DO LOW INTEREST RATES ENCOURAGE ECONOMIC GROWTH EVERYWHERE?
THE EFFECT OF THE FEDERAL FUNDS RATE ON THE PROBABILITY THAT A COMPANY WILL REPURCHASE STOCK

A Thesis
submitted to the Faculty of the Graduate School of Arts and Sciences at Georgetown University in partial fulfillment of the requirements for the degree of Master of Public Policy in Public Policy

By

James Frkovich, B.A.

Washington, DC December 12, 2016
Copyright 2016 by James Frkovich
All Rights Reserved
DO LOW INTEREST RATES ENCOURAGE ECONOMIC GROWTH EVERYWHERE?
THE EFFECT OF THE FEDERAL FUNDS RATE ON THE PROBABILITY THAT A
COMPANY WILL REPURCHASE STOCK

James Frkovich, B.A.

Thesis Advisor: Robert Bednarzik, Ph.D

ABSTRACT

The Federal Funds Rate has been abnormally low since the 2008 financial crisis. The decision to keep it so low has been controversial for many reasons. However, one area that had not been adequately analyzed is the relationship between the Federal Funds and the probability that a company will repurchase its own stock. This paper empirically tests this relationship, and the results indicate that increasing the Federal Funds Rate is negatively related to the probability that a corporation will repurchase its own stock. This finding has significant policy implications, since a component of the Federal Reserve’s dual mandate is to maximize employment in the U.S. economy. This study indicates that a low Federal Funds Rate creates an incentive for companies to repurchase their own stock, rather than investing in job creating capital assets.
# TABLE OF CONTENTS

INTRODUCTION ................................................................................................................................. 1

I. REPURCHASING STOCK: THE MOTIVATION ............................................................................. 3

II. LITERATURE REVIEW ............................................................................................................... 4

III. THE ROLE OF THE FEDERAL RESERVE ........................................................................... 11

IV. THE FEDERAL FUNDS RATE AND STOCK BUYBACKS: THE CONNECTION ...... 14

V. HYPOTHESIS AND MODEL DESCRIPTION ........................................................................... 20

VI. REGRESSION RESULTS ............................................................................................................ 24

VII. ROBUSTNESS OF THE MODEL ............................................................................................. 27

VIII. POLICY RECOMMENDATIONS ............................................................................................. 29

IX. CONCLUSIONS ......................................................................................................................... 33

APPENDIX: Supplementary Materials ......................................................................................... 34

BIBLIOGRAPHY ............................................................................................................................... 37
LIST OF FIGURES

Figure 1: Average Federal Funds Rate.............................................................................................................. 11
Figure 2: Federal Reserve Effective Interest Rates: 1980-2015......................................................................... 12
Figure 3: High Market Quality Corporate Bond Yield Curve Par Yields, 1984-Present.................... 16
Figure 4: U.S. Corporate Profits 1980-Present.................................................................................................. 18
Figure 5: Annual Relationship Between the Federal Funds Rate and the Buyback Rate in the United States from 1984 to 2015................................................................................................................. 21

LIST OF TABLES

Table 1: Observations of Corporate Stock Buybacks in the Dataset............................................................ 21
Table 2: Variable Matrix and Rationale............................................................................................................. 23
Table 3: Regression Results Using LPM for Probability of a Stock Buyback .......................................... 26
Table 4: Federal Financial Regulators and Organizations................................................................................ 30
INTRODUCTION

Since global financial markets collapsed in 2007, central banks in developed economies around the world have been implementing policies that have kept interest rates at historic lows. In fact, amongst the top 10 largest economies in the world, only the emerging markets of China, India, and Brazil currently have interest rates set above 1 percent. Lowering interest rates to such historically low levels has been justified as a policy necessary to boost economic growth. This justification is rooted in the belief that low interest rates will encourage investment, which in turn will stimulate economic growth. However, the reality is that in spite of low interest rates, global economic growth remains anemic. Thus, it seems clear that low interest rates alone are insufficient as a policy tool for stimulating economic growth.

One issue that may be negating the effects of the monetary policy of controlling interest rates is the practice of share repurchasing, also commonly called stock buybacks. This is when a company buys back its own equity shares to increase the value of its stock. This behavior has been legitimate since 1982, when the Securities and Exchange Commission (SEC) implemented rule 10-18b that gave publicly traded companies a “safe harbor” for buying back their own stock, as long as a company implemented a share repurchasing program that did not buy more than 25 percent of the previous four weeks trading volume. The effect of this rule is that large publicly traded companies can buy back huge amounts of their own stock without fear of charges of stock price manipulation being filed against them by the SEC. For example, theoretically Apple could repurchase $1.5 billion of its own shares in a single day, and be assured that the SEC would not even investigate the company (Lazonick, 2014, p. 7).

Several researchers (Lazonic, 2014 & 2015; Wang & Bost, 2014; Galston & Kamarck, 2015) have argued that share repurchasing hurts economic growth, because it provides an
incentive for companies to use profits to artificially boost their stock price rather than make investments in fixed assets or research and development (R&D) that would generate employment and economic growth in the U.S. economy. However, no research has been done on the effect of the Federal Funds Rate set by the Federal Reserve on share repurchasing. An economic environment defined by a low Federal Funds Rate provides an incentive for companies to repurchase shares by depressing interest rates in the corporate bond market. The logic behind this argument is that a low Federal Funds Rate enables companies to issue bonds at low interest rates, which in turn reduces the cost of capital for companies carrying debt on their balance sheets. In this environment, Chief Executive Officers (CEOs) and Boards of Directors know that they have relatively cheap access to capital, and that the Federal Reserve is unlikely to dramatically increase interest rates in the short-term. Thus, there is an incentive to use profits to repurchase shares and reward investors with a higher stock price. If interest rates were higher, this behavior would be riskier, because companies would not be assured access to cheap capital in order to finance their operations.

By collectively repurchasing shares, U.S. companies may be depressing U.S. employment, as they are using corporate profits to reward shareholders rather than to reinvest in their business. This should be of concern to the Federal Reserve, as it’s stated objectives are, “maximum employment, stable prices, and moderate long-term interest rates” (“What are the Federal Reserve’s Objectives,” n.d.). Unfortunately, by depressing corporate bond markets the Federal Reserve may be creating a perverse incentive for corporations to repurchase shares rather than make investments that generate employment in the U.S. economy. Thus, the SEC’s rule 10-18b may be negating the positive economic effects of maintaining a low Federal Funds Rate.
In this paper the relationship between the Federal Funds Rate set by the Federal Reserve, and share repurchasing will be explored. This relationship is tested using a linear probability model (LPM). The results of the model indicate that there is a statistically significant negative relationship between the Federal Funds Rate and the probability that a company repurchase its own stock. The policy implications of these findings will also be discussed.

I. REPURCHASING STOCK: THE MOTIVATION

It should be noted that the motivation for repurchasing stock, generating value for shareholders, is not inherently bad. In fact, creating value for shareholders is considered by many to be the most important objective of a business. This view has most famously been articulated by economist Milton Friedman wrote an op-ed in the New York Times which stated that:

In a free-enterprise, private-property system, a corporate executive is an employee of the owners of the business. He has direct responsibility to his employers. That responsibility is to conduct the business in accordance with their desires, which generally will be to make as much money as possible while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical custom. (Friedman, 1970)

In making this argument, Friedman is essentially making the point that a business’s primary responsibility is to the shareholders that own the company. Therefore, the motivation behind repurchasing stock is arguably in line with the fundamental purpose of business.

