

TAKEOVER DEFENSES AND FIRM'S RISK AND VALUE: EVIDENCE FROM THE UK TAKEOVER CODE REFORM IN 2011

Abstract:

The essay exploits the 2011 UK Takeover Code Reform as a natural experiment to examine the causal impact of takeover defenses on firm risk and value. Using 30,060 firm-year observations from 2006 to 2016, the analysis shows that the reduction in takeover threat following the reform significantly decreased firm risk and increased firm value. A decline in the cost of capital, particularly the cost of equity, emerges as the primary channel. The effects are more pronounced for financially constrained and distressed firms, suggesting that takeover defenses enhance shareholder value by protecting future cash flows and lowering discount rates through reduced equity financing costs.

1. Introduction:

The impact of takeover defenses, including antitakeover provisions or antitakeover laws designed to shield managers from the disciplinary pressures of the corporate control market has yielded inconclusive evidence regarding their effect on shareholder welfare (Straska and Waller, 2014; Karpoff and Wittry, 2024). On the other hand, some research suggests that raising these defenses constitutes a significant burden to shareholders (e.g., Gompers et al., 2003; Masulis et al., 2007; Bebchuk et al., 2009; Harford, 2012; Gormley and Matsa, 2016; Karpoff and Wittry, 2018) by exacerbating agency conflicts (Jensen and Meckling, 1976) while serving mainly the interests of entrenched managers (Amihud and Lev, 1981). On the other hand, a large and growing literature appears to indicate that takeover defenses could have a beneficial impact on firm performance by influencing managerial behavior in ways that promote shareholder interests (e.g., Chemmanur et al., 2011; Johnson et al., 2015; Chemmanur and Tian, 2018; Carline and Gogineni, 2021). These studies argue that by alleviating managerial myopia (Stein, 1988) and enabling a longer-term strategic focus, these defenses can ultimately mitigate agency costs and enhance firm value (Chemmanur and Jiao, 2012).

This study adds to the current discussion on whether takeover defense reduces firm risk and value by taking advantage of the reform in the UK Takeover Code that took place in 2011 as a natural exogenous shock in the UK M&A market. Triggered by the high-profile hostile takeover of Cadbury by Kraft in 2010, the reform introduced a series of substantial regulatory changes designed to enhance transparency and strengthen the negotiating position of target firms. Key provisions included: (1) a general ban on break fees and other deal protection mechanisms; (2) mandatory early disclosure of all potential bidders at the start of the offer period; (3) a strict 28-day “put up or shut up” (PUSU) deadline requiring bidders to formalize their intentions; and (4) enhanced disclosure requirements to ensure greater transparency of offers and their implications. In the aggregate, those measures made hostile bids more costly and complicated and bolstered target firms' bargaining position. Consistent with these objectives, Restrepo and Subramanian (2017) document that the reform resulted in a decreasing deal volume and reduced likelihood of UK companies being targeted following the reform.

Studying this reform is important for two main reasons. First, it provides a unique opportunity to causally identify the effect of takeover defenses on firm-level outcomes including risk and valuation. Existing empirical work in this space typically draws on either governance indices or variation across American states' takeover laws, both of which are subject to important reservations. Karpoff and Wittry (2024) claim that previous studies may report different results because of potential mismeasurements of antitakeover provisions (ATPs): the two widely used

ATP indices, G-index and E-index treat non-identical provisions equally in their scales and constructed procedures, resulting in unclear interpretations. Similarly, the use of state-level laws as instruments has been challenged. Catan and Kahan (2016) argue that these laws are often redundant because firms can implement shadow poison pills at minimal cost, whereas Cain et al. (2017) contend that the laws continue to influence firm behavior by shaping the broader legal environment. Karpoff and Wittry (2018) further emphasize that the effectiveness of such laws depends heavily on the surrounding institutional context. Driven by these concerns, the 2011 UK reform presents a compelling alternative. For these reasons, the 2011 UK reform is attractive. Prior to the reform, UK corporations operated in a regime that had little protective devices for managers against takeovers, as that which is observed about ATPs, dual class shares or other means of entrenchment (Armour and Skeel, 2007; Becht et al., 2009; Franks et al., 2009). The reform represented a major departure from this tradition by instituting substantive protections for target firms, thereby altering the dynamics of takeover negotiations. Second, although the reform did not introduce traditional U.S. defenses such as poison pills or staggered boards, it effectively strengthened target boards through procedural rules, including the PUSU deadline and restrictions on deal protections, which limited premature commitments to bidders and enhanced board negotiating leverage. These features make the UK reform a distinctive and powerful setting to examine how modern, institutionalized takeover defenses influence firm risk and value.

A sample of 30,060 firm-year observations was constructed, covering the period from 2006 to 2016, excluding 2011. Treated firms were defined as those headquartered in the U.K., while firms headquartered in other EU countries served as the control group. EU firms were selected as controls because the European Takeover Directive (ETD), implemented in 2006 and modeled after the U.K.'s City Code on Takeovers and Mergers, aimed to harmonize takeover regulations across Europe, providing a suitable benchmark for comparison.

Before proceeding with the main analyses, a difference-in-differences (DiD) approach is applied to compare takeover occurrences between treated firms and those in the control group. This preliminary test validates the research design by confirming that the 2011 U.K. Takeover Code Reform significantly reduced the likelihood of takeovers for treated firms relative to the control group. The results reveal a substantial decline in takeover activity among U.K. firms following the reform.

A difference-in-differences approach is then used to compare firm-level risk before and after the reform between treated and control firms. The results show that the reduced threat of takeover following the 2011 U.K. Takeover Code Reform led to a significant decrease in firm risk. Specifically, treated firms experienced declines in total risk, systematic risk, and idiosyncratic

risk of approximately 3.5%, 0.7%, and 2.4%, respectively, relative to control firms. These reductions represent economically meaningful decreases ranging from 0.05% to 3.65% of the average pre-reform risk levels across the different risk measures.

Such observed behavior aligns with the managerial interest hypothesis (DeAngelo and Rice, 1983; Jensen and Meckling, 1976; Amihud and Lev, 1981; Bertrand and Mullainathan, 2003; Gompers and Matsa, 2016) only if it results in harm to shareholders. Conversely, if this risk reduction behavior ultimately leads to value enhancement, it would support the shareholder interest hypothesis (Stein, 1988; Chemmanur and Jiao, 2012). To distinguish between these hypotheses, the impact of risk reductions following the 2011 Takeover Code Reform on firms' investment opportunities was examined. The results show that the decrease in firm risk induced by takeover defense increases firm value, implying that takeover defenses alleviate agency costs of takeovers. This evidence is consistent with the shareholder interest hypothesis.

The baseline results remain robust across several supplementary analyses. These involve alternative proxies for risk and value, utilizing imputed proxy developed in response to Aretz et al. (2019). Robustness is further supported by a dynamic event-study model and alternative control group classifications, such as the EU-15 countries and EU OECD members. The results are further supported by a difference in differences and propensity score matching combined method, as well as placebo tests. Collectively, these checks strengthen the credibility of the identification strategy and support a causal interpretation of the UK Takeover Code Reform's positive impact on firm value and its negative impact on firm risk.

The next step is to explore the mechanisms underlying the observed effects of the UK Takeover Code Reform on firm risk and value. A company's cost of capital, reflecting the returns required by investors, is primarily determined by its systematic risk and can also be affected by weak corporate governance. The market for corporate control acts as a key check on management, helping to reduce agency conflicts by disciplining poor managerial behavior (La Porta et al., 1998). When governance is weak, managers may act in their own interest rather than shareholders', increasing the firm's risk and raising its cost of capital (Pham et al., 2012). The managerial entrenchment hypothesis posits the notion that takeover defenses increase agency costs by decreasing transparency and increasing costs of issuing equity or debt. This leads to a higher cost of capital. Empirical studies support this, linking takeover defenses to increased costs of equity (Ferreira and Laux, 2007; Chen et al., 2011a) and debt (Qiu and Yu, 2009). In contrast, the shareholder interest hypothesis suggests that takeover defenses shield managers from short-term takeover pressures, which mitigate agency conflicts and decrease the firm's cost of capital. Supporting evidence shows that takeover defenses can reduce the costs of equity (Cremer and

Nair, 2005; Cremers et al., 2009) and debt financing (Klock et al., 2005; Cremer et al., 2007; Chava et al., 2009; Francis et al., 2010; Chen, 2012).

Consistent with the cost of capital channel, it is observed that following the 2011 UK Takeover Code Reform, firms experienced a significant decline in both the cost of equity and the weighted average cost of capital (WACC), while changes in the cost of debt were insignificant. Additionally, treated firms showed a greater tendency to issue equity rather than debt. Overall, the results suggest that improvements in firm value and decreases in risk due to the reform are primarily associated with reductions in the required returns of equity investors but not changes in debt costs. To further validate the cost-of-capital channel, several cross-sectional variations in the impact of the Takeover Code Reform on firm risk and value are examined. The results show that the reduction in risk and the enhancement in value is more pronounced among firms facing higher financial constraints and greater financial distress risk.

This thesis contributes to the growing literature suggesting that takeover defenses, by shielding managers from the threat of takeover, can reduce agency costs and ultimately enhance firm value (Stein, 1988; Chemmanur and Jiao, 2012). For instance, Chemmanur et al. (2011) document that firms adopt more antitakeover provisions (ATPs) to shelter higher-quality managers, facilitating managerial actions and generating better performances following an initial public offering (IPO). Similarly, Johnson et al. (2015) argue that protecting managers with ATPs fosters stronger commitment to business partners, resulting in higher IPO valuations and better subsequent performance. Chemmanur and Tian (2018) document a positive effect of ATPs on corporate innovation investment. Carline and Gogineni (2021) also demonstrate that ATPs decrease the probability investment in mergers and acquisitions (M&A) will constrain investment in innovation, suggesting that shielding managers with ATPs encourages risk-taking by rewarding value-creating investments. While these studies primarily link takeover defenses to larger expected cash flows, this research adds new evidence that the takeover defense could as well be related to lower discount rates. More importantly, it also identifies that the effect of takeover defenses on firms is larger for reducing cost of equity rather than cost of debt.

This study also contributes to the literature on takeover defenses and financing costs. Previous research, including Klock et al. (2005), Cremers et al. (2007), Chava et al. (2009), Qiu and Yu (2009), Francis et al. (2010), and Chen et al. (2012), has examined the impact of takeover defenses on the cost of debt, often finding that bondholders perceive takeover protections as a form of risk mitigation. However, this study finds that the effect of takeover defenses on firms' cost of debt is insignificant. Regarding the relationship between takeover defenses and the cost of equity, Ferreira and Laux (2007) and Chen et al. (2011) report that firms with more antitakeover

provisions tend to have higher costs of equity. In contrast, Cremers and Nair (2005) and Cremers et al. (2009) find that firms with more antitakeover provisions exhibit higher systematic risk, implying a lower cost of equity. The evidence presented here aligns more closely with the latter findings of Cremers and Nair (2005) and Cremers et al. (2009). Moreover, this study differs from Cremers and Nair (2005) and Cremers et al. (2009) in its research design. Those studies use antitakeover provisions as proxies for takeover defenses, a measure that has recently been questioned (Karpoff and Wittry, 2024). In contrast, this research exploits the 2011 UK Takeover Code Reform as a natural experiment, allowing for the identification of the causal effects of takeover defenses on the cost of equity.

Finally, this paper contributes to the literature on takeover defenses by examining a distinct regulatory environment. Unlike conventional types of takeover defense, such as poison pills or staggered boards, the 2011 UK Takeover Code Reform empowered target boards with new rules making it harder for bidders to succeed, including the prohibition of deal protection measures, the requirement for early disclosure of potential bidders, and the imposition of a strict 28-day put up or shut up deadline. These provisions mitigated the bargaining power of target firms and discouraged early commitments to bidders. Taken together, these characteristics make the 2011 reform a unique and powerful context to investigate how contemporary takeover defenses affect firm risk and value.

The remainder of the article is structured as follows. Section 2 provides a brief overview of the relevant literature. Section 3 presents the development of the hypotheses. Section 4 outlines the 2011 U.K. Takeover Code Reform and details the research design. Section 5 describes the data. Section 6 reports the main empirical findings. Section 7 consider potential economic issues. Section 8 explores potential underlying mechanisms. Section 9 conducts a cross-sectional analysis. Section 10 presents various robustness checks. Section 11 concludes the study.

2. Literature Review:

2.1. Theoretical Studies of Takeover Defenses:

2.1.1. Managerial Entrenchment Hypothesis:

DeAngelo and Rice (1983) were among the pioneers in noting that takeover defenses may have a negative impact on shareholder value. Their managerial entrenchment hypothesis implies that these defenses are, as a general matter, designed to protect managers from external threats, often to the detriment of shareholders. By insulating executives from the discipline of the market for corporate control, these provisions may intensify the agency problem between managers and shareholders, thereby leading to lower shareholder value.

The managerial entrenchment hypothesis, grounded in agency theory, conceptualizes the corporation as a nexus of contracts. Within this framework, managers are seen as agents who contribute their expertise on behalf of the firm's owners (Fama, 1980; Fama & Jensen, 1983; Jensen & Meckling, 1976). One non-trivial difficulty in this model is the fact that contracts are incomplete, they can not specify the full duties and rights of every agent. This contractual void allows managers some sort of "freedom" in the allocation process of corporate resources, causing them to put more emphasis on personal goals than firm interests (Jensen & Meckling, 1976). Agency costs thus arises from this lack of complete ability to implement incentive contracting for management. This problem is exacerbated in the case of large publicly held firms when ownership becomes fragmented and control is assumed by professional managers. Managers in such environment tend to be shielded from the effect of their own actions, whereas shareholders can barely monitor them properly (Fama & Jensen, 1983; Jensen & Meckling, 1976). Ultimately, the separation of ownership and control creates conditions in which agency conflicts and the associated agency costs can arise.

Agency theory identifies the external market for corporate control as an important mechanism for curbing the agency costs associated with outside equity (Fama, 1980; Manne, 1965). When corporate managers consistently pursue ineffective or inefficient strategies, firm performance typically declines, leading to a drop in market valuation. This underperformance can render the firm an attractive target for acquisition. Takeover attempts, which often lead to leadership changes, function as an external mechanism of oversight, helping to realign managerial interests with those of shareholders. The mere possibility of a takeover introduces a strong incentive for managers to prioritize efficiency and accountability in their decision-making (Jensen & Ruback, 1983).

Conversely, mechanisms that diminish the disciplinary effect of the external corporate control market, including takeover defenses, are generally viewed as strategies for managerial entrenchment. These measures protect management from the pressures of market discipline, enabling them to retain control even while pursuing inefficient or self-serving practices. As a result, these devices protect management from market discipline, allowing them to stay in charge while following inefficient or self-interested strategies. Consequently, the defenses are frequently perceived to be at odds with shareholder value maximization as they impede the market from correcting poor performance and enable agency conflicts to continue (Jensen & Meckling, 1976). In this light, entrenchment is interpreted as the transfer of 'private benefits' to managers (Amihud & Lev, 1981), or perquisites, at the expense of shareholders.

