consistent with the ideas of Miller and Modigliani (1961). I also found evidence that asset prices compensate investors for their tax burden, consistent with the theory of Brennan (1973), and therefore with the empirical evidence of Poterba and Summers (1984) and Sialm (2009).

After the legislation change, I showed that demand for AIM stocks temporarily doubled, and that monthly AIM excess stock returns decreased by around 0.9%, in-line with their effective tax rate in the pre-legislation change period. Furthermore, AIM stocks with the highest and lowest effective tax rates in the pre-legislation period experienced commensurate decreases in their excess stock returns after the tax cut. This result was robust to using a factor model approach and a difference-in-differences specification, which ensures

[36] The values are winsorized to remove extreme outliers.

that the results do not hinge on the choice of control group. I reinforced these findings by showing that retail investors and then retail investor focused institutions increased their ownership of AIM stocks after the tax cut.

On the company side, I showed that companies respond to the tax rate faced by their retail investors. AIM companies increased their dividends payments by 26%, and 12% more companies began issuing dividends, consistent with the model of Allen, Bernardo, and Welch (2000), and the empirical findings of Chetty and Saez (2005). I also provided evidence which showed that the capital structure decision of companies is affected by the personal investment taxation level of their investors, with 24% more equity issued and a 22% increase in the debt-to-assets ratio of AIM companies after the tax cut.

A. Appendix

A.1. Additional Figures & Tables

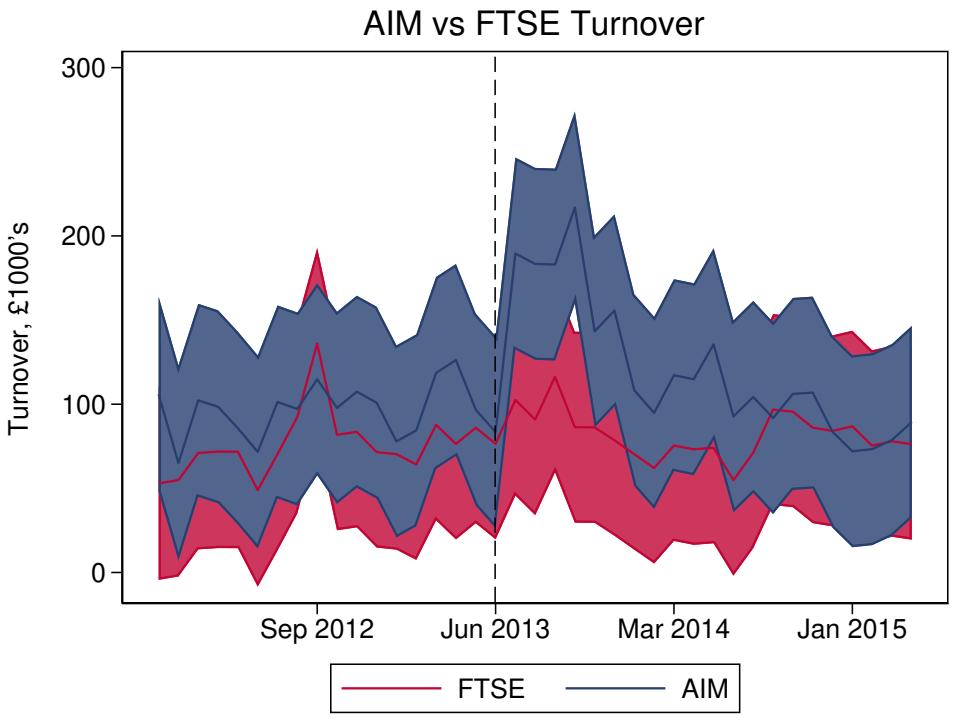

Figure A.1: This figure plots the average monthly turnover (price × volume) of the AIM sample against the FTSE matched sample. 95% confidence intervals are displayed alongside.