However, it should be noted that when Friedman wrote his now famous op-ed in 1970, repurchasing shares was not the means by which companies generated shareholder value. At the time, the SEC had not instituted rule 10-18b that gave corporate executives safe harbor to repurchase large amounts of shares. As a result, corporate executives could not repurchase stock and be guaranteed that they would not be investigated by the SEC for manipulating a company’s stock price. For this reason, executives relied almost solely on dividends to generate value for shareholders. A dividend is a yearend payment that a company makes to shareholders that own a
company’s stock. Before the SEC implemented rule 10-18b in 1982, dividends were the primary means through which executives could generate value for shareholders with yearend profits. The other means of shareholder value creation, the stock price, was dictated by the market, and corporate executives could only affect a company’s stock price by demonstrating strong corporate performance.

The SEC changed this environment by implementing rule 10-18b. It gave corporate executives the ability to affect the price of a company’s stock through share repurchases. Proponents of this rule change argued that giving executives the ability to repurchase stock was necessary because of market inefficiencies. Specifically, proponents of stock buybacks argue that at times it is necessary for executives to be able to repurchase shares when the market undervalues the stock of a company. Additionally, stock buybacks could be necessary to stabilize a company’s share price following a major merger or acquisition (Keasler and Byerly, 2015, p. 14).

Another reason that corporations cite for repurchasing stock is that it allows them to generate value for investors at a lower tax rate. This is because buybacks result in an increased price per share that is taxed at the capital gains tax rate of 15 percent for individuals in high income tax brackets. Meanwhile, ordinary dividends are taxed as personal income, which could result in a tax rate of 39.5 percent for high net worth individuals. Thus, there is a tax incentive for corporate executives to generate value for investors through stock buybacks rather than through dividend payments, as buybacks give shareholders “tax flexibility.” (Ryan, 2014)

II. LITERATURE REVIEW

A number of studies (Lazonic, 2014 & 2015; Wang & Bost, 2014; Galston & Kamarck, 2015) have examined the economic outcomes of corporate buyback behavior. Despite the
justifications for share repurchases, most empirical research (Almeida, Fos, & Kronland, 2015; Keasler & Byerly, 2015; Fu & Chiang, 2016) has shown that the practice has negative consequences for both businesses and the U.S. economy. To begin with, research at the Academic-Industry Research Network (2014) has demonstrated that in practice companies do not tend to buy stock when the stock price is low in bear markets, but rather when it is high in bull markets. This behavior demonstrates that companies are not repurchasing stock to correct for “undervalued” stock, but rather to increase the price of already highly valued stock (Lazonick, 2014, p. 7). Thus, aggregate corporate behavior does not appear to reflect the logical justification for share repurchases.

The reason for this seemingly paradoxical situation can be traced to agency theory, which gained traction in the United States in the 1980s. Agency theory was developed by Michael C. Jensen in 1976 as a means of explaining how firms could most efficiently manage their resources. Jensen’s research (1976) focused on agency costs and how they decreased a firm’s efficiency. The agency costs that Jensen studied were the result of a contractual relationship between the owners of a publicly traded company (shareholders) and a company’s corporate management. He (1976) argued that agency costs arose because managers were not always provided the right incentives to maximize shareholder value, but rather were actually incentivized to make inefficient investments in capital that increased their power and standing within a company. This inefficiency could be corrected by making a corporation’s leadership “owners” as well as managers of a company; creating personal incentives for managers to maximize shareholder value (Jensen & Heckling, 1976). Jensen’s later work also showed that CEOs paid through stock options, rather than through regular income, tended to generate higher returns for shareholders (Jensen & Murphy, 1990).
As agency theory gained traction through the 1980s and 1990s, the general consensus in academia became that the purpose of business was to maximize shareholder value. This argument had important effects on public policy as demonstrated by changes that Congress made to the U.S. tax code in 1993. In that year they passed an omnibus spending bill that included an important section called 162 (m). This section limited possible tax deductions for the CEO of a company and a company’s four top executives to $1 million each. More importantly, the rule also deemed “qualified performance-based compensation” tax exempt (Rose & Wolfram, 2002, p. 140-141). Thus, executives were to be paid in stock options rather than in actual income, with the idea being that CEOs would run companies more efficiently if they knew that their pay was tied to company performance.

The effect of this rule change on CEO compensation has been significant. According to the Brookings Institute’s Center for Effective Public Management the average pay for a CEO running a company with a market capitalization of $1 billion or greater was $22.6 million in 2014. Of this amount CEOs were paid an average of $16.2 million in the form of stock awards. This finding is important, as it indicates that on average the CEOs of large publicly traded companies earn 72 percent of their personal income through stock options. (Galston & Kamarck, 2015, 10-11). This ratio for non-cash compensation to CEOs is concerning, because it provides a powerful personal financial incentive for CEOs to make the decision to buy back company stock.

This situation is especially problematic if one considers the long-term health of a company. As the chief executive of a company, a CEO is responsible for making decisions about how a company should invest its excess cash. With the ability to buy back stock, CEOs can guarantee that investors will see immediate returns and that their annual salary will be increased. Meanwhile, if CEOs decide to invest a company’s excess cash into an asset that has the potential
to generate long-term economic value, such as a factory, they are taking a risk, because they are investing in an asset with large fixed costs that may not pay off (Galston & Kamarck, 2015, 14-15). Thus, CEOs are institutionally and personally motivated to use excess cash to buy back stock rather than to invest in long-run economic value creation. This perverse incentive has been empirically tested by Lamba and Miranda (2010) who found a statistically significant positive relationship between the number of shares outstanding owned by a CEO and the size of a stock repurchase program, indicating that the decision to repurchase stock may be driven in part by a CEO’s personal motivations. This helps explain the paradox of CEOs buying back stock when prices are high.

The increasingly common trend of compensating CEOs through stock options rather than through cash- and the perverse incentives this practice creates- has caused several academics to criticize agency theory. In particular, critics take issue with agency theory’s assumption that the single purpose of a company is to maximize shareholder value (MSV). The loudest critic of agency theory has been William Lazonick, an economist at Harvard University, who argues that the MSV thesis has two fundamental flaws. First, Lazonick argues that MSV is flawed because it assumes that shareholders are the only stakeholders in a company that assume financial risk for a company’s performance. Lazonick contends that this assumption fails to include the government and workers as relevant stakeholders who bear a risk burden associated with corporate governance. He points out that governments bear a risk burden associated with corporate performance because they often provide financial incentives through subsidies and tax breaks to serve the public good with no guarantee of a return on their investment. Additionally, workers also often contribute to value creation at a company in a way that is above and beyond what they
are currently being paid, with no guarantee that their corporate managers will financially reward their time and effort. (Lazonick, 2015, p. 12-13).

