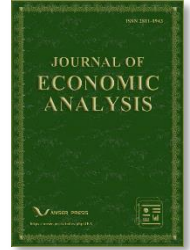




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## The business cycle's influence on share repurchases of the UK

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### ABSTRACT

The UK fully legalised open market share repurchases in 1981, and to our knowledge no study has investigated the business cycle's influence on repurchase decision-making. We address this aspect and investigate the period 1985-2014. This is relevant as the business cycle factors impact the firm-specific variables such as cash flow, profitability, dividends and capital structure, and these factors traditionally influence repurchase decisions. This forms the paper's theoretical intuition, and the empirical objectives test the business cycle's influence on the decision to undertake a repurchase, and also its influence on repurchases values. The results find that the business cycle influences both the decision of undertaking repurchases and repurchases' values, and this influence 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-business cycle relationship witnessed a structural break in 1996:Q2, and the real difference following this break is the increase in the business cycle's influence on the decision regarding repurchase values. The paper thus contributes to existing literature by directly testing the UK's repurchase-business cycle relationship, and providing detailed empirical evidences that business cycle conditions strongly impact the repurchase decision-making.

### KEYWORDS

Repurchases; macroeconomy; business cycle; frequency

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## 1. Introduction

In terms of repurchases the US sees the world's largest levels with the UK second behind, who sees the largest in Europe (Sonika *et al.* 2014). It is customary to see non-US countries witness dividend dominance over repurchases (Lee and Suh, 2011). However, since 2002 the UK has seen a 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 annually (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 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 amongst them are dissimilar.

To the best of our knowledge there are no UK-specific studies that directly investigate the influence of the business cycle on the repurchase decision-making. There are two known US studies that test the repurchase-business cycle relationship. This first is Korajczyk and Levy (2003), which investigates tender offer repurchases, and the tested business cycle indicators are commercial paper spread and stock market return. They find that between 1984-1999 repurchases were counter-cyclical<sup>1</sup>, 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. The second is Dittmar and Dittmar (2008), which investigates net repurchases (the sum of common and preference shares repurchased excess over the issued preferred stock) using one business cycle indicator, the GDP. They conclude that between 1971-2004 repurchases were pro-cyclical<sup>2</sup>. 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.

Our paper undertakes the testing to investigate the business cycle's influences on repurchase decision-making in the UK, namely the decision if a repurchase should be undertaken, and that related to its value, for the period 1985-2014. We define the term 'business cycle' as a collective cohort of various economic indicators that represent the state of the overall macroeconomy. Our investigation is more comprehensive than the aforementioned US studies. We only investigate open market repurchases, as they constitute the majority of all repurchases conducted in the UK (Rau and Vermaelen, 2002; Oswald and Young, 2004) and in the US (Grullon and Michaely, 2004). Thus they are a more accurate representation of repurchase activities. For the control variables we use a unique set of six economic indicators to represent the business cycle, which have been carefully selected by referring to past literature and adjusting to fit the paper's objectives. These include the GDP (Yin and Feng, 2019; Huang and Hseh, 2021), Unemployment (Johnson, 2013), Term Structure (Booth and Booth, 2003; Urom *et al.* 2019), Market Risk (Default Risk and Short-Term Risk) (Jensen *et al.* 1996; Booth and Booth, 2003; Urom *et al.* 2019) and Stock Market index (Huang and Hseh, 2021).

The results consistently reveal that the business cycle plays a significant role in determining the undertaking of a repurchase and also its value. During the Aggregate timeframe the business cycle influence is strongly pro-cyclical, while during Expansion repurchases undertaking is relatively more pro-cyclical than during Contraction, which generally witnesses counter-cyclicity. Also the overall magnitude of business cycle influence remains more

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<sup>1</sup> 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.

<sup>2</sup> 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.

prevalent during Expansion than Contraction. Testing also reveals that the repurchase-business cycle relationship underwent a structural break in the second quarter of 1996 (1996:Q2), with further testing providing evidences of visible changes in the influencing pattern 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 increases. Thus, with of time the share repurchasing pattern sees an increase in counter-cyclicity and also a rising level of the business cycle's influence.

This paper is thus the first empirically backed study that provides information on how the business cycle influences the repurchase decision-making in the UK. However, our specific empirical contributions to existing knowledge are:

- The testing differentiates between the decision if a repurchase must be undertaken, and if so, then a separate checking of how is the payout's value influenced. This distinction provides the ability to assess the business cycle's influence on repurchases on a micro level.
- Checking if the repurchase-business cycle relationship underwent a structural break. This will provide a reference for predictive analyses for possible breaks, which will assist in plotting the changes in the influencing pattern.
- The testing of the Aggregate 30year period (1985-2014), and periods of economic Expansion and Contraction. The firm-level and market-level conditionality drastically differ during the two phases, thus providing time-specific analytical templates.

Thus, using these findings academics can make appropriate arrangements during any future empirical undertakings, not only in the repurchase-business cycle 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.

The paper is structured as follows: Section 1 provides an introduction, Section 2 assesses extant literature, Section 3 discusses the sample, constructs the research objectives and explains the methodologies, Section 4 reports the results and its analyses, and Section 5 concludes the paper.

## 2. Literature Review

Given the absence of UK-specific literature investigating the repurchase – business cycle relationship, for establishing a theoretical framework via indirect assessments this section will discuss the business cycle influences on the determinants of the UK's share repurchases. 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) promote repurchase undertaking. There is a consensus that all of these attributes are generally contingent upon the business cycle. Business cycle 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 conditionality (Al-Najjar and Belghitar, 2011; Kilincarslan and Ozdemir, 2018).

Low leverage drives managers towards repurchasing shares (Lee and Suh, 2011; Cesari and Ozkan, 2015), and European managers state that the business cycle is a crucial determinant of leverage (Bancel and Mittoo, 2004). The leverage behaviour of British firms is influenced by the business cycle (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 (Antonioni *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 business cycle 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 (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 evidences of leverage influencing repurchases and British managers state that the signalling stock undervaluation is among the leading three motives for undertaking repurchases (Dhanani, 2016). Thus, there is a business cycle 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 into the UK has reached historical levels (Department for International Trade, 2016), which is dominated from the US (ONS, 2017). Furthermore, the breadth of globalisation in 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 business cycle, which restates the business cycle's significance for repurchases.

