A Piece of the Corporate Payout Puzzle

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Preliminary version

Abstract

Corporate payouts are economically significant and have fluctuated dramatically for decades. Several researchers have documented these trends and waves in payout activity; however there has been little explanation for why these patterns occur. Existing literature focuses on examining cross-sectional variation in firm level characteristics as the basis for explaining payout policy, yet questions remain. In this paper, we examine the role of macroeconomic factors in the payout equation and find that payout activity fluctuates with changes in the business cycle. We find that changes in the business cycle contribute to an explanation of trends in payout level and form of payout.

Keywords: corporate payouts, dividends, stock repurchases, macroeconomic factors

1. INTRODUCTION

1.1 Motivation for this research

Corporate payout activity has been puzzling for decades. In a seminal paper, Fisher Black (1976) refers to the dividend puzzle in which pieces of the puzzle simply do not fit together. Corporate payout activity results from firm level decisions and incorporates a broad range of issues and influences. Payout decisions reflect investment opportunities, future outlook, and financing decisions, as well as other issues that may include financial flexibility and even management compensation. Payout decisions impact stock prices and engage investors in the decision making structure. For these reasons, payout research has both academic and practical or practitioner oriented motivations. In spite of decades of work, there is not one universal theory that explains payout activity. Numerous questions still remain, and the purpose of this research is to bring new tools and methods to examine still puzzling questions.

1.1.1 Practical motivation

Corporate decisions are made on an ongoing basis, within increasingly complex environments. It is no surprise that an informal review of business strategy textbooks, websites and case studies include the macroeconomic environment as a significant external factor to be considered when designing business strategy and decision making models. As business and markets become increasingly integrated, there is more interest and value in further understanding these interactions. Oxelheim (2002) suggests that due to increased financial and economic integration, no firm can claim to not be affected by what is happening in a broader economic arena. Yet, many questions persist that relate to how the macroeconomic environment impacts and influences numerous types and aspects of firm level decisions. In order to extend

understanding in this area, this research focuses on examining U.S. corporate payout decisions within a macroeconomic context.

Corporate payouts are the focus of this research for a number of reasons. Payouts are economically significant, they incorporate a broad range of corporate finance decisions, and payouts are important to investors. Corporate payouts also provide a rich environment for examining firm decisions from the perspective of why many firms make the same decision at the same time. Existing literature examines why a firm will initiate a payout, but there is very limited information on why many firm will initiate the same action at the same time. Researching payouts from this perspective provides practical insight into macroeconomic risk exposures, for both investors and managers.

1.1.2 Theoretical motivation

There is a rich theoretical environment in which to examine corporate payout activity. We begin with the primary reasons for the puzzling aspects of dividend payouts that are suggested by Fisher Black (1976). He suggests that from a perspective that considers overall value and tax impact of payouts, dividends do not make sense. Dividends are taxed twice: at the firm level and the investor level. In addition to the tax issue, payouts decrease future earning power by disgorging cash and decreasing the overall value of the firm. Miller and Modigliani (1958) develop the perspective of payouts impacting firm value. They suggest that dividend payouts impact future earning power by decreasing current cash holdings. This forward looking perspective expands the corporate payout discussion to include future impacts, and not simply current payouts.

Corporate payouts provide a rich framework for examining corporate decisions. Work in this area has evolved in significant ways, but questions remain. Initial corporate payout research

focused on two primary areas: firm level determinants of payout activity and firm value relative to payouts. Earnings have consistently emerged as a primary determinant of payouts. Firm value relative to payouts is based on the Gordon Growth Model (1976???) that suggests that the value of a stock is based on the future dividend payments. Stock values, as reflected in stock returns, are typically used as leading economic indicators based on the assumption that they reflect expectations about future economic activity; however the intuition is incomplete. Intuition suggests that stock returns, driven by future dividend payments, predict aggregate economic activity because dividends grow when the economy grows. Recent, as well as previous empirical evidence does not provide consistent support for this view. Recently Cochrane (2011) findings support Fama (1990) and suggest that there is a significant link between aggregate output growth and stock returns, but not between dividend growth and stock returns. This lack of correlation between stock returns and dividends indicates not only the importance of the discount rate, but the existence of an expanded sphere of influence that may impact both stock returns and payouts. This work focuses on examining payout activity through a macroeconomic lens. The purpose is to apply new methods to old questions related to why firms pay and what drives payouts. These methods allow for the study of a more complex set of variables and interactions.

In order to further motivate this study, we are interested in examining whether or not firms express concern about macroeconomic factors and influences. In order to analyze this particular issue, we hand gather data for an ad hoc analysis that includes a small sample of firms over a ten year period (2002 – 2012). We focus on the thirty firms in the Dow Jones Industrial Average. We consider this sample to be representative of the overall US economy and a basis on which to form a general assessment. We use this time frame because we want to examine the content of these letters in the years before, during and after the financial crisis. We gather data

from the 10K and examine the letter to shareholders and if included, the factors mentioned in the section that covers risk factors. We measure the number of times that statements were made that conveyed concern for the macroeconomic environment, for example, the mention of the economic downturn as a risk factor. Included here are the key results of interest. Findings indicate a sharp increase in the percent of firms that exhibit concern for the macroeconomic environment. In 2002, a low of 9.5% of firms mentioned these factors 4 or more times. In 2009, 80% of firms did so. Not surprisingly, this was the high for the ten year period. Following the financial crisis, the levels remain high and in 2011, they settled at 23% of firms mentioning these concerns four or more times. These results convey a concern for the overall economic environment at the firm level and further motivate the inclusion of macroeconomic factors within the analysis of payout activity.

This research differs from prior studies in several important ways. As previously mentioned, we apply new tools to examine payout decisions. We analyze payout activity using a Vector Autoregressive (VAR) / Vector Error Correction (VECM) approach following Enders (2010). This approach allows us to apply more recent econometric methods in an effort to capture and analyze the dynamics of short run and long run relations, as well as the simultaneous interactions among the variables of interest. This model allows for the analysis of both permanent and transitory effects. A second importance difference is that we include total payouts, total dividends, and total repurchases. Previous work has not included all of these factors and has not provided a comprehensive view of payout activity. Third, we analyze quarterly data from 1985 - 2011 and include industrials, financials and utilities. Previous work tends to eliminate utilities and financials. We follow Floyd, Li and Skinner (2011) who included financials, and also include utilities in order to have a complete picture of total payouts. Finally,

much of the preceding research on payouts focuses on why firms pay (Lintner, 1956; Lee, 1996, Lie and Lie, 1999; Fama and French, 2001) and in contrast, we focus on changes in the level of aggregate payouts. This study therefore compliments existing research on corporate payouts.