A second flaw that Lazonick finds with agency theory is that the public shareholders that Jensen (1976) identifies as the main risk bearers in a company do not typically invest in the value creating aspects of a company. Rather, Lazonick argues that most public shareholders are traders who are simply hoping that the market price of their stock will increase so they can sell and make a profit (Lazonick, 2015, p. 14). Laurence Fink, the CEO of Blackrock- the world’s largest asset management firm- helpfully contributes to this idea by arguing that there is a distinction between types of shareholders in a company: owners and renters. According to Fink the shareholders who are the true owners of a company are the ones that buy company stock because they believe that a company is making investments in economic activities that will generate long-term economic value creation. Thus, true owners of a corporation take long-term investment positions with the expectation that a company will perform and provide a consistent return on investment. Meanwhile, renters of a stock invest with the expectation that market forces will quickly make a company’s stock price go up, allowing them to dump their shares and cash-in from a temporary change in stock price (Fink, 2015)

Fink’s distinction between owners and renters of a company’s stock demonstrates the fundamental flaw in a critical assumption that is central to agency theory, which is that shareholders have a common interest in holding managers accountable. Fink (2015) argues that this is not in fact true, and that shareholders have different interests that broadly put them into either the owner or renter category of shareholder. This situation is problematic, because CEOs are forced to contend with a conflict of interest between the shareholders that they are appointed to represent. Clearly Lazonick (2014) and the researchers at the Brookings Institute’s Center for
Effective Public Management (2015) contend that the current system incentivizes CEOs to act in the interests of the renters rather than the owners of stock. If they are right, stock buybacks are a financial instrument that effectively allows CEOs to artificially inflate the price of stock and create short-term value for investors at the detriment of a company’s ability to create long-term value. Thus, in the long-term companies that buyback stock should see their performance decline.

Unfortunately the empirical research on the effect of share repurchases on company performance is somewhat thin. However, recent research does seem to support the above thesis that stock buybacks favor short-term rather than long-term company goals (Almeida, Fos, & Kronland, 2015; Keasler & Byerly, 2015; Fu & Chiang, 2016). The strongest empirical research was a study conducted by Almeida, Fos, and Kronland (2015) on firm behavior following earnings per share (EPS) announcements. They used a regression discontinuity model\(^1\) to focus on firms that just missed their anticipated quarterly EPS targets by a few cents to those that beat their quarterly EPS targets by a few cents. They found that 37 percent of firms that repurchase stock fell into the narrow band to the left of just missing a quarterly EPS target. They then ran regressions with controls to observe the effect of the decision to repurchase stock on an average company’s employment levels, capital expenditures, and R&D. The results of these models showed that companies who just missed their EPS targets and executed share repurchases to adjust the price of a company’s stock, on average reduced employment, capital expenditures, and R&D. These findings suggest that many companies are willing to cut investment in their business’s ability to generate long-term value in order to repurchase shares in order to meet EPS targets. Such behavior could significantly impact a company’s long-term performance.

---

\(^1\) A regression discontinuity model tests the relationship between a dependent and independent variable by assigning a cutoff for the independent variable above or below which an intervention or behavior of interest is assigned.
This result has been further supported by research from Keasler and Byerly (2015) who found that on average the market capitalization of firms that made the decision to buyback stock decreased over both a five and ten year period, while on average firms that chose not to buyback stock saw their market capitalization increase over the same time periods. This finding is interesting, because it indicates that in the long-run the actual value of firms that make the decision to repurchase stock decreases over time.

However, it should be noted that Keasler and Byerly’s findings are statistically tenuous. Their research simply compares a buyback treatment group to a non-buyback control group over time, and does not control for any other variables that could be influencing the behavior of the control and treatment groups. Despite this weakness, other empirical research (Fu & Chiang, 2016) seems to support their findings.

A recent study out of the University of Singapore by Fu and Chiang (2016) found that from the period of 2003-2012 share repurchase programs ceased to generate abnormal positive returns in the long run. These findings were interesting because previous research had indicated the opposite. A study conducted by Ikenberry, Laknishok, and Vermaelen (1994), which looked at company data from 1980-1990, indicated a positive relationship between share repurchases and abnormal returns. A later study conducted by Peyer and Vermaelen (2009) confirmed these findings when looking at company data from 1991-2001.

It is important to note that the most recent research conducted by Fu and Chiang (2016) did not contradict the findings of previous studies. In fact from the periods of 1980-1990 and 1991-2001 Fu and Chiang’s results were consistent with previous studies which found that share repurchase programs on average generated positive abnormal returns. However, Fu and Chiang did find that this previous trend seems to have reversed itself after 2002, and their research has
indicated that since then companies that conduct share repurchase programs do not generate abnormal positive returns. These findings are further supported by the work of Keasler and Byerly (2015), which also covered the period of 2002-2012, and found a negative relationship between the decision to repurchase shares and market capitalization. Thus, it is possible that market forces changed in the early 2000s, and that companies suddenly were provided an extra incentive to repurchase stock at levels detrimental to long-term performance. A possible explanation for such a change in market forces was a change in monetary policy at the Federal Reserve.

III. THE ROLE OF THE FEDERAL RESERVE

The latest empirical research seems to indicate that there was a divergence in the relationship between a company’s decision to repurchase shares and corporate performance in the early 2000s. A possible explanation for the reversal in the relationship between share repurchases and long term corporate performance is the role of the Federal Reserve in setting the Federal Funds Rate and defining monetary policy. As Figure 1 and 2 shows the Federal Reserve has been steadily lowering interest rates since 1982 when the SEC implemented rule 10-18b. The orange lines in the chart reflect the three time periods where company performance following share repurchases has been studied as outlined in the literature review.

**Figure 1: Average Federal Funds Rate**

<table>
<thead>
<tr>
<th>Period</th>
<th>Average Federal Funds Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-1990</td>
<td>9.79 percent</td>
</tr>
<tr>
<td>1991-2001</td>
<td>4.96 percent</td>
</tr>
<tr>
<td>2002-2012</td>
<td>1.98 percent</td>
</tr>
</tbody>
</table>

*Source: Board of Governors of the Federal Reserve*
As the above chart shows, interest rates have shown a trend of consistently being lowered over the past three decades. When considered in relation to the empirical research, it is reasonable to surmise that lowering interest rates below a certain threshold may create an incentive for corporations to buyback stock at levels that are harmful to their long-term performance. As noted earlier, the empirical research indicates that corporate performance following stock repurchases was positive in the 1980s and 1990s, but negative following 2002. As the above table shows, during this final period the average Federal Funds Rate was 1.98 percent, well below the averages of the 1980s and 1990s. Furthermore, it is worth noting that since 2002 interest rates have only been above 2 percent in the period of 2005-2007. Thus, it is possible that when interest rates fall below a certain threshold publicly traded corporations are perversely incentivized to buy back stock at levels that hurt their long-term performance.

This behavior is counter to what the Federal Reserve intended when it lowered interest rates. During the period of 2002-2012 the Federal Reserve drastically cut interest rates twice in response to financial crises. The first drastic cut happened in January of 2002. At the time,
Federal Reserve Chairman Alan Greenspan justified the cut by arguing that it was necessary to stabilize financial markets and encourage consumer confidence following the 9/11 terrorist attacks. Greenspan cut the Federal Funds Rate by 3 percentage points bring it to 1.75 percent, its lowest level since 1948. (“Why Did the Federal Reserve,” 2002) After making such a drastic cut to interest rates, Greenspan then kept interest rates below 2 percent for 3 years, declining to raise them until 2005. Greenspan has since said that he kept interest rates low for such a long period because he was concerned about signs of deflation in the U.S. economy (Mufson, 2009).