2.1.2. Shareholder's Interest Hypothesis:

A contrary view in the theoretical literature is conveyed by the shareholders' interest hypothesis, which argues that takeover defenses may actually serve to protect, rather than harm, shareholder value. From this standpoint, such defenses protect long-term firm initiatives that may be misunderstood or undervalued by short-sighted investors or opportunistic acquirers. Without these protections, value-creating projects could be prematurely abandoned following a takeover (Stein, 1988; Chemmanur & Jiao, 2012).

Stein (1988) contends that weakening the threat of takeovers can help managers avoid short-term, myopic decision-making. His argument is grounded in the notion that, due to information asymmetries, managers may struggle to convey the full value of long-term investments to the market. As a result, shareholders with incomplete information may interpret short-term declines in accounting performance as negative signals, causing the firm's stock price to fall. This undervaluation can, in turn, make the company an attractive target for acquisition at a price below its intrinsic value. In response, even well-intentioned managers seeking to act in shareholders' best interests may be discouraged from pursuing long-term, value-creating projects if those projects risk short-term underperformance. Ironically, this behavior can erode value in the long run. Takeover defenses, by mitigating the short-term force of market discipline, can help correct this problem because they can enable managers to concentrate on long term value without the constant threat of being replaced.

Chemmanur and Jiao (2012) consider a model where the incumbent management of a private firm attempt to utilize external financing by going public through an initial public offering (IPO). Here, the incumbent obtains security benefits and private benefits from staying in power. The company that has an option to invest in a short-term and long-term projects. While the long-term project with a longer payoff period provides more value in itself and subsequently enhances firm value, it is less successful in the short run when compared to the short-term project. Hence, the risk of short-term undervaluation in equity surges when an owner undertakes its long-term project. This undervaluation can expose the incumbent to a higher likelihood of being replaced by a rival in a control contest, particularly if external investors interpret short-term underperformance as managerial inefficiency. If the incumbent lacks sufficient voting power, outsiders may vote in favor of the rival. Additionally, the model assumes that incumbents may be either talented or untalented, with talented managers enjoying a lower cost of exerting effort and a comparative advantage in executing complex projects. However, managerial talent is private information, and investors can observe only a prior probability of talent, which adds further uncertainty to their evaluation of managerial decisions.

In this context, the incumbent simultaneously decides on the firm's voting structure and the adoption of other antitakeover provisions (ATPs) in the corporate charter at the time of the IPO, alongside the type of project to pursue and the level of effort to exert in its implementation. In equilibrium, the incumbent's preference for stronger versus weaker ATPs is shaped by three key effects. First, stronger ATPs provide insulation from the market for corporate control, enabling the incumbent to undertake a long-term project that generates greater value, free from short-term performance pressures. Second, this insulation may reduce managerial discipline by allowing untalented incumbents to shirk responsibilities without the threat of replacement, ultimately eroding firm value. Because external investors cannot perfectly distinguish between talented and untalented managers, this potential for value loss is reflected in the IPO valuation, even for firms led by capable managers. Third, independent of project choice, adopting stronger ATPs increases the likelihood that the incumbent retains control after the IPO.

2.2. Empirical Studies of Takeover Defenses:

In empirical research, measures of takeover defenses are generally classified into two main categories. The first relies on composite indices such as the Governance Index (G-Index) and the Entrenchment Index (E-Index) and use them as proxies for the strength of a firm's internal takeover defenses. These indices capture the extent to which governance structures may insulate management from external disciplinary forces. The second category focuses on antitakeover laws as an identification strategy. These laws provide a useful empirical tool because they offer takeover protections that are plausibly exogenous, being implemented at the state level rather than by firm management, which reduces concerns about endogeneity when assessing their effects.

Both the Governance Index (G-Index) and Entrenchment Index (E-Index) quantify the number of takeover defenses a firm employs and are widely used as aggregate measures of a firm's protection against unsolicited takeovers (Gompers et al., 2003; Bebchuk et al., 2009). However, assessing whether these indices accurately capture the effectiveness of takeover defenses is complicated by the endogeneity of firms' adoption decisions.

To a certain extent, a series of studies have argued that the G-Index and E-Index might not relate with takeover risk, which suggests that these two index are not good representations of real takeover defense (Bates et al., 2008; Klausner, 2013; Catan & Kahan, 2016). In contrast, it is conceivable that the defenses included in these indices are successful in preventing takeovers, but firms that face a larger risk of being takeover actually rely more heavily on them (Karpoff et al., 2017). Additionally, firm-specific factors and governance policies are jointly determined with the choice to implement antitakeover provisions, further complicating causal inference (Gompers et al., 2003; Bebchuk et al., 2009). Therefore, the lack of a straightforward empirical link between

raw takeover indices and takeover likelihood could reflect either the inefficacy of these defenses or the influence of endogeneity masking their true effectiveness.

Regarding antitakeover laws, Karpoff and Wittry (2018, Table A1) identify 81 studies that use state-level antitakeover legislation to explore various corporate outcomes. These laws include business combination laws (BC), control share acquisition laws (CS), fair price laws (FP), poison pill laws (PP), and directors' duties laws (DD). However, leveraging state laws to generate exogenous variation in takeover defenses introduces several challenges. Catan and Kahan (2016) argue that all firms have costless and universally effective shadow poison pills, informal defenses that eliminate the additional protective effect of formal state antitakeover laws. In contrast, Cain et al. (2017) reject this, arguing that state laws are promulgated through institutional arrangements and cannot simply nullify other defenses. Karpoff and Wittry (2018) add nuance by highlighting that the actual influence of a state antitakeover law depends heavily on the institutional and legal setting surrounding the firms subject to these regulations.

2.2.1. Takeover Defense and Firm Value:

Early event studies on takeover defenses face notable limitations that may affect the reliability of their findings. One major issue is the common use of proxy mailing dates as event dates, which can lead to contaminated market reactions because proxy statements often contain additional information unrelated to the antitakeover proposals (Comment & Schwert, 1995; Borokhovich et al., 1997). Another significant concern is selection bias: since firms voluntarily choose to propose and implement antitakeover provisions, stock price responses may reflect not only the provisions' direct impact but also investors' assessments of managerial quality or managers' private knowledge about impending takeover bids (Comment & Schwert, 1995; Coates, 2000). Furthermore, the non-random nature of these adoptions means that investors may anticipate such moves, causing the observed market reactions around announcements to underestimate the provisions' true economic effects (Bhagat & Jefferis, 1991; Cunat et al., 2012). Due to these limitations, the empirical results from early event studies have been mixed and inconclusive (Comment and Schwert, 1995; Karpoff and Malatesta, 1989).

To address the limitations of early event studies, many researchers have drawn on the work of Gompers et al. (2003) and Bebchuk et al. (2009) by using the G-Index and Entrenchment Index (E-Index) as proxies for firms' takeover defenses. These indices capture either the number of antitakeover provisions adopted by a firm or the overall level of takeover protection (Bebchuk et al., 2009; Masulis et al., 2007; Cremers et al., 2007). Empirical studies using the G-Index consistently find a negative relationship between the strength of takeover defenses and firm value, measured by Tobin's Q, as well as shareholder returns during the 1990s (Gompers et al., 2003;

Bebchuk and Cohen, 2005; Faleye, 2007; Guo et al., 2008). Expanding on this, Bebchuk et al. (2009) find that the negative effect on firm value is primarily driven by six specific provisions within the G-Index, which they define as the E-Index. Further extending this line of research, Cremers and Ferrell (2014) analyze a broader sample of approximately one thousand firms over the period 1978 to 2007, refining the G-Index and E-Index frameworks. Their results highlight that the link between firm value and shareholder rights is significantly influenced by the time-varying takeover factor proposed by Cremers et al. (2009), which captures fluctuations in investment opportunities.

Several studies use different methods to explore the causal link between takeover defenses and firm value, revealing important insights. Cuñat et al. (2012), employing a regression discontinuity design, find that the positive stock market reaction to shareholder governance proposals is especially strong for antitakeover provisions in the G-Index (Gompers et al., 2003), particularly those eliminating classified boards and poison pills, which account for 68% of proposals near the majority threshold. In a complementary approach, Souther (2016) measures firm value using closed-end mutual fund discounts relative to net asset value and finds that stronger takeover defenses are associated with lower fund values, higher expense ratios, and increased director compensation.

However, other researchers argue that the observed negative correlation between takeover defenses and firm value may not necessarily indicate causation but could be a result of a higher likelihood for low-value firms to adopt such provisions (Cohen and Wang, 2013). To clarify the causal impact, they use court rulings that create exogenous changes in firms' takeover defenses as natural experiments (Cohen and Wang, 2013; Heron and Lie, 2015; Amihud and Stoyanov, 2017). For example, Cohen and Wang (2013) study two Delaware court decisions in 2010. The first ruling weakened the protection staggered boards offered against director removal, reducing their antitakeover effect and coinciding with an increase in affected firms' value. The subsequent reversal restored the protection and was associated with a decline in firm value, suggesting that staggered boards function as antitakeover mechanisms that can lower shareholder wealth. However, Amihud and Stoyanov (2017) dispute these findings, showing that the stock market reactions become insignificant when penny stocks, firms valued under \$10 million, and over-the-counter stocks are excluded. More recently, Karakas and Mohseni (2021) used similar court rulings as quasi-natural experiments to assess staggered boards' impact. They find that weakening staggered boards reduces the voting premium, a measure of private benefits and inefficient resource use, with stronger effects in less competitive industries and among mature firms, where

agency problems from entrenched managers are generally more severe. These results reinforce the entrenchment hypothesis, especially in environments with severe agency conflicts.

2.2.2. Takeover Defense and Corporate Decisions:

The impact of takeover defenses on firm value often operates through changes in firms' financing costs and operational decisions. A broad body of literature explores these underlying channels, producing mixed results.

(1) Cost of Capital:

Several studies examine the relationship between takeover defenses and the cost of capital, but the evidence on this relation is generally mixed. But, with regard to the cost of debt, results are more uniform: companies with stronger takeover defenses generally confront lower borrowing costs. This effect is due to several mechanisms. First, takeover defenses can help reduce the probability of corporate events that are detrimental to bondholders, like recapitalizations, enormous payouts or asset dispositions and this is especially true for takeover bids. Second, the prospect of these defenses could deter wealth transfers from bondholders to stockholders by discouraging risk-enhancing tactics such as high leverage. Third, takeover defenses may reduce firm risk and cash flow volatility because of the restrictions that it imposes on managerial opportunism and monitoring costs between managers and shareholders. Jointly, these results strengthen the firm's credit worthiness and enhance its ability to attract financing. There is growing empirical evidence supporting this perspective, demonstrating that bondholders view takeover protections as a form of risk protection (Klock et al., 2005; Cremers et al., 2007; Chava et al., 2009; Qiu and Yu, 2009; Francis et al., 2010; Chen et al., 2012).

Although the effect of antitakeover provisions on cost of debt is fairly consistent across studies, their impact on cost of equity has been somewhat controversial. There is evidence that these provisions raise the cost of equity because they render firms riskier and less transparent. For instance, Ferreira and Laux (2007) propose that antitakeover defenses impede the flow of private information into stock prices and therefore decrease price efficiency but increase perceived risk. Similarly, Chen et al. (2011) prove that firms with more of these antitakeover provisions induce higher implied costs of equity, as investors require a larger return to be able to assume greater risk. Other studies, however, seem to point in the opposite direction. Cremers and Nair (2005) as Cremers et al. (2009) show that there is a positive relationship between the strength of antitakeover protection and systematic risk associated with firms, i.e., underprotected firms have higher systematic risk. From this perspective, antitakeover provisions can decrease firm risk and reduce the cost of equity financing by facilitating stability.

(2) Capital Structure:

Garvey and Hanka (1999) are among the first who empirically examine the impact of corporate antitakeover laws on corporate capital structure. They studied the influence of state-level antitakeover legislation passed during 1987-90 on firms' capital structure choices. Through a comparison of firms incorporated in states that passed these laws with those in states that did not, they discovered that firms affected by antitakeover laws dramatically decreased their dependence on debt financing. Yet, Wald and Long (2007) show that after accounting for potential selection bias, particularly firms' choices of incorporation, the results become statistically insignificant with description of an interesting they follow up study recommended. Expanding on this strand of research, Bharath and Hertz (2019) investigate how external governance pressure, proxied by the presence of business combination (BC) laws, mediates the relation between firm' choice to issue different types of debt. They found that a lower level of takeover pressure resulting from BC laws on reduced firms' reliance on bank loans for public debt financing, indicating that poor external monitoring induces increased use of arm's-length debt markets.

(3) Cash Holding:

A growing body of research investigates how shareholder rights and takeover defenses influence corporate cash holdings, often linking weaker governance to inefficient use of cash. Using the shareholder rights index developed by La Porta et al. (1998), Dittmar et al. (2007) compare average cash holdings across countries and find that firms in countries with stronger shareholder rights and more developed capital markets hold less cash. This suggests that empowered shareholders seek to limit the amount of cash under managerial discretion. Similarly, Pinkowitz et al. (2006) show that cash is worth less to minority shareholders in countries with weak investor protection, supporting the idea that poor governance facilitates the expropriation of resources by insiders. Kalcheva and Lins (2007) further incorporate firm-level governance controls and find that firms with weaker shareholder rights tend to hold more cash, especially in countries with low investor protection. They also show that cash holdings are more negatively associated with firm value when managerial control is strong and external governance is weak, consistent with the entrenchment hypothesis.

Focusing on U.S. firms, Dittmar and Mahrt-Smith (2007) apply both the G-Index (Gompers et al., 2003) and E-Index (Bebchuk et al., 2005), showing that cash in firms with higher governance indices is valued significantly less, indicating that entrenched managers are more likely to misuse corporate cash, thus destroying shareholder value. Similarly, Harford et al. (2008) find that firms with both excess cash and strong takeover defenses are more likely to increase capital expenditures and engage in acquisitions, suggesting that entrenchment affects how firms deploy

surplus liquidity. According to Yun (2009), the adoption of antitakeover laws causes firms' reallocation from being monitored sources of liquidity, such as line of credit, towards more discretionary cash holdings, exacerbating the argument that these laws increase managerial discretion.

(4) Payout Policy:

Francis et al. (2011) provide further insight into how firms adjust their financial policies in response to antitakeover legislation. They find that after the enactment of state antitakeover laws; firms increase their cash holdings by reducing both dividend payout ratios and the likelihood of paying dividends. Importantly, they discover that managers are not using the retained external funds to invest productively or maximize shareholder value. Instead, it is used to boost managerial and employee compensation, reduce firm leverage, and accumulate discretionary cash reserves, consistent with the managerial entrenchment view. Rather than examining debt and payout decisions separately, John et al. (2015) explore how firms jointly adjust their financial policies in response to changes in antitakeover laws. They note that for companies with greater agency costs, the firm actively uses dividends and debt to reduce them. In specific, these firms are more likely to opt for dividends than debt at all and change their payout policies by moving toward a regime based on regular quarterly dividends or share repurchases that indicates greater discipline in the distribution of capital when external governance is weakened.