The purpose of this study is to examine how macroeconomic variables impact payout policy. By examining permanent and transitory effects, we hope to define the role that macroeconomic factors have in the corporate payout equation. We begin, where many studies do, and assume that earnings are a primary determinant of payouts, and that aggregate earnings and macroeconomic variables share a long term trend. We estimate a co-integrating relation between payout variables and several macroeconomic variables from 1984 – 2011 to determine how payouts respond to changes in the economy. We address the following two research questions. Do total corporate payouts and macroeconomic variables share long term equilibrium? Do these variables have a long term and/or short term causal relationships? The analysis is done by estimating co-integrating vectors using Johansen and Juselius (1990) methods and including the following factors. Payout activity is measured by total dividends, total repurchases and total payout, which is the sum of total dividends and total repurchases. We control for earnings and the level of the market using the price index for the S&P 500. The macroeconomic factors included are: industrial production index (IPI) , money supply (M1), inflation (CPI) and short term interest rate using the 3 month Treasury rate. Due to the co-integration results, we use a Vector Error Correction Model (VECM) coupled with Granger causality tests to find long term and short term causal relationships.

These results support some generally agreed upon findings; however they offer unexpected insight into the differences between dividends and stock repurchases. Granger causality examines short term causality and findings indicate those changes in IPI and the three

month Treasury rate Granger cause total repurchases. No Granger causality is found for dividends. These findings support the theory that dividends are "sticky", and once set, firms tend to be reluctant to make changes. Repurchases, on the other hand, are considered to be a more flexible payout method that can be responsive to changes in the payout environment.

A Vector Error Correction Model is used to examine long term relations, and once again there are interesting differences between dividends and repurchases. Two co-integration equations are found, indicating the presence of shared long term trends. These findings suggest that all three payout variables share a long term trend with IPI and short term interest rates. Total payout and total dividends also share a long term trend with CPI. It is noted that in the presence of more than one co-integrating vector, the first is most useful (Jahansen and Juseliu, 1990). These findings suggest that corporate payouts and macroeconomic variables do share a long term trend and that there are short term and long term macroeconomic influences woven throughout the payout equation.

The remainder of this paper is organized as follows. Section 2 is a brief literature review that includes both theoretical and empirical work, explaining the evolution of payout theory and the theoretical basis for the inclusion of macroeconomic factors. Section 3 describes the data. Section 4 includes methodology, preliminary tests, and the final model. Section 5 presents the results of the VECM regression and Section 6 concludes.

2. LITERATURE REVIEW

2.1 Payout Policy

Allen and Michaley (2002) suggest that the term "payout policy" implies that payout decisions are a complex process that encompasses both dynamic and consistent elements. We

expect payouts to be tied to certain determinants and that payout decisions will change as these determinants change. The majority of research in this area has focused on defining the primary determinants and understanding how payouts change, as these firm specific factors change. Limited research examines what factors cause the determinants to change, and how this ultimately impacts payout policy.

Theoretical arguments suggest that earnings, profitability and investment are the primary determinants of corporate payout policy. The theoretical framework for corporate payout activity is built upon the importance of earnings. Lintner (1956) provides this foundation and identifies earnings as the primary determinant of dividend payout activity. The role of earnings is the foundation of our theoretical understanding of payout activity. The theories are frequently cited that capture the importance of earnings and the tension between payout and retention: the agency cost theory (Jensen, 1986) and the pecking order theory of capital structure (Myers and Majluf, 1984), and the more recently developed lifecycle theory of corporate payouts (Grullon, Michaely and Swaminathan, 2002; DeAngelo and DeAngelo, 2006).

2.2 The evolution of the life cycle theory of corporate payouts

Agency-cost theory is built upon the agency relationship, which is an important relationship within the context of corporate finance. In this relationship, the agent performs a service on behalf of the principal and is compensated for this service by the principal. A potential conflict of interest exists within this relationship due to the ability of the agent to maximize own utility over principal utility. In corporate finance, the relationship between management and investors is a typical agency relationship. The agency cost theory of corporate payouts (Easterbrook, 1984; Jensen, 1986) addresses issues of managerial self-interest that impact the

payout equation and influence decisions regarding payout and retention. Agency theory suggests that managers may retain excess cash in order to benefit themselves at the expense of shareholders and they may adjust corporate decisions to advance their own interests. An expressed concern (Jensen and Meckling, 1976) is that when a firm's excess capital is more than enough to finance current investments, managers could use cash to overinvest in risky projects or increase their own compensation, instead of returning extra cash to shareholders. Easterbrook (1984) and Jensen (1986) suggest that shareholders should control the excess cash available to management and not allow it to build up. This is done by increasing payouts.

Myers and Majluf (1984) offer a different perspective that emphasizes retention, as opposed to payout. They focus on how payout decisions impact capital structure and financing decisions and suggest that firms prioritize sources of financing based on the principle of least resistance. The result is a pecking order that encourages the use of internal funds first, followed by debt, and finally by equity. Internal funds are obtained by retaining free cash flow and limiting payouts. The result is that there is no need to issue additional equity. Myers and Majluf (1984) encourage retention in order to avoid flotation costs, as well as the economic dilution that results from issuing additional equity.

The more recently developed life cycle theory of payouts (Grullon et al. 2002; DeAngelo and DeAngelo, 2006), considers the time-varying costs and benefits of payouts and retention as the foundation of a more comprehensive explanation of payout behavior. The focus remains on the need to deliver free cash flow to shareholders, but additional issues are taken into account. This explanation considers together the managerial incentives for payout and the capital requirements for investment as the basis of an optimal payout policy. This theory allows that the tradeoffs between retention and payout evolve and change over time as the firm's earnings and

investment opportunity set change. However, this theoretical framework does not address the consistent element of payout policy that might explain why many firms initiate similar payout activity during the same period. In this paper, we further investigate the dynamic nature of payout policy by examining how a consistent set of determinants impacts the time series of aggregate payouts.