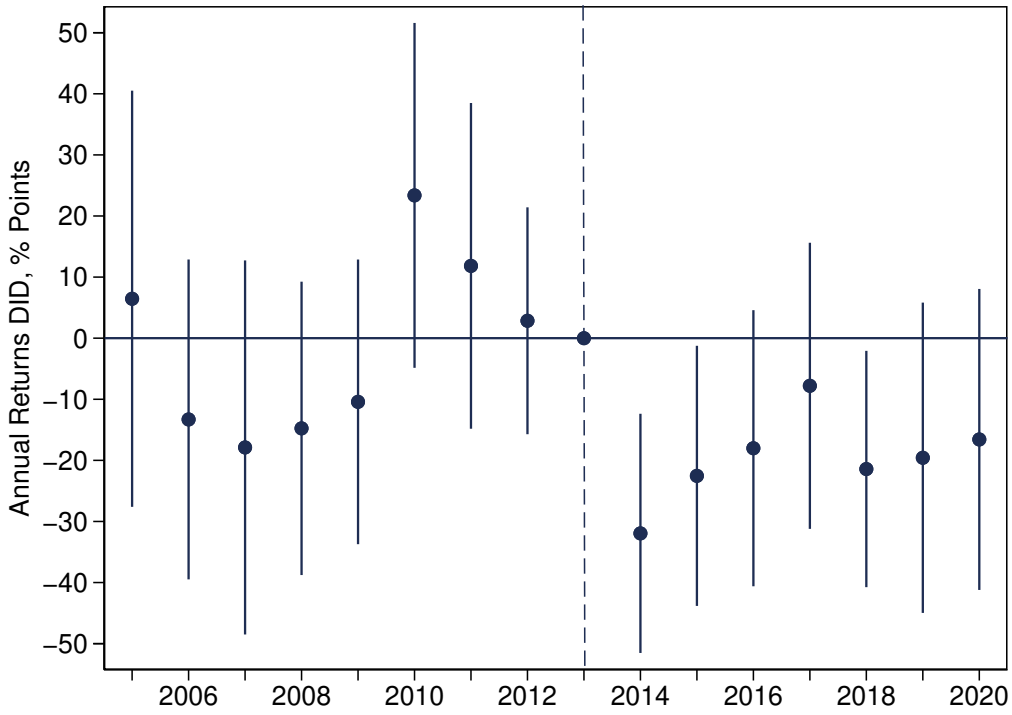

Figure A.2: This figure displays the coefficient estimates of the annual returns dynamic difference-in-differences (DID) regression along with 95% confidence intervals displayed vertically. The baseline year is 2012, the year before the announcement. Standard errors are clustered at the firm level. Firm fixed effects and a sector × year interaction are included in the regression.