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

### 3. Sample, Research Objectives and Methodologies

#### 3.1. Sample Selection

The repurchase data is sourced from the SDC Platinum database and includes all open market announcements of firms 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 (inclusive). 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 value of around £355bn, with the average announcement being worth £847mn (Table 1). The stock market data is obtained from Datastream, and Morningstar. The reason for using multiple sources is to mitigate data inaccuracy. The business cycle 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.

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

*Notes: 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.*

### 3.2. Research Objectives and Methodology

The ability of sourcing internal and/or external finance is easier during a boom, and repurchases will require a large cash outlay. Thus, repurchasing during prosperous times will reduce shareholder apprehension, as regulations require their approval for undertaking an open market repurchase (Dhanani and Roberts, 2009). Hence while developing the three empirical objectives we assume that repurchases are pro-cyclical. The sample is subcategorised for periods of *Expansion* and *Contraction*, which are defined using the traditional quantitative European method (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 remainder 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).

#### 3.2.1. Control Variables

The business cycle is represented by six variables. Starting with the *GDP*, the growth of the gross domestic product (quarterly). *Unemployment*, the fraction of unemployed people in the 16+ working population (quarterly). The combination of using GDP and Unemployment is significant due to their interlinkage. Unemployment accurately tracks European living standards (Fouweather et al. 2015), which lags 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). It is a powerful business cycle representative whose predictive power has shown to increase over 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 role in representing the business cycle.

Given the earlier discussions showing associations between repurchases, leverage and the business cycle, for capturing long-term risk we use *Default Risk*, the excess of Moody's 10year BAA bond yield over the 10year GILT rate (quarterly). 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). 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. We do not hold survivorship and index-of-listing biases; thus we choose FTSE 100 as it represents 80% of the market (Cattlin, 2021).

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 initially 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.

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 BAA 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

*Notes: The table presents the descriptions of the independent variables used throughout the empirical testing, and also states the expected direction of their influence based on pro-cyclicity.*

### 3.2.2. Objective 1: Structural Consistency of The Repurchase-Business Cycle Relationship

Given the testing period spans to three decades, we posit that due to the evolving business cycle and corporate financial policies the repurchase-business cycle relationship potentially underwent a fundamental change. This is tested by applying the Andrews (1993) unknown structural break test on an OLS regression (Equations 1 and 2). If a structural 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.

$$Rep_{t(pre)} = \sum_{k=6}^K \beta_{k(pre)} Business\ Cycle_{k,t(pre)-p} + \varepsilon_{t(pre)} + \alpha \quad (1)$$

$$Rep_{t(post)} = \sum_{k=6}^K \beta_{k(post)} Business\ Cycle_{k,t(post)-p} + \varepsilon_{t(post)} + \alpha \quad (2)$$

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

Where, Rep is the quarterly cumulative repurchase value,  $t(pre) = 1985: Q1 \dots \lambda - 1$  quarter and  $t(post) = \lambda + 1$  quarter ... 2014: Q4 and  $\lambda$  is the structural break quarter,

Business Cycle<sub>k,t-p</sub> is the matrix of p lagged K quarterly business cycle variables, and  $\varepsilon_t$  is the error term and  $\alpha$  is the alpha. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

### 3.2.3. Objective 2: Business Cycle Influence on Repurchase Payout-Probability

In order to quantify the influence of the business cycle on the decision if a repurchase must be undertaken, we employ the Probit regression (Equations 3 and 4) using a value-based approach; independently testing all repurchases and those that are *Large* sized, defined as repurchases with a value above the average level. 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 business cycle environment.

$$Pr(Announcement_t = 1) = \Phi_t(\sum_{k=6}^K \beta_k Business\ Cycle_{k,t-p}) \quad (3)$$

$$Pr(Announcement(large)_t = 1) = \Phi_t(\sum_{k=6}^K \beta_k Business\ Cycle_{k,t-p}) \quad (4)$$

Where,  $\text{Pr}(\text{Announcement}_t = 1)$  is binary and takes the value '1' if a repurchase is announced in a quarter and  $\text{Pr}(\text{Announcement}(\text{large})_t = 1)$  is binary and takes the value '1' if a large sized repurchase is announced in a quarter, during  $t = \text{Aggregate, Expansion, Contraction, Pre Break and Post Break}$ ,  $\text{Business Cycle}_{k,t-p}$  is the matrix of  $p$  lagged  $K$  quarterly business cycle variables, and  $\Phi_t$  is the standard cumulative normal. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

### 3.2.4. Objective 3: Business Cycle Influence on Repurchase Value

Given the earlier evidences of the business cycle influences on cash flow and profitability, and their direct impact on repurchases, we also test if the business cycle influences the repurchase value once the decision of undertaking the payout has been made. In order to do so we undertake the fractional probit regression (Equation 5).

$$E(\text{Rep})_t = \Phi_t\left(\sum_{k=6}^K \beta_k \text{Business Cycle}_{k,t-p}\right) \quad (5)$$

Where,  $E(\text{Rep})_t$  is the quarterly cumulative repurchase value normalised between 0 and 1 for  $t = \text{Aggregate, Expansion, Contraction, Pre Break and Post Break}$ ,  $\text{Business Cycle}_{k,t-p}$  is the matrix of  $p$  lagged  $K$  quarterly business cycle variables, and  $\Phi_t$  is the standard cumulative normal. The information criterion procedures indicate that the variables must lag 1quarter across all specifications; their results are available in the Appendix.

## 3.3. Robustness Testing

### 3.3.1. 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 and large sized; only for 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 over different time periods and repurchase values are statistically different.

### 3.3.2. 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 business cycle 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).

Our investigatory process involves taking the specifications of the testing indicated in Objectives 1 and 2, (Equations 3, 4 and 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 implemented during the 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, this will essentially reverse the impact indicated by the structural break.