The Federal Reserve then increased interest rates to levels comparable to the 1990s during Greenspan’s final year as chairman in 2005. However, Greenspan retired as chairman in February 2006, and was succeeded by Ben Bernanke who kept interest rates around 5 percent through 2007, but in 2008 Bernanke dramatically lowered interest rates in response to the 2008 financial crisis. As a result, by December 2008 interest rates were just 0.16 percent. Ever since Bernanke made this decision, the Federal Reserve has kept the Federal Funds Rate extremely low, having not raised the rate above .05 percent (“Selected Interest Rates,” n.d.).

It is also important to note that the Federal Reserve took measures beyond lowering interest rates to stabilize financial markets in response to the 2008 financial crisis. In November 2008 the Federal Reserve announced that it was implementing a program of “Quantitative Easing” in response to the financial crisis. Quantitative Easing (QE) is an unconventional monetary policy in which a central bank buys assets from commercial banks, in addition to the more traditional practice of buying government bonds, in order to increase the supply of money and credit in the economy (Mahajan, 2015). The Federal Reserve began implementing this policy by first purchasing $600 billion in distressed assets, such as mortgage backed securities, to help stabilize the finances of systemically important private banking institutions in the United States.
The Federal Reserve then continued to expand this program with the aim of creating the environment necessary for economic growth during the Great Recession. Mechanically, the Federal Reserve pursued this policy by announcing 3 rounds of QE, with the final round ending in October of 2014. By the end of the 3 QE programs, the assets held by the Federal Reserve increased from approximately $800 billion to $4.86 trillion (Irwin, 2014).

The point of highlighting the recent actions of the Federal Reserve is to indicate that there may be a relationship between a corporation’s decision to repurchase its own shares, and monetary policy set by the Federal Reserve. The empirical research outlined in the previous section indicates that in the early 2000s corporations may have changed their behavior, and began repurchasing stock at rates that have a negative impact on their long-term performance. When considering what may have caused this change of behavior, it is worth noting that monetary policy since the early 2000s has primarily been defined by responding to economic crisis. First, in the early 2000s Greenspan dramatically lowered interest rates to stabilize financial markets in response to the 9/11 terrorist attacks. Then, with interest rates having been set at normal levels for only 3 years, Ben Bernanke was forced to respond to the 2008 Financial Crisis by taking even more dramatic steps with monetary policy. Thus, it is possible that a relationship exists between monetary policy and a corporation’s decision to repurchase its own shares.

IV. THE FEDERAL FUNDS RATE AND STOCK BUYBACKS: THE CONNECTION

The connection between the Federal Funds Rate and stock buybacks is the effect that the Federal Funds Rate has on corporate bond markets. In order to understand this effect there must first be a discussion about three different types of securities: Treasury Bills (T-Bills), bonds, and equities. In finance, these different types of securities have different levels of risk and return. T-
Bills represent debt issued by the Federal Government, and are considered the least risky security on the market. However, T-Bills also have the lowest rate of return. Bonds are considered to carry mid-level risk and typically generate a return that is higher than T-Bills, but lower than equities. The reason for this difference is that bondholders are paid before equity shareholders if a company goes insolvent and is forced to liquidate its assets (“Corporate Bonds,” n.d.). For this reason, equities are considered the most risky investment of the three securities discussed.

The reason this risk/return relationship is important is that these securities affect each other in their pricing. Of particular importance to this paper is how the availability of T-Bills affects the corporate bond market. One of the mechanical actions that the Federal Reserve takes to lower interest rates is to buy and hold T-Bills. The Federal Reserve does this so that it can immediately put cash into the hands of T-Bill holders, adding liquidity to the financial system. Thus, buying T-Bills, in addition to lowering the Federal Funds Rate, has the effect of making credit more available through the banking system (Schoen, 2015).

By buying T-Bills and reducing the Federal Funds Rate, the Federal Reserve also depresses interest rates in corporate bond markets. This is because corporate bonds become more attractive to conservative investors when less T-Bills are available in the market. However, it is important to understand that this monetary policy does not affect bond markets equally. A low Federal Funds Rate makes short-term bonds more attractive to investors, and long-term ones less attractive. This is because investors that buy bonds with low yields in an environment defined by a low Federal Fund Rate risk being stuck with the low yield bonds if the Federal Reserve raises the Federal Funds Rate before they mature. Additionally, the value of the bonds would depreciate if such a scenario were to occur. Since the Federal Reserve regularly communicates its intention to either raise or lower the Federal Funds Rate, investors have more confidence in
bonds with a short-term maturity. Thus, when the Federal Funds Rate is low, the interest rates for bonds with short-term maturities are more affected than those with long-term maturities.

This trend can be seen in the below graphic which provides a market representation of corporate bond rates with maturities of 2, 5, 10, and 30 years respectively. These bond interest rates represent the average value of high quality corporate bond yields as reported by the Treasury Department. The graphic also shows the Federal Funds Rate for reference.

**Figure 3: High Market Quality Corporate Bond Yield Curve Par Yields, 1984-Present**

![Chart showing Federal Funds Rate and bond yields](chart.png)

*Source: Department of the Treasury and the Federal Reserve Board of Governors*

This chart shows that the Federal Funds Rate affects bond markets in two important ways. First, it shows the strong positive correlation between the Federal Funds Rate and interest rates in corporate bond markets. Secondly, it is important to note that there is a negative relationship between the Federal Funds Rate and the variation of pricing in the bond market. When the Federal Funds Rate is low, the spread between bonds with long-term maturities and bonds with short-term maturities widens, with short-term maturities having considerably lower interest rates.
This spread in interest rates has important implications for corporate executives who make decisions about investment in a company, especially when it comes to investing in expensive fixed assets. Traditional finance theory holds that loans with long-term maturities carry less risk for companies seeking to make large investments in fixed assets. This is because Net Present Value (NPV) of capital decreases over time. Because of interest rates, the NPV of capital is always greater in the present than in the future. Thus, when a company makes an investment in a fixed asset that will have a long-life it should prefer to take out a loan with a long-term maturity as a means of reducing risk. (Westerfield & Jordan, 2009, p. 208-215) For example, if a company were to invest in a factory that is expected to have a useful life of 30 years it could reduce risk in financing the asset by issuing a bond with a 30 year maturity and promising to pay for the asset with money in the future that is less valuable because of NPV. If a company were to decide to finance the factory by issuing a bond that matures in 5 years it would be taking a risk, because if the factory generated returns that were less than expected it would be financing an unproductive asset with present capital that is more valuable than future capital.

However, Morris (1976) demonstrated that when the covariance between revenue and interest rates is high, it is in the interest of a firm to take a debt management strategy that places a greater emphasis on bonds with short-term maturities than bonds with long-term maturities. This is because the variation in firm revenue is lessened over time, as borrowing costs tend to decrease when revenues decrease and vice versa. However, if there is a weak covariance between revenues and interest rates, then a company should hedge its position by placing a greater emphasis on issuing debt with longer-term maturities.

Market conditions post-2002 have weakened the covariance between corporations’ net revenue and interest rates. As Figure 4 shows, corporate profits in the United States dramatically
increased at times where interest rates were set very low after 2002. However, once the Federal Reserve set the Federal Funds Rate at low levels, it tended to only make minor adjustments to it. Thus, the covariance for firms that generated high profits over this period was weak, because revenues were going up while interest rates changed very little.