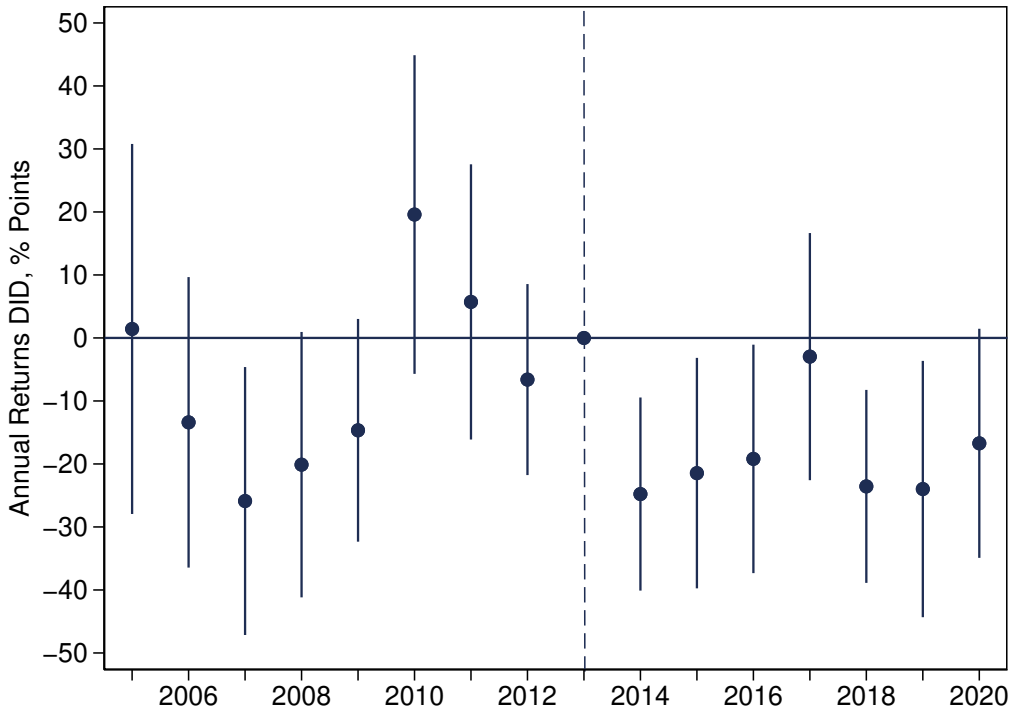

Figure A.3: This figure displays the coefficient estimates of the annual returns dynamic difference-in-differences (DID) regression for the AIM sample and the full FTSE All-Share sample (unmatched sample). 95% confidence intervals displayed vertically. The baseline year is 2012, the year before the announcement. Standard errors are clustered at the firm level. Firm fixed effects and a sector × year interaction are included in the regression.

A.2. ETF Fund Flows

While there is no ETF which exclusively invests in AIM stocks, the iShares MSCI UK Small Cap UCITS ETF is one of, if not the most popular ETF in which investors are able to get exposure to small-cap UK equities.[37] The ETF invests primarily in UK stocks across both the main market LSE and the AIM. Using data from the Global Funds Database at Refinitiv Eikon, Figure A.4 plots the following statistics: fund flows into the iShares MSCI UK Small Cap UCITS, the total value of the ETF, the number of AIM companies included in the ETF (out of approximately 200 companies in total), and finally the relative value of all AIM holdings in the ETF. The figures show that compared to before the legislation change, there was an increase in fund flows into the ETF, a permanent increase in the ETF value, an increase in the number of AIM companies included in the ETF, and an initial increase in the value of AIM holdings in the ETF, followed by an eventual decrease.

A.3. High Frequency Price Reactions on Announcement and Legislation Change Day

This section plots the five minute interval high frequency price data for the FTSE AIM All-Share Index on both the announcement day, and the legislation change day. We see that the AIM index jumped up both on the announcement and on the legislation change day, which supports the hypothesis that the instantaneous stock price was cheaper after the tax cut, and therefore investors bought AIM stock until their price reflected their new lower required rate of return.

[37] On the performance of pooled investments, Sialm and Zhang (2020) find that the performance of US mutual funds is related to their tax burdens.