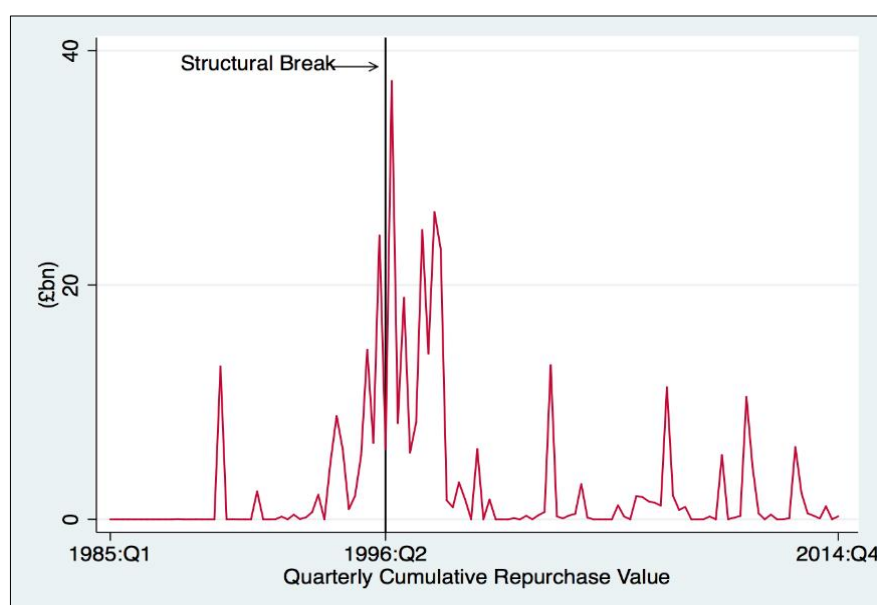
## 4. Results

### 4.1. Structural Consistency of The Repurchase-Business Cycle Relationship

Testing reveals (Table 3) that the relationship between open market repurchases and the business cycle 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.

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) business cycle 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.

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
Panel II: Average Business cycle 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		

*Notes: 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 business cycle indicators denoting the similarity in business cycle circumstances of the four sub-time periods is presented in pair-wise format<sup>3</sup>.*

#### 4.2. Business Cycle Influence on Repurchase Payout-Probability

The marginal effects are presented in Table 5<sup>4</sup>, which reveal the repurchase cyclicity. The influence of each indicator is stated for its; minimum, average and maximum levels, and under overall average conditions, which means when all of the six indicators are held simultaneously at their average levels. Under average business cycle conditions the probability of seeing a repurchase during the Aggregate period is 76%, while in the subcategorised periods the results are; 82% for Expansion, 77% for Contraction, 80% for Pre Break and 79% for Post Break.

Large payouts are atypical and make up 22% of the Aggregate period. Expansion sees their highest quarterly proportionality at 31%, substantially more than that of Contraction's 22%. The distribution of large repurchases during the Pre Break and Post Break periods is identical at 22% for each period. Conforming to their minority composition, the magnitude of the business cycle influence on their undertaking is relatively lower. Under average business cycle conditions the probability of seeing a large repurchase during the Aggregate period is 19%, 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, Expansion holds consistency as the most favourable period, supporting our expectations of the repurchase trend being broadly pro-cyclical. Contraction is generally the least favourable period but is second most popular for large repurchases. This indicates that during downturns the managers use large repurchases to stabilise the stock price, as a price rise following a repurchase is a theoretical consequence to maintain the market capitalisation. It provides shareholders with security as their capital will be safely liquidated during distress, and also 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 business cycle

<sup>3</sup> The complete Pearson's correlation matrix is available in the Appendix.

<sup>4</sup> The coefficients are tabulated in the Appendix.

conditions.

