Essays in Share Repurchases of the UK

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A thesis submitted in partial fulfilment of the requirements of the University of Greenwich for the Degree of Doctor of Philosophy

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DECLARATION

I certify that the work contained in this thesis, or any part of it, has not been accepted in substance for any previous degree awarded to me, and is not concurrently being submitted for any degree other than that of Doctor of Philosophy being studied at the University of Greenwich. I also declare that this work is the result of my own investigations, except where otherwise identified by references and that the contents are not the outcome of any form of research misconduct.

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November 2018

DEDICATION

To my loving father…

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ABSTRACT

The thesis is centred on the open market share repurchases of the UK that were undertaken in the period 1985-2014. The investigation has been conducted through the production of three independent empirical essays, which individually focus on the different aspects related to repurchases. Thus, upon combining the findings of the essays, it is seen that macroeconomic circumstances influence the decision of undertaking repurchases, and once the decision has been taken firm-specific factors strongly determine the size of the repurchase. Further, upon announcing a repurchase non-financial firms witness unexpected short-term stock price gains.

The first empirical essay tests the impact of a corporate announcement stating that the firm intends to undertake a share repurchase on the stock performance. This involved testing the factors that determine the instant price change due to the announcement, and the unexpected stock price change in the short-term and long-term periods. The results reveal that upon realizing a repurchase announcement, a scenario of the tax framework making repurchases tax friendlier than dividends has a negative influence on stock price, which is supported by the finding that a good dividend distribution history has a positive influence. The level of globalisation within the economy also has a negative influence on the stock price, and such an inquiry is novel to the best of knowledge. Further, in the case of non-financial firms a repurchase announcement has shown to cause unexpected stock price gains in the short-term, however in the long-term their stock price witnesses an unexpected loss.

The second empirical essay investigates the determinants of repurchase size after a decision of undertaking a repurchase has been made. The testing primarily aims to see if the motivational hypotheses, which existing literature finds are influential in the decision of undertaking repurchases, also influence the size of the repurchase. The key results state that the size of the repurchases increases if a firm is undervalued, has negative earnings or possesses surplus cash reserves, and these are the leading three determinants. These findings are consistent with Dhanani (2016)'s survey, which finds that the top three intentions of British managers to repurchase shares are to distribute excess cash, improve the reported EPS and signal stock undervaluation. The third empirical essay primarily investigates the influence of the macroeconomy on the decision if a repurchase must be undertaken. To the best of knowledge, no prior study directly tests the repurchase-macroeconomy relationship for the UK. The results reveal that overall an economic upswing positively influences the frequency of repurchase undertaking. However, there are differences in the influences of individual

macroeconomic indicators during economic Expansion and Contraction. During both periods the influences of Term Structure and Short-Term Risk remains positive while that of Default Risk remains negative, however the GDP and Unemployment have negative influences during Expansion but positive influences during Contraction. Further, the aggregate Stock Market performance has a positive influence during Expansion and a negative influence during Contraction. Thus, it is documented that based on the particular stage of the business cycle, different components of the macroeconomy have different influencing patterns on the decision whether a repurchase must be undertaken.

CHAPTER 1. INTRODUCTION

The thesis investigates the UK's open market share repurchases from the period 1985 to 2014. This is realized via the production of three independent empirical essays that examine different facets of a repurchase payout, thus the empirical testing in combination investigates repurchases from their decision-making stage, and extends to the post-announcement conditionality as well. The reason for focusing only on the 'open market' route is due to this method constituting a majority of all repurchases (Rau and Vermaelen, 2002; Oswald and Young, 2004). This chapter is subcategorised into six subsections; the first subsection discusses the research objectives and the key findings realized from the empirical testing, the second subsection discusses the thesis' contributions to existing literature, the third subsection discusses the theoretical background of repurchases, the fourth subsection discusses the class of readers that will benefit from this research, the fifth subsection provides the entire chapter's closing statement and the sixth subsection details the thesis structure.

1.1. Research Objectives and Findings: A Detailed Summary

This section discusses the key empirical objectives of the thesis and the findings realized from their undertaking. These objectives are derived on a two-part problem statement, which is; '*What information is currently missing in the existing UK-specific repurchase literature?*' and '*Are the identified absenteeism important enough to be pursued?*'. Thus, the empirical testing covers the initial stages of the repurchase decision-making, and extends to the impact caused by the announcement stating that a repurchase will be undertaken.

The investigation tests the influence of the macroeconomy on the decision if a repurchase must be undertaken, and the results reveal a strong influencing pattern. For a micro-level understanding, the testing is undertaken not only for the Aggregate period (1985-2014), but the timeline is also split between economic Expansion and Contraction. The said periods are subcategorised using the traditional European approach (Blackstone, 2011), which states that two consecutive positive quarters of GDP sets the period of Expansion, and it lasts until the peak quarterly GDP is reached; the remainder of the quarters are subcategorised as Contraction. Thus, the computation of these timelines is non-linear, as the relevant sets of quarters are lumped together, which results in 62 quarters of Expansion and 58 quarters of Contraction. The macroeconomic influence is tested using six indicators, GDP, Unemployment, Term Structure, Default Risk, Short-Term Risk and Stock Market. Thus, in combination the indicators represent the business cycle's aggregate health, long-term outlook, market's risk levels and aggregate stock market performance.

Aggregately repurchase frequency is positively influenced by a strengthening economy. There is diversity of macroeconomic influence during Expansion and Contraction, however both economic environments see that the general repurchase undertaking pattern is more aligned with economic prosperity. There are equal levels of similarities and dissimilarities between the influences of individual macroeconomic indicators during Expansion and Contraction. The similarities include that during both economic environments, Term Structure and Short-Term Risk positively influence the frequency of repurchase undertaking, while Default Risk has a negative influence. Regarding the dissimilarities, GDP and Unemployment have negative influences during Expansion but positive influences during Contraction, and the aggregate Stock Market has a positive influence during Expansion but negative influence during Contraction. The testing further finds that the repurchase-macroeconomy relationship underwent a structural break in the second quarter of 1996 (1996:Q2), thus further creating two sub-periods, Pre Break and Post Break. Thus unlike the computation of Expansion and Contraction, these timelines are linearly ascertained as the period prior to 1996:Q2 is Pre Break (45 quarters) while the period after 1996:Q2 is the Post Break period (74 quarters). In the Post Break period the level of counter-cyclicity of repurchases increases, which means that following 1996:Q2 repurchases have become relatively more visible during economic slumps. Overall, under the five sets of timeframes (Aggregate, Expansion, Contraction, Pre Break and Post Break), the average probability of witnessing a repurchase is no less than 75%. Thus, the market generally witnesses repurchase favouring macroeconomic conditions.

Once the decision that a repurchase should be undertaken is investigated, the research also tests the macroeconomic and firm-level influence on repurchase value/size. The results reveal that the macroeconomy has a significant level of influence on repurchase value. Under average macroeconomic conditions during the Aggregate period repurchase values are influenced by 6%, while similarly during Expansion the value-level influence is 6%, twice than the 3% figure seen during Contraction. Further, the macroeconomy's value-level influence more than doubles after the structural break, as under average conditions during the Pre Break period the influence level is 2% while in the Post Break period the influence is 5%. Thus, with the progression of time the macroeconomy's value-level influence on repurchases has been rising. From the point of view of the influences of individual macroeconomic indicators, there are two key attributes. The first is that the influence under extreme levels, either towards their peak or lowest levels, has remained largely absent, and secondly their influence pattern is not identical to that seen with their influence on repurchase undertaking frequency. Thus, the macroeconomic influence is circumstantial to the decision-making stage.

Regarding the firm-level influences on repurchase size, the research tests if the motives that previous literature have indicated are typical reasons for repurchasing shares are also influential in determining repurchase size[1]. These include the following motives; distribution of excess cash, adjusting the Earnings Per Share (EPS), signalling stock undervaluation, signalling information asymmetry, replacing dividends, adjusting the capital structure to increase the debt exposure and for providing shareholders with a more tax efficient corporate payout. The influence of board independence is also investigated, while the entire testing checks if the influences are non-linear, as in if they are either U shaped or inverted-U shaped. Thus, a total of 15 proxies represent the above-mentioned motives and board independence. A consistency between the motives highlighted by British managers for undertaking repurchases and the size-specific influences of these motives is realized. The leading three motives identified in Dhanani (2016)'s survey of British managers is concluded by this research to also be the leading three determinants of repurchase size, which are the motives of using repurchases to; signal stock undervaluation, adjust the EPS and distribute excess cash.

The testing also reveals that the influence of the firm's leverage on repurchases size is U shaped. Thus, the motive for using repurchases to increase the capital structure's debt exposure is also a significant determinant of the repurchase size, while it can also have an inverse influence. Further, the influence of board independence is inverted-U shaped, thus indicating that independent directors can either push towards the increasing or decreasing of a repurchase's size. Finally, the motive for using repurchases as replacements for dividend distribution does not show any significant influence on the size of the repurchase, however it has shown an inverse influence. Thus, dividend distribution has a positive influence on the size of a repurchase. The motives of using repurchases for signalling asymmetric information and for ensuring a more tax friendlier corporate payout did not show any significant influences on the decision regarding the size of a repurchase, linearly or non-linearly.

Once the managerial repurchase decision-making is finalised, the firm calls for a shareholder vote for getting their approval, as this is required by law (Dhanani and Roberts, 2009). To assemble shareholders, they must be given a two weeks' notice. Since this notification is publicly available this research assumes that the firm will announce the repurchase immediately after gaining the necessary approval, as the stock price may begin to see a corresponding impact once the intention of obtaining the shareholder vote is made public.

[1] A detailed discussion of the motives identified by previous literature behind the undertaking of the UK's share repurchases is provided further in this chapter in Chapter 1.3.1.

Thus, the research investigates the abnormality in stock performance within +/- two weeks around the announcement. The findings reveal that the stock of non-financial firms witnesses consistent positive abnormal performance. For instance, on the announcement day itself (0) the stock sees a positive abnormal gain of 1%, while in the three-day period surrounding the announcement (-1, 0, 1) the cumulative abnormal gain is 3.26%. The assumption that the stock price is influenced during the two-week period given to shareholders for assembling to cast their votes is supported by the findings, as the average pre-announcement abnormal stock price gains for non-financial firms is 33% more than the post-announcement average. The stock price of financial firms however consistently remains uninfluenced by repurchases announcements. Further, a repurchase announcement's long-term effect on the stock price is investigated on a yearly frequency for three years after the announcement. The results for non-financial firms consistently indicate a negative annual abnormal stock price movement, which ranges between -7% and -14%. Similar to the short-term results, the stock price of financial firms remains uninfluenced by repurchase announcements in the long-term as well.

Finally, the research tests the determinants of the market's reaction towards repurchase announcements. This includes an array of nine proxies, which represent firm leverage, taxation, economic globalisation, board independence, dividend distribution, firm valuation, pre-announcement long-term stock performance, firm-level profitability and the firm's operational sector (non-financial or financial firm). The results reveal that the market reaction is negatively influenced when tax laws favour repurchases over dividends, if the firm is highly leveraged, if the country is seeing high levels of economic globalisation and if the firm is witnessing net loss. The reaction is positively influenced if the firm has a strong dividend distribution history, while there are sparse evidences of positive influence of the stock's valuation and if the announcing firm is a financial institution. However, board independence and the pre-announcement long-term stock performance have shown no significant influences whatsoever on how the market reacts to a repurchase announcement.

Thus, the research concludes that the macroeconomy plays an important role in the decision if a repurchase needs to be undertaken. When a repurchase has received a green light the decision regarding its value/size is significantly determined by macroeconomic circumstances and firm-level conditionality. Finally, after a repurchase is announced the market's reaction has shown to be determined by firm-level and macro-institutional conditions, while the stock performance of non-financial repurchasing firms is strongly influenced by the repurchase announcement, which is visible over the short-term and the long-term periods.

1.2. Research Contributions

The contributions of the thesis to existing literature are very specific and relevant. In this section these contributions are discussed and the importance of their novelty are stated.

(i) The research's first and second empirical essays independently cover the widest timeframes in their respective objectives across all like-for-like UK studies. The first essay covers the period 1993-2010, and the study with the most similar objectives with the lengthiest sample is Lee *et al.* (2010), they test the period 1990-2005. The second essay covers the period 1985-2014, and the study with the most similar objectives with the lengthiest sample is Lee and Suh (2011), they test the period 1998-2006. The importance of this contribution lays in the fact that testing over an extended period provides results that factor in changes of corporate policy, which may be caused due to firm-level, shareholder-level or regulatory-level circumstances. Also, over an extended timeline various macroeconomic events are considered; in the case of this research's timeline it covers the early 1990s housing crisis, the dot.com bubble of 2001, and also the great recession of 2008.

(ii) The testing of non-linear influences (U shaped or inverted-U shaped) of the determinants of repurchase size is unique to this research, which is important due to the possible overlapping of the motive for undertaking the repurchase with other factors. For instance, an assumption may be drawn that dividend distribution will have a negative influence on the repurchase's size-specific decision-making, which will be consistent with the dividend substitution hypothesis. However, if during such an instance the distribution of excess cash were the motive, the assumption will be inaccurate causing faulty analytical outcomes. It is thus possible that depending on the motives for undertaking a repurchase, the influence of other motivational factors on repurchase size may conflict with their usual expectation.

(iii) No past UK-specific study has investigated the direct influence of macroeconomic conditions on the repurchase decision-making process. However, in this research the empirical testing targets this niche. This aspect is worth investigating as factors that have shown to influence the repurchase decision-making in the UK, such as cashflow and leverage, are themselves strongly influenced by the macroeconomy[2]. Thus, instead of making indirect theoretical inferences, with this research's support stakeholders such as managers and shareholders will be able to assess the direct impact of the macroeconomy on repurchases.

[2] A detailed discussion of the relationship of the determinants of the UK's share repurchases with the macroeconomy is provided further in this chapter in Chapter 1.3.2.

(iv) The independent testing of the market's receptiveness of repurchases undertaken by non-financial firms and financial firms. The contribution helps in repurchase policymaking, as managers of both types of firms will have access to specific findings related to their operational sector. Also, asset managers will be able to better optimise their portfolios.

(v) The testing if economic globalisation is a determinant of the market's reaction to repurchase announcements, and if yes then how does it influence the market. The contribution is important as British firms are highly internationalised (Oehler *et al.* 2016; Oehler *et al.* 2017a) and the country's stock market remains cointegrated with major global markets (US, Germany and France) (Berger and Pozzi, 2013). Furthermore, the level of Foreign Direct Investment (FDI) in the UK has been increasing year-on-year (Department for International Trade, 2016), that too from investors from the US (ONS, 2017), which is the world's largest share repurchasing country. Thus, an inflow of foreign investment, which is essentially new funds in the market, may impact the aggregate market's attitude towards repurchases.

1.3. Theoretical Background

This section is categorised into two subsections. The first subsection focuses on the motives behind repurchases of the UK, as established by existing literature. Further, given that no existing study directly investigates the relationship of the UK's repurchase decision-making with the macroeconomy, a proxy method of theoretical understanding is employed. Thus, in the second subsection, the relationship of a host of the determinants of repurchases with the macroeconomy are assessed, with the focus being on the factors discussed in the first subsection. This will establish a linkage between repurchases and the state of the economy.

1.3.1. Motives for Share Repurchases in the UK[3]

Dhanani (2016) recently surveyed the UK's managerial who repurchased shares between 2003-2007, and they stated that returning excess cash was the leading motive. This motive essentially states that firms generally divert cash reserves towards outlets such as investment, but when there is surplus cash accumulation a repurchase is plausible due to two-fold reasoning (Guay and Harford, 2000; Brav *et al.* 2005). If the investment opportunities are unsuitable managers may still undertake them causing principal-agent conflicts, and buying the firm's stock restricts agent-centricity. Burns *et al.* (2015)'s testing of 15 European countries, of which the UK was the largest data-holder (42%), indicates that excess cash improves the prospects of repurchase undertaking. Cesari and Ozkan (2015) too find that

[3] A brief comparative discussion between the market reaction to repurchase announcements in the UK and in competing global markets of the US, Germany and France is provided in the Appendix.

within a sample of five European countries, of which the UK was again the largest data-holder (75%), excess cash increases the repurchase weighting in the total payout. Similarly, Lee *et al.* (2010) find that the UK's repurchases see an increment in value due to excess cash, consistent with Lee and Suh (2011)'s finding that temporary and surplus cash are diverted towards the financing of repurchases. Thus, there is strong empirical support for the managerial assertion in Dhanani (2016)'s survey.

Further, the 2nd and 3rd most popular motives outlined in Dhanani (2016)'s survey are assessed, to improve EPS and signal stock undervaluation, respectively. The motive for adjusting EPS is essentially exploiting a repurchase's trait of reducing the outstanding stock volume, which makes the firm's earnings relative per outstanding share seem more attractive (Dhanani and Roberts, 2009); lower the number of shares greater the earnings distribution amongst them. While the motive for signalling stock undervaluation states that when firms are convinced that the stock is under-priced, for instance due to economic uncertainty, an act of repurchase will signal the market the presence of mispricing, thus pushing the price up to its fair value (Dittmar, 2000). Sonika *et al.* (2014)'s testing of the UK partially supports the managerial responses, as they find that positive EPS deters the undertaking of repurchases, however undervaluation is not a motivator but overvaluation shows tendencies of triggering a repurchase-withdrawal. Similar is Geiler and Renneboog (2015)'s finding that stock valuation has no impact on the repurchase decision-making in the UK. Correspondingly, Crawford and Wang (2012) find that the market's reaction to repurchases does not indicate signalling stock undervaluation as a probable motive, similar to Andriosopoulos and Lasfer (2015).

The signalling of asymmetric information using repurchases has shown a controversial presence in the UK. The motive states the usage of repurchases to signal information that cannot be directly communicated (Dittmar, 2000), which may cause information opaqueness that impacts the stock value. It is generally believed that the information transparency between firms and the wider market are inversely related (Ikenberry e*t al*. 1995), as given the enormity of the large cap firms they have a much swifter and clearer information channel with the market, while the analytical focus is also more on them rather than smaller firms. Thus, using repurchases for reducing asymmetric information bias is typical with smaller firms, however in the UK the contrary is seen. Cesari and Ozkan (2015) find that firm size has consistently motivated the undertaking of repurchases, which is consistent with Lee *et al.* (2010), Andriosopoulos and Hoque (2013) and Burns *et al.* (2015). However, Andriosopoulos and Lasfer (2015) use the same sample as Andriosopoulos and Hoque (2013), and show that

firm size deters the market's reaction to a repurchase announcement, indicating a disconnection between managerial outlook and market expectation. The positive impact of firm size on managerial attitude is not consistent with the logic supported by Ikenberry *et al.* (1995)'s seminal research, and this research is highly supportive of the said fundamental. Supporting this assertion is Mazzi *et al.* (2018)'s finding that in Europe a firm's size and its compliance with governance directives is positively related, thus revealing a predisposed propensity of smaller firms to refrain from divulging information.

The research further investigates the tax preferential hypothesis. Usually the taxation on capital gains and dividends are different, and the hypothesis states the use of repurchases for their tax efficiency over dividend distribution (Barclay and Smith, 1988; De'Jong *et al.* 2003). The motive is circumstantial to a country's tax regime, for instance it is currently irrelevant in the US and Germany since they tax capital gains and dividends at the same rates (Deloitte, 2016a; IRS, 2017). However, in the UK it is highly relevant; since 1981 successive governments have reduced the tax on capital gains while contemporaneously increasing that on dividends (Table 1) (HMRC, 2017; IFS, 2017). Empirically, Ji (2016) finds that the tax regime in the UK is cointegrated with the corporate payout policy.

Table 1: Corporate Payout Tax Rates
The table presents the UK's tax rates applicable on individual investors' capital gains made on repurchases and on dividends earned between the period 1981 and 2017.

Capital Gains Tax Rates[4]		**Dividend Tax Rates**[5]	
Years	**Rate (%)**	**Years**	**Rate (%)**
1981-1988	30	1981-1993	15
1988-2008	10 to 40	1993-1999	25
2008-2012	18	1999-2016	25 | 30.60
2012-2016	18 | 28	2016-2017	7.50 | 32.50 | 38.10
2016-2017	10 | 20		

Alzahrani and Lasfer (2012) indicate a reduction in repurchases prospects if they are tax friendlier than dividends, however Oswald and Young (2008) find the exact opposite, which complements Andriosopoulos and Lasfer (2015)'s conclusion that a repurchase's tax efficiency strengthens the market reaction to its announcement. Completely averse to these findings are the conclusions of Oswald and Young (2004) and Geiler and Renneboog (2015) that tax efficiency of repurchases has no bearing on the managerial decision to undertake them. Thus, the continual alterations of tax rates in the UK are accompanied by literary conflictions regarding the repurchase-taxation relationship.

[4] The rates differ based on the marginal income tax rate.

[5] In 1999, the rate for basic taxpayers remained restricted at 20%, rather than the marginal tax rate.

The Miller-Modigliani Dividend Irrelevance Theory (1961) implies that in a frictionless capital market, a shareholder's investment assessment is solely linked to earnings, and if the firm's strategy is acceptable then they remain indifferent between repurchases and dividends, while any economic shortfall is absorbable through a proportionate sale of the equity holding. Thus, indicating that repurchases and dividends are identical corporate payouts, creating the dividend substitution hypothesis, firms using repurchases as dividend replacements. For the UK, Ji (2016) suggests that repurchases are mildly used as dividend replacements. This is consistent with repurchase's rising popularity as independent corporate payouts and not dividend replacements (Ferris *et al.* 2006; Denis and Osobov, 2008). Burns *et al.* (2015) find that dividends are complementary to repurchases in Europe, and when they remove UK from their testing the results loose statistical significance. However, Lee *et al.* (2010) find that dividend distribution does not influence managerial decision-making. This is partially consistent with Sonika *et al.* (2014)'s finding that dividend paying firms are averse from repurchases, indicating dividend substitution, however the actual dividend distribution does not impact the decision-making. The market reaction to repurchases has also remained uninfluenced by dividend history (Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015). Thus, it can be seen that overall, the UK as a country does not see strong evidences of repurchases being viewed as dividend replacements, rather the two payouts are considered peers.

Multiple factors can influence the capital structure's debt-equity split, such as firm type and financial constraints; nonetheless the tradeoffs between debt and equity are consistent (Marsh, 1982). Debt provides tax shield that equity does not, but mandates fixed coupon payments, thus making it a cheaper source of capital than equity. Firms may opt for increasing their debt exposure to reduce the cost of capital, and the capital restructuring hypothesis states the achieving of this motive through the use of repurchases (Dittmar, 2000; Mitchell and Dharmawan, 2007). Lee and Suh (2011), Burns *et al.* (2015) and Cesari and Ozkan (2015) reveal that lower levels of debt exposure positively influence repurchase undertaking in the UK, thus supporting the presence of the capital restructuring hypothesis. However, Benhamouda and Watson (2010), Lee *et al.* (2010) and Sonika *et al.* (2014) find that leverage has no impact, and completely inconsistent is Andriosopoulos and Lasfer (2015)'s conclusion that higher leverage has a positive influence on the market's reaction towards repurchases. Overall, it is seen that the relationship between firm-level leverage and repurchases is mostly either insignificant, or consistent with the capital restructuring hypothesis.

1.3.2. Theoretical Association of Repurchases with the Macroeconomy

To the best of knowledge there is an absence of UK-specific literature directly investigating the relationship of repurchases with the macroeconomy. Thus, for establishing the theoretical relationship between repurchases and the macroeconomy, the research will discuss the macroeconomic influence on the determinants of the UK's share repurchases. For instance, factors such as the distribution of excess cash (Lee *et al.* 2010; Cesari and Ozkan, 2015), increased profitability (Lee and Suh, 2011; Burns *et al.* 2015) and complementing dividend distribution (Ferris *et al.* 2006; Denis and Osobov, 2008) have shown to promote repurchase undertaking. There is a consensus that all of these attributes are generally contingent upon the business cycle. Macroeconomic fluctuations have conventionally shown to impact productivity (Giglio *et al.* 2016) and profitability (Issah and Antwi, 2017), which adversely influences excess cash accumulation. This in-turn also influences the resources available for dividend distribution, which exhibits pro-cyclicity (McMillan, 2014) and is associated with cash flow conditions (Al-Najjar and Belghitar, 2011; Kilincarslan and Ozdemir, 2018).

Additionally, low leverage too drives managers towards repurchasing shares (Lee and Suh, 2011; Cesari and Ozkan, 2015), and in the opinion of European managers the macroeconomy is a crucial determinant of leverage (Bancel and Mittoo, 2004). It is also seen that the leverage behaviour of British firms is associated with business cycle conditionality (Caglayan and Rashid, 2014; Akhtar, 2017). Dang (2013a) finds that compared to the US, British firms are swifter in pursuing an optimal leverage position, however the financial environment influences the swiftness (Antoniou *et al.* 2008). This is evident as the speed of adjustment after an economic distress is highest in the UK, a market-based economy (Drobetz *et al.* 2015). Thus, as debt issuance is a more cost-effective source of finance than equity issuance, new debt can help finance repurchases that optimises recovery by lowering capital costs. Dang (2013b) finds that British firms are more prone to zero-leverage policies than American firms, and this debt aversion is significantly influenced by macroeconomic conditions. However, Korteweg (2010) finds that American firms can increment their value by up to 5% through optimal leveraging, thus inferring that British firms too can possibly achieve similar benefits by deviating away from zero-leverage policies. For the purposes of realizing optimal leveraging, repurchases can be utilized by financing them using newly issued debt. It will help in providing the benefits of leveraging while also reducing the cost of capital. This again invokes an association of debt and macroeconomic conditions, further supporting the circular link between repurchase undertaking patterns, a firm's debt exposure and the business cycle's conditionality. The above-discussed factors also show interdependencies.

Capital structure is associated with cash flow and dividends (Akhtar, 2017), and dividends are better information communicators during crises than earnings announcement (Bozos *et al.* 2011). Further, leverage is negatively correlated with cash holdings (Al-Najjar, 2013) and profitability (Rajan and Zingales, 1995; Bevan and Danbolt, 2002). The positive relationship between leverage and firm size (Pindado *et al.* 2014) is important since firm size and repurchases are positively related in the UK (Andriosopoulos and Hoque, 2013; Sonika *et al.* 2014), while leverage and firm size influence earnings ratio (Eliwa *et al.* 2016). The leverage of British firms is positively associated with the firm's valuation (Mahajan and Tartaroglu, 2008), thus undervalued firms are low leveraged. This is important due to the erstwhile discussion of leverage influencing repurchases and British managers state that the signalling stock undervaluation is one of the leading three motives for undertaking repurchases (Dhanani, 2016). Thus, there is a macroeconomic-induced linking between leverage and stock valuation. Covenants associated with debt are also dependent on the business cycle, such as credit rating (Bouvatier *et al.* 2012; Wojewodzki *et al.* 2017) and the credit market (Atanasova and Wilson, 2004; Bougheas *et al.* 2006), especially bank lending (Huang, 2003; Pasiouras and Kosmidou, 2007; Caglayan and Xu, 2016) and the bond market (Sekkel, 2011).

The aggregate FDI within the British economy has reached historical levels (Department for International Trade, 2016), which is dominated from the US (ONS, 2017). Furthermore, the breadth of globalisation within the UK's manufacturing sector has been strong enough to reshape the domestic price of goods (Coutts and Norman, 2007). This is backed by the fall in domestic manufacturing levels in terms of GDP contribution; it went from 17% in 1990 to 9% in 2017 (World Bank, 2018). Milberg and Winkler (2010)'s survey of US firms reveals that manufacturing firms with a globalised supply chain management are more prone to undertaking repurchases, which may likely be replicated in the UK too because of the rising FDI. Further, there are numerous evidences establishing a strong breadth of economic contagion (Ductor and Leiva-Leon, 2016; Magkonis and Tsopanakis, 2016) and corporate financial integration across the UK-US (Berger and Pozzi, 2013), but Uddin and Boateng (2011) find that factors such as cross-border mergers and acquisitions are circumstantial to macroeconomic conditions. Thus, any influence of the rising FDI on repurchases is dependent on the macroeconomy, which restates the macroeconomy's significance for repurchases.

Given the depth of indirect associations between the determinants of repurchases and the macroeconomy, it is highly probable that the repurchase decision-making of British firms is influenced by the macroeconomy. Thus, supporting the research's empirical objectives.

1.4. Research Beneficiaries

The combined outputs of this research are beneficial to four classes of readers. The first set of beneficiaries are academics, as they can advance the findings to include other firm-level and macroeconomic factors, and also furthering the firm-level areas that may be influenced by repurchase announcements, such as operating performance. The second set of beneficiaries are corporate policymakers, as they can use the findings as a template and idiosyncratically adjust it for self-assessment, and also to facilitate future repurchase decisions. The third set of beneficiaries are shareholders. Since regulations mandate their approval for a repurchase, they can use the findings to not just maximise their investment but also to decide the authorization vote. Within them, retail investors are at a greater benefit than institutional investors, as they can use the results to offset their relative lack of resources and greater distance from the managerial. Finally, the fourth set of beneficiaries are asset managers, as they can use the findings regarding the macroeconomic and firm-level influences on repurchase decision-making, and also the market's repurchase reception, for better optimising their portfolios.

1.5. Summation

In this chapter the reader is provided with a detailed discussion of the thesis' empirical research objectives, which includes the problem statement that led to their derivation, the key findings and how they contribute to existing knowledge. Further, a literary background of the UK's share repurchases is also provided for a theoretical understanding, which further expands the reader's viewpoint regarding the thesis' empirical research objectives.

1.6. Thesis Structure

The thesis is structured as follows: Chapter 1 opens the thesis with a detailed discussion of the research objectives and their findings, the list of contributions made to existing literature, a theoretical background of repurchases, a discussion of the type of readers to whom the research will benefit, a closing statement and a note on the thesis' structure, Chapters 2, 3 and 4 contain the first, second and third empirical essays, respectively. Each of these essays is autonomous, as they have their own tailored; abstract, introduction, theoretical background, description of the tested sample, discussions about the empirical objectives and their relevant methodologies, results analyses and a conclusion. Chapter 5 concludes the thesis with a summary of the findings, and alongside are commentaries regarding the research's implications on corporate policymaking, the future of repurchases in Britain, the limitations of this research and further investigable avenues. Thereafter, combined lists of references and appendices for all chapters are produced as evidential supplements of the thesis.

CHAPTER 2. FIRST EMPIRICAL ESSAY

The Influence of Share Repurchase Announcements on Stock Performance: Evidence from the UK

Abstract

The study investigates the conditions surrounding the UK's open market share repurchase announcements for the period 1993-2010, which includes testing the determinants of the market's reaction to the payout and the real reaction itself over the short and long periods. A cohort of the results is underpinned by the market's equity preferring structure, which as a concept indicates that the general tendency of firms is to use equity instead of debt as a source of finance. This includes the negative influences when repurchases are tax friendlier than dividends and if the firm's debt exposure is high, with parallel positive influence of the dividend history. Alongside, we also undertake a novel inquiry of the influence of economic globalisation on the repurchase's market reception, which reverts a negative relationship. This is important since the UK is witnessing a year-on-year increase in FDI (Department for International Trade, 2016), of this the dominant source of investment is from the US, which is the world's large share repurchasing country (Sonika *et al.* 2014). Thus, the rise in the investment levels can influence the market attitude towards repurchases. An additional differentiator of our study is the independent inclusion and controlling of financial firms, which are traditionally excluded due to the difference in their reporting standards. This is important since financial firms are a major force in the economy, and are the largest contributors of the UK's rising service sector trade surplus (Celic, 2017). The market's reaction results reveal that for non-financial firms the announcements increase (decrease) the stock price in the short-term (long-term), and in the case of financial firms the stock remains insulated from any significant price change in the short-term and also in the long-term.

Keyword: Repurchases, Returns, Drivers, Globalisation

JEL Classification: G14, G34, G35

2.1. Introduction

For a more informative understanding this section is subcategorised into four subsections. The first subsection provides a brief commentary on the UK's repurchase background, the second subsection discusses the essay's empirical research objectives and provides a summary of the key results, the third subsection highlights the essay's specific contribution to existent literature and the fourth subsection details the structure of the essay.

2.1.1. Historical Repurchase Pattern in the UK

In principle repurchases have multiple benefits over dividend distribution, as they are better communicators of a firm's future prospects (Bhattacharya, 1979; Allen *et al.* 2000), help in signalling asymmetric information (Ikenberry *et al.* 1995; Lin *et al.* 2017) and stock undervaluation (D'Mello and Shroff, 2000; Baker *et al*. 2003), while also remaining free from payout-commitment (Fenn and Liang, 2001). The UK is considered the world's second largest share repurchasing country behind the US (Sonika *et al.* 2014). In real terms the US' preference for repurchases is very high (Fama and French, 2001; Grullon and Michaely, 2002), so much so that repurchase announcements by financially constrained firms too triggers a positive market reaction (Chen and Wang, 2012). The S&P 500 firms regularly repurchase shares in the region of $500bn in a given year (FactSet, 2016), and from 2005 until 2017 the total repurchases were either equivalent or more than the dividend distribution (Wigglesworth, 2018a), while in 2018 repurchases are expected to reach the $1trn mark (Wigglesworth, 2018b). The historical greater preference of dividends over repurchases in the UK (Denis and Osobov, 2008) is considered typical with non-US firms (Lee and Suh, 2011).

However, unlike the traditional viewpoint of repurchases being dividend substitutes (Jiang *et al.* 2013), in the UK repurchases are not seen as dividend replacements, rather the two corporate payouts are considered complementary to each other (Ferris *et al.* 2006; Burns *et al.* 2015). Thus, the UK's repurchases being popularised as independent of dividends may be indicative of the onset of a pattern that the US saw in the 1980s. Our assertion receives support from various perspectives. The UK fully legalised repurchases in 1981 (Rau and Vermaelen, 2002) and the US did so in 1982 (Bryan, 2016), yet the UK sees a lag in its usage. Between 1980 and 2000 the repurchase-to-dividend ratio in the US increased from 13% to 113% (Grullon and Michaely, 2002), while the ratio for the UK is estimated to increase from 14% in 1989 to 55% in 2005 (Von Eije and Megginson, 2008). However, repurchases have gained prominence in the UK over the past two decades. Geiler and Renneboog (2015) find that repurchases grew in the UK post-2002, while Renneboog and Trojanowski (2011) find

that 4% firms used them in 1992 and in 2004 this increased to 15%. According to Goldman Sachs research (Cornish, 2018) even though the level of repurchases dropped after the recent global crisis (2008-2010), it successfully recovered by 2012 to the pre-2006 figures. Thus, the sustainment of repurchases over a long period indicates a potential rise in its reception.

2.1.2. Summary of Empirical Objectives and Results

The essay undertakes two sets of empirical testing. Initially, the investigation tests the determinants of the market's reaction to repurchase announcements, which includes testing of three hypotheses and five additional variables. Thus, resulting in a combination of nine firm-level and macro-level factors. The three hypotheses individually test if the market reaction to repurchases is influenced by the UK's equity market structure (represented by taxation and firm-level leverage), board independence and economic globalisation, respectively. The additional variables include dividend history, stock valuation, past stock performance, firm-level profitability and the firm's operational sector (non-financial or financial institution). Further testing quantifies the market's real reaction to repurchases in the short-term and long-term periods. The short-term period is defined as two weeks around the announcement day (0), thus including 10 trading days prior (-10) and post (10) the announcement, which totals to 21trading days, while the long-term period is defined as three years after the announcement. The overall approach of the discussed tests differentiate between repurchases of non-financial and financial firms wherever possible, thus realizing a side-by-side comparison of the two sets of firms. This is done due to financial firms being extremely important for UK's economy, as they are the largest taxpayer amongst industries and are highly responsible for the UK's record-level trade surplus (Cadman, 2016; Celic, 2017).

These testing are important due to existing literature holding multiple contradictions, which are explored in detailed in the essay's literature review. The reason why the findings of this essay will be reliable enough to dispel literary contradictions is the fact that to the best of knowledge, the essay's time period of investigation (1993-2010) is the lengthiest compared to like-for-like UK studies. The study that currently holds the lengthiest sample is Lee *et al.* (2010) testing of the period 1990-2005. Thus, our essay's timeline is a novel aspect, as it also covers the effects of the great recession on the market's overall reception of repurchases. We obtain the announcement data[6] of all repurchases undertaken during the period 1985-2014 via the 'open market' route, as this method of repurchasing accounts for majority of all repurchases (Rau and Vermaelen, 2002; Oswald and Young, 2004). The testing only uses the

[6] Collected from SDC Platinum database via a purchase from Thomson Reuter's official data vendor, Alacra Inc.

initial announcement of repurchases, as according to Andriosopoulos and Lasfer (2015) they are more informative than the subsequent repurchase transaction announcements. The original dataset stretched from 1985-2014, however the timeline is trimmed to 1993-2010 due to the application of two data criteria. The first criterion is that the firm must be currently listed as a PLC, as the stock data of non-existent PLCs is inaccessible. The second criterion is that the firm must be listed as a PLC for at least five years pre and post the announcement (-/+ 5 years), thus being existent for at least 10 years around the announcement. This constraint is applied due to the methodology's requirements (see Chapter 2.3.2.), however it also receives support by Chen *et al.* (2013)'s finding that firms that repurchase shares within three-years of going public witness abnormally low operating and stock performances. Thus, the final sample consists of 67 initial announcements stating that a repurchase will be undertaken, which have a combined nominal value of £140bn, with each announcement averagely representing a repurchase of 11% outstanding market capitalisation.

The initial results find that the equity market structure influences the market reaction to repurchases, as higher firm-level leverage and a tax regime favouring repurchases over dividends have a negative impact on the market's response. The level of economic globalisation in the country too has a negative influence on the market's reaction, while board independence does not have any influence on the market reaction. Further, it is also seen that firms with a good dividend distribution history witness a more positive market response, however a negative influence on the market reaction is witnessed if firms announce a repurchase following the annual reporting of net loss (negative net profit). There are evidences that a positive influence on the market reaction is seen if the announcing firm is a financial institution and if the stock is overvalued, however this influencing pattern is not very consistent or statistically strong. Finally, the past stock performance of the announcing firm does not have any influence on the market's reaction. The quantifying of the market reaction to a repurchase announcement itself reveals interesting patterns. Firstly, the market's reaction in the short-term and long-term towards repurchase announcements of financial institutions is insignificant. In the case of non-financial firms, the market shows a consistent positive reaction in the short-term, however in the long-term their reaction is consistently negative.

2.1.3. Contributions to Existing Literature

The most important contribution of this essay to existing literature is the testing if and how does economic globalisation impact the market's reaction to repurchases. This is a valuable investigation due to three important fundamentals. The first is the above-discussed rising popularity of repurchases, which is combined with the second important aspect, the UK's internationalised status. The UK's stock market integration with global markets such as the US, Germany and France has increased over the past four decades (Berger and Pozzi, 2013), with business activities of British firms being characterised by a considerable degree of internalisation (Oehler *et al.* 2016; Oehler *et al.* 2017a), and such an operational pattern has shown to influence stock pricing due to market-driving events, such as the 2016 EU referendum (Oehler *et al.* 2017b). Finally, the third important aspect is the record-level of Foreign Direct Investment (FDI) being seen in recent years (Department for International Trade, 2016), with the FID-to-GDP ratio growing at an annual rate of 3.30% between 1993-2010 (World Bank, 2010), and FDI levels impact stock market valuation (Bayraktar, 2014). Furthermore, the newly received money inflow can be argued as not being temporary investments, as arbitrageurs are not inclined towards FDI (Baker *et al.* 2009). In light of these evidences, combined with the fact that signalling stock undervaluation is among the top three reasons why British managers undertake repurchases (Dhanani, 2016), the aggregate level of the economy's globalisation is potentially important in determining the market attitude towards repurchases. Additionally, the essay's contributions also include the above-discussed aspect of having tested a sample that is lengthiest in terms of coverage of years, and also the side-by-side comparisons between repurchases of non-financial and financial firms.

Thus, the essay will help international firms make better repurchase decisions, while also assisting asset managers holding internationalised portfolios and/or having an investment strategy associated with the firm's operational sector (non-financial or financial institution). The findings will further assist retail shareholders better manage their investment as they have relatively lower amounts of analytical resources, and will also help them make more informed decisions while casting their repurchase approval votes. Future academics can use these findings to further explore other avenues associated with repurchases, such as the influence of repurchase announcements on the firm's operating performance, while also checking for any relationship between repurchases and firm-level internationalisations.

2.1.4. Structure of this Chapter

The essay is structured as follows: Chapter 2.1 provides an introduction, Chapter 2.2 assesses the existing literature, Chapter 2.3 discusses the sample, constructs the hypotheses and explains the methodologies, Chapter 2.4 reports the results and its analyses, and Chapter 2.5 concludes the essay.

2.2. Literature Review

The UK's repurchase announcement-induced stock performance was positive prior to 2000[7], but post-2000[8] the magnitude of reaction strengthened to align with the results of the US[9]. The recent rising popularity in the UK is also attributable to the EU Market Abuse Directive of 2004 (Andriosopoulos and Lasfer, 2015), which permitted the storage of repurchased shares in the treasury, thus supporting the financing of outstanding employee stock options without additional dilution. This is a strong repurchase promoter (Griffin and Zhu, 2010), but even in the US excess outstanding employee stock options reduce the repurchase announcement-induced stock performance by 2/3rd (Jun *et al.* 2009). Such actions are curbed by the UK's regulatory framework, which is more restrictive than that of the US (Dhanani and Roberts, 2009). This is supported by Fried (2014), who states that the US' regulations regarding insider dealing during repurchases are lax. For additional leash the UK government commissioned PwC in 2018 for a special inquiry on repurchases being manipulated for benefiting executive compensation (White, 2018), with the focus being of the possible use of repurchases to inflate the reported EPS to meet targets required for receiving greater performance-related bonuses. This is an important initiative as British managers have stated in Dhanani (2016)'s survey that undertaking repurchases for adjusting the reported EPS is among the top three reasons why they initiate the payout.

In terms of the determinants of the market reaction to repurchases, the impact of stock valuation has shown to differ between being negative (Lee *et al*. 2010) to insignificant (Padgett and Wang, 2007; Crawford and Wang, 2012). This remains partially consistent with stock overvaluation causing managers to withdraw repurchases (Sonika *et al*. 2014). The influence of leverage on the market reaction conflicts from being positive (Andriosopoulos and Lasfer, 2015) to insignificant (Lee *et al*. 2010), which is highly inconsistent with existing literature citing that leverage has a negative influence on the firm-level repurchase decision-

[7] 11day CAR (-5, 0, 5) is between 1% and 2% (Rees, 1996; Oswald and Young, 2004).

[8] 3day CAR (-1, 0, 1) is between 2% and 2.50% (Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015).

[9] 3day CAR (-1, 0, 1) is between 1.70% and 2.50% (Peyer and Vermaelen, 2005; Chang *et al.* 2009).

making (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015). The influence of dividend distribution too shows inconsistencies, as its impact on the market's reaction remains insignificant (Lee *et al*. 2010; Andriosopoulos and Lasfer, 2015), however it has a positive impact on managerial decision making (Burns *et al.* 2015). Furthermore, the pre-announcement stock performance also shows contradictions of having negative (Andriosopoulos and Lasfer, 2015) to insignificant (Crawford and Wang, 2012) influence on the market's reaction, while it has a negative impact on the managerial repurchase decision-making (Burns *et al*. 2015). From a macro-institutional perspective, the relationship of repurchases with taxation is also ridden with contradictory evidences. Andriosopoulos and Lasfer (2015) find that a tax regime that makes repurchases more economical than dividends has a positive influence on market's reaction to a repurchase announcement, however this is inconsistent with Oswald and Young (2008)'s finding that taxation has no bearing on the success of a repurchase. While there are also evidences that taxation does not influence the viability of repurchases (Oswald and Young, 2004; Geiler and Renneboog, 2015).

In addition to these aspects, the influence of ownership structure on repurchases in the UK is idiosyncratic. The importance of this aspect remains in the conclusion that closely held ownership is a strong managerial tool for monitoring corporate payout related decision-making (Alzahrani and Lasfer, 2012), and if the governance mechanisms are weak, managers tend to exploit high leverage positions (Florackis and Ozkan, 2009). This is relevant as the UK has an equity preferential market structure (Demirguc-Kunt and Levine, 1999; Dobrica, 2007; Antoniou *et al.* 2008), which means that their preferred source of financing is equity issuance rather than debt incurrence. Andriosopoulos and Lasfer (2015) find that closely held ownership does not influence the market's repurchase reception, despite being an effective regulator in the decision-making. From an internal decision-making process, Renneboog and Trojanowski (2011) find different payout preferences for closely held owners, as executive managers preferred dividends to repurchases, while industrialised and commercial blockholders did not prefer undertaking any corporate payouts to avoid precommitment issues. Given the fact that British PLCs generally have a more fragmented ownership structure (Sun *et al.* 2016), which gives rise to greater possible contradictions, the level of low repurchase-preferences seen with closely held owners, and the market being uninfluenced by ownership circumstances, the efficacy in ownership structure being a determinant of repurchase as a payout-monitoring tool, or otherwise, is questionable and unreliable. In light of this conclusion the study forgoes its inclusion in the empirical investigations.

In totality we not only see a restricted supply of studies investigating the factors that drive the market's reaction to repurchase announcements, but also a degree of inconsistencies amongst their findings, and also with the managerial decision-making. Thus, this essay's timeline spanning over one of the lengthiest periods to have been empirically investigated, and the testing of the influences of a wide array of factors on the market reaction, as listed erstwhile, shall provide readers with a comprehensive and valuable list of findings.

2.3. Sample, Research Objectives and Methodologies

This section is subcategorised into three subsections. The first subsection discusses the data sources and the repurchase dataset along with the tested sample, the second subsection discusses the empirical objectives and the methodologies employed, and the third subsection discusses the robustness tests undertaken.

2.3.1. Sample Selection

In Table 1 we tabulate the transformation of our original dataset to the tested sample after the application of the two data criterions[10] discussed erstwhile. The sample's average of 11% highlights that the data filtering process is stable, as this value is identical to that seen between 1999-2004 (Padgett and Wang, 2007) and similar to the 10% seen during the period 1985-1998 (Rau and Vermaelen, 2002) and 1990-2005 (Lee *et al.* 2010). This recurring attitude of repurchase announcements being at least 2/3rd of the regulatory restricted 15% level indicates corporate pragmatism, as regulations do not mandate firms to repurchase the entire shareholder-approved value rather just caps the repurchase at that level. Thus, the authorisation of a higher value provides implementation flexibilities, such as resource allocation and market timing, which is highly crucial to success even in repurchase favouring countries like the US (Cesari *et al.* 2012).

[10] (i) The firm must be currently listed as a PLC, as the stock data of non-existent PLCs is inaccessible, and (ii) the firm must be listed as a PLC for at least five years prior to and post the repurchase announcement (-/+ 5 years), thus being existent for at least 10 years around the announcement.

Table 1: Dataset

The table presents the statistics of the initial dataset of 419 announcements between 1985 and 2014, and also of the sample of 67 obtained for the period 1993-2010 due to the application of two data filtering criterions; 1) the firm must be currently listed as a PLC due to the inaccessibility of the stock data of non-existent PLCs and 2) the announcing firm must be listed for at least 10 years around the announcement (+/- 5 years) as per the methodologies applied. After splitting the aggregate time period (1985-2014) into 5year sub-time periods, Panel I focuses on the frequency of repurchase announcements, and Panel II focuses on the final sample's statistics, namely the average percent of shares intended to be repurchased in each announcement and the average £mn value of each announcement.

Panel I: Sample Selection			**Panel II: Sample Statistics**		
Time Period	**# Repurchases (Initial)**	**# Repurchases (Sample)**	**Time Period**	**Average % of Shares Sought**	**Average Value (£mn)**
1985-1989	13	0	1985-1989	---	---
1990-1994	84	5	1990-1994	5.30	287
1995-1999	212	30	1995-1999	11.70	3,039
2000-2004	33	6	2000-2004	11.00	3,360
2005-2009	41	24	2005-2009	11.00	1,050
2010-2014	36	2	2010-2014	14.99	10
1985-2014	419	67	1993-2010	11.00	2,100

As mentioned, we include financial firms in our sample, their average repurchase also represents 11% outstanding equity, which is identical to that of non-financial firms and the sample's average, however there are other nuances. Financial institutions account for 34% of the sample but represent 43% of the sample's total £value; their average repurchase is worth £2.60bn, which is £800mn more than that of a non-financial firm's average. The stock market data is sourced from Datastream and Morningstar, while data required for constructing firm-level variables are obtained from the annual filings, which are sourced from the Companies House. Taxation data is obtained from HMRC, Institute for Fiscal Studies and generic government archives, and globalisation data from the KOF Swiss Economic Institute.

2.3.2. Research Objectives and Methodologies

– Objective 1: Drivers of the Market Reaction to Repurchase Announcements

To the best of knowledge, the most recent study that investigates market drivers are Andriosopoulos and Lasfer (2015) (1997-2006), and the study with the lengthiest time coverage is Lee *et al.* (2010) (1990-2005). However, our investigation covers a lengthier period, which is important since 'investor requirement' is among the top five repurchase motives in Britain (Dhanani, 2016), and this is best captured over long periods of time. We do this by initially developing three principal hypotheses.

– **Principal Hypotheses**

(i) Equity Market Structure: Taxation and Debt Exposure

Earlier discussions revealed that the influence of taxation on repurchases is conflicting throughout the literature. This is surprising since the tax-efficiency of repurchases over dividends has been seminally considered a driving force (Barclay and Smith, 1988), and the UK's tax framework is highly simplistic[11] when compared to other major economies, while tax reforms in European countries such as Finland have driven repurchase policies (Korkeamaki *et al.* 2010). However we would like to argue that the inconsistencies in the literature are due to the ever-evolving tax rates (Table 2) and the specific changes to the tax treatment of institutional investors (Geiler and Renneboog, 2015), which skew the tested sample of previous studies, and all of these aspects are underpinned by the market's equity preferring structure. We further argue that testing the influence of taxation on market's repurchase attitude is important due to the fragmented UK firms' ownership (Sun *et al.* 2016), which also witnesses different payout preferences amongst them (Renneboog and Trojanowski, 2011), as even in the US, which is not as fragmented according to Sun *et al.* (2016), the association of taxation and blockholders have shown to influence repurchases (Cesari *et al.* 2012). For further reliability we dually embody debt exposure alongside taxation, as a firm-level characteristic will complement the macro-institutional perspective. An additional reason is that we do not fully agree with Geiler and Renneboog (2015)'s finding that repurchases of the UK are motivated by higher debt exposure, as this not only contradicts the market's equity structure but also with the fundamental tenets of the traditional motive, the capital restructuring hypothesis, which has been consistently visible in the UK (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015).

Thus, to test the hypothesis we use two control variables, a macro-level and a firm-level representative. The macro-level variable is *Tax Differential*, the dividend tax rate relative to the capital gains tax rate, as explained by Alzahrani and Lasfer (2012)'s study on 23 OECD countries, and in line with this study we expect a negative influence. We support this influence expectation based on the erstwhile discussions of UK being a dividend-preferential market. The firm-level variable is *Leverage Ratio*, total book value of debt relative to shareholders equity, and we expect a negative influence, which is in line with the above-mentioned studies providing evidences of lower leverage promoting repurchases in the UK.

[11] For an individual investor, the UK (HMRC, 2017) and other European countries such as France (Deloitte, 2016b) differentiate between repurchases and dividends, but the former's code is much simpler than the latter; its multi-layering includes at-source deductions, reliefs and rebates. Countries such as the US and Germany (Deloitte, 2016a; IRS, 2016) do not differentiate between the payouts, eliminating the aspect of tax efficiency.

Table 2: Corporate Payout Tax Rates
The table presents the UK's tax rates applicable on individual investors' capital gains made on repurchases and on dividends earned between the period 1981 and 2017.

Capital Gains Tax Rates[12]		Dividend Tax Rates[13]	
Years	**Rate (%)**	**Years**	**Rate (%)**
1981-1988	30	1981-1993	15
1988-2008	10 to 40	1993-1999	25
2008-2012	18	1999-2016	25 | 30.60
2012-2016	18 | 28	2016-2017	7.50 | 32.50 | 38.10
2016-2017	10 | 20		

$H1_0$: The equity market structure does not influence the market reception to repurchases
$H1_1$: The equity market structure influences the market reception to repurchases

(ii) Board Independence

Managers only call for a repurchase approval vote when they favour the payout, stemming principal-agent conflicts. Thus, if managers receive support from independent directors their credibility improves, which maximises the probability of receiving shareholder approval. We use board independence (number of independent directors relative to total board size) to construct the proxy *Board*. A positive influence is expected, as even in the US governance mechanisms, such as board independence, have a positive impact on the market's reaction to repurchase announcements (Manconi *et al.* 2014), with similar positive influences seen on the viability of undertaking repurchases (John *et al.* 2015) and on the post-announcement operating performance (Caton *et al.* 2016). For an additional supplement, a short summary of the UK's governance framework is also detailed as board independence is part of the entire governance system. The framework, the *Combined Code* founded in 1992, is based on a 'comply or explain' principle. It is a 'soft' approach that mandates certain directives, while most are applicable at the firm's discretion, subject to shareholder satisfaction. Antonymous is the US' framework, which is 'legislative led' and mandates almost all directives (Jackson, 2012). Thus, since the post-dot.com bubble there is a consensus in favour of the UK's approach (Barker, 2008). The European Confederation of Directors Association (ecoDa, 2015) explains that the UK's system is the reference template for many European countries, including Germany's *Kodex* and France's *AFEP-MEDEF*[14].