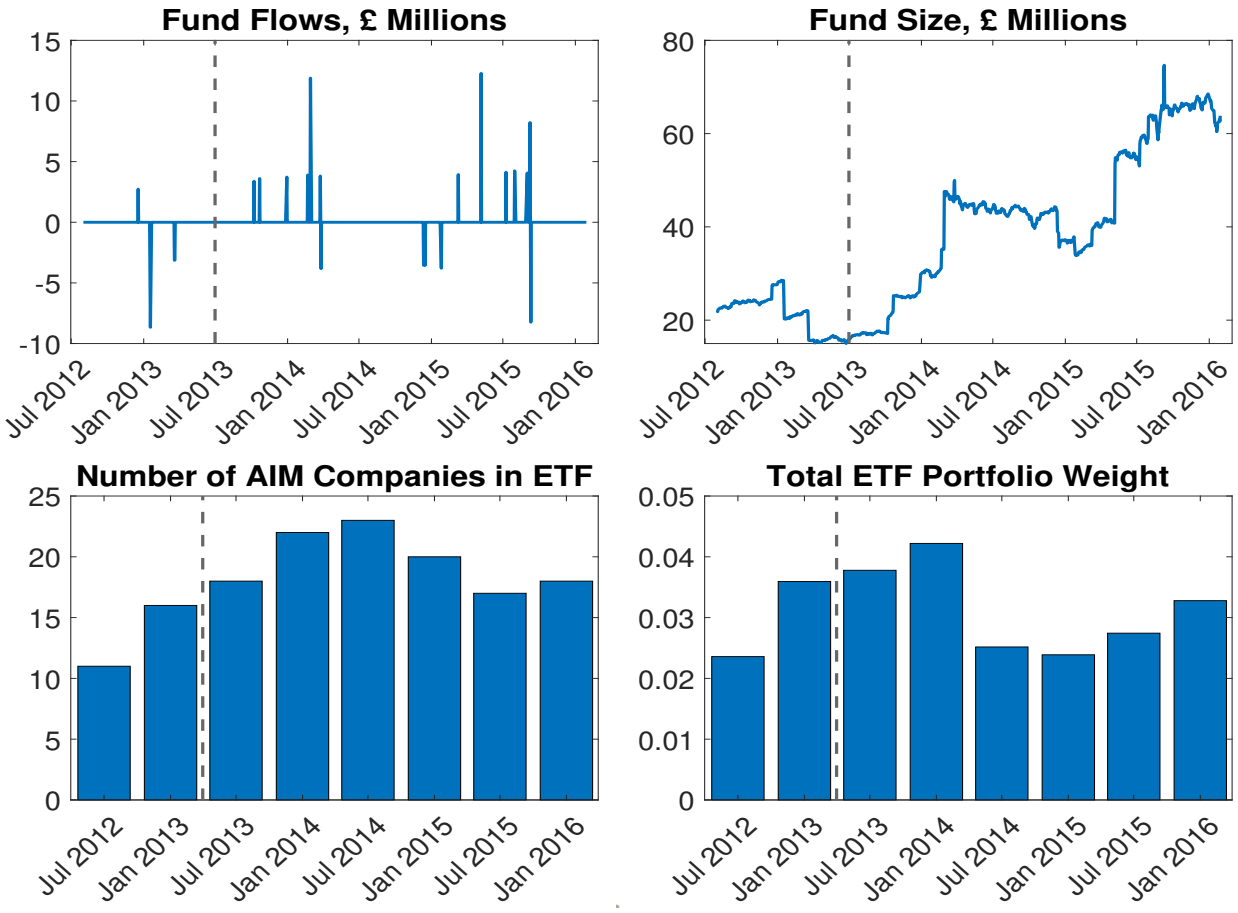

Figure A.4: The top left figure plots fund flows in millions of pounds sterling, the top right figure plots the total value of the ETF, the bottom left figure plots the number of AIM companies included in the ETF, and the bottom right figure plots the total value of AIM stock holding included in the ETF.

A.4. Sectoral Analysis of AIM Stocks

Table A.1 displays the change in returns, turnover, volume, analyst coverage (information), and bid-ask spread (liquidity) for each individual AIM sector. The decrease in returns is observed for nearly all sectors except for Financials and Healthcare which had slightly positive increases close to zero. The increase in turnover and volume is observed for seven out of the ten sectors six months after the legislation change. Over the full-sample, the increase in analyst coverage and the bid-ask spread is observed for eight out of ten sectors (the deviant two sectors are different in each case).

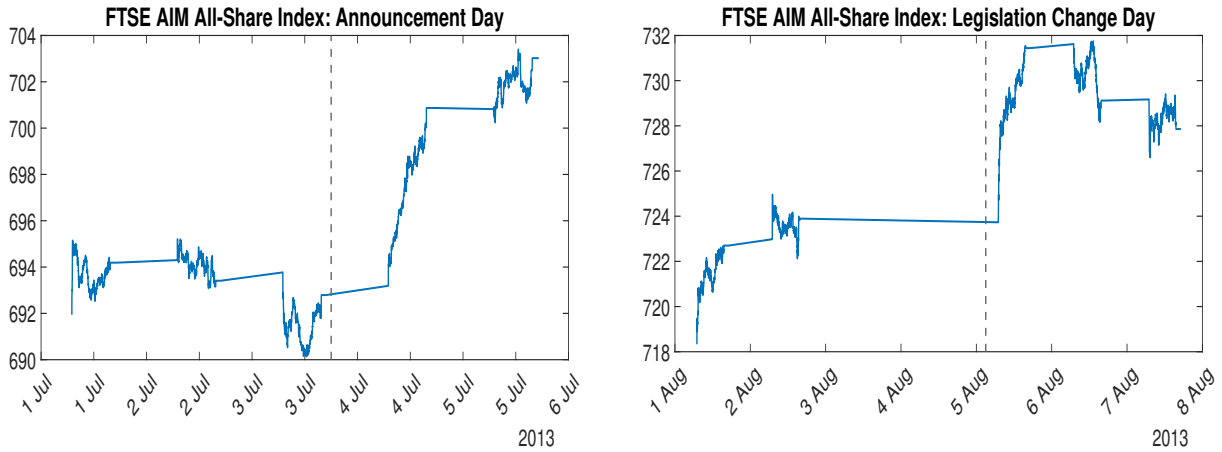

Figure A.5: The left panel plots the intra-day price of the FTSE AIM All-Share Index after the announcement, and the right panel plots the intra-day price on the day of the legislation change.