**Figure 4: U.S. Corporate Profits 1980-Present**

Theoretically, these market conditions should have created an incentive for CEOs to finance fixed assets using bonds with long-term maturities. However, the summary statistics indicate that on average this is not what has happened. Since 2002 the average proportion of cash flow used to buyback stock has increased by 30 percent. Over the same period the average allocation to capital expenditures fell by 40 percent. This has left American companies in a situation where the average age of their fixed assets has reached 22 years, their highest level since 1956 (Wang & Bost, 2014).
This is concerning, because CEOs seem to be making the decision to buyback stock at the expense of investment in capital assets such as plants and operating equipment. Additionally, corporations have been issuing debt at record levels since 2008, but it seems that little of the debt that has been issued has been used to finance capital assets in the United States. By the beginning of 2016, corporations had issued an unprecedented $29 trillion in bonds. Of that amount, 3.8 trillion was spent on mergers and acquisitions, and much of the rest was spent on stock buybacks and dividend payments to investors (Bakewell, 2016).

It should be noted that when companies issue debt to buyback stock and neglect capital investment, they are essentially transferring risk from shareholders to bondholders. If companies were to use capital raised from bonds to invest in fixed assets, they would be implementing a strategy that would place more risk on shareholders. This is because fixed assets create book value for a firm, and those assets can be used to reimburse bondholders if a company goes insolvent. Shareholders on the other hand are less inclined to desire that companies invest in fixed assets, because if a company goes insolvent they will only be compensated after all bondholder payments have been made.

The summary statistics make it clear that companies are taking steps that put the interest of shareholders above the interests of bondholders, and this behavior is understandable. After all, CEOs represent shareholders, not bondholders, and the purpose of business is to maximize shareholder value. However, what is concerning is that the Federal Reserve’s monetary policy may have created market conditions that favor shareholder interests over bondholder interests. In a market defined by high interest rates, bondholders have more leverage over corporate governance, because they can be more selective when purchasing bonds and charge companies that neglect investment in fixed assets a higher interest rate. However, bondholders lose this
leverage when rates are low, and the market loses an important mechanism through which companies that neglect investment in fixed assets are penalized.

Thus, it is possible that the Federal Reserve inadvertently creates a perverse incentive for companies to repurchase stock and neglect investment in fixed assets when interest rates are set at low levels. In such an environment, CEOs may find themselves in a position where normal market conditions would dictate that they invest excess cash or issue debt to finance new fixed assets, but abnormal market conditions caused by a low Federal Funds Rate make the decision to invest in fixed assets less appealing. Additionally, an economic environment defined by a low Federal Funds Rate provides shareholders with greater market power to the detriment of bondholders, removing an impediment that would normally restrict the amount of shares that a company would be able to repurchase

**V. HYPOTHESIS AND MODEL DESCRIPTION**

This paper will test the hypothesis that there is a negative relationship between the Federal Funds Rate and the probability that a corporation will repurchase its own stock in the United States during the period of 1984-2015. The intuition for this hypothesis can be observed in Figure 5, which indicates that there is a negative correlation between the Federal Funds Rate, and the probability that a corporation will repurchase its own stock. This hypothesis is tested using a model in which the key dependent variable is represented as a dummy variable that is coded 1 when the number of shares outstanding in a company decreases from the previous year and 0 when the number of shares outstanding in a company stays the same or increases. Data for this dummy variable was collected from income statements that reported the number of shares outstanding for publicly traded companies. The sample of companies examined included all 30 companies listed in the Dow Jones Industrial Average (DJIA), and the number of observations
for companies in this sample that repurchased stock is listed in Table 1 below. The key independent variable in this model is represented by the annual Federal Funds Rate, which is reported by the Federal Reserve Board of Governors.

**Figure 5: Annual Relationship Between the Federal Funds Rate and the Buyback Rate in the United States from 1984 to 2015**

![Graph showing the relationship between Federal Funds Rate and Buyback Rate from 1984 to 2015.]

**Table 1: Observations of Corporate Stock Buybacks in the Dataset**

<table>
<thead>
<tr>
<th>Company</th>
<th>No. of observations</th>
<th>Percentage of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyback</td>
<td>541</td>
<td>56%</td>
</tr>
<tr>
<td>No Buyback</td>
<td>366</td>
<td>38%</td>
</tr>
<tr>
<td>Missing Data</td>
<td>53</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>960</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
The study uses a linear probability model (LPM) that predicted the likelihood that a company will repurchase its own stock due to changes in the Federal Funds Rate. In order to better isolate this prediction the model includes multiple control variables outlined in Table 2. In general, these variables were meant to control for individual company traits, economic growth, changing conditions in corporate bond markets, and business sentiment about future economic growth. Individual company traits include the company’s size, captured through its inflation adjusted market capitalization, its inflation adjusted year to year investment in plant, property, and equipment (PPE), and any decisions to split a company’s stock. Larger companies are more likely to repurchase stock, as they have greater financial leverage that allows them to repurchase stock with lower short-term risk. Inflation adjusted PPE is also important to consider, as this variable represents the fixed assets of a company. If a company decides to invest in PPE, then it has less cash on hand to repurchase stock. Thus, the decision to buy PPE would make it less likely that a company would repurchase its own stock. Finally, as stock split is when a company splits existing shares in order to decrease the share price without diluting the value of the current shareholder’s stock. Splitting a stock dramatically increases the number of shares outstanding in a company, and it is possible that this action could influence the decision to repurchase shares. It is also possible to do a reverse split which would have had the effect of creating a false buyback in the model. However, no companies conducted reverse splits during the period of observation.

Model

\[ Y = B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 + e \]
### Table 2: Variable Matrix and Rationale

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Definition</th>
<th>Sign</th>
<th>Rationale</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Buyback Dummy variable that indicating whether a company repurchased its own shares.</td>
<td>N/A</td>
<td>Key dependent variable</td>
<td>Galston &amp; Kamarak 2016</td>
</tr>
<tr>
<td>$X_1$</td>
<td>$f_{fr}$ Annual Federal Funds Rate reported by the Federal Reserve.</td>
<td>-</td>
<td>Low interest rates reduce the risk of neglecting in capital investment</td>
<td>Maverick 2016</td>
</tr>
<tr>
<td>$X_2$</td>
<td>$f_{fr}^2$ Federal Funds Rate Squared</td>
<td>+</td>
<td>More actually represents the functional form of the model.</td>
<td>Maverick 2016</td>
</tr>
<tr>
<td>$X_3$</td>
<td>marketcap_2015 Company market capitalization: total value of a company. This value is also adjusted to 2015 dollars.</td>
<td>+</td>
<td>Represents company size. Larger companies are more likely to buy back stock</td>
<td>Galston &amp; Kamarak 2016</td>
</tr>
<tr>
<td>$X_4$</td>
<td>dppe_2015 Change in the value of a company’s plants, property, and equipment (fixed assets) year to year. This value is also adjusted to 2015 dollars.</td>
<td>-</td>
<td>Represents the value of a firm’s fixed assets</td>
<td>Galston &amp; Kamarak 2016</td>
</tr>
<tr>
<td>$X_5$</td>
<td>split Represents whether a company split its stock. Note: there are no reverse splits in the dataset</td>
<td>+</td>
<td>Control for changes in the dependent variable for reasons not caused by repurchasing stock</td>
<td>Westerfield &amp; Jaffe 2009</td>
</tr>
<tr>
<td>$X_6$</td>
<td>gdp Annual growth in GDP</td>
<td>+</td>
<td>Represents annual economic growth in the U.S</td>
<td>Leduc 2010</td>
</tr>
<tr>
<td>$X_7$</td>
<td>5yrspread Average difference between bonds with 5 year and 2 year maturities</td>
<td>-</td>
<td>Low long term yield discourages companies to repurchase shares with excess cash</td>
<td>Westerfield &amp; Jaffe 2009</td>
</tr>
<tr>
<td>$X_8$</td>
<td>cci Consumer Confidents Index (OECD)</td>
<td>-</td>
<td>When consumer confidence is high companies should invest in fixed assets to serve customers</td>
<td>Leduc 2010</td>
</tr>
<tr>
<td>$X_9$</td>
<td>Bci Business Confidence index (OECD)</td>
<td>-</td>
<td>When business confidence is high companies will place a greater emphasis on investing in fixed assets</td>
<td>Leduc 2010</td>
</tr>
</tbody>
</table>