2.3 Waves in total payouts

Evidence supports the existence of trends within total payout data (Floyd, Li and Skinner, 2011; Fama and French, 2001; DeAngelo, DeAngelo and Skinner, 2004; Dittmar and Dittmar, 2004). I return to Lintner (1956) to obtain a framework for examining why these trends occur. I use his well-known partial adjustment model as a framework and work with specifications of the form

$$D*_{it} = a_i + bY_{it} + cM_t + \in_{it} \quad (1)$$

where D* is the desired dividend payout, i and t denote the firm and time period, a is a fixed firm effect, Y_{it} reflects firm-specific economic variables that impact payout decisions, and M_t reflects macroeconomic variables that influence payouts, and $\in_{it}$ represents an error term. I take as the null hypothesis that c= 0. The alternative I offer is that c should differ from zero and that aggregate payouts should vary with macroeconomic conditions.

There is very limited work that examines trends in payout activity within the context of the overall economy; however existing research does identify patterns in corporate activity and provide guidance on factor and model selection when examining aggregate patterns of corporate events. Some existing research focuses on payout activity and some focuses on stock returns. We include both due to the theoretical link between stock returns and dividend payouts. Rau and

Stouraitis (2009) examine a number of corporate events waves and include stock repurchases. Using Vector Auto-Regression methods, they find a pattern in lagged activity that explains distinct patterns in waves of corporate activity. Dittmar and Dittmar (2004) also examine the stock repurchase equation and use a Vector Error Correction Model. They find a co-integrating relation between earnings and GDP. They use the deviation of earnings from the long run co-integrative equilibrium as a factor to explain total repurchases. Chen and Ross (1986) and Lettau and Ludvigson (2001) find macroeconomic variables systematically affect stock market returns. Serfling and Miljkovic (2011) examine how macroeconomic factors impact dividend yield and find significant interactions.

Previous work has identified significant relations between a number of macroeconomic variables, firm specific variables and waves of corporate activity. We continue this work and apply a Vector Error Correction model that allows for the examination of permanent and transitory effects in an effort to further understand the complex interactions that impact firm level payout decisions.

3. DATA AND SUMMARY STATISTICS

There are strong theoretical links between the macroeconomic environment and earnings, as well as corporate payouts and earnings. Existing literature provides a basis for factor and model selection. The purpose of this study is to analyze the relations between macroeconomic factors, aggregate earnings and three aggregate payout variables: total payout, total dividends and total repurchase. Examining firm specific characteristics within a macroeconomic context has a long history (Fama, 1981; Shiller et al.1984; Fama 1990; Cheung and Lai, 1999). We follow previous work in the selection of payout and macroeconomic variables (Dittmar and

Dittmar, 2004; Serfling and Miljkovic, 2011; Floyd, Li and Skinner, 2011), with the exception of monetary base.

The selected macroeconomic variables include the Industrial Production Index (IPI), Consumer Price Index (CPI), the price level of the S&P 500 index (S&P), the three month Treasury rate (short term interest rate) , and the monetary base (M1). The macroeconomic data were retrieved from the website of the Federal Reserve Bank of St. Louis. Data on the S&P 500 price level was obtained from the homepage of Robert Shiller of Yale University. Data is seasonally adjusted. Independent variables were reported monthly and dependent variables were reported quarterly. We converted monthly data to quarterly by taking an average. The payout variables are from COMPUSTAT North America quarterly data from 1984- 2011 available through WRDS. We follow Dittmar and Dittmar (2000, 2004) and use quarterly data. Dividends are the total amount of cash dividends paid (DVQ). Earnings are earnings before extraordinary items (IBQ) and represent the income of a firm after all expenses, including special items, income taxes and minority interest, but before provisions for common and/or preferred dividends. This item does not reflect discontinued operations or extraordinary items Stock repurchases are purchases of common and preferred stock (PRSTKCQ) and this item represents any use of funds which decreases common and/or preferred stock. We vary from previous studies and do not exclude any industry codes. Previous studies tend to exclude utilities and financials, however recent studies include financials. For this paper, we include both utilities and financials, in order to provide a distinct measure of aggregate payout activity. We address sub-groups in later work.

Existing literature not only informs our variable selection, it also informs our model selection. Vector Auto Regression models (VAR) and Vector Error Correction models (VECM)

have been used in a wide variety of financial problems (Campbell and Ammer, 1991; Sarig, 2004; Lettau and Ludvigson, 2001). Payout theory suggests that payout policy is not set but is the result of balancing time- varying costs and benefits of payout and retention. This implies the existence of short term and long term relations, within a dynamic environment. For example, a growing economy leads to an increase in sales and earnings for firms. If firms have investment opportunities available, excess earnings will be retained and used to fund these, resulting in no increase or a potential decline in payouts. If firms do not have investment opportunities, payouts may increase. If payouts increase, does that lead to a growing economy; or did a growing economy lead to an increase in payouts? The cycle is indefinite and it is incorrect to assume that one variable strictly causes another. It is difficult to assume the direction of causality and it is impossible to examine the limitless amount of macroeconomic data. For these reasons, a VAR/VECM model is an appropriate choice to analyze this data. This model allows us to investigate Granger causality between a number of variables that dominate the literature, make no assumptions regarding directional causality, and also captures the effects of unobservable variables with the inclusion of lagged values of the dependent variable.

4. METHODOLOGY, PRELIMINARY TESTS AND RESULTS

We follow Enders (2010) to develop this model and include four steps in this process: 1. pretest all variables for order of integration; 2. estimate the model to determine the number of co-integration equations; 3. identify causal linkages using Granger causality; and 4. interpret the VECM to determine statistical significance.