What is causing this observed heterogeneity in effects across sectors? The effect of personal taxation on stock demand and stock returns is going to be largest in companies in which retail investors are relatively more represented as shareholders. These are typically smaller companies, similar to those in my sample. Within this group of smaller companies, retail investors may have a preference for particular sectors which may explain the heterogeneity observed in Table A.1 and the wide confidence intervals in Figure 2.

Table A.1

Time Period	Sector	Difference in Returns	Turnover % Change	Volume % Change	Analyst % Change	BA Spread % Change
Full Sample	Basic Mat	-0.009	-30.13***	112.21***	34.10***	18.30**
	Con Goods	-0.011*	-7.42	-38.66***	-6.31	14.03***
	Con Services	-0.009	342.02***	108.32***	21.94***	-10.41
	Financials	0.003	69.69***	-34.84***	23.71***	22.79*
	Healthcare	0.004	260.93***	4.75	5.88*	6.29
	Industrials	-0.005	262.08***	64.63***	5.90	-22.90***
	Oil & Gas	-0.028***	-68.84***	5.00	43.96***	80.24***
	Technology	-0.020***	117.86***	44.20***	6.26**	54.32***
	Telecom	-0.023*	-3.35	117.30***	11.35***	51.50***
	Utilies	-0.016	-14.84	-15.05	-2.48	24.90**
12 Months Either Side	Basic Mat	0.012	-66.07***	-14.94	19.65***	27.86**
	Con Goods	-0.025*	-8.88	2.97	2.95	-3.00
	Con Services	-0.048***	98.55*	91.43***	-3.64	-8.88
	Financials	-0.023***	11.81	-3.35	23.18***	9.46
	Healthcare	-0.006	60.33**	55.00**	-6.21	7.88
	Industrials	-0.018	16.43	36.15	-6.10	-33.71***
	Oil & Gas	-0.028**	-30.52**	-0.33	7.08	13.55**
	Technology	-0.055***	56.55	10.02	-3.91	15.04*
	Telecom	0.016	63.71	72.28	-0.25	5.04
	Utilies	-0.024	14.79	-12.29	12.47**	11.17
6 Months Either Side	Basic Mat	0.074**	-45.98	-37.74	10.11	20.84
	Con Goods	-0.004	7.29	17.90	2.18	-8.72
	Con Services	-0.018	88.51	68.30*	-6.14	-22.08
	Financials	-0.006	48.04*	103.12*	16.81**	3.05
	Healthcare	0.013	59.57	81.55**	-2.86	-4.40
	Industrials	-0.013	-19.02	-2.43	-7.17	-28.54*
	Oil & Gas	0.011	-0.88	40.29*	0.00	-1.42
	Technology	0.014	63.09	7.34	-0.29	1.06
	Telecom	0.067	86.15	74.45	-1.55	-1.36
	Utilies	-0.046	22.19	-2.05	7.36	23.13

Note: This table summarises how the average variables of interest changed before and after the legislation for each individual AIM sector. I present results for three different time periods: the full sample (2007-2018), 12 months either side of the legislation, and 6 months either side of the legislation. Monthly log returns are displayed, analyst refers to the number of analysts following a stock, and BA spread refers to the bid-ask spread. The AIM 100 constituents were made up of: 9 Basic Materials, 9 Consumer Good, 9 Consumer Services, 13 Financials, 7 Healthcare, 13 Industrials, 20 Oil & Gas, 13 Technology, 4 Telecommunications, and 3 Utilities. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

A.5. Capital Gains, Dividend, and Inheritance Taxes in the United Kingdom: More Information