$H2_0$: Board independence does not positively influence the market reception to repurchases
$H2_1$: Board independence positively influences the market reception to repurchases

[12] The rates differ based on the marginal income tax rate.

[13] In 1999, the rate for basic taxpayers remained restricted at 20%, rather than the marginal tax rate.

[14] A brief comparative discussion between the directives of the governance frameworks of the UK, Germany and France is available in the Appendix.

(iii) Economic Globalisation

Lazonick (2016) theorizes a positive repurchase-globalisation relationship for the US, but to the best of knowledge no prior study empirically investigates the influence of globalisation on UK's repurchases. This is despite United Nations (2016) reporting that globalisation has successfully contributed to the overall growth of developed economies like the UK. Milberg and Winkler (2010)'s survey of US firms finds that those with a globalised supply chain are more prone to repurchases, and according to the World Bank (2018) the UK's manufacturing sector contribution to the GDP reduced from 17% in 1990 to 9% in 2017, while in the same period the country's trade relative to GDP increased from 47% to 62%, indicating a wave of possibly internationalised supply chain. Combined with the fact that the rising foreign level of year-on-year record peak FDI (Department for International Trade, 2016; ONS, 2017), the inflow of new funds into the market may impact the general attitude towards repurchases. This assertion is supported by existing literature. Foreign investment promotes repurchases in countries like Japan by relinquishing surplus cash (Tong and Bermer, 2016) and British managers state that distributing excess cash is the leading motive for undertaking repurchases (Dhanani, 2016). Also, since Bayraktar (2014) finds that a positive FDI growth impacts stock market valuation, this phenomenon can have a tangible impact on repurchases.

Despite the discussions on the absence of repurchase-globalisation empirical literature for the UK, we recognise the complexity of economic globalisation and the sensitivity in proxy selection. Thus, the KOF Swiss Economic Institute's Index of UK's Economic Globalisation is chosen, represented by the variable *Globalisation*. The index's computation uses FDI and portfolio investment data, which are normalised by GDP, while controlling hidden import barriers, tariff rates, international trade taxes and capital controls. We also recognise that the proxy captures the country's aggregate globalisation level, and not that specific to the equity market, but this is not unintuitive since a similar logic of using aggregate macro-institutional data is the premise of the discussed repurchase-taxation inquiries for the UK. Studies such as Renneboog and Trojanowski (2011), Alzahrani and Lasfer (2012) and Geiler and Renneboog (2015) construct proxies using government-regulated tax rates. We do not have sufficient evidence to posit how globalisation will impact the market reaction, thus the finding of either a positive or negative reaction will in itself be a new contribution to existing literature.

$H3_0$: Globalisation does not negatively influence the market reception to repurchases
$H3_1$: Globalisation negatively influences the market reception to repurchases

We test the hypotheses using the cross-sectional pooled regression (Equation 1), as done by Andriosopoulos and Lasfer (2015); the approach offsets the impact of time.

$$\text{CAR 3day}_i = \beta_1 \text{Tax Differential}_{y-1} + \beta_2 \text{Leverage Ratio}_{i,y-1} + \beta_3 \text{Board}_{i,y-1} + \beta_4 \text{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} + \alpha \quad (1)$$

Where, CAR 3day_i is the 3day (-1, 0, 1) cumulative abnormal return of the ith firm, Tax Differential, Leverage Ratio, Board and Globalisation (yearly lagged) are the hypotheses proxies, $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged), and $\varepsilon_{i,y}$ is the vector of error terms and α is the alpha. We summarise the control variables' description and the expected influences in Table 3.

Table 3: Description of Control Variables

The table presents the descriptions of the independent variables used in the testing of finding the drivers of the market reaction to a repurchase announcement, and also states the expected direction of their influence. In Panel I the proxies of the discussed three hypotheses are presented (Tax Differential, Leverage Ratio, Board and Globalisation), and in Panel II the additional control variables are presented (Dividend, M/B Ratio, Stock Performance, Net Loss and Firm Type).

Control Variable	Description	Expected Influence
Panel I: Hypotheses Proxies		
Tax Differential	Effective higher dividend tax rate relative to higher capital gains tax rate (Alzahrani and Lasfer, 2012).	Negative
Leverage Ratio	Total debt relative to shareholder equity.	Negative
Board	Number of independent directors relative to the total board size.	Positive
Globalisation	The value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation.	Positive/ Negative
Panel II: Additional Control Variables		
Dividend	Binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years).	Positive
M/B Ratio	Market value relative to book value.	Negative
Stock Performance	Average 6month pre-announcement stock return excess over the average 12month pre-announcement return.	Negative
Net Loss	Binary, '1' if net profit is negative.	Negative
Firm Type	Binary, '1' if the firm is a financial institutional.	Negative

Given the UK's equity structure and the complementary existence of repurchases and dividends in the UK (Ferris *et al.* 2006; Denis and Osobov, 2008), we expect *Dividend* to have a positive influence. In line with the fundamentals of the signalling stock undervaluation hypothesis (Ikenberry *et al.* 1995), we expect *M/B Ratio* to have a negative influence. *Stock Performance* is expected to have a negative influence due to the presumption of the market being cautious of the potential momentum effect exploitation, which was revealed by Andriosopoulos and Lasfer (2015), and also complements our expectations for *M/B Ratio*. We refer to the notion that excess cash distribution is the premier repurchase motive of British managers for undertaking repurchases (Dhanani, 2016), which Geiler and Renneboog (2015) empirically concur, thus *Net Loss* is expected to have a negative influence. As the independent testing of the impact if the announcing firm is a financial institution is not popular with past studies, we expect *Firm Type* to have a negative influence; to the best of knowledge we are the first to undertake such an empirical approach.

– Objective 2: Market Reaction to Repurchase Announcements

Alongside the reactionary determinants, we quantify the market reaction independently for non-financial and financial firms over short-term and long-term periods. The periodic differentiation is important, as the announcement itself does not guarantee instant repurchase transactions, which are usually realized over the regulatory mandated 18 months period. Thus, triggering a contention of a deviation in the reaction during the post-announcement period.

(i) Short-Term Market Reaction

Regulations mandate that shareholders must receive two-week notice to appear for a repurchase vote, and since this notification is publicly disseminated the stock price may witness pre-emptive fluctuations. Thus, pragmatism indicates that upon approval an announcement will follow the next day, and the investigation corresponds to this intuition. We cover two weeks around the announcement day (0), thus 10 trading days before (-10) and after (10), resulting in a total of 21trading days. The 'market reaction' is represented by the abnormality in stock price, which is computed using the event study analysis through the application of CAPM (Sharpe, 1964; Lintner, 1965)[15]. The parameter estimation data is collected on a monthly frequency for +/-5years around the announcement, minimising statistical noise and beta bias. It is arguable that since the UK has witnessed a positive market reaction since the 1980s (Rees, 1996; Oswald and Young, 2004; Lee *et al.* 2010;

[15] Benchmark = FTSE 100. The sample comprises of firms listed on any FTSE index, but we still choose this as the benchmark since it represents 80% of the market (FTSE Russell, 2017). Risk-free rate = 3month T-Bill.

Andriosopoulos and Lasfer, 2015), our investigation can be forgone. However, the positive market attitude is not guaranteed; in countries like Australia the stock performance around an announcement is often negative (Lamba and Miranda, 2010; Akyol *et al.* 2013). Further, even if we were to presume that the results will reveal a positive market reaction, we still do not have sufficient evidences to take a similar leap and presume the actual magnitude of the reaction, and if there is difference in the reaction towards financial and non-financial firms. The stock abnormality is thus computed from various perspectives (Equations 2 through 4):

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (2)$$

Where, $AR_{i,t}$ is the daily abnormal return for firm i on day t = 21trading days (-10, -9, -8…8, 9, 10) surrounding the announcement day (0), $R_{i,t}$ is the realized stock return and $E(R_{i,t})$ is the expected stock return. For assessing if the market pre-emptively responds to the shareholder notification to appear for repurchase vote, the Mann-Whitney Rank Sum test will be conducted on the pre-announcement and post-announcement ARs.

$$RAR_{i,t} = \sum_{t=-10}^{10} AR_{i,t} \quad (3)$$

Where, RAR is the rolling abnormal return and is computed using the traditional cumulative frequency approach. Starting from the sum of the pre-announcement 10th and 9th days' AR and then adding each consecutive day; (-10, -9), (-10, -8)…(-10, 0, 10). The approach reveals the announcement-induced progressive change in a shareholder's equity ownership.

$$CAR_{i,(T1,0,T2)} = \sum_{T1=-10}^{T2} AR_{i,t} \quad (4)$$

Where, CAR is the cumulative abnormal return for 10 symmetrically constructed event windows around the announcement day (0), stretching from T1 = -10, -9…-1 to T2 = 1, 2…10; (-1, 0, 1), (-2, 0, 2)…(-10, 0, 10). We also compute DCAR, the average daily abnormal return for each CAR event window. Since CARs are symmetrically evolving, DCAR indicates the relative stability in the stock's abnormality.

(ii) Long-Term Market Reaction

A repurchase is presumed to fully or partially complete within the regulatory permitted 18 months, and this may be attributed to either one or multiple transactions. If a transaction occurs on the final possible day, it is plausible that its influence will trickle into the beginning of the 3rd year. Thus, the reaction, represented by the long-term stock price abnormality, will be computed for the post-announcement three years using a geometric monthly abnormal returns approach (Equations 5 through 7).

$$\mathrm{MLTAR}_{(1\text{st year})} = \left[\sqrt[12]{\Pi_{t=1}^{12}\left[1 + \mathrm{R}_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=1}^{12}\left[1 + \mathrm{R}_{m,t}\right]} - 1\right] \quad (5)$$

$$\mathrm{MLTAR}_{(2\text{nd year})} = \left[\sqrt[12]{\Pi_{t=13}^{24}\left[1 + \mathrm{R}_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=13}^{24}\left[1 + \mathrm{R}_{m,t}\right]} - 1\right] \quad (6)$$

$$\mathrm{MLTAR}_{(3\text{rd year})} = \left[\sqrt[12]{\Pi_{t=25}^{36}\left[1 + \mathrm{R}_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=25}^{36}\left[1 + \mathrm{R}_{m,t}\right]} - 1\right] \quad (7)$$

Where, $\mathrm{MLTAR}_{(1\text{st year})}$, $\mathrm{MLTAR}_{(2\text{nd year})}$, $\mathrm{MLTAR}_{(3\text{rd year})}$ are the monthly long-term abnormal return for the 1st, 2nd and 3rd post-announcement years, respectively, of the ith firm, t is the post-announcement month = 1st, 2nd…36th, $\mathrm{R}_{i,t}$ is the realized stock return, and $\mathrm{R}_{m,t}$ is the return on the FTSE 100 index (similar to the short-term analysis' approach).

2.3.3. Robustness Testing

(i) Determinants of Achieving Stronger Market Reaction

For ensuring reliability of the hypotheses testing two-stage robustness checking is undertaken. The first focuses on the determinants of achieving stronger short-term market reaction, which is undertaken since past literature establishes a consistently positive reaction that yields commercial benefits. Thus the ordered probit regression is undertaken for three periods (Equations 8 through 10); (i) the pre-announcement period (-10, -1), addressing the pre-emptive market response due to the notice of shareholder assembly for approval being publicly available, (ii) the announcement period (-1, 0, 1), directly verifying the results yielded from Equation 1, and (iii) the post-announcement period (0, 10), quantifying the realized influence due to spreading of the repurchase's news throughout the market.

$$\mathrm{CAR}(-10,-1)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} \quad (8)$$

$$\mathrm{CAR}(-10,-1) = \begin{cases} 1 \text{ if } \mathrm{CAR}(-10,-1) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(-10,-1) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(-10,-1) > \lambda_2 \end{cases}$$

$$\mathrm{CAR}(-1,0,1)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} \quad (9)$$

$$\mathrm{CAR}(-1,0,1) = \begin{cases} 1 \text{ if } \mathrm{CAR}(-1,0,1) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(-1,0,1) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(-1,0,1) > \lambda_2 \end{cases}$$

$$\mathrm{CAR}(0,10)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} \quad (10)$$

$$\mathrm{CAR}(0,10) = \begin{cases} 1 \text{ if } \mathrm{CAR}(0,10) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(0,10) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(0,10) > \lambda_2 \end{cases}$$

Where, $\mathrm{CAR}(-1,0,1)_i$, $\mathrm{CAR}(-10,-1)_i$ and $\mathrm{CAR}(0,10)_i$ of i^{th} firms are ordinal variables = 1, 2 or 3 if the value of the CAR of their associated event window is in the 1st, 2nd or 3rd tercile[16], respectively, λ_1 and λ_2 are the cut-off points (upper most levels) of the 1st and 2nd terciles, respectively, $\mathrm{Tax\ Differential}$, $\mathrm{Leverage\ Ratio}$, Board and $\mathrm{Globalisation}$ (yearly lagged) are the hypotheses proxies, $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged), $\varepsilon_{i,y}$ is the vector of error terms. We summarise the control variables' description and the expected influences in Table 3.

(ii) Leamer's Global Sensitivity Analysis

The second-stage robustness check is based on Leamer (1985)'s advocacy of global sensitivity analysis. The concept argues that continual alteration in the testing environment discerns the initial outcome's sensitivity, which in-turn reveals their reliability. Thus Equation 1 is replicated, but under four different conditions; (i) exclusion of each announcement, (ii) exclusion of each year, (iii) separating firms based on their operational sector, financial v/s non-financial institution, and (iv) sequentially dropping each control variable.

[16] tercile divides the data into three equal sets, 1st (3rd) tercile houses the lowest (highest) 1/3rd of the values.

2.4. Results

This section is subcategorised into four subsections. The first subsection discusses the summary statistics of the independent variables, the second subsection discusses the results from the testing of the drivers of market reaction to repurchases, the third subsection discusses the results from the testing of the market's reaction to repurchases, and the fourth subsection discusses the results from the two sets of robustness tests.

2.4.1. Summary Statistics

The summary statistics of the independent variables used in the multivariate empirical testing are reported in Table 4. *Tax Differential* indicates that in 1993 dividends were 63% tax-friendlier than repurchases, compliant with the then repurchases' less popularity. However with time this figure narrowed, and from the late-1990s it went in favour of repurchases; by 2008 they were 55% tax-friendlier than dividends. The tax changes of 2010 marginally increased the dividend friendliness, but since then further changes have resulted in the current differential being 1.90 (HMRC, 2017), thus making repurchases almost twice more tax-efficient. The average *Leverage Ratio* of 2 is higher than the country's average of 0.41 (Dobrica, 2007), consistent with Geiler and Renneboog (2015)'s finding that high leverage promotes repurchases over dividends. The dissimilarity between non-financial firms (1.20) and financial firms (3.75) is attributable to the differences in their intangibility.

The average *Board* is 58%, indicating good governance practices since the general board independence in the UK is 41% (Guest, 2008) as opposed to 70% in the US (Boone *et al.* 2007). Board independence is not a standalone performance enhancer, its combination with factors such as centrality results in lower leverage (Mateus *et al.* 2015), which is conducive to the UK's equity structure and the governance's flexibilities allow attaining an optimum mix. Non-financial firms are less independent (47%) than financial firms (80%), compliant with European literature (Fernandes *et al.* 2017). Complementarily, board independence of financial firms is positively associated with performance during economic crises (Fernandes *et al.* 2016a) and access to bailouts (Fernandes *et al.* 2016b), thus the sample's financial firms reveal board-level stability in favour of supporting survival during distress. Based on the sample data, *Globalisation* witnesses an average annual increase of 0.56%, which is encouraging given the maturity of the highly industrialised economy. The achievement is dominantly attributed to the service sector's growth; its GDP contribution reached a record 80% in 2016 (Cadman, 2016) and trade surplus a historical £63bn in 2015 (Celic, 2017).

Table 4: Summary Statistics of Control Variables

The table presents the summary statistics of the independent variables used in the testing of finding the drivers of the market reaction to a repurchase announcement. In Panel I the firm-specific factors are summarised; Leverage Ratio (total debt relative to shareholder equity), Board (number of independent directors relative to the total board size), Dividend (binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years)), M/B Ratio (market value relative to book value), Stock Performance (average 6month pre-announcement stock return excess over the average 12month pre-announcement return) and Net Loss (binary, '1' if net profit is negative). In Panel II the country-specific factors are presented; Tax Differential (effective higher dividend tax rate relative to higher capital gains tax rate) and Globalisation (the value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation). Moreover, both panels subcategorise the summary statistics based on the firm's operational sector, non-financial or financial institution.

	Mean	Std. Dev.	Minimum	Maximum
Panel I: Firm-Specific Variables[17]				
Leverage Ratio				
All Firms	2.079	3.479	0.013	14.424
Non-Financial Firms	1.208	1.186	0.029	6.421
Financial Firms	3.744	5.449	0.013	14.424
Board				
All Firms	0.584	0.248	0.200	1.000
Non-Financial Firms	0.473	0.153	0.250	1.000
Financial Firms	0.797	0.265	0.200	1.000
Dividend				
All Firms	0.522	0.503	0.000	1.000
Non-Financial Firms	0.613	0.492	0.000	1.000
Financial Firms	0.347	0.486	0.000	1.000
M/B Ratio				
All Firms	2.786	4.223	0.178	27.790
Non-Financial Firms	3.411	4.706	0.630	27.790
Financial Firms	1.590	2.817	0.178	14.388
Stock Performance				
All Firms	0.004	0.038	-0.053	0.257
Non-Financial Firms	0.007	0.044	-0.053	0.257
Financial Firms	-0.003	0.015	-0.047	0.032
Net Loss				
All Firms	0.164	0.373	0.000	1.000
Non-Financial Firms	0.090	0.290	0.000	1.000
Financial Firms	0.304	0.470	0.000	1.000
Panel II: Country Specific Yearly Variables				
Tax Differential	0.769	0.367	0.380	1.700
Globalisation	71.778	2.854	65.770	76.120

Dividend reveals that 52% of the firms have a strong dividend distribution history, with non-financial firms (61%) surpassing financial firms (35%). The average *M/B Ratio* (2.80) is slightly higher than the country's average (2) for the period 1979-2015 (Keimling, 2016). However financial firms are relatively less overvalued (1.59) than non-financial firms (3.41), which is intuitive since the sensitivity of the former attracts surplus attention. As a perfect market condition is improbable (Latif *et al.* 2011) certain degree of overvaluation is presumable, and the magnitude seen with the sample is not alarming. The average *Stock Performance* for non-financial firms (0.70%) is positive as opposed to that of financial firms (-0.30%). For a broader ascertainment the figures are deconstructed over 5year blocks (Table

[17] The total number of firms is 67 (100%), of which 44 (66%) are non-financial and 23 (34%) are financial.

5), with a sub-splitting to highlight the impact of the great recession (2008-2009). It is revealed that the performance has revolved in a restricted range of -1% to 1%, diminishing the contention of repurchases being used for artificially supporting a falling stock price. Also, the great recession has not shown any major impact on the performance pattern, highlighting the relative insulation from the crisis. *Net Loss* reveals that averagely 16% of the sample firms suffer a loss prior to the announcement, while loss-making financial firms are more likely (30%) to undertake a repurchase than non-financial firms (9%).

Table 5: Long-Term Stock Performance
The table presents the 5year time-specific breakdown of the long-term stock performance prior to a repurchase announcement, and also further subcategorises for the period of recession (2008-2009).

Time Period	Stock Performance (%)
1990-1994	-0.32
1995-1999	0.91
2000-2004	-0.70
2005-2009	0.31
2005-2007	0.76
2008-2009	-0.36
2010-2014	-0.58

The subcategorisation based on operational sector unveils strong repurchase-specific idiosyncrasies. A typical financial firm when compared to a non-financial firm; is more leveraged, has greater board independence, witnesses milder overvaluation, bears greater dividend substitution propensities, its stock realizes negative pre-announcement long-term returns and remains unrestrained towards repurchases when financially constraint.

2.4.2. Drivers of the Market Reaction to Repurchase Announcements

The reaction drivers are tested under different environments (Table 6). The five additional control variables are held at the base in Model I, and each hypothesis proxy is individually added at the helm in Models II through V, thus adding 'bottom up stress', and finally in Model VI all of the control variables are simultaneously tested. For this empirical undertaking, we do not expect endogeneity with any of the nine independent variables. This is concluded as the dependent variable employed for the testing is the 3day (-1, 0, +1) CAR, and none of the independent variables represent information that is equivalent or similar to that realized from the 3day (-1, 0, +1) CAR. Thus, no independent variable can be interchanged with the dependent variable for realizing the same empirical objective.

Table 6: Drivers of the Market Reaction to Repurchase Announcements

The table presents the results from the testing of finding the drivers of the market reaction to a repurchase announcement, as described in Equation 1: $\text{CAR 3day}_i = \beta_1 \text{Tax Differential}_{y-1} + \beta_2 \text{Leverage Ratio}_{i,y-1} + \beta_3 \text{Board}_{i,y-1} + \beta_4 \text{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} + \alpha$. Where, CAR 3day_i is the 3day (-1, 0, 1) cumulative abnormal return of the ith firm, Tax Differential (effective higher dividend tax rate relative to higher capital gains tax rate), Leverage Ratio (total debt relative to shareholder equity), Board (number of independent directors relative to the total board size) and Globalisation (the value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation) are yearly lagged hypotheses proxies. $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged); Dividend (binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years)), M/B Ratio (market value relative to book value), Stock Performance (average 6month pre-announcement stock return excess over the average 12month pre-announcement return), Net Loss (binary, '1' if net profit is negative) and Firm Type (binary, '1' if the firm is a financial institutional). $\varepsilon_{i,y}$ is the vector of error terms and α is the alpha. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and t-statistics are stated in the parenthesis.

	I	II	III	IV	V	VI
Dividend	0.068**	0.075**	0.048	0.066**	0.041	0.031
	(2.11)	*(2.38)*	*(1.52)*	*(2.06)*	*(1.31)*	*(1.00)*
M/B Ratio	0.003	0.003	0.004	0.003	0.004	0.005*
	(1.02)	*(0.91)*	*(1.27)*	*(1.12)*	*(1.53)*	*(1.78)*
Stock Performance	0.145	0.068	0.263	0.164	0.239	0.290
	(0.39)	*(0.19)*	*(0.73)*	*(0.44)*	*(0.68)*	*(0.86)*
Net Loss	-0.074*	-0.042	-0.118***	-0.095**	-0.064	-0.100**
	(-1.78)	*(-0.98)*	*(-2.73)*	*(-2.05)*	*(-1.63)*	*(-2.23)*
Firm Type	0.025	0.029	0.058*	0.003	-0.001	0.001
	(0.80)	*(0.94)*	*(1.77)*	*(0.10)*	*(-0.05)*	*(0.03)*
Tax Differential		-0.076**				-0.052
		(-2.03)				*(-1.91)*
Leverage Ratio			-0.011**			-0.008*
			(-2.59)			*(-1.44)*
Board				0.081		0.096
				(1.03)		*(1.25)*
Globalisation					-0.018***	-0.017***
					(-2.94)	*(-2.84)*
Constant	-0.023	0.027	0.002	-0.061	1.280***	1.230***
	(-0.80)	*(0.72)*	*(0.09)*	*(-1.30)*	*(2.88)*	*(2.87)*
Adjusted R^2	0.197	0.174	0.206	0.132	0.229	0.331
Obs.	67	67	67	67	67	67

Tax Differential has a negative influence, thus revealing that according to our expectations, the market reaction to repurchase announcements is deterred when the tax framework makes repurchases more economical than dividends. This is also consistent with the repurchase-taxation relationship seen in the UK (Alzahrani and Lasfer, 2012). The phenomenon can be attributed to the market using this approach as a signalling tool for ensuring a curb on any firm intentions of using repurchases as possible dividend replacements, which is supported by the historical complementary nature of the two corporate payouts (Ferris *et al.* 2006; Denis and Osobov, 2008). Further, *Leverage Ratio* too has a negative influence, which is consistent with our expectations and also with the past UK literature stating that repurchase and debt exposure have an inverse relationship (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and

Ozkan, 2015). The market's attitude is encouraging, as during instances when the firm is highly leveraged, they use their response to the repurchase announcement for sending a cautionary message to the firm, regarding the impact of the repurchase due to a reduction in the outstanding stock volume. In the light of *Tax Differential* and *Leverage Ratio* both having significant negative influences, we accept the alternative hypothesis $H1_1$: The equity market structure influences the market reception to repurchases.

The insignificance of *Board* is inconsistent with our expectations, which indicates that the market does not find the presence of independent directors a relevant factor in determining their reaction to repurchases. This can be attributed to the regulatory directive that the firm must gain shareholder approval for undertaking a repurchase (Dhanani and Roberts, 2009), as the market can find that since the announcement is only possible after shareholders are in agreement with the managerial, the role of independent directors in this instance is thus less effective. This is consistent with past UK findings indicating that independent directors often feel that their role is more advisory, as opposed to that being of a monitor (Franks *et al.* 2001; Ozkan, 2007). Given the insignificance of *Board*, we accept the null hypothesis $H2_0$: Board independence does not positively influence the market reception to repurchases.

The influence of *Globalisation* is negative, which is a new contribution of this study to existing literature. This finding indicates that the repurchases-globalisation relationship theorised for the US (Lazonick, 2016), cannot be restated for the UK due to the newly found empirical evidence. Further addition to knowledge is the concept of rising inflow of foreign money into British markets causing a negative market perception of repurchases. This can be attributed to the possibility that greater investment supply causes a reduction in stock price, consistent with the supply-demand principle, and the market presumes that to artificially support a price fall repurchases are being undertaken; since the firm cannot regulate the 'demand' side of the aggregate market, they are presumed to be regulating the 'supply' side. In light of *Globalisation*'s influencing pattern, we accept the alternative hypothesis $H3_1$: Globalisation negatively influences the market reception to repurchases.

It is seen that *Dividend* has a positive influence, which is consistent with our expectations. Further, it is also consistent with the historical viewpoint that the UK is dividend-preferring (Renneboog and Trojanowski, 2011), and repurchases and dividends have a complementary relationship (Ferris *et al.* 2006; Denis and Osobov, 2008; Burns *et al.* 2015). Thus, it can be concluded that if firms wish to witness a market reaction that encourages repurchase undertaking, as it may also help in getting shareholder approvals, then it is important that they first undertake substantial dividend distribution. The influence of *Net Loss* is negative, which is consistent with our expectations and remains strongly aligned with the UK's environment. British managers have stated in Dhanani (2016)'s survey that the distribution of surplus cash is the key reason for undertaking repurchases, and empirical evidences have supported the positive relationship between cash circumstances and repurchases (Lee *et al.* 2010; Lee and Suh 2011; Burns *et al*. 2015; Cesari and Ozkan, 2015). In fact, this positive association has the greatest level of consensus amongst existing literature (see Chapter 1.3.1).

The influence of *M/B Ratio* is positive, which remains inconsistent with our expectations, as it indicates that overvalued stocks tend to encourage the market response towards repurchase, which by their very nature reduce the stock value thus automatically incrementing their valuation. This finding also contradicts past literature (Crawford and Wang, 2012; Andriosopoulos and Lasfer, 2015; Geiler and Renneboog, 2015), however, given that the positive influence is very restrictive, it is not highly concerning. Similarly, *Firm Type* too contradicts our expectations by having a positive influence, but given that the influence is extremely sparring the finding does not provide sufficient evidences to state that the market does certainly react more positively towards repurchases when the announcing firm is a financial institution. Finally, the influence of *Stock Performance* is insignificant, indicating that past long-term performance of the firm's stock does not affect the market's attitude towards the announcement of a repurchase. This finding thus remains inconsistent with our expectations and past UK literature (Burns *et al*. 2015; Andriosopoulos and Lasfer, 2015).

Thus, in totality we find that the factors that are primarily important in determining the market reaction to repurchases are the market's equity structure, which is represented by the country's tax policy and a firm's debt exposure, the economy's globalisation level, the firm's dividend history and also its state of solvency.

2.4.3. Market Reaction to Repurchase Announcements

(i) Short-Term Market Reaction

The repurchase announcement-induced short-term stock abnormality is reported in Table 7. The stock of non-financial firms witnesses continuous positive performance, while disconcert towards financial firms is iterated as the market reaction towards them is absolutely insignificant. However, for a grass root perspective the insignificance is briefly ignored and the ARs, which are the computational foundation of the remaining abnormal returns, are compared to the expected return, realized return and the benchmark FTSE 100's performance (Figures 1 and 2). Over the tested 21trading days the expected return of non-financial firms (financial firms) remains below (above) the FTSE 100 performance, thus revealing the difference in their systemic risks, which is aligned with their characteristics. Given the insignificance of the financial firms' results, further analysis will solely focus on the reaction towards non-financial firms. The positive pre-announcement ARs reveal the significant impact caused by the shareholder notification for an authorisation vote, which is compliant with the methodology's intuition and supports the assertion that for ensuring information efficiency the announcement must follow immediately after gaining the shareholder approval. This market efficiency of responding to relevant news is visible with not just corporate events, but also political circumstances; the market swiftly responded to the Brexit vote result with instant price corrections observable (Oehler *et al.* 2017b).

Figure 1: Comparing ARs, Non-Financial Firms
The graph compares the daily abnormal returns of non-financial firms with the expected stock return, realized stock return and the return on the FTSE 100 index.

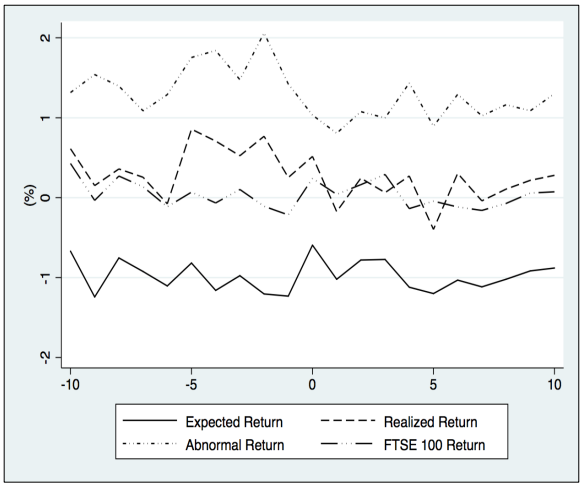


Figure 2: Comparing ARs, Financial Firms
The graph compares the daily abnormal returns of financial firms with the expected stock return, realized stock return and the return on the FTSE 100 index.

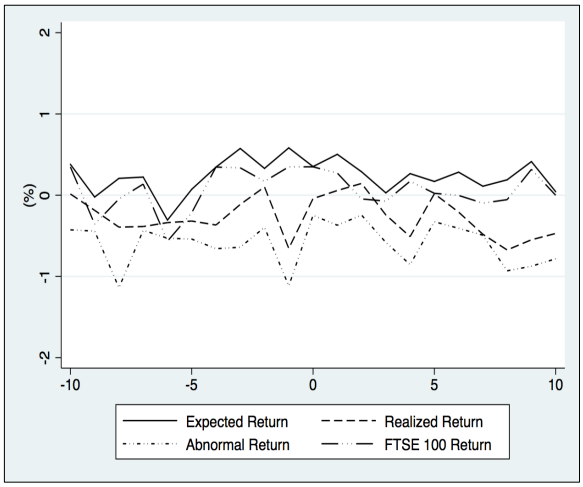


Table 7: Short-Term Abnormal Stock Returns[18]

The table presents the results from the testing of the market's short-term reaction towards repurchase announcements, as described in; (i) Equation 2: $AR_{i,t} = R_{i,t} - E(R_{i,t})$, where $AR_{i,t}$ is the daily abnormal return for firm i on day t = 21trading days (-10, -9, -8…8, 9, 10) surrounding the announcement day (0), $R_{i,t}$ is the realized stock return and $E(R_{i,t})$ is the expected stock return, (ii) Equation 3: $RAR_{i,t} = \sum_{t=-10}^{10} AR_{i,t}$, where RAR is the rolling abnormal return and is computed using the traditional cumulative frequency approach. Starting from the sum of the pre-announcement 10th and 9th days' AR and then adding each consecutive day; (-10, -9), (-10, -8)…(-10, 0, 10) and (iii) Equation 4: $CAR_{i,(T1,0,T2)} = \sum_{T1=-10}^{T2} AR_{i,t}$, Where, CAR is the cumulative abnormal return for 10 symmetrically constructed event windows around the announcement day (0), stretching from T1 = -10, -9…-1 to T2 = 1, 2…10; (-1, 0, 1), (-2, 0, 2)…(-10, 0, 10). We also compute DCAR, the average daily abnormal return for each CAR event window. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels.

Panel I: Non-Financial Firms

Day	AR (%)	Event Window	RAR (%)	Event Window	CAR (%)	DCAR (%)
-10	1.31**			(-1, 0, 1)	3.26**	1.09**
-9	1.54**	(-10, -9)	2.85**	(-2, 0, 2)	6.40**	1.28**
-8	1.40**	(-10, -8)	4.25**	(-3, 0, 3)	8.87**	1.27**
-7	1.09*	(-10, -7)	5.34**	(-4, 0, 4)	12.15***	1.35**
-6	1.29**	(-10, -6)	6.62**	(-5, 0 5)	14.79**	1.34**
-5	1.75***	(-10, -5)	8.38**	(-6, 0, 6)	17.37**	1.34**
-4	1.84***	(-10, -4)	10.22**	(-7, 0, 7)	19.48**	1.30**
-3	1.48***	(-10, -3)	11.69**	(-8, 0, 8)	22.04**	1.30**
-2	2.06***	(-10, -2)	13.75***	(-9, 0, 9)	24.67**	1.30**
-1	1.42***	(-10, -1)	15.17***	(-10, 0, 10)	27.28**	1.30**
0	1.03**	(-10, 0)	16.21***		Average	1.29**
1	0.81*	(-10, 1)	17.01**			
2	1.08**	(-10, 2)	18.09**			
3	1.00**	(-10, 3)	19.09**			
4	1.43***	(-10, 4)	20.52**			
5	0.89*	(-10, 5)	21.42**			
6	1.29***	(-10, 6)	22.71**			
7	1.02**	(-10, 7)	23.73**			
8	1.16**	(-10, 8)	24.90**			
9	1.09**	(-10, 9)	25.98**			
10	1.30***	(-10, 10)	27.28**			

The above panel presents the results from the testing of the market's short-term reaction towards repurchase announcements of non-financial firms.

[18] The results are coherent with the aggregate sample's 'lump sum'.

Panel II: Financial Firms						
Day	**AR (%)**	**Event Window**	**RAR (%)**	**Event Window**	**CAR (%)**	**DCAR (%)**
-10	-0.43			(-1, 0, 1)	-2.61	-0.87
-9	-0.44	(-10, -9)	-1.43	(-2, 0, 2)	-3.78	-0.76
-8	-1.14	(-10, -8)	-2.88	(-3, 0, 3)	-5.56	-0.79
-7	-0.43	(-10, -7)	-3.59	(-4, 0, 4)	-7.64	-0.85
-6	-0.53	(-10, -6)	-4.40	(-5, 0 5)	-9.07	-0.82
-5	-0.54	(-10, -5)	-5.23	(-6, 0, 6)	-10.54	-0.81
-4	-0.66	(-10, -4)	-6.16	(-7, 0, 7)	-12.03	-0.80
-3	-0.64	(-10, -3)	-7.09	(-8, 0, 8)	-14.71	-0.87
-2	-0.40	(-10, -2)	-7.75	(-9, 0, 9)	-16.59	-0.87
-1	-1.12	(-10, -1)	-9.19	(-10, 0, 10)	-18.37	-0.87
0	-0.25	(-10, 0)	-9.70		Average	-0.83
1	-0.37	(-10, 1)	-10.36			
2	-0.24	(-10, 2)	-10.87			
3	-0.58	(-10, 3)	-11.73			
4	-0.85	(-10, 4)	-12.87			
5	-0.33	(-10, 5)	-13.47			
6	-0.41	(-10, 6)	-14.14			
7	-0.49	(-10, 7)	-14.92			
8	-0.93	(-10, 8)	-16.14			
9	-0.87	(-10, 9)	-17.30			
10	-0.78	(-10, 10)	-18.37			

The above panel presents the results from the testing of the market's short-term reaction towards repurchase announcements of financial firms.

The average pre-announcement AR (1.52%) is greater than the post-announcement average (1.11%), which is explainable by a reactionary saturation due to the pre-emptive response towards the shareholder notification. The Mann-Whitney test (Table 8) concludes that this fall is significant at the 1% level, thus supporting our assertion. The continuous positive RAR further reveals that from the moment the market becomes aware of a potential repurchase in the imminent-term, the value of a shareholder's equity holding continually snowballs until at least two weeks after the payout's official announcement has been realized.

Table 8: Mann-Whitney Rank Sum Test

The table presents the results from the Mann-Whitney test to verify if the pre and post announcement daily abnormal returns of non-financial and financial firms are statistically different. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels. z-statistics are stated in the parenthesis for the ARs, and in the case of the Z-Score they constitute the p-value.

	Average AR Non-Financial Firms (%)	**Average AR Financial Firms (%)**
Pre-Announcement	1.52***	-0.63
	(16.509)	(-7.232)
Post-Announcement	1.11***	-0.59
	(18.134)	(-7.276)
Z-Score	3.098***	-0.845
	(0.001)	(0.398)

The 3day CAR (3.26%) is higher than the post-2000 literature (Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015) and twice than that of the US (Chang *et al.* 2009). The magnitude thus corresponds to the rising repurchase popularity over the past decades, and also reiterates the market's efficiency of price adjustment to maintain market capitalisation. The DCAR shows stability across the event windows, thus the price rise is less likely to be temporary, as seen in the case of Germany (Seifert and Stehle, 2003), and is rather absorbed into the intrinsic value. The market's consistent positive reaction contends if they have the ability of spotting circumstances that require a negative reaction, such as when repurchases are undertaken due to managerial overconfidence in judging the market, which negatively influences the repurchase (Shu *et al.* 2013). However, using a real market example helps mitigate this contention; the negative reaction seen in 2014 when WPP PLC announced a repurchase programme (Jones, 2014). The market discerned that the repurchase is a pre-empt tool for artificially inflating the stock value and accounting ratios in the imminent-term, so that the immediate-term announcement of the firm missing its revenue target will only eat into the recently yielded false gains. Thus, the market's robust determination of the overall circumstances surrounding a repurchase is observable in a real-world setting.

(ii) Long-Term Market Reaction

The results from the testing of the market's long-term reaction to repurchase announcements are presented in Table 9, which reveal the annualized performance of a shareholder equity holding relative to the FTSE 100 benchmark. The basic essence of the short-term reaction is replicated with the long-term results, as the market continues to react insignificantly towards financial firms while having a significant response towards non-financial firms. However the directionality is negative, which is coherent with Rees (1996) but not with the positive findings of Oswald and Young (2004) and Crawford and Wang (2012). In the long-term repurchase transactions are realized and the outstanding stock volume reduces, which increments the firm's debt exposure, thus the equity structure's ethos causes the market to react negatively. This also bridges the disparity with the short-term results; the instant positivity is accredited to efforts of ensuring the theoretically necessary proportionate stock price rise, which ensures the firm's key financial ratios are maintained, and not necessarily because of market liking. Thus, the market's aggregate individuality is revealed. Since frequent announcements reduce the market's long-term positive reaction magnitude in the US (Yook, 2010), British managers may benefit from similar reactionary saturation, as this will reduce the negative impact of repurchases. Such tact will either mean undertaking frequent repurchases and/or increase its longevity via re-authorisations.

Table 9: Long-Term Abnormal Stock Returns: Annualized MLTAR

The table presents the results from the testing of the market's long-term reaction towards repurchase announcements, as described in; (i) Equation 5: $\text{MLTAR}_{(1\text{st year})} = \left[\sqrt[12]{\Pi_{t=1}^{12}\left[1 + R_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=1}^{12}\left[1 + R_{m,t}\right]} - 1\right]$, (ii) Equation 6: $\text{MLTAR}_{(2\text{nd year})} = \left[\sqrt[12]{\Pi_{t=13}^{24}\left[1 + R_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=13}^{24}\left[1 + R_{m,t}\right]} - 1\right]$, and (iii) Equation 7: $\text{MLTAR}_{(3\text{rd year})} = \left[\sqrt[12]{\Pi_{t=25}^{36}\left[1 + R_{i,t}\right]} - 1\right] - \left[\sqrt[12]{\Pi_{t=25}^{36}\left[1 + R_{m,t}\right]} - 1\right]$, where, $\text{MLTAR}_{(1\text{st year})}$, $\text{MLTAR}_{(2\text{nd year})}$, $\text{MLTAR}_{(3\text{rd year})}$ are the monthly long-term abnormal return for the 1st, 2nd and 3rd post-announcement years, respectively, of the ith firm, t is the post-announcement month = 1st, 2nd…36th, $R_{i,t}$ is the realized stock return, and $R_{m,t}$ is the return on the FTSE 100 index (similar to the short-term analysis' approach). Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels.

Year	Non-Financial Firms (%)	Financial Firms (%)
1st Year	-8.79**	-4.15
2nd Year	-7.04***	-0.07
3rd Year	-13.45***	10.87

2.4.4. Robustness Testing

(i) Determinants of Stronger Market Reaction

The results of the ordered probit regression are presented in Table 10. The primary intention is the reliability checking of the hypotheses; thus, their proxies will receive the dominant analytical focus. In Panel I the coefficients are presented while in Panel II the marginal effects are presented, and within them there are three sub-panels, A, B and C, which house the results for the pre announcement (-10, -1), actual announcement (-1, 0, 1) and post announcement (0, 10) periods, respectively. The empirical set-up within these panels is identical to that applied to the initial testing of drivers of the market reaction to repurchase announcements (Table 6). The marginal effects of the 1st (3rd) tercile represents the likelihood of the abnormal return being the in the lowest (highest) 1/3rd values.

The influence of *Tax Differential* remains significantly negative only around the market's instant reaction, which directly attests the initial results; however, the influence for the remaining periods is insignificant. *Leverage Ratio* has an absolute negative influence, remaining consistent with our expectations and the initial results. Thus, the influences remain consistent with the H1 hypothesis' expectations. Thus, we continue to accept the alternative hypothesis $H1_1$: The equity market structure influences the market reception to repurchases. *Board* has an absolute positive influence, which is misaligned with the initial results but conforms to the H2 hypothesis' expectations. Thus, indicating the market's assumed assurance that independent directors effectively monitor the entire repurchase process, from the period when shareholders are called for authorisation until the payout is successfully announced and the news settles into the market. The pattern also infers that independent directors are considered unbiased despite having a closer relationship with the 'agent' than the

'principal'. In light of the results being consistent with our expectations but inconsistent with the initial results, the outcomes of the second-stage robustness checking will be considered for better clarity. *Globalisation* has an absolute negative influence, adhering to the initial results and the H3 hypothesis' expectations. Thus, we continue to accept the alternative hypothesis $H3_1$: Globalisation negatively influences the market reception to repurchases.

Table 10: Robustness Check: Determinants of Stronger Market Reaction

The table presents the results from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, as described in;

(i) Equation 8: $$\mathrm{CAR}(-10,-1)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y}$$

$$\mathrm{CAR}(-10,-1) = \begin{cases} 1 \text{ if } \mathrm{CAR}(-10,-1) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(-10,-1) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(-10,-1) > \lambda_2 \end{cases}$$

(ii) Equation 9: $$\mathrm{CAR}(-1,0,1)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y}$$

$$\mathrm{CAR}(-1,0,1) = \begin{cases} 1 \text{ if } \mathrm{CAR}(-1,0,1) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(-1,0,1) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(-1,0,1) > \lambda_2 \end{cases}$$

(iii) Equation 10: $$\mathrm{CAR}(0,10)_i = \beta_1 \mathrm{Tax\ Differential}_{y-1} + \beta_2 \mathrm{Leverage\ Ratio}_{i,y-1} + \beta_3 \mathrm{Board}_{i,y-1} + \beta_4 \mathrm{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y}$$

$$\mathrm{CAR}(0,10) = \begin{cases} 1 \text{ if } \mathrm{CAR}(0,10) \leq \lambda_1 \\ 2 \text{ if } \lambda_1 < \mathrm{CAR}(0,10) \leq \lambda_2 \\ 3 \text{ if } \mathrm{CAR}(0,10) > \lambda_2 \end{cases}$$

Where, $\mathrm{CAR}(-1,0,1)_i$, $\mathrm{CAR}(-10,-1)_i$ and $\mathrm{CAR}(0,10)_i$ of i^{th} firms are ordinal variables = 1, 2 or 3 if the value of the CAR of their associated event window is in the 1st, 2nd or 3rd tercile[19], respectively, λ_1 and λ_2 are the cut-off points (upper most levels) of the 1st and 2nd terciles, respectively, Tax Differential (effective higher dividend tax rate relative to higher capital gains tax rate), Leverage Ratio (total debt relative to shareholder equity), Board (number of independent directors relative to the total board size) and Globalisation (the value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation) are yearly lagged hypotheses proxies. $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged); Dividend (binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years)), M/B Ratio (market value relative to book value), Stock Performance (average 6month pre-announcement stock return excess over the average 12month pre-announcement return), Net Loss (binary, '1' if net profit is negative) and Firm Type (binary, '1' if the firm is a financial institutional). $\varepsilon_{i,y}$ is the vector of error terms and α is the alpha. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parenthesis.

[19] tercile divides the data into three equal sets, 1st (3rd) tercile houses the lowest (highest) 1/3rd of the values.

Panel I: Coefficients

Panel IA: Intention of a Repurchase, Dependent Variable: CAR (-10, -1)

	I	II	III	IV	V	VI
Dividend	0.941***	1.035***	0.712*	0.965***	0.766**	0.671
	(2.70)	*(2.91)*	*(1.90)*	*(2.69)*	*(2.11)*	*(1.55)*
M/B Ratio	0.088*	0.084*	0.133**	0.102**	0.103**	0.154***
	(1.87)	*(1.82)*	*(2.31)*	*(2.13)*	*(2.12)*	*(2.93)*
Stock Performance	3.924	3.130	8.404	4.473	4.429	8.552*
	(0.86)	*(0.69)*	*(1.57)*	*(0.97)*	*(1.01)*	*(1.79)*
Net Loss	-0.244	0.001	-1.133**	-0.847*	-0.178	-1.598***
	-(0.56)	*(0.00)*	*(-2.27)*	*(-1.71)*	*(-0.41)*	*(-2.57)*
Firm Type	0.310	0.360	0.999**	-0.400	0.093	0.082
	(0.89)	*(1.02)*	*(2.37)*	*(-0.91)*	*(0.25)*	*(-0.14)*
Tax Differential		-0.620				-0.751
		(-1.53)				*(-1.58)*
Leverage Ratio			-0.306***			-0.282***
			(-3.52)			*(-3.20)*
Board				2.540***		3.421***
				(2.73)		*(2.71)*
Globalisation					-0.162**	-0.277***
					(-2.35)	*(-3.04)*
Likelihood Ratio Chi^2	18.61	20.99	39.84	26.52	24.26	55.99
Pseudo R^2	0.126	0.142	0.270	0.180	0.164	0.380
Obs.	67	67	67	67	67	67

The above panel presents the coefficients obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the coefficients relating to the market reaction to the possible undertaking of a repurchase.

Panel IB: Actual Repurchase Announcement, Dependent Variable: CAR (-1, 0, 1)

	I	II	III	IV	V	VI
Dividend	0.645*	0.741**	0.406	0.620*	0.421	0.272
	(1.88)	*(2.12)*	*(1.13)*	*(1.79)*	*(1.17)*	*(0.67)*
M/B Ratio	0.071	0.067	0.093*	0.075*	0.090**	0.115**
	(1.60)	*(1.54)*	*(1.89)*	*(1.72)*	*(1.96)*	*(2.49)*
Stock Performance	6.359	5.438	8.522	6.949	6.713	9.156*
	(1.25)	*(1.10)*	*(1.61)*	*(1.34)*	*(1.45)*	*(1.92)*
Net Loss	-0.525	-0.254	-1.297***	-0.928*	-0.449	-1.657***
	(-1.21)	*(-0.55)*	*(-2.59)*	*(-1.90)*	*(-1.03)*	*(-2.67)*
Firm Type	0.555	0.622*	1.198***	0.169	0.284	0.387
	(1.61)	*(1.77)*	*(2.87)*	*(0.42)*	*(0.78)*	*(0.73)*
Tax Differential		-0.711*				-0.722
		(-1.73)				*(-1.57)*
Leverage Ratio			-0.185***			-0.185***
			(-3.44)			*(-3.10)*
Board				1.527*		2.676**
				(1.83)		*(2.42)*
Globalisation					-0.208***	-0.296***
					(-2.95)	*(-3.40)*
Likelihood Ratio Chi^2	14.59	17.66	27.61	17.96	23.67	45.18
Pseudo R^2	0.099	0.120	0.187	0.122	0.160	0.307
Obs.	67	67	67	67	67	67

The above panel presents the coefficients obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the coefficients relating to the market's instant reaction to the repurchase announcement.

Panel IC: Post the Announcement, Dependent Variable: CAR (0, 10)						
	I	**II**	**III**	**IV**	**V**	**VI**
Dividend	0.986***	1.049***	0.758**	1.052***	0.808**	0.743*
	(2.81)	*(2.94)*	*(2.02)*	*(2.88)*	*(2.22)*	*(1.67)*
M/B Ratio	0.086*	0.082*	0.127**	0.104**	0.101**	0.159***
	(1.84)	*(1.80)*	*(2.27)*	*(2.20)*	*(2.13)*	*(3.09)*
Stock Performance	5.984	5.367	11.216*	6.883	6.290	10.962**
	(1.16)	*(1.06)*	*(1.73)*	*(1.28)*	*(1.32)*	*(2.06)*
Net Loss	-0.026	0.166	-0.839*	-0.751	0.044	-1.510**
	(-0.06)	*(0.36)*	*(-1.73)*	*(-1.52)*	*(0.10)*	*(-2.42)*
Firm Type	0.292	0.317	0.909**	-0.541	0.070	-0.481
	(0.84)	*(0.91)*	*(2.22)*	*(-1.23)*	*(0.19)*	*(-0.78)*
Tax Differential		-0.445				-0.672
		(-1.13)				*(-1.39)*
Leverage Ratio			-0.299***			-0.262***
			(-3.39)			*(-2.89)*
Board				3.050***		4.415***
				(3.20)		*(3.16)*
Globalisation					-0.171**	-0.322***
					(-2.46)	*(-3.38)*
Likelihood Ratio Chi^2	18.80	20.08	38.45	29.91	25.02	58.88
Pseudo R^2	0.127	0.136	0.261	0.203	0.170	0.400
Obs.	67	67	67	67	67	67

The above panel presents the coefficients obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the coefficients relating to the market's reaction after the repurchase announcement has been realized.

Panel II: Marginal Effects						
Panel IIA: Intention of a Repurchase, Dependent Variable: CAR (-10, -1)						
	I	**II**	**III**	**IV**	**V**	**VI**
Dividend						
1st tercile	-0.288***	-0.308***	-0.160**	-0.272***	-0.223**	-0.132
	(-3.03)	*(-3.29)*	*(-1.98)*	*(-3.01)*	*(-2.25)*	*(-1.62)*
3rd tercile	0.282***	0.303***	0.185**	0.266***	0.216**	0.133
	(2.98)	*(3.31)*	*(2.00)*	*(2.95)*	*(2.24)*	*(1.57)*
M/B Ratio						
1st tercile	-0.027*	-0.025*	-0.030**	-0.028**	-0.030**	-0.030***
	(-1.89)	*(-1.84)*	*(-2.33)*	*(-2.18)*	*(-2.16)*	*(-2.98)*
3rd tercile	0.026**	0.024*	0.034**	0.028**	0.029***	0.030***
	(2.01)	*(1.95)*	*(2.52)*	*(2.35)*	*(2.30)*	*(3.44)*
Stock Performance						
1st tercile	-1.202	-0.934	-1.896	-1.264	-1.293	-1.692*
	(-0.86)	*(-0.69)*	*(-1.56)*	*(-0.97)*	*(-1.02)*	*(-1.80)*
3rd tercile	1.179	0.919	2.189*	1.233	1.248	1.694*
	(0.87)	*(0.70)*	*(1.66)*	*(0.99)*	*(1.03)*	*(1.90)*
Net Loss						
1st tercile	0.074	0.0004	0.255**	0.239*	0.052	0.316***
	(0.56)	*(0.01)*	*(2.43)*	*(1.78)*	*(0.41)*	*(2.80)*
3rd tercile	-0.073	-0.0004	-0.295**	-0.233*	-0.050	-0.316***
	(-0.56)	*(-0.01)*	*(-2.40)*	*(-1.76)*	*(-0.41)*	*(1.90)*
Firm Type						
1st tercile	-0.095	-0.107	-0.225**	-0.113	-0.027	-0.016
	(-0.90)	*(-1.03)*	*(-2.43)*	*(-0.92)*	*(-0.26)*	*(0.14)*
3rd tercile	0.093	0.105	0.260***	0.110	0.026	0.016
	(0.90)	*(1.04)*	*(2.61)*	*(0.93)*	*(0.26)*	*(-0.14)*
Tax Differential						
1st tercile		0.185				0.148
		(1.60)				*(1.61)*
3rd tercile		-0.182				-0.148
		(-1.57)				*(-1.64)*
Leverage Ratio						
1st tercile			0.069***			0.055
			(4.48)			*(3.83)*
3rd tercile			-0.079***			-0.056
			(-3.66)			*(-3.28)*
Board						
1st tercile				-0.717***		-0.677***
				(-3.00)		*(-3.04)*
3rd tercile				0.700***		0.677***
				(3.02)		*(2.89)*
Globalisation						
1st tercile					0.047**	0.055***
					(2.47)	*(3.03)*
3rd tercile					-0.045***	-0.055***
					(-2.56)	*(-3.73)*

The above panel presents the marginal effects obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the marginal effects relating to the market reaction to the possible undertaking of a repurchase.

Panel IIB: Actual Repurchase Announcement, Dependent Variable: CAR (-1, 0, 1)						
	I	**II**	**III**	**IV**	**V**	**VI**
Dividend						
1st tercile	-0.204**	-0.226**	-0.111	-0.190*	-0.123	-0.065
	(-1.98)	*(-2.25)*	*(-1.15)*	*(-1.87)*	*(-1.19)*	*(-0.67)*
3rd tercile	0.204**	0.227**	0.114	0.189*	0.119	0.058
	(1.99)	*(2.27)*	*(1.14)*	*(1.86)*	*(1.19)*	*(0.67)*
M/B Ratio						
1st tercile	-0.022	-0.020	-0.025*	-0.023*	-0.026**	-0.027***
	(-1.62)	*(-1.55)*	*(-1.91)*	*(-1.75)*	*(-2.00)*	*(-2.57)*
3rd tercile	0.022*	0.020	0.026**	0.023*	0.025**	0.025***
	(1.69)	*(1.62)*	*(2.02)*	*(1.83)*	*(2.10)*	*(2.81)*
Stock Performance						
1st tercile	-2.015	-1.663	-2.344	-2.129	-1.971	-2.194**
	(-1.26)	*(-1.10)*	*(-1.61)*	*(-1.35)*	*(-1.47)*	*(-1.97)*
3rd tercile	2.009	1.670	2.405*	-2.123	1.901	1.978**
	(1.30)	*(1.13)*	*(1.70)*	*(1.39)*	*(1.50)*	*(2.03)*
Net Loss						
1st tercile	0.166	0.077	0.356***	0.284**	0.132	0.397***
	(1.25)	*(0.55)*	*(2.81)*	*(2.01)*	*(1.05)*	*(2.98)*
3rd tercile	-0.166	-0.078	-0.366***	-0.283**	-0.127	-0.358***
	(-1.22)	*(-0.55)*	*(-2.80)*	*(-1.96)*	*(-1.04)*	*(-2.84)*
Firm Type						
1st tercile	-0.176*	-0.190*	-0.329***	-0.051	-0.083	-0.092
	(-1.67)	*(-1.84)*	*(-3.06)*	*(-0.42)*	*(-0.78)*	*(-0.73)*
3rd tercile	0.175*	0.191*	0.338***	0.051	0.080	0.083
	(1.66)	*(1.86)*	*(3.28)*	*(0.42)*	*(0.78)*	*(0.74)*
Tax Differential						
1st tercile		0.217*				0.173
		(1.83)				*(1.63)*
3rd tercile		-0.218*				-0.156
		(-1.78)				*(-1.63)*
Leverage Ratio						
1st tercile			0.050***			0.044***
			(4.11)			*(3.45)*
3rd tercile			-0.052***			-0.040***
			(-3.83)			*(-3.38)*
Board						
1st tercile				-0.467*		-0.641***
				(-1.90)		*(-2.66)*
3rd tercile				0.466*		0.578***
				(1.91)		*(2.58)*
Globalisation						
1st tercile					0.061***	0.071***
					(3.20)	*(3.78)*
3rd tercile					-0.059***	-0.064***
					(-3.47)	*(-4.06)*

The above panel presents the marginal effects obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the marginal effects relating to the market's instant reaction to the repurchase announcement.

Panel IIC: Post the Announcement, Dependent Variable: CAR (0, 10)						
	I	**II**	**III**	**IV**	**V**	**VI**
Dividend						
1st tercile	-0.303***	-0.317***	-0.176**	-0.289***	-0.235**	-0.141*
	(-3.22)	*(-3.39)*	*(-2.12)*	*(-3.31)*	*(-2.39)*	*(-1.76)*
3rd tercile	0.294***	0.309***	0.198***	0.276***	0.225**	0.142*
	(3.11)	*(3.32)*	*(2.14)*	*(3.17)*	*(2.35)*	*(1.69)*
M/B Ratio						
1st tercile	-0.026*	-0.025*	-0.029***	-0.028**	-0.029**	-0.030***
	(-1.88)	*(-1.83)*	*(-2.31)*	*(-2.27)*	*(-2.17)*	*(-3.32)*
3rd tercile	0.025**	0.024*	0.033***	0.027**	0.028**	0.030***
	(1.97)	*(1.92)*	*(2.47)*	*(2.41)*	*(2.29)*	*(3.65)*
Stock Performance						
1st tercile	-1.840	-1.625	-2.609*	-1.895	-1.830	-2.083**
	(-1.16)	*(-1.06)*	*(-1.72)*	*(-1.28)*	*(-1.33)*	*(-2.09)*
3rd tercile	1.784	1.581	2.941*	1.810	1.751	2.105**
	(1.19)	*(1.08)*	*(1.84)*	*(1.33)*	*(1.36)*	*(2.21)*
Net Loss						
1st tercile	0.008	-0.050	0.195*	0.206	-0.013	0.287***
	(0.06)	*(-0.36)*	*(1.80)*	*(1.55)*	*(-0.10)*	*(2.60)*
3rd tercile	-0.007	0.049	-0.220*	-0.197	0.012	-0.290***
	(-0.06)	*(0.36)*	*(-1.79)*	*(-1.57)*	*(0.10)*	*(-2.58)*
Firm Type						
1st tercile	-0.089	-0.096	-0.211**	0.149	-0.020	-0.091
	(-0.85)	*(-0.92)*	*(-2.29)*	*(1.24)*	*(-0.19)*	*(0.80)*
3rd tercile	0.087	0.093	0.238**	-0.142	0.019	0.092
	(0.85)	*(0.92)*	*(2.40)*	*(-1.25)*	*(0.19)*	*(-0.78)*
Tax Differential						
1st tercile		0.134				0.127
		(1.15)				*(1.40)*
3rd tercile		-0.131				-0.129
		(-1.14)				*(-1.44)*
Leverage Ratio						
1st tercile			0.069***			0.049***
			(4.24)			*(3.38)*
3rd tercile			-0.078***			-0.050***
			(-3.50)			*(-2.91)*
Board						
1st tercile				-0.839***		-0.839***
				(-3.63)		*(-3.69)*
3rd tercile				0.802***		0.848***
				(3.69)		*(3.47)*
Globalisation						
1st tercile					0.049***	0.061***
					(2.61)	*(3.46)*
3rd tercile					-0.047***	-0.062***
					(-2.70)	*(-4.24)*

The above panel presents the marginal effects obtained from the robustness testing of finding the determinants of seeing a stronger market reaction to a repurchase announcement, more specifically focusing on the marginal effects relating to the market's reaction after the repurchase announcement has been realized.

Regarding the influences of the additional control variables, a strong level of stability is continually realized. The positive influences of *Dividend*, *M/B Ratio* and *Firm Type* are consistent with the initial results, while a negative influence of *Net Loss* is realized, which is also consistent with the initial results. A discrepancy is seen with *Stock Performance*, as a series of positive influences are realized, which is inconsistent with the initial results finding that the factor has an insignificant influence on the market's reaction. However, if looked at the meaning of this positive finding, which is the presence of the momentum effect as firms with high performing stocks witness better market reception to repurchase announcements, it remains compatible with the positive influence realized for *M/B Ratio*.

(ii) Leamer's Global Sensitivity Analysis

A series of looped regressions are undertaken by applying Leamer (1985)'s four criterions on the empirical Model VI of Table 6, which were derived by applying Equation 1. This outputs 95 regressions, which translates to 95 coefficients[20] for each hypothesis' proxy(s). The summary statistics of these proxies are presented in Table 11, while their frequency distribution is available in Figures 3 through 6. Given the nature of the initial testing, only the proxies of the tested hypotheses are discussed, and not of the additional control variables.

The coefficients of *Tax Differential* and *Leverage Ratio* are consistently negative, which conforms to the expectations of the H1 hypothesis, the initial results and the first-stage robustness check. Thus, we continue to accept the alternative hypothesis $H1_1$: The equity market structure influences the market reception to repurchases. All the coefficients of *Board* are positive; upon combining this with the expectations of the H2 hypothesis, the initial results and the first-stage robustness check, an unstable pattern is observed. Thus, we accept the null hypothesis $H2_0$: Board independence does not positively influence the market reception to repurchases. However, we leave room for the possibility of a different set of results if board independence is tested via a differing methodological approach. *Globalisation* has an absolute negative influence, which conforms to the expectations of the H3 hypothesis, the initial results and the first-stage robustness check. Thus, we accept the alternative hypothesis $H3_1$: Globalisation negatively influences the market reception to repurchases.

[20] The information regarding t-statistics is available in the Appendix.

Table 11: Robustness Check: Summary Statistics of Leamer Regression Coefficients

The table presents the summary statistics of the coefficients produced from the robustness testing of applying Leamer (1985)'s four sensitivity criterions of sequentially dropping each firm, year, type of firm (non-financial or financial institution) and control variable, to Equation 1, which results in 95 looped regressions for each hypothesis proxy: $\text{CAR } 3\text{day}_i = \beta_1 \text{Tax Differential}_{y-1} + \beta_2 \text{Leverage Ratio}_{i,y-1} + \beta_3 \text{Board}_{i,y-1} + \beta_4 \text{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} + \alpha$. Where, $\text{CAR } 3\text{day}_i$ is the 3day (-1, 0, 1) CAR of the ith firm, Tax Differential (effective higher dividend tax rate relative to higher capital gains tax rate), Leverage Ratio (total debt relative to shareholder equity), Board (number of independent directors relative to the total board size) and Globalisation (the value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation) are yearly lagged hypotheses proxies. $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged); Dividend (binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years)), M/B Ratio (market value relative to book value), Stock Performance (average 6month pre-announcement stock return excess over the average 12month pre-announcement return), Net Loss (binary, '1' if net profit is negative) and Firm Type (binary, '1' if the firm is a financial institutional). $\varepsilon_{i,y}$ is the vector of error terms and α is the alpha.

	Obs.	Mean	Std. Dev.	Min	Max	Positive Coef. (%)	Negative Coef. (%)
Tax Differential	95	-0.053	0.006	-0.077	-0.026	0 (0)	95 (100)
Leverage Ratio	95	-0.008	0.001	-0.011	-0.006	0 (0)	95 (100)
Board	95	0.096	0.011	0.054	0.145	95 (100)	0 (0)
Globalisation	95	-0.017	0.001	-0.018	-0.012	0 (0)	95 (100)

The graphs (Figures 3 through 6) present the coefficients that are summarised in Table 11.

Figure 3: Tax Differential Coefficients

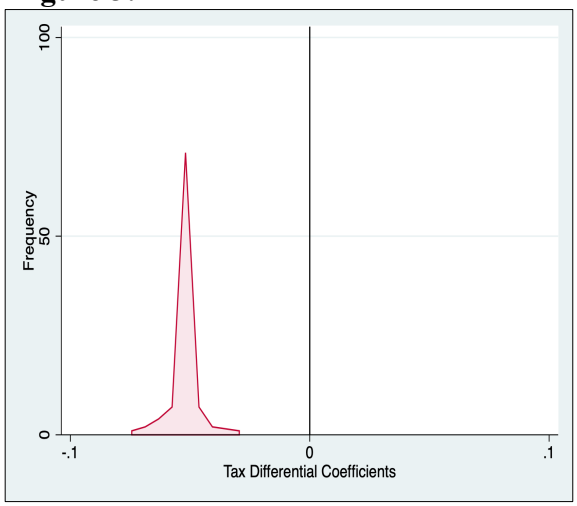


Figure 4: Leverage Ratio Coefficients

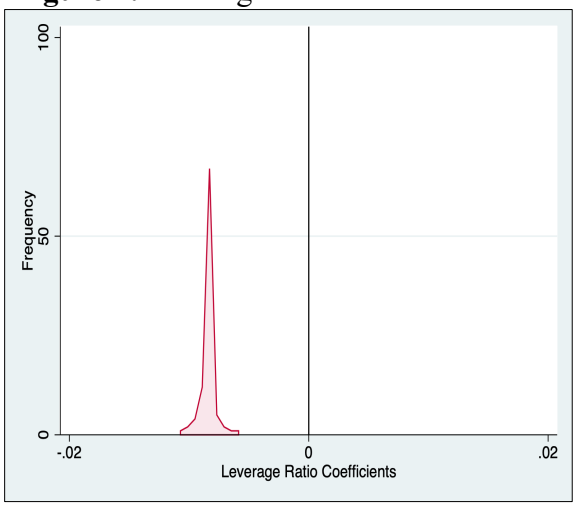


Figure 5: Board Coefficients

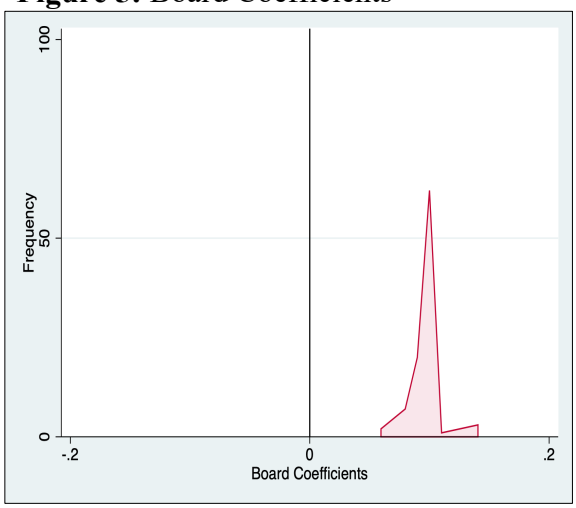
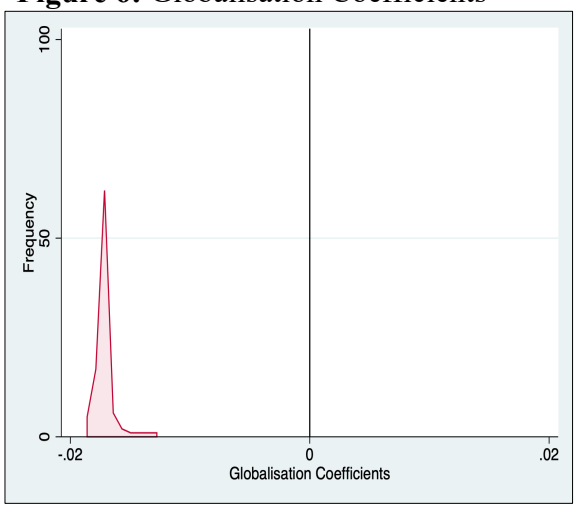


Figure 6: Globalisation Coefficients



2.5. Conclusion

The study encompasses various aspects associated with the market's relationship with a repurchase, and concludes an illustrative view of the association. This is ascertained by combining the rising popularity of British repurchases and inconsistencies within extant literature, which resulted in a set of empirical objectives investigating the factors that determine the market's reaction repurchase announcements, and the real reaction itself over the short-term and long-term periods following the announcement.

The checking if the equity market structure had a significant influence in driving the market's reaction is valuable, as the market structure was proxied using two variables. The first variable was a tax proxy that factored a comparison between the taxation of gains from repurchases and dividends earned, and the second variable proxied firm-level leverage. The results showed that the equity market structure was prevalent, which is a contribution to literature and a relevant conclusion for British managers. They now have the insight that given the UK's tax framework continually making repurchases more economical than dividends, and firms having no direct control over the country's fiscal policy, they need to offset the negative impact from an internal level. This can be made sure by staying away from repurchases when the firm is highly leveraged, as the results have shown that high leverage further deters the market's repurchase receptiveness, and by utilising the finding of a positive influence of dividend history, thus the undertaking of strong dividend distribution before pursuing repurchases. Upon combining this approach with the study's finding that the market reaction is positive in the short-term and negative in the long-term, managers can also employ tactics such as paying stronger dividends in the years following a repurchase to try and curb the long-term impact. Furthermore, given the discussions of the rising FDI and the results indicating that globalisation has a negative impact on the market's reaction to repurchase announcements, this is also a contribution to literature and an aspect that managers must remain cautious about. This can be tackled by the finding that a period of negative profitability negatively impacts the market's reaction, as managers may not just avoid repurchase undertaking during loss making periods, but undertake repurchases during periods of higher profitability.

Finally, apart from the managers of British firms, the findings of the essay are highly applicable for retail shareholders as well since they do not have access to sophisticated analytical resources, such as institutional shareholders or even asset managers. Given the discussed rising repurchase popularity in Britain, retail shareholders may find it tedious to keep up with managing their equity investments due to the impact of repurchase announcements. Hence, in light of the findings of this essay, retail shareholders can find respite that if they own shares in a financial institution then their stock holding is not significantly influenced either in the short-term or long-term by a repurchase announcement. However, if they hold ownership in non-financial firms then they can now ensure to profit from the short-term gains, and then liquidate their investment to avoid the long-term negative impact. Furthermore, they can not only manage their investment portfolio more efficiently, but in circumstances when they have to vote for a repurchase approval, they now know the factors that drive the market reaction. Thus, they can vote accordingly after making a more accurate prediction of repurchase success, and even lobby the firm to amend their policy to gain an approval, such as increase the dividend distribution due to its positive impact on market reaction. Finally, future academics can extend these findings in two directions. The first will be to test how repurchase announcements impact the firm's operating performance over the following years, while the second investigable avenue is to undertake complementary investigations of testing the impact of dividend announcements.

CHAPTER 3. SECOND EMPIRICAL ESSAY

Determinants of Repurchase Size: Evidence from the UK

Abstract

The study focuses on the factors that determine the size of an open market share repurchase in the UK. The testing covers the time period 1985-2014, and tests if the traditional motives for repurchasing shares are also the determinants of the size of the repurchase. The testing also checks if the influences of the determinants are non-linear, U shaped or inverted-U shaped, which to the best of knowledge is also a novel empirical approach. The consideration of non-linear influences on repurchase size is relevant due to overlapping of repurchase determinants. For instance, if distribution of excess cash is the motive for undertaking the repurchase, and not to replace dividend distribution, then the influence of dividend distribution on repurchase size may conflict with the traditional expectation of repurchases being used as dividend replacements. The testing finds that the motive of using repurchases for signalling stock undervaluation has the most consistent influence on repurchase size, followed by the motives of using repurchases for adjusting the reported EPS when earnings are negative and for distributing surplus cash reserves. The motive for using repurchases to adjust the capital structure to increase the debt exposure has a U shaped influence on repurchases size, while board independence has an inverted-U shaped influence. Overall, when compared to current literature this study is able to substantiate that there is a strong consistency between the motives that lead to repurchases in the UK, and the determinants of repurchase size.

Keywords: Repurchases, Size, Determinants

JEL Classification: G34, G35

3.1. Introduction

For a more informative understanding this section is subcategorised into four subsections. The first subsection provides a concise background of the UK's repurchase undertaking pattern, the second subsection provides a summary of the essay's research objectives and the results, the third subsection discusses the contributions of the essay to existing literature, and the fourth subsection details the structure of the essay.

3.1.1. Summary of the UK's Repurchase Pattern

The majority of all repurchases in the UK are undertaken via the 'open market' route (Rau and Vermaelen, 2002; Oswald and Young, 2004), which is a straightforward corporate event; the managerial enters the market like any other investor and purchases shares, with the exception that the buyer is also the stock's issuer, thus making it a 're'purchase. Renneboog and Trojanowski (2011) and Geiler and Renneboog (2015) find that repurchases in the UK are on an upswing since 2002, while the UK leads Europe in terms of repurchases (Sonika *et al.* 2014). Denis and Osobov (2008) find that despite the UK being heavily dividend preferential, repurchases are not seen as their replacements; they are independent corporate payouts that complement dividend distribution. This is consistent with Ferris *et al.* (2006)'s finding that dividends in the UK are declining and still repurchases are not used as their substitutes.

3.1.2. Summary of Empirical Objectives and Results

Our research's primary aim is to determine if there is a consistency between the motives that influence the undertaking of repurchases and their influence on repurchases size. Such an exploration is important due to existing literature holding several contradictions, which are explored in detailed further in the essay's literature review. This begins by assessing the three leading motives that British managers have cited in Dhanani (2016)'s survey for undertaking repurchases; distributing excess cash, adjusting the reported Earnings Per Share (EPS) and for signalling stock undervaluation. Furthermore, the contradictions in the use of repurchases for the following reasons are also assessed; replacing dividend distribution, providing shareholders with a tax friendlier corporate payout, to signal asymmetric information and for adjusting the capital structure for increasing firm-level leverage. Including these motives, the influence of board independence is also tested. Further, the empirical testing also investigates if the influences of the size-specific determinants is non-linear, U shaped or inverted-U shaped. This is important due to overlapping of factors that may lead to inaccurate/faulty assessments. For instance, let's assume that the motive for undertaking repurchases is to distribute excess cash reserves, which British managers have stated in Dhanani (2016)'s

survey is the number one reason for repurchasing shares. Simultaneously the firm holds its dividend distribution constant since they don't intend to replace dividends with repurchases, then there may be inaccurate estimations drawn by analysts or the findings of empirical investigations may conflict with the expected influence of dividends. Thus, due to the contemporaneous existence of multiple forces that influence the repurchase decision-making, there may be instances when any one or more of the above-mentioned forces has a contradictory influence from its traditional expectation.

For the empirical investigation we test a sample of open market repurchase announcements[21] of firms listed on the London Stock Exchange, which starts from 1985, the farthest historic year to which our data source SDC Platinum[22] extends, and leads up to 2014. Our sample effectively constitutes 360 repurchase announcements, and averagely each announcement is worth £797mn (nominal) and represents 10% outstanding market equity. Thus, indicating that the combined market value of the announcing firms is just under £3trn.

The empirical results reveal that the three leading motivational hypotheses that determined repurchase size were; to use repurchases for signalling stock undervaluation, to adjust the reported EPS when earnings are negative and to distribute excess cash reserves. Thus, it is clear that the research's three leading determinants of repurchase size are identical to the top three motives for repurchasing shares in the UK, as highlighted in Dhanani (2016)'s survey. The only discrepancy is the order of preference, which is not surprising given the differences in timelines, sampling and methodologies. This highlights that since the survey is undertaken for a cross-sectional period (2003-2007) of this research's tested timeline (1985-2014), the managerial attitude remains consistent over the long-run. This may also be due to their understanding with shareholders about their expectations, as regulations require their approval for an open market repurchase. Furthermore, we find that the motive of using repurchases for adjusting the capital structure in favour of debt has a U shaped influence on repurchase size, while the impact of board independence is inverted-U shaped. The influence of the motive to use repurchases as dividend substitutes is contradictory, as it has a positive influence, while the motives for using repurchases to signal asymmetric information or for its tax efficiency have not shown any significant influence on the payout's size, either linearly or non-linearly.

[21] We only include the initial announcements and not actual transactions since Andriosopoulos and Lasfer, (2015) find that they are most informative. Repurchases undertaken through the open market route are tested as they represent a majority of all repurchases (Rau and Vermaelen, 2002; Oswald and Young, 2004).

[22] The data is obtained is by a one-off purchase from Thomson Reuters' via its official vendor Alacra Inc.

3.1.3. Contributions to Existing Literature

The essay's empirical findings advance existing knowledge in two aspects. First is the checking if the top motives professed by British managers for undertaking repurchases are also the top three determinants of repurchase size. Thus, if there is consistency in the influences of factors that motivate repurchases and their corresponding influence on the size of the repurchase, it will reveal a stable decision-making pattern. Further, the consistency is checked against the responses given by British managers who undertook repurchase during a five-year period (2003-2007) (Dhanani, 2016), and this essay's testing of a timeline spanning for 30years (1985-2014). Thus, if a consistency between the two sets of studies is obtained, then it will also establish that the repurchase policy of British PLCs has remained very stable and consistent over the last three decades. The stability will echo a hallmark regulatory directive, which is not applied in the world's largest repurchasing country the US, of requiring shareholder approval for repurchases (Dhanani and Roberts, 2009), as shareholders would have essentially also shown consistency in their preferential circumstances to provide their vote of approval. The second contribution is the testing if the determinants of repurchase size have a U shaped or an inverted-U shaped influence. The approach is an empirical verification of a logical assumption that due to the multiple factors that can compel repurchases, when one factor is a determinant for undertaking repurchases then the influences of the remainder determinants may be contrary to their conventional expectations. Thus, facilitating accurate analysis and investigatory ventures for future researches.

3.1.4. Structure of this Chapter

The essay is thus structured as follows: Chapter 3.1 provides an introduction, Chapter 3.2 briefs the traditional determinants of repurchases in the UK, Chapter 3.3 discusses the sample, constructs the research objectives and explains the methodologies, Chapter 3.4 reports the results and its analyses, and Chapter 3.5 concludes the essay.

3.2. Literature Review

This subsection focuses on the discussion regarding the determinants that have compelled repurchases in the UK. The analyses initially discuss the three leading motives for undertaking repurchases, as stated by British managers in Dhanani (2016)'s survey, which are using repurchases for distributing excess cash, adjusting the reported EPS and signalling a stock undervaluation. Following, a discussion is provided on the motives for undertaking repurchases for; signalling asymmetric information, as a tax friendlier corporate payout, replacing dividends and adjusting the capital structure to increase the debt exposure.

Dhanani (2016) recently surveyed the UK's managerial who repurchased shares between 2003-2007, and they stated that returning excess cash was the leading motive. This motive essentially states that firms generally divert cash reserves towards outlets such as investment, but when there is surplus cash accumulation a repurchase is plausible due to two-fold reasoning (Guay and Harford, 2000; Brav *et al.* 2005). If the investment opportunities are unsuitable managers may still undertake them causing principal-agent conflicts, and buying the firm's stock restricts agent-centricity. Burns *et al.* (2015)'s testing of 15 European countries, of which the UK was the largest data-holder (42%), indicates that excess cash improves the prospects of repurchase undertaking. Cesari and Ozkan (2015) too find that within a sample of five European countries, of which the UK was again the largest data-holder (75%), excess cash increases the repurchase weighting in the total payout. Similarly, Lee *et al.* (2010) find that the UK's repurchases see an increment in value due to excess cash, consistent with Lee and Suh (2011)'s finding that temporary and surplus cash are diverted towards the financing of repurchases. Thus, there is strong empirical support for the managerial assertion in Dhanani (2016)'s survey.

Further, the 2nd and 3rd most popular motives outlined in Dhanani (2016)'s survey are assessed, to improve EPS and signal stock undervaluation, respectively. The motive for adjusting EPS is essentially exploiting a repurchase's trait of reducing the outstanding stock volume, which makes the firm's earnings relative per outstanding share seem more attractive (Dhanani and Roberts, 2009); lower the number of shares greater the earnings distribution amongst them. While the motive for signalling stock undervaluation states that when firms are convinced that the stock is under-priced, for instance due to economic uncertainty, an act of repurchase will signal the market the presence of mispricing, thus pushing the price up to its fair value (Dittmar, 2000). Sonika *et al.* (2014)'s testing of the UK partially supports the managerial responses, as they find that positive EPS deters the undertaking of repurchases, however undervaluation is not a motivator but overvaluation shows tendencies of triggering a repurchase-withdrawal. Similar is Geiler and Renneboog (2015)'s finding that stock valuation has no impact on the repurchase decision-making in the UK. Correspondingly, Crawford and Wang (2012) find that the market's reaction to repurchases does not indicate signalling stock undervaluation as a probable motive, similar to Andriosopoulos and Lasfer (2015).

The signalling of asymmetric information using repurchases has shown a controversial presence in the UK. The motive states the usage of repurchases to signal information that cannot be directly communicated (Dittmar, 2000), which may cause information opaqueness

that impacts the stock value. It is generally believed that the information transparency between firms and the wider market are inversely related (Ikenberry e*t al*. 1995), as given the enormity of the large cap firms they have a much swifter and clearer information channel with the market, while the analytical focus is also more on them rather than smaller firms. Thus, using repurchases for reducing asymmetric information bias is typical with smaller firms, however in the UK the contrary is seen. Cesari and Ozkan (2015) find that firm size has consistently motivated the undertaking of repurchases, which is consistent with Lee *et al.* (2010), Andriosopoulos and Hoque (2013) and Burns *et al.* (2015). However, Andriosopoulos and Lasfer (2015) use the same sample as Andriosopoulos and Hoque (2013), and show that firm size deters the market's reaction to a repurchase announcement, indicating a disconnection between managerial outlook and market expectation. The positive impact of firm size on managerial attitude is not consistent with the logic supported by Ikenberry *et al.* (1995)'s seminal research, and this research is highly supportive of the said fundamental. Supporting this assertion is Mazzi *et al.* (2018)'s finding that in Europe a firm's size and its compliance with governance directives is positively related, thus revealing a predisposed propensity of smaller firms to refrain from divulging information.

The research further investigates the tax preferential hypothesis. Usually the taxation on capital gains and dividends are different, and the hypothesis states the use of repurchases for their tax efficiency over dividend distribution (Barclay and Smith, 1988; De'Jong *et al.* 2003). The motive is circumstantial to a country's tax regime, for instance it is currently irrelevant in the US and Germany since they tax capital gains and dividends at the same rates (Deloitte, 2016a; IRS, 2017). However, in the UK it is highly relevant; since 1981 successive governments have reduced the tax on capital gains while contemporaneously increasing that on dividends (see Table 2) (HMRC, 2017; IFS, 2017). Empirically, Ji (2016) finds that the tax regime in the UK is cointegrated with the corporate payout policy. Alzahrani and Lasfer (2012) indicate a reduction in repurchases prospects if they are tax friendlier than dividends, however Oswald and Young (2008) find the exact opposite, which complements Andriosopoulos and Lasfer (2015)'s conclusion that a repurchase's tax efficiency strengthens the market reaction to its announcement. Completely averse to these findings are the conclusions of Oswald and Young (2004) and Geiler and Renneboog (2015) that tax efficiency of repurchases has no bearing on the managerial decision to undertake them. Thus, the continual alterations of tax rates in the UK are accompanied by literary conflictions regarding the repurchase-taxation relationship.

The Miller-Modigliani Dividend Irrelevance Theory (1961) implies that in a frictionless capital market, a shareholder's investment assessment is solely linked to earnings, and if the firm's strategy is acceptable then they remain indifferent between repurchases and dividends, while any economic shortfall is absorbable through a proportionate sale of the equity holding. Thus, indicating that repurchases and dividends are identical corporate payouts, creating the dividend substitution hypothesis, firms using repurchases as dividend replacements. For the UK, Ji (2016) suggests that repurchases are mildly used as dividend replacements. This is consistent with repurchase's rising popularity as independent corporate payouts and not dividend replacements (Ferris *et al.* 2006; Denis and Osobov, 2008). Burns *et al.* (2015) find that dividends are complementary to repurchases in Europe, and when they remove UK from their testing the results loose statistical significance. However, Lee *et al.* (2010) find that dividend distribution does not influence managerial decision-making. This is partially consistent with Sonika *et al.* (2014)'s finding that dividend paying firms are averse from repurchases, indicating dividend substitution, however the actual dividend distribution does not impact the decision-making. The market reaction to repurchases has also remained uninfluenced by dividend history (Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015). Thus, it can be seen that overall, the UK as a country does not see strong evidences of repurchases being viewed as dividend replacements, rather the two payouts are considered peers.

Multiple factors can influence the capital structure's debt-equity split, such as firm type and financial constraints; nonetheless the tradeoffs between debt and equity are consistent (Marsh, 1982). Debt provides tax shield that equity does not, but mandates fixed coupon payments, thus making it a cheaper source of capital than equity. Firms may opt for increasing their debt exposure to reduce the cost of capital, and the capital restructuring hypothesis states the achieving of this motive through the use of repurchases (Dittmar, 2000; Mitchell and Dharmawan, 2007). Lee and Suh (2011), Burns *et al.* (2015) and Cesari and Ozkan (2015) reveal that lower levels of debt exposure positively influence repurchase undertaking in the UK, thus supporting the presence of the capital restructuring hypothesis. However, Benhamouda and Watson (2010), Lee *et al.* (2010) and Sonika *et al.* (2014) find that leverage has no impact, and completely inconsistent is Andriosopoulos and Lasfer (2015)'s conclusion that higher leverage has a positive influence on the market's reaction towards repurchases. Overall, it is seen that the relationship between firm-level leverage and repurchases is mostly either insignificant, or consistent with the capital restructuring hypothesis.

3.3. Sample, Research Objectives and Methodologies

This section is subcategorised into three subsections. The first subsection discusses the various data sources, and also the repurchase dataset and the tested sample, the second subsection discusses the empirical objective undertaken and the employed methodology, and the third subsection discusses the robustness testing undertaken.

3.3.1. Sample Selection

The initial dataset comprised of 419 announcements between 1981-2014, with the first announcement being in 1985. We do not hold survivorship bias but were unable to locate the annual reports of 59 non-existent firms, which results in a sample of 360 repurchases that are averagely worth £797mn (nominal) and represent a repurchase of 10% outstanding equity. The data required for constructing firm-level control variables is extracted from their annual filings, which are obtained from the Companies House. The taxation and macroeconomic data are obtained from multiple sources, which include the archives of HMRC, Institute for Fiscal Studies, Office for National Statistics, Bank of England and generic government records.

Table 1: Dataset

The table presents the statistics of the initial dataset of 419 announcements between 1985 and 2014, and also of the sample of 360 obtained due to the unavailability of the accounts of 59 non-existent companies. After splitting the aggregate time period (1985-2014) into 5year sub-time periods, Panel I focuses on the frequency of repurchase announcements, and Panel II focuses on the final sample's statistics, namely the average percent of shares intended to be repurchased in each announcement and the average £mn value of each announcement.

Panel I: Sample Selection			**Panel II: Sample Statistics**		
Time Period	**# Repurchases (Initial)**	**# Repurchases (Sample)**	**Time Period**	**Average % of Shares Sought**	**Average Value (£mn)**
1985-1989	13	12	1985-1989	10.66	98
1990-1994	84	67	1990-1994	9.21	96
1995-1999	212	180	1995-1999	9.91	439
2000-2004	33	32	2000-2004	11.19	195
2005-2009	41	39	2005-2009	10.76	1,033
2010-2014	36	30	2010-2014	8.52	1,124
1985-2014	419	360	1985-2014	9.90	797

3.3.2. Research Objectives and Methodology

3.3.2.1. Research Objective: Determinants of Repurchasing Size

The study's objective is to ascertain the factors that determine the size of a repurchase, with a strong focus on the consistency between the motives that compel the undertaking of repurchases and their size-specific influence, while also checking if their influences on repurchase size are non-linear (U shaped or inverted-U shaped). In this subsection we thus discuss the seven motives of undertaking repurchases (as discussed in Chapter 3.2.) and board independence, while also developing hypotheses to test their influences on repurchase size. These constitute the primary influencers, while to support them we also develop hypotheses to check the influences of firm-level profitability and macrofinancial conditions. Thus, the combination of determinants captures a spectrum of internal and external influences.

– Primary Influencers

(i) Excess Cash Distribution Hypothesis

Firms utilise cash for investment, but when there is surplus accumulation a repurchase is plausible due to two-fold reasoning (Guay and Harford, 2000; Brav *et al.* 2005). If the investment opportunities are unsuitable managers may still undertake them causing principal-agent conflicts, and buying the firm's stock restricts agent-centricity. In order to test if excess cash influences the size of repurchases, we develop two hypotheses:

The first hypothesis, H1, tests if excess cash influences repurchase size by using the proxy *Cash*, which is pre-tax income and depreciation relative to total assets. The proxy is expected to have a positive influence given the nature of the hypothesis.

$H1_0$: The excess cash distribution hypothesis does not influence the size of repurchases
$H1_1$: The excess cash distribution hypothesis influences the size of repurchases

Since British managers state that adjusting the reporting earnings is a leading motive for undertaking repurchases (Dhanani, 2016), it is possible that cash flow may have a non-linear influence on repurchase size. This is tested by the second hypothesis, H2, by using the proxy $Cash^2$, which is *Cash* to the power of 2. The proxy is expected to have a negative influence.

$H2_0$: The excess cash distribution hypothesis does not have an opposing influence on the size of repurchases

$H2_1$: The excess cash distribution hypothesis has an opposing influence on the size of repurchases

(ii) Adjusting EPS Hypothesis

The outstanding stock volume is reduced by repurchases, which automatically triggers an increase in the firm's earnings per share ratio; lower the number of shares greater the earnings distribution amongst them. Thus, Dhanani and Roberts (2009) explain that to exploit this trait of repurchases, managers might deliberately undertake the payout for enhancing the EPS to meet investor and analyst expectations, which upon missing may harm the stock value. We are particularly interested in seeing if firms who have reported negative annual earnings, meaning are suffering a net loss, use repurchases to absorb the impact of the negative reporting. Thus, we develop the following hypothesis:

The third hypothesis, H3, tests if adjusting EPS influences repurchase size by using the proxy *EPS*, which is binary and takes the value '1' if the reported earnings is negative. The proxy is expected to have a positive influence. Given the nature of the proxy we do not test the possibility of a non-linear influence.

$H3_0$: The adjusting EPS hypothesis does not influence the size of repurchases

$H3_1$: The adjusting EPS hypothesis influences the size of repurchases

(iii) Signalling Stock Undervaluation Hypothesis

The motive states that when firms are convinced that the stock is under-priced, for instance due to economic uncertainty, an act of repurchase will signal to the market of the mispricing, thus pushing the price up to its fair value (Dittmar, 2000). In order to test if stock undervaluation influences the size of repurchases, we develop two hypotheses:

The fourth hypothesis, H4, tests if stock undervaluation influences the size of repurchases by using the proxy *M/B Ratio*, which is the firm's market value relative to the book value. The proxy is expected to have a negative influence, as a low ratio will indicate greater chances of the stock being undervalued.

$H4_0$: The signalling stock undervaluation hypothesis does not influence the size of repurchases
$H4_1$: The signalling stock undervaluation hypothesis influences the size of repurchases

Since repurchases can be used for window dressing a firm's financials for creating a false positive image (Dhanani and Roberts, 2009), it is possible that repurchases may be used to support an existing stock overvaluation, which indicates non-linear influence of firm valuation. This is tested by the fifth hypothesis, H5, by using the proxy *M/B Ratio*^{2}, which is *M/B Ratio* to the power of 2. The proxy is expected to have a positive influence.

$H5_0$: The signalling stock undervaluation hypothesis does not have an opposing influence on the size of repurchases
$H5_1$: The signalling stock undervaluation hypothesis has an opposing influence on the size of repurchases

(iv) Signalling Information Asymmetry Hypothesis

The motive states using repurchases for signalling an information bias in favour of the firms, as the opaqueness may impact the stock performance (Dittmar, 2000). Such a circumstance is not surprising due to the absence of perfect market conditions (Latif *et al.* 2011). In order to test if asymmetric information influences the size of repurchases, we develop two hypotheses:

The sixth hypothesis, H6, tests if asymmetric information influences the size of repurchases by using the proxy *Size*, which is the natural logarithm of the total book value of assets. The proxy is expected to have a negative influence, which is consistent with the conventionally expected influence of asymmetric information on repurchases (Ikenberry *et al*. 1995); larger firms have a stronger communication channel with the market, and given their enormity there is greater analytical focus on them, thus reducing the chances of information asymmetry.

$H6_0$: The signalling information asymmetry hypothesis does not influence the size of repurchases
$H6_1$: The signalling information asymmetry hypothesis influences the size of repurchases

Previous UK literature has shown that contrary to expectations, firm size positively influences repurchases (Lee *et al.* 2010; Andriosopoulos and Hoque, 2013; Burns *et al.* 2015; Cesari and Ozkan, 2015), and hence a similar positive influence can be expected on repurchase size as well. This is tested by the seventh hypothesis, H7, by using the proxy $Size^2$, which is *Size* to the power of 2. The proxy is expected to have a positive influence.

$H7_0$: The signalling information asymmetry hypothesis does not have an opposing influence on the size of repurchases
$H7_1$: The signalling information asymmetry hypothesis has an opposing influence on the size of repurchases

(v) Dividend Substitution Hypothesis

The Miller-Modigliani Dividend Irrelevance Theory (1961) implies that in a frictionless capital market, a shareholder's investment assessment is solely linked to earnings, and if the firm's strategy is acceptable then they remain indifferent between repurchases and dividends, while any economic shortfall is absorbable through a proportionate sale of the equity holding. Thus, indicating that repurchases and dividends are identical corporate payouts, creating the dividend substitution hypothesis; firms using repurchases as dividend replacements. In order to test if dividend replacement influences the size of repurchases, we develop two hypotheses:

The eighth hypothesis, H8, tests if dividend substitution influences the size of repurchases by using the proxy *Dividend*, which is the ordinary dividend payout relative to the net income. Since the hypothesis states that repurchases are essentially substitutes of dividends, the proxy is expected to have a negative influence.

$H8_0$: The dividend substitution hypothesis does not influence the size of repurchases
$H8_1$: The dividend substitution hypothesis influences the size of repurchases

Given that the current UK-specific literature concludes that repurchases and dividends are independent from each other (Ferris *et al.* 2006; Denis and Osobov, 2008; Burns *et al.* 2015), the dividend distribution's influence on repurchase size may contrast from that expected by the dividend substitution hypothesis. This is tested by the ninth hypothesis, H9, by using the proxy $Dividend^2$, which is *Dividend* to the power of 2. The proxy is expected to have a positive influence.

$H9_0$: The dividend substitution hypothesis does not have an opposing influence on the size of repurchases
$H9_1$: The dividend substitution hypothesis has an opposing influence on the size of repurchases

(vi) Capital Restructuring Hypothesis

Debt and equity financing have their individual tradeoffs (Marsh, 1982), such as debt provides tax shield but mandates coupon payments, thus it is a cheaper source of capital than equity. Firms may opt for increasing their debt exposure to reduce the cost of capital, and the capital restructuring hypothesis states the achieving of this motive by using repurchases (Dittmar, 2000; Mitchell and Dharmawan, 2007). In order to test if capital restructuring influences the size of repurchases, we develop two hypotheses:

The tenth hypothesis, H10, tests if capital restructuring influences the size of repurchases by using the proxy *Debt Ratio*, which is the total debt value relative to total asset value. Given the hypothesis' nature, lower the firm's leverage exposure greater there is the probability of repurchases being used to increment the capital structure's debt component, the proxy is expected to have a negative influence.

$H10_0$: The capital restructuring hypothesis does not influence the size of repurchases
$H10_1$: The capital restructuring hypothesis influences the size of repurchases

However, highly leveraged firms too may opt for repurchases, especially since the market positively reacts to repurchases announcements of such firms (Andriosopoulos and Lasfer, 2015), thus a firm's leverage position can also have an incrementing influence on repurchases size. This is tested by the eleventh hypothesis, H11, by using the proxy *Debt Ratio*^{2}, which is *Debt Ratio* to the power of 2. The proxy is expected to have a positive influence.

$H11_0$: The capital restructuring hypothesis does not have an opposing influence on the size of repurchases
$H11_1$: The capital restructuring hypothesis has an opposing influence on the size of repurchases

(vii) Tax Preferential Hypothesis

The motive states the usage of repurchases over dividends purely due to the tax regime making repurchases more economical than dividends (Barclay and Smith, 1988; De'Jong *et al.* 2003). As from the year 1981 successive British governments have reduced the tax on capital gains from repurchases while contemporaneously increasing that on dividends earned (Table 2) (HMRC, 2017; IFS, 2017), the investigation of this aspect is highly important. In order to test if tax preference influences the size of repurchases, we develop two hypotheses:

The twelfth hypothesis, H12, tests if the tax friendliness of repurchases influences the size of the repurchase by using the proxy *Taxation*, which is the effective (higher) dividend tax rate relative to capital gains tax (Alzahrani and Lasfer, 2012). Given the nature of the proxy's computation it is expected to have a positive influence, as a ratio above 1 will indicate that repurchases are more tax economical than dividends.

$H12_0$: The tax preferential hypothesis does not influence the size of repurchases
$H12_1$: The tax preferential hypothesis influences the size of repurchases

A repurchase's tax friendliness reduces the prospects of its undertaking in the UK (Oswald and Young, 2008). Thus, the thirteenth hypothesis, H13, tests if this phenomenon is present in the taxation's influence on repurchase size by using the proxy $Taxation^2$, which is *Taxation* to the power of 2. The proxy is expected to have a negative influence.

$H13_0$: The tax preferential hypothesis does not have an opposing influence on the size of repurchases
$H13_1$: The tax preferential hypothesis has an opposing influence on the size of repurchases

Table 2: Corporate Payout Tax Rates
The table presents the UK's tax rates applicable on individual investors' capital gains made on repurchases and on dividends earned between the period 1981 and 2017.

Capital Gains Tax Rates[23]		**Dividend Tax Rates**[24]	
Years	**Rate (%)**	**Years**	**Rate (%)**
1981-1988	30	1981-1993	15
1988-2008	10 to 40	1993-1999	25
2008-2012	18	1999-2016	25 | 30.60
2012-2016	18 | 28	2016-2017	7.50 | 32.50 | 38.10
2016-2017	10 | 20		

[23] The rates differ based on the marginal income tax rate.

[24] In 1999, the rate for basic taxpayers remained restricted at 20%, rather than the marginal tax rate.

(viii) Board Independence

We also aim to test the influence of independent directors on repurchase size, and the reason for assuming the importance of board independence is due to the UK's institutional and market environment. Given that the UK's regulations require firms to obtain shareholder approval for a repurchase (Dhanani and Roberts, 2009), from a shareholder's perspective it is presumable that if the firm is seeking approval then they favour the repurchase, stemming principal-agent conflicts that are traditional with repurchases (Fenn and Liang, 2001; Maxwell and Stephens, 2003). Shareholders may thus depend on independent directors for ensuring repurchase monitoring. It is arguable that mandatory governance regulations can reduce the significance of independent directors' role in repurchase monitoring, since in the UK regulations require large firms to have a board that is at least half independent (OECD, 2017). Thus, from a theoretical perspective it causes an argument that larger the firm greater the role of independent directors in repurchase monitoring. However, a firm's size has an inverse relationship with asymmetric information, smaller the firm less connected it is with the market and repurchases are generally considered an excellent tool for signalling asymmetric information (Ikenberry *et al.* 1995; Lee *et al.* 2010), while dividends and information asymmetry have shown a positive relationship in the UK (Hussainey and Al-Najjar, 2011).

Therefore, the relationship of board independence with repurchases that this research posits is unattached from a firm's size, which is an assertion supported by existing literature. For instance, Fosu *et al.* (2016) find that firms with higher growth opportunities witness greater consequences of asymmetric information, which is a trait of small firms since they generally outdo the market, thus supporting their greater use of repurchases to signal information bias. The capital restructuring hypothesis is the fourth leading motive among British managers for repurchasing shares (Dhanani, 2016), and its influence in repurchase decision-making is supported by the findings of Lee and Suh (2011), Burns *et al.* (2015) and Cesari and Ozkan (2015), while Rahaman (2011) finds that firm size is inversely related to debt exposure; smaller the firm greater the debt exposure. Thus, if managers of such firms want to further increment their debt component via repurchases, the support of independent directors will help in obtaining shareholder consent. Additionally, Akbar *et al.* (2016) find that a European firm's size has a positive relationship with governance compliance, however Pass (2006)'s survey finds that only 34% of British firms were in full regulatory compliance; 66% of the managers confess of being in violation. A follow up analysis by Shrives and Brennan (2015) found that since then firm-level compliance did improve, however non-compliance was still visible. It is presumable that the violated regulations are those that are not overtly noticeable

by shareholders and regulatory bodies, and the directives associated with board composition are not included in this category. Thus, independent directors will always be present for monitoring repurchases, irrelevant of not just firm size but also regulatory violations. In order to test if board independence influences the size of repurchases, we develop two hypotheses:

The fourteenth hypothesis, H14, tests if board independence influences the size of repurchases by using the proxy *Board*, which is the independent directors relative to the board size. Since the erstwhile discussions established that repurchases offset principal-agent conflicts, the proxy is expected to have a positive influence. This is also supported by the fact that distribution of excess cash is the key reason for undertaking repurchases according to British managers (Dhanani, 2016), and such an instance has a higher chance of cash mismanagement.

$H14_0$: Board independence does not positively influence the size of repurchases
$H14_1$: Board independence positively influences the size of repurchases

However, given that repurchases employ a greater deal of resources than dividends and have a structural effect on the firm's stock volume, while insider owners have shown dividend preference over repurchases (Renneboog and Trojanowski, 2011), it is possible that independent directors may during certain instances deter the actual size of the repurchase. This is thus tested by the fifteenth hypothesis, H15, by using the proxy $Board^2$, which is *Board* to the power of 2. The proxy is expected to have a negative influence.

$H15_0$: Board independence does not negatively influence the size of repurchases
$H15_1$: Board independence negatively influences the size of repurchases

– Additional Influencers

(i) Profitability

Given the testing of excess cash distribution hypothesis on repurchase size, an additional supporting empirical supplement is to also test the actual influence of profitability as well, since a by-product of increased profitability is the accumulation of unexpected cash reserves. In order to test if profitability influences the size of repurchases, we develop two hypotheses:

The sixteenth hypothesis, H16, tests if firm-level profitability influences the size of repurchases by using two proxies, *Return on Assets* (*ROA*), which is the natural logarithm of net profit relative to total asset value, and *Net Profit*, which is the natural logarithm of the net profit scaled by 1000. The use of *ROA* is popular with past repurchase studies of the UK, such as Lee and Suh (2011) and Burns *et al.* (2015), however the factor's computation uses the balance sheet's estimation of non-tangible assets as well, which stems complexity. Andonova and Ruiz-Pava (2016) find that the estimation of total asset value and its reporting can impact profitability, which is supported by Sacer *et al.* (2016). Furthermore, Ze-To (2016) finds that the stock performance of British PLCs is highly predictable by using asset liquidity estimates. Since we know that in the UK stock performance has not just impacted the market reception to repurchases (Andriosopoulos and Lasfer, 2015) but also the decision of repurchasing shares (Burns *et al.* 2015), the dependence on *ROA* as a reliable control variable for representing profitability's influence on repurchase size is too strong. Thus, we also include *Net Profit*. Given that excess cash positively influences repurchase undertaking (as discussed above), *ROA* and *Net Profit* are expected to have positive influences.

$H16_0$: Profitability does not positively influence the size of repurchases
$H16_1$: Profitability positively influences the size of repurchases

Declining profitability can impact the stock value and repurchases are capable of supporting a plunge (Dhanani and Roberts, 2009), while British managers have stated that adjusting the reported EPS is a leading repurchase motive (Dhanani, 2016). This indicates the potential of witnessing circumstances when contrasting influences are also realized, which is thus tested by the seventeenth hypothesis, H17, by using the proxies ROA^2, which is which is *ROA* to the power of 2, and $Net\ Profit^2$, which is *Net Profit* to the power of 2. Both the proxies are expected to have negative influences.

$H17_0$: Profitability does not negatively influence the size of repurchases
$H17_1$: Profitability negatively influences the size of repurchases

(ii) Macrofinancial Conditions

We test the influence of macrofinancial conditions on repurchases size since factors associated with repurchases are also associated with the macro-level conditions, such as excess cash; business cycle conditionality impacts profitability (Issah and Antwi, 2017) and productivity (Giglio *et al*. 2016), which directly impacts cash reserves. Thus, the eighteenth hypothesis is developed, H18, which tests the influence of macrofinancial conditions on repurchases size by using four proxies for two different perspectives, the overall economic view and short-term conditions. The influence of the business cycle's [25] aggregate conditionality will be tested using the binary variables *Expansion* and *Recession*, which take the value '1' if a repurchase is announced during economic expansion and recession, respectively. Simultaneously, for testing the influence of the short-term conditions we use the variables *Market Risk*, the difference between the 3month Sterling LIBOR and 3month T-Bill rate, and *Stock Market*, the quarterly performance of the FTSE 100 index, which represents 80% of the UK's stock market (FTSE Russell, 2017).

We assume that repurchases are more likely during an economic upswing, primarily due to British managers stating that distributing excess cash is the leading motive for undertaking repurchases (Dhanani, 2016), and such a scenario is typical to economic prosperity. Further reasons include the behaviour of other aspects associated with repurchases. For instance, repurchases are often financed using new debt, which is consistent with the UK's literature finding a strong presence of the capital restructuring hypothesis (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015), and bank lending (Pasiouras and Kosmidou, 2007; Caglayan and Xu, 2016), debt issuance (Dang, 2013a) and credit worthiness (Bouvatier *et al.* 2012) are pro-cyclical. Furthermore, there are evidences that the UK's stock market is pro-cyclical (Masuduzzaman, 2012) and cointegrated with the business cycle (Apergis *et al.* 2015). We thus expect the variables *Expansion* and *Stock Market* to have positive influences, while *Recession* and *Market Risk* to have negative influences.

$H18_0$: The macrofinancial environment does not influence the size of repurchases

$H18_1$: The macrofinancial environment influences the size of repurchases

[25] We describe 'Recession' as two consecutive quarters of negative GDP, which ends after following two consecutive quarters of positive GDP. This is a quantitative approach that is widely used in Europe (Blackstone, 2011), as opposed to the qualitative approach of the US. 'Expansion' is the period following the end of a recession until the peak GDP is reached.

– Summary of Control Variables

The discussed 18 hypotheses thus cover multiple internal and external factors that impact repurchases, and these hypotheses are represented by a total of 23 proxies, which will be used as control variables in the empirical testing. Thus, given this extensiveness, in Table 3 each of the proxy is listed along with its corresponding hypothesis and the expected influence.

Table 3: Description of Control Variables

The table presents the descriptions of the independent variables used in the empirical testing of finding the determinants of repurchase size, and also states the expected direction of their influence. In Panel I the main influencers discussed in the literature review are presented, which includes the discussed seven motivational hypotheses (Excess Cash Distribution, Adjusting EPS, Signalling Stock Undervaluation, Signalling Information Asymmetry, Dividend Substitution Capital Restructuring and Tax Preferential) and board independence. In Panel II the profitability ratios are presented (Return on Assets and Net Profit), and in Panel III the macrofinancial indictors are presented (Expansion, Recession, Market Risk and Stock Market). The square of each control variable is provided to test possible U shaped or inverted-U shaped influences, where applicable i.e. non-binary variables.

Panel I: Primary Influencers: Motivational Hypotheses and Board Independence			
Hypothesis	**Variable**	**Description**	**Expected Influence**
H1	Cash	Pre-tax income and depreciation relative to total assets.	Positive
H2	$Cash^2$	Cash to the power of 2.	Negative
H3	EPS	Binary, '1' if EPS is negative.	Positive
H4	M/B Ratio	Firm's market value relative to the book value.	Negative
H5	$M/B\ Ratio^2$	M/B Ratio to the power of 2.	Positive
H6	Size	Natural logarithm of the total book value of assets.	Negative
H7	$Size^2$	Size to the power of 2.	Positive
H8	Dividend	Ordinary dividend payout relative to the net income.	Negative
H9	$Dividend^2$	Dividend to the power of 2.	Positive
H10	Debt Ratio	Total debt value relative to total asset value.	Negative
H11	$Debt\ Ratio^2$	Debt Ratio to the power of 2.	Positive
H12	Taxation	Effective (higher) dividend tax rate relative to capital gains tax (Alzahrani and Lasfer, 2012).	Positive
H13	$Taxation^2$	Taxation to the power of 2.	Negative
H14	Board	Independent directors relative to the board size.	Positive
H15	$Board^2$	Board to the power of 2.	Negative
Panel II: Additional Influencers: Profitability Ratios and Macrofinancial Indicators			
H16	ROA	Natural logarithm of net profit relative to total asset value.	Positive
	Net Profit	Natural logarithm of the net profit scaled by 1000.	Positive
H17	ROA^2	ROA to the power of 2.	Negative
	$Net\ Profit^2$	Net Profit to the power of 2.	Negative
H18	Expansion	Binary, '1' if a repurchase occurs during expansion.	Positive
	Recession	Binary, '1' if a repurchase occurs during recession.	Negative
	Market Risk	3month LIBOR excess of 3month T-Bill (quarterly).	Negative
	Stock Market	Quarterly performance of the FTSE 100 index.	Positive

3.3.2.2. Methodology

We use the tobit regression left censored at 0% (Equation 1) for fulfilling the objective of finding the determinants of repurchase size, and this approach is common with past UK studies; such as Burns *et al.* (2015) and Cesari and Ozkan (2015). However, for the dependent variable we opt for Cesari and Ozkan (2015)'s approach of using repurchase value relative to market capitalisation, as opposed to Burns *et al.* (2015)'s usage of repurchase value relative to total assets. This is done due to the regulatory restriction of 15% outstanding equity on open market repurchases, which is better reflected by scaling repurchases with market valuation.

$$\mathrm{REP}_{i,y} = \Sigma_{j=15}^{J}\beta_j \mathrm{Primary\ Influencers}_{j,i,y-1} + \Sigma_{l=4}^{L}\beta_l \mathrm{Profitability}_{l,i,y-1} + \Sigma_{k=4}^{K}\beta_k \mathrm{Macrofinancial}_{k,y} + \varepsilon_{i,y} \quad (1)$$

Where, $\mathrm{REP}_{i,y}$ is the ratio of the repurchase announcement value to the market capitalisation of ith firm in year y = 1985, 1986…2014, $\mathrm{Primary\ Influencers}_{j,i,y-1}$ is the matrix of J yearly-lagged primary proxies, $\mathrm{Profitability}_{l,i,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios and $\mathrm{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators, and $\varepsilon_{i,y}$ is the vector of error terms. We summarise the control variables' description and the expected influences in Table 3.

3.3.3. Robustness Testing

(i) Determinants of Repurchase Value

In order to ensure stability of the results of the determinants of repurchase size, we undertake the fractional probit regression to find the determinants of repurchase value (Equation 2). This will thus verify the results from Equation 1 using a different methodological approach.

$$E[\mathrm{REP}_{i,y}] = \phi(\Sigma_{j=15}^{J}\beta_j \mathrm{Primary\ Influencers}_{j,i,y-1} + \Sigma_{l=4}^{L}\beta_l \mathrm{Profitability}_{l,i,y-1} + \Sigma_{k=4}^{K}\beta_k \mathrm{Macrofinancial}_{k,y} + \varepsilon_{i,y}) \quad (2)$$

Where, $E[\mathrm{REP}_{i,y}]$ is the ratio of the repurchase announcement value to the market capitalisation normalised between 0 and 1 of ith firm in year y = 1985, 1986…2014, $\mathrm{Primary\ Influencers}_{j,i,y-1}$ is the matrix of J yearly-lagged primary proxies, $\mathrm{Profitability}_{l,i,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios and $\mathrm{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators, ϕ is the standard cumulative normal and $\varepsilon_{i,y}$ is the vector of error terms. We summarise the control variables' description and the expected influences in Table 3.

(ii) Leamer's Global Sensitivity Analysis

For additional reliability of the empirical results we further undertake another robustness test, the global sensitivity analysis advocated by Leamer (1985). This warrants continually altering the testing environment to see how sensitive are the outputs, thus revealing their reliability, which essentially requires sequentially dropping (i) each repurchase announcement, (ii) each year, (iii) separating firms based on their operational sector, financial v/s non-financial institution, and (iv) dropping each control variable. Thus, the tobit regression (Equation 1) will be undertaken by applying these four criterions.

3.4. Results

This section is subcategorised into four subsections. The first subsection discusses the distribution of repurchases based on their size, the second subsection discusses the summary statistics of the independent variables, the third subsection discusses the results from the testing of the determinants of repurchase size, and the fourth subsection discusses the results from the two sets of robustness tests.

3.4.1. Repurchase Size-Specific Distribution

Figure 1 provides size-specific frequency distribution of the repurchases, i.e. their value relative to the market capitalisation, and their information is summarised in Table 4 alongside the Mann-Whitney Rank Sum results that reveal if repurchases are different across size-specific quartiles. The frequency distribution is lopsided and indicates managerial liking for large sized repurchases; the average quantity of shares sought by the upper (lower) 50% of the firms is 13.50% (6.30%). This is a pragmatic managerial approach, as shareholder consent does not mandate that the repurchase must be of the approved size, rather it must be capped at that level. Thus, approval for a larger size provides flexibilities in the payout's execution, which is important since factors such as repurchase timing are crucial for success, as proven throughout time by the testing of global markets (Kahle, 2001; Chan *et al.* 2007; Ishikawa and Takahashi, 2011; Cesari *et al.* 2012). The Mann-Whitney results find significance across the quartiles, thus there is a statistical difference between repurchases of different values.

Figure 1: Repurchase Size-Specific Frequency Distribution

The graph presents the distribution of repurchases based on the announcement's value relative to the firm's market capitalisation. It also highlights the four quartiles.

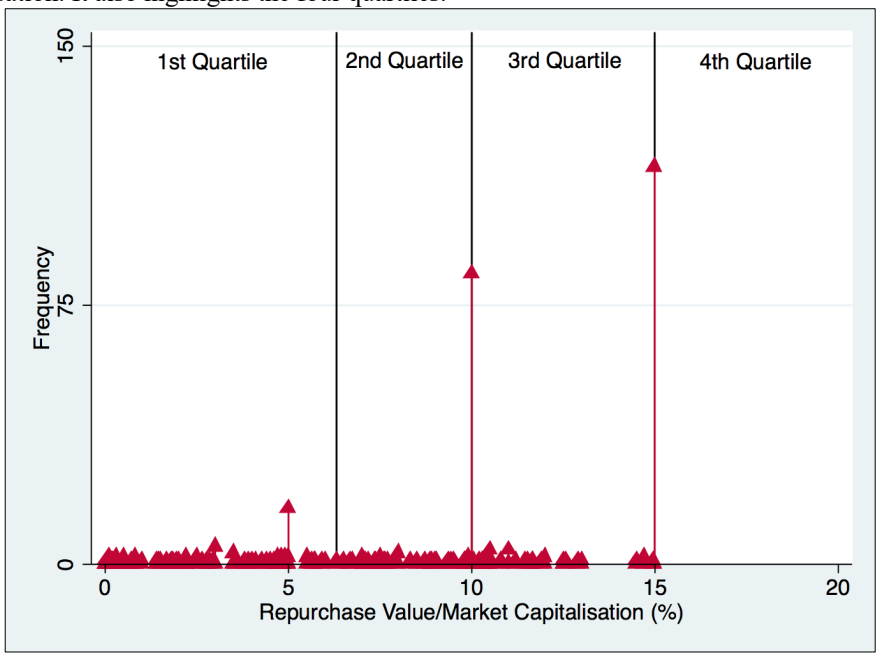


Table 4: Repurchase Size-Specific Summary

The table presents the quartile-level statistics of the repurchases in Panel I, namely the upper and lower ends of each quartile and the average percent of shares intended to be repurchased within each quartile. In Panel II the results from the Mann-Whitney test to check if the repurchases across the four quartiles are statistically different are presented, which was undertaken by pairing the four quartiles that lead to a combination of 6 pairs. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and p-values are in the parenthesis.

Panel I: Quartile-Level Statistics			**Panel II: Mann-Whitney Rank Sum**	
Quartile	**Quartile Width (%)**	**Average % of Shares Sought**	**Quartile Pair**	**Z-Score**
1st	0.03-6.31	3.20	**1st and 2nd**	-11.751*** *(0.000)*
2nd	6.50-10.00	9.31	**1st and 3rd**	-11.634*** *(0.000)*
3rd	10.00-14.99	11.90	**1st and 4th**	-12.392*** *(0.000)*
4th	14.99-15.00	14.99	**2nd and 3rd**	-9.794*** *(0.000)*
			2nd and 4th	-12.582*** *(0.000)*
			3rd and 4th	-9.764*** *(0.000)*

3.4.2. Summary Statistics

The summary statistics of the control variables are presented in Table 5, and the Mann-Whitney Rank Sum test results to check the real difference in the variables across repurchase size-specific quartiles are available in Table 6.

Table 5: Summary Statistics of Control Variables

The table presents the summary statistics of the independent variables used in the testing of the determinants of repurchase size. In Panel I the firm-specific factors are summarised; Cash (pre-tax income and depreciation relative to total assets), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), Size (natural logarithm of the total book value of assets), Dividend (ordinary dividend payout relative to the net income), Debt Ratio (total debt value relative to total asset value), Board (independent directors relative to the board size), ROA (natural logarithm of net profit relative to total asset value) and Net Profit (natural logarithm of the net profit scaled by 1000). In Panel II the country-specific factors are presented; Taxation (effective (higher) dividend tax rate relative to capital gains tax), Expansion (binary, '1' if a repurchase occurs during expansion), Recession (binary, '1' if a repurchase occurs during recession), Market Risk (3month LIBOR excess of 3month T-Bill (quarterly)) and Stock Market (quarterly performance of the FTSE 100 index). Moreover, both panels subcategorise the summary statistics based on repurchase size-specific quartiles.

	Mean	Std. Dev.	Minimum	Maximum
Panel I: Firm Specific Variables				
Cash				
1st Quartile	0.131	0.167	-0.427	0.976
2nd Quartile	0.100	0.213	-1.281	0.580
3rd Quartile	0.105	0.151	-0.439	0.585
4th Quartile	0.084	0.181	-0.806	0.584
All Repurchases	0.105	0.180	-1.281	0.976
EPS				
1st Quartile	0.033	0.180	0.000	1.000
2nd Quartile	0.100	0.300	0.000	1.000
3rd Quartile	0.167	0.375	0.000	1.000
4th Quartile	0.200	0.400	0.000	1.000
All Repurchases	0.125	0.331	0.000	1.000
M/B Ratio				
1st Quartile	3.564	5.087	0.115	27.327
2nd Quartile	2.708	2.745	0.169	19.765
3rd Quartile	1.930	2.156	0.014	14.143
4th Quartile	0.789	12.299	-112.243	18.544
All Repurchases	2.248	6.926	-112.243	27.327
Size				
1st Quartile	12.842	2.559	7.530	19.520
2nd Quartile	13.463	2.784	8.143	19.038
3rd Quartile	12.934	2.262	8.799	18.905
4th Quartile	12.539	2.556	4.057	19.273
All Repurchases	12.945	2.558	4.057	19.520
Dividend				
1st Quartile	0.563	0.586	0.000	3.847
2nd Quartile	0.370	0.556	-2.537	2.571
3rd Quartile	0.382	0.889	-2.695	5.677
4th Quartile	0.350	1.589	-6.979	9.112
All Repurchases	0.416	0.996	-6.979	9.112
Debt Ratio				
1st Quartile	0.395	0.242	0.005	0.959
2nd Quartile	0.467	0.219	0.023	0.956
3rd Quartile	0.362	0.231	0.002	0.941
4th Quartile	0.382	0.280	0.006	1.052
All Repurchases	0.402	0.246	0.002	1.052
Board				
1st Quartile	0.540	0.266	0.054	1.000
2nd Quartile	0.511	0.174	0.200	1.000
3rd Quartile	0.561	0.225	0.200	1.000
4th Quartile	0.591	0.247	0.166	1.000
All Repurchases	0.551	0.231	0.054	1.000

ROA				
1st Quartile	0.354	0.441	-0.585	2.401
2nd Quartile	0.358	0.332	-0.410	1.386
3rd Quartile	0.320	0.493	-0.754	3.583
4th Quartile	0.296	0.414	-0.959	1.668
All Repurchases	0.332	0.423	-0.959	3.583
Net Profit				
1st Quartile	4.297	1.357	0.000	7.051
2nd Quartile	4.237	1.801	0.000	6.964
3rd Quartile	3.822	1.952	0.000	6.692
4th Quartile	3.455	2.011	0.000	7.158
All Repurchases	3.952	1.823	0.000	7.158
Panel II: Country Specific Variables				
Taxation	0.702	0.265	0.375	1.700
Expansion	0.730	0.444	0.000	1.000
Recession	0.044	0.206	0.000	1.000
Market Risk	0.004	0.001	0.0009	0.009
Stock Market	0.005	0.026	-0.105	0.063

The sample's average *Cash* is similar to that seen in a cross-sectional timeframe 1997-2006 (Andriosopoulos and Lasfer, 2015), thus firms show a consistent attitude towards solvency during a repurchase payout. The patterns of *Cash* and *Dividend* are complementary as both see a negative relationship with repurchase size; firms of the 1st (4th) quartile have the highest (lowest) level of excess cash and dividend distribution. Thus if firms have low levels of solvency when a repurchase is in consideration, they lower the dividend payouts to avoid cash flow deficiency. *EPS* reveals that firms of the 1st (4th) quartile are the least (most) to witness negative earnings, and this is consistent with British managers stating that adjusting *EPS* is the second most popular repurchase motive (Dhanani, 2016). *M/B Ratio* and repurchase size have a linear negative relationship, as the most (least) overvalued firms fall in the 1st (4th) quartile, and the sample's average is equivalent to the country's average (2) between 1979-2015 (Keimling, 2016). Thus revealing that a typical repurchasing firm is not greatly overvalued than the aggregate market. Firm *Size* and repurchase size show a disproportionate relationship; firms of the 2nd (4th) quartile are the largest (smallest). The results thus highlight the erstwhile discussed contradictions of British literature showing that firm size motivates repurchases, which contrasts seminal viewpoint and the general implications of asymmetric information. The average *Debt Ratio* across the quartiles is also disproportionate, as firms of the 2nd (3rd) quartile are the most (least) leveraged.

Similar fashioned disproportionateness is further visible with the variable *Board*; firms of the 2nd (4th) quartile are the least (most) independent. The disparity is attributable to the governance code's excessive flexibility (ecoDa, 2015), which gives firms discretionary powers for board composition as it only restricts large cap firms to have at least 50% independent directors (OECD, 2017). This impact is further supported by the fact that the average UK firm (Guest, 2008) is less independent than that in the US (Boone *et al.* 2007), 41% v/s 70%. However since the sample's average is 55%, it is revealed that a repurchasing firm in Britain is more monitored than the average firm. The profitability ratios, *ROA* and *Net Profit*, generally reduce across the quartiles; firms of the 1st (4th) quartile are amongst the most (least) profitable. The consistent pattern of less profitable firms opting for a larger sized repurchase is consistent with the pattern seen with *EPS*.

Taxation finds that over the 30year (1985-2014) period dividends are averagely 30% tax friendlier than repurchases, however Figure 2 reveals that the ratio has been periodically incrementing, with its peak of 1.90 reaching in 2017 after the research's cut-off year (2014). The continual growth in repurchase's economic efficiency can thus induce a shift of an increased repurchase weighting in the corporate payout policy, especially given the earlier discussed evidences of rising repurchase popularity independent of dividend distribution. Repurchases are more popular during business cycle *Expansion* than *Recession*, as 73% are witnessed during a business cycle upswing as opposed to 4.40% during a crisis. The average *Market Risk* is not grave, which complements the modest *Stock Market* performance.

Figure 2: Taxation Variable (1985-2017)
The graph presents the Taxation (effective (higher) dividend tax rate relative to capital gains tax) independent variable for the period 1985-2017.

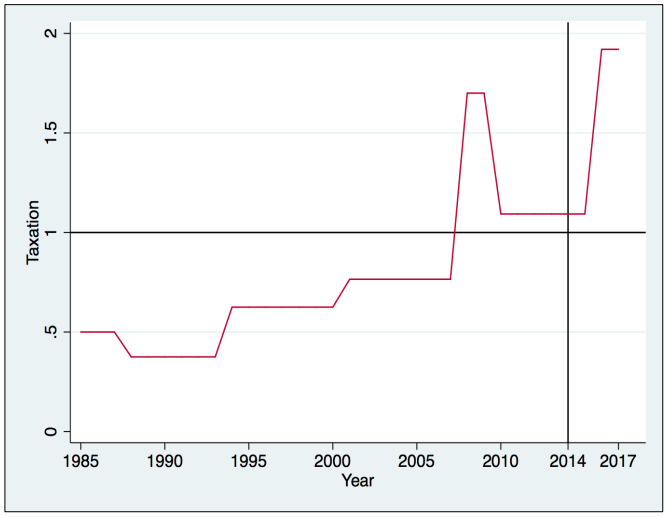


Table 6: Mann-Whitney Rank Sum Test

The table presents the results from the Mann-Whitney test to verify if the firm-specific factors across the firms of the four repurchase size-specific quartiles are statistically different, namely Cash (pre-tax income and depreciation relative to total assets), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), Size (natural logarithm of the total book value of assets), Dividend (ordinary dividend payout relative to the net income), Debt Ratio (total debt value relative to total asset value), Board (independent directors relative to the board size), ROA (natural logarithm of net profit relative to total asset value) and Net Profit (natural logarithm of the net profit scaled by 1000). This was undertaken by pairing the factors from the four quartiles that leads to a combination of 6 pairs. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and p-values are stated in the parentheses.

	Quartile Pair					
	Q1:Q2	**Q1:Q3**	**Q1:Q4**	**Q2:Q3**	**Q2:Q4**	**Q3:Q4**
Cash	-0.186	0.608	2.536**	0.639	2.472**	1.981**
	(0.852)	*(0.543)*	*(0.011)*	*(0.522)*	*(0.013)*	*(0.047)*
EPS	-1.552	-1.788*	-4.512***	-0.254	-3.266***	-3.038***
	(0.120)	*(0.073)*	*(0.000)*	*(0.799)*	*(0.001)*	*(0.002)*
M/B Ratio	0.533	0.127	2.150**	-0.692	2.234**	2.529**
	(0.601)	*(0.898)*	*(0.031)*	*(0.488)*	*(0.025)*	*(0.011)*
Size	-0.910	-0.536	0.067	0.162	1.076	0.619
	(0.362)	*(0.591)*	*(0.946)*	*(0.871)*	*(0.282)*	*(0.535)*
Dividend	1.129	2.928***	4.569***	1.760*	3.662***	2.326**
	(0.259)	*(0.003)*	*(0.000)*	*(0.078)*	*(0.000)*	*(0.020)*
Debt Ratio	-0.893	-1.132	1.558	-0.403	2.395**	2.556***
	(0.372)	*(0.257)*	*(0.119)*	*(0.686)*	*(0.016)*	*(0.010)*
Board	0.691	0.271	-3.351***	-0.754	-4.831***	-4.309***
	(0.429)	*(0.786)*	*(0.000)*	*(0.450)*	*(0.000)*	*(0.000)*
ROA	-0.783	-0.563	1.807*	0.363	2.791***	2.277**
	(0.433)	*(0.573)*	*(0.070)*	*(0.717)*	*(0.005)*	*(0.022)*
Net Profit	-0.072	0.153	2.459**	0.079	2.408**	2.213**
	(0.943)	*(0.878)*	*(0.013)*	*(0.937)*	*(0.016)*	*(0.026)*

The Rank Sum results indicate an informative pattern across repurchasing firms. Initially, it is seen that *Size* is the only factor that is not different across the quartiles. Also, no variable is absolutely different on a statistical level, and the greatest difference is seen with *Dividend*, as it is significant for five of the six quartile-pairs. In terms of aggregate quartile-level patterns, the greatest of differences is seen between firms in the upper most quartile (Q4) and those in the remainder quartiles. Against Q1 all but *Size* and *Debt Ratio* are statistically different, and against quartiles Q2 and Q3 all but *Size* are statistically different. The upper quartile essentially consists of firms that repurchase the maximum possible shares, thus revealing that they are strongly different from any group of firms that consists of those intending to repurchase less than the maximum permitted via the open market route. Further, there is lesser difference between firms in quartiles Q3 and Q2, than there is between those in quartiles Q3 and Q1. Thus, revealing that firms around the median level are relatively more similar. However, we see no significant difference with any variable between firms in quartiles Q2 and Q1, which reveals that the bottom 50% of the firms are most similar. Overall, a general pattern is discerned that as a firm increases the repurchase size their characteristics also tend to see an increase in difference against those that are not increasing the sizes.

3.4.3. Determinants of Repurchase Size

In Table 7 we present the coefficients of the censored tobit regression undertaken to find the determinants of repurchase size. In Panel I we focus on the primary influencers (motivational hypotheses and board independence), which is done by forming a base of the top three repurchase motives that were stated by British managers in Dhanani (2016)'s survey; these are excess cash distribution, adjusting EPS and signalling stock undervaluation. In Models I through III these three hypotheses are individually tested, thereof in Models IV through IX we hold the proxies of these hypotheses as the base and sequentially add the remaining proxies in each model, and in Model X the proxies of the seven hypotheses and board independence are lumped together. The results in Panel II aim to focus on the influences of firm-level profitability and macrofinancial conditions by taking all of the proxies of the primary influencers (motivational hypotheses and board independence) as base. Thereof in Models I through III we undertake the testing of the influence of profitability, in Models IV through VI we test the influence of aggregate macrofinancial indicators, in Models VII through IX we test the influence of macrofinancial indicators that represent individual components of the business cycle, and in Model X all of the profitability and macrofinancial proxies are lumped together alongside the primary influencers (motivational hypotheses and board independence), making it the master model with a total of 23 control variables. With this empirical testing, none of the 23 control variables are expected to be endogenous. This is asserted as the dependent variable used for the testing is the percent of shares announced for repurchasing, and none of the control variables represent information that is equivalent or similar to that obtained from the said dependent variable. Thus, no control variable can be interchanged with the dependent variable for realizing the same empirical objective.

Within this table the Pseudo R^2 are reported, which are consistently negative. This may be unconventional but such a realization is very much possible with tobit regression (Sribney, 2019). Pseudo R^2 can be mathematically expressed as; Pseudo $R^2 = 1 - \frac{L1}{L0}$. Where, $L1$, is the full model log-likelihood and $L0$ is the constant. In the case of discrete distributions, the log likelihood is the log of a probability, thus remaining either negative or zero. Due to this, $0 \geq L1 \geq L0$ and $0 \leq \frac{L1}{L0} \leq 1$, and thus $0 \leq Pseudo\ R^2 \leq 1$. In the case of continuous distributions, the log likelihood is the log of a density, and density functions can be ≥ 1, thus the log likelihood can be either positive or negative. Similarly, mixed continuous/discreet likelihood models, such as tobit regression, may end up with a positive log likelihood, which justifies the finding of a negative Pseudo R^2;

If $L1 \geq 0$ and $L0 \leq 0$, then $\frac{L1}{L0} \leq 0$, and $1 - \frac{L1}{L0} > 1$

If $L1 > L0 > 0$, then $\frac{L1}{L0} > 1$, and $1 - \frac{L1}{L0} < 0$

Cash has a consistent positive influence, confirming the presence of the excess cash distribution hypothesis, which is aligned with past empirical results (Lee and Suh, 2011; Burns *et al.* 2015). Thus, we accept the alternative hypothesis $H1_1$: The excess cash distribution hypothesis influences the size of repurchases. However, $Cash^2$ remains insignificant, thus if firms are in possession of surplus cash, they are only inclined towards increasing repurchase size. In light of this we accept the null hypothesis $H2_0$: The excess cash distribution hypothesis does not have an opposing influence on the size of repurchases. Moving to the other two base motives, we see that *EPS* has a strong positive influence, indicating the presence of the adjusting EPS hypothesis in determining repurchase size. Thus, we accept the alternative hypothesis $H3_1$: The adjusting EPS hypothesis influences the size of repurchases. This is unsurprising managerial attitude, not just because it is consistent with our expectations and the Dhanani (2016) survey, but also since in countries like the US repurchases are often undertaken for adjusting the EPS (Almeida *et al.* 2016) and such acts have shown to positively influence the stock performance of repurchase undertaking firms (Li and Swanson, 2016). Further, *M/B Ratio* has a negative influence, indicating that the signalling stock undervaluation hypothesis influences the size of a repurchase, thus we accept the alternative hypothesis $H4_1$: The signalling stock undervaluation hypothesis influences the size of repurchases. Further, the $M/B\ Ratio^2$ is consistently negative, thus we accept the null hypothesis $H5_0$: The signalling stock undervaluation hypothesis does not have an opposing influence on the size of repurchases. However, given the absolute negative influences of both control variables, the influencing pattern supports the assertion that the signalling stock undervaluation hypothesis is a strong determinant of repurchase size. These findings in totality are thus highly consistent with Dhanani (2016)'s survey of British managers.

Table 7: Determinants of Repurchase Size

The table presents the results from the testing of the determinants of repurchase size (Equation 1) $REP_{i,y} = \Sigma_{j=15}^{J}\beta_j \text{Primary Influencers}_{j,i,y-1} + \Sigma_{l=4}^{L}\beta_l \text{Profitability}_{l,i,y-1} + \Sigma_{k=4}^{K}\beta_k \text{Macrofinancial}_{k,y} + \varepsilon_{i,y}$. Where, $REP_{i,y}$ is the ratio of the repurchase announcement value to the market capitalisation of ith firm in year y = 1985, 1986…2014. $\text{Primary Influencers}_{j,i,y-1}$ is the matrix of J yearly-lagged primary proxies; Cash (pre-tax income and depreciation relative to total assets), Cash^2 (Cash to the power of 2), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), M/B Ratio^2 (M/B Ratio to the power of 2), Size (natural logarithm of the total book value of assets), Size^2 (Size to the power of 2), Dividend (ordinary dividend payout relative to the net income), Dividend^2 (Dividend to the power of 2), Debt Ratio (total debt value relative to total asset value), Debt Ratio^2 (Debt Ratio to the power of 2), Taxation (effective (higher) dividend tax rate relative to capital gains tax), Taxation^2 (Taxation to the power of 2), Board (independent directors relative to the board size) and Board^2 (Board to the power of 2). $\text{Profitability}_{l,i,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios; ROA (natural logarithm of net profit relative to total asset value), ROA^2 (ROA to the power of 2), Net Profit (natural logarithm of the net profit scaled by 1000) and Net Profit^2 (Net Profit to the power of 2). $\text{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators; Expansion (binary, '1' if a repurchase occurs during expansion), Recession (binary, '1' if a repurchase occurs during recession), Market Risk (3month LIBOR excess of 3month T-Bill (quarterly)) and Stock Market (quarterly performance of the FTSE 100 index). $\varepsilon_{i,y}$ is the vector of error terms. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and t-statistics are stated in the parenthesis.

Panel I: Primary Influencers (Motivational Hypotheses and Board Independence)

	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Cash	-0.021			0.030*	0.031**
	(-1.59)			*(1.90)*	*(1.98)*
Cash^2	-0.013			-0.005	-0.003
	(-0.65)			*(-0.28)*	*(-0.16)*
EPS		0.031***		0.039***	0.040***
		(4.37)		*(4.61)*	*(4.63)*
M/B Ratio			-0.002***	-0.002***	-0.002***
			(-3.81)	*(-3.79)*	*(-3.85)*
M/B Ratio^2			-0.0001***	-0.0001***	-0.0001***
			(-2.69)	*(-2.71)*	*(-2.78)*
Size					-0.002
					(-0.36)
Size^2					0.0001
					(0.44)
Dividend					
Dividend^2					
Debt Ratio					
Debt Ratio^2					
Taxation					
Taxation^2					
Board					
Board^2					
Constant	0.101***	0.095***	0.104***	0.097***	0.109**
	(34.71)	*(37.91)*	*(36.60)*	*(27.64)*	*(2.35)*
LR Chi^2	2.87	18.61	14.84	36.21	36.72
Pseudo R^2	-0.002	-0.015	-0.012	-0.030	-0.036
Obs.	360	360	360	360	360

Panel I Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.028*	0.034**	0.030*	0.032**	0.030*
	(1.74)	*(2.16)*	*(1.93)*	*(2.05)*	*(1.85)*
Cash^2	-0.003	-0.002	-0.006	0.002	0.001
	(-0.20)	*(-0.14)*	*(-0.33)*	*(0.11)*	*(0.06)*
EPS	0.036***	0.038***	0.039***	0.039***	0.036***
	(3.76)	*(4.52)*	*(4.62)*	*(4.67)*	*(3.76)*
M/B Ratio	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-3.70)	*(-4.04)*	*(-3.79)*	*(-4.16)*	*(-4.03)*
M/B Ratio^2	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(-2.63)	*(-3.21)*	*(-2.70)*	*(-3.05)*	*(-3.22)*
Size					0.001
					(0.23)
Size^2					-0.0001
					(-0.31)
Dividend	-0.001				-0.001
	(-0.47)				*(-0.33)*
Dividend^2	0.0007*				0.0007*
	(1.76)				*(1.82)*
Debt Ratio		-0.059*			-0.076**
		(-1.85)			*(-2.09)*
Debt Ratio^2		0.076**			0.087**
		(2.22)			*(2.31)*
Taxation			-0.014		-0.037
			(-0.36)		*(-0.94)*
Taxation^2			0.007		0.017
			(0.41)		*(0.88)*
Board				0.157***	0.170***
				(3.13)	*(3.18)*
Board^2				-0.117***	-0.133***
				(-3.01)	*(-3.20)*
Constant	0.097***	0.104***	0.103***	0.052***	0.072
	(24.53)	*(14.50)*	*(5.77)*	*(3.55)*	*(1.39)*
LR Chi^2	39.62	41.77	36.40	45.94	55.97
Pseudo R^2	-0.033	-0.034	-0.030	-0.038	-0.046
Obs.	360	360	360	360	360

The above panel presents the results from the testing of the impact of the primary influencers (motivational hypotheses and board independence) on repurchase size.

Panel II: Primary Influencers (Motivational Hypotheses and Board Independence), Profitability Ratios & Macrofinancial Indicators					
	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Cash	0.034**	0.024	0.029	0.029*	0.030*
	(2.05)	*(1.41)*	*(1.64)*	*(1.82)*	*(1.83)*
Cash^2	-0.011	-0.010	-0.020	0.0005	0.001
	(-0.53)	*(-0.47)*	*(-0.88)*	*(0.03)*	*(0.07)*
EPS	0.027**	0.036	0.028	0.035***	0.036***
	(2.35)	*(1.23)*	*(0.32)*	*(3.63)*	*(3.76)*
M/B Ratio	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-3.72)	*(-4.22)*	*(-3.84)*	*(-3.98)*	*(-4.03)*
M/B Ratio^2	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(-2.94)	*(-3.46)*	*(-3.13)*	*(-3.11)*	*(-3.23)*
Size	0.0006	-0.002	-0.003	0.001	0.001
	(0.09)	*(-0.33)*	*(-0.38)*	*(0.22)*	*(0.22)*
Size^2	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(-0.15)	*(-0.21)*	*(-0.09)*	*(-0.28)*	*(-0.29)*
Dividend	-0.003	-0.0008	-0.003	0.001	-0.0009
	(-0.92)	*(-0.29)*	*(-0.93)*	*(-0.44)*	*(-0.31)*
Dividend^2	0.001**	0.0008**	0.001**	0.0008*	0.0007*
	(2.29)	*(2.04)*	*(2.39)*	*(1.93)*	*(1.81)*
Debt Ratio	-0.079**	-0.079**	-0.083**	-0.074**	-0.076**
	(-2.15)	*(-2.16)*	*(-2.26)*	*(-2.03)*	*(-2.08)*
Debt Ratio^2	0.087**	0.098**	0.099**	0.082**	0.087**
	(2.30)	*(2.53)*	*(2.51)*	*(2.19)*	*(2.31)*
Taxation	-0.037	-0.041	-0.041	-0.022	-0.041
	(-0.93)	*(-1.03)*	*(-1.02)*	*(-0.54)*	*(-0.93)*
Taxation^2	0.016	0.018	0.018	0.007	0.019
	(0.87)	*(0.96)*	*(0.95)*	*(0.37)*	*(0.87)*
Board	0.174***	0.171***	0.172***	0.161***	0.170***
	(3.24)	*(3.19)*	*(3.22)*	*(3.00)*	*(3.16)*
Board^2	-0.135***	-0.133***	-0.134***	-0.126***	-0.133***
	(-3.25)	*(-3.20)*	*(-3.22)*	*(-3.02)*	*(-3.18)*
ROA	-0.020		-0.020		
	(-1.42)		*(-1.45)*		
ROA^2	0.009		0.008		
	(1.63)		*(1.45)*		
Net Profit		0.0004	0.0006		
		(0.06)	*(0.09)*		
Net Profit^2		0.003	0.003		
		(0.92)	*(0.79)*		
Expansion				-0.009*	
				(-1.83)	
Recession					-0.002
					(-0.20)
Market Risk					
Stock Market					
Constant	0.078	0.088*	0.094*	0.076	0.074
	(1.53)	*(1.67)*	*(1.77)*	*(1.48)*	*(1.40)*
LR Chi^2	58.63	57.66	59.90	59.31	56.01
Pseudo R^2	-0.048	-0.048	-0.049	-0.049	-0.046
Obs.	360	360	360	360	360

Panel II Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.029*	0.030*	0.030*	0.030*	0.029*
	(1.78)	*(1.86)*	*(1.83)*	*(1.84)*	*(1.66)*
Cash^2	0.001	0.001	0.001	0.001	-0.019
	(0.07)	*(0.07)*	*(0.06)*	*(0.07)*	*(-0.82)*
EPS	0.035***	0.036***	0.036***	0.036***	0.025
	(3.68)	*(3.76)*	*(3.78)*	*(3.78)*	*(0.82)*
M/B Ratio	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(-4.00)	*(-4.04)*	*(-4.03)*	*(-4.04)*	*(-3.74)*
M/B Ratio^2	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(-3.12)	*(-3.23)*	*(-3.26)*	*(-3.27)*	*(-2.99)*
Size	0.001	0.001	0.001	0.001	-0.003
	(0.17)	*(0.21)*	*(0.17)*	*(0.15)*	*(-0.39)*
Size^2	-0.0001	-0.0001	-0.0001	-0.0001	0.0001
	(-0.23)	*(-0.29)*	*(-0.25)*	*(-0.23)*	*(0.00)*
Dividend	-0.001	-0.001	0.0001	-0.0009	-0.003
	(-0.37)	*(-0.35)*	*(-0.33)*	*(-0.34)*	*(-1.03)*
Dividend^2	0.0008*	0.0007*	0.0007*	0.0007*	0.001**
	(1.91)	*(1.82)*	*(1.85)*	*(1.85)*	*(2.46)*
Debt Ratio	-0.073**	-0.075**	-0.076**	-0.075**	-0.081**
	(-2.02)	*(-2.07)*	*(-2.09)*	*(-2.07)*	*(-2.19)*
Debt Ratio^2	0.081**	0.087**	0.087**	0.087**	0.093**
	(2.16)	*(2.31)*	*(2.33)*	*(2.32)*	*(2.35)*
Taxation	-0.032	-0.051	-0.036	-0.050	-0.038
	(-0.75)	*(-0.95)*	*(-0.91)*	*(-0.93)*	*(-0.66)*
Taxation^2	0.013	0.023	0.015	0.022	0.015
	(0.61)	*(0.90)*	*(0.82)*	*(0.86)*	*(0.52)*
Board	0.158***	0.171***	0.171***	0.172***	0.162***
	(2.95)	*(3.19)*	*(3.20)*	*(3.21)*	*(3.02)*
Board^2	-0.123***	-0.134***	-0.134***	-0.135***	-0.126***
	(-2.95)	*(-3.21)*	*(-3.22)*	*(-3.23)*	*(-3.00)*
ROA					-0.021
					(-1.53)
ROA^2					0.008
					(1.50)
Net Profit					0.0001
					(0.01)
Net Profit^2					0.003
					(0.70)
Expansion	-0.010*				-0.010*
	(-1.93)				*(-1.80)*
Recession	-0.008				-0.007
	(-0.64)				*(-0.53)*
Market Risk		-0.582		-0.590	-0.195
		(-0.38)		*(-0.38)*	*(-0.13)*
Stock Market			-0.070	-0.070	-0.054
			(-0.81)	*(-0.81)*	*(-0.63)*
Constant	0.084	0.080	0.074	0.083	0.107*
	(1.60)	*(1.43)*	*(1.45)*	*(1.48)*	*(1.83)*
LR Chi^2	59.73	56.11	56.62	56.77	63.82
Pseudo R^2	-0.049	-0.046	-0.047	-0.047	-0.052
Obs.	360	360	360	360	360

The above panel presents the results from the testing of the impact of the primary influencers (motivational hypotheses and board independence), profitability ratios and macrofinancial indicators on repurchase size.

The consistent insignificance of *Size* reveals that the signalling information asymmetry hypothesis does not influence repurchase size, thus we accept the null hypothesis $H6_0$: The signalling information asymmetry hypothesis does not influence the size of repurchases. Further, given that $Size^2$ too is consistently insignificant, we accept the null hypothesis $H7_0$: The signalling information asymmetry hypothesis does not have an opposing influence on the size of repurchases. These findings are inconsistent with past studies finding that a firm's size has a positive influence on the managerial repurchase decision-making (Benhamouda and Watson, 2010; Andriosopoulos and Hoque, 2013; Sonika *et al.* 2014). Thus, revealing that when it comes to the particular decision regarding the determination of the repurchase's size, the firm's size has no influence on managerial attitude. The insignificance of *Dividend* rejects the influence of the dividend substitution hypothesis in determining repurchase size, thus we accept the null hypothesis $H8_0$: The dividend substitution hypothesis does not influence the size of repurchases. However, $Dividend^2$ has a positive influence, which compels the acceptance of the alternative hypothesis $H9_1$: The dividend substitution hypothesis has an opposing influence on the size of repurchases. These findings are thus coherent with Burns *et al.* (2015), and is also consistent with the findings of Ferris *et al.* (2006) and Denis and Osobov (2008) that repurchases are standalone corporate payouts in the UK, which complement dividend distribution rather than being their replacements. Thus, we see consistency between the influence of dividend distribution on the intention of undertaking repurchases and on the size of the repurchase.

The presence of the capital restructuring hypothesis as determinant of repurchase size is visible from the negative influence of *Debt Ratio*; thus, we accept the alternative hypothesis $H10_1$: The capital restructuring hypothesis influences the size of repurchases. The findings remain consistent with the past literature (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015). The positive influence of $Debt\ Ratio^2$ warrants the acceptance of the alternative hypothesis $H11_1$: The capital restructuring hypothesis has an opposing influence on the size of repurchases. The finding is consistent with Geiler and Renneboog (2015), and thus helps prove this study's novel contribution that leverage has a U shaped influence on managerial decision relating to repurchase size. We further find existing evidences to support the U shaped influencing pattern. British firms have shown swiftness in gaining an optimal leverage position (Dang, 2013a), and repurchases are an efficient mechanism of its attainment, while Andriosopoulos and Lasfer (2015) find that the market reaction to a repurchase announcement witnesses a positive impact when the firm is highly leveraged.

We do not find any evidence that the tax preferential hypothesis determines repurchase size, as *Taxation* remains consistently insignificant, thus we accept the null hypothesis $H12_0$: The tax preferential hypothesis does not influence the size of repurchases. The finding is consistent with Oswald and Young (2004) and Geiler and Renneboog (2015), however, $Taxation^2$ too has a consistent insignificant influence, which requires the acceptance of the null hypothesis $H13_0$: The tax preferential hypothesis does not have an opposing influence on the size of repurchases. Thus, the insignificant influencing pattern further adds to the on-going contradictions within existing literature regarding the repurchase-taxation relationship.

Corresponding to our expectations *Board* has a positive influence on repurchase size, hence we accept the alternative hypothesis $H14_1$: Board independence positively influences the size of repurchases. Thus, upon combining this with the result of *Cash*, the British managerial reveal to have remained consistent with the seminal view that diverting excess cash towards repurchases ensures managerial discipline by averting them from agent-centric decisions (Jensen and Meckling, 1976; Easterbrook, 1984; Jensen, 1986). $Board^2$ has a negative influence, which requires the acceptance of the alternative hypothesis $H15_1$: Board independence negatively influences the size of repurchases. Thus, the inverted-U shaped influence of board independence is the new contribution to literature, and existing literature are in support of this contribution. The negative influence of $Board^2$ is consistent with the negative relationship between board independence and overall firm-level performance in the UK (Hsu and Wu, 2014), which is supported by the country's institutional environment. The UK's governance code is largely voluntary and the board structure is influenced by firm-specific benefits such as economic prosperity (Raheja, 2005), which is a stronger influencer than CEO performance (Guest, 2008), while independent directors often feel complacent and consider themselves advisors rather than monitors (Franks *et al.* 2001; Ozkan, 2007). Thus, it is pragmatic to observe that the application of discretion will not always result in a board composition that consists of independent directors who always favour repurchases, due to reasons such as repurchases requiring a large cash outlay and the inherent reduction in the volume of shares available to trade in the market.

We thus establish that over the 30year tested period signalling stock undervaluation was the primary determinant of repurchase size; this is an important finding. Albeit the coefficients of *Cash* and *EPS* have more impact on an economic level, but $Cash^2$ is insignificant while $M/B\ Ratio^2$ influence direction is identical to *M/B Ratio*, and the level of significance of *EPS* is relatively less. The managerial attitude is thus similar to that seen in the US where stock undervaluation increments repurchase success (Bonaime *et al.* 2014), and the signalling undervaluation hypothesis is highly popular amongst American managers (Baker *et al.* 2003; Brav *et al.* 2005). Fields (2016) interviewed 44 directors serving on boards of 96 PLCs that held a combined market valuation of $2.7trn, and they concluded that the signalling stock undervaluation hypothesis is a keystone to a repurchase programme, irrelevant of any other motive that may be present. Thus, the motive perhaps held the 3rd rank in the UK only during the Dhanani (2016)'s survey years (2003-2007), which is understandable since at the time the economy was in an upswing and undervaluation during such periods becomes unlikely, but in the long-term it is substantiated to remain essential in determining repurchase size.

The influences of *ROA* and *Net Profit* are consistently insignificant; thus, we accept the null hypothesis $H16_0$: Profitability does not positively influence the size of repurchases. Further, ROA^2 and $Net\ Profit^2$ too have insignificant influences, compelling the acceptance of the null hypothesis $H17_0$: Profitability does not negatively influence the size of repurchases. The inability of profitability to impact the size of a repurchase is consistent with Cesari and Ozkan (2015). Insignificant influences are seen with *Market Risk*, *Stock Market* and *Recession*; however, *Expansion* has a negative influence, contradicting our expectations. Thus, we must accept the alternative hypothesis $H18_1$: The macrofinancial environment influences the size of repurchases. The pattern reveals managerial tendency of maximizing repurchase size during times of less prosperity, not particularly during a period that is recessionary but during economic compression when stock prices begin to unnecessary fall due to macro-adjustments. This conclusion is consistent with the results of *EPS*, *M/B Ratio* and $M/B\ Ratio^2$. Hence, the combination of testing the additional influencers bolsters the conclusion that the motivational hypotheses and board independence are the key determinants of repurchase size in the UK.

3.4.4. Robustness Testing

(i) Determinants of Repurchase Value

The robustness testing to determine the influencers behind managerial selection of repurchases values are reported in Table 8. Given the nature of the testing the results are split into two panels; Panel I constitutes the coefficients and Panel II the marginal effects. However, both these panels are split into subsections A and B, with the former focusing on the results of the primary influencers (motivational hypotheses and board independence) and the latter on the profitability and macrofinancial indicators, while the empirical models within them are arranged identically to the approach undertaken for the testing of determinants of repurchase size (Table 7). The three base motivational hypotheses, excess cash distribution, adjusting EPS and signalling stock undervaluation have shown similar results to those found in the initial testing. This means significant positive influences of *Cash* and *EPS*, significant negative influences of *M/B Ratio* and *M/B Ratio*^{2}, and the insignificance of *Cash*^{2}. Thus we continue to accept the following hypotheses; $H1_1$: The excess cash distribution hypothesis influences the size of repurchases, $H2_0$: The excess cash distribution hypothesis does not have an opposing influence on the size of repurchases, $H3_1$: The adjusting EPS hypothesis influences the size of repurchases, $H4_1$: The signalling stock undervaluation hypothesis influences the size of repurchases, and $H5_0$: The signalling stock undervaluation hypothesis does not have an opposing influence on the size of repurchases.

An anomaly is seen with the dividend substitution hypothesis. The positive influence of *Dividend*^{2} is consistent with the initial results, thus we continue to accept the alternative hypothesis $H9_1$: The dividend substitution hypothesis has an opposing influence on the size of repurchases. However, the sparingly negative influence of *Dividend* compels the acceptance of the alternative hypothesis $H8_1$: The dividend substitution hypothesis influences the size of repurchases, which the initial results rejected. The influences of *Debt Ratio*, *Debt Ratio*^{2}, *Board* and *Board*^{2} remain consistent with the initial results, which reveal a U shaped influence of leverage and an inverted-U shaped influence of board independence. Thus, we continue to accept the following alternative hypotheses; $H10_1$: The capital restructuring hypothesis influences the size of repurchases, $H11_1$: The capital restructuring hypothesis has an opposing influence on the size of repurchases, $H14_1$: Board independence positively influences the size of repurchases, and $H15_1$: Board independence negatively influences the size of repurchases. Further, *Size*, *Size*^{2}, *Taxation* and *Taxation*^{2} each has a statistically insignificant influence, which is consistent with the initial results. Thus we continue to accept the following null hypotheses; $H6_0$: The signalling information asymmetry hypothesis does

not influence the size of repurchases, $H7_0$: The signalling information asymmetry hypothesis does not have an opposing influence on the size of repurchases, $H12_0$: The tax preferential hypothesis does not influence the size of repurchases, and $H13_0$: The tax preferential hypothesis does not have an opposing influence on the size of repurchases.

Regarding profitability we see that unlike the initial results, *ROA* has a negative influence and ROA^2 positive influence. However, the ratios conflict with our expectations, which causes an anomalous revelation that is understandable by looking at the entirety of the results. The incrementing of repurchase value during periods of increased profitability is coherent with the positive influence of *Cash*, while the inverse influence is consistent with the positive influence of *EPS* and negative influence of *Expansion*. This posits the diversion of resources towards dividend distribution since a business cycle upswing brings firm-level prosperity, which seminal studies have found is better communicable via dividends (John and Williams, 1985; Bernheim, 1991); the assertion is further supported by the positive influence of $Dividend^2$. Thus, during periods of prosperity following economic compression, firms tend to prefer dividends for communicating specific information. The influences of *Net Profit* and $Net\ Profit^2$ are insignificant, identical to the initial results. Further, the negative influence of *Expansion*, and insignificant influences of *Recession*, *Market Risk* and *Stock Market* remain consistent with the initial results. Thus, we continue to accept the alternative hypothesis $H18_1$: The macrofinancial environment influences the size of repurchases.

Table 8: Robustness Check: Determinants of Repurchase Value

The table presents the results from the robustness testing of the determinants of repurchase value (Equation 2): $E[REP_{I,y}] = \phi(\Sigma_{j=15}^{J}\beta_j \text{Primary Influencers}_{j,I,y-1} + \Sigma_{l=4}^{L}\beta_l \text{Profitability}_{l,I,y-1} + \Sigma_{k=4}^{K}\beta_k \text{Macrofinancial}_{k,y} + \varepsilon_{I,y})$. Where, $E[REP_{I,y}]$ is the ratio of the repurchase announcement value to the market capitalisation normalised between 0 and 1 of ith firm in year y = 1985, 1986…2014. $\text{Primary Influencers}_{j,I,y-1}$ is the matrix of J yearly-lagged primary proxies; Cash (pre-tax income and depreciation relative to total assets), Cash^2 (Cash to the power of 2), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), M/B Ratio^2 (M/B Ratio to the power of 2), Size (natural logarithm of the total book value of assets), Size^2 (Size to the power of 2), Dividend (ordinary dividend payout relative to the net income), Dividend^2 (Dividend to the power of 2), Debt Ratio (total debt value relative to total asset value), Debt Ratio^2 (Debt Ratio to the power of 2), Taxation (effective (higher) dividend tax rate relative to capital gains tax), Taxation^2 (Taxation to the power of 2), Board (independent directors relative to the board size) and Board^2 (Board to the power of 2). $\text{Profitability}_{l,I,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios; ROA (natural logarithm of net profit relative to total asset value), ROA^2 (ROA to the power of 2), Net Profit (natural logarithm of the net profit scaled by 1000) and Net Profit^2 (Net Profit to the power of 2). $\text{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators; Expansion (binary, '1' if a repurchase occurs during expansion), Recession (binary, '1' if a repurchase occurs during recession), Market Risk (3month LIBOR excess of 3month T-Bill (quarterly)) and Stock Market (quarterly performance of the FTSE 100 index). Φ is the standard cumulative normal and $\varepsilon_{i,y}$ is the vector of error terms. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parenthesis.

Panel I: Coefficients

Panel IA: Primary Influencers (Motivational Hypotheses and Board Independence)

	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Cash	-0.387			0.639**	0.678**
	(-1.56)			*(2.30)*	*(2.32)*
Cash^2	-0.223			-0.170	-0.126
	(-0.69)			*(-0.69)*	*(-0.49)*
EPS		0.656***		0.873***	0.894***
		(4.18)		*(5.14)*	*(5.10)*
M/B Ratio			-0.046	-0.045***	-0.047***
			(-1.54)	*(-3.39)*	*(-3.42)*
M/B Ratio^2			0.0001	-0.0002	-0.0002
			(0.01)	*(-1.45)*	*(-1.49)*
Size					-0.038
					(-0.26)
Size^2					0.001
					(0.34)
Dividend					
Dividend^2					
Debt Ratio					
Debt Ratio^2					
Taxation					
Taxation^2					
Board					
Board^2					
Constant	0.462***	0.341***	0.529***	0.378***	0.547
	(8.30)	*(7.48)*	*(7.24)*	*(5.80)*	*(0.57)*
WALD Chi^2	2.53	17.47	11.76	46.73	44.44
Pseudo R^2	0.002	0.018	0.013	0.034	0.034
Obs.	360	360	360	360	360

Panel IA Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.502*	0.754***	0.658**	0.686**	0.575*
	(1.77)	*(2.57)*	*(2.31)*	*(2.42)*	*(1.86)*
Cash^2	-0.124	-0.116	-0.198	-0.030	-0.044
	(-0.50)	*(-0.44)*	*(-0.78)*	*(-0.12)*	*(-0.15)*
EPS	0.646***	0.891***	0.879***	0.886***	0.666***
	(3.13)	*(5.10)*	*(5.18)*	*(4.79)*	*(2.99)*
M/B Ratio	-0.042***	-0.051***	-0.045***	-0.049***	-0.048***
	(-3.27)	*(-3.68)*	*(-3.38)*	*(-3.61)*	*(-3.49)*
M/B Ratio^2	-0.0001	-0.0003**	-0.0001	-0.0002*	-0.0003**
	(-1.57)	*(-2.01)*	*(-1.42)*	*(-1.64)*	*(-2.21)*
Size					0.062
					(0.38)
Size^2					-0.002
					(-0.47)
Dividend	-0.216				-0.210
	(-1.41)				*(-1.39)*
Dividend^2	0.059*				0.057*
	(1.83)				*(1.88)*
Debt Ratio		-1.196*			-1.435*
		(-1.69)			*(-1.83)*
Debt Ratio^2		1.553**			1.717**
		(2.13)			*(2.12)*
Taxation			-0.285		-0.760
			(-0.39)		*(-1.01)*
Taxation^2			0.162		0.347
			(0.47)		*(1.01)*
Board				2.818***	3.029***
				(2.88)	*(2.93)*
Board^2				-2.103***	-2.362***
				(-2.65)	*(-2.82)*
Constant	0.345***	0.520***	0.485	-0.424	-0.126
	(4.78)	*(3.08)*	*(1.43)*	*(-1.50)*	*(-0.11)*
WALD Chi^2	44.77	55.87	46.78	49.10	63.77
Pseudo R^2	0.041	0.039	0.034	0.041	0.054
Obs.	360	360	360	360	360

The above panel presents the coefficients from the robustness testing of the impact of the primary influencers (motivational hypotheses and board independence) on repurchase values.

Panel IB: Primary Influencers (Motivational Hypotheses and Board Independence), Profitability Ratios & Macrofinancial Indicators

	Model I	Model II	Model III	Model IV	Model V
Cash	0.724**	0.364	0.479	0.560*	0.575*
	(2.19)	*(1.02)*	*(1.29)*	*(1.80)*	*(1.85)*
Cash^2	-0.441	-0.187	-0.580	-0.055	-0.044
	(-1.28)	*(-0.55)*	*(-1.62)*	*(-0.19)*	*(-0.15)*
EPS	0.383	1.207	0.923	0.637***	0.665***
	(1.39)	*(1.42)*	*(1.12)*	*(2.88)*	*(2.97)*
M/B Ratio	-0.043***	-0.053***	-0.050***	-0.047***	-0.048***
	(-3.19)	*(-3.55)*	*(-3.29)*	*(-3.45)*	*(-3.50)*
M/B Ratio^2	-0.0002*	-0.0003	-0.0002	-0.0002**	-0.0003**
	(-1.93)	*(-1.46)*	*(-1.31)*	*(-2.05)*	*(-2.21)*
Size	0.047	-0.024	-0.046	0.066	0.062
	(0.30)	*(-0.13)*	*(-0.26)*	*(0.39)*	*(0.38)*
Size^2	-0.002	-0.002	-0.001	-0.002	-0.002
	(-0.37)	*(-0.37)*	*(-0.30)*	*(-0.47)*	*(-0.47)*
Dividend	-0.300*	-0.232*	-0.358**	-0.218	-0.210
	(-1.83)	*(-1.66)*	*(-2.21)*	*(-1.45)*	*(-1.38)*
Dividend^2	0.071**	0.070**	0.088**	0.058*	0.057*
	(2.20)	*(2.18)*	*(2.51)*	*(1.95)*	*(1.87)*
Debt Ratio	-1.594**	-1.463*	-1.668**	-1.382*	-1.435*
	(-2.08)	*(-1.97)*	*(-2.18)*	*(-1.77)*	*(-1.83)*
Debt Ratio^2	1.803**	1.871**	2.043**	1.606**	1.718**
	(2.29)	*(2.29)*	*(2.53)*	*(1.98)*	*(2.12)*
Taxation	-0.805	-0.885	-0.947	-0.430	-0.754
	(-1.06)	*(-1.17)*	*(-1.25)*	*(-0.56)*	*(-0.91)*
Taxation^2	0.367	0.389	0.419	0.147	0.344
	(1.05)	*(1.13)*	*(1.20)*	*(0.42)*	*(0.89)*
Board	3.014***	2.972***	2.920***	2.860***	3.030***
	(2.93)	*(2.87)*	*(2.83)*	*(2.75)*	*(2.94)*
Board^2	-2.336***	-2.301***	-2.239***	-2.221***	-2.362***
	(-2.80)	*(-2.74)*	*(-2.67)*	*(-2.64)*	*(-2.82)*
ROA	-0.694*		-0.718*		
	(-1.83)		*(-1.92)*		
ROA^2	0.293*		0.272*		
	(1.81)		*(1.71)*		
Net Profit		0.151	0.164		
		(0.74)	*(0.82)*		
Net Profit^2		0.008	0.016		
		(0.08)	*(0.14)*		
Expansion				-0.192**	
				(-2.01)	
Recession					0.004
					(0.02)
Market Risk					
Stock Market					
Constant	0.074	0.241	0.512	-0.090	-0.130
	(0.07)	*(0.20)*	*(0.44)*	*(-0.08)*	*(-0.11)*
WALD Chi^2	64.19	57.68	59.97	66.59	63.79
Pseudo R^2	0.058	0.055	0.059	0.056	0.054
Obs.	360	360	360	360	360

Panel IB Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.553*	0.577**	0.565*	0.568*	0.493
	(1.77)	*(1.86)*	*(1.83)*	*(1.84)*	*(1.31)*
Cash^2	-0.043	-0.038	-0.043	-0.038	-0.547
	(-0.15)	*(-0.13)*	*(-0.15)*	*(-0.13)*	*(-1.49)*
EPS	0.645***	0.658***	0.669***	0.661***	0.809
	(2.90)	*(2.93)*	*(3.03)*	*(2.98)*	*(0.96)*
M/B Ratio	-0.048***	-0.048***	-0.048***	-0.048***	-0.048***
	(-3.47)	*(-3.51)*	*(-3.50)*	*(-3.52)*	*(-3.37)*
M/B Ratio^2	-0.0002**	-0.0003**	-0.0003**	-0.0003**	-0.0002
	(-2.05)	*(-2.23)*	*(-2.28)*	*(-2.31)*	*(-1.62)*
Size	0.061	0.058	0.053	0.049	-0.040
	(0.37)	*(0.45)*	*(0.33)*	*(0.30)*	*(-0.22)*
Size^2	-0.002	-0.002	-0.002	-0.002	-0.001
	(-0.44)	*(-0.44)*	*(-0.42)*	*(-0.40)*	*(-0.23)*
Dividend	-0.212	-0.216	-0.209	-0.215	-0.363**
	(-1.42)	*(-1.43)*	*(-1.40)*	*(-1.44)*	*(-2.25)*
Dividend^2	0.057*	0.058*	0.058*	0.059*	0.086***
	(1.94)	*(1.91)*	*(1.92)*	*(1.95)*	*(2.56)*
Debt Ratio	-1.378*	-1.420*	-1.437*	-1.422*	-1.607**
	(-1.76)	*(-1.81)*	*(-1.85)*	*(-1.82)*	*(-2.11)*
Debt Ratio^2	1.593**	1.710**	1.731**	1.724**	1.908**
	(1.96)	*(2.11)*	*(2.15)*	*(2.14)*	*(2.37)*
Taxation	-0.562	-1.133	-0.742	-1.116	-0.970
	(-0.68)	*(-1.18)*	*(-0.99)*	*(-1.16)*	*(-0.96)*
Taxation^2	0.219	0.532	0.327	0.513	0.399
	(0.57)	*(1.17)*	*(0.95)*	*(1.13)*	*(0.82)*
Board	2.824***	3.058***	3.042***	3.072***	2.774***
	(2.72)	*(2.96)*	*(2.94)*	*(2.97)*	*(2.66)*
Board^2	-2.190***	-2.379***	-2.367***	-2.385***	-2.108**
	(-2.61)	*(-2.84)*	*(-2.83)*	*(-2.85)*	*(-2.51)*
ROA					-0.738*
					(-1.93)
ROA^2					0.278*
					(1.70)
Net Profit					0.140
					(0.70)
Net Profit^2					0.010
					(0.10)
Expansion	-0.202**				-0.180*
	(-2.06)				*(-1.82)*
Recession	-0.108				-0.114
	(-0.48)				*(-0.50)*
Market Risk		-16.000		-16.032	-9.576
		(-0.56)		*(-0.56)*	*(-0.34)*
Stock Market			-1.373	-1.375	-1.203
			(-0.75)	*(-0.75)*	*(-0.67)*
Constant	0.008	0.113	-0.065	0.174	0.771
	(0.01)	*(0.09)*	*(-0.06)*	*(0.14)*	*(0.60)*
WALD Chi^2	66.48	64.40	66.75	67.34	66.35
Pseudo R^2	0.057	0.054	0.054	0.055	0.062
Obs.	360	360	360	360	360

The above panel presents the coefficients from the testing of the impact of the primary influencers (motivational hypotheses and board independence), profitability ratios and macrofinancial indicators on repurchase values.

Panel II: Marginal Effects					
Panel IIA: Primary Influencers (Motivational Hypotheses and Board Independence)					
	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Cash	-0.141			0.226**	0.239**
	(-1.57)			*(2.31)*	*(2.33)*
Cash^2	-0.081			-0.060	-0.044
	(-0.69)			*(-0.69)*	*(-0.49)*
EPS		0.236***		0.308***	0.315***
		(4.31)		*(5.27)*	*(5.23)*
M/B Ratio			-0.016	-0.016***	-0.016***
			(-1.56)	*(-3.44)*	*(-3.47)*
M/B Ratio^2			0.0001	-0.0001	-0.0001
			(0.01)	*(-1.46)*	*(-1.50)*
Size					-0.013
					(-0.26)
Size^2					0.0001
					(0.34)
Dividend					
Dividend^2					
Debt Ratio					
Debt Ratio^2					
Taxation					
Taxation^2					
Board					
Board^2					

Panel IIA Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.176*	0.264***	0.232**	0.241**	0.199*
	(1.77)	*(2.58)*	*(2.32)*	*(2.43)*	*(1.86)*
Cash²	-0.043	-0.040	-0.070	-0.010	-0.015
	(-0.50)	*(-0.44)*	*(-0.78)*	*(-0.12)*	*(-0.15)*
EPS	0.227***	0.313***	0.210***	0.311***	0.230***
	(3.15)	*(5.18)*	*(5.31)*	*(4.92)*	*(3.00)*
M/B Ratio	-0.014***	-0.018***	-0.015***	-0.017***	-0.016***
	(-3.32)	*(-3.73)*	*(-3.43)*	*(-3.67)*	*(-3.54)*
M/B Ratio²	-0.0001	-0.0001**	-0.0001	-0.0001*	-0.0001**
	(-1.58)	*(-2.03)*	*(-1.43)*	*(-1.66)*	*(-2.23)*
Size					0.021
					(0.38)
Size²					-0.001
					(-0.47)
Dividend	-0.076				-0.072
	(-1.42)				*(-1.39)*
Dividend²	0.020*				0.020*
	(1.85)				*(1.89)*
Debt Ratio		-0.420*			-0.497*
		(-1.71)			*(-1.85)*
Debt Ratio²		0.545**			0.595**
		(2.15)			*(2.15)*
Taxation			-0.100		-0.263
			(-0.39)		*(-1.01)*
Taxation²			0.057		0.120
			(0.47)		*(1.01)*
Board				0.988***	1.050***
				(2.90)	*(2.97)*
Board²				-0.737***	-0.818***
				(-2.67)	*(-2.85)*

The above panel presents the marginal effects from the testing of the impact of the primary influencers (motivational hypotheses and board independence) on repurchase values.

Panel IIB: Primary Influencers (Motivational Hypotheses and Board Independence), Profitability Ratios & Macrofinancial Indicators					
	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Cash	0.250**	0.126	0.165	0.193*	0.199*
	(2.20)	*(1.02)*	*(1.29)*	*(1.80)*	*(1.85)*
Cash^2	-0.152	-0.064	-0.199	-0.019	-0.015
	(-1.29)	*(-0.55)*	*(-1.62)*	*(-0.19)*	*(-0.15)*
EPS	0.132	0.417	0.317	0.220***	0.230***
	(1.40)	*(1.43)*	*(1.12)*	*(2.90)*	*(2.99)*
M/B Ratio	-0.014***	-0.018***	-0.017***	-0.016***	-0.016***
	(-3.23)	*(-3.59)*	*(-3.33)*	*(-3.49)*	*(-3.54)*
M/B Ratio^2	-0.0001*	-0.0001	-0.0001	-0.0001**	-0.001**
	(-1.95)	*(-1.47)*	*(-1.31)*	*(-2.07)*	*(-2.23)*
Size	0.016	-0.008	-0.016	0.022	0.021
	(0.30)	*(-0.13)*	*(-0.26)*	*(0.39)*	*(0.38)*
Size^2	-0.0007	-0.0007	-0.0006	-0.001	-0.001
	(-0.37)	*(-0.37)*	*(-0.30)*	*(-0.47)*	*(-0.47)*
Dividend	-0.103*	-0.080*	-0.123**	-0.075	-0.072
	(-1.84)	*(-1.67)*	*(-2.22)*	*(-1.46)*	*(-1.39)*
Dividend^2	0.024**	0.024**	0.030**	0.020**	0.020*
	(2.21)	*(2.20)*	*(2.53)*	*(1.97)*	*(1.89)*
Debt Ratio	-0.550**	-0.505*	-0.574**	-0.477*	-0.497*
	(-2.11)	*(-1.90)*	*(-2.21)*	*(-1.79)*	*(-1.85)*
Debt Ratio^2	0.622**	0.646**	0.703***	0.555**	0.595**
	(2.32)	*(2.33)*	*(2.58)*	*(2.00)*	*(2.14)*
Taxation	-0.278	-0.306	-0.326	-0.148	-0.261
	(-1.07)	*(-1.18)*	*(-1.25)*	*(-0.56)*	*(-0.92)*
Taxation^2	0.126	0.134	0.144	0.051	0.119
	(1.06)	*(1.13)*	*(1.20)*	*(0.42)*	*(0.90)*
Board	1.041***	1.027***	1.005***	0.988***	1.050***
	(2.96)	*(2.90)*	*(2.86)*	*(2.78)*	*(2.97)*
Board^2	-0.806***	-0.795***	-0.771***	-0.767***	-0.818***
	(-2.83)	*(-2.77)*	*(-2.70)*	*(-2.67)*	*(-2.85)*
ROA	-0.239*		-0.247*		
	(-1.84)		*(-1.92)*		
ROA^2	0.101*		0.093*		
	(1.82)		*(1.72)*		
Net Profit		0.052	0.056		
		(0.74)	*(0.83)*		
Net Profit^2		0.002	0.005		
		(0.08)	*(0.14)*		
Expansion				-0.066**	
				(-2.02)	
Recession					0.001
					(0.02)
Market Risk					
Stock Market					

Panel IIB Continued

	Model VI	Model VII	Model VIII	Model IX	Model X
Cash	0.191*	0.200*	0.195*	0.196*	0.169
	(1.77)	*(1.87)*	*(1.83)*	*(1.84)*	*(1.31)*
Cash²	-0.014	-0.013	-0.015	-0.013	-0.187
	(-0.15)	*(-0.13)*	*(-0.15)*	*(-0.13)*	*(-1.50)*
EPS	0.222***	0.228***	0.231***	0.229***	0.277
	(2.92)	*(2.95)*	*(3.05)*	*(2.99)*	*(0.97)*
M/B Ratio	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***
	(-3.52)	*(-3.55)*	*(-3.55)*	*(-3.57)*	*(-3.41)*
M/B Ratio²	-0.0001**	-0.0001**	-0.0001**	-0.0001**	-0.0001
	(-2.07)	*(-2.26)*	*(-2.31)*	*(-2.33)*	*(-1.63)*
Size	0.021	0.020	0.018	0.016	-0.013
	(0.37)	*(0.35)*	*(0.33)*	*(0.30)*	*(-0.22)*
Size²	-0.0001	-0.0009	-0.0009	-0.0008	-0.0004
	(-0.44)	*(-0.44)*	*(-0.42)*	*(-0.40)*	*(-0.23)*
Dividend	-0.073	-0.074	-0.072	-0.074	-0.124**
	(-1.42)	*(-1.44)*	*(-1.40)*	*(-1.45)*	*(-2.26)*
Dividend²	0.019*	0.020*	0.020*	0.020**	0.029***
	(1.95)	*(1.92)*	*(1.93)*	*(1.96)*	*(2.58)*
Debt Ratio	-0.476*	-0.492*	-0.497*	-0.492*	-0.551**
	(-1.78)	*(-1.83)*	*(-1.87)*	*(-1.84)*	*(-2.14)*
Debt Ratio²	0.550**	0.592**	0.599**	0.596**	0.654***
	(1.98)	*(2.14)*	*(2.18)*	*(2.17)*	*(2.40)*
Taxation	-0.194	-0.392	-0.257	-0.386	-0.332
	(-0.68)	*(-1.18)*	*(-0.99)*	*(-1.16)*	*(-0.96)*
Taxation²	0.075	0.184	0.113	0.177	0.137
	(0.57)	*(1.17)*	*(0.95)*	*(1.13)*	*(0.83)*
Board	0.975***	1.059***	1.053***	1.063***	0.951***
	(2.75)	*(3.00)*	*(2.98)*	*(3.01)*	*(2.69)*
Board²	-0.756***	-0.824***	-0.819***	-0.825***	-0.723**
	(-2.63)	*(-2.87)*	*(-2.86)*	*(-2.88)*	*(-2.53)*
ROA					-0.253*
					(-1.94)
ROA²					0.095*
					(1.70)
Net Profit					0.048
					(0.70)
Net Profit²					0.003
					(0.10)
Expansion	-0.069**				-0.062*
	(-2.07)				*(-1.82)*
Recession	-0.037				-0.039
	(-0.48)				*(-0.50)*
Market Risk		-5.543		-5.548	-3.285
		(-0.56)		*(-0.56)*	*(-0.34)*
Stock Market			-0.475	-0.475	-0.412
			(-0.75)	*(-0.76)*	*(-0.67)*

The above panel presents the marginal effects from the testing of the impact of the primary influencers (motivational hypotheses and board independence), profitability ratios and macrofinancial indicators on repurchase values.

(ii) Leamer's Global Sensitivity Analysis

The Leamer (1985)'s criterions are applied to the determinants of repurchase size test's empirical setup that included all of the 23 tested control variables (Table 7, Panel II, Model X). The analysis focuses on the 10 control variables that were significant in the initial testing (7 motivational hypotheses proxies, 2 board independence proxies and 1 macrofinancial indicator). The testing thus results in a loop of 414 regressions, and the realized coefficients[26] are presented in Figures 3 through 12, while their summary statistics are reported in Table 9. We find that 7 of the control variables are coherent with the initial results, *Cash, Dividend*^{2}*, Debt Ratio, Debt Ratio*^{2}*, Board, Board*^{2} and *Expansion*. Thus indicating the continual acceptance of the following hypotheses; $H1_1$: The excess cash distribution hypothesis influences the size of repurchases, $H9_1$: The dividend substitution hypothesis has an opposing influence on the size of repurchases, $H10_1$: The capital restructuring hypothesis influences the size of repurchases, $H11_1$: The capital restructuring hypothesis has an opposing influence on the size of repurchases, $H14_1$: Board independence positively influences the size of repurchases, $H15_1$: Board independence negatively influences the size of repurchases, and $H18_1$: The macrofinancial environment influences the size of repurchases.

While *M/B Ratio, M/B Ratio*^{2} and *EPS* each has one contradictory coefficient. These contradictions are rather consistent with each other. The negative coefficient of *EPS* indicates that managers are less prone to increasing repurchase size when earnings are negative, which is consistent with the signalling stock undervaluation hypothesis being a determinant of repurchases size. Similarly, the positive coefficient of *M/B Ratio* and *M/B Ratio*^{2} indicate that managers are prone to unethically increase repurchase size when the firm is overvalued, which is consistent with the adjusting EPS hypothesis being a determinant of repurchases size. In light of this we continue to accept the following hypotheses; $H3_1$: The adjusting EPS hypothesis influences the size of repurchases, $H4_1$: The signalling stock undervaluation hypothesis influences the size of repurchases, and $H5_0$: The signalling stock undervaluation hypothesis does not have an opposing influence on the size of repurchases.

[26] The information regarding t-statistics is available in the Appendix.

Thus, when we combine the fundamentals of the tested proxies with the findings of the initial testing and those of the two robustness tests, and then sort them based on their influence pattern (if U shaped or inverted-U shaped, which are less desired), and the economic value of coefficients, a list of the most to least influencing determinants of repurchases size is discernible. The most popular are the signalling stock undervaluation hypothesis, which is followed by the adjusting EPS and excess cash distribution hypotheses, thus revealing their consistency with Dhanani (2016)'s survey, which states these three motives to be the top three reasons for repurchasing shares. The only difference is that the order of preference highlighted in the survey is misaligned, which is ignorable as it covers a cross-section timeline (2003-2007) compared to that of this research (1985-2014). Following are the influences of dividend distribution, capital restructuring hypothesis and board independence.

Table 9: Robustness Check: Summary Statistics of Leamer Regression Coefficients

The table presents the summary statistics of the coefficients produced from the robustness testing of applying Leamer (1985)'s four sensitivity criterions of sequentially dropping each firm, year, type of firm (non-financial or financial institution) and control variable, to Equation 1, which results in 414 looped regressions: $REP_{i,y} = \Sigma_{j=15}^{J}\beta_j \text{Primary Influencers}_{j,i,y-1} + \Sigma_{l=4}^{L}\beta_l \text{Profitability}_{l,i,y-1} + \Sigma_{k=4}^{K}\beta_k \text{Macrofinancial}_{k,y} + \varepsilon_{i,y}$. Where, $REP_{i,y}$ is the ratio of the repurchase announcement value to the market capitalisation of ith firm in year y = 1985, 1986…2014. $\text{Primary Influencers}_{j,i,y-1}$ is the matrix of J yearly-lagged primary proxies; Cash (pre-tax income and depreciation relative to total assets), $Cash^2$ (Cash to the power of 2), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), M/B $Ratio^2$ (M/B Ratio to the power of 2), Size (natural logarithm of the total book value of assets), $Size^2$ (Size to the power of 2), Dividend (ordinary dividend payout relative to the net income), $Dividend^2$ (Dividend to the power of 2), Debt Ratio (total debt value relative to total asset value), Debt $Ratio^2$ (Debt Ratio to the power of 2), Taxation (effective (higher) dividend tax rate relative to capital gains tax), $Taxation^2$ (Taxation to the power of 2), Board (independent directors relative to the board size) and $Board^2$ (Board to the power of 2). $\text{Profitability}_{l,i,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios; ROA (natural logarithm of net profit relative to total asset value), ROA^2 (ROA to the power of 2), Net Profit (natural logarithm of the net profit scaled by 1000) and $Net\ Profit^2$ (Net Profit to the power of 2). $\text{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators; Expansion (binary, '1' if a repurchase occurs during expansion), Recession (binary, '1' if a repurchase occurs during recession), Market Risk (3month LIBOR excess of 3month T-Bill (quarterly)) and Stock Market (quarterly performance of the FTSE 100 index). $\varepsilon_{i,y}$ is the vector of error terms.

	Obs.	Mean	Std. Dev.	Min	Max	Positive Coef. (%)	Negative Coef. (%)
Cash	414	0.029	0.003	0.008	0.080	414 (100)	0 (0)
EPS	414	0.025	0.003	-0.012	0.045	413 (99.75)	1 (0.25)
M/B Ratio	414	-0.002	0.0002	-0.006	0.001	1 (0.25)	413 (99.75)
M/B Ratio^2	414	-0.0001	0.0001	-0.0001	0.0001	1 (0.25)	413 (99.75)
Dividend^2	414	0.001	0.0001	0.0004	0.002	414 (100)	0 (0)
Debt Ratio	414	-0.080	0.005	-0.113	-0.0004	0 (0)	414 (100)
Debt Ratio^2	414	0.092	0.005	0.012	0.121	414 (100)	0 (0)
Board	414	0.162	0.010	0.005	0.251	414 (100)	0 (0)
Board^2	414	-0.125	0.008	-0.214	-0.002	0 (0)	414 (100)
Expansion	414	-0.010	0.0004	-0.014	-0.007	0 (0)	414 (100)

The graphs (Figures 3 through 8) present 6 of the 10 coefficients that are summarised in Table 9.

Figure 3: Cash Coefficients

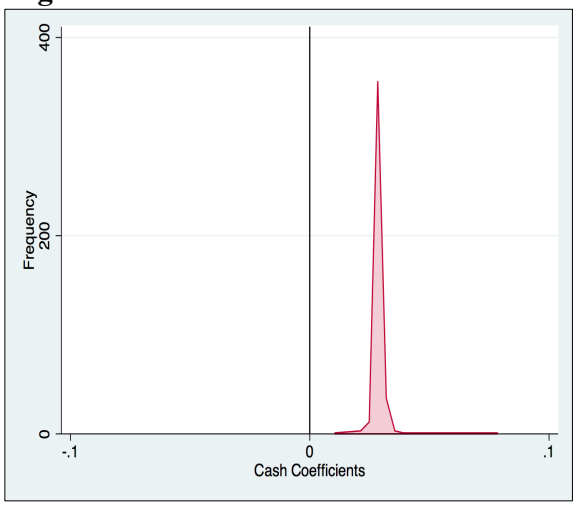


Figure 4: EPS Coefficients

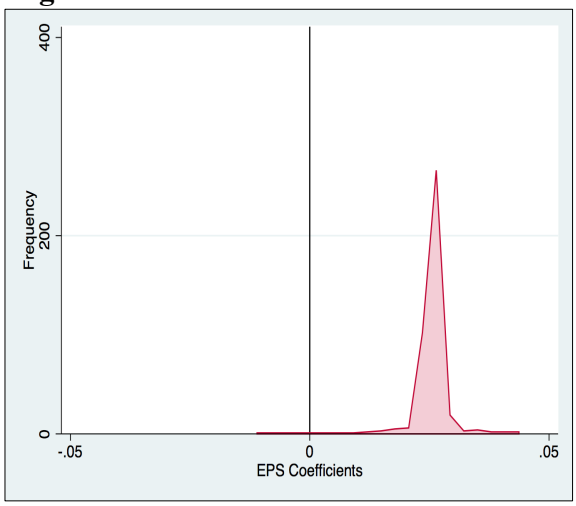


Figure 5: M/B Ratio Coefficients

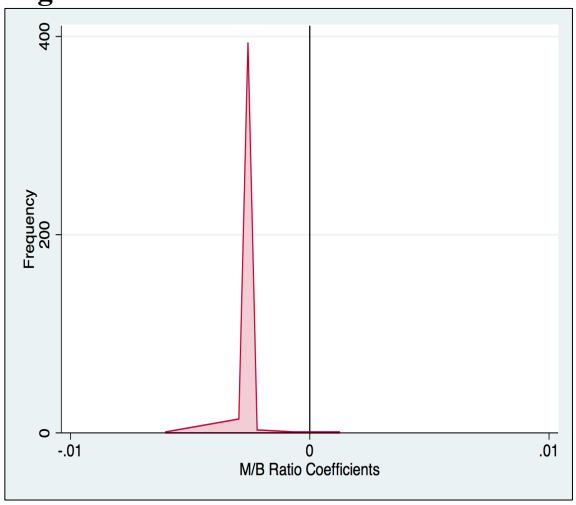


Figure 6: M/B Ratio^2 Coefficients

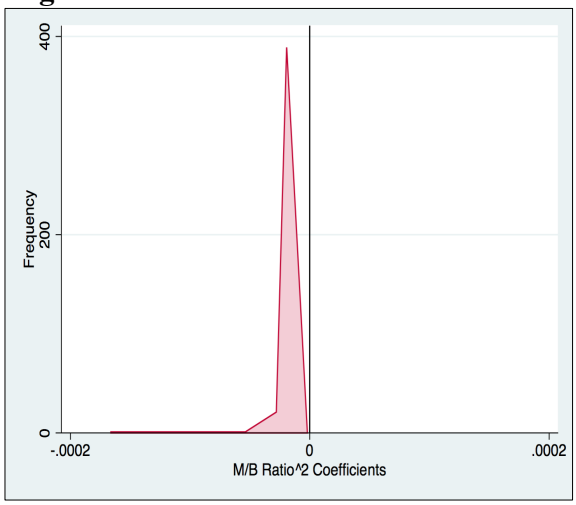


Figure 7: Dividend^2 Coefficients

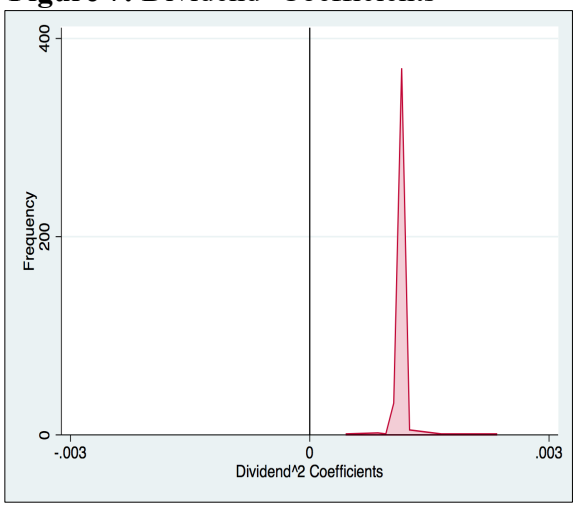
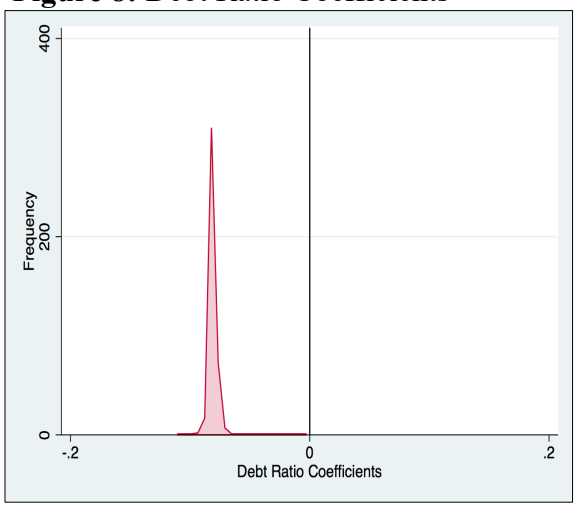


Figure 8: Debt Ratio Coefficients



The graphs (Figures 9 through 12) present the remaining 4 of the 10 coefficients that are summarised in Table 9.

Figure 9: Debt Ratio^2 Coefficients

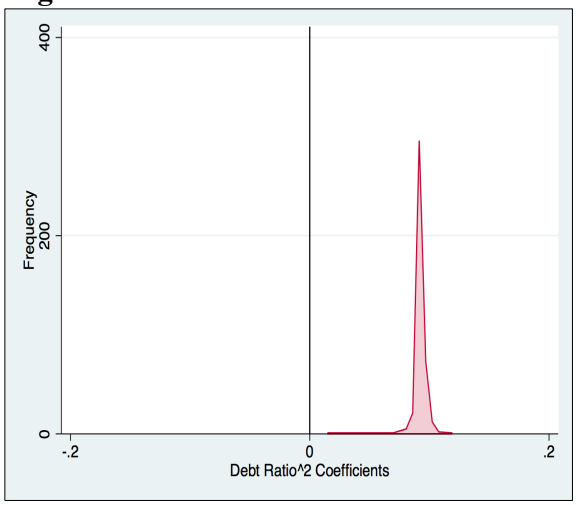


Figure 10: Board Coefficients

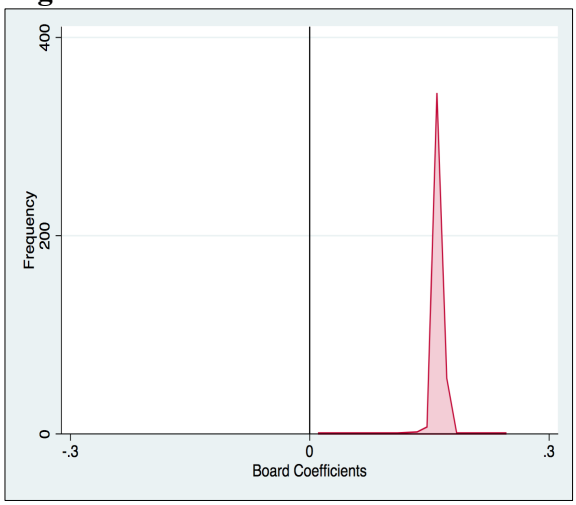


Figure 11: Board^2 Coefficients

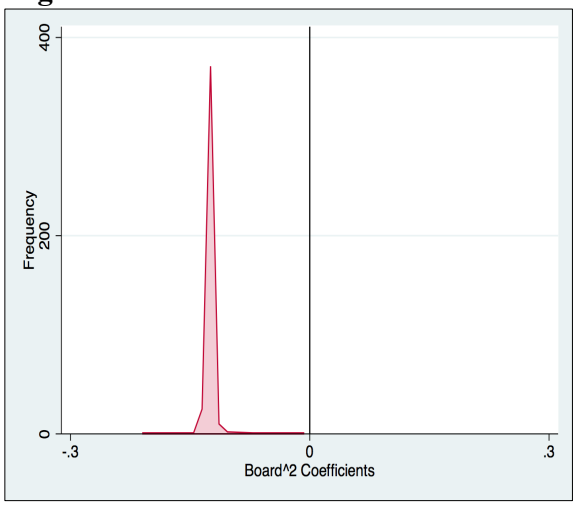
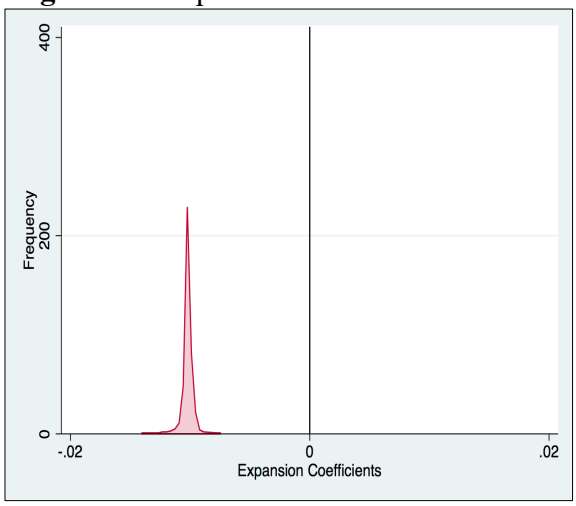


Figure 12: Expansion Coefficients



3.5. Conclusion

The motivation for testing of the determinants of the size of Britain's open market share repurchases was due to the fluctuating influences of the motivational hypotheses on the decision to undertake repurchases. Thus, leading to the investigation of how influential the hypotheses are in determining the size of repurchases, and if their influences are either U shaped or inverted-U shaped. Furthermore, we theoretically discuss and empirically test the relationship of repurchases with board independence, and also additionally include the testing of the influences of firm-level profitability and macrofinancial environment.

Univariate analysis indicates that firm-specific characteristics can be disproportionate across repurchase size, while as repurchase size increases the differences between firm-level characteristics between firms too increases; the upper (bottom) 50% of firms are amongst the least (most) similar. Thus, we now know that when assessing the firms that undertake high valued share repurchases it is important to be cautious. This finding is highly applicable for a portfolio manager to manage the investment exposure in light of a repurchase announcement. The multivariate testing reveals that the most popular motivational hypotheses that determine repurchase size are the signalling stock undervaluation, followed by the adjusting EPS and excess cash distribution hypotheses. These remain consistent with the responses given by British managers in Dhanani (2016)'s survey. This is highly relevant to shareholders as the consistency held by the managers over an extended period establishes that the repurchase policy is stable. The key new contributions of this study to existing literature, that leverage has a U shaped influence on repurchase size and board independence has an inverted-U shaped influence, are highly important to shareholders. As debt can be both beneficial and detrimental, shareholders can take respite that the managers are just aware of the same but also factor it in during the repurchase decision-making. Further, despite independent directors having a closer relationship with the managers, and the largely voluntary nature of the UK's governance code, they do not always agree with managerial opinion about repurchases. Thus, when they deem necessary, they ensure that managers pursue higher value repurchases, but at the same time if a contrasting circumstance is realized they have a deterring impact as well.

Aside from the mentioned stakeholders, this study is highly applicable to British managers in the form of a self-assessment tool for future decision-making, while also providing support for managing the repurchase-dividend relationship. Also, academics can use these findings to further the investigation if the motivations for undertaking repurchases are also subject to non-linear influences. Thus, adding a strong complementary perspective to this study.

CHAPTER 4. THIRD EMPIRICAL ESSAY

Macroeconomic Influence on Share Repurchases of the UK

Abstract

The UK fully legalised open market share repurchases in 1981, and to the best of knowledge no study has since investigated the macroeconomic influence on repurchase decision-making. We address this niche and investigate the period 1985-2014. This direct investigation is relevant as the macroeconomy influences factors that determine the undertaking of repurchases, such as cash flow, profitability, dividends and capital structure, thus showing indirect linkages. This forms the study's theoretical intuition, and the empirical objectives test the macroeconomic influence on the decision to undertake a repurchase, and also its influence on repurchases values. The results find that the macroeconomy influences the decision of undertaking repurchases and also that related to repurchases values, and this influence pattern has aggregately remained positively associated with economic prosperity. Thus, the frequency of repurchase announcements by British firms is more probable during prosperous economic circumstances. The results also reveal that the repurchase-macroeconomy relationship witnessed a structural break in 1996:Q2, and the real difference following this break is the increase in the macroeconomic influence's depth on the decision regarding repurchases' values. The study thus contributes to existing literature by being the first to test the UK's repurchase-macroeconomy relationship, and providing detailed empirical evidences that macroeconomic conditions strongly impact the repurchase decision-making.

Keywords: Repurchases, Macroeconomy, Frequency, Value

JEL Classification: E30, G35

4.1. Introduction

For an informative understanding this section is subcategorised into six subsections. The first subsection focuses on the background of the UK's macroeconomy, as it generally reveals a distinct pattern over the last three decades, rather, from the year of repurchases legalisation (1981) significant changes in economic movements are observable, the second subsection provides a brief background of the repurchase popularity in the UK, the third subsection discusses the currently available literature on the repurchase-macroeconomy relationship, the fourth subsection discusses the essay's empirical objectives and summarises the key findings, the fifth subsection states the contributions made by this essay to existing literature, and the fifth subsection lists the structure of the essay.

4.1.1. Background of the UK's Macroeconomy

According to the ONS (2018) the GDP rate seen in 1987:Q3 (2.50%) is the highest quarterly output post-1980, and the closest level achieved since then was in 1999:Q3 (1.60%). Growth has since been shrinking; post-2005:Q4 it has not surpassed the 1% mark, thus affecting the standard of living (Cribb *et al.* 2017), which has the historical tendency of lagging economic growth (Jones and Klenow, 2016). Simultaneously the unemployment rate is reducing and the quarterly peak seen in 1984:Q1 (11.90%) is long lost, in 2018:Q3 it reached a historical low of 4% (ONS, 2018). These simultaneous patterns of GDP and unemployment are inconsistent. However, the gradually reducing quarterly yield on the 10year GILT from 12.20% in 1990:Q2 to 1.50% in 2018:Q1 (BoE, 2018) supports the saturation of growth, and stipulates a rise in market risk that causes higher demand for sovereign securities. The downfall in GILT yield can also indicate an improvement in government's credibility, however after considering the UK's scenario it is seen as an indicator of lower growth (Pickard, 2011). Additional evidences of a structural shift are observable by deconstructing the GDP's components. According to the World Bank (2018), the service sector's GDP contribution incremented from 70% in 1990 to 80% in 2015, and this significant shift is absorbed from the manufacturing sector as its contribution in the same period went from 17% to 9%. The service sector's record-level trade surplus of £63bn in 2015 (ONS, 2018) reveals that global demand has fuelled its growth, and within it the financial service industry is a dominant force; it accounts for 11% of the economic output and is the largest taxpayer across all industries (Celic, 2017). The synthesis of the discussed attributes thus suggests that the steady rise in the economy's dependence on the service sector has a positive impact on employment levels, but the total output, market growth and market risk did not see similar positivity.

4.1.2. Background of the UK's Repurchase Popularity

When it comes to repurchase payouts the US sees the world's largest levels, with the UK second behind it, who sees the largest in Europe (Sonika *et al.* 2014). It is almost a custom to see that non-US countries witness dividend dominance over repurchases (Lee and Suh, 2011). However, since 2002 the UK has seen a gradually strong rise in repurchase payouts (Geiler and Renneboog, 2015), and not as dividend substitutes but as independent payouts (Ferris *et al.* 2006; Burns *et al.* 2015). In terms of actual value, the S&P 500 firms routinely repurchase shares in the region of $500bn every year (FactSet, 2016), while between 1989-2005 the total value of repurchases in the UK was around £100bn (Von Eije and Megginson, 2008). Thus, despite evidences of UK-US stock market cointegration (Berger and Pozzi, 2013) and the rising economic contagion between the countries (Ductor and Leiva-Leon, 2016; Magkonis and Tsopanakis, 2016), which is visible with components such as business cycles' co-movements (Imbs, 2004; 2006), sovereign debt yield (Diebold *et al.* 2008) and interest rates (Byrne *et al.* 2012), the repurchase patterns within them are dissimilar.

4.1.3. Current Repurchase-Macroeconomy Literature

To the best of knowledge there are no UK-specific studies that directly investigate the influence of the macroeconomy on the repurchase decision-making. There are two known US studies that tested the repurchase-macroeconomy relationship. Korajczyk and Levy (2003) find that between 1984-1999 repurchases were counter-cyclical[27], thus given that the US witnessed increased credit risk during downturns (Nickell *et al.* 2000; Bangia *et al.* 2002), the managerial potentially used repurchases for absorbing a stock price fall. Contradictorily, Dittmar and Dittmar (2008) conclude that between 1971-2004 repurchases were pro-cyclical[28]. This indicates the potential use of repurchases for distributing excess cash and increasing the firm's debt exposure for lower costs, as Dittmar (2000) finds these two motives being present during a majority of the tested years, and the circumstances for them are typical to expansionary periods. Thus, the two studies are in contradiction and this essay will ensure that the UK-specific testing undertaken is more expansive and refined (see further).

[27] Counter-cyclical refers to an influence that is opposite to the strengthening of the economy, for instance, if Unemployment has a positive influence then this influence is counter-cyclical.

[28] Pro-cyclical refers to an influence that is consistent with the strengthening of the economy, for instance, if GDP has a positive influence then this influence is pro-cyclical.

4.1.4. Summary of Empirical Objectives and Results

Our study undertakes the testing to investigate the macroeconomy's influences on repurchase decision-making, namely the decision if a repurchase should be undertaken, and that related to its value, for the period 1985-2014. Additionally, it is also more comprehensive than the aforementioned US studies. Korajczyk and Levy (2003) investigate tender offer repurchases, and the tested macroeconomic indicators are commercial paper spread and stock market return. Dittmar and Dittmar (2008) investigate net repurchases (the sum of common and preference shares repurchased excess over the issued preferred stock), and only one macroeconomic indicator is tested, the GDP. We do not concur with their choices of samples, since repurchases undertaken via the open market route not only constitute the majority of all repurchases conducted in the UK (Rau and Vermaelen, 2002; Oswald and Young, 2004), but also in the US (Grullon and Michaely, 2004), and thus we solely focus on them. Also, our empirical testing includes six macroeconomic indicators that represent the business cycle's aggregate health (GDP and Unemployment), long-term outlook (Term Structure), market risk (Default Risk and Short-Term Risk) and aggregate stock market return (Stock Market).

The testing investigates the macroeconomic influence on the repurchase decision-making, which includes if a repurchase must be undertaken and if yes then what should be its value. The results consistently reveal that the macroeconomy plays a significant role in determining the undertaking of a repurchase and also its value. During the Aggregate timeframe (1985-2014) the macroeconomic influence is strongly pro-cyclical, and under average macroeconomic conditions the average probability of seeing a repurchase announcement is 76%, while the value-level influence is 6%. During Expansion repurchases undertaking is relatively more pro-cyclical than during Contraction. Under average economic conditions, the probability of seeing a repurchase announcement during Expansion is 82% with the value of the repurchase being influenced by 6%, similarly, during Contraction the probability of seeing a repurchase announcement is 77% with the value of the repurchase being influenced by 3%. Thus, despite evidences of relatively more counter-cyclicity during Contraction than Expansion, the real macroeconomic influence however remains more prevalent during Expansion. Testing also reveals that the repurchase-macroeconomy relationship underwent a structural break in the second quarter of 1996 (1996:Q2), with further testing providing evidences of visible changes after the break. In the Pre Break period the repurchase undertaking pattern is dominantly pro-cyclical, however in the Post Break period the level of counter-cyclicity increased. Under average macroeconomic conditions, the probability of witnessing a repurchase announcement during the Pre Break and Post Break periods remains

equivalent (80% v/s 79%), however the influence on repurchases value increased from 2% to 5%. Thus, with the progression of time the repurchase undertaking pattern sees an increase in counter-cyclicity and also a rising level of macroeconomic influence on repurchases values.

4.1.5. Contributions to Existing Literature

The essay's overall empirical contribution to existing literature is creating the first ever empirically baked source, which provides information on how the macroeconomy influences the repurchase decision-making in the UK. Within this overall contribution, a series of sectioned contributions to existing knowledge are also made. Firstly, the checking if the repurchase-macroeconomy relationship underwent a structural break, which will provide future researchers and asset managers a reference for analyses, as they will be able to factor in if the relationship between repurchases and the macroeconomy witnesses any structural shifts over long horizons. Further, the testing of the macroeconomic influence on repurchase decision-making differentiates between the decision if a repurchase must be undertaken, and if so, then how is the payout's value influenced. This distinction provides the ability to assess the macroeconomy's influence on repurchases on a micro level. Finally, the individual testing of not only over the 30year period (1985-2014), but also for periods of economic Expansion and Contraction are highly important. The firm-level and market-level conditionality are drastically different during the two periods, which makes it a logical presumption to expect a difference in the macroeconomic influences over the business cycle stages. Thus, using these findings academics can make appropriate arrangements during any future empirical undertakings, not only in the repurchase-macroeconomy subject-area, but also in the case of dividend distribution. Furthermore, asset managers will have a better idea on how to factor in the business cycle conditionality to manage their portfolios against firms undertaking repurchases during different economic phases.

4.1.6. Structure of this Chapter

The essay is thus structured as follows: Chapter 4.1 provides an introduction, Chapter 4.2 assesses extant literature, Chapter 4.3 discusses the sample, constructs the research objectives and explains the methodologies, Chapter 4.4 reports the results and its analyses, and Chapter 4.5 concludes the essay.

4.2. Literature Review

Given the absence of UK-specific literature directly investigating the relationship of repurchases with the macroeconomy, for establishing a theoretical relationship via using indirect assessments this section will discuss the macroeconomic influences on the determinants of the UK's share repurchases. For instance, factors such as the distribution of excess cash (Lee *et al.* 2010; Cesari and Ozkan, 2015), increased profitability (Lee and Suh, 2011; Burns *et al.* 2015) and complementing dividend distribution (Ferris *et al.* 2006; Denis and Osobov, 2008) have shown to promote repurchase undertaking. There is a consensus that all of these attributes are generally contingent upon the business cycle. Macroeconomic fluctuations have conventionally shown to impact productivity (Giglio *et al.* 2016) and profitability (Issah and Antwi, 2017), which adversely influences excess cash accumulation. This in-turn also influences the resources available for dividend distribution, which exhibits pro-cyclicity (McMillan, 2014) and is associated with cash flow conditions (Al-Najjar and Belghitar, 2011; Kilincarslan and Ozdemir, 2018).

Additionally, low leverage too drives managers towards repurchasing shares (Lee and Suh, 2011; Cesari and Ozkan, 2015), and in the opinion of European managers the macroeconomy is a crucial determinant of leverage (Bancel and Mittoo, 2004). It is also seen that the leverage behaviour of British firms is associated with business cycle conditionality (Caglayan and Rashid, 2014; Akhtar, 2017). Dang (2013a) finds that compared to the US, British firms are swifter in pursuing an optimal leverage position, however the financial environment influences the swiftness (Antoniou *et al.* 2008). This is evident as the speed of adjustment after an economic distress is highest in the UK, a market-based economy (Drobetz *et al.* 2015). Thus, as debt issuance is a more cost-effective source of finance than equity issuance, new debt can help finance repurchases that optimises recovery by lowering capital costs. Dang (2013b) finds that British firms are more prone to zero-leverage policies than American firms, and this debt aversion is significantly influenced by macroeconomic conditions. However, Korteweg (2010) finds that American firms can increment their value by up to 5% through optimal leveraging, thus inferring that British firms too can possibly achieve similar benefits by deviating away from zero-leverage policies. For the purposes of realizing optimal leveraging, repurchases can be utilized by financing them using newly issued debt. It will help in providing the benefits of leveraging while also reducing the cost of capital. This again invokes an association of debt and macroeconomic conditions, further supporting the circular link between repurchase undertaking patterns, a firm's debt exposure and the business cycle's conditionality. The above-discussed factors also show interdependencies.

Capital structure is associated with cash flow and dividends (Akhtar, 2017), and dividends are better information communicators during crises than earnings announcement (Bozos *et al.* 2011). Further, leverage is negatively correlated with cash holdings (Al-Najjar, 2013) and profitability (Rajan and Zingales, 1995; Bevan and Danbolt, 2002). The positive relationship between leverage and firm size (Pindado *et al.* 2014) is important since firm size and repurchases are positively related in the UK (Andriosopoulos and Hoque, 2013; Sonika *et al.* 2014), while leverage and firm size influence earnings ratio (Eliwa *et al.* 2016). The leverage of British firms is positively associated with the firm's valuation (Mahajan and Tartaroglu, 2008), thus undervalued firms are low leveraged. This is important due to the erstwhile discussion of leverage influencing repurchases and British managers state that the signalling stock undervaluation is one of the leading three motives for undertaking repurchases (Dhanani, 2016). Thus, there is a macroeconomic-induced linking between leverage and stock valuation. Covenants associated with debt are also dependent on the business cycle, such as credit rating (Bouvatier *et al.* 2012; Wojewodzki *et al.* 2017) and the credit market (Atanasova and Wilson, 2004; Bougheas *et al.* 2006), especially bank lending (Huang, 2003; Pasiouras and Kosmidou, 2007; Caglayan and Xu, 2016) and the bond market (Sekkel, 2011).

The aggregate FDI within the British economy has reached historical levels (Department for International Trade, 2016), which is dominated from the US (ONS, 2017). Furthermore, the breadth of globalisation within the UK's manufacturing sector has been strong enough to reshape the domestic price of goods (Coutts and Norman, 2007). This is backed by the fall in domestic manufacturing levels in terms of GDP contribution; it went from 17% in 1990 to 9% in 2017 (World Bank, 2018). Milberg and Winkler (2010)'s survey of US firms reveals that manufacturing firms with a globalised supply chain management are more prone to undertaking repurchases, which may likely be replicated in the UK too because of the rising FDI. Further, there are numerous evidences establishing a strong breadth of economic contagion (Ductor and Leiva-Leon, 2016; Magkonis and Tsopanakis, 2016) and corporate financial integration across the UK-US (Berger and Pozzi, 2013), but Uddin and Boateng (2011) find that factors such as cross-border mergers and acquisitions are circumstantial to macroeconomic conditions. Thus, any influence of the rising FDI on repurchases is dependent on the macroeconomy, which restates the macroeconomy's significance for repurchases.

Given the depth of indirect associations between the determinants of repurchases and the macroeconomy, it is highly probable that the repurchase decision-making of British firms is influenced by the macroeconomy. Thus, supporting the essay's empirical objectives.

4.3. Sample, Research Objectives and Methodologies

This section is subcategorised into three subsections. The first discusses the data sources and briefs the repurchase sample used in the empirical testing, the second subsection discusses the empirical objectives and the relevant methodologies employed, and the third subsection discusses the robustness testing undertaken.

4.3.1. Sample Selection

The repurchase data is sourced from the SDC Platinum database and includes all open market announcements of companies listed on the London Stock Exchange between 1981-2014 (inclusive). However, the database identifies 1985 as the year of the first announcement, thus the timeline is trimmed to 1985-2014. Only the initial announcements are collected as Andriosopoulos and Lasfer (2015) find that they are most informative. In total 419 announcements were witnessed that have a cumulative nominal value of around £355bn, with the average announcement being worth £847mn. The stock market data is obtained from Datastream, and Morningstar. The reason for using multiple sources is to mitigate any data inaccuracy. The macroeconomic data is obtained from the archives of the Office for National Statistics, Bank of England, Federal Reserve Bank of St. Louis and World Bank.

Table 1: Sample

The table presents the statistics of the sample of 419 announcements between 1985 and 2014. After splitting the aggregate time period (1985-2014) into 5year sub-time periods, the frequencies of repurchase announcements and the average £mn value of each announcement is presented.

Time Period	# Repurchases	Average Value (£mn)
1985-1989	13	1,006
1990-1994	84	315
1995-1999	212	1,002
2000-2004	33	808
2005-2009	41	1,034
2010-2014	36	869
1985-2014	419	847

4.3.2. Research Objectives and Methodologies

We sequentially develop three empirical objectives covering different aspects of the repurchase-macroeconomy relationship. In the absence of past precedence, we assume that repurchases are pro-cyclical due to two-fold reasoning. The ability of sourcing internal and external finance is easier during a boom, and repurchases require a larger cash. Thus, the phenomenon eases any shareholder apprehension while also increases the chances of getting their approval, as according to regulations their approval is mandatory for undertaking an open market repurchase (Dhanani and Roberts, 2009). Furthermore, the research's sample is subcategorised for periods of *Expansion* and *Contraction*, which are defined using the traditional quantitative European method rather than the qualitative approach of the US (Blackstone, 2011). *Expansion* is the period beginning from two quarters positive GDP growth until the peak growth rate is reached, and *Contraction* is defined as the reminder of the quarters. Our tested timeline consists a total of 120 quarters (1985:Q1-2014:Q4), of which 62 quarters witness Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), and 58 quarters witness Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1).

– Control Variables

The aggregate business cycle is represented by two variables. The first variable is *GDP*, the growth of the gross domestic product (quarterly), and it is expected to have a positive influence. The second variable is *Unemployment*, the fraction of unemployed people in the 16+ working population (quarterly), and it is expected to have a negative influence. The reason for using two proxies is due to the fact that unemployment accurately tracks European living standards (Fouweather *et al.* 2015), which has generally shown to lag GDP (Jones and Klenow, 2016). This is important since the UK's GDP has shown a consistently declining pattern since 1990 (ONS, 2018), while in the period after witnessing the great recession (2008-2009) the standard of living has been plunging (Cribb *et al.* 2017). In order to capture future outlook, we use *Term Structure*, the 10year GILT rate excess over the 3month T-Bill rate (quarterly), and it is expected to have a positive influence. The variable is considered a powerful business cycle representative whose predictive power has shown to increase with the passage of time (Benati and Goddhart, 2008). Additionally, Chadha and Waters (2014) conclude that it is essentially determined by a cohort of macroeconomic indicators, thus further strengthening its importance and reliability.

Given the earlier discussions showing associations between repurchases, leverage and the macroeconomy, for capturing long-term risk we use *Default Risk*, the excess of Moody's 10year BBA bond yield over the 10year GILT rate (quarterly), and it is expected to have a negative influence. Determinants of short-term and long-term interest rates are non-identical (De Graeve *et al.* 2009); long-term rates are more influenced by the conditions of financially integrated countries than the domestic short-term rates (Byrne *et al.* 2012). Thus, for capturing immediate market risk we use *Short-Term Risk*, the excess of 3month Sterling LIBOR over 3month T-Bill rate (quarterly), and it is expected to have a negative influence. The UK's stock market is in long-term equilibrium with the macroeconomy (Masuduzzaman, 2012), and is influenced by the fiscal policy (McGrattan and Prescott, 2005), which supports it being a determinant of real activity (Giglio *et al.* 2016). Thus, the aggregate market is represented by *Stock Market*, the quarterly change in the FTSE 100 index, and it is expected to have a positive influence. Our sample does not hold survivorship bias nor differentiates due to index of listing; thus, we choose FTSE 100 as it represents 80% of the market (FTSE Russell, 2017). The US studies indicate that the control variables must lag 3quarters (Korajczyk and Levy, 2003) or 1quarter (Dittmar and Dittmar, 2008). However, for reliability we will run three independent information criterion procedures for each test specification to determine the appropriate lag length, Akaike's Information Criterion (AIC) and Hannan and Quinn Information Criterion (HQIC) and Schwarz's Bayesian Information Criterion (SBIC).

Table 2: Description of Control Variables
The table presents the descriptions of the independent variables used throughout the empirical testing, and also states the expected direction of their influence.

Variable	Description (All Quarterly)	Expected Influence
GDP	Growth rate of the gross domestic product.	Positive
Unemployment	Fraction of unemployment in the 16+ working population.	Negative
Term Structure	10year GILT excess over the 3month T-Bill.	Positive
Default Risk	Moody's BBA bond excess over the 10year GILT.	Negative
Short-Term Risk	3month Sterling LIBOR excess over 3month T-Bill.	Negative
Stock Market	Return on the FTSE 100 index.	Positive

– Objective 1: Structural Consistency of the Repurchase-Macroeconomy Relationship

Given the erstwhile discussion on the UK's evolving economic structure, along with the association of the aspects attached with repurchases that show continual dependence on the business cycle, we posit that the repurchase-macroeconomy relationship potentially underwent a fundamental change in the tested period. This is undertaken by applying the Andrews (1993) unknown structural break test on an OLS regression (Equations 1 and 2). If a break is found then further tests will also subcategorise the sample for Pre and Post Break periods, thus quantifying the real change in the relationship dynamics indicated by the break.

$$\mathrm{Rep}_{t(pre)} = \Sigma_{k=6}^{K}\beta_{k(pre)}\mathrm{Macroeconomy}_{k,t(pre)-p} + \varepsilon_{t(pre)} + \alpha \quad (1)$$

$$\mathrm{Rep}_{t(post)} = \Sigma_{k=6}^{K}\beta_{k(post)}\mathrm{Macroeconomy}_{k,t(post)-p} + \varepsilon_{t(post)} + \alpha \quad (2)$$

$$H_0: \beta_{n(pre)} = \beta_{n(post)} \quad H_1: \beta_{n(pre)} \neq \beta_{n(post)}$$

Where, Rep is the quarterly cumulative repurchase value, $t(pre) = 1985{:}\,Q1 \ldots \lambda - 1quarter$ and $t(post) = \lambda + 1quarter \ldots 2014{:}\,Q4$ and λ is the structural break quarter, $\mathrm{Macroeconomy}_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables, and ε_t is the error term and α is the alpha. We summarise the control variables' description and the expected influences in Table 2. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

– Objective 2: Macroeconomic Influence on Repurchase Payout-Probability

Absence of direct literature disallows for presuming a repurchase pattern, rather only assume using secondary evidences. We thus address this niche by undertaking the probit regression (Equations 3 and 4) using a value-based approach; independently testing all repurchases and those that are large sized i.e. above the average value. The coefficients will be converted to find the payout-probability at each control variable's minimum, average and maximum levels, and also under the overall average macroeconomic environment.

$$\Pr(\mathrm{Announcement}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k\mathrm{Macroeconomy}_{k,t-p}\right) \quad (3)$$

$$\Pr(\mathrm{Announcement(large)}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k\mathrm{Macroeconomy}_{k,t-p}\right) \quad (4)$$

Where, $\Pr(\mathrm{Announcement}_t = 1)$ is binary and takes the value '1' if a repurchase is announced in a quarter and $\Pr(\mathrm{Announcement(large)}_t = 1)$ is binary and takes the value '1' if a large sized repurchase is announced in a quarter, during $t =$ Aggregate, Expansion, Contraction, Pre Break and Post Break, $\mathrm{Macroeconomy}_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables, and $\emptyset_t$ is the standard cumulative normal. We summarise the control variables' description and the expected influences in Table 2. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

– Objective 3: Macroeconomic Influence on Repurchase Value

Given the earlier discussions on the influence of business cycle conditionality on cash flow and profitability, and their subsequent relationship with repurchases, it is important to test if the macroeconomy influences the actual repurchase value. The payout-probability testing does not address this aspect; thus, we undertake the fractional probit regression (Equation 5).

$$\mathrm{E(Rep)_t} = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k \mathrm{Macroeconomy_{k,t-p}}\right) \quad (5)$$

Where, $\mathrm{E(Rep)_t}$ is the quarterly cumulative repurchase value normalised between 0 and 1 for t = Aggregate, Expansion, Contraction, Pre Break and Post Break, $\mathrm{Macroeconomy_{k,t-p}}$ is the matrix of p lagged K quarterly macroeconomic variables, and $\emptyset_t$ is the standard cumulative normal. We summarise the control variables' description and the expected influences in Table 2. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

4.3.3. Robustness Testing[29]

(i) Mann-Whitney Rank Sum Test

The payout-probability and value-level investigation employ a series of 10 and 5 specifications, respectively, which are based on time periods, (Aggregate; Expansion and Contraction; Pre Break and Post Break) and repurchase values (all or large sized) only in the case of Objective 1. Thus, the Mann-Whitney Rank Sum test will be used on the results obtained from Objectives 1 and 2 to see if the findings are statistically different.

(ii) Variable-Level Stability

The testing subcategorises the data into two subsets, the first is Expansion-Contraction and the second is Pre Break-Post Break. Thus, our intention is to check if the variable-level macroeconomic influence is more dependent on the overall state of the economy, or on the corporate financial payout policy. For example, the GDP's influence on the decision-making may fluctuate if shareholders lobby the managerial to pursue an entrenched repurchase policy as opposed to an aggressively frequent attitude. The shareholder opinion is particularly important in the UK as regulations mandate their approval for a repurchase, and 'investor requirement' is among the five leading motives amongst British managers for undertaking repurchases (Dhanani, 2016). This investigatory process involves taking the specifications[30]

[29] It is assumed that a structural break will be witnessed, hence accounting for the time periods indicated by it.

[30] The information criterion procedures indicate that the variables must lag 1quarter across all test specifications, and their results are available in the Appendix.

of the testing indicated in Objectives 1 and 2, the macroeconomic influence on payout-probability (Equations 3 and 4) and on repurchase value (Equation 5), and then swapping the independent variables within the subsets (Expansion-Contraction; Pre Break-Post Break). Thus, checking any influence change if, (i) firms swap their repurchase policy of Expansionary period with that implemented during Contraction, vice-versa, and (ii) firms swap their repurchase policy of the Pre Break period with that implemented during the Post Break period, vice-versa, essentially reversing the impact indicated by the structural break.

4.4. Results

This section is subcategorised into five subsections. The first subsection discusses the results from the testing of the possible structural break in the repurchase-macroeconomy relationship, the second subsection discusses the summary statistics of the independent variables, the third subsection discusses the results from the testing of the macroeconomic influence on the undertaking of repurchases, the fourth subsection discusses the results from the testing of the macroeconomic influence on the value of repurchases, and the fifth subsection discusses the results from the two sets of robustness tests.

4.4.1. Structural Consistency of the Repurchase-Macroeconomy Relationship

Testing reveals (Table 3) that the relationship between open market repurchases and the macroeconomy underwent a structural break in the second quarter of 1996 (1996:Q2). Figure 1 distinctively reveals that in the immediate quarter after the structural break (1996:Q3), the quarterly repurchase value reached its all-time peak of £37.40bn.

Table 3: Structural Break Results

The table presents the results from the Andrews (1993) testing to determine if the repurchase-macroeconomy relationship underwent a structural break in the aggregate period (1985:Q1-2014:Q4), as described in; (i) Equation 1: $\text{Rep}_{t(\text{pre})} = \Sigma_{k=6}^{K}\beta_{k(\text{pre})}\text{Macroeconomy}_{k,t(\text{pre})-p} + \varepsilon_{t(\text{pre})} + \alpha$, and (ii) Equation 2: $\text{Rep}_{t(\text{post})} = \Sigma_{k=6}^{K}\beta_{k(\text{post})}\text{Macroeconomy}_{k,t(\text{post})-p} + \varepsilon_{t(\text{post})} + \alpha$, where the null hypothesis is $H_0: \beta_{n(\text{pre})} = \beta_{n(\text{post})}$, and the alternate hypothesis is $H_1: \beta_{n(\text{pre})} \neq \beta_{n(\text{post})}$, Rep is the quarterly cumulative repurchase value, $t(\text{pre}) = 1985: Q1 \ldots \lambda - 1\text{quarter}$ and $t(\text{post}) = \lambda + 1\text{quarter} \ldots 2014: Q4$ and λ is the structural break quarter, $\text{Macroeconomy}_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). ε_t is the error term and α is the alpha.

Null Hypothesis (H_0)	Alternative Hypothesis (H_1)	Structural Break Quarter	SWALD Statistic	P-Value
Structural Break Absent	Structural Break Present	1996:Q2	76.684	0.000

Figure 1: Quarterly Repurchase Value

The graph presents the quarterly cumulative repurchase value in £bn for the aggregate period (1985:Q1-2014:Q4) and highlights the quarter during which the structural break was witnessed (1996:Q2).

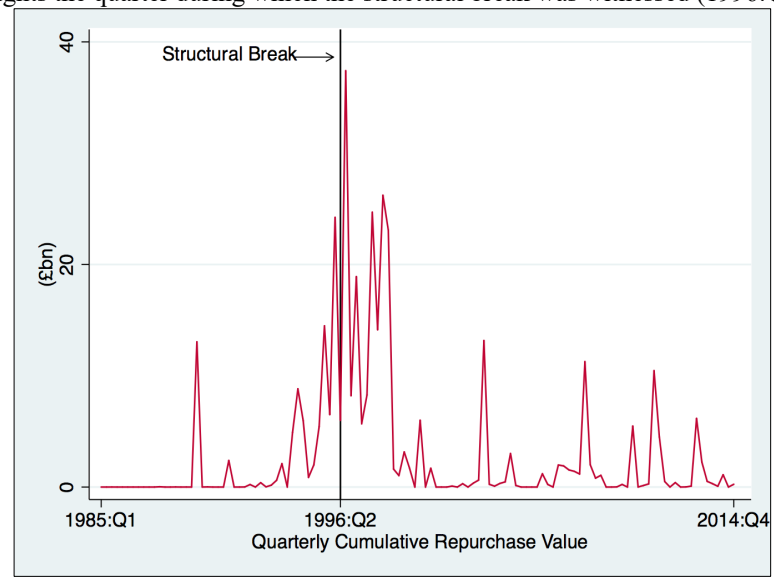


Table 4 details the time-specific traits of the subcategorised periods. The average quarterly repurchases value during Expansion (Contraction) and Post Break (Pre Break) is higher (lower) than the Aggregate's average, while the pair 'Expansion & Post Break' ('Contraction & Pre Break') has the lowest (highest) macroeconomic correlation coefficient. Thus revealing that periods of lower repurchase popularity are more similar than those when the payout is strongly prevalent. This conforms to the payout being historically less popular than dividends, especially in the opinion of insider owners (Renneboog and Trojanowski, 2011), and supporting the discussed evidences of a relatively recent rise in its popularity. It is contestable that the pattern may be due to a skewed overlapping of timelines, however in real terms this is invalid; only 45% (38%) of the Post Break (Pre Break) period witnesses Expansion (Contraction), indicating that the overlapping of the timelines plays a minor role.

Table 4: Time-Specific Characteristics

The table presents the statistics of the quarterly cumulative repurchase values over five time periods in Panel I; Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4). In Panel II the average correlation coefficient of all macroeconomic indicators denoting the similarity in macroeconomic circumstances of the four sub-time periods is presented in pair-wise format[31].

Panel I: Quarterly Cumulative Repurchase Statistics (£bn)			
Time Period	**Mean**	**Minimum**	**Maximum**
Aggregate	3.00	0.00	37.50
Expansion	4.60	0.00	37.50
Contraction	1.25	0.00	13.20
Pre Break	2.05	0.00	24.25
Post Break	3.50	0.00	37.50

[31] The complete Pearson's correlation matrix is available in the Appendix.

Panel II: Average Macroeconomic Correlation	
Time Period Pairs	**Pearson's Coefficient**
Expansion & Contraction	0.042
Expansion & Pre Break	0.047
Expansion & Post Break	0.023
Contraction & Pre Break	0.081
Contraction & Post Break	0.065
Pre Break & Post Break	0.048

4.4.2. Summary Statistics

The Univariate descriptions of the control variables are available in Table 5, and for additional ease they are also graphically presented in Figures 2 through 7. Around the structural break the *GDP* sees a mild drop, conforming to the onset of a downward trend. As output saturates over the tested period (ONS, 2018), the averages of Expansion and Contraction (Pre Break and Post Break) being more (less) distant from the Aggregate's average indicate that the subcategorisations successfully encompass different economic phases. The downward trend of *Unemployment* is unsurprisingly non-linear, and the longest period of consistent decline begins before the structural break. On the other hand, a tangible decline in the *Term Structure* is visible around the structural break, and such a downward magnitude does not reappear. Despite 62% of the Pre Break period witnessing economic Expansion and 55% of the Post Break period witnessing economic Contraction, and given the overall downward *GDP* trend, the average *Unemployment* is lower and *Term Structure* is higher after the break. Thus, the evolvement in the economic structure is visible.

The proximity of the average *Default Risk* during Expansion and Contraction to the Aggregate period's average indicates stability within the business cycle stages, while the extreme levels of the Pre Break and Post Break conform to the periods being dominated by boom and slump, respectively. An upward trend is seen immediately after the structural break, attributable to the persistence in bond defaults since 2000 (Martin, 2011); in 2002 the global bond defaults reached a record high ($100bn), which was outdone in 2009 ($328bn) due to the great recession. Since then the highest number of defaults was recorded in 2016 (FT, 2016), indicating a rising risk level even after the research's cut-off year (2014). This is consistent with the earlier discussions highlighting that the consistent reduction in the yield on 10year GILTs has less to do the government's improving credibility, and more associated with gloomy market conditions pushing investors towards secure investment inlets.

Table 5: Summary Statistics of Control Variables[32]

The table presents the summary statistics of the independent variables from the empirical testing; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). The summary statistics are subcategorised based on the five time periods; Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4).

	Mean	Std. Dev.	Minimum	Maximum
GDP				
Aggregate	0.005	0.006	-0.023	0.025
Expansion	0.007	0.005	-0.002	0.025
Contraction	0.003	0.007	-0.023	0.018
Pre Break	0.006	0.007	-0.011	0.025
Post Break	0.005	0.006	-0.023	0.016
Unemployment				
Aggregate	0.074	0.020	0.047	0.116
Expansion	0.086	0.017	0.059	0.116
Contraction	0.062	0.014	0.047	0.097
Pre Break	0.094	0.014	0.069	0.116
Post Break	0.062	0.012	0.047	0.084
Term Structure				
Aggregate	0.006	0.016	-0.038	0.035
Expansion	0.013	0.013	-0.016	0.035
Contraction	-0.0009	0.015	-0.038	0.033
Pre Break	0.001	0.018	-0.038	0.034
Post Break	0.009	0.013	-0.016	0.035
Default Risk				
Aggregate	0.014	0.013	-0.017	0.044
Expansion	0.012	0.012	-0.014	0.033
Contraction	0.016	0.014	-0.017	0.044
Pre Break	0.001	0.009	-0.017	0.021
Post Break	0.022	0.008	0.0006	0.044
Short-Term Risk				
Aggregate	0.004	0.002	0.0009	0.023
Expansion	0.004	0.002	0.001	0.008
Contraction	0.004	0.003	0.0009	0.023
Pre Break	0.005	0.001	0.001	0.009
Post Break	0.003	0.003	0.0009	0.023
Stock Market				
Aggregate	0.004	0.027	-0.105	0.063
Expansion	0.007	0.026	-0.105	0.055
Contraction	0.001	0.027	-0.074	0.063
Pre Break	0.008	0.028	-0.105	0.055
Post Break	0.002	0.026	-0.074	0.063

[32] Distribution of quarters: (i) Aggregate = 120 (100%), (ii) Macroeconomic Conditions: Expansion = 62 (51.70%) and Contraction = 58 (48.30%), and (iii) Structural Break: Pre Break = 45 (37.50%) and Post Break = 74 (61.70%).

The graphs (Figures 2 through 7) present the independent variables used in the empirical testing during the Aggregate time period (1985:Q1-2014:Q4), whose summary statistics are summarised in Table 5. The graphs also highlight the structural break quarter (1996:Q2).

Figure 2: GDP

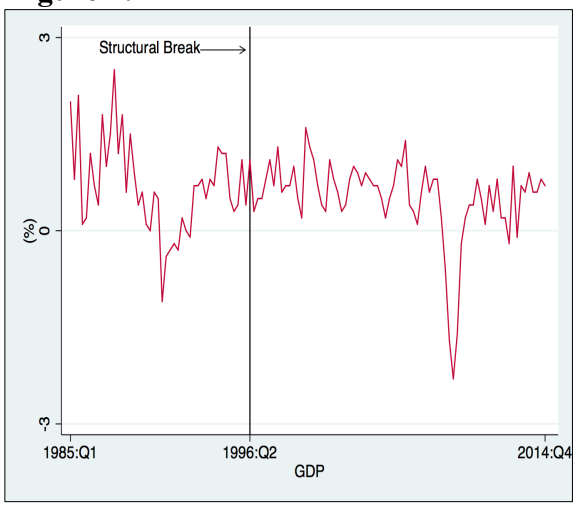


Figure 3: Unemployment

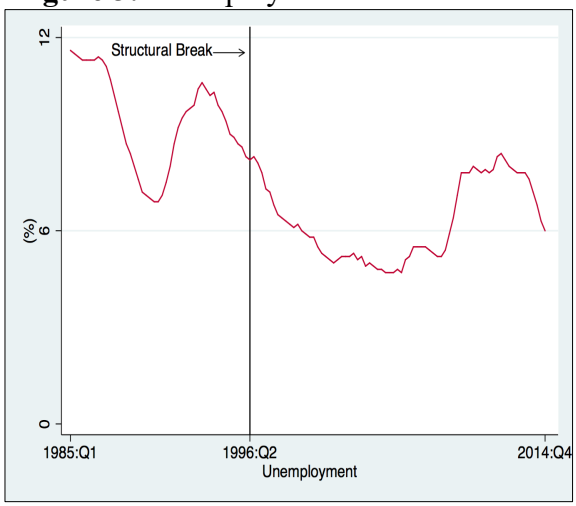


Figure 4: Term Structure

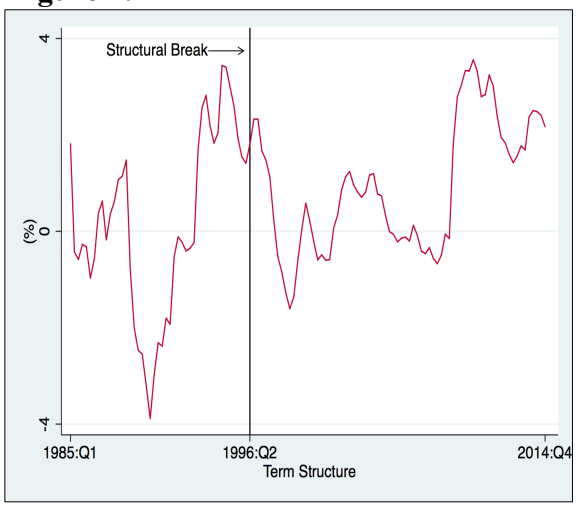


Figure 5: Default Risk

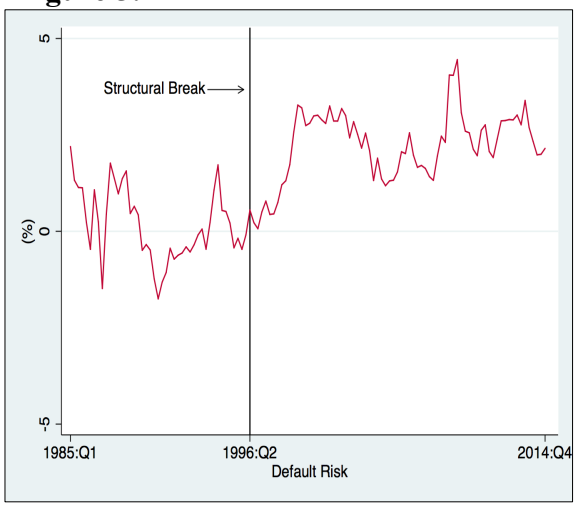


Figure 6: Short-Term Risk

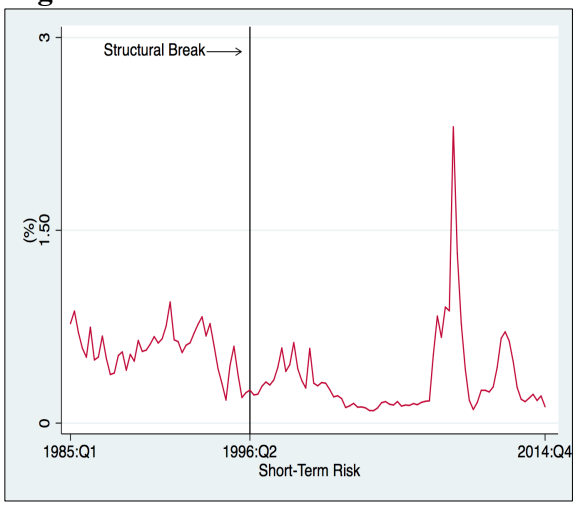
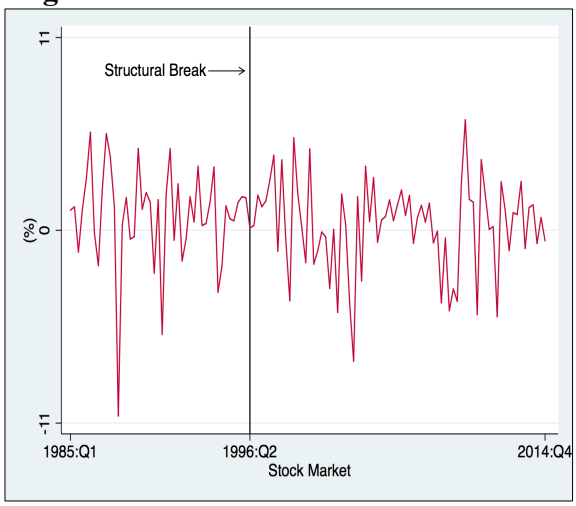
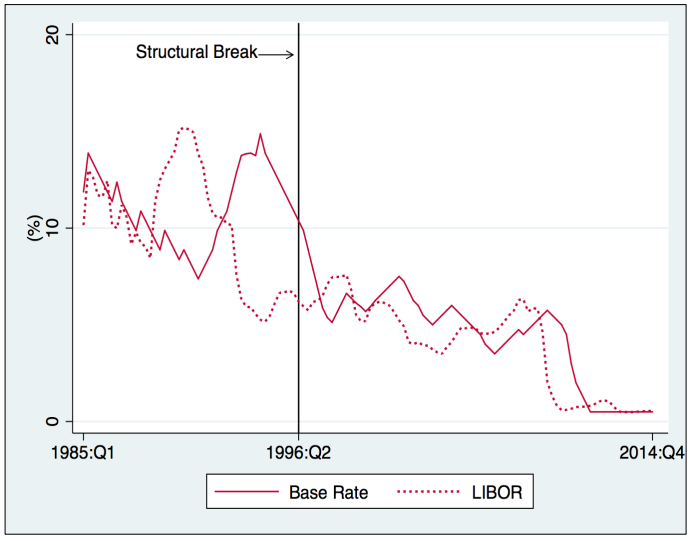


Figure 7: Stock Market



The *Short-Term Risk* across the time periods remains close to the Aggregate's average. The low volatility is laudable since it not only reveals continual stability in the short-term economic outlook. A strong spike is however seen due to the great recession (2008-2009), which is as logical as it is short lived. Overall there is a downward trend in the immediate risk level, as the Post Break average is lower than that of the Pre Break, consistent with the patterns of *Unemployment* and *Term Structure*. Upon combining this finding with the patterns of *Default Risk* further reveals that the market's confidence level and efficiency in future prediction is more prominent for the short-term. However, a strong contributor to the declining *Short-Term Risk* may also be the falling BoE base rate. Reducing interest rate results in more money being invested than saved, thus reducing the general risk level and cost of short-term borrowing. For a brief period (Figure 8) prior to the structural break the Sterling LIBOR and BoE see inverse relationships that essentially offset each other, and thereof follow a similar pattern. Correspondingly, their Pearson's correlation coefficient is 0.70. *Stock Market* expectedly sees the greatest volatility, which causes the high dispersal of their average levels across the time periods. A distinct change around the structural break is visible, as there is a small section of condensed volatility that widens as we move away from the quarter.

Figure 8: BoE Base Rate v/s 3month Sterling LIBOR
The graph compares the Bank of England's interest rate with the 3month Sterling LIBOR during the Aggregate period (1985:Q1-2014:Q4), and highlights the structural break quarter (1996:Q2).



The descriptive statistics highlight noticeable single dimensional shifts in the repurchase-macroeconomy relationship around the structural break, with the most visible changes being with *Term Structure*, *Default Risk* and *Stock Market*. Thus, the potential for the multivariate testing revealing stronger insights further strengthens.

4.4.3. Macroeconomic Influence on Repurchase Payout-Probability

The results of the macroeconomic influence on the probability of witnessing a repurchase are presented in Table 6. In Panel I the coefficients are provided, and in Panel II the marginal effects are presented that reveal the cyclicity of repurchases as the influence of each indicator is revealed at its minimum, average and maximum level; the panel also states the payout-probability under overall average conditions, which means when all of the six indicators are held simultaneously at their average levels for each tested period. Further, for a clearer understanding of the results this section is subcategorised into four subsections. The first subsection discusses the macroeconomic influence on repurchases during the tested time periods under average macroeconomic conditions, the second subsection discusses the macroeconomic influence on repurchases during the Aggregate period, the third subsection discusses and compares the macroeconomic influence on repurchases during the two business cycle conditions, Expansion and Contraction, and the fourth subsection discusses and compares the macroeconomic influence on repurchases during the two sets of timeframes created due to the structural break of 1996:Q2, Pre Break and Post Break periods.

4.4.3.1. Repurchases Under Average Macroeconomic Conditions

Under average macroeconomic conditions the probability of seeing a repurchase during the Aggregate period is 76%, while within the subcategorised periods the results are, 82% for Expansion, 77% for Contraction, 80% for Pre Break and 79% for Post Break. Thus, repurchases witness a highly conducive environment. Large payouts are atypical in nature since they make up 22% of the Aggregate period, and this proportionality is consistent with the market's traditional preference for dividends. Expansion sees their highest quarterly proportionality (31%), substantially more than that of Contraction (22%). The distribution of large repurchases during the Pre Break and Post Break periods is identical to that seen during Contraction. Conforming to their minority composition the magnitude of the macroeconomic influence on the undertaking of a large repurchase is relatively lower. Under average macroeconomic conditions the probability of seeing a large repurchase is 19% during the Aggregate period, while within the subcategorised periods the results are, 24% for Expansion, 20% for Contraction, 13% for Pre Break and 11% for Post Break. From an overall viewpoint of the subcategorised time periods, and ignoring the individual influences of the control variables, Expansion holds consistency as the most favourable environment, supporting our expectations of the repurchase trend being broadly pro-cyclical. Contraction is generally the least favourable but is the second most favoured environment for large repurchases. Thus, during downturns, the managerial have a greater inclination towards large repurchases, which

stabilises the firm's financials, and also helps in the recovery process. It also provides shareholders with security by liquidating their capital during distress and communicates the managerial trust in the firm's future. The pattern hence indicates marginal counter-cyclicity.

Additionally, throughout the test specifications the magnitude of the variable-level influence on large repurchases is lower and also diminishes at the minimum and/or maximum levels, complementing their atypical nature since they are less likely to be undertaken during extreme conditions. Thus, the role of the macroeconomy is substantially diminished during the decision whether a large valued repurchase needs undertaking.

4.4.3.2. Aggregate Period

During the Aggregate period, aside from GDP's counter-cyclicity and Short-Term Risk's static[33] influence, all other variables have pro-cyclical influences. Thus, repurchases are dominantly pro-cyclical but are seldom undertaken for mitigating a declining economic output. However, the influences of all control variables on large payouts is pro-cyclical, including GDP and Short-Term Risk. The results remain coherent with our expectation that the basic repurchase ideology in the UK is pro-cyclical. The GDP's and Short-Term Risk's changing influence according to the value of repurchases highlights diversity, which increases in depth and breadth for the remaining results. The staunch pro-cyclical pattern is also consistent with current repurchase literature. For instance, repurchases and dividends are complementary in the UK (Ferris *et al.* 2006; Denis and Osobov, 2008), and dividend distribution is pro-cyclical (McMillan, 2014). Also, excess cash motivates repurchases (Lee *et al*. 2010; Cesari and Ozkan, 2015) and since profitability is contingent upon the macroeconomy (Issah and Antwi, 2017), the ability of having surplus cash reserves for financing repurchases is typical to a prosperous economy.

[33] 'Static' is defined as influence that is only significant at one of the three macroeconomic levels, 'Minimum or Average or Maximum' or if the magnitude of change across these three levels is less than 1%.

Table 6: Macroeconomic Influence on Repurchase Payout-Probability

The table presents the results from the testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement, as described in; (i) Equation 3: $\Pr(\text{Announcement}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k \text{Macroeconomy}_{k,t-p}\right)$, and (ii) Equation 4: $\Pr(\text{Announcement(large)}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k \text{Macroeconomy}_{k,t-p}\right)$, where, $\Pr(\text{Announcement}_t = 1)$ is binary and takes the value '1' if a repurchase is announced in the quarter and $\Pr(\text{Announcement(large)}_t = 1)$ is binary and takes the value '1' if a large sized repurchase is announced in the quarter, during t = Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4), $\text{Macroeconomy}_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). $\emptyset_t$ is the standard cumulative normal. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parentheses.

Panel I: Coefficients

	Aggregate		**Expansion**		**Contraction**	
	All	**Large**	**All**	**Large**	**All**	**Large**
GDP	-1.515	26.715	-9.711	-35.314	52.115	31.761
	(-0.06)	*(0.92)*	*(-0.26)*	*(-0.76)*	*(1.18)*	*(0.77)*
Unemployment	-21.368**	-17.040	-48.733***	-35.450**	25.581	-18.574
	(-2.25)	*(-1.37)*	*(-2.89)*	*(-1.98)*	*(1.08)*	*(-0.86)*
Term Structure	29.672***	29.057**	33.214*	0.016	26.155	-0.410
	(2.77)	*(2.36)*	*(1.95)*	*(0.00)*	*(1.31)*	*(-0.02)*
Default Risk	-38.660***	-36.281***	-35.734*	-77.784***	-35.428	-4.222
	(-2.94)	*(-2.56)*	*(-1.71)*	*(-3.61)*	*(-1.50)*	*(-0.16)*
Short-Term Risk	-0.818	-40.512	20.211	-229.193	19.961	23.670
	(-0.01)	*(-0.43)*	*(0.15)*	*(-1.41)*	*(0.23)*	*(0.25)*
Stock Market	1.456	8.960	7.681	3.341	-9.935	9.180
	(0.31)	*(1.49)*	*(1.06)*	*(0.40)*	*(-1.22)*	*(1.08)*
Constant	2.868***	0.692	5.069***	4.580***	-0.543	0.158
	(3.84)	*(0.87)*	*(3.47)*	*(3.13)*	*(-0.35)*	*(0.11)*
LR Chi^2	14.07	16.64	21.72	22.73	9.37	3.63
Pseudo R^2	0.102	0.130	0.316	0.297	0.137	0.058
Obs.	120	120	62	62	58	58

Panel I Continued				
	Pre Break		Post Break	
	All	Large	All	Large
GDP	-12.389	-18.983	5.112	52.446
	(-0.31)	*(-0.34)*	*(0.13)*	*(0.84)*
Unemployment	-83.258***	-3.614	36.513	69.261**
	(-3.35)	*(-1.64)*	*(1.63)*	*(2.22)*
Term Structure	60.299***	53.357**	-7.888	-20.605
	(2.68)	*(2.45)*	*(-0.39)*	*(-0.77)*
Default Risk	-0.802	-13.047	-35.107	-96.040***
	(-0.02)	*(-0.32)*	*(-1.35)*	*(-2.91)*
Short-Term Risk	120.127	-77.527	-24.334	10.997
	(0.60)	*(-0.39)*	*(-0.30)*	*(0.08)*
Stock Market	0.346	3.862	3.462	17.004*
	(0.05)	*(0.40)*	*(0.52)*	*(1.73)*
Constant	7.993***	4.358*	-0.591	-3.600*
	(3.45)	*(1.85)*	*(-0.46)*	*(-1.94)*
LR Chi^2	21.42	15.33	9.16	31.17
Pseudo R^2	0.395	0.321	0.111	0.403
Obs.	45	45	74	74

The above panel presents the coefficients produced from the testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement.

Panel II: Multilevel Marginal Effects						
	Aggregate		**Expansion**		**Contraction**	
	All	**Large**	**All**	**Large**	**All**	**Large**
GDP						
Minimum Level	0.752***	0.073	0.778***	0.400***	0.283	0.053
	(3.82)	*(0.68)*	*(8.40)*	*(3.20)*	*(0.93)*	*(0.43)*
Average Level	0.740***	0.221***	0.758***	0.308***	0.720***	0.215***
	(19.58)	*(6.18)*	*(16.66)*	*(6.17)*	*(13.00)*	*(3.95)*
Maximum Level	0.731***	0.372**	0.721***	0.177	0.889***	0.359*
	(5.27)	*(2.07)*	*(4.82)*	*(1.11)*	*(8.87)*	*(1.71)*
Unemployment						
Minimum Level	0.870***	0.369***	0.970***	0.576***	0.622***	0.305**
	(18.86)	*(3.20)*	*(35.52)*	*(4.25)*	*(5.27)*	*(2.52)*
Average Level	0.727***	0.233***	0.772***	0.303***	0.744***	0.219***
	(18.57)	*(6.51)*	*(14.11)*	*(5.94)*	*(12.76)*	*(4.07)*
Maximum Level	0.440***	0.095	0.331**	0.101	0.927***	0.081
	(3.25)	*(1.46)*	*(2.14)*	*(1.38)*	*(8.23)*	*(0.73)*
Term Structure						
Minimum Level	0.287**	0.025	0.485***	0.315**	0.407*	0.227
	(2.06)	*(0.86)*	*(2.90)*	*(2.22)*	*(1.84)*	*(0.98)*
Average Level	0.735***	0.219***	0.764***	0.315***	0.707***	0.223***
	(18.85)	*(5.95)*	*(14.68)*	*(6.38)*	*(12.70)*	*(4.22)*
Maximum Level	0.923***	0.498***	0.905***	0.315***	0.900***	0.219
	(22.15)	*(3.91)*	*(14.24)*	*(3.00)*	*(10.06)*	*(1.06)*
Default Risk						
Minimum Level	0.953***	0.599***	0.901***	0.835***	0.957***	0.266
	(30.78)	*(4.21)*	*(14.70)*	*(10.66)*	*(15.11)*	*(0.96)*
Average Level	0.738***	0.232***	0.743***	0.324***	0.735***	0.224***
	(20.27)	*(6.22)*	*(17.31)*	*(5.91)*	*(13.00)*	*(4.23)*
Maximum Level	0.347***	0.042	0.565***	0.039	0.391*	0.191
	(2.87)	*(1.23)*	*(4.76)*	*(1.25)*	*(1.76)*	*(0.99)*
Short-Term Risk						
Minimum Level	0.741***	0.256***	0.740***	0.512***	0.704***	0.207***
	(10.27)	*(3.04)*	*(5.84)*	*(3.30)*	*(7.31)*	*(2.59)*
Average Level	0.740***	0.222***	0.754***	0.318***	0.721***	0.226***
	(18.83)	*(6.16)*	*(14.49)*	*(6.05)*	*(13.34)*	*(4.15)*
Maximum Level	0.735**	0.074	0.775***	0.090	0.819**	0.368
	(2.33)	*(0.33)*	*(6.43)*	*(0.88)*	*(2.25)*	*(0.58)*
Stock Market						
Minimum Level	0.691***	0.047	0.530**	0.226	0.889***	0.072
	(4.16)	*(0.76)*	*(2.15)*	*(1.09)*	*(9.04)*	*(0.77)*
Average Level	0.740***	0.218***	0.759***	0.315***	0.722***	0.215***
	(19.59)	*(6.01)*	*(17.03)*	*(6.41)*	*(13.55)*	*(3.98)*
Maximum Level	0.764***	0.375***	0.830***	0.356***	0.530***	0.404**
	(9.12)	*(3.24)*	*(11.84)*	*(3.09)*	*(3.24)*	*(2.08)*
Average of All Variables	0.763***	0.185***	0.817***	0.238***	0.767***	0.204***
	(18.57)	*(4.61)*	*(14.06)*	*(3.68)*	*(11.98)*	*(3.61)*

Panel II Continued				
	Pre Break		Post Break	
	All	Large	All	Large
GDP				
Minimum Level	0.756***	0.285	0.715**	0.058
	(4.83)	*(1.29)*	*(2.06)*	*(0.55)*
Average Level	0.711***	0.213***	0.756***	0.211***
	(13.61)	*(4.30)*	*(16.10)*	*(5.59)*
Maximum Level	0.663***	0.153	0.772***	0.326**
	(3.96)	*(0.91)*	*(5.96)*	*(2.25)*
Unemployment				
Minimum Level	0.978***	0.626***	0.583***	0.069
	(52.67)	*(2.91)*	*(4.53)*	*(1.46)*
Average Level	0.722***	0.215***	0.772***	0.225***
	(12.32)	*(3.86)*	*(16.16)*	*(4.76)*
Maximum Level	0.257**	0.035	0.925***	0.569***
	(2.40)	*(0.70)*	*(14.64)*	*(3.53)*
Term Structure				
Minimum Level	0.172*	0.010	0.774***	0.274***
	(1.89)	*(0.74)*	*(12.41)*	*(3.36)*
Average Level	0.667***	0.223***	0.751***	0.233***
	(10.25)	*(4.14)*	*(15.75)*	*(5.66)*
Maximum Level	0.969***	0.643***	0.689***	0.150**
	(24.61)	*(5.38)*	*(3.74)*	*(1.99)*
Default Risk				
Minimum Level	0.713***	0.266	0.924***	0.721***
	(5.02)	*(1.54)*	*(11.07)*	*(4.27)*
Average Level	0.710***	0.215***	0.771***	0.192***
	(13.82)	*(4.42)*	*(15.60)*	*(4.32)*
Maximum Level	0.707***	0.165	0.498**	0.004
	(4.95)	*(1.14)*	*(2.34)*	*(0.50)*
Short-Term Risk				
Minimum Level	0.603***	0.277	0.773***	0.217***
	(3.03)	*(1.54)*	*(10.70)*	*(3.37)*
Average Level	0.709***	0.209***.	0.760***	0.220***
	(13.78)	*(3.74)*	*(15.66)*	*(6.02)*
Maximum Level	0.778***	0.164	0.607	0.261
	(7.03)	*(1.20)*	*(1.12)*	*(0.46)*
Stock Market				
Minimum Level	0.702***	0.142	0.678***	0.059
	(3.81)	*(0.84)*	*(4.07)*	*(1.08)*
Average Level	0.710***	0.219***	0.761***	0.208***
	(14.02)	*(4.41)*	*(15.82)*	*(5.45)*
Maximum Level	0.713***	0.257**	0.813***	0.431***
	(7.84)	*(2.22)*	*(7.42)*	*(3.00)*
Average of All Variables	0.795***	0.126*	0.786***	0.108**
	(9.77)	*(1.81)*	*(15.13)*	*(2.12)*

The above panel presents the marginal effects produced from the testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement, essentially indicating the probability of a repurchase announcement at the minimum, average and maximum levels of each macroeconomic variable, and when each macroeconomic variable is simultaneously held at its average level.

4.4.3.3. Business Cycle Conditions: Expansion v/s Contraction

This section is further subcategorised into two subsections. The first subsection takes a macro route, and provides an overall summary of the six macroeconomic indicators' influence on repurchase undertaking during the periods of Expansion and Contraction. This summarisation also includes the tabulation of the directionality of the macroeconomic indicators' influence, pro-cyclical or counter-cyclical or static. Thus, the approach provides an overall pattern of repurchase undertaking during the two time periods. The second subsection takes the micro route, and discusses the influencing pattern of each of the tested macroeconomic indicator, thus providing a more detailed perspective.

– Summary

During Expansion, the consistent pro-cyclical influences on all repurchase and those that are large valued are seen with Unemployment, Default Risk and Stock Market. Pro-cyclicity is seen with Term Structure's influence on all repurchases, but the influence becomes static for large repurchases. The influence of Short-Term Risk on large repurchases is pro-cyclical, however on all repurchase it is counter-cyclical, while consistent counter-cyclicity is seen in the case of GDP's influence. Moving towards the period of Contraction, the consistent pro-cyclical influence on all repurchases and those that are large valued is only seen with one control variable, the GDP. Pro-cyclicity is visible with the influences of Term Structure and Default Risk, but only on all repurchases as their influence on large repurchases becomes static. Unemployment and Stock Market have identical results; their influences are pro-cyclical for large repurchases, which turns counter-cyclical for all repurchases. Finally, the influence of Short-Term Risk consistently remains counter-cyclical for all repurchases and those that are large valued.

In Table 7 we summarise the findings based on their cyclicity. It is thus seen that repurchases are marginally more pro-cyclical during Expansion than Contraction, while in the case of large payouts the actual level of counter-cyclicity is identical, with only a change in the source of the cyclicity. Based on our expectations of pro-cyclicity, and presuming that a static influence is preferred over counter-cyclicity, the most to least pro-cyclical indicators over the entire business cycle functioning are; Default Risk, Term Structure, Unemployment, Stock Market, GDP and Short-Term Risk. Further, under similar logic we also rank the variables based on their consistency over the business cycle stages, which are; Term Structure, Default Risk, Unemployment, Stock Market, Short-Term Risk and GDP.

Thus, upon combining both types of sorting we find that of the six macroeconomic indicators, Unemployment and Stock Market consistently remain in the middle ranks, Term Structure and Default Risk see a drift but they keep holding the upper ranks, similarly GDP and Short-Term Risk too see changes but continually hold the lower ranks.

Table 7: Summary of Macroeconomic Influence, Business Cycle
The table summarises the cyclicity of each macroeconomic variable's influence on the probability of witnessing a repurchase announcement during Expansion and Contraction in Panel I, and in Panel II ranks their influences based on their pro-cyclicity and consistency.

Panel I: Directionality of Influence

	Expansion		Contraction	
	All	**Large**	**All**	**Large**
GDP	Counter-Cyclical	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Static	Pro-Cyclical	Static
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Short-Term Risk	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical	Counter-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical

Panel II: Ranks of Influences

	Based on Pro-Cyclicity	**Based on Consistency**
GDP	5th	6th
Unemployment	3rd	3rd
Term Structure	2nd	1st
Default Risk	1st	2nd
Short-Term Risk	6th	5th
Stock Market	4th	4th

– Variable-Level Influence

The influence of GDP reveals a strong idiosyncrasy; its change from absolute counter-cyclicity during Expansion to absolute pro-cyclicity during Contraction highlights that repurchases are deemed efficient in mitigating the implications of a declining economic output during an upswing. When this is combined with the absolute pro-cyclicity of Stock Market during Expansion, it is inferred that since the popular method of discerning the economy's health is its overall output, any sign of compression during an upswing may trigger the sentiment that the business cycle boom is ending. This is consistent with the previous literature stating that macroeconomic fluctuations impact productivity (Giglio *et al.* 2016), and any such effect seen during the period of Expansion due to a declining GDP can cause an unfair impact on stock value. Hence before the impact of the falling output reaches the equity market, the managerial use repurchases as a pre-emptive tool to offset any price effect caused by the perception of an oncoming downfall.

The Unemployment's only counter-cyclical influence is seen with all repurchases during Contraction, which is slightly surprising. The summary statistics revealed that the average Unemployment during Expansion (8.60%) was more than that seen during Contraction (6.20%), which conforms to the continual downfall in the UK's joblessness to historical lows (as discussed earlier). Thus, the counter-cyclical influence suggests a rising sensitivity caused by the lowering joblessness, as any rise may now be more harmful than during previous times, and repurchases are potentially effective in absorbing the impact. The absence of counter-cyclicity in the influences of Term Structure and Default Risk indicate that repurchases are not deemed an antidote to the commercial impact caused by their downfall. This is supported by extant repurchase literature, which finds that the capital restructuring hypothesis as a strong motive for repurchases (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015), and as new debt plays a key role in the delivery of the motive, it is logical for Default Risk to not exhibit counter-cyclical influences on repurchase decision making.

The influence of Short-Term Risk is important; its only instance of pro-cyclicity is for large repurchases during Expansion. The nature of this indicator is representing the immediate risk that the market is witnessing, and given that LIBOR is linked with $350trn of financial contracts (ICE LIBOR, 2018), any risk rise will have a swift impact. Thus, repurchases are seen as having the ability of mitigating the impact of such a scenario, and this is exemplified by the fact that the most instances of counter-cyclicity realized during the total business cycle analyses is with Short-Term Risk. The only solo instance of counter-cyclicity of Stock Market is restricted during Contraction for all repurchases, which is consistent with the phenomenon seen that repurchases undertaking are more targeted at controlling the impact of the factors that influence the equity market, thus limiting the level of impact that reaches the stock price.

4.4.3.4. Structural Break Impact: Pre Break v/s Post Break

Similar to the previous section, this section too is subcategorised into two further subsections. The first subsection uses a macro approach, and provides an overall summary of the six macroeconomic indicators' influence on the decision if a repurchase must be undertaken during the Pre Break and Post Break periods. This reporting also includes a table that summarises the directionality of the macroeconomic indicators' influence on repurchases, pro-cyclical or counter-cyclical or static. Thus, an overall summary of the repurchase pattern during the two time periods is made available. The second subsection uses a micro approach, and discusses the influencing pattern of each of the tested macroeconomic indicator, thus a more detailed perspective of the findings will be made available.

– Summary

For all repurchases (large) the influences of three (three) control variables showed a change in pattern during the business cycle's testing (Expansion v/s Contraction). In a like for like comparison to assess the structural break's impact, we see that the influences of five (four) control variables witnessed a change in pattern for all repurchases (large). Thus, an increase in diversity is seen, which is very informative. The periods of Expansion and Contraction differ in real terms, but share a logical causality. For instance, it is argued that the credit defaults seen during downturns are essentially the conceptualisation of the risk accumulated due to the actions undertaken during the preceding upswing (Pederzoli and Torricelli, 2005; Jimenez and Saurina, 2006). The computation of these timelines is non-linear, they take in all quarters that witness Expansion and Contraction during the tested years, as opposed to the linear approach used for assessing the structural break's impact, which creates two groups of data that separately cover the quarters prior to and post 1996:Q2. Thus, it is seen that the structural break test captures on a real level the depth of change in the repurchase-macroeconomy relationship over the progression of time. This is realistically seen as after the break around 3/4th of the macroeconomic influence has shown a variation in its cyclicity.

In the Pre Break period three control variables have a consistent pro-cyclical influence on all repurchases and those that are large valued, Unemployment, Term Structure and Stock Market. The influences of GDP and Short-Term Risk are counter-cyclical on all repurchases, but for large repurchases their influence turns static, while the absolute influence of Default Risk is static. Once the structural break is witnessed stronger diversity is observed. In the Post Break period, the influences of three control variables are consistently pro-cyclical on all repurchases and those that are large valued, GDP, Default Risk and Stock Market. Pro-cyclicity is seen with Short-Term Risk, but this is limited to all repurchases, as the influence turns static for large repurchases. Finally, Unemployment and Term Structure have consistent counter-cyclical influences on all repurchases and those that are large valued.

In Table 8 we summarise the findings as we did for the business cycle's results. Repurchases generally see an equal level of counter-cyclicity before and after the break, with only the source of the influence changing. However, the greatest change is visible with large payouts. Before the structural break they do not see a single instance of counter-cyclicity, while after the break counter-cyclicity is visible with two of the six control variables. Based on the sorting methods undertaken for the business cycle's results, the most to least pro-cyclical indicators are; Stock Market, Default Risk, GDP, Short-Term Risk, Unemployment and Term

Structure. The most to least consistent indicators are; Stock Market, Default Risk, Short-Term Risk, GDP, Unemployment and Term Structure. Thus, upon combining both types of sorting we find strong stability within the six macroeconomic indicators; Stock Market and Default Risk consistently hold the upper ranks, similarly Unemployment and Term Structure continue to hold the lower ranks, respectively, however GDP and Short-Term Risk stay in the middle ranks and swap positions. Overall, with the evolution of time there is a strong correlation between the consistency in macroeconomic influence on the managerial decision to undertake a repurchase, and the odds of that influence being pro-cyclical.

Table 8: Summary of Macroeconomic Influence, Structural Break Impact
The table summarises the cyclicity of each macroeconomic variable's influence on the probability of witnessing a repurchase announcement during the Pre and Post Break periods in Panel I, and in Panel II ranks their influences based on their pro-cyclicity and consistency.

Panel I: Directionality of Influence

	Pre Break		Post Break	
	All	**Large**	**All**	**Large**
GDP	Counter-Cyclical	Static	Pro-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical	Counter-Cyclical
Default Risk	Static	Static	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Counter-Cyclical	Static	Pro-Cyclical	Static
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical

Panel II: Ranks of Influences

	Based on Pro-Cyclicity	**Based on Consistency**
GDP	3rd	4th
Unemployment	5th	5th
Term Structure	6th	6th
Default Risk	2nd	2nd
Short-Term Risk	4th	3rd
Stock Market	1st	1st

– Variable-Level Influence

The GDP's change to absolute pro-cyclicity after the break conforms to the indicator's downward trend. Since the output is consistently saturating the level of volatility also reduces, thus showing a change in corporate attitude of buying its own shares to mitigate the impact caused by a fall in the economy's produce. On the other hand, the Unemployment and Term Structure's absolute change from pro-cyclicity to counter-cyclicity is drastic. The finding reiterates the earlier assertion during the business cycle's results analysis that despite reduced joblessness during Contraction, Unemployment had a counter-cyclical influence, which was attributed to the market's fondness of rising job opportunities and in the opinion of British managerial repurchases can offset the impact of rising joblessness. Thus, we see a replication of such market attitude as after the break the average level of Unemployment dropped by 1/3rd. A similar inference can be drawn for Term Structure. Despite the timeline seeing the

great recession started in 2008, after the break the average level increased nine-times (see Table 5), justifying the market's fondness for a prosperous future, especially given the rising Default Risk. Thus, repurchases are deemed to mitigate the commercial impact caused by long-term uncertainty. The importance of these influences is reinforced by the fact that their counter-cyclicity extends to large repurchases. The change of Default Risk's influence from absolute static to pro-cyclical is consistent with its average after the break rising 22-times, as repurchases are often financed using new debt they become inefficient in offsetting its impact. Thus, similar to the previous discussions, the pattern is consistent with the presence of the capital restructuring hypothesis as a popular repurchase motive in the UK (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015).

With Short-Term Risk we see a very intuitive influence change. Its counter-cyclicity on all repurchases changes to pro-cyclicity after the structural break, inferring that firms no longer deem repurchases to be an antidote to the commercial implications of a rising immediate market risk. This is consistent with the erstwhile discussed downward trend in the Short-Term Risk, as reduced levels tag along lesser stickiness, similar to the influence seen with GDP. Furthermore, given that the global interest rate climate since the great recession has remained on the lower side (Bank for International Settlements, 2019) for lubricating the economy, especially that of the UK, our findings become more reliable. Finally, Stock Market's absolute pro-cyclicity reiterates the earlier discussions during the analysis of the business cycle's results; repurchases are mobilised to tackle the impact of macroeconomic uncertainties before this impact causes the stock price to witness an unusual drop. The pattern's reappearance however reveals that the British managerial are careful about using repurchases for price support, and do so cautiously since announcing a repurchase during a slump in the equity market may be too obvious to conceal.

4.4.4. Macroeconomic Influence on Repurchase Value

The results of the macroeconomic influence on repurchase value are presented in Table 9. Panel I constitutes the coefficients, and in Panel II the marginal effects are tabulated that reveal the value-level impact of the macroeconomy at each indicator's minimum, average and maximum level, and also the payout-probability under overall average conditions, which means when all of the six indicators are held simultaneously at their average levels for each tested period. Further, for a clearer ascertainment of the results this section is subcategorised into five subsections. The first subsection provides a discussion on the macroeconomic influence on repurchases under average macroeconomic conditions, the second subsection focuses on the macroeconomic influence on repurchases during the Aggregate period, the third subsection discusses and compares the macroeconomic influence on repurchases during the two business cycle conditions, Expansion and Contraction, the fourth subsection discuses and compares the macroeconomic influence on repurchases during the periods before and after the structural break of 1996:Q2, Pre Break and Post Break periods, and the fifth subsection provides an overall summary of the directionality of the influences of the six macroeconomic indicators during the tested periods, pro-cyclical or counter cyclical or static.

4.4.4.1. Repurchases Under Average Macroeconomic Conditions

The value-level influence under average macroeconomic conditions during the Aggregate period is 6%, while within the subcategorised periods the results are, 6% during Expansion, 3% during Contraction, 2% during Pre Break and 5% during Post Break. The fundamentals of the results are dissimilar to the payout-probability results, but remain consistent with the repurchase value-specific distribution (Table 3). The periods that witness higher (lower) than average repurchase values, Expansion and Post Break (Contraction and Pre Break), also witness greater (lesser) macroeconomic influence on payout value. The symmetry assures reliability, and establishes the macroeconomy's pivotal role in the decision regarding repurchase value. For a better ascertainment of the repurchase-macroeconomy relationship, further analyses will also compare the value-level results with those seen for the payout-probability testing of all repurchases. The payout-probability results for large valued repurchases are not considered, as the value-level testing does not differentiate between repurchases based on their value, thus providing a better 'like for like' assessment.

Table 9: Macroeconomic Influence on Repurchase Value

The table presents the results from the testing of the influence of macroeconomic conditions on the value of a repurchase announcement, as described Equation 5: $E(Rep)_t = \emptyset_t(\Sigma_{k=6}^{K}\beta_k Macroeconomy_{k,t-p})$, where, $E(Rep)_t$ is the quarterly cumulative repurchase value normalised between 0 and 1 during $t =$ Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4), $Macroeconomy_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). $\emptyset_t$ is the standard cumulative normal. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parentheses.

Panel I: Coefficients

	Aggregate	**Expansion**	**Contraction**	**Pre Break**	**Post Break**
GDP	5.302	-60.764*	45.465**	-23.786	-17.656
	(0.29)	*(-1.72)*	*(2.35)*	*(-0.75)*	*(-0.69)*
Unemployment	-15.122**	-35.853***	-16.957	-46.856***	47.522***
	(-2.04)	*(-3.16)*	*(-1.34)*	*(-2.94)*	*(3.33)*
Term Structure	15.056**	-9.672	7.107	25.438***	-36.568***
	(2.30)	*(-1.24)*	*(0.55)*	*(3.27)*	*(-3.04)*
Default Risk	-33.822***	-56.687***	-12.920	4.982	-56.417***
	(-3.72)	*(-4.59)*	*(-1.06)*	*(0.20)*	*(-4.26)*
Short-Term Risk	-46.268	-154.435**	63.473	-191.540*	-28.473
	(-0.77)	*(-2.00)*	*(1.31)*	*(-1.90)*	*(-0.57)*
Stock Market	6.556	2.433	5.804*	2.654	7.187*
	(1.54)	*(0.44)*	*(1.79)*	*(0.50)*	*(1.78)*
Constant	0.109	3.529***	-1.118	3.573**	-2.874***
	(0.23)	*(3.27)*	*(-1.51)*	*(2.46)*	*(-3.85)*
WALD Chi^2	17.89	26.82	13.60	28.80	54.30
Pseudo R^2	0.081	0.226	0.047	0.227	0.259
Obs.	120	62	58	45	74

The above panel presents the coefficients produced from the testing of the influence of macroeconomic conditions on the value of a repurchase announcement.

Panel II: Multilevel Marginal Effects					
	Aggregate	**Expansion**	**Contraction**	**Pre Break**	**Post Break**
GDP					
Minimum Level	0.060	0.231***	0.001	0.101	0.176
	(0.96)	*(2.94)*	*(0.70)*	*(1.28)*	*(1.20)*
Average Level	0.079***	0.111***	0.030***	0.054***	0.096***
	(5.47)	*(6.46)*	*(3.57)*	*(3.64)*	*(6.39)*
Maximum Level	0.093*	0.019	0.105*	0.026	0.070***
	(1.73)	*(0.83)*	*(1.84)*	*(0.97)*	*(2.79)*
Unemployment					
Minimum Level	0.159***	0.331***	0.057**	0.232**	0.026**
	(2.90)	*(4.28)*	*(2.09)*	*(2.09)*	*(2.21)*
Average Level	0.083***	0.104***	0.034***	0.044***	0.096***
	(5.36)	*(5.62)*	*(3.14)*	*(3.51)*	*(6.13)*
Maximum Level	0.026*	0.016	0.008	0.005	0.307***
	(1.73)	*(1.30)*	*(0.88)*	*(1.02)*	*(3.70)*
Term Structure					
Minimum Level	0.021	0.175***	0.018	0.006	0.166***
	(1.47)	*(3.19)*	*(0.86)*	*(1.01)*	*(4.90)*
Average Level	0.080***	0.123***	0.034***	0.054***	0.105***
	(5.33)	*(6.37)*	*(3.25)*	*(3.01)*	*(6.10)*
Maximum Level	0.162***	0.091***	0.055	0.177***	0.025**
	(3.41)	*(3.47)*	*(1.10)*	*(3.28)*	*(2.07)*
Default Risk					
Minimum Level	0.341***	0.527***	0.080	0.047	0.339***
	(3.29)	*(6.50)*	*(1.17)*	*(1.37)*	*(3.82)*
Average Level	0.079***	0.129***	0.034***	0.055***	0.067***
	(5.54)	*(6.06)*	*(3.33)*	*(3.61)*	*(5.36)*
Maximum Level	0.008	0.016**	0.014	0.064	0.003
	(1.54)	*(1.97)*	*(1.31)*	*(1.06)*	*(1.03)*
Short-Term Risk					
Minimum Level	0.098***	0.210***	0.024***	0.131*	0.102***
	(2.84)	*(3.45)*	*(2.62)*	*(1.93)*	*(4.37)*
Average Level	0.078***	0.119***	0.036***	0.035***	0.095***
	(5.50)	*(6.30)*	*(3.29)*	*(3.14)*	*(6.53)*
Maximum Level	0.012	0.034	0.254	0.010	0.041
	(0.46)	*(1.38)*	*(0.91)*	*(1.04)*	*(0.64)*
Stock Market					
Minimum Level	0.017	0.082	0.011	0.033	0.036
	(0.86)	*(0.98)*	*(1.39)*	*(0.93)*	*(1.54)*
Average Level	0.076***	0.122***	0.031***	0.055***	0.089***
	(5.43)	*(6.27)*	*(3.43)*	*(3.71)*	*(6.46)*
Maximum Level	0.141***	0.142***	0.065**	0.067*	0.154***
	(2.63)	*(3.13)*	*(2.17)*	*(2.06)*	*(3.23)*
Average of All Variables	0.060***	0.062***	0.027***	0.020***	0.048***
	(5.02)	*(3.00)*	*(3.57)*	*(2.59)*	*(4.09)*

The above panel presents the marginal effects produced from the testing of the influence of macroeconomic conditions on the value of a repurchase announcement, essentially indicating the influence on a repurchase announcement at the minimum, average and maximum levels of each macroeconomic variable, and when each macroeconomic variable is simultaneously held at its average level.

4.4.4.2. Aggregate Period

In the Aggregate period each control variable has a pro-cyclical influence, with the payout's value being influenced from 3% up to 34%. The influences of GDP, Term Structure and Stock Market are insignificant at low levels, while that of Default Risk and Short-Term Risk remains insignificant at higher levels; the pro-cyclicity further strengthens. Unemployment's influence however remains significant across all levels, revealing the variable's importance in the value-level decision-making. As a thumb rule corporate decision on repurchase values is thus significantly associated with the macroeconomy, which is strongly pro-cyclical in nature. The only discrepancy of the value-level results with those realized for the payout-probability testing is that relating to the influence of GDP. Since the counter-cyclicity seen in the payout-probability results was relatively mild, the inconsistency is not too disconcerting.

4.4.4.3. Business Cycle Conditions: Expansion v/s Contraction

During Expansion the macroeconomic influence on repurchase value ranges from 2% to 53%, with the influences of Unemployment, Default Risk, Short-Term Risk and Stock Market remaining pro-cyclical, while that of GDP and Term Structure showing counter-cyclicity. Upon comparing with the payout-probability results inconsistency is seen with only two control variables, Term Structure, whose influence on payout-probability was pro-cyclical, and Short-Term Risk, whose influence on payout-probability was counter-cyclical. Thus, it is seen that when the Term Structure is declining firms do not opt for increasing the frequency of repurchases to tackle its implications, rather hold the frequency constant and increment repurchase values. Vice versa is seen with Short-Term Risk, as managerial have shown to only increase the payout frequency to tackle its commercial impact and not increment payout value. Thus the act of a repurchase is only to send a message that the rise in immediate market risk must not be held as a serious threat to the firm's financials.

The level of counter-cyclicity during Contraction is relatively less, as only Short-Term Risk has a counter-cyclical influence, while GDP, Unemployment and Stock Market have pro-cyclical influences, while Term Structure and Default Risk have static influences. The width of influence magnitude is between 2% and 11%, far less than that realized for Expansion. This conforms to the reduced profitability and lesser surplus cash during an economic downturn, which impact the available resources for financing repurchases. The influences of GDP and Short-Term Risk remain consistent with the payout-probability results, while that of Term Structure and Default Risk are not highly inconsistent as their influences were pro-cyclical, and this turning static highlights that under extreme conditions during an economic

slump their importance on the value-level decision diminishes. However, Unemployment and Stock Market showed counter-cyclical influences on payout-probability, thus the managerial use repurchases just to signal unnecessary commercial implications on stock price due to their decline, and do not consider that raising payout value is vital in offsetting the impact.

A two-stage comparison will be undertaken for a clearer understanding, comparing the value-level results of the business cycle stages, and then further factoring in the payout-probability results for the time periods. Overall, the value-level results for Expansion and Contraction sees consistency only with two control variables, Unemployment and Stock Market. Thus, indicating diversity in the macroeconomic influences over the business cycle stages. Greater counter-cyclicity is seen during Expansion than Contraction, which is consistent with managers being more inclined towards trying to sustain the prosperity of an upswing. Given that macroeconomic boom realizes greater profitability and cash flow, this tact's potential for success increases. This pattern is however in confliction with the payout-probability results, which revealed greater counter-cyclicity during Contraction than Expansion, revealing distinct managerial attitude. They deem that during Expansion (Contraction) increasing repurchase values (frequency) is more effective in tackling the impact of declining macroeconomic circumstances. Hence during a downturn, just the act of announcing a repurchase is sufficient for signalling the managerial confidence in the firm's future.

4.4.4.4. Structural Break Impact: Pre Break v/s Post Break

Prior to the structural break the macroeconomic influence on repurchase value ranges from 4% to 23%, and no instance of counter-cyclicity is observed. Unemployment, Term Structure, Short-Term Risk and Stock Market have pro-cyclical influences, while the influences of GDP and Default Risk remain static. These results are strongly consistent with the payout-probability findings, with discrepancies in the influences of two control variables, GDP and Short-Term Risk. Since both these control variables revealed counter-cyclicity during the payout-probability testing, which is not seen with the value-level testing, it is deemed that the mitigating effect expected from repurchases during a declining output and rising immediate market risk is achieved by just announcing the payout, rather than incrementing its value.

The level of macroeconomy's value-level influences broadens after the structural break and so does their counter-cyclicity, as in the Post Break period the influence extends from 2% to 34% with half of the control variables showing counter-cyclicity, GDP, Unemployment and Term Structure. The influences of Default Risk and Stock Market are pro-cyclical, while that of Short-Term Risk is static. However, the level of similarity between the value-level and payout-probability results remains equivalent, as four of the control variables show consistency and two reveal discrepancies, GDP and Short-Term Risk. These two were in fact the same variables that also showed discrepancies prior to the break, thus revealing that ignoring the cyclicity of the results, the influences of these two control variables over the decision-making process have always been inconsistent. The influence of GDP is pro-cyclical on the decision to undertake a repurchase, thus the counter-cyclicity on payout value reveals that the managerial perceive that increasing repurchase values while holding frequency constant during a declining economic output best offsets the commercial implications. This is aligned with the GDP's saturation after the break, which raises the indicator's sensitivity. Since the output levels now stay much closer to the 0% mark, it becomes more susceptible to enter the negative area, and two such quarters will establish the onset of a recession. Thus if firms opt to increase repurchase values instead of frequency, they may be able to swiftly offset the impact of the decline without attracting too much attention. In the case of Short-Term Risk the indicator has a pro-cyclical influence on the probability of undertaking a repurchase, and its static influence on payout value establishes that under extreme risk conditions firms refrain from altering repurchase values, which is not highly unexpected.

Similar to the business cycle's results, here too we undertake a two-stage comparison of the results. The consistency of the control variables' influence before and after the break is very bleak, as this is seen with just one variable, Stock Market. Further, the upper limit of macroeconomic influence on payout value increased by almost 50% after the break; while counter-cyclicity was absolutely absent before the break, but it was seen with half of the control variables after the break. However, upon comparing the alignment of the findings with the payout-probability testing we see that four of the control variables remained consistently same before and after the break, Unemployment, Term Structure, Default Risk and Stock Market. Thus, revealing that when it comes to GDP and Short-Term Risk there is an on-going confliction about how firms deal with their implications via the use of repurchases.

The results also highlight the probable trigger that led to the actual structural break in 1996:Q2, which can now be dominantly credited to changes in firm-level conditions rather than the macroeconomic environment. More specifically, drastic alteration in repurchase policy of holding frequency stable and increasing the actual payout value, thus an upward value-level shock. In Table 10 we see that in 1996:Q3 the average quarterly repurchase value reached a 30year peak of £37.40bn, while the announcement pattern from 1994 to 1997 has been stable between 41 and 45 repurchases, with the average of the four years being 43 announcements. However, in 1998 the annual frequency spiked by 60% to 69 announcements, yet the structural break was witnessed in 1996 and not in any quarter of 1998, as the average quarterly values in 1998 were visibly lower than those in 1996. Also, the payout-probability testing revealed that the general level of counter-cyclicity of macroeconomic influence on all repurchases remained stable before and after the structural break, however before the break large valued repurchases did not see counter-cyclicity but after the break they strongly witnessed counter-cyclical influences. This too supports our assertion that the value of repurchases is a substantial contributor to the structural break, thus making repurchase value-level influence a sensitive component of the repurchase-macroeconomy relationship.

Table 10: Repurchase Statistics Surrounding the Structural Break

The table presents the quarterly repurchase statistics in Panel I for the period surrounding the structural break quarter (1996:Q2), which starts from 1994:Q1 and extends to 1998:Q4. In Panel II the said period's annual statistics are presented (1994-1998).

Panel I: Quarterly Breakdown			**Panel II: Yearly Breakdown**		
Quarters	**Announcement Frequency**	**Average Value (£bn)**	**Years**	**Total Announcements**	**Average Quarterly Value (£bn)**
1994:Q1	5	4.90	1994	42	5.10
1994:Q2	19	8.80	1995	45	7.10
1994:Q3	6	6.00	1996	41	19.00
1994:Q4	12	0.90	1997	43	14.40
1995:Q1	6	2.00	1998	69	16.30
1995:Q2	20	5.40			
1995:Q3	10	14.50			
1995:Q4	9	6.50			
1996:Q1	9	24.20			
1996:Q2	7	6.00			
1996:Q3	9	37.40			
1996:Q4	16	8.20			
1997:Q1	10	18.90			
1997:Q2	9	5.70			
1997:Q3	14	8.30			
1997:Q4	10	24.70			
1998:Q1	15	14.10			
1998:Q2	17	26.20			
1998:Q3	23	23.10			
1998:Q4	14	1.60			

4.4.4.5. Summary

The summaries of the entirety of the value-level testing results are reported in Table 11, thus providing a clear and concise picture of the value-level cyclicity during the Aggregate period, different business cycle stages, Expansion and Contraction and the periods surrounding the structural break, Pre Break and Post Break. Firstly, it is seen that the influences widely remain insignificant at the minimum and maximum levels of the control variables, indicative of payout value being uninfluenced under extreme economic environments. These insignificances are consistent with the respective macroeconomic indicator's cyclical pattern. Further, the general influence during economic Contraction is more restrictive and stationary compared to that seen during economic Expansion. Thus, indicating that macroeconomic slump/uncertainty also effects the ability of the macroeconomy to influence repurchase values. Finally, it is also seen that the influence during the aggregate period may be pro-cyclical, but with the progression of time the counter-cyclicity is strongly rising, as indicated by the Pre Break and Post Break results. Thus, indicating that over the longer-term there is a dynamically changing of the repurchase-macroeconomy relationship.

Table 11: Summary of Macroeconomic Influence
The table summarises the cyclicity of each macroeconomic variable's influence on repurchase values during the Aggregate, Expansion, Contraction and the Pre and Post Break periods.

	Aggregate	Expansion	Contraction	Pre Break	Post Break
GDP	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Static	Counter-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Counter-Cyclical	Static	Pro-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical	Static	Static	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Static
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical

4.4.5. Robustness Testing

(i) Mann-Whitney Rank Sum Test

The payout-probability and value-level testing established that the macroeconomic influence on repurchase decision-making is diverse. However, we run a Mann-Witney Rank Sum test on the results for determining if this diversity holds on a statistical level. The results are reported in Table 12, which is subcategorised in Panels I through III based on the time period; aggregate period, business cycle stages and periods surrounding the structural break.

In the Aggregate period the macroeconomic influence on large repurchases shows a statistically significant difference from that seen on all repurchases. Over the business cycle stages we see that of the six tested pairs for payout-probability, one shows statistical insignificance, while each of the five that show significant differences consists large valued repurchases. Thus, the general macroeconomic influence on repurchases undertaken during the periods of Expansion and Contraction is statistically indifferent, however the influences on large valued repurchases during both time periods are statistically different from any other influence. We also see that the macroeconomy's value-level influence too is significantly different over the business cycle. Around the structural break, we see that of the six tested pairs for payout-probability two show statistical insignificance, while of the four that show significant differences each consists large valued repurchases. Thus, revealing that albeit slightly less, but here too the macroeconomic influences on large valued repurchases is dominantly different on a statistical level from those on repurchases in general. Finally, we continue to see that the macroeconomic influences on repurchase value during the Pre Break and Post break periods are statistically different.

Hence it is seen that under all subcategorised time periods the greatest of statistical differences in macroeconomic influences are associated with repurchase values, be it the payout-probability of large valued repurchases or the value-level influence on all repurchases. Thus, the pattern supports our assertion that the repurchase-macroeconomy relationship is most fragile to payout value, which has strongly contributed to the relationship's structural break. This robustness test focused on the 'lump sum' of results, and hence for a broader understanding further variable-level checks are undertaken.

Table 12: Robustness Check: Mann-Whitney Rank Sum Test

The table presents the results from the Mann-Whitney robustness testing to check if the repurchase-macroeconomy relationship is statistically different during different time periods. Panel I focuses on the Aggregate period, Panel II on Expansion and Contraction, and Panel III on Pre and Post Break periods. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and p-values are stated in the parentheses.

Pairs	Z-Score	H_0 = Distribution is Identical
Panel I: Aggregate Period		
All = Large	4.747*** *(0.000)*	*Reject*
Panel II: Business Cycle Conditions		
Panel IIA: Payout-Probability		
Expansion: All = Contraction: All	0.854 *(0.392)*	Accept
Expansion: Large = Contraction: Large	2.011** *(0.044)*	*Reject*
Expansion: All = Expansion: Large	4.401*** *(0.000)*	*Reject*
Contraction: All = Contraction: Large	4.968*** *(0.000)*	*Reject*
Expansion: All = Contraction: Large	5.031*** *(0.000)*	*Reject*
Expansion: Large = Contraction: All	-4.148*** *(0.000)*	*Reject*
Panel IIB: Value-Level Influence		
Expansion = Contraction	2.865*** *(0.004)*	*Reject*
Panel III: Structural Break Impact		
Panel IIIA: Payout-Probability		
Pre Break: All = Post Break: All	-1.567 *(0.117)*	Accept
Pre Break: Large = Post Break: Large	0.221 *(0.824)*	Accept
Pre Break: All = Pre Break: Large	3.972*** *(0.000)*	*Reject*
Post Break: All = Post Break: Large	4.904*** *(0.000)*	*Reject*
Pre Break: All = Post Break: Large	4.177*** *(0.000)*	*Reject*
Pre Break: Large = Post Break: All	-4.367*** *(0.000)*	*Reject*
Panel IIIB: Value-Level Influence		
Pre Break = Post Break	-1.709* *(0.087)*	*Reject*

(ii) Variable-Level Stability

The second robustness test focuses on the variable-level influence if the repurchase policy within the subcategorised periods are swapped, thus interchanging the independent variables highlighted in Objectives 1 and 2; (i) Business Cycle Conditions: The implementation of Contraction's repurchase policy during Expansion's macroeconomic environment, vice versa, and (ii) Structural Break Impact: The implementation of Post Break's repurchase policy during Pre Break's macroeconomic environment, vice versa. If the variable's influence remains unchanged (changed) then it reveals that its influence is more determined by the macroeconomy (frim-level conditionality) and less by firm-level conditionality (macroeconomy). The regression results are available in the Appendix, while their summaries are available in Table 13, which also include the original results for comparative ease.

– **Business Cycle Conditions**

For the macroeconomic influence on payout-probability, upon employing the general repurchase policy of Contraction (Expansion) during Expansion (Contraction), the influences of three (three) control variables remains unchanged, GDP, Term Structure and Stock Market (Term Structure, Default Risk and Stock Market). Thus, during the entire business cycle functioning, the influences of Term Structure and Stock Market on the general decision if a repurchase needs undertaking remains more dependent on the macroeconomy than firm-level conditionality. In the case of large repurchases, upon employing the policy of Contraction (Expansion) during Expansion (Contraction), the influences of two (one) macroeconomic variables remains unchanged, Short-Term Risk and Stock Market (Unemployment). Thus, no variable has an influence that is consistently dependent the macroeconomy for both sets of repurchases. We now sort the macroeconomic indicators with first preference given to those that are most macroeconomic-dependent, followed by secondary preference given to their cyclicity, which ranks pro-cyclicity as the desired output, followed by static influence and then counter-cyclicity; Stock Market, Term Structure, Unemployment, Default Risk, Short-Term Risk and GDP. For the macroeconomic influence on repurchase value, upon employing the repurchase policy of Contraction (Expansion) during Expansion (Contraction), the influences of three (two) macroeconomic variables remains unchanged, Default Risk, Short-Term Risk and Stock Market (Unemployment and Stock Market). Thus, during the entire business cycle functioning the influence of Stock Market on the decision on repurchase value remains more dependent on the macroeconomy than firm-level conditionality. We now sort the macroeconomic indicators using the approach employed for the payout-probability results; Stock Market, Unemployment, Default Risk, Short-Term Risk, Term Structure and GDP.

Thus we see that despite it being logical to expect deviation in macroeconomic influences over different business cycle stages, an idiosyncrasy is however revealed; the influences of individual macroeconomic indicators are not necessarily fully determined by the state of the economy, and a change in the corporate policy can also impact the actual influence on the decision-making process. The results further highlight that the macroeconomic influence on the general repurchase payout policy remains equally dependent on the economic state during both business cycle periods, however we see reduced dependence in the case of the influence on the decision if a large repurchase must be undertaken, and also on the influence on repurchase value. The findings thus support our assertion that the repurchase-macroeconomy relationship is most sensitive when it comes to the value of the repurchases undertaken.

– **Structural Break Impact**

For the macroeconomic influence on payout-probability, upon employing the general repurchase policy of Post Break (Pre Break) during Pre Break (Post Break), the influence of two (two) control variables remains unchanged, GDP and Stock Market (GDP and Stock Market). Thus, in the years before and after the structural break the influences of GDP and Stock Market on the general decision if a repurchase needs undertaking remains more dependent on the macroeconomy than firm-level conditionality. In the case of large repurchases, upon employing their policy of Post Break (Pre Break) during the Pre Break (Post Break) period, the influences of zero (two) macroeconomic variables remains unchanged (Term Structure and Short-Term Risk). Thus, no variable has an influence that is consistently dependent on the macroeconomy for both sets of repurchases. We now sort the macroeconomic indicators using the same approach used for the business cycle's payout-probability results; GDP, Stock Market, Short-Term Risk, Term Structure, Default Risk and Unemployment. For the macroeconomic influence on repurchase value, upon employing the repurchase policy of Post Break (Pre Break) during Pre Break (Post Break), the influence of zero (two) macroeconomic variable remains unchanged (Term Structure and Short-Term Risk). Thus, during Pre Break and Post Break periods the influence of no variable on the decision of repurchase value remains more dependent on the macroeconomy than firm-level conditionality. We now sort the macroeconomic indicators using the same approach used for the business cycle's value-level results; Short-Term Risk, Term Structure, Stock Market, GDP, Default Risk and Unemployment.

The results for the periods surrounding the structural break reveal strong characteristics. Firstly, the influences of the macroeconomic indicators are less dependent on the macroeconomy and more on the firm-level conditionality. For instance, when the Post Break repurchase policy is applied to the Pre Break macroeconomic environment, the payout-probability results for large valued repurchases and the value-level results absolutely change, and such a pattern was not witnessed for the business cycle's testing. Further, it is also seen that when the repurchase policy of the Pre Break period is applied to the Post Break period, the results for the payout-probability testing of large valued repurchases and on the value-level testing were identical. Thus given these patterns of idiosyncrasies relating to large valued repurchases and value-level influence, we have sufficient evidences to establish that; the repurchase-macroeconomy relationship is most sensitive to repurchase values, and the corporate policy of increasing repurchase values while holding frequency constant is the key reason for the structural break witnessed in the second quarter of 1996.

Table 13: Robustness Check: Variable-Level Influence, Summary

The table provides a comparative summary of the cyclicity of each macroeconomic variable's influence on the probability of witnessing a repurchase, and that on the payout's value, as tabulated in Tables 7, 8 and 11, and compares it with the robustness testing of swapping repurchase policy between Expansion and Contraction, and between Pre and Post Break periods, as described in Chapter 5.3.3.(ii). Panel I focuses on Expansion and Contraction, and Panel II on Pre and Post Break periods. The cells shaded in 'Green' indicate that a change in policy did not have a change in influence, while the cells in 'Red' indicate that a change in policy did have a change in influence.

Panel I: Payout-Probability				
Panel IA: Business Cycle Conditions				
Macroeconomic Setting: Expansion, Original: Expansion Policy, Robustness: Contraction Policy				
	Original: All	**Robustness: All**	**Original: Large**	**Robustness: Large**
GDP	Counter-Cyclical	Counter-Cyclical	Counter-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Static	Pro-Cyclical
Default Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Short-Term Risk	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Macroeconomic Setting: Contraction, Original: Contraction Policy, Robustness: Expansion Policy				
	Original: All	**Robustness: All**	**Original: Large**	**Robustness: Large**
GDP	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Unemployment	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Static	Pro-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical	Static	Counter-Cyclical
Short-Term Risk	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical
Stock Market	Counter-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical

Panel IB: Structural Break Impact

Macroeconomic Setting: Pre Break, Original: Pre Break Policy, Robustness: Post Break Policy

	Original: All	Robustness: All	Original: Large	Robustness: Large
GDP	Counter-Cyclical	Counter-Cyclical	Static	Counter-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Default Risk	Static	Pro-Cyclical	Static	Counter-Cyclical
Short-Term Risk	Counter-Cyclical	Pro-Cyclical	Static	Counter-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical

Macroeconomic Setting: Post Break, Original: Post Break Policy, Robustness: Pre Break Policy

	Original: All	Robustness: All	Original: Large	Robustness: Large
GDP	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Unemployment	Counter-Cyclical	Static	Counter-Cyclical	Insignificant
Term Structure	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Static
Short-Term Risk	Pro-Cyclical	Static	Static	Static
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static

Panel II: Value-Level Influence

Panel IIA: Business Cycle Conditions

Macroeconomic Setting: Expansion, Original: Expansion Policy, Robustness: Contraction Policy

	Original	Robustness
GDP	Counter-Cyclical	Static
Unemployment	Pro-Cyclical	Counter-Cyclical
Term Structure	Counter-Cyclical	Pro-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical

Macroeconomic Setting: Contraction, Original: Contraction Policy, Robustness: Expansion Policy

	Original	Robustness
GDP	Pro-Cyclical	Counter-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical
Term Structure	Static	Pro-Cyclical
Default Risk	Static	Pro-Cyclical
Short-Term Risk	Counter-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical

Panel IB: Structural Break Impact

Macroeconomic Setting: Pre Break, Original: Pre Break Policy, Robustness: Post Break Policy

	Original	Robustness
GDP	Static	Pro-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Counter-Cyclical
Default Risk	Static	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Counter-Cyclical
Stock Market	Pro-Cyclical	Counter-Cyclical

Macroeconomic Setting: Post Break, Original: Post Break Policy, Robustness: Pre Break Policy

	Original	Robustness
GDP	Counter-Cyclical	Static
Unemployment	Counter-Cyclical	Insignificant
Term Structure	Counter-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Static
Short-Term Risk	Static	Static
Stock Market	Pro-Cyclical	Static

– **Summary of Variable-Level Stability**

In Table 14 we present a collective summary of the variable-level influence's dependence on the macroeconomy. This will help get a condensed viewpoint of the fundamental behind the macroeconomic influence on various repurchase decision-making aspects during different time periods. In Panel I the summary is related to the variable-level influence's dependence when it comes to the decision if a repurchase needs to be undertaken; the row titled 'Absolute' states the variables whose influence did not change despite a change in corporate policy, thus being dominantly reliant on the state of the economy, the row titled 'Partial' states the variables whose influence changed for either all or large repurchases upon a change in corporate policy, thus being partially reliant on the state of the economy, and the row titled 'None' states the variables whose influence completely changed due to a change in corporate policy, thus being dominantly non-reliant on the state of the economy. In Panel II the summary is related to the variable-level influence's dependence when it comes to the decision regarding the repurchase value after a decision has been made that a repurchase will be undertaken; the rows titled 'Absolute' and 'None' have the same connotation as per those synonymous in Panel I, however over here we do not have a row titled 'Partial' since the value-level testing did not differentiate between repurchases based on their value, i.e. independent testing for all repurchases and those that are large valued were not undertaken.

Table 14: Robustness Check: Variable-Level Macroeconomic Dependence

The table summarises the macroeconomic variables based on the robustness testing revealing if their influences changed due to a change in repurchase policy, thus indicating their dependence on the macroeconomy. Panel I focuses on the influence on the decision if a repurchase must be undertaken, and Panel II on the decision relating to repurchase value.

Panel I: Decision to Undertake a Repurchase

	Expansion	**Contraction**	**Pre Break**	**Post Break**
Absolute	Stock Market	------	------	------
Partial	GDP Term Structure Short-Term Risk	Unemployment Term Structure Default Risk Stock Market	GDP Stock Market	GDP Term Structure Short-Term Risk Stock Market
None	Unemployment Default Risk	GDP Short-Term Risk	Unemployment Term Structure Default Risk Short-Term Risk	Unemployment Default Risk

Panel II: Decision on Repurchase Value

	Expansion	**Contraction**	**Pre Break**	**Post Break**
Absolute	Default Risk Short-Term Risk Stock Market	Unemployment Stock Market	------	Term Structure Short-Term Risk
None	GDP Unemployment Term Structure	GDP Term Structure Default Risk Short-Term Risk	GDP Unemployment Term Structure Default Risk Short-Term Risk Stock Market	GDP Unemployment Default Risk Stock Market

From the perspective of the decision to undertake a repurchase, irrespective of what is the payout value, we see that the only instance when the influence of a macroeconomic indicator is dominantly dependent on the state of the economy is with Stock Market during Expansion. Following are periods of Contraction and Post Break, as the influences of four macroeconomic indicators within each period show partial dependence on the state of the economy. Finally, during the Pre Break period the influence of two macroeconomic indicators shows partial dependence on the state of the economy. Thus we see that with the progression of time the influences of the macroeconomic indicators show an increasing dependence on the state of the economy than firm-level conditionality. From the perspective of the value-level decision, we see that during Expansion three macroeconomic indicators show more dependence on the state of the economy than the firm-level conditionality. Following are periods of Contraction and Post Break, as the influences of two macroeconomic indicators within each period show more dependence on the state of the economy. Finally, during the Pre Break period the influence of no macroeconomic indicator is more dependent on the state of the economy. Thus, the pattern is consistent with that seen for the payout-probability findings. When we combine the influences on payout-probability and payout value as two parts of the whole repurchase decision-making process, we see that if a time period is specifically assessed based on the business cycle stage, there is a greater chance for the macroeconomic influence on repurchase decision-making to be more dependent on the state of the economy. Further, with the progression of time there is an increasing likelihood that the macroeconomic influence is more dependent on the state of the economy, specifically that related to the decision of whether a repurchase must be undertaken.

4.5. Conclusion

This research was set out with the solo intention of addressing the absence of UK-specific literature regarding the repurchase-macroeconomy relationship, and this undertaking was supported by the macroeconomy's influence on factors that determined the UK's repurchases. The headline of the results is the tenable statement that corporate repurchase decision-making is statistically dependent upon macroeconomic conditions, with a further narrative detailing the macroeconomy's role in the decision-making. The macroeconomic correlation between periods based on repurchase values conforms to the relatively recent repurchase popularity, as it indicates that the macroeconomic conditions during periods of lower repurchase values are most similar while those with higher values are least similar. Aggregately, the repurchase undertaking pattern is dominantly pro-cyclical, however in the case of large repurchases their undertaking is absolutely pro-cyclical.

Thus, in totality the findings are important as they provide insight into the previously untested repurchase-macroeconomy relationship. These insights include that repurchases are generally more pro-cyclical, however during both periods of Expansion and Contraction there are undeniable instances of counter-cyclicity. Thus, indicating that during these periods British managers use repurchases to tackle the effects of a macroeconomic downturn, however the attitude of doing so is circumstantial to the time period. During Expansion managers tend to increase repurchase values rather than their frequency, while during Contraction they tend to increase repurchase frequency rather than their values. Thus, shareholders can use this finding to not only decide how to cast their vote of repurchase approval, but also use these findings to efficiently manage their investment portfolio for maximum returns. Even future researchers can capitalise on this pattern to ensure appropriate time-specific testing.

Furthermore, over the 30years the repurchase-macroeconomy relationship underwent a structural change in 1996:Q2, which is just before the quarter with the highest recorded repurchase value. The general repurchases decision-making before and after the break was strongly pro-cyclical, however the decision to undertake large repurchases remains free from counter-cyclicity prior to the break, but this pattern strongly discontinues thereafter. The value-level decision-making too witnessed similar but more dispersed patterns; the bleak counter-cyclicity seen prior to the break amplified after the break. In terms of magnitude, the influence on the probability of undertaking repurchases remained equivalent around the structural break, with a prominent alteration seen with the rising level of macroeconomic influence on repurchases value. When these findings are combined with the actual pattern of the announced repurchases, it is highlighted that a major contributor to the structural break is the change in corporate policy, essentially the increasing of repurchase values while holding frequency constant. Thus, these findings will help shareholders in tracking the repurchase undertaking patterns of British managers, and gauging any possible changes in how the macroeconomy influences repurchases due to extreme managerial decision-makings. Furthermore, asset managers can also assess any structural shifts due to changes in corporate circumstances, thus efficiently managing their portfolios during repurchase announcements.

Overall, the results of the study are beneficial for British managers as they now have a precise information source for self-assessments, and thus alter any repurchase decisions during extreme economic climates. Finally, academics are provided with precedence for future investigations within this subject-area, and complementary investigations on the relationship between dividends and the macroeconomy is also worth undertaking.

CHAPTER 5. CONCLUSION

In light of the extensiveness of the research undertaken via the production of three empirical essays, this chapter is subcategorised into four subsections in order to provide a systematic conclusion that is able to highlight and discuss all the relevant aspects of this research. The first subsection provides a summary of the findings of the three empirical essays by arranging them in the order corresponding to that of a repurchase decision-making process, which is done through the use of a 'master table' that details the expectations and realizations of all the empirical testing carried out, the second subsection discusses the implications of the research's findings on the corporate repurchase policymaking of British firms, the third subsection briefs the constraints of the research, and the fourth subsection discusses how future academics can extend the knowledge provided by this research.

5.1. Summary of Findings and Empirical Contributions

The synchrony of the three empirical essays provides a clear output of how the decision of a repurchase is influenced by macroeconomic and firm-level circumstances, along with the market's reception to repurchase announcements. In this subsection these findings are summarised not just in the order of their empirical undertaking on an essay-by-essay basis, rather in the order corresponding to the repurchase undertaking process. This translates to first looking at the investigations related to the undertaking of a repurchase, then looking at the investigations related to the influences on repurchase value/size, and then finally looking at the investigations related to the impact of the actual repurchase announcement.

For clarity, the expected influences from the testing and the realized influences are tabulated in Table 1. To ease readability a colour-coding scheme is employed in the column that lists the realized influences; when the realized influence corresponds to the expectation then the cell is highlighted in green, but when it contrasts the expectation the cell is highlighted in red. Further, the table is subcategorised into three panels. Panel I focuses on the initial decision-making process, thus including the tests related to the decision of whether a repurchase must be undertake, Panel II focuses on the further decision-making process, thus including the tests related to the decision regarding the value/size of the repurchase, and Panel III focuses on the final stage of announcing the repurchase once the decision-making stages investigated by the tests summarised in Panels I and II are realized, thus including the tests related to the investigating the impact of the repurchase announcement. Also, the discussions of the information presented in Table 1 will combine the five empirical contributions of this research, which were listed in the introductory chapter (Chapter 1).

Table 1: Summary of Research Findings

The following table presents an aggregate summary table of the research, which provides with the expected results and the realized results. Panel I focuses on the testing related to the initial decision-making process, thus including the tests related to the decision of whether a repurchase must be undertake, Panel II focuses on the testing of the further decision-making process, thus including the tests related to the decision regarding the value/size of the repurchase, and Panel II focuses on the testing of the final stage of announcing the repurchase, thus including the tests related to the investigating the impact of the repurchase announcement.

Panel I: Stage 1: Decision if a repurchase must be undertaken – The macroeconomy's influence

	Timeframe: Aggregate			
	All Repurchases		**Large Repurchases**	
	Expectation	**Realization**	**Expectation**	**Realization**
GDP	Pro-Cyclical	Counter-Cyclicity	Pro-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Static	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
	Timeframe: Expansion			
	All Repurchases		**Large Repurchases**	
	Expectation	**Realization**	**Expectation**	**Realization**
GDP	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
	Timeframe: Contraction			
	All Repurchases		**Large Repurchases**	
	Expectation	**Realization**	**Expectation**	**Realization**
GDP	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Short-Term Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Stock Market	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical
	Timeframe: Pre Structural Break			
	All Repurchases		**Large Repurchases**	
	Expectation	**Realization**	**Expectation**	**Realization**
GDP	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Static
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Default Risk	Pro-Cyclical	Static	Pro-Cyclical	Static
Short-Term Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Static
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical

	Timeframe: Post Structural Break			
	All Repurchases		Large Repurchases	
	Expectation	Realization	Expectation	Realization
GDP	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical

Panel II: Stage 2: Influences on the decision regarding repurchase value/size

Panel IIA: Macroeconomic influence

	Timeframe: Aggregate		Timeframe: Expansion	
	Expectation	Realization	Expectation	Realization
GDP	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
	Timeframe: Contraction		**Timeframe: Pre Structural Break**	
	Expectation	Realization	Expectation	Realization
GDP	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Static
Unemployment	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical
Term Structure	Pro-Cyclical	Static	Pro-Cyclical	Pro-Cyclical
Default Risk	Pro-Cyclical	Static	Pro-Cyclical	Static
Short-Term Risk	Pro-Cyclical	Counter-Cyclical	Pro-Cyclical	Pro-Cyclical
Stock Market	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical	Pro-Cyclical

	Timeframe: Post Structural Break	
	Expectation	Realization
GDP	Pro-Cyclical	Counter-Cyclical
Unemployment	Pro-Cyclical	Counter-Cyclical
Term Structure	Pro-Cyclical	Counter-Cyclical
Default Risk	Pro-Cyclical	Pro-Cyclical
Short-Term Risk	Pro-Cyclical	Static
Stock Market	Pro-Cyclical	Pro-Cyclical

Panel IIB: Firm-level and taxation influence		
	Expectation	**Realization**
Excess Cash	Positive Influence	Positive Influence
[Non-Linear]	Negative Influence	Insignificant Influence
Negative Earnings	Positive Influence	Positive Influence
Stock Valuation	Negative Influence	Negative Influence
[Non-Linear]	Positive Influence	Insignificant Influence
Firm Size	Negative Influence	Insignificant Influence
[Non-Linear]	Positive Influence	Insignificant Influence
Dividends	Negative Influence	Insignificant Influence
[Non-Linear]	Positive Influence	Positive Influence
Debt Exposure	Negative Influence	Negative Influence
[Non-Linear]	Positive Influence	Positive Influence
Independent Directors	Positive Influence	Positive Influence
[Non-Linear]	Negative Influence	Negative Influence
Profitability	Positive Influence	Insignificant Influence
[Non-Linear]	Negative Influence	Insignificant Influence
Taxation	Positive Influence	Insignificant Influence
[Non-Linear]	Negative Influence	Insignificant Influence

Panel III: Stage 3: Impact of the repurchase announcement		
Panel IIIA: Drivers of the market reaction		
	Expectation	**Realization**
Taxation	Negative Influence	Negative Influence
Debt Exposure	Negative Influence	Negative Influence
Independent Directors	Positive Influence	Insignificant Influence
Globalisation	Positive/Negative Influence	Negative Influence
Dividend History	Positive Influence	Positive Influence
Stock Valuation	Negative Influence	Positive Influence
Stock Performance	Negative Influence	Insignificant Influence
Negative Earnings	Negative Influence	Negative Influence
Firm's Operational Sector	Negative Influence	Positive Influence
Panel IIIB: The market reaction, as reflected by the unexpected stock price adjustment		
Unexpected short-term stock price adjustment		
	Non-Financial Firms	**Financial Firms**
Day -1	1.42%	Insignificant Adjustment
Day 0	1.03%	Insignificant Adjustment
Day 1	0.81%	Insignificant Adjustment
3day (-1, 0, 1) Cumulative	3.26%	Insignificant Adjustment
Pre-Announcement Average	1.52%	Insignificant Adjustment
Post-Announcement Average	1.11%	Insignificant Adjustment
Unexpected long-term stock price adjustment		
	Non-Financial Firms	**Financial Firms**
Year 1	-8.79%	Insignificant Adjustment
Year 2	-7.04%	Insignificant Adjustment
Year 3	-13.45%	Insignificant Adjustment

Looking at Panels I and II, it is initially established that the empirical contribution of being the first research that investigates the influence of the macroeconomy in the repurchase decision-making, has been a rewarding path. This undertaking was based on the presumption that the firm-level factors that influence the repurchase decision-making process, such as cash flow, dividend history and leverage (Ferris *et al*. 2006; Denis and Osobov, 2008; Lee *et al*. 2010; Lee and Suh, 2011; Cesari and Ozkan, 2015) are also influenced by the macroeconomy (Caglayan and Rashid, 2014; McMillan, 2014; Akhtar, 2017; Issah and Antwi, 2017), thus there is potential for the macroeconomy to have a direct impact on the repurchase decision-making process. This was further supported by the two studies Korajczyk and Levy (2003) and Dittmar and Dittmar (2008), which investigated the repurchase-macroeconomy relationship for the US, yet no past study had done so for the UK. The results of the research thus showed a substantial influence of the macroeconomy on the decision-making process, which was very diverse in its own right. Firstly, it is seen that the macroeconomic influence on the decision itself if a repurchase must be undertaken varied when the repurchase is of a large value. Secondly, it is then seen that the macroeconomic influence on the decision if a repurchase must be undertaken, and that on its value differed from each other, while thirdly, these two sets of influences further differed based upon the state of the economy, Expansion or Contraction. Finally, the repurchase-macroeconomy relationship did see a structural break in 1996:Q2, and after the break their relationship dynamic did show a significant shift.

This brings us to the second analytical aspect that despite repurchases showing that the influences of the six macroeconomic indicators (GDP, Unemployment, Term Structure, Default Risk, Short-Term Risk and Stock Market) show a strong consistency with the expectation of pro-cyclicity during each of the tested timelines (Aggregate, Expansion, Contraction, Pre Structural Break and Post Structural Break), a unique pattern is discerned. In totality of the testing of the macroeconomic influences, 90[34] influencing patterns were realized. Of these 90 patterns, pro-cyclicity was realized with 56 patterns, while 34 patterns remained inconsistent as their influences were either static or counter-cyclical. However, 9 of the 34 inconsistencies were from the Post Structural Break period, which is averagely 50% more than that seen with the rest of the timeframes. Hence, this research further establishes that not only is the macroeconomic influence on the repurchase decision-making process dependent on the value of the repurchase and economic environment, but also that with the progression of time the macroeconomic influence is drifting towards counter-cyclicity.

[34] 10 models for the testing of the influence on repurchase undertaking, 5 models for the testing of the influence on repurchase value, totalling to 15 models, and each had 6 macroeconomic indicators as independent variables.

Assessing the firm-level influences on repurchase size, there were two sets of empirical contributions. The first was that the length of the tested timeline was the longest seen within current literature, which was considered important due to the time period factoring in the maximum possible internal and external influences that may affect the repurchase policy, such as alterations in the corporate objectives, shareholder requirements, regulatory directives and business cycle circumstances. This contribution proved beneficial, as the leading motives stated by British managers for undertaking repurchases in the period 2003-2007 (Dhanani, 2016) were also the leading determinants of repurchase size for the period 1985-2014; signalling stock undervaluation, adjusting the reported EPS and signalling stock undervaluation. Thus, the research contributes to literature that the corporate repurchase policy is not only stable over the past three decades, but there is also a synchrony between the factors that motivate repurchase undertaking and their respective influences on the size of the repurchase. Further, it also concluded that profitability fails to influence the size of repurchases, thus further strengthening the influences of the motivational hypotheses, as they compel the repurchase undertaking and hence are significant in the determination of repurchase size. Also, tax efficiency of repurchases or information asymmetry between the firm and the market do not influence the size of repurchases, either linearly or non-linearly.

The second empirical contribution within this area was the first ever study to check if the determinants of repurchase size had a non-linear influence. This aspect was tested due to the overlapping of repurchase determinants, for instance, if distributing excess cash is the reason for undertaking repurchases and not replacing dividends, then the influence of dividend distribution may differ from that expected if repurchases were used as their replacements. This approach of testing too has revealed significantly important insights. It is seen that the influence of the firm's debt exposure is U shaped while that of independent directors is inverted-U shaped. Thus, the realizations indicate that in the case of leverage, the first order of influence is negative, which is compatible with the traditionally accepted repurchase-leverage association in the UK (Lee and Suh, 2011; Cesari and Ozkan, 2015), however there may be instances when debt exposure has a positive impact on repurchase size. While with the case of independent directors, their first order of influence is positive, which is consistent with the principal-agent conflicts attached with repurchases that can be mitigated by repurchases (Jensen and Meckling, 1976; Easterbrook, 1984; Jensen, 1986), thus getting independent directors' favouritism as well. However, a negative influence is also possible as repurchases have shown a complementary existence with dividends and not their substitutes (Ferris *et al.* 2006; Denis and Osobov, 2008), thus causing additional pressure on financial

resources, which may harm the independent directors' view towards the payout. Upon looking at these two sets of influences, it is substantiated with certainty that due to the multiple dynamics and determinants that are simultaneously working at any given moment, their influencing patterns over extended time periods may see a confliction with their expectations. This is an important contribution that will strengthen the analytical tools provided by future researches not just on the UK's repurchases, but also on those of other countries.

Finally, the investigation of the impact of the repurchase announcement was envisioned to make three empirical contributions to existing literature; the expected and realizes results are summarised in Panel III. The first contribution was that the testing focused on a sample that was the lengthiest compared to the currently available like-for-like UK studies, similar to that seen with the investigation of firm-level determinants of repurchase size. This contribution is beneficial in combination with the second empirical contribution of undertaking independent investigations of non-financial and financial firms, as the market reaction analysis revealed strong insights, as the short-term and long-term reaction analyses, which is quantified as the unexpected stock price adjustment, indicated a distinct repurchase receptiveness.

Firstly, the stock of financial firms remained completely unaffected in the short-term and long-term due to a repurchase announcement. Thus, providing with a sample-specific clarity for future investigations. In the case of non-financial firms, it is certain that the market's short-term reaction remains undoubtedly positive, however given that their long-term reaction is negative we now know that the short-term unexpected positive price adjustment is intended for adjusting the key financials to reflect the oncoming stock volume reduction, and not due to a very high preference for repurchases. This apprehension of the market is consistent with the fact that even different types of insider owners least prefer repurchase undertaking (Renneboog and Trojanowski, 2011). Thus, the contribution indicates that in terms of the repurchase preference as a corporate payout in the UK, there is a consensus amongst closely-held owners and the wider market that the payout should be least preferred. This finding is also consistent with the fact that distributing excess cash is the main reason why British managers undertake repurchases (Dhanani, 2016), as this method is least controversial due to factors such as the lack of burden on any cashflow, the preservation of the dividend payout and ensuring that the capital structure also remains intact.

The third empirical contribution of the research was the undertaking if the rising economic globalisation, which has seen peak levels of foreign cash being flooded into the UK market (Department for International Trade, 2016; ONS, 2017), impacts the market view of repurchases. The results have backed the empirical undertaking, as consistently the level of globalisation has negatively influenced the market's repurchase receptiveness. Further, this too gains additional importance upon being viewed in conjunction with the empirical contribution of having the lengthiest tested sample. This sheds light on the fact that since the market already is not keen on repurchases in the long-term, combined with the year-on-year rising FDI levels, the market's repurchase affinity may continue to see a dip.

There was another set of important finding that was not envisioned prior to the undertaking of the investigation; however, it was realized post the testing. The methodological approach assumed that since the regulations require shareholder approval for a repurchase, and a two-week notice must be given to shareholders for gathering to cast their votes (Dhanani and Roberts, 2009), the market will expectedly begin to react to the possibility of a repurchase as this notification is publicly disseminated. This assumption was reflected by the results, as the pre-announcement average daily abnormal return was 33% more than the post-announcement average daily abnormal return. However, given the fact that the difference of market reaction before and after the announcement was substantial, it highlighted a market trait of assuming that if a repurchase vote is called then there is a strong likelihood of getting an approval. This is supported by the fact that the investigation of the firm-level determinants of repurchase size showed consistency with the motives stated by British managers (as discussed above). The stability in repurchase policy is also a reflection of a stable relationship between managers and shareholders, thus supporting the high probability of getting shareholder approval.

It can thus be concluded that the five empirical contributions that were an essential part of the research's undertaking, proved to not only be the right direction of investigation, but provided with insights that are valuable in maintaining the viability and efficiency of repurchases. Given that these contributions are spread throughout the different stages of repurchase decision-making process and also after the repurchase is announced, the importance of the research becomes more diverse. Further, these contributions cover the internal firm-level and external macroeconomic circumstances, which are reflected by independent testing for various economic periods, and also differentiate between the firm's operational sector, thus the level of information provided is widespread. Finally, the findings of each of the main research objective was verified by two robustness tests, thus their reliability is undoubted.

This is highly important as given the diversity and widespread nature of the findings, a high level of reliability increases the influence of this research, especially regarding the implications on corporate repurchase policymaking and the ability to catalyse future academics to undertake relevant research ventures.

5.2. Implications on Corporate Policymaking and Future of Repurchases

Initially, British firms are advised to remain cautious of the unexpected negative impact repurchase announcements are having on the stock price in the long-term, thus not being blinded by the positive short-term unexpected gains. If this trend is not broken then not only may a repurchase loose its credibility as a corporate payout, but their announcements will attract short selling, which could then eat into the unexpected short-term gains. Thus to control for this impact managers could benefit from the pattern seen in the US (Yook, 2010), where frequent repurchasing firms witness reduced unexpected positive long-term stock performance. In the UK managers can instead of getting a single shareholder authorisation for 10%-11% of outstanding market capitalisation, as seen consistently in the research, they can undertake multiple share repurchases by getting periodic approvals of less than 5%. Thus, increasing repurchase frequency while holding their size/value consistent may dampen the long-term unexpected negative stock performance, and such a success will help increase the overall repurchase popularity. Further, the managers should continue to keep repurchases independent of dividends, as highlighted by extant literature, since the research finds that stronger dividend distribution history increases the positivity of the market reaction to repurchase announcements, and dividend distribution also positively influences repurchase size. This will be of particular help in the preservation of the increased counter-cyclicity of repurchases since 1996, as concluded by this research. This is important as repurchases can provide capital security to shareholders during macro distress, while also mitigating any stock price fall. Further, the repurchase will also signal the firm's confidence in its recovery, which is crucial with large blockholders who may choose to liquidate their holding for a cash in-stream, however if they are given confidence about the financial recovery then they may choose to continue maintaining their investment.

Given that the discussions revealed that repurchases have been slowly incrementing over the last 15years, and have recently recovered from their downfall during the great recession that started in 2008, along with the research's findings that the market's short-term reception is positive to repurchases, if firms control for the above mentioned policy implications then the future of repurchases is positive. The most important controlling aspect is the unexpected

long-term negative impact of repurchases. Further, since the UK government is committed to reducing corporate taxation to make the country highly competitive, the country may see corporate cash-savings being diverted towards repurchases, which is similar to the effect caused by the US government's tax reform witnessed in 2017/2018.

5.3. Research Limitations

The primary constraint of the thesis is that its testing is solely UK focused, and does not take into consideration a comparative testing for other markets. However, given the nature of the research scholarship the limitation was expected. A retrospective view of the three essays also reveals marginal overall constraints. The research is more focused on the decision-making process of repurchases from a firm-level and macroeconomic perspective, with a repurchase announcement's impact only being limited to stock performance. There is an absence of an empirical perspective on a repurchase's impact on the firm's operating performance, and the role of reauthorisations. Further, the research does not directly verify the influence of the realized firm-level determinants of repurchase size on the market's reaction to repurchase announcements. This constraint was recognized at an advanced stage, while the differences in sampling techniques curbed alterations. Finally, the research does not test for circumstances that cause the non-linearity in the influences of the determinants of repurchase size.

5.4. Future Research Prospects

The research covers an expansive ground, however, there are future avenues that will help in further contributing to extant knowledge. The areas worth looking at include investigating a repurchase's relationship with stock liquidity around the announcement, and how that contributes to the abnormality in stock performance. It is also beneficial to look at the repurchase's influence on operating performance, as it will contribute in determining the long-term viability of repurchases. The influence of economic globalisation on repurchases compels the testing if individual firm-level internationalisation influences repurchase decision-making. This will entail building reliable and robust proxy(s), which can also help further test if internationalisation also influences dividend distribution. Finally, the third empirical essay is to the best of knowledge the first direct attempt at investigating the macroeconomic influences on repurchase decision-making, which can be further horizontally explored. This refers to checking if the macroeconomic contagions between financially integrated countries influences repurchase decision-making, which complements the aforementioned proposed investigation regarding the influence of individual firm-level internationalisation on various aspects of corporate payout policies.

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APPENDIX

CHAPTER 1. INTRODUCTION

Assessing the Impact of Repurchase Announcements: A Global Outlook

For a broader understanding of the market reaction to repurchase announcements, a comparative discussion of the UK is presented against the US, Germany and France. The stock markets of these four countries are cointegrated (Berger and Pozzi, 2013), and they represent around 57% of the world's financial securities (Roxburgh *et al.* 2011). For the UK, Rees (1996) undertook the first-ever study and tested the years 1981-1990. It revealed an 11day (-5, 0, 5) Cumulative Abnormal Return (CAR) of 1.14% and a Buy and Hold Abnormal Return (BHAR) of -7%. Oswald and Young (2004) tested the years 1995-2000, and found an 11day CAR of 1.95% and a BHAR of 7%. Thus, the short-term reaction remained positive and is prominent over 11days, while the difference in the long-term reaction indicates improved market reception. Post-2000 the short-term reaction has strengthened, with the 3day (-1, 0, 1) CAR ranging between 2% and 2.50% (Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015). Regarding the determinants of the market's reaction to a repurchase announcement, stock's growth prospects has a positive influence (Lee *et al.* 2010), while asymmetric information and a robust regulatory environment too have positive influences, but past stock returns has a negative influence (Andriosopoulos and Lasfer, 2015).

The market reaction in the US is generally positive, as the 3day CAR revolves between 1.50% and 2.50% (Peyer and Vermaelen, 2005; Chang *et al.* 2009), and even for financially constrained firms the value is positive (0.75%) (Chen and Wang, 2012). The long-term reaction remains a stable 4% (Yook, 2010), but this value increases (decreases) to 5% (2.50%) for infrequent (frequent) repurchasing firms. The reaction magnitude increases for firms with a good repurchase-record and strong cash reserves (Chang *et al.* 2009). In Europe, Germany sees a 3day CAR ranging from 3.50% to 6% (Seifert and Stehle, 2003; Lee *et al.* 2010; Andres *et al.* 2016). Improving growth prospects have a negative influence (Lee *et al.* 2010), while firm size has a negative (Seifert and Stehle, 2003) to positive influence (Hackethal and Zdantchouk, 2006). Also, past stock returns (Andres *et al.* 2016) and stock overvaluation (Hackethal and Zdantchouk, 2006) have a negative impact. In France the 3day CAR ranges from insignificant to 0.75% (Ginglinger and L'Her, 2006; Lee *et al.* 2010; Andriosopoulos and Lasfer, 2015). The influences of stock's growth prospects and information asymmetry are similar to that seen in Germany (Lee *et al.* 2010), while the protection of minority shareholders has shown a positive influence (Ginglinger and L'Her, 2006).

CHAPTER 2. FIRST EMPIRICAL ESSAY

Comparison of UK's Governance Framework

The board structure in the UK follows a single-tier system, while the German and French system gives firms the option to either implement a single-tier or implement a dual-tier system, which as the name suggest consists of two administrative layers, the management and supervisory layers. The management layer composes of executive directors and primarily oversees the daily workings of the firm. On the other hand, the supervisory layer consists of independent directors, shareholder electives and employee representatives, and they collectively monitor the management layer and also oversee the firm's long-term decisions. With regards to board composition, the UK mandates at least 50% independent directors for large firms with no gender quotas. France too mandates that large firms must have at least 50% independent directors or 33% if the firm has controlling shareholders, however there is a 40% female board quota. Germany mandates a 30% quota for males and females, each, while for board independence the supervisory board has the power to choose the appropriate composition, with restrictions on offering positions to members of the management board.

Table A.1: Robustness Check: Summary Statistics of Leamer Regression t-statistics

The table presents the summary statistics of the t-statistics produced from the robustness testing of applying Leamer (1985)'s four sensitivity criterions of sequentially dropping each firm, year, type of firm (non-financial or financial institution) and control variable, to Equation 1, which results in 95 looped regressions: $\text{CAR 3day}_i = \beta_1 \text{Tax Differential}_{y-1} + \beta_2 \text{Leverage Ratio}_{i,y-1} + \beta_3 \text{Board}_{i,y-1} + \beta_4 \text{Globalisation}_{y-1} + \sum_{k=5}^{K} \beta_k Y_{k,i,y-1} + \varepsilon_{i,y} + \alpha$. Where, CAR 3day_i is the 3day (-1, 0, 1) CAR of the ith firm, Tax Differential (effective higher dividend tax rate relative to higher capital gains tax rate), Leverage Ratio (total debt relative to shareholder equity), Board (number of independent directors relative to the total board size) and Globalisation (the value of the KOF Swiss Economic Institute's Index of UK's Economic Globalisation) are yearly lagged hypotheses proxies. $Y_{k,i,y-1}$ is the matrix of K firm-specific variables (yearly lagged); Dividend (binary, '1' if ordinary dividend payout relative to net income is above the average 4year level around the announcement (+/- 2years)), M/B Ratio (market value relative to book value), Stock Performance (average 6month pre-announcement stock return excess over the average 12month pre-announcement return), Net Loss (binary, '1' if net profit is negative) and Firm Type (binary, '1' if the firm is a financial institutional). $\varepsilon_{i,y}$ is the vector of error terms and α is the alpha.

	Obs.	Mean	Std. Dev.	Min	Max	Positive t-stat (%)	Negative t-stat (%)
Tax Differential	95	-1.451	0.166	-2.18	-0.72	0 (0)	95 (100)
Leverage Ratio	95	-1.906	0.147	-2.46	-1.27	0 (0)	95 (100)
Board	95	1.242	0.178	0.68	2.36	95 (100)	0 (0)
Globalisation	95	-2.826	0.113	-3.27	-2.44	0 (0)	95 (100)

The graphs (Figures A.1 through A.4) present the t-statistics that are summarised in Table A.1.

Figure A.1: Tax Differential t-statistics

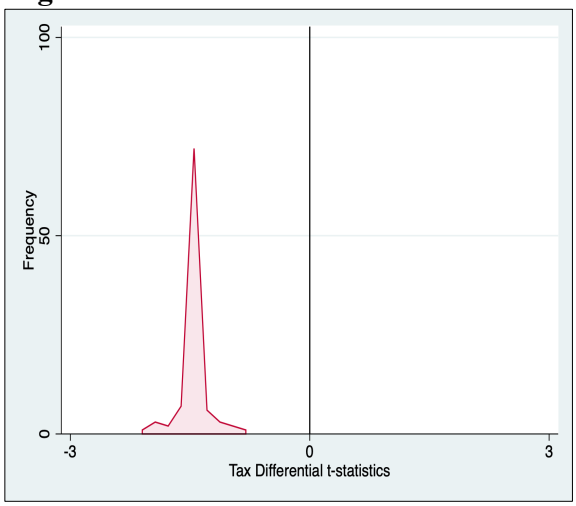


Figure A.2: Leverage Ratio t-statistics

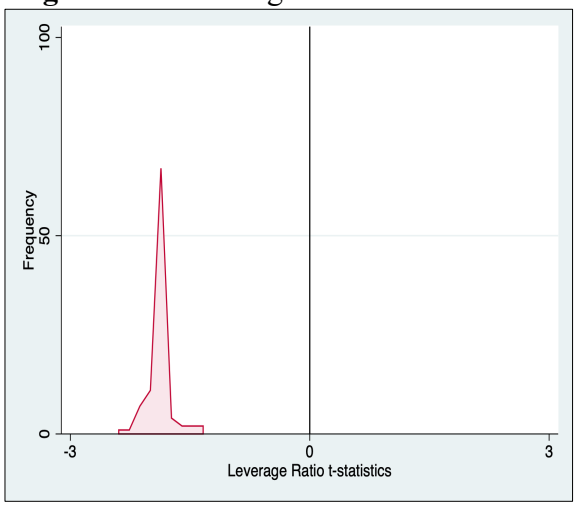


Figure A.3: Board t-statistics

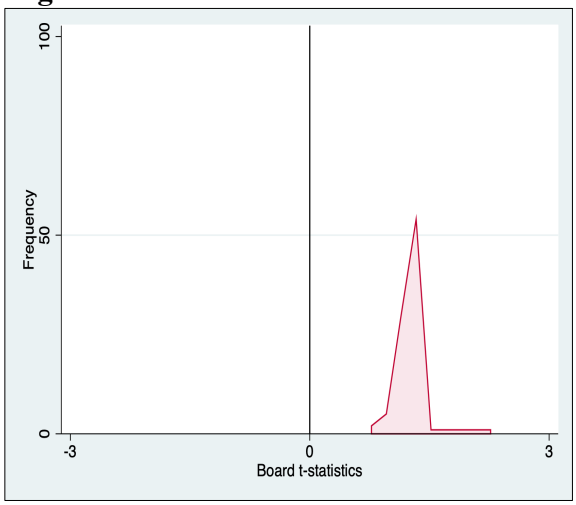


Figure A.4: Globalisation t-statistics

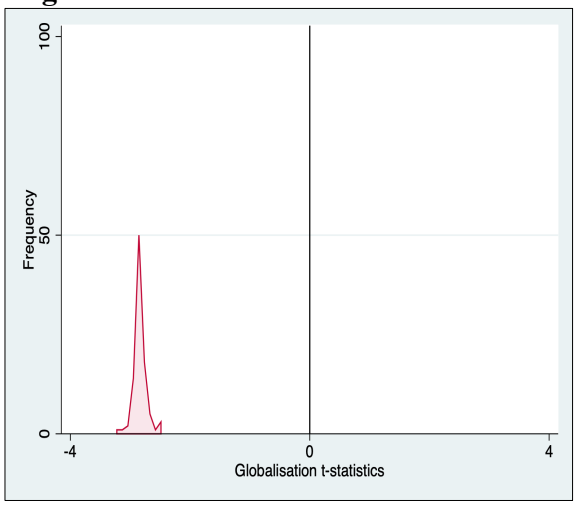


Table A.2: Robustness Check: Summary Statistics of Leamer Regression t-statistics

The table presents the summary statistics of the t-statistics produced from the robustness testing of applying Leamer (1985)'s four sensitivity criterions of sequentially dropping each firm, year, type of firm (non-financial or financial institution) and control variable, to Equation 1, which results in 414 looped regressions: $REP_{i,y} = \Sigma_{j=15}^{J}\beta_j \text{Primary Influencers}_{j,i,y-1} + \Sigma_{l=4}^{L}\beta_l \text{Profitability}_{l,i,y-1} + \Sigma_{k=4}^{K}\beta_k \text{Macrofinancial}_{k,y} + \varepsilon_{i,y}$. Where, $REP_{i,y}$ is the ratio of the repurchase announcement value to the market capitalisation of ith firm in year y = 1985, 1986…2014. $\text{Primary Influencers}_{j,i,y-1}$ is the matrix of J yearly-lagged primary proxies; Cash (pre-tax income and depreciation relative to total assets), $Cash^2$ (Cash to the power of 2), EPS (binary, '1' if EPS is negative), M/B Ratio (firm's market value relative to the book value), M/B $Ratio^2$ (M/B Ratio to the power of 2), Size (natural logarithm of the total book value of assets), $Size^2$ (Size to the power of 2), Dividend (ordinary dividend payout relative to the net income), $Dividend^2$ (Dividend to the power of 2), Debt Ratio (total debt value relative to total asset value), Debt $Ratio^2$ (Debt Ratio to the power of 2), Taxation (effective (higher) dividend tax rate relative to capital gains tax), $Taxation^2$ (Taxation to the power of 2), Board (independent directors relative to the board size) and $Board^2$ (Board to the power of 2). $\text{Profitability}_{l,i,y-1}$ is the matrix of L firm-specific yearly-lagged profitability ratios; ROA (natural logarithm of net profit relative to total asset value), ROA^2 (ROA to the power of 2), Net Profit (natural logarithm of the net profit scaled by 1000) and Net $Profit^2$ (Net Profit to the power of 2). $\text{Macrofinancial}_{k,y}$ is the matrix of K macrofinancial indicators; Expansion (binary, '1' if a repurchase occurs during expansion), Recession (binary, '1' if a repurchase occurs during recession), Market Risk (3month LIBOR excess of 3month T-Bill (quarterly)) and Stock Market (quarterly performance of the FTSE 100 index). $\varepsilon_{i,y}$ is the vector of error terms.

	Obs.	Mean	Std. Dev.	Min	Max	Positive Coef. (%)	Negative Coef. (%)
Cash	414	1.648	0.112	0.33	2.33	414 (100)	0 (0)
EPS	414	0.825	0.127	-0.21	2.12	413 (99.75)	1 (0.25)
M/B Ratio	414	-3.704	0.302	-4.21	0.60	1 (0.25)	413 (99.75)
M/B Ratio^2	414	-2.959	0.275	-3.62	0.64	1 (0.25)	413 (99.75)
Dividend^2	414	2.447	0.102	0.75	2.75	414 (100)	0 (0)
Debt Ratio	414	-2.174	0.158	-2.95	-0.03	0 (0)	414 (100)
Debt Ratio^2	414	2.331	0.148	0.84	2.97	414 (100)	0 (0)
Board	414	2.999	0.194	0.42	3.99	414 (100)	0 (0)
Board^2	414	-2.979	0.202	-3.98	-0.25	0 (0)	414 (100)
Expansion	414	-1.800	0.086	-2.21	-1.17	0 (0)	414 (100)

The graphs (Figures A.5 through A.10) present 6 of the10 t-statistics that are summarised in Table A.2.

Figure A.5: Cash t-statistics

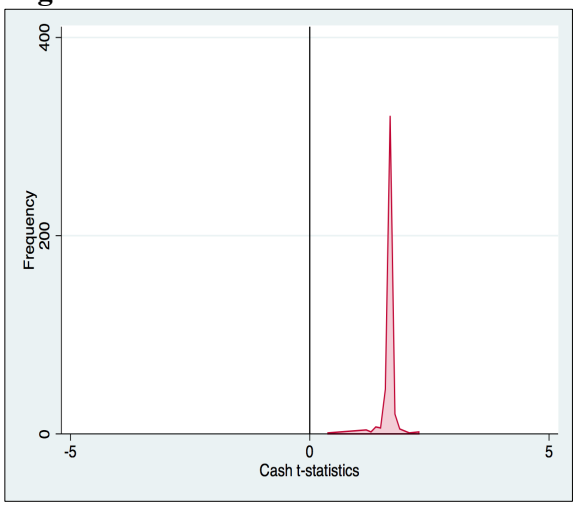


Figure A.6: EPS t-statistics

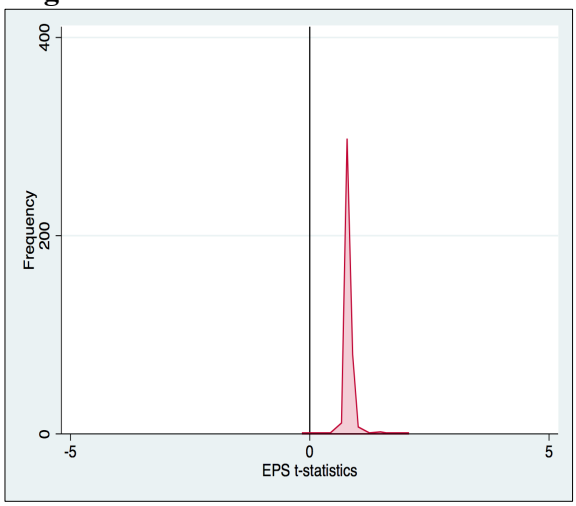


Figure A.7: M/B Ratio t-statistics

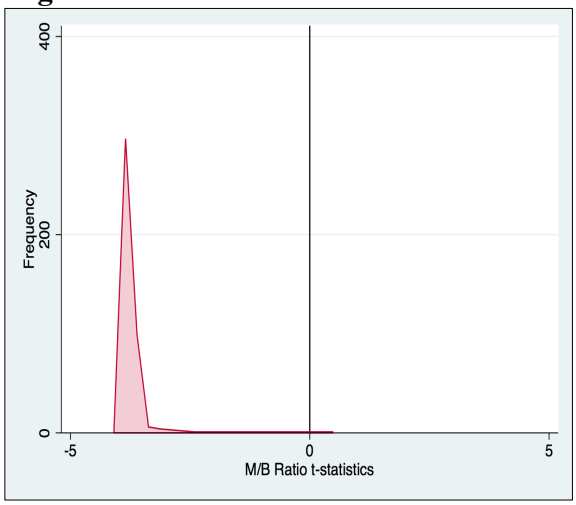


Figure A.8: M/B Ratio^2 t-statistics

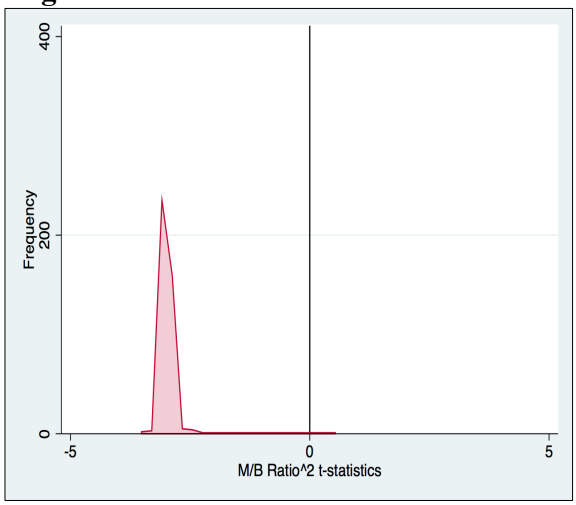


Figure A.9: Dividend^2 t-statistics

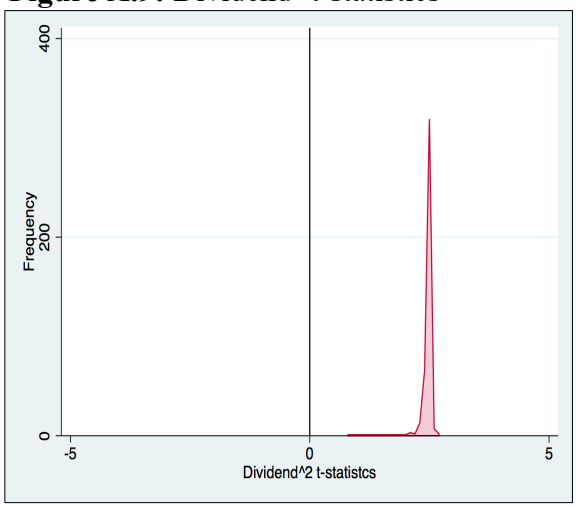
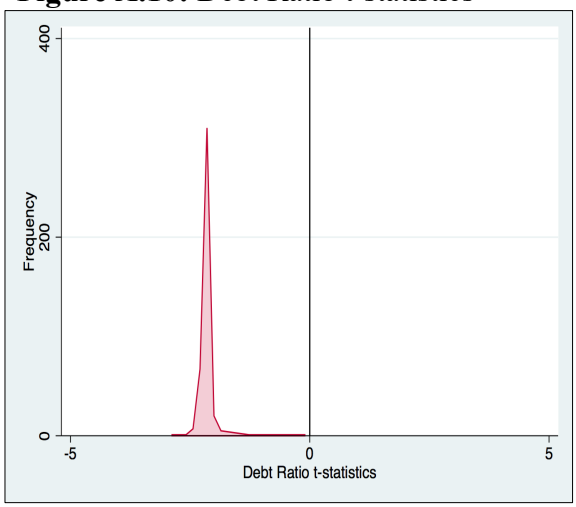


Figure A.10: Debt Ratio t-statistics



The graphs (Figures A.11 through A.14) present the remaining 4 of the 10 t-statistics that are summarised in Table A.2.

Figure A.11: Debt Ratio^2 t-statistics

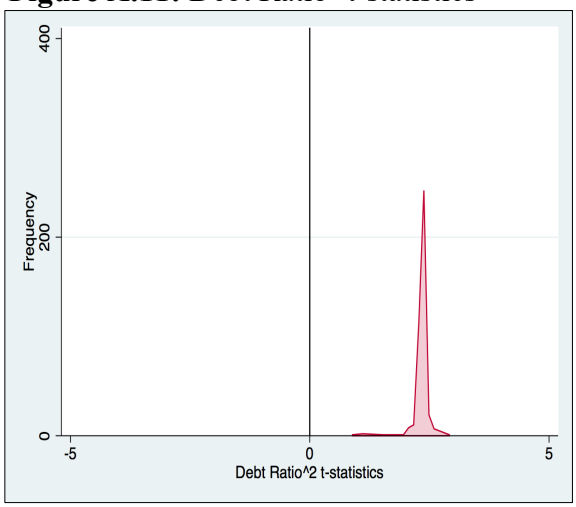


Figure A.12: Board t-statistics

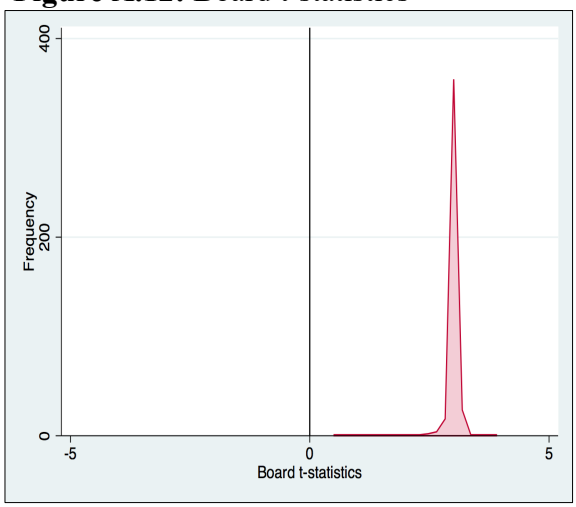


Figure A.13: Board^2 t-statistics

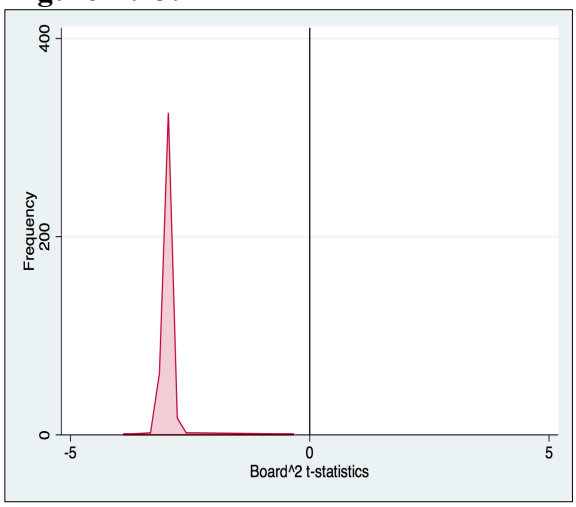


Figure A.14: Expansion t-statistics

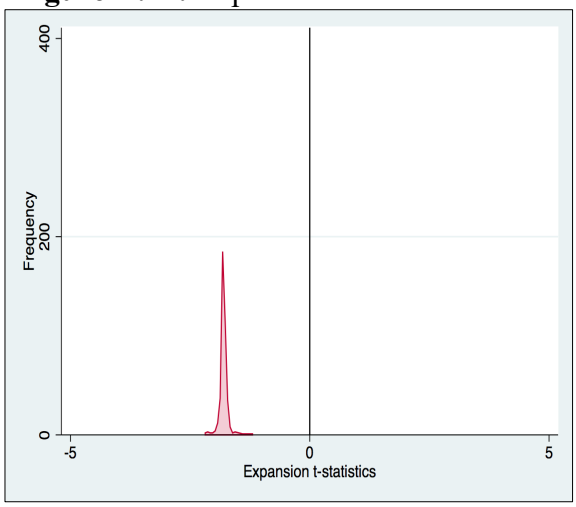


Table A.3: Lag Selection

The table presents the results from the information criterion testing, which were undertaken to facilitate the lag selection for the empirical and robustness testing. These include; AIC = Akaike's Information Criterion, HQIC = Hannan and Quinn Information Criterion and SBIC = Schwarz's Bayesian Information Criterion.

Lags	AIC	HQIC	SBIC	Lags	AIC	HQIC	SBIC
Structural Break Test				Probit: Aggregate, All			
0	-0.085	0.0008	0.127	0	-20.659	-20.573	-20.445
1	-79.858*	-78.991*	-77.722*	1	-99.660*	-98.792*	-97.523*
2	-75.347	-73.786	-71.502	2	-98.533	-96.972	-94.688
3	-75.338	-73.083	-69.784	3	-96.591	-94.336	-91.036
Probit: Aggregate, Large				Probit: Expansion, All			
0	-20.514	-20.427	-20.300	0	-26.944	-26.369	-26.174
1	-99.922*	-99.055*	-97.786*	1	-101.443*	-100.198*	-98.246*
2	-97.263	-95.702	-93.418	2	-100.037	-97.795	-94.282
3	-97.561	-95.306	-92.006	3	-99.746	-96.508	-91.433
Probit: Expansion, Large				Probit: Contraction, All			
0	-26.245	-26.121	-25.928	0	-24.865	-24.738	-24.536
1	-102.019*	-100.782*	-98.849*	1	-99.436*	-98.166*	-96.151*
2	-100.750	-98.523	-95.046	2	-98.945	-96.659	-93.032
3	-98.256	-95.040	-90.016	3	-99.434	-96.132	-90.894
Probit: Contraction, Large				Probit: Pre Break, All			
0	-24.115	-23.988	-23.786	0	-30.126	-29.989	-29.750
1	-97.629*	-96.358*	-94.344*	1	-105.816*	-104.446*	-102.054*
2	-96.785	-94.498	-90.872	2	-104.124	-101.659	-97.353
3	-97.578	-94.275	-89.037	3	-104.205	-100.644	-94.425
Probit: Pre Break, Large				Probit: Post Break, All			
0	-27.616	-27.480	-27.244	0	-28.601	-28.464	-28.225
1	-103.749*	-102.384*	-100.025*	1	-102.943	-101.573*	-99.181*
2	-101.567	-99.109	-94.864	2	-102.778	-100.313	-96.007
3	-100.621	-97.072	-90.939	3	-104.542*	-100.981	-94.762
Probit: Post Break, Large				Probit: Macro = Expansion, Rep = Contraction, All			
0	-24.767	-24.652	-24.478	0	-26.228	-26.100	-25.897
1	-101.776	-100.627*	-98.884*	1	-101.819*	-100.540*	-98.503*
2	-102.339*	-100.272	-97.135	2	-100.480	-98.178	-94.513
3	-101.364	-98.378	-93.847	3	-97.851	-94.527	-89.232
Probit: Macro = Expansion Rep = Contraction, Large				Probit: Macro = Contraction Rep = Expansion, All			
0	-26.447	-26.320	-26.119	0	-25.377	-25.249	-25.045
1	-100.286*	-99.015*	-97.000*	1	-100.953*	-99.674*	-97.637*
2	-97.605	-95.319	-91.693	2	-99.259	-96.958	-93.292
3	-97.016	-93.714	-88.476	3	-99.347	-96.023	-90.728
Probit: Macro = Contraction Rep = Expansion, Large				Probit: Macro = Pre Break Rep = Post Break, All			
0	-24.230	-24.103	-23.902	0	-27.371	-27.234	-26.995
1	-98.966*	-97.696*	-95.681*	1	-103.030	-101.661*	-99.268*
2	-97.766	-95.479	-91.853	2	-101.971	-99.506	-95.200
3	-98.080	-94.778	-89.540	3	-103.152*	-99.590	-93.371

Probit: Macro = Pre Break Rep = Post Break, Large				Probit: Macro = Post Break Rep = Pre Break, All			
0	-28.269	-28.132	-27.896	0	-34.397	-34.260	-34.025
1	-105.118*	-103.753*	-101.395*	1	-110.305*	-108.940*	-106.581*
2	-102.255	-99.798	-95.552	2	-108.794	-106.337	-102.092
3	-101.64	-98.091	-91.958	3	-107.116	-103.567	-97.434
Probit: Macro = Post Break, Rep = Pre Break, Large				Fractional Regression Probit: Aggregate			
0	-33.834	-33.697	-33.461	0	-22.297	-22.210	-22.083
1	-109.474*	-108.109*	-105.751*	1	-101.860*	-100.993*	-99.723*
2	-107.860	-105.403	-101.158	2	-99.252	-97.691	-95.406
3	-108.828	-105.280	-99.147	3	-99.577	-97.322	-94.022
Fractional Regression Probit: Expansion				Fractional Regression Probit: Contraction			
0	-40.564	-40.467	-40.316	0	-25.948	-25.821	-25.619
1	-46.711	-45.936*	-44.722*	1	-100.644*	-99.374*	-97.359*
2	-46.895*	-45.442	-43.165	2	-98.889	-96.603	-92.977
3	-46.822	-44.691	-41.351	3	-98.978	-95.672	-90.434
Fractional Regression Probit: Pre Break				Fractional Regression Probit: Post Break			
0	-24.282	-24.167	-23.993	0	-26.893	-26.779	-26.604
1	-102.720*	-101.572*	-99.829*	1	-104.849*	-103.700*	-101.958*
2	-99.771	-97.704	-94.567	2	-104.12	-102.053	-98.916
3	-100.675	-97.689	-93.159	3	-103.168	-100.182	-95.651
Fractional Regression Probit: Macro = Expansion Break, Rep = Contraction				Fractional Regression Probit: Macro = Contraction Break, Rep = Expansion			
0	-29.638	-29.511	-29.309	0	-25.677	-25.550	-25.348
1	-103.311*	-102.041*	-100.027*	1	-100.249*	-98.978*	-96.964*
2	-101.212	-98.925	-95.299	2	-98.664	-96.378	-92.752
3	-100.625	-97.322	-92.084	3	-99.023	-95.720	-90.482
Fractional Regression Probit: Macro = Pre Break, Rep = Post Break				Fractional Regression Probit: Macro = Post Break, Rep = Pre Break			
0	-29.726	-28.589	-29.353	0	-41.153	-41.032	-40.822
1	-106.491*	-105.127*	-102.768*	1	-117.196*	-116.104*	-114.217*
2	-103.028	-100.572	-96.325	2	-115.633	-113.692	-110.337
3	-102.455	-98.906	-92.774	3	-115.552	-112.761	107.939

Table A.4: Macroeconomic Correlation

The table presents the complete pair-wise time-specific Pearson correlation matrix between the macroeconomic circumstances of the four sub-time periods, i.e. Expansion, Contraction, Pre Break and Post Break, which results in six pairs that are subcategorised as follows: Panel I = Expansion and Contraction, Panel II = Expansion and Pre Break, Panel III = Expansion and Post Break, Panel IV = Contraction and Pre Break, Panel V = Contraction and Post Break, and Panel VI = Pre Break and Post Break.

Panel I: Expansion-Contraction						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.474	0.243	-0.212	-0.425	0.153	0.133
Unemployment	0.018	0.252	0.027	0.424	0.109	-0.039
Term Structure	0.006	-0.275	0.314	0.259	-0.215	-0.016
Default Risk	-0.025	-0.137	0.062	0.045	0.077	-0.068
Short-Term Risk	-0.096	0.019	0.060	0.492	0.002	0.005
Stock Market	-0.048	-0.036	-0.260	-0.003	-0.110	0.313
Average	0.055	0.011	-0.002	0.132	0.003	0.055
Average of All	0.042					
Panel II: Expansion-Pre Break						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.580	0.204	0.034	0.155	0.013	-0.021
Unemployment	0.225	0.213	-0.583	0.203	0.201	0.098
Term Structure	-0.387	-0.648	-0.571	-0.553	0.133	-0.052
Default Risk	0.152	0.044	0.460	0.294	-0.451	-0.084
Short-Term Risk	0.358	0.184	-0.168	0.443	0.168	0.059
Stock Market	0.048	0.188	0.004	-0.046	0.134	0.654
Average	0.163	0.031	-0.137	0.083	0.033	0.109
Average of All	0.047					
Panel III: Expansion-Post Break						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.094	0.026	-0.226	-0.155	-0.196	0.198
Unemployment	0.146	0.193	-0.215	-0.162	0.106	0.036
Term Structure	-0.282	-0.036	0.193	0.407	0.135	-0.311
Default Risk	-0.422	0.405	0.388	0.131	0.286	0.019
Short-Term Risk	-0.093	0.109	-0.159	-0.009	0.245	0.009
Stock Market	0.130	-0.022	-0.052	-0.185	0.027	0.090
Average	-0.071	0.113	-0.012	0.004	0.101	0.007
Average of All	0.023					
Panel IV: Contraction-Pre Break						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.275	0.121	-0.010	0.101	0.374	0.006
Unemployment	0.374	0.630	0.051	0.447	0.073	0.096
Term Structure	-0.241	-0.547	-0.278	-0.131	0.316	-0.071
Default Risk	-0.024	-0.576	-0.170	0.060	0.029	-0.203
Short-Term Risk	0.351	0.479	0.202	0.247	-0.309	0.197
Stock Market	-0.059	0.414	0.192	0.163	0.174	0.177
Average	0.113	0.087	-0.002	0.148	0.110	0.034
Average of All	0.081					

Panel V: Contraction-Post Break						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.244	-0.278	-0.343	-0.213	-0.311	-0.127
Unemployment	-0.415	0.612	0.234	-0.223	0.500	-0.061
Term Structure	-0.084	0.173	0.615	0.361	-0.225	-0.070
Default Risk	0.154	0.091	0.394	0.397	-0.300	0.147
Short-Term Risk	-0.265	0.566	0.318	-0.036	0.346	0.232
Stock Market	0.152	0.020	0.010	-0.296	-0.016	0.050
Average	-0.036	0.197	0.205	-0.002	-0.001	0.029
Average of All	0.065					

Panel VI: Pre Break-Post Break						
	GDP	**Unemployment**	**Term Structure**	**Default Risk**	**Short-Term Risk**	**Stock Market**
GDP	0.037	0.039	-0.041	0.236	-0.236	0.151
Unemployment	0.417	0.572	-0.032	0.489	0.101	0.069
Term Structure	-0.244	0.093	-0.111	0.003	0.532	-0.138
Default Risk	-0.150	-0.777	-0.363	-0.220	-0.237	-0.233
Short-Term Risk	0.397	0.308	-0.119	0.429	-0.213	0.134
Stock Market	0.183	0.402	0.354	0.277	-0.310	-0.058
Average	0.107	0.106	-0.052	0.202	-0.061	-0.013
Average of All	0.048					

Table A.5: Robustness Check: Variable-Level Influence on Payout-Probability

The table presents the results from the robustness testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break). This essentially means taking Equations 3 and 4 and within them swapping the independent variables accordingly; (i) Equation 3: $\Pr(\text{Announcement}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k \text{Macroeconomy}_{k,t-p}\right)$, and (ii) Equation 4: $\Pr(\text{Announcement(large)}_t = 1) = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k \text{Macroeconomy}_{k,t-p}\right)$, where, $\Pr(\text{Announcement}_t = 1)$ is binary and takes the value '1' if a repurchase is announced and $\Pr(\text{Announcement(large)}_t = 1)$ is binary and takes the value '1' if a large sized repurchase is announced, during t = Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4), $\text{Macroeconomy}_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). $\emptyset_t$ is the standard cumulative normal. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parentheses.

Panel I: Coefficients

	Macroeconomy: Expansion Repurchases: Contraction		**Macroeconomy: Contraction Repurchases: Expansion**	
	All	**Large**	**All**	**Large**
GDP	-22.649	17.607	-33.265	-51.292
	(-0.63)	*(0.41)*	*(-0.83)*	*(-0.83)*
Unemployment	16.791	8.377	-29.417	-162.166***
	(1.15)	*(0.41)*	*(-1.14)*	*(-2.91)*
Term Structure	9.138	38.407*	79.176**	108.318***
	(0.62)	*(1.95)*	*(2.35)*	*(2.91)*
Default Risk	2.395	10.986	-19.506	52.852
	(0.14)	*(0.59)*	*(-0.59)*	*(1.18)*
Short-Term Risk	-41.390	-115.913	-138.763	-227.542
	(-0.35)	*(-0.84)*	*(-1.52)*	*(-1.54)*
Stock Market	2.401	11.587	-10.955	-14.018
	(0.36)	*(1.27)*	*(-1.00)*	*(-0.98)*
Constant	-0.668	-1.984	4.038*	7.972***
	(-0.56)	*(-1.25)*	*(1.96)*	*(2.86)*
LR Chi^2	3.08	9.46	28.17	39.14
Pseudo R^2	0.045	0.153	0.439	0.533
Obs.	58	58	58	58

Panel I Continued

	Macroeconomy: Pre Break Repurchases: Post Break		Macroeconomy: Post Break Repurchases: Pre Break	
	All	**Large**	**All**	**Large**
GDP	-60.809	-40.261	162.001	33.576
	(-1.22)	*(-0.85)*	*(1.51)*	*(0.38)*
Unemployment	95.283**	92.889***	-59.011	-1.227
	(2.44)	*(3.29)*	*(-0.93)*	*(-0.01)*
Term Structure	-36.721*	-35.723	5.722	-177.594***
	(-1.81)	*(-1.62)*	*(0.11)*	*(-2.57)*
Default Risk	-17.600	32.301	33.304	-31.442
	(-0.49)	*(0.93)*	*(0.76)*	*(-0.66)*
Short-Term Risk	-399.819**	63.438	-699.451	-1421.861**
	(-2.09)	*(0.29)*	*(-1.49)*	*(-2.25)*
Stock Market	1.614	-3.937	2.024	-8.047
	(0.21)	*(-0.45)*	*(0.13)*	*(-0.53)*
Constant	-5.271*	-9.886***	4.216	2.747
	(-1.94)	*(-3.63)*	*(1.13)*	*(0.59)*
LR Chi^2	11.35	22.26	28.53	19.24
Pseudo R^2	0.217	0.444	0.527	0.403
Obs.	45	45	45	45

The above panel presents the coefficients produced from the robustness testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement, if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break).

Panel II: Multilevel Marginal Effects				
	Macroeconomy: Expansion Repurchases: Contraction		Macroeconomy: Contraction Repurchases: Expansion	
	All	Large	All	Large
GDP				
Minimum Level	0.788***	0.184**	0.870***	0.542***
	(7.26)	*(1.81)*	*(7.93)*	*(2.72)*
Average Level	0.720***	0.226***	0.749***	0.339***
	(12.47)	*(4.48)*	*(18.14)*	*(8.64)*
Maximum Level	0.585**	0.309	0.663***	0.231**
	(2.45)	*(1.39)*	*(5.26)*	*(2.06)*
Unemployment				
Minimum Level	0.549***	0.170	0.842***	0.549***
	(3.13)	*(1.35)*	*(11.09)*	*(7.31)*
Average Level	0.719***	0.224***	0.770***	0.150***
	(12.13)	*(4.49)*	*(16.36)*	*(3.26)*
Maximum Level	0.853***	0.289*	0.527**	0.001
	(8.79)	*(1.67)*	*(2.16)*	*(0.14)*
Term Structure				
Minimum Level	0.634***	0.028	0.051	0.001
	(3.86)	*(0.71)*	*(0.48)*	*(0.19)*
Average Level	0.726***	0.199***	0.811***	0.274***
	(12.47)	*(3.61)*	*(14.96)*	*(5.21)*
Maximum Level	0.789***	0.495***	0.998***	0.649***
	(7.02)	*(3.02)*	*(279.19)*	*(15.38)*
Default Risk				
Minimum Level	0.701***	0.155	0.823***	0.056
	(4.27)	*(1.39)*	*(10.06)*	*(0.41)*
Average Level	0.723***	0.226***	0.741***	0.271***
	(12.65)	*(4.42)*	*(18.63)*	*(4.62)*
Maximum Level	0.738***	0.289**	0.648***	0.506***
	(5.95)	*(2.21)*	*(3.69)*	*(3.97)*
Short-Term Risk				
Minimum Level	0.765***	0.331**	0.843***	0.427***
	(6.01)	*(2.13)*	*(13.53)*	*(7.04)*
Average Level	0.728***	0.229***	0.776***	0.305***
	(12.49)	*(4.26)*	*(16.67)*	*(5.50)*
Maximum Level	0.659***	0.104	0.157	0.001
	(3.28)	*(0.91)*	*(0.56)*	*(0.21)*
Stock Market				
Minimum Level	0.629**	0.029	0.872***	0.504***
	(2.24)	*(0.49)*	*(8.79)*	*(3.15)*
Average Level	0.722***	0.222***	0.750***	0.330***
	(12.60)	*(4.42)*	*(17.41)*	*(7.92)*
Maximum Level	0.758***	0.382***	0.613***	0.191
	(6.92)	*(2.72)*	*(3.79)*	*(1.47)*
Average of All Variables	0.730***	0.178***	0.859***	0.005
	(12.31)	*(3.08)*	*(14.12)*	*(0.43)*

Panel II Continued

	Macroeconomy: Pre Break Repurchases: Post Break		Macroeconomy: Post Break Repurchases: Pre Break	
	All	**Large**	**All**	**Large**
GDP				
Minimum Level	0.919***	0.402**	0.115	0.130
	(10.51)	*(2.22)*	*(0.42)*	*(0.59)*
Average Level	0.720***	0.265***	0.719***	0.228***
	(12.74)	*(5.53)*	*(16.85)*	*(4.64)*
Maximum Level	0.437**	0.156	0.987***	0.347
	(2.06)	*(1.59)*	*(23.91)*	*(1.03)*
Unemployment				
Minimum Level	0.151	0.002	0.586***	0.224
	(1.59)	*(0.46)*	*(2.93)*	*(0.78)*
Average Level	0.736***	0.192**	0.212	0.218
	(13.50)	*(2.50)*	*(0.37)*	*(0.32)*
Maximum Level	0.980***	0.770***	0.035	0.213
	(49.97)	*(6.09)*	*(0.12)*	*(0.21)*
Term Structure				
Minimum Level	0.926***	0.591***	0.677*	0.975***
	(19.64)	*(3.13)*	*(1.91)*	*(23.26)*
Average Level	0.728***	0.288***	0.714***	0.292***
	(17.28)	*(5.01)*	*(16.23)*	*(3.55)*
Maximum Level	0.456***	0.098	0.743***	0.001
	(3.84)	*(1.27)*	*(2.76)*	*(0.09)*
Default Risk				
Minimum Level	0.810***	0.144	0.572	0.487
	(5.63)	*(1.36)*	*(1.24)*	*(1.18)*
Average Level	0.735***	0.244***	0.605***	0.356
	(12.95)	*(4.72)*	*(3.53)*	*(1.61)*
Maximum Level	0.635***	0.386**	0.733***	0.219***
	(2.95)	*(2.22)*	*(13.19)*	*(4.16)*
Short-Term Risk				
Minimum Level	0.955***	0.210	0.837***	0.297***
	(20.95)	*(1.44)*	*(11.15)*	*(4.04)*
Average Level	0.691***	0.252***	0.134	0.001
	(11.76)	*(5.28)*	*(0.47)*	*(0.19)*
Maximum Level	0.395***	0.287**	0.002	0.001
	(3.30)	*(2.15)*	*(0.13)*	*(0.03)*
Stock Market				
Minimum Level	0.687***	0.340	0.677**	0.391
	(2.83)	*(1.60)*	*(2.37)*	*(1.29)*
Average Level	0.736***	0.255***	0.713***	0.218***
	(12.77)	*(5.40)*	*(16.39)*	*(4.42)*
Maximum Level	0.755***	0.224***	0.728***	0.158
	(6.85)	*(2.96)*	*(6.18)*	*(1.31)*
Average of All Variables	0.827***	0.143**	0.844***	0.053
	(10.48)	*(2.08)*	*(9.94)*	*(0.75)*

The above panel presents the marginal effects produced from the robustness testing of the influence of macroeconomic conditions on the probability of witnessing a repurchase announcement, if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break). Essentially indicating the probability of a repurchase announcement at the minimum, average and maximum levels of each macroeconomic variable, and when each macroeconomic variable is simultaneously held at its average level.

Table A.6: Robustness Check: Variable-Level Influence on Payout Value

The table presents the results from the robustness testing of the influence of macroeconomic conditions on the value of a repurchase announcement, if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break). This essentially means taking Equation 5 and then swapping the independent variables accordingly Equation 5: $E(Rep)_t = \emptyset_t\left(\Sigma_{k=6}^{K}\beta_k Macroeconomy_{k,t-p}\right)$, where, $E(Rep)_t$ is the quarterly cumulative repurchase value normalised between 0 and 1 during t = Aggregate (1985:Q1-2014:Q4), Expansion (1985:Q1-1988:Q1; 1992:Q3-1999:Q4; 2010:Q2-2014:Q4), Contraction (1988:Q2-1992:Q2; 2000:Q1-2010:Q1), Pre Break (1985:Q1-1996:Q1) and Post Break (1996:Q3-2014:Q4), $Macroeconomy_{k,t-p}$ is the matrix of p lagged K quarterly macroeconomic variables; GDP (growth rate of the gross domestic product), Unemployment (fraction of unemployment in the 16+ working population), Term Structure (10year GILT excess over the 3month T-Bill), Default Risk (Moody's BBA bond excess over the 10year GILT), Short-Term Risk (3month Sterling LIBOR excess over 3month T-Bill) and Stock Market (return on the FTSE 100 index). $\emptyset_t$ is the standard cumulative normal. Superscripts indicate statistical significance at the 0.10 (*), 0.05 (**) and 0.01 (***) percent levels, and z-statistics are stated in the parentheses.

Panel I: Coefficients

	Macroeconomy: Expansion Repurchases: Contraction	**Macroeconomy: Contraction Repurchases: Expansion**	**Macroeconomy: Pre Break Repurchases: Post Break**	**Macroeconomy: Post Break Repurchases: Pre Break**
GDP	-10.973	-23.802	28.234*	-34.065
	(-0.50)	*(-0.91)*	*(1.65)*	*(-0.81)*
Unemployment	2.877	-77.787***	56.947***	7.015
	(0.42)	*(-3.55)*	*(4.40)*	*(0.14)*
Term Structure	13.274	51.551***	-13.723	-144.719***
	(1.46)	*(3.31)*	*(-1.62)*	*(-3.73)*
Default Risk	-7.896	-3.099	-10.545	-3.699
	(-0.81)	*(-0.17)*	*(-0.55)*	*(-0.13)*
Short-Term Risk	-51.958	-81.226*	51.062	-825.563***
	(-0.80)	*(-1.91)*	*(0.49)*	*(-3.20)*
Stock Market	8.146	0.613	-3.840	6.934
	(1.48)	*(0.15)*	*(-0.91)*	*(0.74)*
Constant	-1.993***	3.424***	-7.298***	-0.087
	(-3.03)	*(3.10)*	*(-5.80)*	*(-0.04)*
WALD Chi^2	14.01	33.15	29.23	41.71
Pseudo R^2	0.042	0.250	0.261	0.248
Obs.	58	58	45	45

The above panel presents the coefficients produced from the robustness testing of the influence of macroeconomic conditions on the value of a repurchase announcement, if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break).

Panel II: Multi-Level Marginal Effects				
	Macroeconomy: Expansion Repurchases: Contraction	**Macroeconomy: Contraction Repurchases: Expansion**	**Macroeconomy: Pre Break Repurchases: Post Break**	**Macroeconomy: Post Break Repurchases: Pre Break**
GDP				
Minimum Level	0.041*	0.265	0.054	0.127
	(1.80)	*(1.59)*	*(1.55)*	*(0.96)*
Average Level	0.032***	0.137***	0.116***	0.054***
	(3.36)	*(6.20)*	*(5.01)*	*(4.00)*
Maximum Level	0.021	0.089**	0.214***	0.018
	(1.11)	*(2.04)*	*(3.33)*	*(0.72)*
Unemployment				
Minimum Level	0.027**	0.272***	0.002	0.065
	(2.30)	*(5.24)*	*(0.79)*	*(0.83)*
Average Level	0.033***	0.062***	0.072***	0.084
	(3.43)	*(4.27)*	*(3.08)*	*(0.36)*
Maximum Level	0.039*	0.001	0.397***	0.104
	(1.75)	*(0.47)*	*(4.64)*	*(0.25)*
Term Structure				
Minimum Level	0.012	0.001	0.247***	0.986***
	(1.11)	*(0.51)*	*(3.02)*	*(29.21)*
Average Level	0.031***	0.094***	0.135***	0.056***
	(3.01)	*(5.10)*	*(6.01)*	*(3.04)*
Maximum Level	0.059**	0.490***	0.072*	0.001
	(2.51)	*(4.63)*	*(1.92)*	*(0.14)*
Default Risk				
Minimum Level	0.041	0.151	0.167**	0.067
	(1.54)	*(1.11)*	*(2.28)*	*(0.64)*
Average Level	0.032***	0.133***	0.132***	0.060
	(3.60)	*(4.80)*	*(6.28)*	*(1.25)*
Maximum Level	0.022**	0.118*	0.099*	0.053***
	(2.07)	*(1.70)*	*(1.84)*	*(3.28)*
Short-Term Risk				
Minimum Level	0.047*	0.157***	0.095*	0.109***
	(1.75)	*(5.34)*	*(1.83)*	*(3.42)*
Average Level	0.034***	0.114***	0.125***	0.001
	(3.07)	*(5.98)*	*(5.65)*	*(0.41)*
Maximum Level	0.019	0.005	0.151**	0.001
	(1.37)	*(0.45)*	*(2.14)*	*(0.12)*
Stock Market				
Minimum Level	0.002	0.122***	0.208**	0.012
	(0.50)	*(2.64)*	*(1.97)*	*(0.45)*
Average Level	0.031***	0.129***	0.127***	0.055***
	(3.41)	*(6.36)*	*(5.68)*	*(3.67)*
Maximum Level	0.069*	0.136***	0.100***	0.092
	(1.86)	*(2.62)*	*(3.03)*	*(1.39)*
Average of All Variables	0.024***	0.025	0.066***	0.010
	(3.56)	*(1.41)*	*(2.97)*	*(1.36)*

The above panel presents the marginal effects produced from the robustness testing of the influence of macroeconomic conditions on the value of a repurchase announcement, if the repurchase undertaking policy of firms were interchanged between the business cycle stages (Expansion and Contraction) and around the structural break quarter of 1996:Q2 (Pre Break and Post Break). Essentially indicating the change in value of a repurchase announcement at the minimum, average and maximum levels of each macroeconomic variable, and when each macroeconomic variable is simultaneously held at its average level.