4.1 Pretest all variables for order of integration

We first test all series for unit roots. Although it is common practice in time series modeling to apply the augmented Dickey- Fuller and Phillips-Perron tests to determine whether a series has a unit root, improved tests with better statistical properties are now available. Elliot, Rothenberg and Stock (1999) proposed an efficient test that modified the Dickey- Fuller test using a generalized least squares (GLS) rationale. They demonstrate that this modified test has the best overall performance. We apply the GLS Dickey- Fuller test to all of the variables. The NG-Perron sequential t test is used to determine the optimum lag length. The results are shown in Table 1 and Table 2. The results reflect the existence of unit roots in all but one variable. All series are stationary when first differenced with the exception of the corporate yield curve. Since we first applied the natural logarithm to the total payout, CPI, IPI, S&P, and M1 before differencing, these variables can be interpreted as percent change. The yield variables, when differenced, are a change in the percent.

4.2 Test for cointegration

We test for co-integration in order to determine if a Vector Error Correction Model (VECM) or a Vector Auto Regression (VAR) model is appropriate. Due to the fact that these models are very sensitive to lag length, we use the Schwarz Information Criteria to determine lag length. If there is no co-integration present, we can apply a VAR model. If co-integration is present, a VECM model is the appropriate choice. We apply the Johansen (1991) method to test for co-integration to detect if there is a long run relation between the variables. After taking the first difference, any linear trend is removed. For this reason, we use the results from a model

that includes an intercept and not a trend. This test suggests two co-integration equations when estimating the VECM and the results of this test are in Table 3.

Comparing the trace statistic to the critical value for Rank = 1, the trace statistic exceeds the 5% critical value. This indicates that the hypothesis that Rank = 1 at the 5% level of significance in favor of the hypothesis that Rank is greater than 1. This indicates that there are two co-integrating relations in the data and therefore, a Vector Error Correction Model is the appropriate choice for model selection. This accommodates the fact that the variables have unit roots and also are co-integrated.

4.3 Granger causality

Granger causality tests determine if past values of variable X can help explain current values of variable Y. Since the results of the co-integration test revealed two co-integrating equations, the Granger causality tests involve the coefficients on non-stationary variables which lead to the standard interpretations of the F-statistic as being inappropriate (Enders, 2010). We use the Wald test that only considers the exclusion of the stationary variables resulting from being first differenced. Table 4 presents the results of the (VEC) Granger Causality/ Wald Test.

The key idea behind Granger causality is that past values of *X* can help explain present values of *Y*. Granger causality does not suggest that *X* causes *Y*. Variable *X* Granger causes *Y* is past values of *X* can help to explain current values of *Y*. The focus of Granger causality is short term relations, while the VECM identifies long term relations. The Granger causality result in Table 4 indicates that past values of industrial production and short term interest rates influence current values of total payouts and total repurchases, but do not exert short term influence on total dividends.

5. Results: Vector Error Correction Model

The vector error correction model is estimated for total payout, total dividend, and total repurchase. As outlined previously, the preliminary tests indicate the existence of two co-integration equations in this model, one for payout and one for earnings. Each VECM model includes four macroeconomic variables: percentage change in industrial production index, percentage change in consumer price index, percentage change in money supply (M1) and change in three month Treasury rate, while controlling for earnings and the price level of the S&P. As previously stated, results from Granger causality and weak exogeneity tests provide interesting results regarding the environment of influence. Granger causality tests, which focus on short run relations, indicate that IPI and the three month Treasury rate were endogenous for total payout and total repurchase. Weak exogeneity tests, which focus on long run relations, indicate IPI and the three month Treasury rate respond to deviations from a long run equilibrium relation. The VECM analysis further refines and clarifies these results.

The results from the VECM analysis support current theoretical explanations for payouts, but also indicate interesting differences among the three payout variables. These are reviewed in this section and reported in detail in Tables 5, 6, and 7. Two co-integration equations reflect the long term relations, while the error correction terms and speed of adjustment coefficients represent how each variable responds to deviations from the long run equilibrium. The first co-integration equation in each model is the primary focus. The first co-integration equation for total payout indicates changes in total payout share a long term trend with IPI, CPI and short term interest rates. The first co-integration equation for total dividends also indicates changes in total dividends share a long term trend with IPI, CPI and short term interest rates. The first co-integration equation for total repurchases indicates changes in total repurchases share a long term

trend only with IPI and short term interest rates. CPI is dropped from the equation and is not significant. Additional details are reported in the co-integration equations in Table 5.

The VECM results provide additional support for a significant relation between payouts and IPI and short term interest rates. Results for total payout indicate that IPI, CPI, the S&P, and the three month Treasury rate share a long term trend with total payout. IPI, CPI and the three month rate all have significant, negative relations with total payout. The VECM results for total dividends are similar to total payout. Total dividends share a long term trend with IPI, CPI, the S&P and the three month Treasury. As with total payout, all relations are negative. VECM results for total repurchases are a bit different. Total repurchases share a long term trend with IPI, S&P, and the three month rate. IPI and the three month rate are significant, negative relations and CPI is not significant relative to repurchases.

These results are not surprising. Industrial production (IPI) is a coincident economic indicator. Both theory and empirical evidence suggest that corporate cash flows are related to a measure of aggregate output such as gross domestic product (GDP) or industrial production (IPI). As previously discussed, overall economic activity and investment function within a feedback loop in which overall economic activity drives investment and investment drives overall economic activity (Bernanke and Gertler, 1989). Existing literature suggests that firms decrease payouts during times of increased investment, and increase payouts during periods of declining investment. Following previous research (Chen, Ross and Roll, 1986; Mukherjee and Naka,1995; Serfling and Miljkovic, 2011), IPI is used as the measure for overall economic activity. Our findings support a theoretical framework in which payouts decrease when aggregate economic activity is increasing, thus driving an increase in investment activity. Inflation, as measured by the consumer price index (CPI), is a source of uncertainty in financial markets. It is

considered a lagging economic indicator and in general, the literature suggests a negative relation between inflation and corporate output (Chen, Roll and Ross, 1986; DeFina, 1999; Humpe and McMillan, 2007). There are a number of theoretical explanations for this. First, inflation increases costs and that leads to a decline in profits. DeFina (1999) finds that there is a negative impact due to the immediate increase in costs and the delayed adjustment to output prices. The result is a decline in profits. The second theoretical explanation is that future inflation is a source of uncertainty that may result in increasing the discount rate and reducing the present value of future cash flows. Based on this theoretical framework, a negative relation between aggregate payout activity and CPI is not surprising. Interest rates have a broad range of influence within the context of this work and, once again, the literature provides a basis for hypothesis development and expectations. To begin with, the spread between long term rates and short term rates is considered a leading economic indicator and short term rates are classified as coincident indicators (Tainer, 2006). Short term rates reflect monetary policy changes and business cycle stages. Intuition and theory suggest that interest rates have a broad range of influence that includes the cost of external finance and the discount rate used in stock valuation models. An increase in interest rates increase the cost of external finance and ultimately lead to a decline in earnings, which leads to a decline in payout. An increase in the discount rate also results in a decline in the present value of future cash flows. In spite of different theoretical frameworks, the directional relation is consistently negative.