As of 2021 in the UK, Capital gains tax is due on any profits made during the financial year above the capital gains tax allowance which is £12,600 ($18,900). Investors can also report losses to reduce their total taxable gains. If an investor's total taxable gain is still above the tax-free allowance, they can deduct unused losses from previous tax years. Capital gains tax for stocks (chargeable assets) is 20% (it was 28% from 2010 to 2016) and for residential property it is 28% if taxable income is over £50,000 ($75,000). Tax is paid on anything above the personal allowance.[38] For dividends, no tax is paid on the first £2,000 ($3,000) of dividends and also if total income (including all sources of income that financial year) falls below £12,500 ($18,750). After these allowances, dividends are taxed at 32.5% if earning are above £50,000 ($75,000) and 37.5% if earnings are above £150,000 ($225,000).[39]

Inheritance tax (IHT) of 40% in the UK is applied to the value of all bequeathed assets over the current £325,000 ($487,500) threshold (since 2009). If an agent's main residence is being bequeathed, the nil-rate band increases by £125,000 ($187,500), increasing to £175,000 ($262,500) by 2021.[40] IHT is not liable in the following circumstances: If assets are bequeathed to a spouse or civil partner, if any wealth was gifted seven years before the agents death, if bequeathed wealth includes a life insurance policy or lump-sum pension payout which is under a trust, if all wealth is bequeathed to a charitable organisation. Gifts below £3,000 ($4,500) are allowed each year, IHT free. The estates of military personnel who die in active service do not face IHT. Most AIM shares qualify for "Business Property Relief" (BPR) which makes them exempt from IHT if the investor holds the AIM share for two continuous years. The tax office rule is that AIM shares qualify for BPR if they do not make most of their profits investing in financial assets.

[38] See https://www.gov.uk/tax-sell-shares for further information.
[39] See https://www.gov.uk/tax-on-dividends .
[40] The nil-rate band in the US is up to $5,000,000.

A.6. Cumulative Abnormal Returns

Early event studies pioneered by Eugene Fama to test for market efficiency calculate the cumulative abnormal returns (CARs) of the treatment assets before and after the event to observe if there is a difference. Event studies are usually carried out over short horizons because abnormal returns are calculated after specifying a model and then estimating its parameters. As the time after an event increases, so will the likelihood that the parameter estimates are no longer accurate. Fama (1998) explains that CAR analysis is not ideal as the "bad model" problem (a model which does not fully or adequately explain asset returns) is amplified for longer horizon studies. Therefore, if the effect of an event is not likely to be realised over a short space of time (e.g. day, week, or month), CAR analysis is not well suited.

Bearing this in mind, I run the following regression for my AIM 100 stock sample:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,1}(R_{m,t} - R_{f,t}) + \beta_{i,2}\text{Size}_t + \beta_{i,3}\text{Value}_t + \beta_{i,4}\text{Momentum}_t + \epsilon_{i,t} \quad (7)$$

where $R_{i,t} - r_{R,t}$ is the excess return on asset i on day t, t is trading days and is between [-22,0] with the event taking place at t=1, α_i is a regression constant, $(R_{m,t} - R_{f,t})$ is the excess return on the market, Size is a capitalization weighted long-short portfolio, Value is a book-to-market long short portfolio, and Momentum is a winners minus losers portfolio. From this regression, I extract the estimated regression errors, $\hat{\epsilon}_{i,t}$. After the event, from t= [1,22], I calculate the difference in realised returns and the predicted model return for that period, which uses the estimated coefficients from before the event ($\hat{\alpha}_i$, $\hat{\beta}_{i,1}$, $\hat{\beta}_{i,2}$, $\hat{\beta}_{i,3}$, and $\hat{\beta}_{i,4}$) . For each stock, I calculate the cumulative sum of the errors, and then average across the whole sample. Figure A.6 shows the CAR results. Whereas we do not see a jump in the CAR, we do see an upwards trend away from zero cumulative errors. This suggests an event has occurred, but not an event for which the effect is immediate. This is consistent with the type of event being examined for a number of reasons. Firstly, investors need to actively