The model also includes several variables that are meant to account for external economic factors that could influence a company’s decision to repurchase stock. This includes year to year growth in GDP, which is meant to control for present economic conditions, as it is expected that positive current economic conditions create an encouraging environment for
companies to buyback stock. The model also controls for the five year bond spread to take into account the effect that corporate bond markets can have on the decision to buyback stock through their relationship to interest rates. As previously noted, low interest rates are correlated with an increase in the spread between bonds with 2, 5, 10, and 30 year maturities. Finally, the last external macroeconomic factor that the model takes into account is business sentiment about future economic growth, which is represented in both the Business Confidence Index (BCI) and Consumer Confidence Index (CCI) variables.

A final note should be made that this model does not take into account variables related government regulation. Variables representing government regulation were tested from the Heritage Foundation’s Index of Economic Freedom. Specifically, indicators measuring business regulation, financial regulation, and fiscal freedom were examined. When these variables were included in the model they did not greatly affect the value or significance of the key independent variable. Including the variables in the model also diluted the model’s explanatory power, as the indicators from the Heritage Foundation’s Index of Economic Freedom were only available post-1993. Thus, including the indicators would mean dropping nearly a third of the model’s observations. Because these indicators did not change the significance or coefficient of the key independent variable, they were not included in the final model. However, they were considered and tested.

**VI. REGRESSION RESULTS**

The hypothesis was tested using three LPM regressions. Besides LPM, both logit and fixed effects models were tried. However, neither the coefficients nor the significance levels of the variables tested changed much in either of these models. As a result, the LPM coefficients were used for simplicity of interpretation.
As Table 3 shows, the results from the LPM regressions that test the relationship between the Federal Funds Rate and the probability that a company will repurchase its own stock.\(^2\) Model 1 has just the two hypothesized variables. They move in opposite directions, and as such appear to be negatively related. Model 2 adds internal control variables (market capitalization, changes in PPE, and corporate stock splits). A separate control variable representing the Federal Funds Rate squared was also included to account for the likelihood that there is a threshold level below which the Federal Funds Rate’s influence on the probability that a company will repurchase its own stock diminishes. This control is necessary to correct for the years 2008-2015 when the Federal Funds Rate was consistently abnormally low (below 1 percent). Model 2 indicates that there are strong significant relationships between market capitalization and changes in PPE and the probability that a company will repurchase its own stock. However, the control variables added in model 2 did not change the coefficient or significance of the relationship between the Federal Funds Rate and the probability that a corporation will repurchase its own stock.

Model 3 adds control variables that represent changes in the external macroeconomic conditions during the study period. These control variables include annual growth in GDP, the spread between bond markets with 2 and 5 year maturities,\(^3\) the Business Confidence Index, and the Consumer Confidence Index. Interestingly, in Model 3 the coefficient of the Federal Funds Rate increases from approximately 4.1 percentage points to 12.2 percentage points and remains statistically significant. Additionally, the market capitalization control variable is no longer significant, and the change in PPE variable is only marginally significant when the external macroeconomic control variables are added to the model. Among the external macroeconomic

---

\(^2\) The model was tested using both a link test and a Ramsey RESET test. Neither of these tests indicated a problem with the model’s functional form or omitted variable bias.

\(^3\) Both the 10 to 2 year and 30 to 2 year bond spreads were also examined. However, these spreads had a strong correlation to the Federal Funds Rate and had to be dropped from the model.
control variables, the spread between the 2 and 5 year bond markets is highly significant, and the Consumer Confidence Index score is significant. It should also be noted that the Business Confidence Index score, while listed as not significant, is nearly marginally significant with a p-value of 0.108.

**Table 3: Regression Results Using LPM for Probability of a Stock Buyback**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy: Probability of Stock Buyback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Funds Rate</td>
<td>-0.042***</td>
<td>-0.041***</td>
<td>-0.122***</td>
</tr>
<tr>
<td></td>
<td>(-7.74)</td>
<td>(-2.70)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Federal Funds Rate Squared</td>
<td>0.002</td>
<td>0.006***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.11)</td>
<td>(2.85)</td>
<td></td>
</tr>
<tr>
<td>Market Capitalization (Millions USD, inflation adjusted)</td>
<td>6.73x10^{-7}***</td>
<td>2.27x10^{-7}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.28)</td>
<td>(1.23)</td>
<td></td>
</tr>
<tr>
<td>Year-to-Year Change in Plants, Property, and Equipment (Millions USD, inflation adjusted)</td>
<td>-8.04x10^{-6}***</td>
<td>-6.64x10^{-6}*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.12)</td>
<td>(-1.77)</td>
<td></td>
</tr>
<tr>
<td>Dummy: Stock Split</td>
<td>-0.039</td>
<td>-0.036</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.451)</td>
<td>(-0.70)</td>
<td></td>
</tr>
<tr>
<td>Annual Growth in GDP</td>
<td>-0.021</td>
<td></td>
<td>-0.255***</td>
</tr>
<tr>
<td></td>
<td>(-1.34)</td>
<td></td>
<td>(-4.74)</td>
</tr>
<tr>
<td>Spread between 2 and 5 year bonds</td>
<td></td>
<td>-0.255***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-4.74)</td>
<td></td>
</tr>
<tr>
<td>Business Confidence Index Score</td>
<td>0.038</td>
<td></td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>(1.61)</td>
<td></td>
<td>(1.61)</td>
</tr>
<tr>
<td>Consumer Confidence Index Score</td>
<td>0.056**</td>
<td></td>
<td>0.056**</td>
</tr>
<tr>
<td></td>
<td>(2.14)</td>
<td></td>
<td>(2.14)</td>
</tr>
<tr>
<td>Observations</td>
<td>907</td>
<td>861</td>
<td>861</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.062</td>
<td>0.062</td>
<td>0.102</td>
</tr>
<tr>
<td>F-Statistic</td>
<td>59.95</td>
<td>12.39</td>
<td>10.72</td>
</tr>
<tr>
<td>Probability</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

T-statistics are given in parentheses. *, **, and *** represent statistical significance at the 90 percent, 95 percent, and 99 percent levels. There are 53 observations for which data was not available for the access to FFR dummy that were dropped from model 1. There were also an additional 46 observations which lacked data on market capitalization and change in PPE that were dropped from models 2 and 3.
All three of these models seem to support the hypothesis, as they show a statistically significant negative relationship between the Federal Funds Rate and the probability that a company will repurchase its own stock. This relationship also seems to be unaffected when control variables related to a company’s unique characteristics and external macroeconomic factors are added to the model, as expected by Galston and Kamarack.