In many aspects, our findings are consistent with current theoretical explanations; however there are further results that offer additional insights. The results indicate strong similarities between the significant relations found for the two forms of payout: dividends and repurchases. The directional relations are not surprising. What is surprising is the level of influence and

sensitivity, as indicated by the coefficients. These findings suggest that repurchases are more sensitive to changes in IPI and dividends are more sensitive to changes short term interest rates. This finding supports the literature that suggests that repurchases and dividends are very different avenues for payout and not simply substitutions for one another. The repurchase form is considered to be more flexible and designed to disgorge non-operating or transitory earnings, while dividends are considered to be more consistent and less likely to be changed. The different coefficients for IPI clearly stand out in the results. A 1% change in IPI leads to a 10.58% decline in total payouts, a 5.37% decline in total dividends, and a 19.65% decline in total repurchases. This result reveals that repurchases are much more sensitive to changes in IPI. Further results indicate that dividends are more sensitive to changes in three month interest rates. A 1% change in the three month Treasury rate leads to a 1.88% decline in total dividends and only a .42% decline in total repurchases. Our findings suggest that IPI and short term interest rates influence payout decisions, both amount and form, in ways not previously understood.

6. Conclusion

Does payout activity share a long run equilibrium relation with the overall economy, and are there significant short term and long term influences in the payout equation that extend beyond firm level determinants? Our findings document significant relations between macroeconomic factors and aggregate payout variables. We investigate how total payouts, total dividends and total repurchases interact within a complex and dynamic system. We provide evidence in support of the lifecycle theory of corporate payouts that suggests that the business cycle influences the payout cycle and the primary links are earnings and firm investment. We also find support for the existence of significant differences between dividends and repurchases. We find this support

from examining payout activity beyond the firm level and identifying different sensitivities among payout variables and the broader business and economic environment.

How do we explain why many firms initiate the same action at the same time? We examine this question through the lens of corporate payout activity. Our findings suggest that dividends and repurchases need to be examined separately, as well as together in the form of total payouts. We argue that payout waves result from responses to the broad economic environment, as well as firm level characteristics. IPI significantly explains both repurchase and dividend activity. Specifically, IPI, as a measure of aggregate output, operates within a feedback loop in which economic activity drives investment and investment drives economic activity. In periods of increased investment, aggregate payout declines. Our findings show a greater decline in repurchases over dividends, and repurchases generally imply an increased level of financial flexibility in payout policy. With economic expansion also comes varying degrees of uncertainty (Dittmar and Dittmar, 2008), therefore increasing the need for flexibility and the impact to repurchases. Our findings are consistent with this explanation. Short term interest rates also significantly explain aggregate dividend and repurchase activity. As costs of external finance increase, earnings decrease, and payouts decrease. An alternative explanation is that an increase in external finance causes a decline in investment which would lead to an increase in payout. We provide evidence for a negative relation between short term rates and payout activity, as well as a stronger relation with dividends, as opposed to repurchases. Given that economic growth relates to each of these factors, our results indicate that payout activity and form fluctuate with changes in the business cycle indicating that changes in the business cycle contribute to the explanation of why many firms initiate payout activity, and select the same form of payout, at the same time.

References

Allen, F. and Michaely, R. (2002). Payout policy. *North-Holland Handbooks of Economics* edited by G. Constantinides, M. Harris, and R. Stulz, forthcoming.

Brav, A., Graham, J. R., Harvey, C. R. and Michaely, R. (2005). Payout policy in the 21st century. *Journal of Financial Economics*, forthcoming.

Campbell, J. and Ammer, J. (1991). What moves the stock and bond markets? A variance decomposition for long-term asset returns. Working Paper, NBER 3760.

Cheung, Y. W. and Lai, K. S. (1999). On cross-country differences in the persistence of real exchange rates. *Journal of International Economics, 48*, forthcoming.

DeAngelo, H. and DeAngelo, L. (2006). The irrelevance of the MM dividend irrelevance theorem. *Journal of Financial Economics, 79*(2), 293-315.

DeAngelo, H., DeAngelo, L., and Skinner, D. (2004). Are dividends disappearing? Dividend concentration and the consolidation of earnings. *Journal of Financial Economics, 72*, 425-456.

DeAngelo, H., DeAngelo, L., and Stulz, R. (2006). Dividend policy and the earned/ contributed capital mix: A test of the lifecycle theory. *Journal of Financial Economics, 81*(2), 227-254.

Dittmar, A. K. (2000). Why do firms repurchase stock? *Journal of Business, 73*, 331-355.

Dittmar, A. K. and Dittmar, R. F. (2004). Stock repurchase waves: An explanation of the trends in aggregate corporate payout policy. Working Paper, University of Michigan.

Easterbrook, F. H. (1984). Two agency-cost explanations of dividends. *American Economic Review, 74*, 650-9.

Elliott, G., Rothenberg, T. J., and Stock, J. H. (1996). Efficient tests for an autoregressive unit root. *Econometrica, 64*, 813-836.

Enders, C. K. (2010). *Applied missing data analysis*. New York: Guilford Press.

Fama, E. F. (1981). Stock returns, real activity, inflation, and money. *American Economic Review, 71*, 545-565.

Fama, E. F. (1990). Stock returns, expected returns, and real activity. *Journal of Finance, 45*, 1089-1108.

Fama, E. F. and French, K. R. (2001). Disappearing dividends: changing firm characteristics or lower propensity to pay? *Journal of Financial Economics, 60*, 3-43.

Floyd, E., Li, N., and Skinner, D. J. (2011). Payout policy through the financial crisis: the growth of repurchases and the resilience of dividends. Working Paper, University of Chicago.

Grullon, G., Michaely, R., and Swaminathan, B. (2002). Are dividend changes a sign of firm maturity? *Journal of Business, 75*(3), 387-424.

Guay, W. and Harford, J. (2000). The cash-flow permanence and information content of dividend increases versus repurchases. *Journal of Financial Economics, 57*, 385-415.

Jagannathan, M., Stephens, C. P., and Weisbach, M. S. (2000). Financial flexibility and the choice between dividends and stock repurchases. *Journal of Financial Economics, 57*, 355-384.

Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review, 76*, 323-9.

Jensen, M. and Meckling, W. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics, 3*, 305-360.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in gaussian vector autoregressive models. *Econometrica, 59*, 1551-580.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics, 52*, 169-210.

Lee, B. S. (1996). Time-series implications of aggregate dividend behavior. *Review of Financial Studies, 9*, 589-618.

Lettau, M. and Ludvigson, S. (2001). Consumption, aggregate wealth, and expected stock returns. *Journal of Finance, 56*(3), 815-850.

Lie, E. and Lie, H. (1999). The role of personal taxes in corporate decisions: An empirical analysis of share repurchase and dividends. *Journal of Financial and Quantitative Analysis, 34*, 533-552.

Lintner, J. (1956). Distribution of incomes of corporations among dividends, retained earnings, and taxes. *American Economic Review, 46*(2), 97-113.

Miller, M. H. and Modigliani, F. (1959). The cost of capital, corporation finance, and the theory of investment: Reply. *American Economic Review, 49*(4), 655-669.

Myers, S. C. and Majluf, N. S. (1984). Corporate financing decisions when firms have investment information that investors do not. *Journal of Financial Economics, 13*, 187-220.

Rau, P.R. and Stouraitis, A. (2009). Patterns in the timing of corporate event waves. Available at SSRN: http://ssrn.com/abstract=946797 or http://dx.doi.org/10.2139/ssrn.946797.

Sarig, O. (2004). A time-series analysis of corporate payout policies. *Review of Finance, 9*, 1-22.

Serfling, M. A. and Miljkovic, D. (2011). Time series analysis of the relationships among (macro) economic variables, the dividend yield and the price level of the s&p 500 index. *Applied Financial Economics, 21*, 1117-1134.

Shiller, R. J., Fischer, S., and Friedman, B. M. (1984). Stock prices and social dynamics. *Brookings Papers on Economic Activity,* 1984(2), 457-51.

Table 1: Results from Dickey Fuller GLS Test – natural log

Table 2 presents the results of this test using the natural log of total payout, CPI, IPI, S&P level, monetary base, M1 and M2. This transformation is not applied to the remaining variables. All results indicate the presence of a unit root with the exception of the corporate yield curve. This result indicates that this variable is stationary. The NG-Perron sequential t test is used to determine the optimum lag length.

Variable	Lag length	DF-GLS tau statistics	5% critical value	trend	level of significance	Decision
lntotalpay	12	-2.23	-2.76	trend	5%	contains unit root
lncpi	11	-1.36	-2.79	trend	5%	contains unit root
lnipi	8	-1.87	-2.87	trend	5%	contains unit root
lnsp	1	-1.34	-3.00	trend	5%	contains unit root
lnmb	10	-2.37	-2.82	trend	5%	contains unit root
lnm1	11	-2.06	-2.79	trend	5%	contains unit root
lnm2	10	-1.59	-2.82	trend	5%	contains unit root
CYC	3	-2.72	-2.08	no trend	5%	I(0)
TYC	1	-2.52	-2.10	no trend	1%	contains unit root
Moody Aaa	1	-2.35	-3.00	trend	5%	contains unit root
Moody Baa	0	-1.80	-3.02	trend	5%	contains unit root

Table 2**:** Results from Dickey Fuller GLS Test – first difference of the natural log

Table 2 presents the results of this test using the first difference of the natural log of total payout, CPI, IPI, S&P level, monetary base, M1 and M2. The natural log transformation is not applied to the remaining variables. The first difference of the logged variables results in growth rates. All results indicate the presence of a unit root. The NG-Perron sequential t test is used to determine the optimum lag length.

Variable	Lag length	DF-GLS tau statistics	5% critical value	trend	level of significance	Decision
D.lntotalpay	11	-2.06	-1.99	no trend	5%	I(1)
D.lncpi	10	-2.22	-2.00	no trend	5%	I(1)
D.lnpi	1	-4.69	-2.10	no trend	5%	I(1)
D.lnsp	0	-7.06	-2.11	no trend	5%	I(1)
D.lnmb	8	-2.44	-2.03	no trend	5%	I(1)
Dlnm1	12	-1.34	-1.97	no trend	5%	unit root
Dlnm2	9	-0.35	-2.01	no trend	5%	unit root
DCYC	12	-0.33	-1.97	no trend	5%	unit root
DTYC	12	-3.55	-1.97	no trend	1%	I(1)
D.AAA	7	-1.03	-2.04	no trend	5%	unit root
D.baa	1	-4.76	-2.10	no trend	5%	I(1)

Table 3: Results of Johansen co-integration test

The hypothesis being tested is always a certain co-integrating rank with the alternative hypothesis being that co-integrating rank is greater than the hypothesis being tested. In comparing the Trace statistic to the 5% critical value for Rank 1, the 5% critical value > the trace statistic. Thus, the hypothesis that Rank = 1 is rejected at the 5% level of significance in favor of the hypothesis that Rank > 1.

maximum rank	LL	eigenvalue	trace statistic	5% critical value	Max statistics	5% critical value
0	1025.0383		143.2524	82.49	67.4624	36.36
1	1058.7695	0.47402	75.79	59.46	39.176	30.04
2	1078.3575	0.31141	36.6140*	39.89	20.1764	23.8
3	1088.4457	0.17482	16.4376	24.31	12.221	17.89
4	1094.5562	0.10987	4.2166	12.53	3.3891	11.44
5	1096.2507	0.03176	0.8274	3.84	0.8274	3.84
6	1096.6645	0.00785				