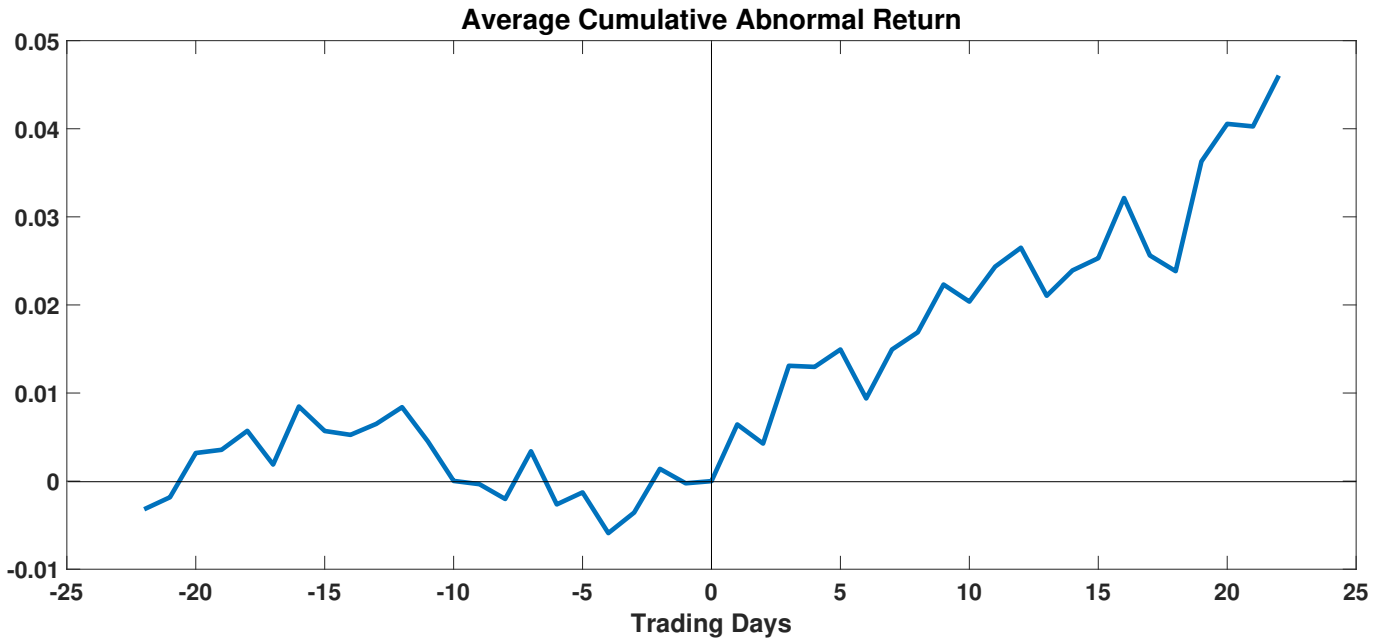

Figure A.6 : The figure plots the average cumulative return of AIM 100 stocks before and after the ISA announcement. Abnormal returns are calculated with respect to the residuals of Equation (7).

buy the AIM shares through the ISA, and therefore the effects of the legislation change on returns will not be realised until investors have done so. Given that some investors may have already reached their ISA limit for the financial year, or that investor's display inattention to their portfolios, it is likely that the effects will not be fully realised within a short period time and therefore CAR analysis is not well suited for this study.

A similar story can also be seen by analysing the Fama-Macbeth regression output before and after the legislation announcement. Table A.2 shows that after the legislation, the alpha of the regression specification (3.1) is substantially bigger and also highly statistically significant. This big change in the alpha component of the second stage regression procedure suggests that post announcement, there was a change in the behaviour of AIM share returns which cannot be explained by the traditional factors in the literature. The main text of this paper attempts to explain this abnormal behaviour, and given that the effect of the legislation will be realised over a longer horizon during which other relevant stock price

Table A.2

This table displays the Fama-Macbeth regression output for the AIM sample three years before the legislation announcement and three years after. Coefficients are the average slope parameters of the second stage procedure, multiplied by 100. P-values are displayed underneath in parentheses.