(5) Investment Decisions:

Finally, a growing body of research investigates how takeover defenses influence corporate investment decisions and reached contradictory results. Some studies suggest that protecting managers from takeover threats can enhance firm performance. For instance, Chemmanur et al. (2011) and Johnson et al. (2015) show that takeover defenses help preserve high-quality long-term projects and fosters stronger business partnerships. Similarly, Chemmanur and Tian (2018) offer casual evidence that eliminating firm-level takeover defenses leads to a greater propensity for managers to manager risk optimally than value-enhancing innovation. In contrast, two studies of state business combination laws by Atanassov (2013) and Karpoff and Wittry (2018) highlight a reduction in both the quantity and quality of patents following their passage, consistent with increased protection from takeovers inhibiting innovation activity as well as generating managerial complacency. In a complement to this work, Iskenderoglu (2021) shows that stake antitakeover laws induce conglomerate segments to take more conservative investment actions but not standalone firms, implying the impact of takeover defenses on investment behavior varies across firm structure.

A separate body of research investigates the effects of takeover defenses on mergers and acquisitions (M&A) and has found contradictory evidence. Numerous studies provide support to the manager entrenchment hypothesis indicating that takeover defenses undermine market control and enabling managers to engage in empire building or value destroying acquisition activities. For example, Masulis et al. (2007) find that firms with stronger takeover defenses earn lower abnormal returns around acquisition announcements, implying that protected managers are more likely to engage in inefficient deals. Similarly, Harford et al. (2012) find that entrenched managers are less likely to use stock-based transactions, potentially to avoid institutional scrutiny, and are more prone to overpay for targets and pursue low-synergy acquisitions, ultimately harming post-merger performance. Gormley and Matsa (2016) further argue that antitakeover laws promote risk-averse behavior, leading managers to favor diversifying acquisitions that reduce firm volatility and employment risk but erode shareholder value.

Other studies, however, indicate that takeover defenses may improve managerial decision making in certain circumstances. Humphery-Jenner (2014) concludes that in innovation dependent industries, the antitakeover provisions allow managers to resist short term pressures coming from shareholders or from market efficiency, causing them to engage on mergers and acquisitions which are efficient and follow their shareholder long term interests. Likewise, Drobetz and Momtaz (2020) document that these shieldings help in long-horizon innovation investments with respect to M&A quality and performance. Carline and Gogineni (2021) demonstrate that while takeover defenses lower the aggregate volume of M&A, the deals undertaken tend to be higher quality, suggesting that such defenses can mitigate risk-related agency conflicts, strengthen strategic decision making, and create value for shareholder value versus entrenching managers.

3. Hypothesis Development:

Grounded in the preceding theory and empirical evidence, there are two competing views on the effect of takeover defenses. First, the managerial entrenchment hypothesis (DeAngelo and Rice, 1983) states that takeover defenses shift control from shareholders to managers, thereby weakening the disciplining role of the takeover market and exacerbating agency conflicts between managers and shareholders, which ultimately lead to costly outcome (e.g. Gompers et al., 2003; Masulis et al., 2007; Bebchuk et al., 2009; Harford, 2012; Cuñat et al., 2020). On the other hand, shareholder interest hypothesis (Stein, 1988; Chemmanur and Jiao, 2012) suggests that takeover defenses reduce the potential manager myopia problem caused by the threat of takeover, thereby reducing agency conflicts between managers and shareholders, which ultimately lead to benefit outcome (Humphery-Jenner, 2014; Chemmanur and Tian, 2018; Drobetz and Momtaz, 2020; Carline and Gogineni, 2021). Both theories explain the takeover defenses under the assumption

of principle agency problem between managers and shareholders (Jensen and Meckling, 1976; Amihud and Lev, 1981).

3.1. Takeover Defense and Firm Risk:

This section examines the potential impact of takeover defenses on firm risk through two primary channels: the expected future cash flows and the cost of capital. First, takeover defenses may influence firm risk by affecting the nature and volatility of expected future cash flows. Under the managerial entrenchment hypothesis, such defenses insulate managers from external monitoring and the disciplinary threat of takeovers. This protection may encourage risk-averse behavior, as managers concerned about employment security and holding undiversified personal portfolios may avoid value-enhancing but risky projects (Jensen & Meckling, 1976; Holmström, 1999). Instead, they may adopt risk-reducing strategies that are potentially suboptimal for shareholders (Masulis et al., 2007; Harford et al., 2012; Atanassov, 2013; Cuñat et al., 2020). Thus, greater takeover protection may suppress the firm's engagement in value-enhancing risk-taking activities. In contrast, the shareholder interest hypothesis suggests that constant exposure to takeover threats can induce managerial short-termism, deterring long-term investments. Takeover defenses may alleviate this pressure, allowing managers to pursue innovative and riskier long-term projects, thereby enhancing firm value and aligning with shareholders' long-term interests (Chemmanur et al., 2011; Johnson et al., 2015; Chemmanur & Tian, 2018; Carline & Gogineni, 2021).

Second, takeover defenses may affect firm risk via changes in the cost of capital, which reflects investor-required returns based on perceived risk. Under the managerial entrenchment view, takeover defenses can increase agency conflicts, reduce transparency, and weaken governance, prompting investors to demand higher returns and raising the firm's cost of capital (Ferreira & Laux, 2007; Chen et al., 2011a). Conversely, the shareholder interest perspective holds that by promoting stability and reducing managerial short-termism, takeover defenses can lower perceived risk and cash flow volatility, resulting in a lower cost of capital. Empirical studies support this view, documenting a negative relationship between takeover defenses and both the cost of equity (Cremers & Nair, 2005; Cremers et al., 2009) and the cost of debt (Klock et al., 2005; Cremers et al., 2007; Chava et al., 2009).

Based on the competing theoretical perspectives discussed above, the following hypotheses are proposed regarding the relationship between takeover defenses and firm risk.

Hypothesis 1(a): takeover defenses lower corporate risk.

Hypothesis 1(b): takeover defenses increase corporate risk.

3.2. Takeover Defense and Firm Value:

The value of a firm can be conceptualized as the present value of expected future cash flows, discounted at the firm's cost of capital. Thus, any mechanism, including takeover defenses, that affects a firm's risk profile, or the investor-perceived discount rate can ultimately impact firm value.

Under the managerial entrenchment hypothesis, takeover defenses may lead managers to avoid risk-enhancing projects due to employment concerns or undiversified wealth. This behavior can reduce the expected growth of future cash flows, particularly if valuable, but riskier, investments are avoided. Simultaneously, governance deterioration and increased agency costs associated with managerial entrenchment can raise the firm's cost of capital, as investors demand a premium for heightened agency risk and reduced transparency. The combined effect of lower expected cash flows and a higher discount rate results in a decline in firm value.

However, under the shareholder interest hypothesis, takeover defenses are seen as mechanisms that shield managers from short-term market pressures, allowing them to make longer-term strategic investments in innovation and R&D. These investments may increase the volatility of cash flows in the short term, but they can also enhance the firm's long-term growth potential, thus raising the expected value of future cash flows. Furthermore, by enabling a more stable strategic focus and reducing agency conflicts, takeover defenses may lower the cost of capital. When the increase in expected cash flows exceeds any associated rise in risk or is paired with a sufficiently larger decrease in the discount rate, the net effect is an increase in firm value. Based on these two arguments, the following second pair of hypotheses is proposed.

Hypothesis 2(a): takeover defenses decrease firm's value.

Hypothesis 2(b): takeover defenses increase firm's value.

4. Empirical Framework:

4.1. UK Takeover Code Reform 2011:

4.1.1. The Evolving UK Takeover Regime:

The U.K. Takeover Code was first introduced in 1968 to make it mandatory to offers for the shares of a public company and to ensure shareholders have an opportunity to decide on such offers. The Code applies to listed companies with registered offices in the United Kingdom and is administered by the Panel on Takeovers and Mergers. Its primary objectives are to ensure that all shareholders are treated fairly and equally, that there is full and timely disclosure of information, and the prevention of misleading or coercive bid tactics.

A defining feature of the Code is the Board Neutrality Rule, which prohibits target company directors from taking any action that could frustrate a bona fide takeover offer without prior shareholder approval. Combined with the mandatory bid rule, which requires a general offer to all shareholders when a party acquires 30 percent or more of voting rights, these provisions have historically limited the use of takeover defenses in the U.K., including poison pills and staggered boards. Unlike jurisdictions such as the United States, where defensive strategies are common, U.K. law has long emphasized shareholder primacy and minimal managerial interference during takeovers.

The U.K. Takeover Code also served as a template for the EU Takeover Directive (2004/25/EC), which sought to harmonize takeover regulation across EU member states. The Directive adopted key principles from the U.K. model, including equal treatment of shareholders, the Board Neutrality Rule, and the mandatory bid requirement. The U.K. formally incorporated the Directive into domestic law through the Companies Act 2006. However, due to the pre-existing strength of the U.K. regime, the Directive introduced minimal substantive changes.

The turning point came after Kraft Foods bought Cadbury P.L.C. in a bitter battle that ended in 2010. Kraft's decision shortly after the takeover to close a large British factory, despite earlier public promises, prompted accusations from investors and regulators in Britain as well as condemnation by the Takeover Panel. The episode also had involved broader questions about the influence of institutional investors focused on short-term return, deficiencies in the process of bidding for a company and the limited power bodies being acquired have to fend off unwanted suitors. As a result of this, the Takeover Panel started a consultation process in 2010 and after considering all responses to the consultation released major changes to the Takeover Code on September 19, 2011. These adjustments were designed to enhance the position of offeree companies and the transparency of offers, but not at the expense of neutrality and openness.

4.1.2. Main Contents of the Takeover Code Reform 2011:

The 2011 UK Takeover Code Reform introduced significant changes to the regulation of takeover activity, particularly by restricting deal-protection mechanisms traditionally used to secure transactions. In its final form, the reform prohibited most deal-protection arrangements, including termination (break-up) fees and other protections identified in PCP 2010/2. The only exceptions to this rule apply to formal sale processes initiated by the target company and limited inducement fees offered to white-knight bidders. Notably, the restrictions apply only to the target side and do not prevent bidders from unilaterally offering protections.

The reform also introduced enhanced disclosure requirements during the offer period, defined as beginning with the public announcement of an actual or potential offer and ending when the offer becomes unconditional, lapses, or is withdrawn. If the offer period is triggered by a target company announcement, the company is now required to identify all potential bidders, including those involved in negotiations or those that have made unsolicited approaches. It also introduced a compulsory “put up or shut up” (PUSU) rule: if any bidder is named, he has 28 days to do one of two things, either to announce its firm intention to make an offer or say it will not make one. The amendments also introduced new disclosure requirements for bidders, such as full disclosure with respect to offer-related financing arrangements, advisory fees and post-offer intentions in relation to the target. Together they constituted an effort to increase transparency, reduce uncertainty, and curtail deal protections that might chill competing bids thus enhancing shareholder rights and rebalancing power between bidders and target boards in the context of the UK takeover market.

Overall, the 2011 UK Takeover Code Reform can be seen as a major transformation of takeover defense mechanisms in the UK. First, the introduction of the “announce all bidders” and the “put up or shut up” (PUSU) rule intended to alleviate some of the detrimental consequences of long-lasting bid speculation. These provisions prevent acquirers from expressing interest, without a time limit and with no offer price in sight, and at the same time deter them from taking this path by reducing speculation and operational uncertainty on the target firm's side. The 28-day deadline under the PUSU rule also offers a valuable tool for target boards to discourage unsophisticated or speculative bidders, which may in some cases enhance the negotiating position of the board. Although not a typical takeover defense, this power to force bidders to bid or walk away gives the target board more leverage during initial takeover negotiations.

Second, the prohibition on deal protection measures, including break fees and implementation deeds, places greater risk on bidders. Although exceptions exist, usually involving minimal fees with white-knight bidders and Panel approval, these rules restrict a target board's ability to commit prematurely to a single bidder. This allows boards to consider alternative bids more freely and enhances their ability to maximize shareholder value. The ability to negotiate with competing bidders without encumbrances increases the target's strategic flexibility during contested bids.

Together, these changes do not constitute traditional defensive measures like poison pills or staggered boards, but they effectively enhance the target board's leverage and strategic options when facing a takeover attempt. Consistent with this belief, Restrepo and Subramanian (2017) find that both number of deals volumes decline showing a decrease in the probability of firms

being targeted after the reform, which implies that takeovers become more costly to execute and likely to complete in the UK.

4.2. Difference-in-Difference Research Design:

To investigate hypothesis, this study relies on the announcement and enactment of the UK Takeover Code Reform 2011 as quasi-nature experiments and employ a Difference-in-Difference research design. The main objective is to assess the impact of the UK 2011 Takeover Code Reform on corporate risk and value.

To assess the impact of the 2011 UK Takeover Code Reform, firm-level risk and firm valuation are compared between treatment and control groups before and after the reform. The Takeover Code applies to companies with registered offices in the United Kingdom, the Channel Islands, or the Isle of Man, provided any of their securities are traded on UK-regulated markets or relevant exchanges. Accordingly, the treatment group comprises public firms listed in these jurisdictions and directly subject to the reform. The control group consists of firms that were not affected. Following prior studies on the European Takeover Directive (ETD) (Clere et al., 2011; Hopt, 2014a, 2014b), which was modeled after the UK City Code and aimed to harmonize takeover regulation across EU member states, it is reasonable to assume a broadly consistent regulatory environment across EU countries after its transposition into national law by 2006. Therefore, public firms listed in other EU countries are used as the control group (Humphery-Jenner, 2012; Dissanaik et al., 2021).

The analysis proceeds by estimating the following baseline model (Model 1) to test the proposed hypotheses. The first step examines the causal effect of the 2011 UK Takeover Code Reform on the likelihood of firms being targeted in takeover bids, comparing outcomes across the pre- and post-reform periods for both treatment and control groups. The second step evaluates the reform's impact on firm-level risk and firm valuation. Lastly, the analysis explores potential mechanisms through which any identified causal effects on firm risk and value may operate.

$$Y_{ictj} = \beta_0 + \beta_1 Post_t + \beta_2 Treat_i + \beta_3 Post_t \times Treat_i + \theta X_{i,t-1} + \lambda_i + \lambda_c + \lambda_j + \lambda_t + \epsilon_{icjt} \quad (1)$$

Where Y_{ictj} denotes the outcome variable of interest, including the likelihood of a firm being targeted in a takeover, as well as firm-level risk and valuation measures. $Post_t$, is a binary indicator equal to 1 for years following the 2011 UK Takeover Code Reform and 0 otherwise. $Treat_i$, is a treatment group indicator as previously defined. $X_{i,t-1}$, is a vector of firm-level control variables lagged by one period. The model includes fixed effects for firm (λ_i), country

(λ_c), industry (λ_j) and year (λ_t). The error term is denoted by ϵ_{icjt} . The primary independent variable of interest is the interaction term $Post_t$ and $Treat_i$ ($Post_t \times Treat_i$), where the coefficient estimator (β_3) captures the difference-in-differences (DiD) effect of the 2011 UK Takeover Code Reform. In the firm risk model, a negative and statistically significant (β_3) suggests that the reform led to a reduction in firm risk, whereas a positive and significant (β_3) would indicate an increase in risk following the reform. In the firm value model, a negative and significant (β_3) would imply that risk changes induced by the reform reduced firm value, consistent with the managerial entrenchment hypothesis. Conversely, a positive and significant (β_3) would suggest that reform-induced risk-taking enhanced firm value, supporting the shareholder interest hypothesis.

5. Sample and Data:

5.1. Sample Selection:

The sample is formed based on firm-level accounting data obtained from Worldscope, while securities data are sourced from Datastream. The analysis examines over a 10-year window surrounding the implementation of the 2011 UK Takeover Code Reform. In order to reduce the risks of any potential confounding effects during the transitional phase, the period from January 2011 to January 2012 is excluded. The pre-reform period refers to January 2006 to December 2010, and the post-reform period spans January 2012 to December 2016. This symmetric five-year window on either side of the reform provides a balanced framework for evaluating firm behavior regarding risk and valuation. The chosen timeframe allows for meaningful trend analysis while mitigating the risk of biased estimation in DiD models due to serial correlation (Bertrand et al., 2003).

The first sample is built following the approach in Panel A of Table 1, in line with previous literature on takeover defenses and firm risk (Masulis et al., 2007; Harford et al., 2012; Gormley and Matsa, 2016; Carline and Gogineni, 2021). The criterion for sample selection is the following: (1) firms must have their headquarters located within the European Union (EU); (2) firms must report non-negative values for book equity, total assets, and sales throughout the sample period; (3) firms operating primarily in the financial or utility sectors, as classified by their two-digit Standard Industrial Classification (SIC) codes, are excluded; and (4) firms must have sufficient data available from both Datastream and Worldscope to construct the key variables required for analysis. After screening according to these criteria, the final sample consists of 30,060 firm-year observations, representing 4,488 unique firms over the study period.

In addition, data on mergers and acquisitions (M&A) are obtained from the Securities Data Company (SDC) database for the period 2006–2016, covering firms identified as takeover targets. To maintain consistency with prevailing practices in the empirical literature, the analysis excludes M&A transactions that meet any of the following criteria: (1) the bidding firm already holds more than 50% of the target firm's equity prior to the deal; and (2) the bidding firm seeks to acquire less than 50% of the target firm's equity. Panel B of Table 1 presents the distribution of firm-year observations across the sample period. And Panel C of Table 1 displays the distribution of firm-year observations by country.

[Insert Table 1 Here]

5.2. Analysis Variables:

5.2.1. Proxies for Firm Risk and Value:

In this study, firm's level risk is proxied by the volatility of weekly stock returns. Additionally, systematic and idiosyncratic risks are calculated by regressing each firm's weekly returns for each year on the Fama-French (1993) three-factor model (Model 2).

$$r_{i,t} = \beta_{0,i} + \beta_{1,i}r_{MKTRF,t} + \beta_{2,i}r_{SMB,t} + \beta_{3,i}r_{HML,t} + \varepsilon_{i,t} \quad (2)$$

Where $r_{i,t}$ is the firms weekly stock returns, $r_{MKTRF,t}$ is the excess return on market portfolio, $r_{SMB,t}$ is the size premium and $r_{HML,t}$ is the value premium from Kenneth French's website. $\varepsilon_{i,t}$ is the error term. The proxies for systematic and idiosyncratic risks are defined as square roots of explained and unexplained variance, respectively, from Model (2).

To assess the impact of changes in firm's level risk on firm value, this study examines whether shifts in a firm's risk profile correspond to investments reflected by higher or lower Tobin's Q. Tobin's Q is measured following the definition used by Gompers et al. (2003) and Bebcuk et al. (2009), where Q is calculated as the market value of assets divided by the book value of assets. The market value of assets is determined by adding the book value of assets to the market value of common stock, then subtracting the sum of the book value of common stock and balance sheet deferred taxes.

5.2.2. Additional Variables:

Since treated and control firms may differ in their firm-specific characteristics, additional controls for key firm-level factors are incorporated to account for other variables that might also affect changes in firm's level risk, thereby isolating the effect of the takeover reform more accurately. Return on capital employed (ROCE) is the ratio of earnings before interest and taxes to capital

employed and is included to control for differences in management quality. Additionally, a market-based measure of management quality, average abnormal return (AER), is incorporated, calculated as the average daily abnormal stock return over the preceding year. Firm growth opportunities are controlled for using market-to-book ratio (MTB), defined as the market value of assets divided by the book value of total assets, since firm's risk may be influenced by growth prospects. Liquidity is measured as the ratio of cash and short-term investments to the book value of total assets, while leverage is defined as the book value of debt divided by the book value of total assets. Sales growth (SGA) is calculated as the annual growth rate of sales. Asset tangibility is measured as the ratio of net property plant and equipment to total assets. Firm size is proxied by the natural logarithm of total assets, and firm age is measured as the natural logarithm of one plus the number of years since incorporation, controlling for differences in the firm's life cycle or stage of development. Finally, product market competition is accounted for using the Herfindahl-Hirschman Index (HHI).

In the firm value regressions, additional control variables include Capital Expenditure (CAPEX), Research and Development (R&D), and Mergers & Acquisitions (M&A). CAPEX is measured as the ratio of total capital expenditures to the book value of assets. R&D is defined as the amount spent on research and development scaled by the book value of assets. M&A represents the sum of M&A deal transaction values paid by a firm in a given year, divided by the book value of assets. Except for firm age, all these variables are winsorized at the top and bottom 1% to reduce the impact of outliers. Detailed definitions of these variables are provided in the Appendix A. Table 2 presents the summary descriptive statistics of all variables used in this study.

[Insert Table 2 Here]

6. Main Empirical Results:

6.1. Univariate Tests:

The analysis starts by examining the mean differences for important variables of interest between treated and control firms in both pre- and post-reform periods. Mean values and differences for the outcome variables prior to reform are shown in Columns 1 to 3 of Table 3. Columns 4 to 6 show the corresponding statistics for period after the reform. Finally, in Column 7 presents the Difference-in-Differences (DiD) estimates showing the relative change over time between two groups after across the pre- and post-reform periods.

Treated firms were more likely to be taken over than control firms before the reform. More precisely, the probability of takeover was 0.058 for the treated group compared to a value of 0.048 for the control group, with a statistically significant difference of 0.010 ($p\text{-value} \leq 0.01$). A similar

pattern is observed for the number of bids, with treated firms receiving an average of 0.070 bids to control firms' 0.057 bids, a difference of 0.013 ($p\text{-value} \leq 0.01$). This increased associated takeover risk certainly made the treated firms riskier prior to reform at the firm level. Correspondingly, treated firms showed increases in total risk, systematic risk, and idiosyncratic risk of 8.2%, 0.5%, and 4.8%, respectively, relative to control firms, with all differences significant at the 1% level. Furthermore, the higher risk profile of treated firms was associated with a significantly greater firm value, as measured by Tobin's Q, which was 17.9% higher for treated firms compared to control firms in the pre-reform period ($p\text{-value} \leq 0.01$).

After the reform, both groups of firms exhibited a similar likelihood of being taken over. Specifically, the probability of takeover (and the number of bids) was 0.032 (0.038) for the treated group and 0.038 (0.046) for the control group, with differences of -0.006 and -0.008, respectively, both statistically insignificant. Unlike the pre-reform period, this reduction in takeover threat likely contributed to a similar level of risk for treated firms relative to control firms following the reform. This is reflected in the statistically insignificant differences in total risk, systematic risk, and idiosyncratic risk, measured at 1.1%, -0.2%, and 0.4%, respectively. Notably, the reduction in firm-level risk among UK firms was associated with a significant increase in firm value, as evidenced by a 37.2% higher Tobin's Q among treated firms relative to control firms during the post-reform period ($p\text{-value} \leq 0.01$) which significantly surpassed the difference observed pre-reform.

Finally, the DiD estimates, presented in the last column, show statistically significant results across all variables with $p\text{-values}$ of 0.01 or better. Specifically, there is a 1.6% decrease in the likelihood of treated firms being targeted for takeovers and a 2.0% decrease in the number of bids following the 2011 UK Takeover Code Reform, relative to control firms. This provides robust evidence that the reform significantly reduced the takeover threat faced by treatment firms compared to controls. Additionally, the DiD estimates for total, systematic, and idiosyncratic risk reveal significant negative effects of -7.2%, -0.7%, and -4.4%, respectively, suggesting that there is a significant risk reduction for the treatment firms in post-reform period relative to control firms. Regarding firm valuation, the DiD estimate for Tobin's Q shows a significant positive effect of 19.2%, indicating that the risk-reduction behaviors adopted by treatment firms contributed to a notable increase in firm value relative to controls. Collectively, these results suggest that the reduction in firm risk, stemming from a lower likelihood of being targeted following the 2011 Takeover Code Reform, ultimately increased firm value (Stein, 1988; Chemmanur et al., 2012).

[Insert Table 3 Here]

6.2. UK Takeover Code Reform and Takeover Occurrence:

Prior to investigating if the 2011 UK Takeover Code Reform affected risk taking and value of firms, the analysis first test whether the reform affected probability of takeover for treated firm with respect to control firms. This provides support for the research design by indicating that the reform successfully mitigated the threat of potential takeovers. It was a type of antitakeover regulation to some degree in the treatment relative to control group. Accordingly, a significant decline in takeover activity among treated firms, relative to control firms, is expected, indicating a diminished takeover threat following the reform.

To validate this argument, the Difference-in-Differences (DiD) model (Model 1) is estimated using a pooled Ordinary Least Squares (OLS) regression. The dependent variables are either an indicator for bid occurrence, equal to one if a takeover occurs in the observation year and zero otherwise, or the number of bids a firm receives in that year. Eight regression models are estimated. Columns 1–2 and 5–6 of Table 4 present results controlling for industry and year fixed effects. Columns 3–4 and 7–8 extend the specification by including country fixed effects. In all models, standard errors are robust to heteroscedasticity and clustered at the firm level.

Columns 1–2 of Table 4 present the results for models estimating the likelihood of takeover occurrence among sample firms. In both specifications, the coefficient on the treated variable is positive and statistically significant, which implies that treated firms are more likely to be takeover in the pre-reform period. This result supports univariate results presented in Table 3. After the reform, this trend reverses, as evidenced by significantly negative coefficients on the difference-in-differences (DiD) interaction term (Inter). In particular, the probability of being takeover for treated firms decreased by 1.5% as compared to pre-reform control firms. In economic magnitude, this decrease is equivalent to around 0.31% of the overall sample mean probability of takeover attempts. Columns 3–4, which also control for firm and country fixed effects, produce similar results. In these models, the probability of takeover presence among treated firms decreases between 1.4% and 1.5%, a decline of about 0.29–0.31% from the sample average. Columns 5 to 8, where the binary takeover indicator has been replaced by a count of bids received, yield similar results and provide reassurance over the robustness of the results. Collectively, those effects are indicative that firms who were affected by the 2011 UK Takeover Code Reform had a statistically and economically significant negative impact on takeover activities relative to control firms. This evidence indicates that the reform increased takeover defense and reduced vulnerability to bid for UK-listed companies.

[Insert Table 4 Here]

6.3. UK Takeover Code Reform 2011 and Firm Risk:

This section employs the Difference-in-Differences (DiD) framework to investigate whether the strengthened takeover defenses introduced by the UK Takeover Code Reform 2011 influenced changes in the risk profiles of firms within the treatment group. Columns 1–4 of Table 5 report the results where the dependent variable is total firm risk, proxied by the volatility of weekly stock returns calculated at each year-end. Subsequently, columns 5–12 replace total risk with systematic risk and idiosyncratic risk, representing the explained and unexplained variances, respectively, derived from the Fama-French (1993) three-factor model. Industry and year fixed effects are controlled for all columns, while firm and country fixed effects are additionally incorporated in the columns 3-4, 7-8 and 11-12. Throughout all regressions, standard errors are robust to heteroscedasticity and clustered at the firm level.

Columns 1–2 of Table 5, which control for industry and year fixed effects, show that the “Treated” variable has a positive and statistically significant coefficient in both models. This result is consistent with those reported in Table 3 which suggests that the treated firms had higher risk-taking behavior than the control firms before the reform of takeover code in 2011. Following the reform, however, this pattern flips as can be seen in the strongly negative coefficients on the DiD term (Inter). The overall risk of treated firms decreased by 8.1% (3.5%) compared to pre-reform controls. Economically, these decreases imply a reduction of 3.65% (1.58%) with respect to the average pre-reform total risk for treated firms. Upon further inclusion of country and firm fixed effects (columns 3–4), the results remain robust, with the total risk of treated firms decreasing by 5.8% (3.5%) relative to pre-reform control firms. Economically, this corresponds to a significant decline of 2.62% (1.58%) from the average pre-reform total risk level of treated firms.

Next, the impact of the strengthened takeover protections resulting from the 2011 UK Takeover Code Reform on firms’ systematic and idiosyncratic risk is examined. Regarding systematic risk, the DiD terms (Inter) across all four models (Models 5–8) are negative and statistically significant. Specifically, systematic risk for treated firms decreased by 0.9%, 0.7%, 0.8%, and 0.6% relative to pre-reform control firms. Economically, the reductions are about 0.07%, 0.06%, 0.07% and 0.05% less than those of average pre-reform systematic risk values for treated companies at other moments in time respectively. A comparable pattern is found for idiosyncratic risk, with DiD terms (Inter) in all four models (Models 9–12) being negative and significant as well. In particular, the idiosyncratic risk of treated firms was 4.8%, 2.4%, 3.5% and 2.3% lower than that of pre-reform control firms. From an economic point of view, this entails reductions of 1.15%, 0.57%, 0.84% and 0.55% concerning the average level of pre-reform idiosyncratic risk among treated firms.

Overall, the results confirm that firms impacted by the 2011 UK Takeover Code Reform significantly reduced their risk levels compared to control firms. This provides robust causal evidence of a negative relationship between enhanced takeover defenses and firm risk.

[Insert Table 5 Here]

6.4. UK Takeover Code Reform 2011 and Firm Value:

The subsequent analysis examines the value consequences of risk-reduction behavior following the 2011 UK Takeover Code Reform. The results, presented in Table 6, are estimated using the Difference-in-Differences (DiD) model, with Tobin's Q as the dependent variable. Tobin's Q is calculated as total assets minus book value of equity plus market value of equity minus deferred taxes, all scaled by the book value of total assets. Four regressions are conducted: the first two (columns 1 and 2) control for industry and year fixed effects, while the last two (columns 3 and 4) further include firm and country fixed effects. Standard errors are corrected for heteroscedasticity and clustered at the firm level in all models.

In the models controlling for industry and year fixed effects (columns 1-2), the "Treated" variable exhibits a positive and significant coefficient, consistent with findings in Table 3. This indicates that higher risk-taking by treated firms was associated with greater firm value relative to control firms before the reform. This positive relationship continues post-reform, as shown by the significant and positive coefficients on the DiD term (Inter). Specifically, Tobin's Q for treated firms increased by 21.7% (7.3%) relative to pre-reform control firms. Economically, these increases correspond to rises of 24.72% (8.31%) above the average pre-reform firm value for treated firms. When firm and country fixed effects are included (columns 3-4), the results remain robust, with Tobin's Q for treated firms increasing by 14.1% (8.9%) relative to pre-reform control firms.

The findings suggest that the 2011 UK Takeover Code Reform led to value enhancement for treated firms, consistent with the view of shareholder's interest hypothesis, by reducing the potential threat of takeovers, the reform ultimately generated shareholder-beneficial outcomes (Stein, 1988; Chemmanur et al., 2012). When combined with the analysis of risk-taking behavior (Table 2.5), the results indicate that the value-enhancing effect of takeover defenses stems from risk-reduction, contrasting with earlier studies that emphasized risk-increasing behavior (Chemmanur et al., 2011, Chemmanur & Jiao 2012; Humphery-Jenner, 2014; Johnson et al., 2015; Chemmanur & Tian, 2018; Drobetz & Momtaz, 2020; Carline & Gogineni, 2021).

[Insert Table 6 Here]

7. Potential Economic Issues:

The key identifying assumption underlying the Difference-in-Differences (DiD) estimation technique is the parallel trends assumption. This means that, in the absence of treatment, both treated and control firms should exhibit similar trends in the outcome variable over time. Put differently, if the 2011 UK Takeover Code Reform had not occurred, the DiD coefficient (Inter) should be statistically indistinguishable from zero. Although the parallel trends assumption cannot be directly tested, this paper applies a range of diagnostic tests recommended by Roberts and Whited (2013) to evaluate whether this assumption is likely to hold in this context.

7.1. Parallel Trend:

Multiple assessments were conducted to examine whether treated and control firms exhibited parallel trends in key outcome variables prior to the implementation of the takeover reform.

Initially, the annual growth rates of the variables under analysis were calculated by comparing changes from the previous year to the current year. Table 7 presents comparable mean growth rates in the main outcome variables, and key firm characteristics between the treated and control groups. The only exceptions are significant pre-reform differences in the growth rates of tangibility, firm size, and age. In general, the results are consistent with the parallel trends assumption, which is reassuring as it reduces the likelihood that unobserved differences between the groups are driving the findings.

[Insert Table 7 Here]

Following the approach outlined in Bertrand and Mullainathan (2003), a dynamic specification of Model (1) was implemented by replacing the DiD term with nine interaction terms between the Treated indicator and individual years surrounding the reform. The variables “pre2” through “pre5” equal one for the years 2010, 2009, 2008, and 2007, respectively, while “post1” through “post5” equal one for the years 2012, 2013, 2014, 2015 and 2016. The year 2006 serves as the reference category. In the absence of preexisting trends, the coefficients on the pre-reform interaction terms with Treated are expected to be close to zero and statistically insignificant. Additionally, both firm-specific characteristics, as well as industry and year fixed effects are included. Standard errors are corrected for heteroscedasticity and clustered at the firm level.

Table 8 presents the results from re-estimating the main regressions using the dynamic specification. The coefficient estimates for the interaction terms between Treated and the pre-reform years (pre4#Treated, pre3#Treated, pre2#Treated, and pre1#Treated) are statistically insignificant across all models, suggesting the absence of differential trends between treated and

control firms prior to the reform. In contrast, the post-reform interaction terms (post1#Treated, post2#Treated, post3#Treated, post4#Treated, and post5#Treated) are negative and statistically significant in the risk-taking regressions, and positive and significant in the firm value regressions. These patterns are consistent with the core results, further supporting the parallel trends assumption and the robustness of the primary findings.

[Insert Table 8 Here]

Tables 7 and 8 report results from several tests that assess the validity of the parallel trends assumption underlying the difference-in-differences (DiD) analysis. These tests examine whether treated and control firms exhibited similar trends in firm risk and valuation prior to the 2011 UK Takeover Code Reform. One approach employs a dynamic specification in which the single post-reform DiD indicator is replaced with year-specific terms and grouped intervals surrounding the reform. This structure facilitates detection of any differential pre-trends and allows examination of the broader trajectory of treatment effects. However, it does not provide precise insight into the timing or persistence of the reform's impact. To deal with this concern, a dynamic multivariate regression is estimated following the methodology of Bertrand and Mullainathan (2003), incorporating year-specific interaction terms for the five years preceding and following the reform year. The resulting coefficients are plotted in Figure 1, offering a visualization of pre-treatment dynamics and the temporal pattern of the reform's effect on firm risk and valuation.

The resulting estimates of difference-in-differences (DiD) coefficients for the pre-reform period (2006–2010) are all statistically insignificant across panels, suggesting that, in the absence of the reform, treated and control firms would have probably continued to experience similar trends in total risk (Panel A), systematic risk (Panel B), idiosyncratic risk (Panel C), and firm value (Panel D). These findings support the validity of the parallel trends assumption that underlies the DiD identification strategy. In contrast, the DiD coefficients for the removed reform periods (2012–2016) are overwhelmingly negative in risk models and positive significant in value model, indicating that the reform was followed by a fall of firm risk and a rise in firm value for treated firms compared to control group. This shift seems to be permanent which can last up to five years after adoption of the 2011 UK Takeover Code Reform.

[Insert Figure 1 Here]

7.2. Placebo Tests:

To further assess whether the results are specifically attributable to the 2011 U.K. Takeover Code Reform, placebo (falsification) tests are conducted by falsely assuming alternative treatment years.

These tests aim to rule out the possibility of spurious correlations between the treated group and outcomes such as firm's level risk and value.

Specifically, these placebo specifications are estimated using randomly assigned treated and control firms rather than the actual classification. If the observed reductions in risk-taking and the increase in firm value reported in Tables 5 and 6 were not unique to the actual treated firms, similar significant Difference-in-Differences (DiD) coefficients would be expected in regressions using falsely assigned treatment groups (Pseudo Inter). Following the established methodology, the model includes firm-specific characteristics, as well as industry, year, country, and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm level. The results, presented in Table 9, show that the DiD estimated (Pseudo Inter) are not statistically significant for all of their specifications, suggesting no heterogeneous effect of the reform on pseudo-treated firms. These findings reinforce the validity of the main results and confirm that the effects are specific to the actual treated firms affected by the 2011 U.K. Takeover Code Reform.

The findings of the parallel trends and placebo tests validate two key components of the empirical strategy. First, they confirm that the treated and control firms exhibited comparable levels of risk and firm value performance prior to the implementation of the 2011 UK Takeover Code Reform, lending support to the empirical credibility of parallel trends assumption. Second, the findings support the strength of the regulatory shock and further substantiate the robustness of the identification strategy employed.

[Insert Table 9 Here]

7.3. Propensity Score Matching:

Notwithstanding the positive evidence from parallel trends and falsification analyses, it is possible that treated and control firms differ along dimensions that are in fact unrelated to the effect of pretreatment takeover defenses. To mitigate this concern, a propensity score matching (PSM) approach is employed to construct a sample that closely aligns treated and control firms based on relevant observable characteristics. Which can reduce systematic differences between groups, thereby minimizing the likelihood of non-parallel trends in the outcome variables prior to the reform.

To compute the propensity scores, a logit model is estimated using the pre-reform sample. The dependent variable is a binary indicator equal to one if a firm belongs to the treatment group and zero otherwise. The independent variables include all control variables from Model (1), capturing relevant firm-specific characteristics prior to the reform. Each firm's propensity score is derived from the predicted probability obtained from this logit model. Using these scores, each treated

firm is matched (without replacement) to one control firm from the same industry that has the closest propensity score, subject to a caliper of 5% of the standard deviation of the propensity score, as recommended by Rosenbaum and Rubin (1985). This matching is performed using data from the period prior to the implementation of the UK Takeover Code Reform. Subsequently, the previous models are re-estimated using the propensity score-matched control sample. Consistent with prior literature, the regressions control for firm-specific characteristics, as well as industry, year, country, and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm level. The estimates, shown in Table 10, align with the main Difference-in-Differences (DiD) construction results and lend support to the robustness of the primary analysis's conclusions.

[Insert Table 10 Here]

8. Underlying Mechanisms:

8.1. UK Takeover Code Reform 2011 and Firm Cost of Capital:

This section investigates the mechanism through which affected firms enhance their value by reducing their risk levels. Specifically, the analysis focuses on one potential channel linking firm risk and value: the cost of capital.

A company's cost of capital represents the investors' required return and is largely determined by the firm's systematic risk, along with other risks that may arise from weak corporate governance practices. The cost of capital can influence firms' investment decisions in two primary ways. First, an increase in the cost of capital may convert a project with a positive net present value into one with a negative net present value, thereby discouraging investment regardless of the firm's financial constraints. Second, higher external financing costs can reduce investment by making it more difficult for firms to raise capital to fund profitable projects. Although theory clearly predicts a negative relationship between the cost of capital and investment, empirical validation of this effect has been challenging, largely due to the difficulty in directly observing the cost of capital.

The market for corporate control serves as a key mechanism to protect outside investors from potential mismanagement by internal management, thereby reducing agency conflicts (La Porta et al., 2000). Poor governance structures, insufficient monitoring, information asymmetry, and agency problems can lead to self-serving behavior by management. When management pursues strategies that do not maximize firm value, the firm's exposure to market risk increases, elevating systematic risk and ultimately raising the cost of capital (Kien et al., 2004). According to the managerial entrenchment hypothesis, takeover defenses, which often increase agency costs, can worsen corporate transparency and disclosure, thereby raising issuance and transaction costs.

These factors further increase the firm's cost of capital. Supporting this view, prior studies find that takeover defenses are associated with higher costs of equity (Ferreira and Laux, 2007; Chen et al., 2011a) and debt (Qiu and Yu, 2009). Conversely, under the shareholder interest hypothesis, takeover defenses may mitigate managerial short-termism caused by takeover threats, thereby reducing agency costs and lowering the cost of capital. Empirical evidence consistent with this hypothesis shows that takeover defenses can lead to reduced costs of equity (Cremer and Nair, 2005; Cremers et al., 2009) and debt financing (Klock et al., 2005; Cremer et al., 2007; Chava et al., 2009; Francis et al., 2010; Chen, 2012).

Building on prior evidence regarding the cost of capital, it is argued that a lower cost of capital serves as the key mechanism through which affected firms enhance their value by strategically reducing their risk levels. To explore the cost of capital channel, whereby takeover defense affects corporate risk and value, this section first investigates how the cost of raising external capital varies with takeover defenses. To this end, estimating the cost of equity, cost of debt and WACC for each firm in each year. The cost of capital is defined as the weighted average cost of capital (WACC). Specifically, in Model (3), let E denote the value of equity; D the value of debt; $V=D+E$, the total value of the firm, r_E the equity cost of capital; r_D the debt cost of capital; τ_c the corporate tax rate; and r_{wacc} the weighted average cost of capital.

$$r_{wacc} = \frac{E}{V}r_E + \frac{D}{V}r_D(1 - \tau_c) \quad (3)$$

The computation of r_{wacc} requires measuring r_E , r_D , E , D , V and τ_c . For each component, several plausible proxies exist. Following Frank and Shen (2016), r_E is estimated as the cost of equity derived from the Fama and French three-factor model (1993). Specifically, the following regression (Model 4) is estimated using firm i 's weekly returns within a given year to obtain estimates of the beta coefficients (b_i ; s_i ; h_i):

$$r_{i,t} - r_{f,t} = \alpha_i + b_i (r_{m,t} - r_{f,t}) + s_i r_{SMB,t} + h_i r_{HML,t} + e_i \quad (4)$$

Where, $r_{i,t}$ is the return for firm i in week t , $r_{f,t}$ is the risk-free rate return in week t ; $r_{m,t}$ is the Fama and French market return in week t , $r_{SMB,t}$ the difference in returns between small and large-stock portfolios in week t , and $r_{HML,t}$ the different in returns between high and low book-to-market portfolios in week t .

Next, following methods suggested in Fama and French (1997) and D'Mello and Shroff (2000), the annual risk premium for each firm-year which referred to as the cost of equity (r_E) is then estimated as follows (Model 5)

$$r_{E,t} = E(r_{i,t}) - r_f = b_i (E(r_{m,t}) - r_{f,t}) + s_i E(r_{SMB,t}) + h_i E(r_{HML,t}) \quad (5)$$

Where r_E is the cost of equity of firm i in year t , $\beta_{i,t}$ is the estimated market beta. The expectations of $r_m - r_f$; $r_{SMB,t}$ and $r_{HML,t}$ are the arithmetic average weekly Fama-French market returns over the period 1990 until year-end date. When then annualize the cost of equity estimates by multiplying by 52 weeks.

Following Frank and Shen (2016), r_D represents the cost of debt, calculated as the ratio of interest and related expense to the sum of firm's long-term debt and debt in current liabilities. The variable D denotes the firm's leverage, defined as the total debt dividend by total assets. The corporate tax rate τ_c is the firm's corporate tax rate is measured as income tax expenses divided by net income. Observations where τ_c exceeds one or is below zero are set to missing.

Table 11 presents the Difference-in-Differences (DiD) analysis results on the impact of the 2011 U.K. Takeover Code Reform on firms' cost of capital. Consistent with prior research, all regression models include controls for industry, year, country, and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm level to ensure robustness and reliability. The coefficient estimates of the DiD term (Inter) are negative and significant in the cost of equity models (Columns 1 and 2) and the weighted average cost of capital (WACC) models (Columns 5 and 6), while remaining statistically insignificant in the cost of debt models (Columns 3 and 4). Overall, these findings suggest that the risk reduction and value enhancement associated with the 2011 reform are primarily driven by a decrease in firms' WACC, resulting from a lower required return for equity holders rather than debt holders.

[Insert Table 11 Here]

8.2. UK Takeover Code Reform 2011 and Finance Issuance:

As a further investigation, the effect of takeover defenses on firms' financing decisions is examined. Given that the 2011 U.K. Takeover Code Reform lowers the cost of external capital by reducing the cost of equity rather than the cost of debt, the cost of capital channel predicts firms would be more inclined to issue equity rather than debt. This hypothesis is tested by analyzing whether the probability and amount of equity or debt issuance increase following the reform. Consistent with the security issuance literature, a firm is classified as issuing equity (debt) if the amount issued as a percentage of total assets at the beginning of the fiscal year exceeds 5%. Equity issuance is measured as the change in stockholders' equity minus the change in retained earnings, scaled by beginning-of-year total assets, while debt issuance is defined as the change in long-term debt scaled by beginning-of-year total assets.

Table 12 presents the Difference-in-Differences (DiD) results on the reform's impact on securities issuance. Consistent with prior research, all regression models include controls for industry, year, country, and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm level to ensure robustness and reliability. The findings show that both the amount (Columns 1 and 2 of Table 12) and the likelihood (Columns 3 and 4 of Table 12) of equity issuance increase following the reform, whereas no significant effect is observed for debt issuance (the rest Columns of Table 12). These results further reinforce that the risk reduction and value enhancement triggered by the 2011 reform operate through a decline in firms weighted average cost of capital (WACC), primarily driven by a lower required return on equity. Consequently, firms adjust their financing behavior by favoring equity issuance, consistent with the cost of capital channel.

[Insert Table 12 Here]

9. Cross-Sectional Heterogeneity:

To further support the cost of capital channel, cross-sectional variations in the impact of the UK Takeover Code Reform on firm risk and value are examined based on the degree of financial constraints faced by firms. If the reform influences firm risk and value through financing costs, firms experiencing greater financial constraints are expected to be more affected. Limited access to financing may hinder firms' ability to reduce risk and enhance value. The Hadlock and Pierce (2010) size and age index, a widely used proxy for financial constraints, is employed to measure the extent of financial constraint for each firm. Using two-digit SIC codes, firms above the median index value are classified as highly financially constrained, while those below the median are classified as less financially constrained. Additionally, if the Takeover Code Reform impacts firm risk and value through financing costs, this effect is expected to be more pronounced for firms experiencing higher levels of financial distress. The Altman Z-score is used as a measure of financial distress. Based on two-digit SIC codes, firms with Z-scores below the median are classified as externally finance-dependent (higher distress), while those above the median are considered internally finance-dependent (lower distress).

Table 13 presents the differential effects of the 2011 UK Takeover Code Reform on firms' risk and value across groups with high and low financial constraints (Panel A) and financial distress (Panel B), based on the Hadlock-Pierce (HP) index and Altman Z-score, respectively. Consistent with prior research, all regression models include controls for industry, year, country, and firm fixed effects. Standard errors are adjusted for heteroscedasticity and clustered at the firm level to ensure robustness and reliability. For conciseness, only the coefficients on the DiD terms and the p-values from the Wald chi-squared tests comparing the DiD estimates between the groups are

reported. Although all treated firms experienced risk reductions following the reform, firms facing higher financial constraints and greater financial distress exhibited more pronounced decreases in risk, accompanied by larger increases in firm value. Specifically, post-reform total risk declined by 6% for firms with higher financial constraints and by 7.7% for firms with higher financial distress, compared to 1.5% and 0.4% reductions for firms in the lower financial constraint and distress groups, respectively. All differences between groups are statistically significant at the 5% level or better according to the chi-squared tests. Notably, across all partitions, Tobin's Q increased more substantially for firms in the high financial constraint and distress groups than for those in the low groups.

[Insert Table 13 Here]

10. Robustness Tests:

10.1. Alternative Proxies for Risk and Value:

Since the measurement of firm risk and value is central to this study, the robustness of results is examined using alternative proxies for these variables. Traditional approaches quantify firm risk as the volatility of stock returns, further decomposed into systematic and idiosyncratic components through models such as the Capital Asset Pricing Model (CAPM) or other affine asset-pricing models (Fama and French, 1993). However, this method presents challenges when assessing the impact of firm's risk. Future realized volatility not only captures firm's risk but also reflects factors like firm disclosures, informed trading in the firm's shares, and other characteristics of the firm's information environment. Consequently, relying on risk measures based on future realized returns may introduce spurious correlations between firms' risk and other elements (Ross, 1989; Bushee and Noe, 2000; Armstrong and Vashishtha, 2012).

To mitigate these issues, an approach similar to Aretz et al. (2019) is adopted by constructing an imputed proxy for firm's risk. This proxy is derived from the standard deviation of portfolio stock returns based on the industries in which a firm operates. Because industry-level volatility is less influenced by firm-specific information and disclosure practices, this imputed proxy offers a more accurate reflection of corporate decisions to adjust firm risk through changes in the operating portfolio.

A firm is viewed as a portfolio of operating segments, which can be added, removed, or reweighted, thereby changing the portfolio's overall structure and risk profile. To approximate returns for a firm's operating segments, firms operating within the same single industry are aggregated into pure-play industry portfolios. These portfolios are constructed by calculating value-weighted weekly returns of single-segment firms within each industry, defined at the two-

digit Standard Industrial Classification (SIC) code level, with a minimum requirement of three such firms per industry portfolio. For each firm i in week t , the imputed weekly return, $r_{i,t}$, is computed as a weighted average of the returns of its corresponding industry portfolios. The weights reflect the proportion of each operating segment's asset book value relative to the total asset value of the firm, thereby capturing the firm's exposure to different industry risks (Model 6).

$$r_{i,t} = \sum_{S=1}^S \frac{A_i^S}{A_i} r_t^S \quad (6)$$

Where r_t^S is the imputed weekly return of pure-play industry portfolio “S” in week t . A_i^S is the asset book value of segment “S” of firm i , and A_i is the asset book value of firm i at fiscal year-end. So, the imputed total risk (Imputed_total_risk), is the annualized volatility of weekly imputed returns $r_{i,t}$. Furthermore, systematic and idiosyncratic risk are computed by regressing each firm's weekly returns at year-end on the Fama and French (1993) three-factor model.

Finally, following the methodology proposed by Aretz et al. (2019), Imputed Q is constructed as the value-weighted average of firms' Q across all operating segments. Each segment's Q is calculated as the value-weighted average of the Tobin's Q of all pure-play firms within that segment's industry, using the same approach applied in constructing the imputed risk measures. This method captures a firm's overall valuation based on the performance of its constituent industry segments.

Table 14 presents the analysis results. Columns 1 and 2 use the firm's total imputed risk, measured by the volatility of value-weighted weekly imputed stock returns at year-end, as the dependent variable. Columns 3 to 6 replace imputed total risk with imputed systematic risk and imputed idiosyncratic risk, representing the explained and unexplained variances from the Fama-French (1993) three-factor model, respectively. Columns 7 and 8 substitute the risk measures with imputed Q to assess the value implications of firms' risk-taking following the Takeover Code Reform. Consistent with prior analyses, all models include controls for industry, year, country, and firm fixed effects, with standard errors adjusted for heteroscedasticity and clustered at the firm level. The coefficients on the DiD terms align closely with findings from the main analyses, reinforcing the robustness of the results.

[Insert Table 14 Here]

10.2. Alternative Classification for Control Groups:

In order to check the results do not hinge on the particular choice of control group, a series of sensitivity analyses are conducted using alternative control samples. First, the study is confined

to EU-15, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom, which comprised the European Union before the 2004 enlargement and the announcement of the European Takeover Directive (ETD), following Dissanaïke et al. (2021). First, the study is confined to EU-15. As OECD member states, these countries have similar institutional, economic and policy features compared to the UK where they stand as a useful reference point in relation to their economic structure, geographical closeness and governance quality.

The main regression models are re-estimated with the alternative control groups. Further, all firm-specific characteristics, industry, year, country and firm fixed effects are controlled for. Standard errors are heteroscedasticity-robust and clustered at the firm level. Table 15 shows that the conclusions are broadly as before, supporting the robustness of the findings to alternative specifications for the definition of the control group.

[Insert Table 15 Here]

11. Conclusion:

This study leverages the 2011 UK Takeover Code Reform as a natural experiment to identify the causal effects of takeover defenses on firm risk and value. By boosting the bargaining power of target firms and increasing the cost and complexity of takeovers, the reform discounted the takeover threat for UK firms compared to their EU counterparts. Based on a sample of 30,060 firm-year observations over the period from 2006 to 2016, the analysis provides strong and robust evidence that this reduction in takeover threat significantly led to a decrease in firm risk and an increase in firm value.

To identify the mechanism of this relationship, the cost of capital is examined as a potential channel. A company's cost of capital, which reflects the returns required by investors, is primarily determined by its systematic risk but can also be affected by weak corporate governance. The market for corporate control serves as an important mechanism to discipline management, thereby reducing agency conflicts caused by poor managerial behavior. When governance is weak, managers may prioritize their own interests over those of shareholders, increasing the firm's risk and raising its cost of capital. According to the managerial entrenchment hypothesis, takeover defenses increase agency costs because they decrease transparency and raise the cost of issuing both equity and debt, thus resulting in a higher cost of capital. However, empirical results following the 2011 UK Takeover Code Reform reveal a significant decline in both the cost of equity and the weighted average cost of capital (WACC), but no change on cost debt which remains insignificant. Further, the treated companies to a greater extent prefer equity instead of

debt issues. These findings imply that the reform's positive impact on firm value and risk is primarily driven by a reduction in the required returns of equity investors rather than changes in debt financing costs.

To further validate the cost-of-capital channel, several cross-sectional variations in the impact of the Takeover Code Reform on firm risk and value are examined. Results also suggest that cost of capital decrease and firm value increase are more significant for high financial constrained firms and high financial distress risk firms. These results provide further evidence that the reduction in takeover threat significantly decreases firm risk and increases firm value mainly through its impact on the cost of capital, which is attributable mainly to decline in cost of equity rather than debt.

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Table 1 Sample Selection and Distribution:**Panel A: Sample selection:**

Data Screen	No.
Firms with headquarter located in the EU from 2006-2016.	96,204
With non-negative book value of equity, assets, and sales throughout the sample period.	92,081
Exclude firms with a primary two-digit standard industrial classification (SIC) code for finance and utility industry.	57,501
Available information from Datastream and Worldscope to construct the main analysis variables.	35,612
Exclude the period from February 2010 to June 2011 when the reform was implemented.	30,060

Panel B: Sample Distribution Across Announced Year:

Year	No.	Percentage
2006	2,715	9.03
2007	3,024	10.06
2008	3,115	10.36
2009	3,285	10.93
2010	3,282	10.92
Pre-reform	15,421	51.30
2012	3,155	10.50
2013	3,020	10.05
2014	2,911	9.68
2015	2,841	9.45
2016	2,712	9.02
Post-reform	14,639	48.70

Panel C: Sample Distribution Across Countries:

Country	No.	Percentage
Austria	472	1.57
Belgium	700	2.33
Cyprus	291	0.97
Czech Republic	64	0.21
Denmark	819	2.72
Estonia	56	0.19
Finland	1030	3.43
France	3831	12.74

Table 1 Continued

Germany	3830	12.74
Greece	1697	5.65
Hungary	152	0.51
Ireland	486	1.62
Italy	1440	4.79
Latvia	111	0.37
Lithuania	137	0.46
Luxembourg	179	0.60
Malta	46	0.15
Netherlands	991	3.30
Poland	2258	7.51
Portugal	324	1.08
Slovakia	46	0.15
Slovenia	157	0.52
Spain	823	2.74
Sweden	2169	7.22
United Kingdom	7951	24.05

This table provides the summary statistics of the main samples. The Panel A describes the formation of the main sample. Which consists of 33,060 firm-year observations, representing 4,488 unique firms from 2006 to 2016. The Panel B presents the yearly distribution of the sample. The Panel C provide the country distribution across the main samples.

Table 2: Summary Statistics

Variable	Obs	Mean	Std.	Min	P25	P50	P75	Max
Bid Occurrence	30745	.044	.205	0	0	0	0	1
Bid Number	30745	.052	.265	0	0	0	0	6
Total Risk	30060	1.672	.451	.829	1.361	1.582	2.257	3.54
System Risk	30060	.117	.083	.012	.061	.096	.220	.507
Idiosyncratic Risk	30060	.393	.239	.094	.239	.326	.674	1.702
Q	30060	1.525	1.139	.415	.958	1.211	2.476	9.697
AER	30060	-.002	.019	-.074	-.010	-.001	.019	.056
ROCE	30060	.038	.128	-.791	.006	.052	.152	.321
Liquidity	30060	.135	.147	0	.038	.086	.317	.851
Leverage	30060	.207	.165	0	.062	.191	.436	.675
SGA	30060	.124	.5	-.85	-.040	.052	.368	4.161
Tangibility	30060	.251	.221	0	.064	.194	.579	.899
MTB	30060	2.013	1.147	1.029	1.371	1.675	3.085	9.055
Size	30060	19.555	2.348	14.133	17.858	19.282	22.920	25.304
Age	30060	3.004	.999	.693	2.303	2.944	4.477	5.481
HHI	30060	.124	.13	.025	.040	.074	.299	.651
CAPEX	30060	.049	.059	0	.013	.031	.109	.391
RD	30060	.019	.052	0	0	0	.060	.356
M&A	30060	.019	.063	0	0	0	.046	.44

This table provides summary statistics (number of observations, mean, standard deviation, min, P25, P50, P75 and max) of variables used in this study. See Appendix A for variable definitions.

Table 3: Univariate Difference-in-Difference Tests: Treated and Control Firms

Variables	Pre- Reform			Post-Reform			Diff-in-Diff (7)
	Treated (1)	Control (2)	Diff (3)	Treated (4)	Control (5)	Diff (6)	
Bid Occurrence	.058	.048	.010***	.032	.038	-.006	-.016***
Bid Number	.070	.057	.013***	.038	.046	-.008	-.020***
Total Risk	1.802	1.720	.082***	1.604	1.593	.011	-.072***
Systematic Risk	.129	.124	.005***	.107	.109	-.002	-.007***
Idiosyncratic Risk	.460	.412	.048***	.362	.358	.004	-.044***
Tobin's Q	1.642	1.463	.179***	1.817	1.446	.372***	.193***

This table presents the univariate results for the difference-in-difference analysis. Mean value for each variable in the pre- and post-reform of the treated and control group are reported. The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Variable definitions can be found in Appendix A. The difference in means is tested by t-test, *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 4: Likelihood of Bid Occurrence

	Bid Occurrence (1/0)				Bid Number			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inter	-.015*** (.005)	-.015*** (.005)	-.014*** (.005)	-.015*** (.005)	-.019*** (.007)	-.02*** (.007)	-.018*** (.007)	-.019*** (.007)
Treat	.007 (.004)	.011** (.004)			.007 (.006)	.012** (.006)		
AER		-.082 (.071)		-.066 (.071)		-.113 (.085)		-.095 (.085)
ROCE		0 (.01)		-.002 (.01)		.006 (.011)		.005 (.011)
Liquidity		-.003 (.01)		-.005 (.01)		-.009 (.014)		-.011 (.014)
Leverage		.017* (.01)		.022** (.01)		.024* (.013)		.028** (.013)
SGA		-.005** (.002)		-.006*** (.002)		-.007*** (.003)		-.008*** (.003)
Tangibility		-.002 (.008)		-.008 (.008)		-.006 (.01)		-.011 (.01)
MTB		-.003*** (.001)		-.003** (.001)		-.003* (.002)		-.002 (.002)
Size		.002** (.001)		.002** (.001)		.001* (.001)		.002* (.001)
Age		-.003** (.001)		-.002 (.001)		-.002 (.002)		-.001 (.002)
HHI		.095*** (.036)		.095*** (.036)		.131*** (.046)		.132*** (.046)
_cons	.044*** (.002)	.013 (.014)	.045*** (.001)	.009 (.015)	.053*** (.002)	.018 (.018)	.055*** (.002)	.014 (.018)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	NO	NO	YES	YES	NO	NO	YES	YES
Adj. R ²	.005	.006	.008	.009	.005	.006	.007	.008
Obs	30745	30745	30745	30745	30745	30745	30745	30745

This table investigates the impact of UK Takeover code reform in 2011 on firm's likelihood of being selected as target. The dependent variables are either an indicator variable for whether there is takeover occurrence for the firms during the year of observation or the number of bids for the firms during the year of observation. The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. All models include industry and year fixed effect. Furthermore, country fixed effect is included in models (3-4) and (5-6). See Appendix A. for variables definitions. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 5: Firms Risk

[illegible]

Table 5 Continued:

Country FE	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
Firm FE	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
Adj. R ²	.153	.316	.559	.576	.113	.165	.341	.352	.123	.300	.531	.549
Observations	30060	30060	30060	30060	30060	30060	30060	30060	30060	30060	30060	30060

This table presents the difference-in-difference results for the impact of UK Takeover code reform in 2011 on firm's level risk. The dependent variable in the columns 1-4 is the firm's total risk, which is measure by the volatility of firms' weekly stock returns at the end of each year. Next, the firm's total risk is replaced with the systematic risk (columns 5-8) and idiosyncratic risk (columns 9-12), they are measured by the explained variance and unexplained variance of Fama and French 3 factor model. The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Industry and year fixed effects are controlled in all columns. While firm and country fixed effects are controlled in columns 3-4, 7-8 and 11-12. Variable definitions can be found in Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively

Table 6: Firm Value				
	(1)	(2)	(3)	(4)
Inter	.217*** (.045)	.073*** (.017)	.141*** (.036)	.089*** (.02)
Treat	.127*** (.038)	-.015 (.013)		
AER		4.918*** (.268)		3.471*** (.243)
ROCE		.135* (.077)		.352*** (.105)
Liquidity		.179*** (.053)		.453*** (.087)
Leverage		.535*** (.029)		.179*** (.054)
SGA		.027* (.014)		.03* (.016)
Tangibility		-.109*** (.023)		-.153*** (.059)
MTB		.865*** (.014)		.53*** (.02)
Size		.022*** (.002)		.022 (.018)
Age		.02*** (.004)		.025 (.017)
HHI		.067 (.082)		.132* (.076)
CAPEX		-.031 (.085)		.24** (.105)
RD		.492*** (.174)		.709* (.369)
M&A		.035 (.064)		.078 (.062)
_cons	1.466*** (.016)	-.825*** (.052)	1.508*** (.004)	-.169 (.357)
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	NO	NO	YES	YES
Firm FE	NO	NO	YES	YES
Adj. R ²	.089	.757	.738	.816
Observations	30060	30060	30060	30060

This table presents the difference-in-difference results for the impact of UK Takeover code reform in 2011 on firm's value. The firm value (Tobin's Q). The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Industry and year fixed effects are controlled in all columns. While firm and country fixed effects are controlled in columns 3 and 4. Variable definitions can be found in Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

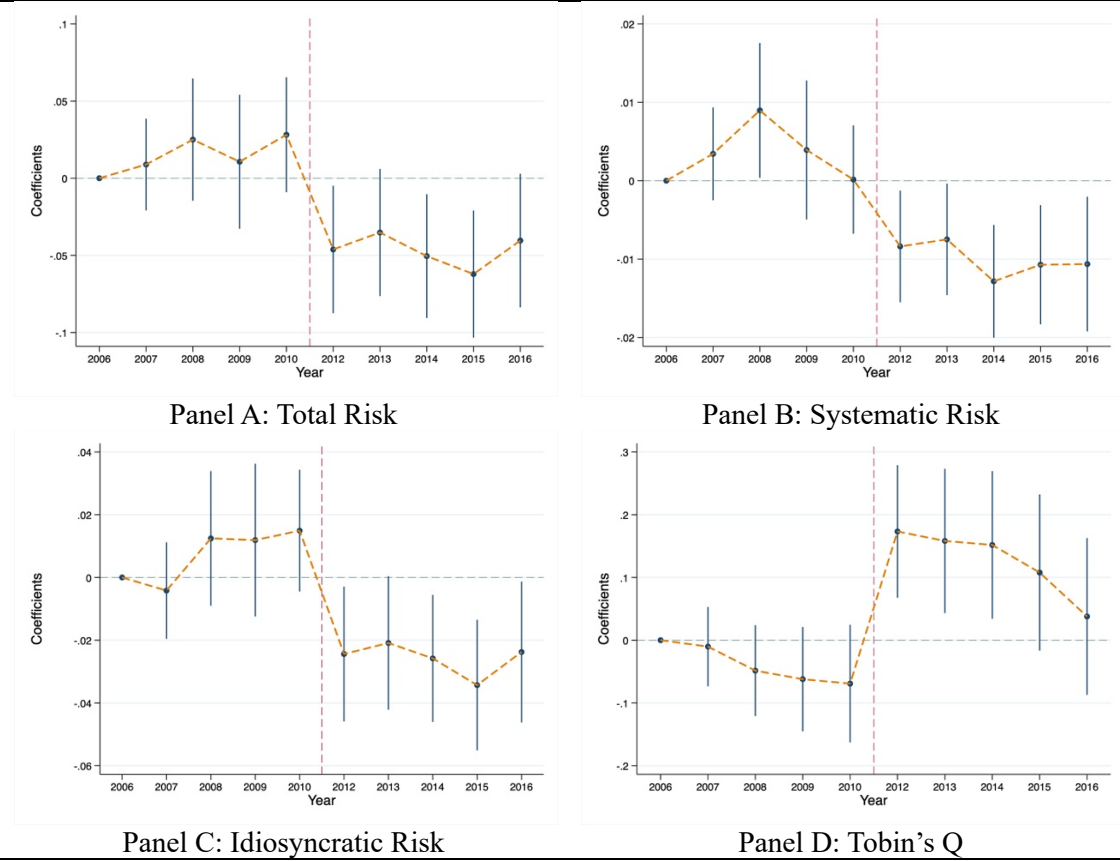
Table 7: Parallel Trend: Pre-Reform Growth Rates in Analysis Variables				
	Treat	Control	Diff	
	(1)	(2)	Treat-Control (3)	P-Value (4)
Δ Total Risk	.006	.038	-.032	.119
Δ Systematic Risk	.008	.010	-.002	.332
Δ Idiosyncratic Risk	.012	.018	-.006	.716
Δ Q	-.069	-.021	-.048	.663
Δ AER	.005	.006	-.001	.497
Δ ROCE	-.013	.000	-.013	.143
Δ MTB	-.116	.018	-.134	.185
Δ Liquidity	-.004	-.005	.002	.406
Δ Leverage	.007	.005	.002	.286
Δ SGA	-.081	-.508	.427	.671
Δ Tangibility	-.001	-.004	.003*	.001
Δ Size	.071	.098	-.030***	.000
Δ Age	.070	.089	-.015***	.000
Δ HHI	.001	-.000	.001	.139
Δ CAPEX	-.010	-.011	.001	.914
Δ R&D	-.000	-.001	.001	.799
Δ M&A	-.001	-.012	.011	.188

This table presents the average of annual changes in the main variables in the pre-reform period for the treated and control groups, as well as the differences in these average annual changes between the two groups. The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Variable definitions can be found in Appendix A. The difference in means is tested by t-test, *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 8: Parallel Trend: Dynamic Effects UK Takeover Code Reform 2011				
	(1) Total Risk	(2) System Risk	(3) Ido Risk	(4) Q
Pre4#treat	.009 (.015)	.003 (.003)	-.004 (.008)	-.01 (.032)
Pre3#treat	.025 (.02)	.009** (.004)	.012 (.011)	-.049 (.037)
Pre2#treat	.011 (.022)	.004 (.005)	.012 (.012)	-.062 (.042)
Pre1#treat	.028 (.019)	0 (.004)	.015 (.01)	-.069 (.048)
Post1#treat	-.046** (.021)	-.008** (.004)	-.024** (.011)	.173*** (.054)
Post2#treat	-.035* (.021)	-.007** (.004)	-.021* (.011)	.158*** (.059)
Post3#treat	-.05** (.02)	-.013*** (.004)	-.026** (.01)	.152** (.06)
Post4#treat	-.062*** (.021)	-.011*** (.004)	-.034*** (.011)	.108* (.063)
Post5#treat	-.04* (.022)	-.011** (.004)	-.024** (.011)	.038 (.064)
Treat	.009 (.016)	-.002 (.003)	.007 (.008)	.229*** (.047)
_cons	1.664*** (.005)	.117*** (.001)	.387*** (.003)	1.399*** (.015)
Firm level Control	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Adj. R ²	.318	.167	.302	.7576
Obs	30060	30060	30060	30060

This table presents the results from various tests of the parallel trends assumption. presents the ordinary least squares regression results on the dynamic effects of the adoption of the takeover code reform. pre4#treat; pre3#treat; pre2#treat and pre1#treat is the interaction term between a dummy variable that equals 1 for the year before the takeover code reform and the Treat dummy. post1#treat; post2#treat; post3#treat; post4#treat and post5#treat is the interaction term between a dummy variable that equals 1 for the years that after the takeover code reform and the Treat dummy. Treated is a dummy variable equal to one for the firm located in the UK and zero for the firms located in the rest EU countries. Where firms total risk the firm's volatility of firms' week stock returns at the end of each year. Systematic risk and idiosyncratic risk are the square root of the explained and unexplained variance in the regression of a firm's weekly returns at the end of each year on the Fama and French (1993) three factor model. Q is the total assets minus book value of equity plus the market value of equity minus deferred taxes scaled by book value of total assets. Each models include industry and year fixed effects and the same set of control variables as in Table 5 and 6. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Figure 1. Precise Timing for the Effect of UK Takeover Code Reform 2011



This figure presents difference-in-difference multivariate regression results for precise timing of the effect of UK takeover code reform on firm's risk and value by plotting coefficients for DiD inter tracking five individual years before the reform and four years after the reform, replacing primary focuses on the coefficient for a single DiD term ($Treat \times Post$) elsewhere in the paper. The sample covers 2006-2016 but excluding 2011 when the UK takeover code reform was announced. Post is replaced with firm-year dummies before (2006-2010) and after (2012-2016) the UK takeover code announcement. Treated is a dummy variable equal to one for the firm located in the UK and zero for the firms located in the rest EU countries. Where firms total risk the firm's volatility of firms' week stock returns at the end of each year. Systematic risk and idiosyncratic risk are the square root of the explained and unexplained variance in the regression of a firm's weekly returns at the end of each year on the Fama and French (1993) three factor model. Q is the total assets minus book value of equity plus the market value of equity minus deferred taxes scaled by book value of total assets. Each models include industry and year fixed effects and the same set of control variables as in Table 5 and 6. Variables definitions can be found in the Appendix A. Vertical bars through the coefficients represent 95% confidence intervals corrected for heteroscedasticity and clustering at the firm level.

Table 9: Placebo Tests				
	(1) Total Risk	(2) System Risk	(3) Ido Risk	(4) Q
Pseudo Inter	.001 (.012)	.003 (.002)	.002 (.006)	-.009 (.017)
AER	-.793*** (.138)	-.18*** (.033)	-.465*** (.084)	3.453*** (.244)
ROCE	-.324*** (.036)	-.044*** (.008)	-.19*** (.022)	.353*** (.104)
Liquidity	-.114*** (.034)	-.016** (.007)	-.058*** (.019)	.444*** (.088)
Leverage	.398*** (.034)	.068*** (.007)	.209*** (.02)	.167*** (.054)
SGA	-.009 (.005)	-.003** (.001)	-.004 (.003)	.028* (.016)
Tangibility	-.034 (.041)	-.008 (.008)	-.026 (.023)	-.15** (.059)
MTB	-.039*** (.005)	-.004*** (.001)	-.019*** (.003)	.532*** (.02)
Size	-.096*** (.009)	-.01*** (.002)	-.052*** (.005)	.028 (.018)
Age	-.016 (.01)	-.004 (.002)	-.008 (.005)	.027 (.017)
HHI	.132 (.084)	.023 (.016)	.069 (.043)	.134* (.077)
CAPEX				.248** (.105)
RD				.699* (.368)
M&A				.068 (.061)
_cons	3.602*** (.178)	.323*** (.035)	1.451*** (.101)	-.283 (.352)
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adj. R ²	.653	.461	.629	.834
Observation	30060	30060	30060	30060

This table presents the difference-in-difference results of the placebo tests for the impact of the UK takeover code reform on managerial risk-taking and firm value. I keep the sample period from 2006 to 2016 (excluding 2011) but randomly assigns firms into the treated and control groups. Pseudo Inter is an interaction term of the randomly treated firms and Post. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Each models include industry, year, country and firm fixed effects and the same set of control variables as in Table 5 and 6. Where the main dependent variables are firm's total risk, systematic risk, idiosyncratic risk and Tobin's Q. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 10: Propensity Score Matching

	(1) Total Risk	(2) System Risk	(3) Ido Risk	(4) Q
Inter	-.034*** (.012)	-.005** (.002)	-.022*** (.007)	.09*** (.021)
AER	-.902*** (.161)	-.211*** (.038)	-.521*** (.098)	3.303*** (.29)
ROCE	-.297*** (.042)	-.04*** (.009)	-.178*** (.026)	.303** (.122)
Liquidity	-.094** (.04)	-.008 (.008)	-.046** (.022)	.452*** (.1)
Leverage	.437*** (.04)	.073*** (.007)	.225*** (.023)	.174*** (.062)
SGA	-.009 (.006)	-.002 (.001)	-.005 (.004)	.022 (.019)
Tangibility	-.054 (.047)	-.011 (.009)	-.027 (.027)	-.117* (.07)
MTB	-.035*** (.005)	-.003*** (.001)	-.018*** (.003)	.541*** (.022)
Size	-.089*** (.01)	-.009*** (.002)	-.048*** (.006)	.014 (.021)
Age	.002 (.012)	-.001 (.003)	0 (.006)	.039* (.023)
HHI	.078 (.089)	.012 (.017)	.039 (.046)	.126 (.096)
CAPEX				.245* (.134)
RD				.924** (.399)
M&A				.108 (.071)
_cons	3.412*** (.207)	.283*** (.04)	1.334*** (.117)	-.106 (.41)
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adj. R ²	.567	.347	.533	.804
Observation	21349	21349	21349	21349

This table presents the difference-in-difference results for the impact of the UK takeover code reform on firm's risk level and value using the matched sample. The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Each treated firms are matched with a control firm based on the propensity score estimated using all additional control variables for the pre-reform period. The matched firms must operate in the same industry and have the closed propensity score (within 5% radius) in the year before the adoption of the takeover code reform. Each models include industry, year, country and firm fixed effects and the same set of control variables as in Table 5 and 6. Where the main dependent variables are firm's total risk, systematic risk, idiosyncratic risk and Tobin's Q. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 11: Channel Analysis for Cost of Capital						
	CoE		CoD		WACC	
	(1)	(2)	(3)	(4)	(5)	(6)
Inter	-.014*** (.004)	-.011** (.004)	-.01 (.013)	-.005 (.012)	-.021*** (.004)	-.016*** (.004)
AER		.018 (.082)		.044 (.111)		-.076 (.143)
ROCE		.039*** (.015)		.02 (.041)		.049*** (.019)
Liquidity		.01 (.013)		.067 (.042)		.049** (.023)
Leverage		.028 (.02)		-.047* (.026)		.046 (.029)
SGA		0 (.003)		.004 (.006)		-.001 (.003)
Tangibility		.002 (.023)		-.013 (.03)		.029 (.028)
MTB		0 (.002)		-.019*** (.006)		-.004* (.003)
Size		-.021*** (.005)		-.024*** (.008)		-.031*** (.008)
Age		.008** (.004)		-.004 (.011)		.008* (.005)
HHI		-.074 (.066)		.076 (.049)		.011 (.066)
CAPEX		-.01 (.021)		-.045 (.044)		-.007 (.026)
RD		-.035 (.036)		-.273* (.16)		-.027 (.046)
M&A		-.003 (.015)		-.061** (.026)		.006 (.017)
_cons	1.171*** (.001)	1.564*** (.106)	.105*** (.001)	.62*** (.16)	1.196*** (0)	1.757*** (.151)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Adj. R ²	.992	.992	.368	.370	.992	.992
Observations	30060	30060	23585	23585	18565	18565

This table presents the difference-in-difference ordinary least square results for the impact of the U.K. Takeover Code Reform in 2011 on cost of capital. The dependent variables are the ROE, which is the cost of equity from the Fama and French 3 factor model by using firm weekly stock returns in each calendar year; RoD is the cost of debt, which is the ratio of interest and related expense to the sum of firm's long-term debt and debt in current liabilities; and the weighted average cost of capital (WACC), which is estimated by using Equation (3). The treated group of firms are classified as the firm located in the UK, the firm's located in the rest of EU countries are classified as control group. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Each models include industry, year, country and firm fixed effects. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively

Table 12: Chanel Analysis for Source of Financing Issuance

	Equity Issuance Amount		Equity Issuance Dummy		Debt Issuance Amount		Debt Issuance Dummy	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inter	.015*** (.004)	.024*** (.004)	.022* (.012)	.045*** (.012)	.005 (.002)	.004 (.002)	.008 (.011)	.001 (.012)
AER		.134** (.065)		.081 (.148)		-.039 (.032)		-.223 (.14)
ROCE		.006 (.021)		.121*** (.04)		.019** (.008)		.089*** (.033)
Liquidity		-.064*** (.017)		-.155*** (.036)		-.028*** (.007)		-.173*** (.031)
Leverage		.125*** (.015)		.314*** (.034)		-.244*** (.009)		-.563*** (.036)
SGA		.006* (.003)		.011* (.006)		-.002 (.001)		-.012** (.005)
Tangibility		-.066*** (.018)		-.124*** (.044)		.022** (.01)		.092** (.047)
MTB		.028*** (.003)		.046*** (.005)		.005*** (.001)		.016*** (.005)
Size		-.066*** (.004)		-.168*** (.009)		-.02*** (.002)		-.065*** (.008)
Age		-.009*** (.003)		-.029*** (.011)		.004* (.002)		.021* (.012)
HHI		.044** (.021)		.009 (.07)		-.021 (.017)		-.08 (.09)
CAPEX		.084*** (.026)		.276*** (.067)		.094*** (.015)		.42*** (.07)
RD		.004 (.066)		-.1 (.126)		-.004 (.02)		.07 (.109)
M&A		-.006 (.015)		-.014 (.044)		.017* (.01)		.047 (.046)
_cons	.009*** (.001)	1.263*** (.088)	.164*** (.001)	3.413*** (.189)	.008*** (0)	.421*** (.038)	.17*** (.001)	1.454*** (.166)

Table 12 Continued

Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R ²	.1243	.1680	.1510	.1823	.0166	.0689	.0601	.0843
Observations	28593	28593	28593	28593	28593	28593	28593	28593

This table presents the difference-in-difference ordinary least square results for the impact of the U.K. Takeover Code Reform in 2011 on security issue. The dependent variables are the Equity issuance amount, which is measured as the change in stockholders' equity minus the change in retained earnings, scaled by beginning-of-year total assets; Equity issuance dummy is a dummy variable that equals one if the amount of equity issuance as a percentage of total assets at the beginning of the fiscal year exceeds 5%; Debt issuance amount, which is measured as the change in long-term debt scaled by beginning-of-year total assets; Debt issuance dummy is a dummy variable that equals one if the amount of debt issuance as a percentage of total assets at the beginning of the fiscal year exceeds 5%. The treated group of firms are classified as the firm located in the UK, whereas the control group of firms are classified as the firm located in the rest of EU. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Each models include industry, year, country and firm fixed effects. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively

Table 13: Cross-Sectional Tests				
	Risk			Tobin's Q
	Total (1)	Systematic (2)	Idiosyncratic (3)	(4)
Panel A: Partitions Based on HP Index				
High	-.060*** (.015)	-.016*** (.003)	-.033*** (.008)	.128*** (.038)
Low	-.015 (.022)	.004 (.004)	-.018 (.012)	.064*** (.020)
Difference	-.046**	-.020***	-.014**	.063**
P-value	(.030)	(.000)	(.010)	(.040)
Panel B: Partitions Based on Z-score				
Low	-.077*** (.022)	-.018*** (.004)	-.045*** (.012)	.107*** (.036)
High	-.004 (.017)	.001 (.003)	-.009 (.000)	.075*** (.016)
Difference	-.074***	-.019***	-.037***	.029*
P-value	(.000)	(.000)	(.000)	(.080)

This table presents the difference-in-difference estimators for the cross-sectional impact of UK Takeover code reform in 2011 on managerial risk-taking and firm's value. Panel A, and B partition the sample into High and Low subsamples based on the median level of HP index and Altman z-score. The dependent variables are firm's total risk; firm's systematic risk; firm's idiosyncratic risk and firm value. Where firms total risk the firm's volatility of firms' week stock returns at the end of each year. Systematic risk and idiosyncratic risk are the square root of the explained and unexplained variance in the regression of a firm's weekly returns at the end of each year on the Fama and French (1993) three factor model. Q is the total assets minus book value of equity plus the market value of equity minus deferred taxes scaled by book value of total assets. Each models include industry, year, country and firm fixed effects and the same set of control variables as in Table 5 and 6. The treated group of firms are classified as the firm located in the UK, whereas the control group of firms are classified as the firm located in the rest of EU. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively

Table 14: Alternative Proxies for Risk and Value

	Imputed Risk						Imputed Tobin's Q	
	Total		System		Idiosyncratic		(7)	(8)
	(1)	(2)	(3)	(4)	(5)	(6)		
Inter	-.053*** (.014)	-.056*** (.015)	-.006*** (.002)	-.007*** (.002)	-.022*** (.006)	-.022*** (.006)	2.85* (1.547)	2.783* (1.543)
AER		-.039 (.137)		-.043* (.025)		-.015 (.059)		31.664** (13.136)
ROCE		.019 (.034)		-.005 (.006)		.004 (.013)		-.356 (2.001)
Liquidity		-.067** (.031)		-.002 (.006)		-.027** (.012)		-6.516*** (1.983)
Leverage		.011 (.037)		-.001 (.006)		.014 (.015)		-1.104 (1.6)
SGA		-.007 (.005)		-.001 (.001)		-.003 (.002)		-.504 (.46)
Tangibility		-.082** (.039)		-.014** (.007)		-.04** (.017)		-4.897*** (1.74)
MTB		.005 (.004)		.001 (.001)		.002 (.002)		-.158 (.258)
Size		.016** (.008)		.001 (.001)		.004 (.003)		-.093 (.126)
Age		.001 (.013)		-.001 (.002)		.001 (.005)		.196 (.206)
HHI		.197** (.086)		.06*** (.016)		.071** (.031)		2.66 (5.364)
CAPEX								14.414*** (4.988)
RD								.444 (5.004)
M&A								-5.025* (2.68)
cons	1.278***	.964***	.086***	.065**	.222***	.132**	9.722***	12.844***

Table 14 Continued:

	(.002)	(.159)	(0)	(.027)	(.001)	(.061)	(.27)	(2.831)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	.475	.476	.344	.345	.423	.424	.259	.261
Obs	15343	15343	15343	15343	15343	15343	15343	15343

This table presents the difference-in-difference results for the impact of UK Takeover code reform in 2011 on alternative proxies for firm's risk and value. The dependent variable in the columns 1-2 is the firm's total risk, which is measure by the volatility of firms' weekly imputed stock returns at the end of each year. Next, it replaced with the firm's imputed total risk with the imputed systematic risk (columns 3-4) and imputed idiosyncratic risk (columns 5-6), they are measured by the explained variance and unexplained variance of Fama and French 3 factor model. Finally, in Columns 7-8, the dependent variable is the firm value (Tobin's Q), which is measured by the imputed value of firm's Q. Each models include industry, year, country and firm fixed effects and the same set of control variables as in Table 5 and 6. The treated group of firms are classified as the firm located in the UK, whereas the control group of firms are classified as the firm located in the rest of EU. The pre-reform period is defined as the year from 2006-2010, the post-reform period is defined as the year from 2012-2016. Year 2011 is excluded as the announcement of UK takeover code reform was in the 2011. Inter is an interaction variable for the firms classified as the treatment firms in the post-reform period. Each models include industry, year, country and firm fixed effects. Variables definitions can be found in the Appendix A. Standard errors are corrected for heteroscedasticity and clustering at the firm level and presented in parentheses. *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

Table 15: Alternative Classification for Control Groups

	(1) Total Risk	(2) System Risk	(3) Ido Risk	(4) Q
Panel A: Alternative Control Groups Basing on EU 15 Countries				
Inter	-.043*** (.012)	-.008*** (.002)	-.026*** (.006)	.07*** (.02)
_cons	3.502*** (.188)	.31*** (.037)	1.401*** (.106)	-.229 (.366)
Firm level Control	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adj. R ²	.648	.456	.624	.845
Obs	26742	26742	26742	26742
Panel B: Alternative Control Groups Basing on EU OECD Countries				
Inter	-.037*** (.012)	-.006*** (.002)	-.023*** (.006)	.085*** (.02)
_cons	3.609*** (.18)	.33*** (.035)	1.459*** (.102)	-.16 (.365)
Firm level Control	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adj. R ²	.643	.45	.62	.84
Obs	29000	29000	29000	29000

This table reports difference-in-differences estimates of the impact of the 2011 UK Takeover Code Reform on firm risk and valuation, using alternative control groups. The treatment group comprises firms headquartered in the United Kingdom. In Panel A, the control group includes firms located in EU-15 countries—Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and Sweden. In Panel B, the control group consists of firms from Western European countries in the OECD, excluding the United Kingdom. The pre-reform period spans 2006–2010, while the post-reform period covers 2012–2016; the year 2011 is excluded due to the timing of the reform announcement. The variable *Inter* is an interaction term identifying treated firms in the post-reform period. Total risk is measured as the standard deviation of weekly stock returns for each firm at year-end. Systematic risk and idiosyncratic risk are calculated as the square roots of the explained and unexplained variances, respectively, from a regression of weekly returns on the Fama and French (1993) three-factor model. *Q* is calculated as total assets minus the book value of equity plus the market value of equity minus deferred taxes, scaled by the book value of total assets. All models include industry and year fixed effects, along with the same set of control variables used in Tables 5 and 6. Variable definitions are provided in Appendix A. Standard errors are clustered at the firm level and are robust to heteroscedasticity. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Appendix A: Definition of Main Variables

Variable	Definition	Source
Main Dependent Variables:		
Bid Occurrence	A dummy variable equal to 1 if the sample of firms was targeted in each year.	SDC
Bid Number	The number of bids for the sample of firms was targeted in each year.	SDC
Total Risk	The firm's volatility of firms' week stock returns at the end of each year.	Datastream
Systematic Risk	The square root of the explained variance in the regression of a firm's weekly returns at the end of each year on the Fama and French (1993) three factor model.	Datastream
Idiosyncratic Risk	The square root of the unexplained variance in the regression of a firm's weekly returns at the end of each year on the Fama and French (1993) three factor model.	Datastream
Tobin's Q	The total assets minus book value of equity plus the market value of equity minus deferred taxes scaled by book value of total assets.	Datastream and Worldscope
Main Independent Variables:		
Treat	The treated group of firms are classified as the firm located in the UK	
Control	The control group of firms are classified as the firm located in the rest of EU countries	
Pre-reform	The pre-reform period is defined as the year from 2006-2010	
Post	The post-reform period is defined as the year from 2012-2016.	
Inter	An interaction variable for the firms classified as the treatment firms in the post-reform period.	
Additional Control Variables:		
AER	The average daily abnormal return for a given fiscal year	Datastream
ROCE	The ratio of earnings before interest and taxes to the capital employed	Worldscope
MTB	The ratio of market value of assets scaled by book value of total assets.	Datastream and Worldscope
Liquidity	The value of cash and short-term investments scaled by book value of total assets.	Worldscope
Leverage	The book value of debt scaled by the book value of total assets.	Worldscope
SGA	The year-on-year change in sales	Worldscope
Tangibility	The net property, plant and equipment to the book value of total assets.	Worldscope
Size	The nature logarithm of book value of total assets.	Worldscope
Age	The natural logarithm of one plus the number of years since the firms incorporated.	Worldscope
HHI	The sum of squared sales-based market shares for the two-digit standard industrial classification code-based industry of the focus firm for a given fiscal year.	Worldscope
CAPEX	The capital expenditure scaled by book value of total assets	Worldscope

R&D	The amount spends on research and development scaled by book value of total assets,	Worldscope
M&A	The sum of M&A deal transaction value paid by a given firm divided by the book value of total assets	SDC
Alternative Proxies for Main Dependent Variables:		
Imputed Total Risk	Imputed measure of risk as Aretz et al. (2019). Standard deviation of returns of a portfolio that mimics firm's industry composition.	Worldscope and Datastream
Imputed Systematic Risk	Imputed measure of systematic risk as in Aretz et al. (2019). The square root of the explained variance in the regression of a firm's imputed returns at the end of each year on the Fama and French (1993) three factor model.	Worldscope and Datastream
Imputed Idiosyncratic Risk	Imputed measure of systematic risk as in Aretz et al. (2019). The square root of the unexplained variance in the regression of a firm's imputed returns at the end of each year on the Fama and French (1993) three factor model.	Worldscope and Datastream
Imputed Tobin's Q	Imputed Tobin's Q as in Aretz et al. (2019). Value-weighted average Tobin's Q across a firm's business segments. Segment weights are computed using the current fiscal-year-end book values of assets and a segment's Q is computed as the value-weighted average of Tobin's Q of all single-segment firms operating in a segment's industry. Tobin's Q is the total assets minus book value of equity plus the market value of equity minus deferred taxes scaled by book value of total assets.	Worldscope and Datastream
Channel Analysis Variables:		
Market leverage	Total debt as a fraction of total asset	Worldscope
Tax	The firm's corporate tax rate, which is equal to income tax expenses divided by net income, set to missing if it is above one or below zero.	Worldscope
Cost of Debt	The ratio of interest and related expense to the sum of firm's long-term debt and debt in current liabilities.	Worldscope
Cost of Equity	The cost of equity from the Fama-French 3 Factor model. Weekly stock returns in each calendar year are used to estimate firm β . The dependent variable is the excess stock return, and the independent variable is the Fama and French market excess return. $r_E = r_f + \beta E[r_m - r_f]$. r_f is the risk-free rate from Fama French Database. $E[r_m - r_f]$ is the historical mean of the Fama and French market excess return; that is, the date t equity premium is the average of the Fama and French market excess return from time t to time 1.	Datastream
WACC	Weighted average cost of capital. Which is estimated by using Equation (3.3)	Worldscope & Datastream
Equity issuance amount	The change in stockholders' equity minus the change in retained earnings, scaled by beginning-of-year total assets	Worldscope
Equity issuance dummy	Dummy variable that equals one if the amount of equity issuance as a percentage of total assets at the beginning of the fiscal year exceeds 5%	Worldscope

Debt issuance amount	The change in long-term debt scaled by beginning-of-year total assets;	Worldscope
Debt issuance dummy	Dummy variable that equals one if the amount of debt issuance as a percentage of total assets at the beginning of the fiscal year exceeds 5%.	Worldscope
Cross-section Analysis Variables:		
HP index	Hadlock and Pierce (2010) index is calculated as $-0.737\text{size} + 0.043\text{size}^2 - 0.040\text{Age}$.	Worldscope
Altman z-score	Altman z-score is calculated as $+3.3 (\text{earnings before interest and tax}/\text{total assets}) + 1.2 (\text{working capital}/\text{total assets}) + 0.6 (\text{market value of equity}/\text{total liabilities}) + 1.4 (\text{retained earnings}/\text{total assets})$.	Worldscope & Datastream