VII. ROBUSTNESS OF THE MODEL

The basic model has some limitations that may affect the robustness of the model. The first factor to consider is that the sample of companies examined is limited to the 30 companies currently present in the Dow Jones Industrial Average (DJIA). While using this approach had the advantage of testing the model on a sample selected by experts at the Wall Street Journal’s editorial board to accurately represent the US economy, there are several drawbacks to this approach. Firstly, the companies represented in the DJIA (see annex A) are all large and well established companies that have excellent credit ratings. Thus, the sample does not represent smaller companies or companies that have riskier credit ratings, and it should be understood that the model’s predictive value is less useful if one is studying a company that has a profile different from those in the DJIA.

An additional limitation to the DJIA as a sample is that the companies in the DJIA change overtime, although changes are rare and only come after major events change the composition of a DJIA company such as a major merger or acquisition. However, several companies have been dropped and added to the DJIA during the time observed in the model. Since the version of the DJIA that is most relevant to policy is the DJIA in its present form, the companies currently listed in the DJIA were the ones selected to be observed over the period of observation, and those that have been dropped from the DJIA were not observed.
The model also has several limitations that are related to the control variables used. In relation to the control variables meant to correct for a company’s unique features (market capitalization, change in PPE, and stock split) a limitation was that the data source used for these variables was limited to publicly available information reported in the sample companies’ annual income statements and balance sheets. While these data are useful, other important factors internal to a company are ignored. Perhaps the most notable limitation to this approach is that it does not control for a company’s non-financial unique qualities such as industry and brand value. However, these fixed non-financial unique qualities, such as industry, were tested using a fixed effects model and found to have little effect on the model’s coefficient values or significance. However, non-fixed unique qualities, such as brand value, remain unaccounted for in the model.

An additional factor unique to each company that remains unmeasured in the model is company culture and corporate leadership. While these factors are largely qualitative and lack reliable data they are important, and could affect the predictive power of the model. Thus it would be valuable for future research to control for factors related to corporate leadership and culture, such as CEO compensation method.

A final limitation to the model is the availability of data that measures the influence of macroeconomic factors on the decision to repurchase a company’s stock. The model relies on national economic indicators that are relevant to all companies in the sample. However, many companies have other concerns that are industry specific, but potentially significant in making the decision to repurchase stock. For example, the presently low price of oil discourages investment in PPE in the petroleum industry, but encourages investment in PPE in companies with large supply chains that require large fleets of vehicles, such as Coca-Cola. These industry
specific indicators could potentially affect the decision to repurchase a company’s stock. However, they are unmeasured in the model.

**VII. POLICY RECOMMENDATIONS**

Despite the model’s sample limitations, the model seems to have a robust findings upon which to base policy. The model supports the hypothesis that increasing the Federal Funds Rate decreases the probability that a company will repurchase its own stock. This inverse relationship indicates that lowering the Federal Funds Rate increases the probability that a corporation will repurchase its own stock. This relationship should be concerning to the Federal Reserve, as it has important policy ramifications.

First, when a company makes the decision to repurchase its own stock it is also making a choice not to make a capital investment. This is significant, because a component of the Federal Reserve’s dual mandate is to support maximum employment. Low interest rates are meant to achieve this goal by supporting capital investment and making borrowing cheaper. While the Federal Reserve may achieve this goal with privately owned businesses, the model indicates that publicly traded companies are also provided an extra incentive to repurchase their own stock. This should be concerning to the Federal Reserve, because the SEC’s rule 10-18b provides publicly traded corporations a means through which to use a low interest rate environment to reward shareholders at the expense of using profits to invest in job creating capital investment.

In effect, the model indicates that SEC policy undermines the Federal Reserve’s efforts to stimulate job growth in the economy through monetary policy. This issue highlights the problem of fragmentation in financial regulation in the United States. As outlined in Table 4, multiple institutions with few clear delineations of responsibility regulate the U.S. financial system. One area where there is a clear delineation of responsibility is between bank regulators and securities
regulators. The results of the model presented in this paper demonstrate the limitations to this approach, as separating these responsibilities can prevent the desired effects of monetary policy.

**Table 4: Federal Financial Regulators and Organizations**

<table>
<thead>
<tr>
<th>Prudential Bank Regulators</th>
<th>Securities and Derivatives Regulators</th>
<th>Other Regulators of Financial Activities</th>
<th>Coordinating Forums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Deposit Insurance Corporation (FDIC)</td>
<td>Commodities Futures Trading Commission (CFTC)</td>
<td>Consumer Financial Protection Bureau (CFPB)</td>
<td>Federal Financial Institutions Examination Council (FFIEC)</td>
</tr>
<tr>
<td>National Credit Union Administration (NCUA)</td>
<td></td>
<td></td>
<td>President’s Working Group on Capital Markets (PWG)</td>
</tr>
<tr>
<td>Federal Reserve Board (FRB or Fed)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Congressional Research Service (CRS)*

In order to better understand the problem of fragmentation in America’s financial system, it is worth considering the mandate of the Federal Reserve and the SEC. Each of these institutions represents the leading bank and securities regulator respectively. The Federal Reserve has always played a role in banking regulation, but in 2010 the Dodd Frank Act dramatically increased its mandate by making it the primary regulator for financial firms that are deemed systemically important by the Treasury department’s Fiscal Stability Oversight Council (FSOC). As a result of this expanded power, the Federal Reserve has essentially become the government institution charged with monitoring and regulating the health of the U.S. financial system. The Federal Reserve is also given tools to intervene in markets, such as the Federal Funds Rate, when government intervention is needed to restore market stability. The SEC on the other hand has much more passive powers. Its main concern is maintaining fair markets and protecting investors from fraud. However, beyond disclosure requirements and a few specific
rules that apply to corporate governance, the SEC does not have any direct regulatory control over publicly traded corporations (Murphy, 2015, p. 23-24).

The point of highlighting the responsibilities of both the Federal Reserve and the SEC is to show that both regulators are narrowly focusing on two critical aspects of the U.S. financial system. The model presented in this paper shows the weakness of this approach, as restricts the ability of the U.S. financial regulatory system to respond to crises. A better approach to addressing future economic crises may be to suspend rule 10-18b at times when the Federal Reserve deems it necessary to set rates abnormally low. Doing this would prevent firms from repurchasing stocks during times of economic crises, and allow companies to reward shareholders only by paying dividends which are taxed at a much higher rate than buybacks. Alternatively, companies could either sit on their cash or invest in capital assets. Thus, the model in this paper indicates that suspending rule 10-18b during times of economic crisis would likely help the Federal Reserve better achieve its mandate to maximize employment in the United States.