**Table 5.** Business Cycle Influence on Repurchase Payout-Probability.

	Multilevel Marginal Effects									
	Aggregate		Expansion		Contraction		Pre Break		Post Break	
	All	Large	All	Large	All	Large	All	Large	All	Large
<b>GDP</b>										
Minimum Level	0.752*** (3.82)	0.073 (0.68)	0.778*** (8.40)	0.400*** (3.20)	0.283 (0.93)	0.053 (0.43)	0.756*** (4.83)	0.285 (1.29)	0.715** (2.06)	0.058 (0.55)
Average Level	0.740*** (19.58)	0.221*** (6.18)	0.758*** (16.66)	0.308*** (6.17)	0.720*** (13.00)	0.215*** (3.95)	0.711*** (13.61)	0.213* (4.30)	0.756*** (16.10)	0.211*** (5.59)
Maximum Level	0.731*** (5.27)	0.372** (2.07)	0.721*** (4.82)	0.177 (1.11)	0.889*** (8.87)	0.359* (1.71)	0.663*** (3.96)	0.153 (0.91)	0.772*** (5.96)	0.326** (2.25)
<b>Unemployment</b>										
Minimum Level	0.870*** (18.86)	0.369*** (3.20)	0.970*** (35.52)	0.576*** (4.25)	0.622*** (5.27)	0.305** (2.52)	0.978*** (52.67)	0.626* (2.91)	0.583*** (4.53)	0.069 (1.46)
Average Level	0.727*** (18.57)	0.233*** (6.51)	0.772*** (14.11)	0.303*** (5.94)	0.744*** (12.76)	0.219*** (4.07)	0.722*** (12.32)	0.215* (3.86)	0.772*** (16.16)	0.225*** (4.76)
Maximum Level	0.440*** (3.25)	0.095 (1.46)	0.331** (2.14)	0.101 (1.38)	0.927*** (8.23)	0.081 (0.73)	0.257** (2.40)	0.035 (0.70)	0.925*** (14.64)	0.569*** (3.53)
<b>Term Structure</b>										
Minimum Level	0.287** (2.06)	0.025 (0.86)	0.485*** (2.90)	0.315** (2.22)	0.407* (1.84)	0.227 (0.98)	0.172* (1.89)	0.010 (0.74)	0.774*** (12.41)	0.274*** (3.36)
Average Level	0.735*** (18.85)	0.219*** (5.95)	0.764*** (14.68)	0.315*** (6.38)	0.707*** (12.70)	0.223*** (4.22)	0.667*** (10.25)	0.223* (4.14)	0.751*** (15.75)	0.233*** (5.66)
Maximum Level	0.923*** (22.15)	0.498*** (3.91)	0.905*** (14.24)	0.315*** (3.00)	0.900*** (10.06)	0.219 (1.06)	0.969*** (24.61)	0.643* (5.38)	0.689*** (3.74)	0.150** (1.99)
<b>Default Risk</b>										
Minimum Level	0.953*** (30.78)	0.599*** (4.21)	0.901*** (14.70)	0.835*** (10.66)	0.957*** (15.11)	0.266 (0.96)	0.713*** (5.02)	0.266 (1.54)	0.924*** (11.07)	0.721*** (4.27)
Average Level	0.738*** (20.27)	0.232*** (6.22)	0.743*** (17.31)	0.324*** (5.91)	0.735*** (13.00)	0.224*** (4.23)	0.710*** (13.82)	0.215* (4.42)	0.771*** (15.60)	0.192*** (4.32)
Maximum Level	0.347*** (2.87)	0.042 (1.23)	0.565*** (4.76)	0.039 (1.25)	0.391* (1.76)	0.191 (0.99)	0.707*** (4.95)	0.165 (1.14)	0.498** (2.34)	0.004 (0.50)
<b>Short-Term Risk</b>										
Minimum Level	0.741*** (10.27)	0.256*** (3.04)	0.740*** (5.84)	0.512*** (3.30)	0.704*** (7.31)	0.207*** (2.59)	0.603*** (3.03)	0.277 (1.54)	0.773*** (10.70)	0.217*** (3.37)
Average Level	0.740*** (18.83)	0.222*** (6.16)	0.754*** (14.49)	0.318*** (6.05)	0.721*** (13.34)	0.226*** (4.15)	0.709*** (13.78)	0.209* (3.74)	0.760*** (15.66)	0.220*** (6.02)
Maximum Level	0.735** (2.33)	0.074 (0.33)	0.775*** (6.43)	0.090 (0.88)	0.819** (2.25)	0.368 (0.58)	0.778*** (7.03)	0.164 (1.20)	0.607 (1.12)	0.261 (0.46)
<b>Stock Market</b>										
Minimum Level	0.691*** (4.16)	0.047 (0.76)	0.530** (2.15)	0.226 (1.09)	0.889*** (9.04)	0.072 (0.77)	0.702*** (3.81)	0.142 (0.84)	0.678*** (4.07)	0.059 (1.08)
Average Level	0.740*** (19.59)	0.218*** (6.01)	0.759*** (17.03)	0.315*** (6.41)	0.722*** (13.55)	0.215*** (3.98)	0.710*** (14.02)	0.219* (4.41)	0.761*** (15.82)	0.208*** (5.45)
Maximum Level	0.764*** (9.12)	0.375*** (3.24)	0.830*** (11.84)	0.356*** (3.09)	0.530*** (3.24)	0.404** (2.08)	0.713*** (7.84)	0.257* (2.22)	0.813*** (7.42)	0.431*** (3.00)
Average Of All Variables	0.763*** (18.57)	0.185*** (4.61)	0.817*** (14.06)	0.238*** (3.68)	0.767*** (11.98)	0.204*** (3.61)	0.795*** (9.77)	0.126* (1.81)	0.786*** (15.13)	0.108** (2.12)

Notes: The table presents the marginal effects produced from the testing of the influence of business cycle conditions on the probability of witnessing a repurchase announcement, indicating the probability of a repurchase announcement at the minimum, average and maximum levels of each variable, and when each variable is simultaneously held at its average level. Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated

in the parentheses.

#### 4.2.1. Aggregate Period

During the Aggregate period, aside from GDP's counter-cyclicity and Short-Term Risk's static<sup>5</sup> influence, all other variables have pro-cyclical influences. Thus, repurchases are dominantly pro-cyclical but are seldom undertaken for mitigating the effects of a downward business cycle trend. However, the influences of all control variables on large payouts is pro-cyclical. 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 business cycle.

#### 4.2.2. Expansion And Contraction

In Table 6 we summarise the findings based on their cyclicity. This highlights key interlinkages and distinctions between the Expansion and Contraction, which is logical as these phases differ in real terms but share a logical causality. For instance, it is argued that the credit defaults seen during downturns are the conceptualisation of the risk accumulated due to the actions undertaken during the preceding upswing (Pederzoli and Torricelli, 2005; Jimenez and Saurina, 2006).

**Table 6.** Summary of Business cycle Influence, Expansion and Contraction.

	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

Notes: The table summarises the cyclicity of each variable's influence during Expansion and Contraction.

The absolute change in the influence of GDP from being counter-cyclicity during Expansion to pro-cyclical during Contraction, reveals that all and large repurchases are deemed efficient in mitigating the implications of a declining economic output during a business cycle 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 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

<sup>5</sup> 'Static' is defined as influence that is only significant at one of the three levels, 'Minimum or Average or Maximum' or if the magnitude of change across these three levels is less than 1%.

controlling the impact of the factors that influence the equity market, thus limiting the level of impact that reaches the stock price.

The Unemployment's only counter-cyclical influence is seen with all repurchases during Contraction. 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 (ONS, 2018). 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 market risk, and given that LIBOR is linked with \$350trn of financial contracts (Bowman, 2019), 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 supported by the factor having fact that the most instances of counter-cyclicity.

#### 4.2.3. Pre Structural Break and Post Structural Break

In Table 7 we summarise the findings based on their cyclicity. The GDP's change to absolute pro-cyclicity after the break conforms to the indicator's downward trend<sup>6</sup>. The factor witnesses diminishing volatility, which shifts its impact in a way that corporations do not find repurchasing shares an effective offsetting mechanism. Unemployment and Term Structure's absolute change from pro-cyclicity to counter-cyclicity is noteworthy. The finding reiterates the earlier discussions regarding the results for Contraction that despite consistent reduction in joblessness Unemployment has a counter-cyclical influence. Thus, the downward<sup>6</sup> trend in Unemployment has resulted in a situation that repurchasing shares have become an effective tool to offset the effects of joblessness on the stock value. A similar inference can be drawn for Term Structure. Despite the Post Break timeline seeing the great recession of 2008 the average level increased nine-times<sup>6</sup>, 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.

**Table 7.** Summary of Business cycle Influence, Pre Break and Post Break.

	Pre Break		Post Break	
	All	Large	All	All
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

*Notes: The table summarises the cyclicity of each variable's influence during Pre Break and Post Break.*

The change of Default Risk's influence from absolute static to pro-cyclical is consistent with its average after

<sup>6</sup> Summary statistics are tabulated in the Appendix.

the break rising 22-times<sup>7</sup>, as repurchases are often financed using new debt they thus become inefficient in offsetting its impact. Thus the pattern is consistent with the capital restructuring hypothesis' popularity in the UK (Lee and Suh, 2011; Burns *et al.* 2015; Cesari and Ozkan, 2015). With Short-Term Risk a very intuitive influence change is seen. Its counter-cyclicity on all repurchases changes to pro-cyclicity after the structural break, inferring that firms no longer deem repurchases an antidote to the commercial implications of immediate risk. This is consistent with the downward trend in the Short-Term Risk<sup>7</sup> as reduced levels result in lower volatility, similar to that 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 reveals that the managers are careful about using repurchases for price support, and do so cautiously since announcing a repurchase during a Stock Market slump is harder to conceal than using the payout to offset the effects of other variables.

### 4.3. Business cycle Influence on Repurchase Value

The marginal effects that quantify the business cycle influence on repurchase value are presented in Table 8<sup>8</sup>. The influence of each indicator is stated for its; minimum, average and maximum levels, and under overall average conditions, which means when all of the six indicators are held simultaneously at their average levels. Under average business cycle conditions the influence on repurchase value during the Aggregate period is 6%, while in the subcategorised periods the results are; 6% for Expansion, 3% for Contraction, 2% for Pre Break and 5% for Post Break. The periods that witness higher (lower) than average repurchase values, Expansion and Post Break (Contraction and Pre Break), also witness greater (lesser) influence on repurchase value. This reinforces the results reliability and establishes the business cycle's role in the decision-making.

#### 4.3.1. 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 associated with the business cycle, which is strongly pro-cyclical in nature. The only discrepancy of the value-level results (pro-cyclical) with the payout-probability (counter-cyclical) results is that related to GDP. Thus, a reducing economic output's positive influence in repurchase undertaking but a negative influence on its value is indicative of using the payout for signalling. When the output falls the announcing of repurchases signals the firm's confidence in the stock value, thus absorbing any adverse effects, but only when there is a rising output does the firm actually allocate more funds for share repurchasing.

#### 4.3.2. Expansion and Contraction

In Table 9 we summarise the findings based on their cyclicity. During Expansion, repurchases are not seen as signalling tools to communicate in the firms' future when there is adversity in Unemployment, Default Risk, Short-Term Risk and Stock Market, as they all have pro-cyclical influences. It also reveals that when the factors witness a downward trend, the firm reduces the repurchase values to minimise cash outflows. The opposite influencing pattern is however seen with GDP and Term Structure, thus increasing repurchase values is seen as good

<sup>7</sup> Summary statistics are tabulated in the Appendix.

<sup>8</sup> The coefficients are tabulated in the Appendix.

communicators of confidence in the firm when the economic output falls or the long-term economic outlook is bleak, which is why firms divert more cash towards repurchases.

**Table 8.** Business Cycle Influence on Repurchase Value.

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

Notes: The panel presents the marginal effects produced from the testing of the influence of business cycle 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 business cycle variable, and when each business cycle variable is simultaneously held at its average level. Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated in the parentheses.

**Table 9.** Summary of Business cycle Influence.

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

*Notes: The table summarises the cyclicity of each variable's influence during Expansion and Contraction.*

During Contraction it is seen that GDP, Unemployment and Stock Market have pro-cyclical influences. These are partially consistent with the influencing patterns seen during Expansion, with the discrepancy related to GDP. Thus indicating that only when the economic output begins to increase during business cycle distress, which is a sign of a recovering economy, does the firm allocate greater funds for repurchases. The influences of Term Structure and Default risk are static, which is contrasting to the counter-cyclical and pro-cyclical influences seen during Expansion, respectively. Thus under extreme levels of the factors the repurchase values remain unaffected. Finally, Short-Term Risk has a counter-cyclical influence, which contrasts the pro-cyclical influence seen during Expansion. Hence during business cycle distress repurchase values are increased to offset the immediate market risk's impact on the stock price.

#### 4.3.3. Pre Break and Post Break

In Table 10 we summarise the findings based on their cyclicity. Firstly, we see a real influencing pattern change following the structural break (1996:Q2), as prior to the break none of the variables have a counter-cyclical influence while after the break counter-cyclicity is widely seen. During the Pre Break period Unemployment, Term Structure, Short-Term Risk and Stock Market have pro-cyclical influences. Thus, increasing repurchase values prior to the break to offset these factors' downward trend effect on stock price is not deemed viable. The influence of GDP and Default Risk are static, which indicates that under extreme levels the factors do not influence repurchase values. During the Post Break period Default Risk and Stock Market have pro-cyclical influences, the latter's influence remains consistent across the structural break. Thus their adverse effects on stock price are not deemed absorbable by increasing repurchase values. The influence of Short-Term Risk is static, which differs from the pro-cyclical influence seen prior to the break. Thus with the progression of time repurchase value increment is deemed to have become less effective to offset the adverse effect on the stock price due to rising immediate market risk. Finally, GDP, Unemployment and Term Structure have counter-cyclical influences, which are completely contrasting to the influence seen prior to the break. Thus, as time progressed increasing repurchase values have shown to offset the adverse effects on stock price due to a downward trend in these factors.

**Table 10.** Summary of Business cycle Influence.

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

*Notes: The table summarises the cyclicity of each variable's influence during Pre Break and Post Break.*

From the results we can deduce the probable trigger that led to the actual structural break in 1996:Q2. This can be credited to changes in firm-level conditions rather than the business cycle 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 11 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 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 further supports our assertion that repurchase values is a substantial contributor to the structural break, thus making repurchase value-level influence a sensitive component of the repurchase-business cycle relationship.

**Table 11.** Repurchase Statistics Surrounding the Structural Break.

Quarters	Quarterly Breakdown		Years	Yearly Breakdown	
	Announcement Frequency	Average Value (£Bn)		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			

*Notes: 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).*

#### 4.4. Robustness Testing

##### 4.4.1. Mann-Whitney Rank Sum Test

The payout-probability and value-level testing showed diversity in the business cycle's influence on repurchase decision-making. However, we run a Mann-Witney Rank Sum test on the results for determining if this diversity



holds on a statistical level, which are available in Table 12.

**Table 12.** Summary of Business Cycle Influence.

Pairs	Z-Score	H <sub>0</sub> = 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

Notes: Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and p-values are stated in the parentheses.

In the Aggregate period the business cycle 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 business cycle 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 business cycle'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 business cycle 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 business cycle 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 business cycle 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-business cycle relationship is most fragile to payout value, which has strongly contributed to the relationship's structural break.

#### 4.4.2. 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<sup>9</sup>; (i) Business Cycle Conditions: The implementation of Contraction's repurchase policy during Expansion's business cycle environment, vice versa, and (ii) Structural Break Impact: The implementation of Post Break's repurchase policy during Pre Break's business cycle environment, vice versa. If the variable's influence remains unchanged (changed) then it reveals that its influence is more determined by the business cycle (firm-level conditionality) and less by firm-level conditionality (business cycle).

##### 4.4.2.1. Expansion and Contraction

Regarding payout-probability, upon employing the general repurchase policy of Contraction during Expansion, the influences of three control variables remains unchanged, these are GDP, Term Structure and Stock Market. While when upon employing the general repurchase policy of Expansion during Contraction the influences of three control variables remains unchanged, these are 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 business cycle than firm-level conditionality. In the case of large repurchases, upon employing the policy of Contraction during Expansion, the influences of two control variables remains unchanged, these are Short-Term Risk and Stock Market. While upon employing the policy of Expansion during Contraction, the influence of one control variable remains unchanged, which is Unemployment.

Regarding repurchase value, upon employing the repurchase policy of Contraction during Expansion, the influences of three control variables remains unchanged, these are Default Risk, Short-Term Risk and Stock Market. While upon employing the repurchase policy of Expansion during Contraction, the influences of two control variables remains unchanged, these are 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 business cycle than firm-level conditionality.

Thus we see that despite it being logical to expect deviation in business cycle influences over different business cycle stages, an idiosyncrasy is however revealed; the influences of individual business cycle 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 business cycle 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 support our assertion that the repurchase-business cycle relationship is most sensitive when it comes to the value of the repurchases undertaken.

##### 4.4.2.2. Structural Break Impact

Regarding payout-probability, upon employing the general repurchase policy of Post Break during Pre Break, the influence of two control variables remains unchanged, these are GDP and Stock Market. While upon employing

<sup>9</sup> The results are available in the Appendix.

the general repurchase policy of Pre Break during Post Break, the influence of two control variables remains unchanged, GDP and Stock Market. The identical results indicate that 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 business cycle than firm-level conditionality. In the case of large repurchases, upon employing the policy of Post Break during Pre Break, the influences of zero business cycle variables remains unchanged.. While upon employing their policy of Pre Break during Post Break, the influences of two business cycle variables remains unchanged, these are Term Structure and Short-Term Risk. Thus, no variable has an influence that is consistently dependent on the business cycle for both sets of repurchases.

Regarding repurchase value, upon employing the repurchase policy of Post Break during Pre Break, the influence of zero business cycle variable remains unchanged. While upon employing the repurchase policy of Pre Break during Post Break, the influence of two business cycle variable remains unchanged, these are 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 business cycle than firm-level conditionality.

The results for the periods surrounding the structural break reveal distinct characteristics. Firstly, the influences of the control variables are less dependent on the business cycle and more on the firm-level conditionality. For instance, when the Post Break repurchase policy is applied to the Pre Break business cycle 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-business cycle 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 1996:Q2.

## 5. Conclusion

This research was set out with the solo intention of addressing the absence of UK-specific literature regarding the repurchase-business cycle relationship. The headline of the results is the statement that corporate repurchase decision-making is statistically dependent upon business cycle conditions, with a further narrative detailing the business cycle's role in the decision-making. The business cycle correlation between periods based on repurchase values conforms to the relatively recent repurchase popularity, as it indicates that the business cycle 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.

During 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 business cycle 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. Furthermore, over the 30years the repurchase-business cycle 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 business cycle 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.

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## Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

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## Appendix

**Table A1.** Lag Selection.

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

Notes: 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.

**Table A2.** Business cycle Correlation.

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					

Notes: The table presents the complete pair-wise time-specific Pearson correlation matrix between the business cycle 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.

**Table A3.** Business Cycle Influence on Repurchase Payout-Probability (Coefficients).

	Aggregate		Expansion		Contraction		Pre Break		Post Break	
	All	Large	All	Large	All	Large	All	Large	All	Large
GDP	-1.515 (-0.06)	26.715 (0.92)	-9.711 (-0.26)	-35.314 (-0.76)	52.115 (1.18)	31.761 (0.77)	-12.389 (-0.31)	-18.983 (-0.34)	5.112 (0.13)	52.446 (0.84)
Unemployment	- 21.368** (-2.25)	-17.040 (-1.37)	- 48.733** *(-2.89)	- 35.450** (-1.98)	25.581 (1.08)	-18.574 (-0.86)	- 83.258** *(-3.35)	-3.614 (-1.64)	36.513 (1.63)	69.261** (2.22)
Term Structure	29.672** *(2.77)	29.057** (2.36)	33.214* (1.95)	0.016 (0.00)	26.155 (1.31)	-0.410 (-0.02)	60.299** *(2.68)	53.357** (2.45)	-7.888 (-0.39)	-20.605 (-0.77)
Default Risk	- 38.660** *(-2.94)	- 36.281** *(-2.56)	- 35.734* (-1.71)	- 77.784** *(-3.61)	-35.428 (-1.50)	-4.222(- 0.16)	-0.802 (-0.02)	-13.047 (-0.32)	-35.107 (-1.35)	- 96.040** *(-2.91)
Short-Term Risk	-0.818 (-0.01)	-40.512 (-0.43)	20.211 (0.15)	-229.193 (-1.41)	19.961 (0.23)	23.670 (0.25)	120.127 (0.60)	-77.527 (-0.39)	-24.334 (-0.30)	10.997 (0.08)
Stock Market	1.456 (0.31)	8.960(1. 49)	7.681 (1.06)	3.341 (0.40)	-9.935 (-1.22)	9.180 (1.08)	0.346 (0.05)	3.862 (0.40)	3.462 (0.52)	17.004* (1.73)
Constant	2.868*** (3.84)	0.692 (0.87)	5.069*** (3.47)	4.580*** (3.13)	-0.543(- 0.35)	0.158(0. 11)	7.993*** (3.45)	4.358*(1 .85)	-0.591(- 0.46)	-3.600*(- 1.94)
LR Chi <sup>2</sup>	14.07	16.64	21.72	22.73	9.37	3.63	21.42	15.33	9.16	31.17
Pseudo R <sup>2</sup>	0.102	0.130	0.316	0.297	0.137	0.058	0.395	0.321	0.111	0.403
Obs.	120	120	62	62	58	58	45	45	74	74

Notes: The table presents the coefficients produced from the testing of the influence of business cycle conditions on the probability of witnessing a repurchase announcement. Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated in the parentheses.

**Table A4.** Business cycle Influence on Repurchase Values (Coefficients).

	Aggregate	Expansion	Contraction	Pre Break	Post Break
GDP	5.302 (0.29)	-60.764* (-1.72)	45.465** (2.35)	-23.786 (-0.75)	-17.656 (-0.69)
Unemployment	-15.122** (-2.04)	-35.853*** (-3.16)	-16.957 (-1.34)	-46.856*** (-2.94)	47.522*** (3.33)
Term Structure	15.056** (2.30)	-9.672 (-1.24)	7.107 (0.55)	25.438*** (3.27)	-36.568*** (-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 <sup>2</sup>	17.89	26.82	13.60	28.80	54.30
Pseudo R <sup>2</sup>	0.081	0.226	0.047	0.227	0.259
Obs.	120	62	58	45	74

Notes: The table presents the coefficients produced from the testing of the business cycle conditions on the value of a repurchase announcement. Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated in the parentheses.

**Table A5.** Robustness Check: Mann-Whitney Rank Sum Test.

Pairs	Z-Score	H <sub>0</sub> = 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

Notes: The table presents the results from the Mann-Whitney robustness testing. Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and p-values are stated in the parentheses.



**Table A6.** Robustness Check: Variable-Level Influence on Payout-Probability.

Panel I: Coefficients								
	Business Cycle: Expansion		Business Cycle: Contraction		Business Cycle: Pre Break Repurchases: Post Break		Business Cycle: Post Break	
	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion
	All	Large	All	Large	All	Large	All	Large
GDP	-22.649 (-0.63)	17.607 (0.41)	-33.265 (-0.83)	-51.292 (-0.83)	-60.809 (-1.22)	-40.261 (-0.85)	162.001 (1.51)	33.576 (0.38)
Unemployment	16.791 (1.15)	8.377 (0.41)	-29.417 (-1.14)	162.166*** (-2.91)	95.283** (2.44)	92.889*** (3.29)	-59.011 (-0.93)	-1.227 (-0.01)
Term Structure	9.138 (0.62)	38.407* (1.95)	79.176** (2.35)	108.318*** (2.91)	-36.721* (-1.81)	-35.723 (-1.62)	5.722 (0.11)	- 177.594*** (-2.57)
Default Risk	2.395 (0.14)	10.986 (0.59)	-19.506 (-0.59)	52.852 (1.18)	-17.600 (-0.49)	32.301 (0.93)	33.304 (0.76)	-31.442 (-0.66)
Short-Term Risk	-41.390 (-0.35)	-115.913 (-0.84)	-138.763 (-1.52)	-227.542 (-1.54)	-399.819** (-2.09)	63.438 (0.29)	-699.451 (-1.49)	1421.861* *
Stock Market	2.401 (0.36)	11.587 (1.27)	-10.955 (-1.00)	-14.018 (-0.98)	1.614 (0.21)	-3.937 (-0.45)	2.024 (0.13)	-8.047 (-0.53)
Constant	-0.668 (-0.56)	-1.984 (-1.25)	4.038* (1.96)	7.972*** (2.86)	-5.271* (-1.94)	-9.886*** (-3.63)	4.216 (1.13)	2.747 (0.59)
LR Chi <sup>2</sup>	3.08	9.46	28.17	39.14	11.35	22.26	28.53	19.24
Pseudo R <sup>2</sup>	0.045	0.153	0.439	0.533	0.217	0.444	0.527	0.403
Obs.	58	58	58	58	45	45	45	45
Panel II: Marginal Effects								
	Business Cycle: Expansion		Business Cycle: Contraction		Business Cycle: Pre Break Repurchases: Post Break		Business Cycle: Post Break	
	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion	Repurchases: Contraction	Repurchases: Expansion
	All	Large	All	Large	All	Large	All	Large
GDP								
Minimum Level	0.788*** (7.26)	0.184** (1.81)	0.870*** (7.93)	0.542*** (2.72)	0.919*** (10.51)	0.402** (2.22)	0.115 (0.42)	0.130 (0.59)
Average Level	0.720*** (12.47)	0.226*** (4.48)	0.749*** (18.14)	0.339*** (8.64)	0.720*** (12.74)	0.265*** (5.53)	0.719*** (16.85)	0.228*** (4.64)
Maximum Level	0.585** (2.45)	0.309 (1.39)	0.663*** (5.26)	0.231** (2.06)	0.437** (2.06)	0.156 (1.59)	0.987*** (23.91)	0.347 (1.03)
Unemployment								
Minimum Level	0.549*** (3.13)	0.170 (1.35)	0.842*** (11.09)	0.549*** (7.31)	0.151 (1.59)	0.002 (0.46)	0.586*** (2.93)	0.224 (0.78)
Average Level	0.719*** (12.13)	0.224*** (4.49)	0.770*** (16.36)	0.150*** (3.26)	0.736*** (13.50)	0.192** (2.50)	0.212 (0.37)	0.218 (0.32)
Maximum Level	0.853*** (8.79)	0.289* (1.67)	0.527** (2.16)	0.001 (0.14)	0.980*** (49.97)	0.770*** (6.09)	0.035 (0.12)	0.213 (0.21)
Term Structure								
Minimum Level	0.634*** (3.86)	0.028 (0.71)	0.051 (0.48)	0.001 (0.19)	0.926*** (19.64)	0.591*** (3.13)	0.677* (1.91)	0.975*** (23.26)
Average Level	0.726*** (12.47)	0.199*** (3.61)	0.811*** (14.96)	0.274*** (5.21)	0.728*** (17.28)	0.288*** (5.01)	0.714*** (16.23)	0.292*** (3.55)
Maximum Level	0.789*** (7.02)	0.495*** (3.02)	0.998*** (279.19)	0.649*** (15.38)	0.456*** (3.84)	0.098 (1.27)	0.743*** (2.76)	0.001 (0.09)
Default Risk								
Minimum Level	0.701*** (4.27)	0.155 (1.39)	0.823*** (10.06)	0.056 (0.41)	0.810*** (5.63)	0.144 (1.36)	0.572 (1.24)	0.487 (1.18)
Average Level	0.723*** (12.65)	0.226*** (4.42)	0.741*** (18.63)	0.271*** (4.62)	0.735*** (12.95)	0.244*** (4.72)	0.605*** (3.53)	0.356 (1.61)
Maximum Level	0.738*** (5.95)	0.289** (2.21)	0.648*** (3.69)	0.506*** (3.97)	0.635*** (2.95)	0.386** (2.22)	0.733*** (13.19)	0.219*** (4.16)
Short-Term Risk								
Minimum Level	0.765***	0.331**	0.843***	0.427***	0.955***	0.210	0.837***	0.297***

	(6.01)	(2.13)	(13.53)	(7.04)	(20.95)	(1.44)	(11.15)	(4.04)
Average Level	0.728***	0.229***	0.776***	0.305***	0.691***	0.252***	0.134	0.001
	(12.49)	(4.26)	(16.67)	(5.50)	(11.76)	(5.28)	(0.47)	(0.19)
Maximum Level	0.659***	0.104	0.157	0.001	0.395***	0.287**	0.002	0.001
	(3.28)	(0.91)	(0.56)	(0.21)	(3.30)	(2.15)	(0.13)	(0.03)
Stock Market								
Minimum Level	0.629**	0.029	0.872***	0.504***	0.687***	0.340	0.677**	0.391
	(2.24)	(0.49)	(8.79)	(3.15)	(2.83)	(1.60)	(2.37)	(1.29)
Average Level	0.722***	0.222***	0.750***	0.330***	0.736***	0.255***	0.713***	0.218***
	(12.60)	(4.42)	(17.41)	(7.92)	(12.77)	(5.40)	(16.39)	(4.42)
Maximum Level	0.758***	0.382***	0.613***	0.191	0.755***	0.224***	0.728***	0.158
	(6.92)	(2.72)	(3.79)	(1.47)	(6.85)	(2.96)	(6.18)	(1.31)
Average of All Variables	0.730***	0.178***	0.859***	0.005	0.827***	0.143**	0.844***	0.053
	(12.31)	(3.08)	(14.12)	(0.43)	(10.48)	(2.08)	(9.94)	(0.75)

Notes: The table presents the results from the robustness testing of the influence of business cycle 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). Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated in the parentheses.

**Table A7. Robustness Check: Variable-Level Influence on Payout Value.**

Panel I: Coefficients				
	Business Cycle: Expansion Repurchases: Contraction	Business Cycle: Contraction Repurchases: Expansion	Business Cycle: Pre Break Repurchases: Post Break	Business Cycle: Post Break Repurchases: Pre Break
GDP	-10.973 (-0.50)	-23.802 (-0.91)	28.234* (1.65)	-34.065 (-0.81)
Unemployment	2.877 (0.42)	-77.787*** (-3.55)	56.947*** (4.40)	7.015 (0.14)
Term Structure	13.274 (1.46)	51.551*** (3.31)	-13.723 (-1.62)	-144.719*** (-3.73)
Default Risk	-7.896 (-0.81)	-3.099 (-0.17)	-10.545 (-0.55)	-3.699 (-0.13)
Short-Term Risk	-51.958 (-0.80)	-81.226* (-1.91)	51.062 (0.49)	-825.563*** (-3.20)
Stock Market	8.146 (1.48)	0.613 (0.15)	-3.840 (-0.91)	6.934 (0.74)
Constant	-1.993*** (-3.03)	3.424*** (3.10)	-7.298*** (-5.80)	-0.087 (-0.04)
WALD Chi <sup>2</sup>	14.01	33.15	29.23	41.71
Pseudo R <sup>2</sup>	0.042	0.250	0.261	0.248
Obs.	58	58	45	45
Panel II: Multi-Level Marginal Effects				
	Business Cycle: Expansion Repurchases: Contraction	Business Cycle: Contraction Repurchases: Expansion	Business Cycle: Pre Break Repurchases: Post Break	Business Cycle: Post Break Repurchases: Pre Break
GDP				
Minimum Level	0.041* (1.80)	0.265 (1.59)	0.054 (1.55)	0.127 (0.96)
Average Level	0.032*** (3.36)	0.137*** (6.20)	0.116*** (5.01)	0.054*** (4.00)
Maximum Level	0.021 (1.11)	0.089** (2.04)	0.214*** (3.33)	0.018 (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)

Notes: The table presents the results from the robustness testing of the influence of business cycle 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). Superscripts indicate statistical significance at the 0.10 (\*), 0.05 (\*\*) and 0.01 (\*\*\*) percent levels, and z-statistics are stated in the parentheses.

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