	AIM Sample		
	Full	Before	After
α	0.13	0.03	0.3
	[0.07]	[0.68]	[0.00]
Market	49.12	120.88	-18.44
	[0.30]	[0.01]	[0.54]
Size	0.06	0.23	0.07
	[0.74]	[0.18]	[0.59]
Value	0.5	0.26	0.06
	[0.02]	[0.15]	[0.67]
Momentum	0.34	0.21	0.21
	[0.06]	[0.11]	[0.13]

events may occur, it is necessary to employ a different methodology to measure the effect of the legislation change on AIM stock returns. I therefore employ a difference-in-differences methodology in my main analysis.

A.7. Did Stocks Switch Exchange During My Period of Study?

Switching between the AIM exchange and the main market LSE is not uncommon. In fact, as shown in Table A.3, it happens nearly every year in both directions. In total, from the entire AIM exchange, 65 companies switched to the main market LSE between 2008 and 2018. Throughout the same period, 56 companies went in the opposite direction. From my AIM 100 sample and the matched FTSE sample, 7 went from the AIM to the main, and 4 went from the main to the AIM.

All switches from my AIM 100 sample to the main LSE occurred after the legislation change. It is therefore possible that the switch was a consequence of the treatment. Hence, in my main analysis in Section 3, I keep the treatment status of companies fixed, which yields an "intention-to-treat" estimate of the treatment effect. As a robustness check, I allow treatment status to change, and I also drop all switching stocks from the analysis. Results remain substantially unchanged.

A.8. Efficiency Implications and Policy Evaluation of the Tax Cut

Permitting AIM stocks to be held in tax-efficient ISAs restored the previous imbalance in tax burdens on retail investors when investing in AIM and FTSE stocks. The imbalance of taxes could have led to an inefficient allocation of capital between AIM and FTSE stocks as investors might have been reluctant to invest in AIM stocks given their potential tax liability. This means that on the margin, capital which should have gone to AIM companies to invest in and help grow the company was not ending up there. Therefore, the legislation might have acted to improve the capital allocation efficiency in UK stock markets. In a more prac-

tical sense, the marginal positive net present value investment by a company might now go ahead if for example, future capital issues are able to reach capital targets more easily.

With regards to the efficiency improvement after the dividend tax reduction, if AIM companies were hoarding earnings and not paying them out as dividends because of the dividend tax, it is possible that the retained earnings were not being used efficiently. Therefore, given that we observed an increase in dividend payments, this might suggest that the dividend tax cut increased the efficiency of capital allocation between companies and investors. As share re-purchases also increased, it is not the case that dividend payments simply replaced share re-purchases, which provides further evidence that there was an increase in the capital allocation efficiency after the tax cut.

Evaluating the policy would require a comparison between the direct loss in tax revenue after allowing AIM stocks to be held in ISAs, and the potential benefits a tax cut might have on the UK economy. The benefits of the tax cut may be an increase in investment and growth by AIM companies if they have more access to capital, which may result in higher UK economic growth, which in turn leads to higher tax receipts. Capital gains tax revenue in the UK in 2013 was around £4 billion, out of a total of £567.15 billion (OECD). Capital gains tax revenue came 77% from financial assets, of which 66% is categorized as "listed UK and foreign shares" which includes London Stock Exchange stocks (UK Government). From AIM and FTSE market capitalization's in 2013, if AIM represents around 5% of the total, I estimate that £101.64 million was collected in capital gains tax on AIM stocks, which is 0.01792% of total UK tax revenue. UK GDP in 2013 was £1.782 trillion, and therefore, in order for the tax cut policy to pay for itself, UK GDP would need to increase by 0.0057% as a consequence of the tax cut, or in monetary terms, provide at least £101.64 million in growth.

Table A.3

This table displays the number of companies which switched between the AIM stock exchange and the main market London Stock Exchange. Numbers are provided for all companies on each exchange, and also for my AIM sample and the matched FTSE sample. In total, 65 (56) companies switched from the AIM (Main) to the Main (AIM). In my sample, 7 (4) companies switched from the AIM (Main) to the Main (AIM).

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Full Exchange	AIM to Main	11	9	9	9	3	0	4	6	6	4	4
	Main to AIM	10	3	7	6	4	8	8	5	1	3	1
My Sample	AIM to Main	0	0	0	0	0	0	1	3	2	1	0
	Main to AIM	0	0	0	2	0	0	0	1	0	0	1

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