Table 4**:** Results from Granger causality/ Block exogeneity Wald test

Null Hypothesis	Chi_sq	p-value
D.lnipi does not granger cause D.lntotalpay	7.09	0.03*
D.lncpi does not granger cause D.lntotalpay	2.46	0.29
D.lnsp does not granger cause D.lntotalpay	21.61	0.00*
D.threemnt does not granger cause D.lntotalpay	4.77	0.09
D.lnm1 not granger cause D.lntotalpay	14.20	0.00*
D.lntotalpay does not granger cause D.lnipi	2.75	0.25
D.lncpi does not granger cause D.lnipi	3.34	0.18
D.lnsp does not granger cause D.lnipi	43.43	0.00*
D. does not granger cause D.lnipi	5.93	0.05
D.lnmbdoes not granger cause D.lnipi	12.17	0.02
D.lntotalpay does not granger cause D.lncpi	6.96	0.03*
D.lnipi does not granger cause D.lncpi	5.56	0.06
D.lnsp does not granger cause D.lncpi	4.55	0.10
D.threemnt does not granger cause D.lncpi	1.18	0.55
D.lnm1 not granger cause D.lncpi	2.93	0.23
D.lntotalpay does not granger cause D.lnsp	0.58	0.75
D.lnipi does not granger cause D.lnsp	3.32	0.19
D.lncpi does not granger cause D.lnsp	1.61	0.45
D.threemnt does not granger cause D.lnsp	8.21	0.02*
D.lnm1 not granger cause D.lnsp	2.45	0.29
D.lntotalpay does not granger cause D.lnm1	2.93	0.24
D.lnipi does not granger cause D.lnm1	17.70	0.00*
D.lncpi does not granger cause D.lnm1	1.22	0.54
D.threemnt does not granger cause D.lnm1	4.10	0.13
D.lnsp does not granger cause D.lnm1	3.48	0.18
D.lntotalpay does not granger cause D.threemnt	12.82	0.00*
D.lnipi does not granger cause D.threemnt	22.73	0.00*
D.lncpi does not granger cause D.threemnt	5.62	0.06
D.lnsp does not granger cause D.threemnt	2.27	0.32
D.lnmb does not granger cause D.threemnt	11.63	0.00*

Notes: For each of the above variables, D.ln indicates the first difference of the natural log of total payout, CPI, IPI, S&P level and M1. The natural log transformation is not applied to the three month Treasury rate (threemnt). The first difference of the logged variables results in growth rates. * indicates significance at 5% level.

Table 5: Co-integration Equations from VECM results

Table 5 includes the estimated coefficients for the two co-integration equations for a VECM model that includes total payout, total dividends, total repurchases and IPI, CPI, S&P and the three month Treasury rate. L.ln indicates the lag of the log of the specified variable. P values are in parentheses. Following the literature, the focus is on the first co-integration equation for each payout variable.

Ce1	L.lntotalpay	-10.58L.lnIPI	-5.05L.lncpi	+5.67L.lnsp	-5.12Lthmnt	+39.16
		(0.00)	(0.02)	(0.00)	(0.00)	
Ce2	L.lntoearn	-8.81L.lnipi	-4.91L.lncpi	+4.62L.lnsp	+29.39	
		(0.00)	(0.06)	(0.00)		
Ce1	L.lntotaldiv	-5.37L.lnIPI	-5.82L.lncpi	+1.64L.lnsp	-1.88Lthmnt	+25.24
		(0.00)	()	(0.00)	(0.00)	
Ce2	L.Lntoearn	-7.24L.lnipi	-6.44L.lncpi	+2.30L.lnsp	-0.15Lthmnt	30.61
		(0.00)	(0.06)	(0.00)	(0.01)	
Ce1	L.lntotalrp	-19.65L.lnIPI	+4.38L.lnsp	-.42Lthmnt	+66.26	
		(0.00)	(0.00)	(0.00)		
Ce2	L.Lntoearn	-8.31L.lnipi	+2.55L.lnsp	+28.03		
		(0.00)	(0.00)			

Table 6: VECM Results for total payout

Table 6 includes the estimated error correction terms for a VECM model that includes total payout, IPI, CPI, S&P and the three month Treasury rate. L.ln indicates the lag of the log of the specified variable. P values are in parentheses.

Explanatory Variables		ΔlntotalpaY	ΔlntotalearN	Δlnipi	Δlncpi	Δlnsp	ΔlnM1	Δthrmn
		<0.01	0.37	0.01	<-0.01	-0.04	<0.01	0.05
		(0.73)	(0.01)	(0.00)	(0.70)	(0.02)	(0.00)	(0.61)
		-0.02	-0.50	< -0.01	<0.01	0.02	<-0.01	0.04
		(0.20)	(0.00)	(0.59)	(0.32)	(0.16)	(0.98)	(0.61)
Δ L.lntotalpay		-0.11	-0.29	0.02	<-0.01	-0.02	<-0.01	-0.18
		(0.25)	(0.57)	(0.13)	(0.53)	(0.85)	0.597	(0.72)
ΔL. lntotalearn		<0.01	-0.25	<0.01	0.01	<0.01	<0.01	0.25
		(0.58)	(0.00)	(0.26)	(0.73)	(0.55)	(0.98)	(0.00)
Δ L.lnpi		1.70	5.34	0.29	0.04	0.19	-0.25	4.51
		(0.01)	(0.11)	(0.00)	(0.49)	(0.74)	(0.02)	(0.16)
Δ L.lncpi		-0.11	-8.08	-0.14	-0.05	-2.45	0.17	-12.68
		(0.92)	(0.15)	(0.33)	(0.61)	(0.01)	(0.35)	(0.01)
Δ L.lnsp		0.41	2.59	0.06	0.01	0.40	-0.02	-0.55
		(0.00)	(0.00)	(0.00)	(0.40)	(0.00)	(0.41)	(0.39)
Δ L.lnM1		-0.30	-3.77	-0.24	-0.05	0.85	0.38	2.61
		(0.61)	(0.22)	(0.00)	(0.34)	(0.10)	(0.00)	(0.37)
Δ L.thrmn		0.04	0.17	<0.01	<0.01	<-0.01	<-0.01	0.61
		(0.02)	(0.05)	(0.05)	(0.77)	(0.80)	(0.06)	(0.00)
constant		0.01	0.01	<0.01	<0.01	0.03	<0.01	<0.01
		(0.25)	(0.99)	(0.02)	(0.00)	(0.02)	(0.00)	(0.89)

Notes: Included is the speed of adjustment (SOA) coefficient of the first and second co-integration equations, Δ denotes the change of the natural log of the total payout, total earning, IPI, CPI, the S&P level, M1 and the three month Treasury rate. P values are in parentheses and * denotes significance at the 5% level.

Table 7: VECM results for total dividends

Table 7 includes the estimated error correction terms for a VECM model that includes total dividends, IPI, CPI, S&P and the three month Treasury rate. L.ln indicates the lag of the log of the specified variable. P values are in parentheses

Explanatory Variables		Δlntotaldiv	Δlntotalearn	Δlnipi	Δlncpi	Δlnsp	ΔlnM1	Δthrmn
		-0.03	0.63	0.02	<0.01	-0.06	0.01	0.11
		(0.27)	(0.00)	(0.00)	(0.99)	(0.03)	(0.00)	(0.45)
		<0.01	-0.51	<-0.01	<0.01	0.02	<0.01	0.09
		(0.63)	(0.00)	(0.92)	(0.54)	(0.23)	(0.53)	(0.33)
Δ L.lntotaldiv		-0.10	-0.82	<0.01	<-0.01	-0.05	-0.02	-0.29
		(0.33)	(0.22)	(0.90)	(0.87)	(0.66)	(0.41)	(0.65)
ΔL. lntotalearn		<0.01	-0.25	<0.01	<0.01	<0.01	<-0.01	0.23
		(0.79)	(0.00)	(0.46)	(0.70)	(0.58)	(0.68)	(0.01)
Δ L.lnipi		0.79	5.38	0.32	0.03	0.13	-0.28	3.12
		(0.12)	(0.11)	(0.00)	(0.58)	(0.82)	(0.00)	(0.32)
Δ L.lncpi		0.51	-8.49	-0.07	-0.05	-2.47	0.18	-12.3
		(0.54)	(0.13)	(0.61)	(0.61)	(0.00)	(0.31)	(0.02)
Δ L.lnsp		0.08	2.49	0.07	0.01	0.39	-0.01	-0.70
		(0.43)	(0.00)	(0.00)	(0.35)	(0.00)	(0.41)	(0.27)
Δ L.lnM1		0.24	-3.75	-0.23	-0.07	0.72	0.36	1.49
		(0.60)	(0.22)	(0.00)	(0.20)	(0.17)	(0.00)	(0.61)
Δ L.thrmn		<0.01	0.16	<0.01	<0.01	<0.01	<-0.01	0.59
		(0.78)	(0.06)	(0.14)	(0.74)	(0.99)	(0.01)	(0.00)
constant		0.02	<0.01	<0.01	<0.01	0.03	<0.01	<0.01
		(0.11)	(0.97)	(0.18)	(0.00)	(0.00)	(0.02)	(0.93)

Notes: Included is the speed of adjustment (SOA) coefficient of the first and second co-integration equations, Δ denotes the change of the natural log of the total dividend, total earning, IPI, CPI, the S&P level, M1 and the three month Treasury rate. P values are in parentheses and * denotes significance at the 5% level.

Table 8. VECM Results for Total Repurchase

Table 8 includes the estimated error correction terms for a VECM model that includes repurchases, IPI, CPI, S&P and the three month Treasury rate. L.ln indicates the lag of the log of the specified variable. P values are in parentheses

Explanatory Variables		ΔlntotalrP	Δlntotalearn	Δlnipi	Δlncpi	Δlnsp	ΔlnM1	Δthrmn
		0.01	0.18	<0.01	<-0.01	-0.03	<0.01	0.01
		(0.54)	(0.00)	(0.00)	(0.38)	(0.02)	(0.00)	(0.84)
		-0.05	-0.50	<-0.01	<0.01	0.02	<-0.01	0.05
		(0.09)	(0.00)	(0.59)	(0.23)	(0.25)	(0.99)	(0.56)
Δ L.lntotalrp		-0.15	-0.08	<0.01	<-0.01	<-0.01	<-0.01	-0.03
		(0.12)	(0.76)	(0.29)	(0.83)	(0.90)	(0.94)	(0.92)
ΔL. lntotalearn		<0.01	-0.25	<0.01	<0.01	0.01	<0.01	0.25
		(0.90)	(0.00)	(0.35)	(0.70)	(0.47)	(0.97)	(0.00)
Δ L.lnipi		3.45	5.59	0.31	0.04	0.21	-0.25	4.61
		(0.00)	(0.10)	(0.00)	(0.51)	(0.72)	(0.02)	(0.16)
Δ L.lncpi		-1.90	-8.79	-0.14	-0.07	-2.40	0.15	-13.31
		(0.34)	(0.12)	(0.35)	(0.49)	(0.01)	(0.42)	(0.01)
Δ L.lnsp		0.83	2.58	0.60	<0.01	0.42	-0.02	-0.53
		(0.00)	(0.00)	(0.00)	(0.36)	(0.00)	(0.33)	(0.42)
Δ L.lnM1		-0.61	-3.05	-0.23	-0.03	0.82	0.38	3.39
		(0.57)	(0.32)	(0.00)	(0.56)	(0.11)	(0.00)	(0.24)
Δ L.thrmn		0.08	0.17	<0.01	<0.01	<-0.01	<-0.01	0.61
		(0.00)	(0.05)	(0.02)	(0.95)	(0.69)	(0.11)	(0.00)
constant		0.02	<0.01	<0.01	<0.01	0.02	<0.01	0.01
		(0.49)	(0.99)	(0.00)	(0.00)	(0.07)	(0.00)	(0.84)

Notes: Included is the speed of adjustment (SOA) coefficient of the first and second co-integration equations, Δ denotes the change of the natural log of the total dividend, total earning, IPI, CPI, the S&P level, M1 and the three month Treasury rate. P values are in parentheses and * denotes significance at the 5% level.