The problem is that under the current financial regulatory system such a rule change would be outside of the mandate of the SEC. Since banks and securities are regulated separately, regulators are often mandated to achieve conflicting ends. Fed Chair Ben Bernanke recognized this conundrum in 2009, and argued that there was a need for a “Systemic Risk Authority” to manage and direct all components of financial regulation. Unfortunately, the 2010 Dodd-Frank Act failed to prevent the “balkanization” and “overlap” that Bernanke argued needed to be reformed in the U.S. financial regulatory system.

In addition to making many new regulations and restrictions for banks, the Dodd-Frank Act changed the U.S. financial regulatory system in three important ways. First, it made the
Federal Reserve responsible for regulating systemically important banks, but it left regulation of smaller banks to other financial regulators such as the OCC, FDIC, and NCUA. Second, it created the CFPB to serve as the regulator charged with protecting customers from fraud and abuse with the authority to regulate banks and nonbanks (automobile dealers, real estate agents, and insurance companies). Finally, the Dodd Frank Act created the FSOC as a body with the responsibility to coordinate and share information between America’s financial regulators (Murphy, 2015, p. 24-28).

While many of these reforms provided much needed resilience to U.S. financial regulation, the Dodd Frank Act failed to address the problems of balkanization and overlap identified by Bernanke, it merely added to it. Consider the creation of the FSOC, and its responsibility to coordinate and share information. This responsibility is shared with two other organizations, the FFIEC and PWG, which were created by previous governments to respond to earlier financial crises. It hardly seems efficient to have three organizations share the role of coordination and information sharing between financial regulators, but Dodd Frank did not address this issue when it created the FSOC. An additional problem with Dodd Frank is that it did nothing to enable the holistic management of the U.S. financial system. While the Federal Reserve and the SEC admittedly take a leading role, each regulator is still independently regulating their part of the U.S. financial system.

The model presented in this paper illustrates how regulating the U.S. financial system in this way can be problematic. While banking and security markets are clearly interrelated, they are regulated separately. This reality may be hampering the Federal Reserve’s ability to create stability and growth in the U.S. economy through monetary policy. Some have suggested that responsibility for managing the whole system should rest with the Federal Reserve (Bernanke
2009). While creating this mandate would greatly enhance the responsibilities of the Federal Reserve, it would have the advantage of allowing for the holistic management of the U.S. financial system.

IX. CONCLUSION

The model presented in this paper indicates that America’s fragmented financial regulatory system may have caused corporations to leverage the macroeconomic advantages created by a low Federal Funds Rate to repurchase stock and neglect capital investment. Taking such action creates generous returns for shareholders, but fails to achieve the Federal Reserve’s mandate of maximizing employment. This finding represents one of many problems that could be caused by fragmented financial regulation. Further research is needed to fully understand the issue of fragmentation of the U.S. financial regulatory system. However, it does seem intuitive that holistically managing the U.S. financial system would have many advantages. The findings of this paper represent one advantage that such a system could have.
Companies and Features of the Dow Jones Industrial Average

Companies Listed:

1. 3M
2. American Express
3. Apple
4. Boeing
5. Caterpillar
6. Chevron
7. Cisco
8. Coca-Cola
9. Disney
10. Dupont
11. Exxon-Mobil
12. General Electric
13. Goldman Sachs
14. Home Depot
15. IBM
16. Intel
17. Johnson & Johnson
18. JPMorgan Chase
19. McDonalds
20. Merck
21. Microsoft
22. Nike
23. Pfizer
24. Procter & Gamble
25. Travelers Companies
26. United Technologies
27. United Health
28. Verizon
29. Visa
30. Wal-Mart

*Source: “Dow Jones Industrial Average,” CNN Money*
Dow Jones Industrial Average Sector Allocations

Industrials- 19.66%
Financials- 18.69%
Customer Service- 15.47%
Technology- 14.51%
Health Care- 13.14%
Consumer Goods- 7.01%
Oil & Gas- 6.99%
Basic Materials- 2.59%
Telecommunications- 1.95%

*Source: Dow Jones Industrial Average Fact Sheet

Link Test

<table>
<thead>
<tr>
<th>Probability of Stock Buyback</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear predicted value</td>
<td>1.159*</td>
</tr>
<tr>
<td>$t = 1.71$</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Linear predicted value squared</td>
<td>-0.129</td>
</tr>
<tr>
<td>$t = -0.24$</td>
<td>(0.812)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.046</td>
</tr>
<tr>
<td>$t = -0.23$</td>
<td>(0.821)</td>
</tr>
</tbody>
</table>

Observations: 861
R-Squared: 0.1019
F-Statistic: 48.65
Probabilty: 0

Standard errors are given in parentheses. *, **, and *** represent statistical significance at the 90 percent, 95 percent, and 99 percent levels.

Ramsey RESET Test

The results of a Ramsey RESET test using power of the fitted values of growth yield an F-statistic of 0.10 (degrees of freedom = 3, 848; $p < 0.9603$).

White Test

<table>
<thead>
<tr>
<th>Chi Squared</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heteroskedasticity</td>
<td>148.41</td>
<td>52</td>
</tr>
</tbody>
</table>

*Note: Since the regression is a LPM model heteroskedasticity is not a relevant diagnostic for the model.
# Correlation Coefficients for Model Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Buyback</th>
<th>FFR</th>
<th>FFR2</th>
<th>GDP</th>
<th>MarketCap</th>
<th>PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Stock Buyback</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Funds Rate</td>
<td>-0.2492</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Funds Rate Squared</td>
<td>-0.2248</td>
<td>0.9461</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td>-0.1133</td>
<td>0.5518</td>
<td>0.5478</td>
<td></td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Inflation Adjusted Market Capitalization</td>
<td>0.1768</td>
<td>-0.4122</td>
<td>-0.3825</td>
<td>-0.1528</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Year to Year Change in Plant, Property, and Equipment</td>
<td>-0.0296</td>
<td>-0.0287</td>
<td>-0.260</td>
<td>-0.0129</td>
<td>0.3005</td>
<td>1.0000</td>
</tr>
<tr>
<td>Stock Split</td>
<td>-0.0575</td>
<td>0.1173</td>
<td>0.0709</td>
<td>0.1401</td>
<td>0.0002</td>
<td>-0.0251</td>
</tr>
<tr>
<td>Bond Market Spread Between 2 and 5 Year bonds</td>
<td>0.0637</td>
<td>-0.7122</td>
<td>-0.5929</td>
<td>-0.3417</td>
<td>0.1402</td>
<td>0.0071</td>
</tr>
<tr>
<td>Business Confidence Index Score</td>
<td>0.0560</td>
<td>-0.1532</td>
<td>-0.0740</td>
<td>0.4715</td>
<td>0.0356</td>
<td>0.0057</td>
</tr>
<tr>
<td>Consumer Confidence Index Score</td>
<td>-0.0887</td>
<td>0.6544</td>
<td>0.5557</td>
<td>0.6469</td>
<td>-0.0805</td>
<td>0.0275</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>Split</th>
<th>BondSpread</th>
<th>BCI</th>
<th>CCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Stock Buyback</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Funds Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Funds Rate Squared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation Adjusted Market Capitalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year to Year Change in Plant, Property, and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock Split</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bond Market Spread Between 2 and 5 Year bonds</td>
<td>-0.1196</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Confidence Index Score</td>
<td>0.0267</td>
<td>0.2901</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Consumer Confidence Index Score</td>
<td>0.1140</td>
<td>-0.6015</td>
<td>0.0973</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY


