Walden University

College of Management and Technology

This is to certify that the doctoral dissertation by

Simin Hojat

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Mohammad Sharifzadeh, Committee Chairperson, Management Faculty
Dr. Robert Aubey, Committee Member, Management Faculty
Dr. Jeffrey Prinster, University Reviewer, Management Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2015

Abstract

The Impact of Monetary Policy on the Equity Market

by

Simin Hojat

MPhil, University of Oxford, 1972

BS, University of Teheran, 1968

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

2015

Abstract

Prior studies examining the impact of monetary policy instruments on the equity market have produced mixed results. This problem is important to address because of the substantial impact of monetary policy on the economy and economic resource allocation via the equity market. The purpose of this study was to determine the impact of change in money supply (M2), change in Federal Funds Rate (FFR), and change in Federal Funds Futures (FFF) on the expected rate of returns of publicly traded companies while controlling for the rate of return of the whole equity market and size of the sampled companies. The capital asset pricing model formed the theoretical foundation. The research questions addressed the significance of the monetary policy instruments M2, FFR, and FFF on the expected rate of returns of publicly traded companies. The research design was ex post facto. To answer the research questions, annual data were collected for the period of January 2005 through January 2015 for the rate of return on the overall equity market, rate of return on stocks of 90 publicly traded companies, size of the sample companies, M2, FFR, and FFF. A multiple regression showed a positive effect of market rate of return and company size, a positive moderation effect of M2, and a negative moderation and mediation effect of FFR and FFF on the expected rate of returns of publicly traded companies ($p < .05$). These findings could have positive social change implications in that they may help individual and institutional investors in their investment decision making, leading to better allocation of economic resources. The findings may also assist monetary policy authorities in assessing the impact of monetary policy on the equity market and thus preempting stock market crashes.

The Impact of Monetary Policy on the Equity Market

by

Simin Hojat

MPhil, University of Oxford, 1972

BS, University of Teheran, 1968

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

2015

Dedication

Dedicated to my parents

Acknowledgments

I would like to first thank my dissertation chair and faculty mentor, Dr. Mohammad Sharifzadeh, who provided me with continual support and valuable insight. I also wish to thank my committee member, Dr. Robert Aubey, and my URR, Dr. Jeffery Prinster, for their valuable feedback.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Background

Since the outset of the industrial revolution, the equity market has played an instrumental role in the progress of economic production. This role has become much stronger with the growing complexity of the economic structure, particularly since the financial crisis of 2008 (Borys, 2011; Chiarella, Dieci, He, & Li, 2013; Dempsey, 2013; Doh & Connolly, 2013; Kolozsi, 2013). Thus, capital asset pricing and how equilibrium is established in the equity market have become the focus in all asset pricing models. Yet because asset markets are forward looking, asset pricing in the equity market is distinct from pricing mechanisms in other markets. In the equity market, the time pattern of expected cash flows and the time difference between asset purchase and future cash flows incorporate the elements of risk and expectations into the asset pricing models. Therefore, the important challenge in asset pricing models is to find out which factors determine the risks inherent in a specific asset. To answer this question, I developed a multifactor model for asset price determination in the U.S. equity market, with special emphasis on the change in monetary policy instruments of the Federal Reserve (the Fed).

Background of the Study

In the current economy, most individuals are directly or indirectly involved in the stock market. Each day, individual and institutional investors, such as mutual fund managers and insurance company representatives, invest funds in the stock market. Thus, to decide which stock to buy or sell, investors need to be able to estimate the expected rate of return on various stocks and the amount of risk inherent in each stock. On the other side of the spectrum, business corporations that try to raise capital by offering new securities to the market need to know how to decide on the price of the new securities. This research project was designed to study how the investors in the equity market decide on allocating their investment funds in various stocks—in other words, how they make choices on what stocks to buy or sell in order to obtain an optimum portfolio of stocks that maximizes their return and minimizes their risk.

Traditionally, the mandated goal of monetary policy has been price stability and optimal output and employment in the economy. To achieve this goal, central banks can manipulate some monetary policy instruments, such as by changing short-term interest rates and the volume of money supply. However, the effect of monetary policy on the so-called real economy develops through the broad channel of financial markets, including the equity market. In fact, monetary policy affects investors' asset allocation decision making, and subsequently this effect will be transmitted into the real economy. Therefore, knowledge of how monetary policy affects the financial market, and more specifically the equity market, is essential for understanding how monetary policy affects the broader economy. Because stock prices are highly sensitive to economic conditions and their values are volatile, this sensitivity can cause large swings in stock prices, lead to bubbles, and damage the whole economy (Borys, 2011).

Investors' decisions on what securities to purchase or sell in the equity market depend on three factors: (a) changes in the current and future dividends of the company, (b) changes in short-term interest rates, and (c) the element of risk involved in investing in a specific asset. The role of central banks and monetary policy implementation is essential for all three factors. For example, by changing short-term interest rates, the Fed sends signals to investors about the current and future economic outlook, which affect investors' buy and sell decisions in the stock market. Subsequently, investors' decisions to buy and sell affect the asset prices, which, in turn, impact the asset allocation in the broader macroeconomy. Moreover, any signal about a riskier macroeconomic environment in the future will reduce asset prices in the equity market (Chiarella et al., 2013).

Investors require a higher rate of return for investing in a specific asset if they expect the Fed to increase interest rates or if they expect a higher degree of uncertainty in the stock's future cash flows. Bernanke and Kuttner (2003), in their seminal research, indicated that the elements of risk and expectations are the most significant factors in asset price determination. In other words, the diversion of actual pay-offs from expected pay-offs makes one asset riskier than the other, and this differentiates the investors' expected or required rates of return for different assets. This relationship suggests that there is always a trade-off between the expected rate of return and risk of different assets: More risk requires more return. Hence, analyzing the risk-return relationship has historically been the theoretical foundation of all asset pricing models (Nyberg, 2012). This relationship also served as the framework for the model in this dissertation.

The theoretical explanation of asset pricing equilibrium in the equity market was accomplished by Markowitz and Sharpe, each of whom won the Nobel Prize for his work (Chiarella et al., 2013). The capital asset pricing model (CAPM), which was built upon the previous theory of modern portfolio theory (MPT) by Markowitz, thoroughly explained the relationship between risk and rate of return for any specific asset in the equity market. Markowitz, who has been called the father of modern portfolio theory, developed his theory based on a portfolio of assets rather than a single asset. Sharpe extended the Markowitz model and included a risk-free asset into the model, according to which investors could lend and borrow money at the fixed risk-free rate in their portfolio of assets (Chiarella et al., 2013).

By making some specific assumptions about operation of the capital market and investors, CAPM concluded that rational investors would seek a portfolio of assets that would yield the highest expected return in excess of the risk-free rate. Expected rate of return had two distinct components: the nominal risk-free rate and some risk premium, which represented the volatility of the expected pay-off from the asset. In addition, CAPM indicates a linear relationship between the expected rate of return of a specific stock and its risk. Citing earlier work by Sharpe, by Linter, and by Mossin, Chiarella et al. (2013) argued that to assure the equilibrium in the capital market, this linear relationship between return and risk should hold.

The unprecedented growth of information technology and the emergence of the so-called new economy have changed the structure of financial markets completely. In addition, the unprecedented financial crisis in 2008, which surprised many economists and financial authorities, was considered as a deficiency of classical and neoclassical approaches to explaining financial problems in the economy (Kolozsi, 2013). Furthermore, the literature has inadequately explained the role of monetary policy in the equity market (Abdymomunova & Morleyb, 2011; Alves, 2013; Berger, 2011; Febrian &

Herwany, 2010; Levy, 2012). Thus, by building this dissertation, I developed a multifactor model based on CAPM. To fill the gap, I added four factors to the standard CAPM. Three factors were monetary instruments of the Federal Reserve, namely M2, the Federal Funds Rate, and the Federal Funds Future.

When investors decide to invest their excess money in the equity market, they have to select among a variety of assets. Investment theories are concerned with how rational investors should decide on buying and selling a stock in order to achieve their objectives given various constraints, including their specific risk tolerance. What distinguishes asset pricing in the capital market from pricing in other markets is that the expected rate of return on assets in the equity market entails time patterns. Thus, in the equity market, assets are priced on the basis of their future pay-offs, the length of time that cash flows are expected to occur, and a discount rate to calculate the present value of future cash flows (Cochrane, as cited in Berger, 2011).

Different assets have different degrees of uncertainty, as defined by the diversion of actual return from the expected return, which implies different degrees of risk for different assets. Thus, two assets with the same cash flows might have different prices in the equity market if investors decide that one is riskier than the other. Therefore, the relationship between the expected rate of return of an asset and the risk inherent in the asset is one of the fundamental issues of asset pricing, both theoretically and practically. The CAPM that has been the most controversial and referenced theory in theories of investment has thoroughly analyzed this relationship between risk and expected rate of return (Chiarella et al., 2013).

The capital asset pricing model started with the single-factor CAPM model, which developed a simple linear relationship between the investors' expected rate of return from a security and the systematic risk inherent in that security. This model was later developed into several specific multifactor models. As noted by Sehgal and Balakrishnan (2013), studies with a firm-specific emphasis were Basu et al., Stattman, and Rosenberg et al. Other researchers focused on the relationship between monetary factors and change of stock prices in the equity market and found significant results indicating a significant relationship between monetary factors and stock prices in the equity market (Berger & Kibmer, 2009; Febrian & Herwany, 2010; Doh & Connolly, 2013; Gwilym, 2013; Kolozsi, 2013).

Furthermore, the role of money has changed immensely since the revolutionary growth of information technology. That role has grown as the economic structure has become more complex, specifically since the financial crisis in 2008. Thus, along with the changes in the structure of financial markets, the role of the Federal Reserve System broadened. The Fed now has the authority both to act upon economic activities through its various policy instruments and to regulate and supervise the whole monetary system, including commercial banks. Announcements by the Federal Reserve—even the way that they are worded—affect future economic forecasts as well as stock prices throughout the world (Kolozsi, 2013).

Moreover, along with these changes, the role of monetary policy instruments has changed. Since the early1990s, and specifically after the seminal work of Bernanke and Blinder, the Federal Funds Rate has been the most used policy instrument by the Fed

(Chiarella et al., 2013). Therefore, researchers are now more focused on using the Federal Funds Rate in their research to investigate the effect of monetary policy on the equity market (Chiarella et al., 2013; Dempsey, 2013; Febrian & Herwany, 2010; Gabaix, 2011).

As noted by Chen (2007), the newly used instrument for analyzing the effect of equity markets' expectations and the future course of monetary policy, the Federal Funds Futures, came from a study conducted by Bernanke and Kuttner. Their research showed that the elements of monetary policy changes that are unexpected by the public have a significant effect on equity prices by changing the equity premium. Bernanke and Kuttner (2003) derived a model for monetary policy changes and used Federal Funds Futures contracts as a proxy for market expectations. The authors showed that expectations were significantly more effective concerning the equity market than the real rate of interest (Chen, 2007). The model that I developed was similar to those of Bernanke and Kuttner and Bernanke (2010), with the addition of three independent variables.

Problem Statement

The important issue in asset pricing models is to identify the factors that determine the risks involved in the purchase of a specific asset (Sharpe; Linter; Mossin; as cited in Chiarella et al., 2013). The general problem addressed in this research was the factors that influence investors’ decision making in the equity market and how equilibrium is established in this market. The financial and economic crisis of 2007-2008, which surprised many economists and financial authorities, was considered to indicate a deficiency of the classical and neoclassical approach to understanding financial problems in the economy (Kolozsi, 2013). Furthermore, the literature has inadequately addressed the impact of monetary policy on the equity market (Abdymomunova & Morleyb, 2011; Alves, 2013; Berger, 2011; Febrian & Herwany, 2010; Levy, 2012). Therefore, the specific problem under study in this research was the impact of monetary policy factors, while controlling for macro and firm specific factors, on the equity market. This problem was important to address because the impact of monetary policy on the economy and economic resource allocation via the equity market is significant.

This research is an enhancement of the work of Bernanke and Kuttner (2003). However, the current model enhances Bernanke and Kuttner's model with the addition of the monetary aggregate M2 and the Federal Funds Rate. As a result, I seek to contribute to the field in developing a model consisting of five independent variables: M2, or the level of quantitative easing of the Federal Reserve; the Federal Funds Rate; Federal Funds Futures; companies' size as firm-specific risk; and the expected rate of return on the overall stock market as the systematic risk.

Purpose of the Study

In this quantitative study, I examined the effect of the independent variables market return, company size, change in money supply (M2), change in the Federal Funds Rate, and change in Federal Funds Futures on the dependent variable, the expected rate of return of companies' equity. In this ex post facto design, I collected time series of cross-section data (panel data) on the realized rate of return on the equity of a sample of publicly traded U.S. corporations. The data, from publicly available sources, covered the 10-year period of 2005-2015. I analyzed data using multiple regression models appropriate for panel data (time series of cross section) analysis. The findings are intended to help individual and institutional investors make more informed investment decisions and to assist monetary policy authorities in evaluating the impact of monetary policy on the stock market and thus taking preemptive actions to prevent stock market crashes.

Research Question and Hypotheses

The research question (RQ) guiding this study follows: How do the independent variables market rate of return, company size, change in money supply (M2), change in the Federal Funds Rate, and change in Federal Funds Futures affect the expected rate of return of companies' equity?

This RQ leads to the following five hypotheses:

Hypothesis 1

H_0: There is no relationship between the independent variable market rate of return and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable market rate of return and the dependent variable companies' expected rate of return on equity.

Hypothesis 2

H_0: There is no relationship between the independent variable company's size and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable company's size and the dependent variable companies' expected rate of return on equity.

Hypothesis 3

H_0: There is no relationship between the independent variable change in money supply (M2) and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in money supply (M2) and the dependent variable companies' expected rate of return on equity.

Hypothesis 4

H_0: There is no relationship between the independent variable change in Federal Funds Rate and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in Federal Funds Rate and the dependent variable companies' expected rate of return on equity.

Hypothesis 5

H_0: There is no relationship between the independent variable change in Federal Funds Futures and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in Federal Funds Futures and the dependent variable companies' expected rate of return on equity.

The above hypotheses were tested by running the following multiple regression model:

$$RR_{jt} = \beta_0 + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{jt} \qquad (1)$$

Where,

RR_{jt} = Rate of return on company's j stock during year *t*.

MR_t = Rate of return on the overall stock market during year *t*.

S_j = Company's *j* size, a dummy variable 1 if company is small, 0 if company is large.

MS_t = Change in money supply M2 during year *t*.

FFR_t = Change in Federal Funds Rate during time *t*.

FFF_t = Change in Federal Fund Futures during period *t*.

ε_{jt} = Regression residual.

The regression model was conducted using methods developed for panel data analysis, which I discuss in Chapter 3.

Theoretical Foundation

The capital asset pricing model (CAPM) was the core model for this research. The CAPM was constructed on the basis of Markowitz's portfolio investment theory. Markowitz developed this theory in 1952 and won the Nobel Prize in economics for it. According to Markowitz, the rates of return of individual assets move together, and the correlation between the rates of return of every two assets is rather stable. By knowing the covariance of returns for all assets, one can calculate the risk of any portfolio of assets; risk was defined as the standard deviation of returns (Markowitz, as cited in Berger, 2011).

Markowitz further argued that investors desire the maximum rate of return on a combination of risky assets. Amongst those combinations, he suggested, there is one combination that would carry minimum risk. Thus, on the basis of these analyses, for a given amount of risk, investors will choose the portfolio that will maximize the rate of return on the portfolio. Markowitz called these portfolios *efficient portfolios. The efficient frontier is* a smooth curve that shows that these efficient portfolios lie along a smooth curve (Berger, 2011). Then, assuming that investors are risk-averse, Markowitz suggested that investors choose the portfolio with the maximum rate of return, given their specific risk tolerance. This decision rule holds the basis of investors' buy and sell decisions in the security market. Subsequently, these transactions lead to market equilibrium in the asset market (Berger, 2011).

The CAPM was a simplified version of the Markowitz model. Sharpe was the first to develop CAPM, and this model was later advanced into the equilibrium model of CAPM (Berger, 2011). According to the CAPM, the reason for the covariation of rates of return for individual stocks is the existence of a common factor with which rate of returns on all assets covaries. That factor is the rate of return of the universe of all risky assets. In the CAPM, it is assumed that the rate of return of the whole stock market is a proxy for the universe of all risky assets. The CAPM relies upon a number of assumptions in order to get to a clear-cut formula for equilibrium in the capital market. Six main assumptions are the following: (a) the factors that investors consider for investing in the capital market should be limited to the risk of securities and their expected rate of return; (b) according to Markowitz's model, investors must be rational portfolio optimizers; (c) investors should have homogenous expectations and should have the same economic view of the world; (d) the capital market is a perfect competitive market, and thus no investor could affect the price of any security; (e) there exists a risk-free asset, and investors could borrow and lend at an identical risk-free rate; and (f) there are no taxes or transaction costs involved in investment in the capital market (Chiarella et al., 2013).

The most important tenets of the CAPM, based on the above assumptions, follow: (a) there is a linear relationship between the rate of return of any stock and the rate of return of the overall stock market; (b) the slope of this line reflects the degree of change of the rate of return of a stock as the overall market rate of return changes; (c) the systematic risk that is due to economic circumstances is the only risk that matters for investors, as in a diversified portfolio the risks specific to an individual stock would be eliminated; and (d) there is a stock market risk premium that is equal to the rate of return of the market portfolio minus the risk-free rate in the economy (Chiarella et al., 2013).

Tobin was one of the first scholars who asserted that "financial policies could play a crucial role in altering the market value of a firm's assets relative to their replacement costs" (Eherman & Fratzscher, 2004, p. 719). According to Tobin, a contractionary monetary policy will reduce and an expansionary monetary policy will increase asset prices. Since Tobin first published his perspective, many researchers have discussed the extent and direction of the impact of monetary policy on the equity market. Moreover, there has been some debate about definitions of monetary policy and different devices that central banks historically have used to implement monetary policy (Chen, 2007).

In addition, Fama -French developed an asset pricing model (FFM) by extending the CAPM and adding two new variables to it: (a) size, which was measured by market capitalization; and (b) value, which was measured by book equity to market equity. Fama-French documented their model as the three factor model (FF3). This model, used in many empirical testing situations, was believed to have outperformed all theoretical asset pricing models (Chiarella et al., 2013). Fama-French stated that their multifactor model is a good alternative to CAPM and can explain most of the CAPM anomalies. I followed Fama-French's model and adopted company size as a company-specific risk factor in my model (Chiarella et al., 2013).

Moreover, Fama-French (as cited in Sehgal & Balakrishnan, 2013) suggested another factor, called the *distress factor*, to be included in asset pricing models. The distress factor is a combination of price-to-earning (P/E), price-to-book equity (P/B), and past sales growth (PSG). Thus, companies under distress may yield higher returns to persuade investors to invest in their stocks because companies with high P/B, P/E, and high PSG typically yield lower returns (Sehgal & Balakrishnan, 2013).

Chiarella et al. (2013) focused on heterogeneity and evolutionary behavior of investors in the equity markets and incorporated the adaptive behavior of agents with heterogeneous beliefs in establishing a new version of CAPM, which they called the *evolutionary capital asset pricing model* (ECAPM). The Chiarella et al. results indicated that there is a spillover from the market price of one asset to other assets when rational behavior agents switch to better performing trading strategies. Also, Chiarella et al. concluded that the spillover effect is related to high trading volumes, and the authors found a positive correlation between price volatility and trading volume. They also concluded that the instability of equity markets happens when investors constantly switch to better performing strategies. Thus, on this basis, Chiarella et al. explained the long-term deviation of market prices from the trend and market crashes caused by asset bubbles.

Abdymomunova and Morleyb (2011) developed an improved version of the CAPM for book-to-market (B/M) across stocks with the inclusion of time variation and called this *conditional CAPM* (CCAPM). Abdymomunova and Morleyb concluded that in many cases in which the unconditional CAPM had been rejected, application of CCAPM showed a better result. Moreover, the authors concluded that the conditional CAPM under conditions of high volatility could explain returns on portfolios better than the unconditional CAPM.

Levy (2012) compared the CAPM with prospect theory (PT), which was developed by Kahneman and Tversky. The core idea of prospect theory is that the assumption of expected utility (EU) maximization along with risk aversion in the CAPM did not work in the real economy and should be replaced by a new paradigm. The authors suggested an alternative paradigm in which they claimed that change of wealth and loss aversion are the basis of investors' decisions rather than risk aversion, and they proposed an S-shaped value function, which contained a risk-seeking segment (Levy, 2012). According to this theory, the behavior of an actual investor is different from the behavior of the economic rational person that is one of the assumptions in CAPM. However, prospect theory is not aimed to be an equilibrium pricing model and therefore cannot replace the expected utility model of the CAPM (Levy, 2012).

According to Levy (2012), many economists who have performed experimental CAPM have accepted prospect theory (PT). For example, Tversky and Kahneman developed cumulative prospect theory (CPT) as an alternative to the expected utility paradigm. Whereas PT and CPT have become popular in economic research and have formed the foundation for a new branch in economics and finance—so-called behavioral finance and behavioral economics—CAPM has kept its status as the most popular asset pricing model (Levy 2012).

Levy (2012) reported that many prominent economists have justified the position of CAPM as the most used model of capital asset pricing, including Merton, Levy, and Samuelson and Berk. On the other hand, several economists have expressed that they do not believe in having a mathematical model for finance or economics. In addition, some economists have proposed that the phenomenon of global financial crisis and its devastating effects upon the global economy showed that markets can fail and that finance is not like physics, a science that can produce reliable predictive models (Dempsey, 2013; Moosa, 2013).

Other economists have focused on the role of monetary policy of the Federal Reserve on the movement of asset prices in the capital market (Bernanke, 2010; Chen, 2007). Bernanke and Kuttner (2003) pioneered the use of the Federal Funds Future, an instrument for analyzing the effect of equity markets' expectations and the future course of monetary policy. Bernanke and Kuttner emphasized that the unanticipated element of monetary policy and monetary policy surprises show a significant effect on equity prices through changing the equity premium (Bernanke & Kuttner, 2003). Bernanke and Kuttner tested the effect of investors' expectation obtained from Federal Funds Futures contracts on companies' return, and their result showed that real rate of interest had little effect on companies' return compared with expectations.

With the growing complexities in the economy and revolutionized information technology, the role of central banking has vastly increased in scope. Traditionally, the role of monetary policy was to check for inflation and set it at a rate corresponding with the natural unemployment rate in the economy. In this approach, the most effective instrument of monetary policy was monetary aggregates. Since 1990, and specifically after the 1992 work of Bernanke and Blinder, in studies about the effect of monetary policy on the equity market, Federal Funds Rate has been the most frequently cited instrument (Borys, 2011; Chiarella et al., 2013; Chen, 2007; Dempsey, 2013). In recent studies on the effect of equity markets' expectations and the future course of monetary policy, Federal Funds Futures have been considered the most effective monetary policy-related predictor of the economic activity (Febrian, & Herwany, 2010; Gabaix, 2011; Magni, 2010; Nyberg, 2012).

Moreover, Bernanke and Kuttner (2003) emphasized that the unanticipated element of monetary policy surprises shows significant impacts on the equity prices through changing the equity premium. Bernanke and Kuttner focused on monetary policy shocks and market expectations implied by Federal Funds Futures contracts. Their findings showed that Federal Funds Futures has a significant effect on the equity market, while the effect of real rate of interest on the equity market was minimal. Similar results were achieved by other researchers (Canuto, 2011; Chen, 2007; Doh & Connolly, 2013; Febrian & Herwany, 2010).

Nature of the Study

In this quantitative ex post facto design, I used existing panel data (time series of cross sections) to examine the relationship between independent variables and the dependent variable. The independent variables were market return, company size, change in money supply M2, change in the Federal Funds Rate, and change in Federal Funds Futures. The dependent variable was the expected rate of return of companies' equity. Multiple regression methodology was used to analyze data and examine the relationships between independent and dependent variables of the model.

Definitions

Beta (β): Beta shows how sensitive the rate of return of an asset is to the rate of return of the asset market as a whole. Typically, the S&P 500 Stock Index as a broad index represents the whole asset market.

Capital market: The capital market is a market for meeting demand for and supply of funds in which the length of time for investment is over 1 year. This is distinct from the money market, where financial instruments with maturity of less than 1 year are transacted.

Company size: Size is measured by market capitalization, which is calculated by multiplying the number of outstanding common shares of a company by the market price per share of the company.

Equity market: Equity market or stock market refers to when shares are issued and traded. The equity market is important for economic growth, as companies can have access to finance through this market.

Expected rate of return: Expected rate of return measures the benefits in excess of the initial investment as the percentage of the initial investment for a specific holding period. In case of stocks of a corporation, it can be calculated as the sum of the future price of the stock and the future dividends to be received from the stock less the original stock price divided by the original stock price.

Federal discount rate: "The Federal discount rate is the interest rate that is charged to the borrowing banks when they borrow from the Federal Reserve Bank" (Federal Reserve Bank of San Francisco, n.d.).

Federal Funds Futures: Federal Funds Future are defined as follows:

> These are contracts with the pay outs that are based on the average of federal funds rate at the maturity date. These securities are trading on the Chicago Board of Trade (CBOT). These securities are useful for investors in their investment decision making because, prices of these contracts shows the expectations of federal funds rates. (Federal Reserve Bank of San Francisco, n.d.)

Federal Funds Rate: “This is one of the policy devices of the Federal Reserve and is the rate at which one bank loans to another bank on an overnight basis” (Federal Reserve Bank of San Francisco, n.d.).

Federal Open Market Committee (FOMC): The Federal Reserve manages the open market operations in the United States through buying and selling of U.S. Treasury securities. The important decisions about interest rates and the expansion or contraction of money supply in the United States is taken by FOMC.

FOMC announcements: These announcements, which inform investors about the U.S. Federal Reserve's possible decisions on interest rates in the future, are one of the most anticipated events on the economic calendar that investors use for forecasting future economic events.

Market capitalization: Capitalization is a measure of company size that is calculated by multiplying the number of outstanding common shares of a company by the market price per share of the company.

Money aggregates: “Money supply is equal to all monetary assets available in an economy at a specific time. M1 and M2 are the two definitions of money aggregates” (Federal Reserve Bank of San Francisco, n.d.).

M1: According to The Federal Reserve Bank, M1 is defined as follows:

> The sum of coin and currency in circulation plus demand deposits, checking accounts and negotiable order of withdrawal (NOW) is defined as M. M1 contains cash and assets that can quickly be converted to currency; therefore, it is the most

liquid components of the money supply. (Federal Reserve Bank of San Francisco, n.d.)

M2: "M2 is the sum of M1 and the near money such as: savings deposits, money market mutual funds, and other time deposits which are less liquid and cannot be quickly converted into cash or checking deposits" (Federal Reserve Bank of San Francisco, n.d.).

Realized rate of return: The rate of return that an investor actually earns on an investment for a specific time.

Risk-free rate: The rate of return on a risk-free asset. Typically, U.S. Government Treasury Bills are taken as proxy for a risk-free rate. There are different risk-free rates depending on different maturities for risk-free assets.

Risk premium: The risk premium of an asset is the rate of return on the asset minus the risk-free rate.

Term Eurodollar deposits: "Term Eurodollars are dollar denominated time deposits held at financial institutions outside the United States, particularly held in London" (Federal Reserve Bank of San Francisco, n.d.).

Treasury Bills: The Federal Reserve Bank describes U.S. Treasury Bills as follows:

> The safest and most liquid securities in the world. At various times, the U.S. Treasury has issued bills with maturities ranging anywhere from one month to one year, but it has only consistently offered three-month and six-month securities over this research study's sample period. (Federal Reserve Bank of San Francisco, n.d.)

Assumptions

Because the hypotheses tested in this study were extensions of the standard CAPM hypothesis, I used the same CAPM assumptions in this study. The first assumption made in both Markowitz's investment theory and CAPM is the risk-averse assumption, according to which investors prefer less risk to more risk for the same expected return. This assumption also held in my study in testing both the single-factor model and the multifactor model. The other assumptions of CAPM were related to the structure of the capital market and the way investors act in the capital market, which apply only for testing the standard (single-factor) CAPM but not for the testing of my multifactor model. As evidenced by other scholars and as discussed in the literature review, the theoretical findings of the standard CAPM remain effective even if some of its assumptions are dropped. Therefore, I used the original assumptions of CAPM for testing my single-factor model or the standard CAPM findings. Thus, for the single factor model, my assumptions follow:

1. There is a risk-free asset in the market from which all investors can lend or borrow.
2. Investors decide on investing in a specific asset by considering only the two factors of expected rate of return and the risk inherent in that asset. The expected rate of return is what the investor expects to get for investing in a risky asset. Risk is the deviation of actual returns from expected return.
3. The Markowitz model is used by all investors to select an efficient portfolio.

4. Investors have similar economic expectations and will analyze securities in the same way.
5. A capital market is a perfect competitive market and will consist of many buyers and sellers of securities, so that no investor will influence the asset prices in the market.
6. Other assumptions are having a single holding period for all investors, limitation of investment to the universe of all publicly traded financial assets, and no transaction cost or tax in any transaction. However, in the test of hypotheses for the multifactor model, all of these assumptions can be dropped except the risk aversion assumption (Berger, 2011).

Scope and Delimitations

The scope of CAPM, single-factor or multifactor, includes all risky assets such as stocks and bonds of public and nonpublic corporations, real estate, foreign exchange, gold, and so on. However, typically, testing CAPM is done for stocks that are publicly traded in the stock market. Therefore, the scope of this research was confined to all publicly traded companies' securities that are traded in one of the exchanges in the United States. The variables of the units of analysis that were studied were retrieved from the stock market data and the Federal Reserve site on the Internet. In this study, I focused on determining risk factors that affect the expected rates of return of common stocks in publicly trading corporations, finding the nature of the relationship between risk and return, and estimating the relevant coefficients in the derived relationships.

Limitations

As this research employed the ex post facto design using existing data, the results of the study were affected by operational definitions of the concepts and by the way in which they were measured. The estimated risk premiums for the market in the regression analysis depended on how these variables were defined and measured. Among monetary variables, the Federal Funds Rate and money supply M2 as independent variables are well defined in economic literature. The assumption of normality for the monthly rate of returns was a requirement of the regression model in this study; any diversion from this assumption would have rendered inferences from the estimated regression coefficients less reliable.

Significance of the Study

The growth and the structure of financial market have always been instrumental in the progress of economic production. “This effect became much stronger with the growing complexity in economic structure and the emergence of revolutionary information technology” (Hojat, 2014, p. 15).The change was so significant that the new economic paradigm was named in the literature as the era of *new economy*. The complexity in the economy and the invention of new financial instruments such as initial public offerings (IPOs), security financing, and venture capitalists transformed the financial structure of the economy. Thus, the role of monetary policy and Federal Reserve became more pronounced in both policymaking and regulation in the U.S. financial system. As such, any change of policy by the Federal Reserve changes the future outlook of the economy and stock prices not only in the United States, but also around the globe. However, despite all these changes in the operation of the financial system, economic and finance theories were evidently behind the fast-paced growth of technology in the financial system (Chiarella et al., 2013; Febrian & Herwany, 2010; Kolozsi,2013; Rudebusch & Williams, 2009).

The problem was that factors affecting return on equity and thus accounting for investors' decision to invest in the equity market were not fully explored, specifically in the area of money supply and monetary policy of the Federal Reserve Bank (Abdymomunova & Morleyb, 2011; Alves, 2013; Berger, 2011; Febrian & Herwany, 2010; Levy, 2012). Moreover, since the inception of the CAPM by Sharp (1964), most of the theoretical and empirical endeavors in asset pricing models have been based on the CAPM, both the single-factor and the multifactor models. Although past researchers have tested both macro- and microvariables in stock prices in the U.S. stock market, there has been little research on the role of monetary policy in stock market stability and stocks' valuation (Doh & Connolly, 2013).

Therefore, I based my research on the multifactor model of CAPM with a focus on monetary factors. In this regard, I have contributed to the field by emphasizing the impact of the Federal Reserve, its quantitative easing, its FOMC announcements, and changes in interest rate on the movement of return in the equity market. To achieve this goal, I built a multifactor model based on CAPM enhanced with four additional independent variables: quantitative easing (M2), the Federal Funds Rate, and Federal Funds Future as macroeconomic risk factors and companies' industry affiliation as a firm-specific risk factor. The results of this research demonstrate that the stimulus effect of FOMC monetary policies on the equity market and thereby on the real economy is limited to the extent that those policies affect the private sector's expectation in regard to the economy and future monetary policies of the Federal Reserve (significantly positive effect of M2 as a moderator and the Federal Funds Rate and Federal Funds Futures as moderators and mediators). Thus, the results of this research can help monetary authorities to realize the importance of more FOMC transparency and more forward-leading policies.

In terms of positive social impact of the study, the findings of this research can help individual and institutional investors make more informed investment decisions, leading to better allocation of economic resources. The findings of this research can help monetary authorities to be better prepared in the event that the economy experiences another deep and prolonged recession. This preparedness can assist monetary policy authorities in assessing the impact of monetary policy on the equity market and thus preempting stock market crashes.

Summary and Transition

This research project was designed to examine the factors that determine equilibrium prices in the equity market—specifically, how asset prices are determined and what role individual investors have in asset pricing and establishing equilibrium in the asset market. Theoretically, assets are priced in the capital market on the basis of their future pay-offs, the length of time that cash flows are expected to occur, and a rate to compute the present value of future cash flows (Cochrane, as cited in Berger, 2011). Following this analysis, one can conclude the existence of a relationship between expected rate of return of an asset and the risk inherent in the asset. The capital asset pricing model that has been the most controversial and most referenced theory in theories of investment has thoroughly analyzed this relationship (Berger, 2011).

I followed this line of reasoning by developing a model consisting of five risk factors and testing for their significance in determining stock prices in the equity. The factors that I included in my model were the basic CAPM proposition, the overall rate of return in the stock market, three monetary factors (M2, Federal Funds Rate, and Federal Funds Future), and company size. The reason for the focus on monetary factors was that the role of monetary aggregates and change of interest rate in asset price determination had been inadequately studied by economists (Berger & Kibmer, 2009; Bernanke, 2010; Doh & Connolly, 2013; Febrian & Herwany, 2010; Gwilym, 2013; Kolozsi, 2013). Therefore, my contributions to the literature are (a) combining the above five macro and micro factors in a model and (b) examining the model against recent data—that is, data for the period 2005-2015.

In this chapter, I have discussed the importance of the equity market to the growth of the economy, especially after the explosive growth of information technology. I have explained that asset pricing in the equity market is distinct from pricing in other markets. The core issue in all investment theories is the mechanism of buy and sell and thereby equilibrium in the equity market. Thus, the classical theory of supply and demand and market equilibrium cannot apply in the equity market. Moreover, I have explained that what makes equity market analysis distinct and more complicated is the time difference between the purchase of an equity and the expected cash flow from that purchase. Therefore, because expected cash flows might be different from future realized cash flows, there is an element of risk involved in asset transactions in the equity market. This risk element is an important factor in the price determination of any specific stock in the equity market.

Given this element of risk, I have explained that investors demand higher expected return when investing in riskier assets. Thus, the issue of risk-return relationship is the theoretical foundation of all asset pricing models. I considered this relationship in building my model for this dissertation. I examined the existence of the relationship between rate of return on stocks and the risk factors for which investors in the stocks want to be compensated. My model was a multifactor model based on the standard CAPM with the addition of four independent variables. I tested five hypotheses with regard to the relationship between rates of return of stocks and five risk factors: market return, company size, monetary aggregate, M2, the Federal Funds Rate, and Federal Funds Futures.

In Chapter 2, I explain the basic asset pricing models, modern investment theory and the CAPM, the later models of modified CAPM, and the more recent multifactor models. Then, I elaborate on monetary factors and their impact on the real economy and discuss the monetary policy and its historical evolution. In this regard, I explain the new role of the Federal Reserve in bringing stability to the financial system and preventing asset mispricing. I discuss the theoretical and empirical basis of the three monetary factors that I used to test against data in my model. In addition, I briefly explain the new monetary instrument of FED through FOMC announcements and its effect on asset price evaluation in the equity market.

Chapter 2: Literature Review

Introduction

Although the major theories describing equilibrium under conditions of risk are the modern portfolio theory of Markowitz and the capital asset pricing model of Sharpe, the economic system has gone through major changes since the mid-1990s (Chiarella et al., 2013). The advent of digital industry has revolutionized the economic structure in all areas such as production, consumption, trade, banking, and specifically financial systems. According to Al-Suwailem (2011), time-series data indicate that the growth of technology always comes with more complexity. In a similar fashion, the rapid growth of new technologies that brought the world together through the interconnectivity of global economic systems has transformed the structure of economies into more complicated and more sophisticated systems. Thus, there is a need for a new economic paradigm in this era of knowledge-driven economy known as the *new economy* (Al-Suwailem, 2011).

The lack of compatibility of economic paradigms with real economic events became obvious in the financial crisis of 2007-2008. “The outbreak of the financial and economic crisis in 2007–2008 put an end to the previous consensus on monetary policy” (Kolozsi, 2013, p. 35). The 2008 global financial crisis and the ensuing deep economic recession, the severity of which had not been seen since the Great Depression of 1929-1934, came as a surprise to many economists and financial authorities and was considered to indicate a deficiency of classical and neoclassical approaches to financial problems in the economy (Kolozsi, 2013).

In light of the evolutionary changes that have affected the economic and financial structure of the U.S. economy in the last few decades, I developed a multifactor model that includes new factors that, according to recent economic literature, are more compatible with the new economy. The current research was designed to fill the gap between theory and economic reality. In this literature review, I highlight the historical changes that have occurred with regard to the theoretical approach to the impact of money and finance on the U.S. economy. I also underscore the factors that affect the risk of investing in a specific stock under the new economic circumstances. In this regard, after explaining the basic models of asset price determination, I focus on the changing role of the Federal Reserve and its monetary policy on asset price fluctuations in the U.S. equity market.

Literature Search Strategy

The search was conducted in online academic databases using the key words *money, monetary policy, quantitative easing, interest rate, Federal Funds Rate, Federal Funds Future, FED announcements, macroeconomics, finance, asset pricing, financial instability, hypothesis, fine-tune economic policy, financial crisis,* and *CAPM*. The databases used included SAGE Premier, Google Scholar, EBSCOHost, ProQuest, JSTOR, NBE, and JEL. The search was limited to peer-reviewed articles published within the last 5 years. However, some older yet relevant sources were used for the discussion of the base theories. Journals used included the *Journal of Economic Perspectives, Journal of Money, Credit and Banking, Journal of Economic Issues, Journal of Monetary Economics, Journal of Economics, American Economic Review,* *American Economic Journal, Journal of Economic Literature, Journal of Financial and Quantitative Analysis,* and *Journal of Finance*. I also searched publications from MIT Press, the International Monetary Fund (IMF) website (http://www.imf.org), Princeton University Press, Oxford University Press, and the Federal Reserve website (http://www.federalreserve.gov).

Theoretical Foundation

Modern Portfolio Theory

Markowitz, often called the father of modern portfolio theory (MPT), won the 1990 Nobel Prize in economics. Markowitz's theory is based not on a single asset but on a portfolio of assets. Therefore, he explained the risk-return relationship on the basis of a portfolio of risky assets. Markowitz then postulated that returns on assets covary with one another, and consequently, he built a matrix of covariance/variance of returns of all risky assets. Markowitz computed the risk that was inherent in each portfolio with a mathematical formulation, suggesting that for any specific investor with a certain level of risk, there is a portfolio of assets that maximizes the rate of return, which he called "efficient portfolios" (Berger, 2011).

Markowitz suggested that there are different efficient portfolios for different risk tolerance levels. If the maximum return for each efficient portfolio is plotted against the level of risk for that portfolio, the result is a curve that Markowitz defined as the "efficient frontier." In other words, the efficient frontier shows the relationship between the level of risk and return in each portfolio. Markowitz's model addresses a diversified portfolio of assets for each investor rather than investment in a single asset. Markowitz proposed this idea because he suggested that in a completely diversified portfolio, the nonsystematic risk for investors would fade away, and the only risk that investors would bear would be systematic risk. Thus, he concluded that investors could choose a portfolio on the efficient frontier that is compatible with their level of risk tolerance. Moreover, these portfolios that would maximize the return for investors, given their risk levels, are the basis for buying and selling in the equity market. Subsequently, on the basis of investors' buy or sell decisions in the equity market, the market will reach the state of equilibrium (Chiarella et al., 2013).

Capital Asset Pricing Model

The major theory that describes how assets are priced in the capital market is the CAPM. Theoretically, the CAPM is a model for describing equilibrium asset prices in the market for assets. This model was first developed by Sharpe, Linter, and Mossin and was further elaborated by other scholars. The base of the model is a simple linear relationship between the expected rate of return of each asset and the risk involved with that asset for any individual asset or portfolio of assets (Chiarella et al., 2013).

According to the CAPM, investors compare the discounted future expected pay-offs from a specific asset and decide to buy or sell that asset. Thus, equilibrium price is achieved when the market price of the asset is equal to the discounted amount of expected future pay-offs, and when all asset prices are at equilibrium, there is equilibrium in the market for assets as a whole (Chiarella et al., 2013).

Sharpe (as cited in Chiarella et al., 2013) stated that the CAPM is an extension of previous models in explaining the market equilibrium of asset prices under conditions of risk and the way that the price of a specific asset is related to the components of its risk. Thus, Sharpe proposed that under some specific assumptions, there is a linear relationship between the expected rate of return of an individual asset and some measure of risk that is associated with that asset. Moreover, the novelty of the CAPM resides in bringing in a new asset to the MPT: the risk-free asset (Chiarella et al., 2013).

Tobin (as cited in Balvers & Huang, 2009) was the first to contribute to modern portfolio theory by introducing the role of cash or a risk-free financial asset into the process of optimal portfolio selection. Sharpe included the risk-free financial asset as one of the assets that investors consider to add to their investment portfolios. In other words, according to Sharpe, investors allocate their wealth between a risk-free asset and one of the portfolios that would maximize their returns, given their specific risk tolerance. Subsequently, Sharpe generalized Tobin's idea of the risk-free asset by assuming that all investors can both lend (invest) or borrow at the same risk-free rate as much as they want to (Balvers & Huang, 2009).

Thus**,** the CAPM concluded that all investors would choose a combination of the risk-free asset and a portfolio of risky assets. This combination would provide the highest ratio of excess return-to-risk among all feasible portfolios, called *efficient portfolio*. An investor with an average degree of risk aversion will invest all his or her funds in the optimal portfolio. Investors with above-average risk tolerance will borrow at the risk-free rate and will invest in the efficient portfolio in excess of their own funds. Investors with below-average risk tolerance will invest a portion of their funds in the portfolio and will lend (invest) the rest in the risk-free asset. Therefore, according to the CAPM, portfolio investment consists of two separate tasks: the investment task and the financing task (Balvers & Huang, 2009).

Single-Factor Model of CAPM

According to the CAPM, the required return for investors is divided into two parts, the nominal risk-free rate (NRFR) and the risk premium (RP). Per CAPM, NRFR is determined by the market for government treasury bills and depends on the real rate of economic growth, expected inflation rate, and monetary policy parameters, as well as on investors' time preference. The risk premium, on the contrary, is a required return by investors to compensate for the amount of risk entailed in a specific security. This can be presented mathematically as follows:

$$E(R_j) = E(NRFR) + \beta_j E(R_m - NRFR), \qquad (2)$$

Where,

$E(R_j)$ is the expected return on security j, NRFR is the nominal risk free rate, β_j is the beta or the systematic risk of security j, and $E(R_m)$ is the expected return on the market. Typically, in practice estimates of an individual security's expected return and beta are calculated by taking some broad index, such as the S&P 500 index, as a proxy for the market.

Thus, according to Equation 1, which represents the standard CAPM model,

1. The systematic risk of a security and investors' required rate of return from the security are linearly related; the higher the systematic risk of a security, the higher the rate of return investors will require or expect from that security.

2. If the risk-free rate and market returns stay constant, there is no other variable affecting expected returns of a security except its own systematic risk.
3. The *y*-intercept of the linear relation between expected returns and systematic risk of any security is the risk-free rate.
4. The beta of the risk-free rate is zero, and the beta of the market portfolio is one (Spyrou & Kassimatis, 2009).

Therefore, one can summarize the CAPM model as follows: (a) the degree of risk for each investment is the probability that actual returns will be different from expected returns; (b) the total risk of investing in an asset could be divided into two components, systematic and nonsystematic risks; and (c) based on the assumption that the probability distribution of returns is a bell-shaped symmetric distribution, investors are only concerned with the expected rate of returns and the variance of returns. However, according to the assumptions of the CAPM, the nonsystematic risk of an asset that results from firm-specific factors could be effectively eliminated by holding the asset within a well-diversified portfolio (Spyrou & Kassimatis, 2009).

Systematic risk, on the other hand, is related to the economy as a whole and depends on factors that are out of the control of firms and cannot be eliminated by diversification. However, the systematic risks of different assets differ depending on the types of businesses that firms are in. The difference is related to the co-movements of their returns with the return on the whole asset market. The important outcome from this analysis is that if investors hold well-diversified portfolios, then only systematic risk will affect investors' required returns. Thus, the expected returns on a security can be explicitly estimated by knowing its systematic risk, the risk-free rate, and the expected returns from the general market of risky assets (Patterson, as cited in Spyrou & Kassimatis, 2009).

Multifactor Models and CAPM

The theory of asset pricing that started with Sharpe and Linter has been the accepted model for pricing financial assets among both academics and practitioners. However, since the 1970s, researchers have recognized that this simple model does not fit well with the complexity of contemporary equity markets. “Moreover, CAPM lost its credibility because of empirical contradictions, specifically because of asset pricing anomalies that were evidenced by researchers who applied the model in various stock markets across the world” (Hojat, 2014, p. 22).

Sehgal and Balakrishnan (2013) reported economists’ results showing that some firm-specific factors are significantly important in the effect of macrovariables on specific asset prices in the equity market. Sehgal and Balakrishnan referred to studies on (a) the size of the company by Banz, (b) the value effect by Chan et al., (c) the price-to-earnings ratio by Basu, (d) the ratio of leverage to average return on stocks by Bhandari, and (e) the book equity-to-market equity ratio by Stattman.

In addition, Fama-French developed an asset pricing model (FFM) by extending the CAPM and adding two new variables to it: (a) size, which was measured by market capitalization; and (b) value, which was measured by book equity to market equity. Fama-French documented the model as the three factor model (FF3). This model that was used in many empirical testing was claimed to have outperformed all theoretical asset pricing models (Chiarella et al., 2013). Therefore, Fama-French stated that their multifactor model is a good alternative model for CAPM that could explain most of the CAPM anomalies. I followed the Fama-French model and adopted the company affiliation as a company-specific risk factor in my model (Chiarella et al., 2013).

Moreover, Fama-French suggested another factor, called the *distress factor*, to be included in asset pricing models. They further explained that the indication of distress factor for companies would be reflected in their price-to-book equity (P/B) ratio, price-to-earning (P/E) ratio, and price-to-sales growth (PSG). Thus, companies under distress must yield higher returns to persuade investors to invest in their stocks (Chiarella et al., 2013).

Chiarella et al. (2013) focused on heterogeneity and evolutionary behavior of investors in the equity market, incorporated the adaptive behavior of agents with heterogeneous beliefs, and established a new version of the CAPM, which they called the *evolutionary capital asset pricing model* (ECAPM). The results indicated that there is a spillover from the market price of one asset to other assets when rational behavior agents switch to better performing trading strategies. Also, Chiarella et al. (2013) concluded that this spillover effect is related to high trading volumes and found a positive correlation between price volatility and trading volume. They further concluded that when agents switch to better performing strategies, this could lead to instability in the equity market. Thus, on this basis, they explained some types of market behavior, such as the long-term deviation of market prices from the intrinsic values and market crashes resulting from asset bubbles.

Moreover, Abdymomunova and Morleyb (2011) developed an improved version of the CAPM for book-to-market (B/M) across stocks with the inclusion of time variation and called this *conditional CAPM* (CCAPM). Abdymomunova and Morleyb concluded that in many cases in which the unconditional CAPM was rejected, application of the CCAPM showed a better result. Moreover, they concluded that the conditional CAPM could explain capital market behavior much better than the unconditional CAPM.

Levy (2012) compared the CAPM with the prospect theory (PT) developed by Kahneman and Tversky, who won the Nobel Prize in Economics in 2002 for their work. The core idea of prospect theory is that the assumption of expected utility (EU) maximization along with risk aversion in the CAPM does not work in the real economy and should be replaced by a new paradigm. The alternative paradigm that they suggested is that "investors would make their investment decisions based on change of wealth and loss aversion and thereby they would maximize the expectation of an S-shaped value function, which would contain a risk-seeking segment" (Levy, 2012, p. 18). According to this theory, the behavior of an actual investor is different from the rational agent that is one of the assumptions in the CAPM. However, prospect theory is not aimed to be an equilibrium pricing model and therefore cannot be considered a substitute for the CAPM (Levy, 2012).

According to Levy (2012), many economists who performed experimental CAPM accepted prospect theory (PT). For example, Tversky and Kahneman developed cumulative prospect theory (CPT) as an alternative paradigm to the expected utility paradigm. Whereas PT and CPT became popular in economic research and formed the foundation for a new branch of economics and finance, so-called behavioral finance and behavioral economics, the CAPM has kept its status as the most popular asset pricing model (Levy, 2012).

Prominent economists have justified the position of CAPM as the most used model of capital asset pricing (Levy, 2012). For example, this was evidenced in the works of Merton, Levy and Samuelson, and Berk (as cited in Levy, 2012). Other economists did not believe in having a mathematical model for finance or economics. In addition, some economists proposed that the phenomenon of global financial crisis and its devastating effects upon global economy showed that markets can fail and that finance cannot always produce predictive models (Dempsey, 2013).

Moreover, some economists focused on the role of monetary policy of Federal Reserve on the movement of asset prices in the capital market (Bernanke, 2010; Chen, 2007). However, the newly used instrument for analyzing the effect of financial markets' expectations and the future course of the monetary policy, the Federal Funds Future, came from the study conducted by Bernanke and Kuttner (2003). They were pioneers on this view and emphasized that the unanticipated element of monetary policy and monetary policy surprises shows a significant effect on equity prices through changing the equity premium). Bernanke and Kuttner used Federal Funds Futures contracts to measure market expectations and develop their monetary policy shock model and they showed that the effect of monetary policy on the real rate of interest does not have much impact on investors' decisions (Chen, 2007).

The model that I developed was based on the standard CAPM, with the addition of the money supply M2, the Federal Funds Rate, and Federal Funds Futures into the model. In addition, I used the company's size as one of the firm-specific feature, which I borrowed from Fama-French. My contribution to the previous works is addition of monetary aggregate, M2, into the model in order to test the effect of the so called quantitative easing policy of the Federal Reserve on the cyclical movement of asset prices in the equity market.

Literature Review

The major theory that describes the ways that assets are priced in the capital market is the capital asset pricing model. The CAPM was developed on the basis of modern portfolio theory of Markowitz. Markowitz's model described a diversified portfolio of assets for each investor and not about investing in a single asset. He suggested that in a completely diversified portfolio the only risk that investors bear is the systematic risk. Sharpe extended the Markowitz model to create CAPM with the introduction of risk-free asset into the model according to which investors could lend and borrow money at the fixed risk-free rate along with investing in other assets (Abdymomunova & Morleyb 2011).

Therefore, by making some specific assumptions CAPM concluded that rational investors would seek a portfolio of assets that would yield the highest expected return per unit of risk taken. In other words, according to the standard CAPM, for any individual asset or portfolio of assets, there is a linear relationship between the expected rate of return of the asset and the risk of that asset. Thus, in the standard CAPM model, expected rate of return on each asset is determined by the level of risk inherent in that asset and that level of risk is defined as the rate of return for the whole market (Abdymomunova & Morleyb 2011).

As I explained in the previous section, the single factor model of asset price determination in the equity market is not scientifically adequate to explain the movement of asset prices in the equity market. As later experimental investigations showed, there are more factors that affect the rate of returns for risky assets in the equity market. These factors are of macro and micro. In regard to micro factors, there are several studies that indicated firm specific factors influence the impact of macro changes on the valuation of a specific asset (Balakrishnan 2013). With respect to macro and monetary factors as reported in Chen (2007), the studies conducted by Bernanke and Blinder, Thorbecke, Patelis, and Bernanke and Kuttner indicated macro and in particular monetary factors have great impact on the changes in asset prices in the equity market (Chen, 2007).

This literature review focused on the effect of monetary factors on asset price changes in the equity market. The reason that I emphasized financial instruments and their influence on equity market is that historically the financial market has played an instrumental role in the progress of economic production. Nevertheless, this role was overlooked in the classical idea suggesting that money is neutral and does not affect the real economy in the long run. Traditionally, the role of money was confined to the medium of exchange. Thus, according to Adam Smith (as cited in Brue & Grant, 2013), "money by itself did not add to output or the wealth of society" (p. 85). Accordingly, the role of central banks was only to provide enough liquidity for the economy to facilitate a steady state growth for the economy (Friedman, as cited in Brue & Grant, 2013, p. 539).

Thus, the neutrality of money in the long run and the focus on the destabilizing effect of inflation on the economy in the short run shifted the purpose of monetary policy towards inflation curtailing and ignored its effect on the movement of asset prices in the equity market. Furthermore, the role of money has changed immensely, and it has become much stronger with the growing complexity in the economic structure, specifically since the surprise of financial crisis in 2008. Since 2008, the closeness of financial market and the overall growth of economy is so much that the new economy has been labeled as “the Wall Street economy” (Minsky, as cited in Argits, 2013).

Thus, along with the change in the structure of financial market, the role of Federal Reserve System was broadened. The Federal Reserve has now both the authority to act upon economic activities through its various policy instruments and to regulate and supervise the whole monetary system including commercial banks. Announcements by the Federal Reserve, even the way that they are worded, can affect future economic forecasts and thereby will affect the stock prices in the whole world (Argitis, 2013).

Moreover, along with these changes, the role of policy instruments has also changed. Traditionally, the role of monetary policy was to check for inflation and set it at a rate corresponding with the natural unemployment rate in the economy. The most effective instrument of monetary policy was money aggregates. Since 1990, specifically after the work of Bernanke and Blinder, researchers have widely used The Federal Funds Rate to examine the effect of monetary policy on equity market (Patelis, Thorbecke, as cited in Chen, 2007). The newly used instrument for analyzing the effect of financial markets' expectations and the future course of the monetary policy, Federal Funds Future, came from the study conducted by Bernanke and Kuttner (2003), pioneers on this view who emphasized that the unanticipated element of monetary policy and monetary policy surprises shows a significant effect on equity prices due to changes in the equity premium.

The important point is that any movement of monetary policy both qualitative through wording in announcements or quantitatively through change of interest rates can cause interpretations about the future economic path. The outlook for future economic action would affect both the systematic and nonsystematic risk for investors and, therefore, would affect the investment decisions makings of investors. Moreover, there is a mutual causality between asset prices in the equity market and monetary policy, which cannot be ignored (Rigobon & Sack, as cited in Chen, 2007).

Risk and Micro Factors

This literature review focused on the factors that determine the risk in the asset market for a specific asset. Theoretically, the risk return relationship started with CAPM (Abdymomunova & Morleyb, 2011). However, CAPM, its assumptions, and its tenets were very similar to what Markowitz proposed in his portfolio investment theory (PIT). In other words, according to PIT, the return on every two assets vary together and Markowitz could built a matrix of return covariation for all risky assets and thereby calculate the amount of risk that was involved with each portfolio of risky assets (Abdymomunova & Morleyb, 2011).

The CAPM as an extension of PIT proposed that all risky assets would vary with the market rate of return for all risky assets. The basic assumption that investors were risk averse and they preferred a portfolio with the minimum risk and a desired return or a portfolio with the maximum returns and a given risk is common in both models. Investors would choose a portfolio of risky assets that would entail the minimum risk for investors. These portfolios that yield the maximum rate of return are called efficient portfolios. Markowitz further derived the efficient frontier as a smooth curve that showed the relationship between rate of returns of different efficient portfolios and the risks involved in those portfolios (Abdymomunova & Morleyb 2011). Sharpe was the first to develop CAPM and this model was later advanced into the equilibrium model of CAPM (Chiarella et al., 2013). According to CAPM, the reason for the covariation of rate of returns of individual stocks is because they all covary with the overall market rate of return. Consequently, the overall market rate of return is the return for a portfolio that includes all risky assets (Abdymomunova & Morleyb 2011).

The CAPM made quite a number of assumptions in order to get to a clear-cut formula for equilibrium in the capital market. Some of the main assumptions follow:

1. The factors that investors consider for investing in the capital market should be limited to the risk of securities and their expected rate of return.
2. According to Markowitz model, investors must be rational portfolio optimizers.
3. Investors should have homogenous expectations and should have the same economic view of the world.

4. Capital market is assumed to be a perfect competitive market and thus no investor could affect the price of any security.
5. There exists a risk-free asset in the capital market from which all investors could borrow and lend at any amount at an identical risk-free rate.
6. There are no taxes and transaction costs involved in the investment in the capital market (Alves, 2013).

The most important tenet of CAPM, based on the above assumptions were that (a) there is a linear relationship between the rate of return of any stock and the rate of return of the overall stock market, (b) the degree of change of the rate of return of a stock to the overall market rate of return is shown by the slope of this line, (c) the only risk that matters to the investors is the systematic risk that is due to economic circumstance, because in a diversified portfolio the risks specific to an individual stock would be eliminated, and (d) there is a stock market risk premium for every security that is equal to the rate of return of the market portfolio minus the risk-free rate in the economy (Alves, 2013).

The CAPM was the most favored model to evaluate financial assets and was used by both academia and practitioners to determine the relationship between risk and return in the equity market up to 1970s. However, since the 1970s, researchers recognized that this simple model did not fit well with the complexity of contemporary capital markets. Therefore, the single-factor model, though very simple and elegant, lost its credibility because of empirical contradictions, specifically because of asset pricing anomalies that was evidenced by researchers who applied the model in various stock markets across the world (Sehgal & Balakrishnan, 2013).

Subsequently, over the next 15 years, according to Sehgal and Balakrishnan (2013), other scholars developed multifactor models to account for risk factors not accounted for in the single factor CAPM model. On the empirical front, researchers modified and tested CAPM against both macro and micro factors. According to Sehgal and Balakrishnan the firm specific factors include, (a) the size of the company, (b) the value effect, (c) price to earnings ratio effect, (d) the relation between leverage and average return on stocks, and (e) the book equity to market equity ratio.

The most pronounced firm specific features that showed statistically significant relationship with asset price movement of stocks were size of the firm as measured by market capitalization and value, which was measured by book equity to market equity. Fama-French were amongst scholars who criticized the single factor model of CAPM and developed an asset pricing model (FFM) by extending the CAPM and adding two new variables to it, size and value, and documented their model as three factor model (FF3). This model has been used in many empirical testing in comparison with the traditional CAPM model (Chiarella et al., 2013). Therefore, Fama-French (as cited in Alves, 2013) stated that their multifactor model was a good alternative model for CAPM that could explain most of the CAPM anomalies.

Risk and Macrofactors

Other scholars focused on the effect of macro elements on the stock returns in the equity market, the ones that focused on the real economy. For example, Spyrou and

Kassimatis (2009) found out that real GDP and industrial production were significantly effective in the movement of asset prices. However, with regard to the role of monetary factors on movement of asset prices in the equity market, there was not a consensus among economists. Traditionally, the role of money was confined to the medium of exchange and the classical idea was that money is neutral and did not affect the real economy in the long run (Adam Smith, as cited in Brue & Grant, 2013).

Accordingly, the role of central banks was only to provide enough liquidity for the economy and to facilitate a steady state growth for the economy (Friedman, as cited in Brue & Grant, 2013, p. 539). Thus, the neutrality of money in the long run and the focus on the destabilizing effect of inflation on the economy in the short run shifted the purpose of monetary policy towards inflation curtailing and ignored its effect on the movement of asset prices in the equity market. Tobin (as quoted in Argitis, 2013, p.35) was one of the first scholars who asserted that “financial policies can play a crucial role in altering the market value of a firm's assets relative to their replacement costs”. Tobin concluded that a contractionary monetary policy would reduce and an expansionary monetary policy would increase asset prices (as cited in Argitis, 2013).

The role of money has changed immensely, and it has become much stronger with the growing complexity in the economic structure, specifically since the financial crisis of 2008. In the post crisis of 2008 era, the closeness of the financial market and the overall growth of economy is so much that the new economy was labeled as Wall Street economy (Minsky, as cited in Argitis, 2013). Thus, along with the change in the structure of the financial market, the role of Federal Reserve System was broadened.

Federal Reserve System in the United States has now expanded its authority both to act upon economic activities through its various policy instruments and to regulate and supervise the whole monetary system including commercial banks. Announcements by the Federal Reserve, even the way that they are worded, would affect future economic forecasts and thereby the stock prices in the whole world (Argitis, 2013).

Moreover, along with these changes, the role of policy instruments has also changed. Traditionally, the role of monetary policy was to check for inflation and set it at a rate corresponding with the natural unemployment rate in the economy; in this era, the most effective instrument of monetary policy was money aggregates. Since 1990, specifically after the work of Bernanke and Blinder, “The Federal Funds Rate has been the main instrument in the research for examining the impact of monetary policy on equity market” (Thorbecke, & Patelis, as quoted in Chen, 2007, p. 22).

The Federal Funds Future came from the study conducted by Bernanke and Kuttner (2003) who emphasized that the unanticipated element of monetary policy and monetary policy surprises showed a significant effect on equity prices due to changes in the equity premium. Bernanke and Kuttner used Federal Funds Future as the proxy to measure market expectations in their research and they showed that stock market was not sensitive to the real interest rate, but to the forecast of future outlook. The important point is that any movement of monetary policy both qualitative through wordings of the announcements or quantitatively through change of interest rate would cause interpretations about the future economic path.

New Consensus Model

The conventional macroeconomic view on the role of central banking in the economy was on the basis of a few traditions that were named as new consensus model (NCM). According to NCM, central bankers were on the belief that their main goals were inflation targeting, financial deregulation, and the fine-tuned use of central banks' policy on interest rate that would ensure global financial and economic stability (Argitis, 2013). The theoretical background that was the basis of such a monetary policy was based on the neo-classical and neo-Keynesian economics. For example, many economists tried to calculate the optimum rate of inflation that was coherent with the market equilibrium interest rate and natural rate of unemployment (Argitis, 2013).

Moreover, NCM was part of a macro vision that rested upon two interconnected assumptions: the self-regulated capitalist economy and a decentralized laissez-faire exchange economy. In a self-regulated capitalist economy different components work in harmony in order to obtain a natural rate of unemployment. In a decentralized laissez-faire exchange economy, individuals get motivated by self-interest and are guided by single prices of goods in a perfectly competitive market. Thus, in such a Walrasian general equilibrium system, supply met demand instantaneously at a market-clearing price, money is neutral, and therefore, monetary policy in the long run only changed the price, not the real output (Berger, 2011).

The validity of NCM was questioned by monetary economists and was found utterly inadequate and was challenged because the current model of monetary policy did not offer the right tools to successfully fight the new war against financial upheavals and economic recessions. For example, according to Argitis (2013) economists realized that the single-inflation targeting, the so-called one objective, one instrument, was a diversion and they developed new models that were more comprehensive and complex.

Kolozsi (2013) proposed an institutional matrix of the state and society that includes the behavior of economic actors (investors) and the economic policy as a part of the institutional matrix. This model describes the monetary policy as not only being concerned about the general cost of living, but also should focus on the financial stability as a whole. Furthermore, Minsky also challenged the Walrasian- Hicksian general equilibrium model and emphasized the incorporation of the institutional principle in economic analysis and he criticized the illusion of self-regulated economy (Minsky, as cited in Argitis, 2013). Minsky proposed there is no inherent equilibrating tendency, and thus “natural” instability and unemployment were among the fundamental characteristics of this type of financial economy especially after the rise of securitization as a norm of banking practice.

In Minsky’s *Wall Street Economy*, published in 1986, banks were fundamental institutions in the process of creating capital and financial assets in calendar time. Banks could increase the money supply whenever they had the same beliefs that borrowers were in strong positions in collateral assets and could repay them. However, if the future cash flows turned out to be lower than expected, then borrowers might have been unable to meet their debt service commitments and then banks would have decreased the supply of credit, after which the supply of money would be decreased. In this sense, the financial structure of the economic units and their committed payments were by no means neutral because the value of capital (and financial) assets, investments, and the realization of profits would depend upon financial arrangements and interactions that would involve monetary variables (Minsky, as cited in Argitis, 2013).

Minsky (as cited in Argitis, 2013), who brought about the idea of double pricing, proposed that the demand prices of capital assets should exceed the supply prices of those assets so that the expected profits and accumulation of capital could be guaranteed. Therefore, it was crucial for the stability and functioning of financial capitalist economies that nominal cash inflow of the economic units be greater than their nominal cash outflow. Thus, the coherence of the economic system would depend on the ability of deficit spending units to meet their financial commitments and that would provide stability in the financial markets. However, if financial commitments were not met, the result would be instability in the whole economic system (Argitis, 2013).

Thus, the important point in Minsky's financial instability hypothesis was that investment and the accumulation of capital are finance-led and are established by the expectations of the future prices of assets and goods. The core point of Minsky's perspective was that the purchase of capital assets today depends on the expectation of future income flows. Whereas this would validate past investment decisions, future income flows would validate future payment commitments. Thus, if future income flows were less than what was expected at the time the investment decisions were made, then these decisions would fail to be validated. Subsequently, this occurrence would affect the investment and growth in the economy. Therefore, Minsky concluded that investment was a more volatile components of aggregate demand, mainly because it depends on the investor's subjective evaluations of the future income (as cited in Argitis, 2013).

Monetary Instruments

Monetary Aggregate

The total money in circulation or the liquidity that liquidates aggregate transactions in the economy is the monetary aggregate. The correct amount of money in circulation is necessary in order to promote maximum sustainable economic growth and price stability. Fisher (as cited in Brue & Grant, 2013). defined the relationship between monetary aggregate and price level as $MV+M'V' = PT$ where, M is money in circulation, V is the circulation velocity of money, M' is the volume of bank deposits subject to check, V' is its velocity, and T is the volume of trade or the quantity of goods or services sold. Fisher called this quantity theory of money.

Therefore, according to Fisher (as cited in Brue & Grant, 2013), price level is directly related to the quantity of money, M+M', velocity of circulation, V+ V', and level of transactions. Then, Fisher, on the basis of the assumptions that velocity of circulation and volume of trade are constant, concluded that there is a cause-and-effect relationship between quantity of money in circulation and level of prices in the economy. Monetary policy, according to Fisher, stabilizes the overall price level and thereby the economy as well by controlling the quantity of money in circulation (Brue & Grant, 2013).

Traditionally, central banks around the world implemented this theory to stabilize prices in their economy. This may have been the theoretical background for the so-called quantitative easing policy of Federal Reserve after the financial crisis of 2008.

Federal Reserve easing monetary policy was to prevent the falling prices and also to inject enough liquidity into the economy to keep credit flowing when private lenders were reluctant or unable to do so. The Federal Reserve adopted the policy of quantitative easing through purchase of government bonds from the public that added to the excess reserve for private banks and enlarged their lending capacity. Quantitative easing by adding to the pool of bank reserves would allow them to lend more to the private sector and thereby increase the production and employment in the economy. The operational procedure is as follows. In quantitative easing, bonds are purchased; bonds are replaced by reserves and thereafter interest rate will fall. In fact, the ratio between liquid (reserves) to illiquid (bonds) liabilities is the main determinant of interest rate (Gwilym, 2013).

Thus, an expansionary monetary policy increases the reserves over bonds in order to facilitate lending by the banking industry. However, in order for the monetary easing to be effective, the government should borrow less from the public to keep interest rates low. The effect of monetary expansion or contraction on the economy is through the interest rate because interest rates as a cost to the business corporations should be curtailed to encourage them to borrow and invest more. Higher investment will turn the economic cycle because (a) more funds will be available for the private sector, (b) financially constrained firms can borrow more, and (c) resources will be moved toward the high productivity entrepreneurs (Gwilym, 2013).

An increase or decrease in money stock as a monetary policy device has been widely researched. Results have shown that stock returns lag behind changes in money supply (Chen, 2007). In contrast, Cooper, Pesando, and Rogalski and Vinso showed a gap between changes in monetary aggregates and changes in asset prices in the equity market (as cited in Chen, 2007). The lag is because the increase in money supply first increases the aggregate demand and then affects the stock market. An increase in M2 would add to the liquidity that is available to purchase securities and that would result in higher prices for stocks. However, generally speaking, the research has shown similar findings for the effect of monetary aggregates on equity market. Some empirical testing indicated strong relationships between the two variables (Hamburger & Kochin; Kraft & Kraft; as cited in Chen, 2007) and other research found no relationship between the two.

Also, Chen (2007) reported that monetary policy changes have a significant effect on the equity market. However, the effect of monetary shocks on stock market was proved to be more than its effect on the real economy. Monetary shocks can produce exacerbated movements in the stock market. Indeed, the potential impact of monetary policy changes on the financial markets can be greater than its impact on the real economy. For example, a tightening monetary policy would depress stock returns both because it would lower the returns directly and it would shift the market into bear market. Thus, the financial decisions by firms is different when monetary shocks occurs during a recession or recovery, which creates volatility in the stock market returns (Gwilym, 2013).

Interest Rates

After the Great Depression of 1929, quantitative theory of money lost its credibility. Hawtrey (as cited in Brue & Grant, 2013) for the first time recommended several remedies for curbing the instability of credit and the ensuing instability of economic activity. Measures included the open market operation of central banks, a discount rate change, and a change in commercial banks' reserve requirements. Hawtrey added interest rate changes and restricting bank reserve as tools for curbing inflation but did not recommend the cheap money and greater bank reserves as tools to stimulate the economy (as cited in Brue & Grant, 2013).

In the later research, interest rates were used as the most effective tools of monetary policy. Chen reported several researchers used interest rates in their research and found that changes in interest rate had a positive effect on asset prices in the equity market. More recently, the Federal Funds Rate (FFR) became more popular after the seminal article by Bernanke and Blinder (as cited in Chen, 2007), in which the authors used FFR as an effective instrument of monetary policy. Since then, FFR has been widely used as a measure of monetary policy. Currently, market expectations or Federal Funds Futures contracts are used more in research (Bernanke, 2010).

The two interest rates that typically are used as instruments by the Federal Reserve are the Federal Funds Rates and Discount Rates**.** Bernanke and Blinder (as cited in Chen, 2007) found there is a more significant relationship between Federal Funds Rates and asset prices than the relationship between Discount Rate and asset prices. Other researchers came to the same conclusion. If the purpose of research is to determine the effect of monetary policy on asset prices, the Federal Funds Rate will be a better monetary instrument in the study than other kind of interest rates. For example, research conducted by Cook and Hahn showed that the U.S. equity market experienced a significant reaction to changes in the Federal Funds Rate, specifically on the days of announcements (as cited in Doh & Connolly 2013). However, the problem with using interest rates as monetary policy instrument is that interest rates do not have a specific definition, and there are only a few interest rates. Moreover, rates can change on the basis of many factors, such as business cycles, banking decisions to lend or not to lend, days of announcements by the FOMC, and so forth (Doh & Connolly 2013).

When the Federal Open Market Committee of the Federal Reserve (FOMC) announces the FFR, some part has already been expected by the investors and some part is the surprise. Research reported by Doh and Connolly (2013) has indicated that the market reacts more to the unexpected part of announcements than to the expected component which has already been included into the equity price. Thus, investors should look for some criteria to see the surprise component of the Federal Funds Rate and the closest they could find is Federal Fund Futures (Doh & Connolly, 2013).

Different short-term interest rates have been used by economists as a proxy for the Federal Funds Rate. For example, Gurkaynak, Sack, and Swanson (2007) reported current-month Federal Funds Futures contracts were used by several authors. The month-ahead federal funds futures contract was used by Cochrane and Piazzesi, the one-month Eurodollar deposit rate was used by Ellingsen and Soderstrom, and the 3-month Treasury bill rate was used by Rigobon and Sack (as cited in Gurkaynak, Sack, and Swanson 2007). The most known advocate of this view was expressed in Bernanke and Kuttner (2003) who emphasized that the response of stock prices to the monetary policy is due to the impact of the monetary policy on investors' expectation towards the future phase of economic activity.

FOMC Announcements

Since the financial crisis of 2008, in which the FED adopted the zero lower bound and the FOMC moved the federal funds rate target to near zero, the FOMC turned to unconventional monetary policies which were forward guidance and asset purchases to support the economy. The forward guidance, which became an important aspect of the FOMC, decision making was conveyed to the economy through what was called the FED announcement. In fact, this was the part of monetary policy that reveals information about the likely future path of the Federal Funds Rate. This preguided policy would, in fact, reduce the effect of unforeseen changes of monetary policy or monetary shocks in the economy (Doh & Connolly 2013).

An important point is that announcements have two components: the expected and the unexpected or the surprise component. Any change in interest rate in the future contracts as a proxy for the Federal Funds Future is a good indicator of the surprise component in the policy guidance. Thus, it is important for investors to identify the surprise component of the FOMC announcements as it is the surprise component that would change asset prices in the equity market. In other words, what financial markets have already anticipated does not impact asset prices (Bernanke & Kuttner, 2003).

Since the year 2000 and more so since 2008, the Federal Reserve have become more transparent. Thus, FOMC announcements might convey different messages in regard to wording of the message, and in further analysis investors should distinguish between what is called the path factor and what is called the target factor (Gürkaynak, as cited in Doh & Connolly, 2013). The target factor that explains the movements of the future rates along the entire yield curve is interpreted as the surprise component to a change in the current level of the Federal Funds Rate. The target path is associated with the economic outlook and might arise because the FOMC's forward guidance about the future monetary policy that depends on the economic outlook and is not a promise (Blanchard, 2012). The path factor, on the other hand, "captures information that markets perceive in FOMC announcements about the future path of the target rate beyond what is captured by the target factor" (Woodford, 2012, p. 85).

Monetary Policy and Asset Mispricing

Asset Price Bubbles

In the early 2000 and during the recent credit crunch, it was evident that asset price bubbles existed. However, the literature on this subject is sparse. As cited in Gwilym (2013), Bernanke and Gertler were the first who promoted the subject of asset price bubbles in relation with the Fed's monetary policy. They included an exogenous element as a symbol for bubbles in their financial accelerator model. The principle was that the asset prices grew into a bubble, but the bubble decayed over time, and when it would burst the asset price would go back to the fundamental value.

The important dialogue among researchers has been whether monetary policy should react to asset mispricing or asset price bubbles. In this regard, there are two opposing views: leaning against the wind and cleaning after bubble bursts. As cited in

Gwilym (2013) Bernanke and Gilchrist stated that monetary policy should focus on inflation and rather than being influenced by asset price bubbles. On the contrary, Cecchetti et al. (as cited in Gwilym, 2013) suggested that the monetary policy should react to the asset mispricing, or what was known in the literature as leaning against the wind.

The criticism of leaning against the wind came strongly from Bernanke based on the fact that the nature of bubbles can differ from each other and there should be a distinction between asset price movements that are caused by a change in economic activity and the price changes that are the result of noise trading (Bernanke & Gertler, as cited in Gwilym, 2013). Moreover, Cecchetti et al., who were the promoter of leaning against the wind, and Greenspan (as cited in Gwilym, 2013) found it difficult to distinguish between asset price changes due to economic activity and the movements due to exuberance. Therefore, this lack of feasibility was a reason for not attempting to target asset prices in conducting monetary policy.

On the contrary, others believed if detecting and alleviating asset bubbles was impossible before occurring, then monetary policy should be used to clean up after the crisis by interest rate cut and safeguard the economy after bubble bursts (Bernanke & Gertler, as cited in Gwilym, 2013). The existence of asset price booms and busts in the market, together with the fact that asset price movements in the equity market are closely related to the systematic risk, which is influenced strongly by changes in macro variables. The pendulum of opinions has now turned in favor of leaning against the wind monetary policy in order to offset asset price bubbles (Gwilym, 2013).

Blinder (2010b) distinguished *credit-fueled bubbles* and *equity-type bubbles*. In the case of equity type of bubbles, Blinder suggested that it is justifiable to do the so-called mop-up-after burst of bubble, but the central bank should combine regulatory instruments and interest rates and limited credit-based bubbles (Blinder, 2010a). Some have suggested that macro prudential regulation to be adopted by monetary authorities to stabilize the financial system (Canuto & Cavallari, 2013). The proposed macro prudential regulation should reduce cyclicality and should control the externalities. Therefore, the financial system would operate with less systemic risk and in downturns might improve the system's resistance. One promoted idea was improving the liquidity accessibility regulations, a more robust banking system, and tighter regulatory standards. Moreover, when there are random shocks, internal bubbles would develop as a result of optimism and pessimism. Thus, it would justify the usual criticisms of economic modeling that assumed economic agents are rational. The newly developed behavioral finance paradigm is promoting the idea of the cognitive limitations of individuals' behavior (Gwilym, 2013; Blinder, 2010a).

Monetary Policy and Firm Specific

In a research conducted by Borys (2011), individual stocks shows different sensitivity to the U.S. monetary policy shocks. This was evidenced due to specific firm financial constraints such as low level of cash flows, small capitalization rate, low credit ratings, industry affiliation, and high Tobin's *q* (the market value of a firm's assets divided by the replacement costs). Also, the effect of monetary policy on firms is different in an up cycle or on down cycle. Various research indicated that in the up cycle and contractionary monetary policy, firms that were highly dependent on bank borrowing were affected more by monetary policy (Bernanke & Blinder; Kashyap, Stein, & Wilcox; as cited in Borys, 2011).

The financial constrained firms are impacted more when credit market conditions weakens due to the fact that in the down cycle the present value of firms' collateral would fall with rising interest rates and the firms' balance sheet would worsen (Borys, 2011). In other words, firms with low debt to capital ratios and high price-earnings ratios are more affected by changes in U.S. monetary policy. One factor that repeatedly was tested positive in a relationship between monetary policy and stock prices was the financially constrained firms. These were the firms that had fewer liquid assets and were more dependent on external financing. The evidence showed that the financially constrained firms were more affected by changes in interest rates than firms that were less constrained. Taking the size of firms as representative of the degree of credit constraints, the empirical testing suggested that smaller firms were more vulnerable in financial cycles and more affected by monetary shocks (Borys, 2011).

Moreover, the effect of monetary policy on stock returns was shown to be different in the bear and bull markets. The general view is that monetary policy had greater effects in bear markets. For example as cited in Chen (2007), Bernanke and Gertler and Kiyotaki and Moore concluded that in the bear market the effect of change in monetary policy is more significant on asset prices. Moreover, Chen (2007), in regard to the asymmetric effects of monetary policy, found the effect of monetary policy, discount rates, and Federal Funds Rates is different on stock prices in the bear and bull market.

Chen came to the same conclusion: Contractionary monetary shocks would lower stock prices more in the bear market.

Furthermore, according to empirical verification (Thorbecke, as cited in Chiarella et al., 2013), the stocks of firms belonging to different industries show different reactions to monetary policy. For example, firms that produce commodities with cyclical demand are affected more following a monetary policy move. Therefore, part of the asymmetry between the movement of stock prices and change in monetary policy was shown to be due the industry to which the firm was affiliated (Thorbecke, as cited in Chiarella et al., 2013). For example, the technology sector, cyclical consumer goods, and communications reacted much more to the monetary policy than the firms belonging to other industries. Also, research indicates that capital-intensive industries and industries that produce international goods are affected more by monetary policy changes (Chiarella et al., 2013).

Summary and Conclusions

According to economic theories and what has become the foundation of asset pricing models, the problem of asset pricing has led to the understanding of the factors that determine investors' expected or required rate of return. Expected or required rate of return has two distinct components: the nominal risk-free rate and some risk premium, which represents the volatility of the expected pay-off from the asset. Thus, there is a relationship between expected rate of return and risk involved in the investment in a specific asset, the so called risk-return trade off. The capital asset pricing model (CAPM), which was built upon the previous models by Markowitz, thoroughly elaborated on the relationship between risk and rate of return that investors expect to obtain from purchasing a specific asset. Subsequently, on the basis of this risk-return relationship, Sharpe explained how equilibrium is established in the asset market (Chiarella et al., 2013).

Thus, the investors' expected rate of return depends on the elements that impact the risk involved in investing in a specific asset. The CAPM, like Markowitz's portfolio selection theory, assumes that investors would evaluate the risk of an individual asset by considering the amount of risk that the asset would contribute to the risk of their overall portfolios. Therefore, according to the model, in the case that investors select a completely diversified portfolio the contribution of specific risks of individual securities to the overall portfolio might be negligible. However, the contribution of CAPM compared with the previous models was the well -known CAPM expected return-beta relationship in which firm specific features would affect the expected risk premium for any individual security (Chiarella et al., 2013).

On the basis of this background, in this literature review I explained the elements that contribute to the risk involved in investing in a specific asset both theoretically and empirically. With respect to the firm specific factors the following features were researched and found significant: (a) the size of the company, (b) the value effect, (c) the price to earnings ratio, (d) the ratio of leverage to average return on stocks, and (e) book equity to market equity ratio (Sehgal & Balakrishnan, 2013). However, the focus in this literature review was on the effect of monetary aggregates and interest rates on asset evaluation.

Thus, I elaborated on the changes in the structure of the financial market due to the growth of technology, specifically after the financial crisis of 2008. I explained the new role of Federal Reserve System and its importance in the financial market. The Federal Reserve had the authority to both act upon economic activities through its various policy instruments and to regulate and supervise the whole monetary system including commercial banks. Announcements by the Federal Reserve, even the way that they were worded, would affect future economic forecasts and thereby the stock prices in the whole world (Argitis, 2013). The important point is that any movement of monetary policy both qualitative through wording in announcements or quantitatively through change of interest rate will cause interpretations about the future economic path. Future economic outlook would affect both the systematic and nonsystematic risk for investors and, therefore, the investment decisions made by investors.

With this background, I developed a model and tested the hypotheses for five factors against historical data. The model was based on the standard CAPM, with the addition of the Federal Funds Rate and Federal Funds Futures based on the Bernanke and Kuttner (2003) model. In addition, I used the companies’ size as one firm specific feature in my model. My contribution to the previous works are the addition of monetary aggregate M2 into the model in order to test the effect of the so-called quantitative easing policy of Federal Reserve on the cyclical movement of asset prices in the equity market.

Chapter 3: Methodology

In this research, I analyzed the effect of monetary policy on the volatility of asset prices in the equity market. Since the outset of the industrial revolution, the capital market has played an instrumental role in the progress of economic production. This role has become much stronger with growing complexity in economic structures, specifically since the surprise of the financial crisis in 2008 (Kauppi & Saikkonen, 2008; Kim & Lee, 2008; Rudebusch & Williams, 2009). In today's economy, most individuals are directly or indirectly involved in the stock market. Individual people or investment institutions such as mutual funds and insurance companies invest their excess funds in the stock market each day, and in order to decide which stocks to buy or sell, they need to have some estimation of the expected rate of return on various stocks and the amount of risk involved in each stock. On the other hand, business corporations that try to raise capital for growth of their companies through offering new securities to the market need to know how to decide on the price of new securities. All of these important issues lead to the problem of how securities are or should be priced in the capital market.

From a theoretical point of view, the value of a specific asset traded in the capital market is decided by three factors: (a) the future amount of cash flows from the asset, (b) the expected rate of return to calculate the present value of future cash flows, and (c) the time pattern of the occurrence of the cash flow (Cochrane, as cited in Berger, 2011). In this scenario, the investor faces risk and uncertainty about the future on two different grounds: (a) the risk related to a specific industry and a specific firm, or the *specific risk*; and (b) the risk related to the circumstances in the macroeconomy, or the *systematic risk*.

Thus, different assets have different prices not only because their expected cash flows are different, but also because they entail different degrees of risk. In other words, two assets with the same cash flows might have different prices in the capital market if an investor decides that one is riskier than the other.

As a result of these risks and uncertainties, the expected rate of return is different for different assets. Thus, definition and measurement of risk and its correlation with the expected rate of return are the core issues in all asset pricing models, both theoretically and empirically, and almost all research on asset pricing deals with identifying the appropriate elements that form the risk associated with investment decision making. In other words, the relationship between the expected rate of return of an asset and the risk inherent in that asset is one of the fundamental issues of asset pricing, both theoretically and practically. The CAPM, which has been the most controversial and most referenced theory of investment, has been used to thoroughly analyze the relationship between risk and expected rate of return.

This research focused on pricing assets in the equity market—that is, I examined how assets in the equity market are priced, how equilibrium is established in the market for assets, and how an investor reaches a decision of buy or sell for a specific asset. My goal was to study the economic factors that affect movement of asset prices in the stock market in the United States, specifically the monetary factors. Stock prices and economic activities are always in a mutual interaction and relationship. It is typically presumed that asset prices are an indicator of future economic activities and, therefore, a reflection of the future profit and dividend distribution of corporations.

Moreover, changes in macrovariables change investors' expectations about future cash flows of their investments. More importantly, these expectations change the systematic risk that investors are facing and the discount rate that investors use to calculate the present value of future returns. Because of the importance of monetary factors in the overall operation of the economy, changes in macroeconomic variables eventually reflect in the operation of monetary instruments by the Federal Reserve. My focus in this paper is on the monetary aspect of the economy and its influence on the equity market. The financial market and the overall growth of the economy are so closely linked that the new economy is now labeled the "Wall Street economy" (Minsky, as cited in Argitis, 2013).

The theoretical base of my research was the CAPM, in which relationships between the dependent variable, expected rate of return of individual stocks in the stock market, and five independent variables, the factors that symbolize the investment risk in the stock market, were examined. The model was developed based on five hypotheses related to the relationships between rates of return on stocks of publicly traded companies and relevant risk factors. The independent variables were macro and micro in nature and reflected firm-specific and systematic risks. The independent variables of the model were company size as a firm-specific factor, money supply, M2 reflecting the quantitative easing policy of the Federal Reserve; the Federal Funds Rate, Federal Funds Futures, and expected rate of return in the overall stock market. Although other macroeconomic variables, such as GDP and industrial production, have been shown to have a significant effect on asset price movements, I focused on the monetary side of the economy in this research study because, as I discussed in the literature review, all macro variables are eventually reflected in the monetary conditions in the economy.

I selected three of my independent variables from monetary factors, the ones that in previous research had shown positive effects on the movement in asset prices in the equity market. I tested the significance of these independent variables against data so that investors, business corporations, and government decision makers could learn and benefit from the results. Although the revolutionary technological advancement of information technology has globalized the financial market, the analysis in this paper was confined to monetary policy in the United States. Therefore, exchange rate fluctuations were excluded from the analysis.

In this chapter, I justify the design for the study and then elaborate on the nature of the relationships among the variables, followed by a statement of the specific research hypotheses to be tested. Additionally, I describe the target population, type of data, sources of data, sampling frame, sampling design, and appropriate method to calculate the sample size. Finally, I discuss my plan for data analysis and explain in detail the variables of the model and their operational definitions as well as the methodology that I used to test the hypotheses against empirical data.

Research Design and Rationale

The research question (RQ) guiding this study was about the way the independent variables—market rate of return, company size, change in money supply (M2), change in Federal Funds Rate, and change in Federal Funds Futures—affect the expected rate of return of companies' equity. In order to find answers to this question, I developed a multifactor asset pricing model containing one dependent variable and five independent variables that represent the risks involved in investing in an asset. These independent variables were tested against empirical data to provide a better explanation of the factors that determine stocks' rates of return in the equity market.

The independent variables, or the risk factors, in my model were both of macro or systematic and micro or nonsystematic nature. These variables were (a) market rate of return, or the return on the universe of publicly traded assets as a macro representing systematic risk; (b) company size as a nonsystematic risk; (c) change in monetary aggregate, M2, measured by changes in the volume of banks' reserve in the Federal Reserve, or the amount of government bonds purchased as a macro or systematic risk; (d) change in the Federal Funds Rate obtained from announcements of the FOMC, as a macro or systematic risk; and (e) change in Federal Funds Futures, measured by changes in the rate of current-month federal funds future contracts, as a macro or a systematic risk.

This study was quantitative with an ex post facto design. I used existing panel data (time series of cross sections) to examine the relationship between independent variables and the dependent variable. Ex post facto design was appropriate for this study because the data were historical data and there was no intervention involved.

I collected time series of cross-section data (panel data) on the realized rate of return on the equity of a sample of publicly traded U.S. corporations as well as data on the overall U.S. stock market rate of return, the change in money supply M2, change in the Federal Funds Rate, and change in Federal Funds Futures, over the 10-year period

2005-2015. I analyzed the data using multiple regression models appropriate for panel data (time series of cross section) analysis. Therefore, the research design in this study involved conducting a multiple regression analysis to examine the relationship among variables. The findings of this study may help investors to make more informed investment decisions and may assist monetary policy authorities in assessing the impact of monetary policy on the stock market and thus preempting stock market crashes.

The scope of CAPM, single factor or multifactor, can include all risky assets, such as stocks and bonds of public and nonpublic corporations, real estate, foreign exchange, gold, and so on. However, typically, testing of CAPM has been done for stocks that are publicly traded in the stock market. Therefore, the scope of my research was confined to all publicly traded companies in the U.S. security market. The variables of the units of analysis were retrieved from the stock market databases and the Federal Reserve website. The focus of the study was determining risk factors that affect the expected rates of return of common stocks of publicly traded corporations, finding the nature of the relationship between risk and return, and estimating the relevant coefficients in the derived relationships.

The study's research question gave rise to the following hypotheses:

Hypothesis 1

H_0: There is no relationship between the independent variable market rate of return and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable market rate of return and the dependent variable companies' expected rate of return on equity.

Hypothesis 2

H_0: There is no relationship between the independent variable company's size and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable company's size and the dependent variable companies' expected rate of return on equity.

Hypothesis 3

H_0: There is no relationship between the independent variable change in money supply (M2) and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in money supply (M2) and the dependent variable companies' expected rate of return on equity.

Hypothesis 4

H_0: There is no relationship between the independent variable change in Federal Funds Rate and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in Federal Funds Rate and the dependent variable companies' expected rate of return on equity.

Hypothesis 5

H_0: There is no relationship between the independent variable change in Federal Funds Futures and the dependent variable companies' expected rate of return on equity.

H_1: There is a relationship between the independent variable change in Federal Funds Futures and the dependent variable companies' expected rate of return on equity.

The above hypotheses were tested by running the following multiple regression model:

$$RR_{jt} = \beta_0 + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{jt} \qquad (3)$$

where

RR_{jt} = Rate of return on company's ***j*** stock during year *t*.

MR_t = Rate of return on the overall stock market during year *t*.

S_j = Company's *j* size, a dummy variable 1 if company is small cap and 0 if company is large cap.

MS_t = Change in money supply M2 during year *t*.

FFR_t = Change in the Federal Funds Rate during time *t*.

FFF_t = Change in Federal Fund Futures during period *t*.

ε_{jt} = Regression residual.

The rate of return on company's *j* stock during year *t*, RR_{jt},, is calculated using Equation (4):

$$RR_{jt} = \frac{P_{jt} - P_{j(t-1)} + D_{jt}}{P_{j(t-1)}} \qquad (4)$$

where P_{jt} and $P_{j(t-1)}$ are price of company *j* stock in years *t* and (*t-1*), respectively, and D_{jt} is the dividends paid by company *j* during year *t*.

I examined the relationships between the dependent variable and these five independent variables by employing ex post facto research design. I chose the ex post facto research design because the independent variables of the model cannot be experimentally manipulated and, therefore, it was impossible to collect data through experimentation and employ experimental designs. This design has been used by most researchers using historical data to test for significance of regression coefficients in their models.

Methodology

I developed and tested an enhanced CAPM in which I included some monetary policy variables as well as firm size (measured by market capitalization) to the traditional CAPM. Therefore, I developed a multifactor asset pricing model consisting of one dependent variable and five independent variables (risk factors) that were tested against empirical data to provide a better explanation of the factors that determine stocks' rates of return in the equity market. The dependent variable was the expected rate of returns of publicly traded companies in the stock market, and the five independent variables were the overall rate of return for the whole stock market, company size, the change in money supply M2, change in the Federal Funds Rate and change in Federal Funds Futures. I used available data to investigate correlations and examine regressions among variables. The regression model that was used is as defined in Equation (3).

The model is based on five hypotheses related to the relationships between rates of return on stocks of publicly traded companies and relevant risk factors. I collected time series of cross-section data (panel data) on the realized rate of return on the equity of a sample of publicly traded U.S. corporations as well as data on overall U.S. market rate of return on equity, the change in money supply, M2, change in the Federal Funds Rate, and change in Federal Funds Futures, over the 10-year period 2005-2015. I analyzed data using multiple regression models appropriate for panel (time series of cross-section) data analysis.

Multiple Regression

Multiple regression is a statistical technique that allows one to assess the relationship between one dependent variable or criterion and several independent variables or predictors. Both the dependent variable and independent variables should be continuous; however, it is possible to include discrete or dichotomous variables as dummy variables. Multiple regression is an extension of bivariate regression in which several independent variables are included to predict a value on a dependent variable. Multiple regression is a flexible technique, and it can be used with experimental, observational, and survey research. Multiple regression can determine the strength of the association between a set of predictors and criteria. In addition, it can indicate the statistical significance of each of the independent variables in predicting the dependent variable.

The Assumptions

The assumptions of multiple regressions follow:

1. Outliers can impact the precision of results in multiple regression and must be dealt with prior to conducting research.
2. The ratio of cases to predictors: Multiple regression can be sensitive to sample size, and if the sample is too small, the results will not be accurate. In order to be able to accurately test for multiple correlation and regression coefficients, it is essential to have a sample size greater than 104 plus the number of predictors in multiple regression.
3. The third assumption is multicollinearity: Multiple regression is sensitive to multicollinearity, which is when at least two of the independent variables in the equation are highly correlated with each other. Multicollinearity makes the regression equation unreliable and can yield large standard errors.
4. Assumption 4 is normality of variables: Although there is no need for variables to be normally distributed, the prediction equation is enhanced if all of the variables are normally distributed.

The Types of Multiple Regression

There are three types of multiple regression:

1. Standard type, simultaneous or direct multiple regression is the most widely used type of multiple regression. In this type all predictors are entered into the equation at the same time, that is, the overlapping variance refers to the overlap that is shared among the predictors.
2. The second type of multiple regression is sequential in which the predictors enter into the equation according to an order determined by the researcher,

overlapping variance is assigned to the predictors in the order of entry into the regression equation.

3. The third type of multiple regression is statistical or stepwise multiple regression in which the order of entry for the independent variables depends on statistical criteria. The software package SPSS decides which predictor to put into the equation at each step based on statistical criteria that the researcher decides on.

The Biases in Multiple Regression

Multiple regression provides an estimate of the effect on *Y* due to arbitrary changes in *X*. If an omitted variable can be measured and included, multiple regression is a solution to omitted variable bias. In the case of multiple regression, it is possible to infer the statistical inferences about causal effects from one population and settings to other population and settings. The threats to the internal validity of regression are omitted variable bias, sample selection bias, errors-in-variables bias, and simultaneous causality bias (Nachimas & Nachimas, 2008). Omitted variable bias exists if an omitted variable is both determined by *Y* and is correlated at least to one independent variable. The logical solution to omitted variable bias is to measure the variable and include it as an independent variable in the multiple regression.

If an interaction term is omitted incorrectly, then there is the problem of wrong functional form, and it can use nonlinear specifications (Trochim, 2006). When there is an error in data measurement such as data entry errors and recollection errors in surveys, the errors-in-variables bias occurs. The researcher can prevent variable bias by checking on data to be precise and by adopting a better procedure for measuring the data, in other words, cross-check the subsample of data through various administrative records. Sample selection bias is caused by random sampling of the population. Moreover, sample selection bias causes correlation between an independent variable and the error term. Simultaneous causality bias is a bias caused when both *X* causes *Y* and *Y* causes *X*. This bias can be controlled through randomization (Trochim, 2006).

Rationale for the Particular Method Chosen

I investigated the relationships between the dependent variable and the five independent variables by employing ex-post facto research design. I chose the ex-post facto design because the independent variables of the model cannot be experimentally manipulated and, therefore, it was impossible to collect data through experimentation and employ experimental designs (Campbell & Stanley, as cited in Trochim 2006). The ex-post facto design using existing data was the most appropriate design for this study. This design has been used before in the literature; in fact, most of the studies in this area used regression coefficient for testing their variables. I considered this design as the best fit for my study.

In experimental research, the researcher is dealing with the relationship between variables or expected predictions; therefore, the questions should start with “how” and ask for the relationship between independent and dependent variables. If there is more than one dependent or independent variable, there should be more questions to ask, and if the design of research is group, or cluster based, and whether research is cross-sectional or longitudinal, the type of questioning will be different (Trochim, 2006). Randomization is a solution to this problem. Sample randomization ensures that each one of participants has an equal chance of being assigned either to experimental or control group; therefore, the existence of intrinsic factors will be diminished with randomization. Having a control or comparison group also gives a solution for eliminating intrinsic factors from the experiment. By using a control group, the researcher controls most of the intrinsic factors that could threaten the validity of experiment (Nachimas & Nachimas, 2008).

In order to evaluate different research designs, a researcher needs some criteria and a definition for a good design. “A good design is a design that is doing one thing at a time” (Singleton & Strait, 2005, p. 187). This means that a good design is one in which only independent variable or treatment produces the outcome and nothing else. This is only possible if the researcher controls the preexisting subject differences among the groups and make sure that “events occurring within each experimental conditions are exactly the same except for the manipulated independent variable” (p. 187). To allow only one factor, the independent variable varies and controls the rest. The only research design that can satisfy this condition is a true experiment. However, distortions occur in all research, either because a researcher is not aware of all the facts or because there are other concerns. Therefore, one must redefine a good design as one that minimizes the threat to internal validity.

A researcher has the flexibility to minimize the threat to internal validity by changing the research design; therefore, design selection is important in research (Trochim, 2006). That means the type of research design that researchers construct determines whether there will be a causal relationship in the research and whether the treatment of the program makes a difference on outcome. Therefore, on the basis of this criterion, one can rank the experimental designs based on their internal validity, or their approaches towards randomization and grouping, because randomization and groupings are the factors that determine the internal validity of the designs (Trochim, 2006). Thus, true experiment lists at the top as the best and safest design to apply for the research and it is preferable to other types of experimental designs. The other experimental designs rank lower than true experiment depending based on their structure regarding sample randomization and having identical groupings, as well as controlling the events occurring during the experiment (Trochim, 2006).

To answer this question we have to define research design, internal validity, and experimental design. Research design is “the glue that holds the research projects together” (Trochim, 2006, p. 171). In other words it shows how the research is structured and how the whole procedure of research is put together. “Internal validity is the approximate truth about inferences regarding causal relationship” (p. 172). Experimental design is commonly used in social research in which intervention is involved and is seeking a causal relationship between an independent variable, treatment variable, and a dependent variable or outcome. A strong design minimizes the threat to internal validity. The researcher has the flexibility to minimize the threat to internal validity by changing the research design. The threat to validity in true experiment is minimized due to random sampling and random assignment.

Panel Data Design

A panel dataset consists of observations on multiple units (entities, companies, individuals, etc.), which is the unit that is observed at two or more points in time. The general model framework for regression analysis using panel data approach is:

$$Y_{jt} = \beta_{0j} + \beta_j X_{jt} + \varepsilon_{jt} \qquad (5)$$

where, *j= 1,2,……N* represents individual items in the cross sections, *t=1, 2, 3,.T* represents time, β_{0j} is the intercept for unit *j*, β_j is the row vector of regression coefficients, *X* is the *N-by-T* matrix of observations on *N* units, and ε_{it} is the error term. The error tem has two dimension, one for the units and one for time.

The general model expressed in Equation (5) can take three possibilities (Beck, 2001):

1. Beck (2001) defined pooled Regression without Individual effects as:

If β_{0j} contains only a constant term for all the units, that is individual units have the same intercept, then ordinary least square approach provides consistent and efficient estimates of the common α and the slope vector β, provided assumptions of OLS are met. (p. 24)

In this model, both slopes and intercepts are the same for all units. The pooled regression model can be expressed as follows:

$$Y_{jt} = \beta_0 + \beta_j X_{jt} + \varepsilon_{jt} \qquad (6)$$

2. Fixed Effects (FE): In the FE model each unit ***j*** has its distinct intercept β_{0j} and each β_{0j} is a nonrandom constant. The OLS is applied to solve the regression equation by including *N-1* dummy variables in the model which take values of 1 if $i = j$ and **0** if $i \neq j$. This model is often referred to as Least

Square with Dummy Variables (LSDV). The slope is the same for all units and the intercepts differ according to cross-sectional units, or time, or both cross-sectional units and time. The fixed effect model can be expressed as:

$$Y_{jt} = \beta_{0j} + \beta X_{jt} + \varepsilon_{jt} \tag{7}$$

3. “Random Effects (RE): In RE model it is assumed that each intercept β_{0j} contains a constant term, which is the same for all units, and a random term, which is different for each unit. So, the RE model would be” (Beck, 2001, p. 26):

$$Y_{jt} = (\beta_0 + u_j) + \beta_j X_{jt} + \varepsilon_{jt} \tag{8}$$

Other variants of the random effect model include fixed intercept, random slope as shown in Equation (9) and random intercept, random slope as shown in Equation (10):

$$Y_{jt} = \beta_0 + (\beta_j + v_j) X_{jt} + \varepsilon_{jt} \tag{9}$$

$$Y_{jt} = (\beta_0 + u_j) + (\beta_j + v_j) X_{jt} + \varepsilon_{jt} \tag{10}$$

The RE model is solved “using general least square (GLS) approach” (Beck, 2001, p. 27).

Population

The target population included publicly trading companies in the United States whose securities are traded in the New York Stock Exchange (NYSE) or NASDAQ. However, the sampling frame chosen for this target population was the list of companies whose stocks belong to U.S. companies and not to the stocks of non-U.S. companies that trade in the U.S. stock market. To fulfill this purpose, I chose the list of companies that constitute the Russell 3000 Stock Index, which includes about 98% of the investable U.S.

equity market (www.russell.com). Therefore, the unit of analysis in this study was each company in the Russell 3000 Index that has been operating as public company for the period of 2005- 2014 The data, that is, the characteristics or variables of the units of analysis that I studied, were monthly rates of return of the stocks and the companies' market capitalization.

Sampling and Sampling Procedures

I used stratified random sampling method for this study "to ensure that different groups of the population are represented adequately in the sample" (Nachmias & Nachmias, 2008, p. 171). The target population of the study was publicly trading companies in the United States whose securities are traded in New York Stock Exchange (NYSE) or NASDAQ. However, the sampling framework was the list of companies that constitute the Russell 3000 Stock Index; the unit of analysis was each company in the Russell 3000 Stock Index. The stratification was based on companies' market capitalization (size). The Russell 3000 stock index consists of 1,000 large capitalization and 2,000 small capitalization stock. Therefore, one third of the sample was taken from large cap stocks and two thirds from small cap stocks.

The sample period was from January 2005 to January 2015, and time-series data on the selected companies was collected for this period. This time period was chosen because (a) it provided the opportunity to test the effect of monetary policy on equity market for both pre- and post-2008 crisis, and (b) it covered the era of post financial crisis where general economic conditions were completely different.

Sample size determination is based on the sampling theory. The sampling theory addresses sampling distribution of parameters of the population. Each population parameter has a specific sampling distribution. For example, sampling distribution of the mean of a large population is normal and sampling distribution of multiple correlation coefficient is the *F* distribution. In the test of hypothesis procedure, there are mathematical relationships between the following elements: (a) sample size, (b) type I error, (c) appropriate power of the test, and (d) required effect size. The type of the mathematical relationship between above elements depends on the parameter that one intends to estimate. Power of the test is the probability of rejecting the null hypothesis when it is false, in other words, it is the probability of detecting an effect when the effect does exist. To determine the minimum required sample size in a study tone must know the parameter that one intends to estimate, a type I error, the required power of the test, and the effect size. Conversely, if for any reason the sample size is predetermined then we can calculate the power of the test for that sample size.

My research involved a multiple regression with five predictors. The parameters were the regression coefficient (the betas), and the multiple regression coefficients (*2*). To determine the minimum sample size, the conventional practice is to have a type I error of 5% and a minimum power of 80%. According to Cohen (1988, p. 412) the effect size in a regression model is defined as (a) small effect = 0.02, (b) medium effect = 0.15, and (c) large effect = 0.35. The effect size measures percentage of variations in the dependent variable explained by the independent variables divided by percentage of variation in the dependent variable not explained by the independent variables and is calculated through Equation (11):

$$f^2 = \frac{R^2}{1-R^2} \tag{11}$$

where, f^2 is the square of the effect size and R^2 is the square of coefficient of multiple regression.

To calculate minimum required sample size for my study, I used GPower 3.1. I selected linear multiple regression, fixed model, single regression coefficient. Following their instructions on their manual (2014), for a two-tail test with medium effect size of 0.15, number of predictors 5, alpha 5%, and power 0.80, the software gave me sample size of 55. If I increase my power to 95%, then the required sample size would be 89. Minimum sample size for different effect sizes and a range of powers is shown in Table 1.

Table 1

Minimum Sample Size for Selected Powers and Effect Sizes

	Power			
Effect size	0.8	0.85	0.90	0.95
Small (0.02)	395	451	528	652
Medium (0.15)	55	62	73	89
Large (0.35)	25	29	33	40

To see how sample size and power are related one can plot them for any specific effect size and type I error. The relationship between sample size and power for medium effect size of 0.15 and alpha of 5% is shown in Figure 1.

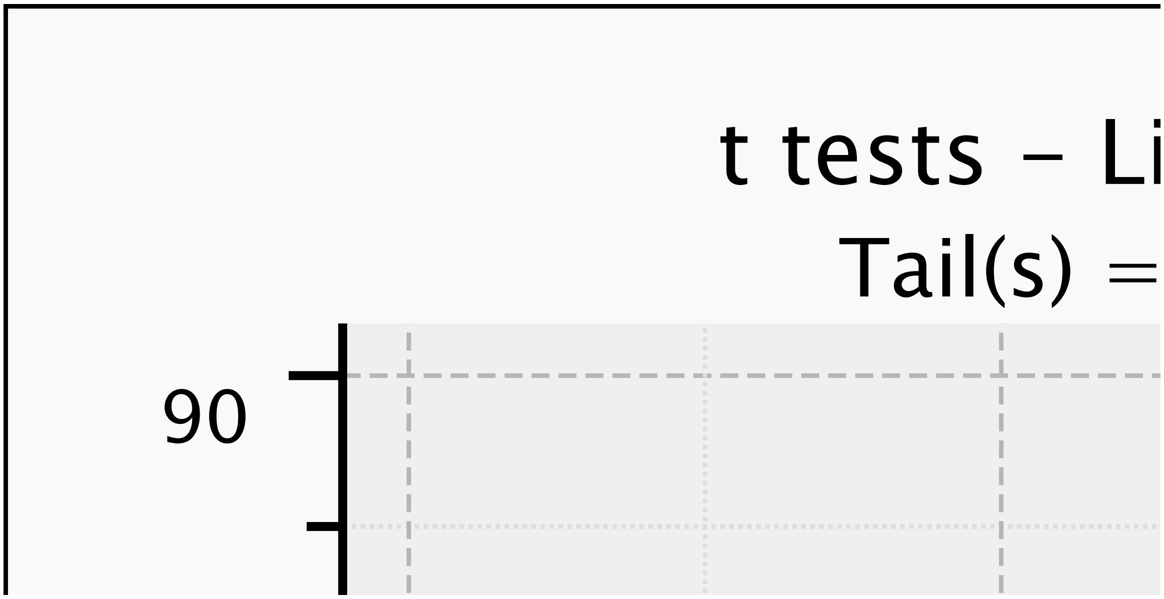

Figure 1. Relationship between power and sample size.

For the purpose of my study I decided with a sample size based on medium effect size and 95% power which as shown in Table 1 is 89 units. So I selected 90 companies for ease of stratification. Therefore, stratified sample consisted of 30 large cap corporations randomly drawn from Russell 1000 Stock Index and 60 small cap corporations randomly drawn from Russell 2000 Stock Index.

Recruitment, Participation, and Data Collection (Primary Data)

In this research data were obtained from the existing financial databases and the data collection process did not require use of survey instruments or interviews. The required data were obtained from different sources. Companies' balance sheets were obtained from Securities and Exchange Commission (SEC). Monthly stock prices for every company were obtained from Yahoo-finance website. Monetary policy related data were retrieved from the U.S. Federal Reserve web site. For recording and storing data Excel worksheets were used.

Pilot Study

There was no pilot study in this research.

Intervention

There was no intervention in this study.

Archival Data

I did not use archival data.

Instrumentation and Operationalization of Constructs

No instrument was used in this study; it was not a survey.

Intervention Studies or Those Involving Manipulation of an Independent Variable

No materials / programs were required for the study.

Data Analysis Plan

Data analysis was conducted using SPSS software and to test hypotheses for the existence and form of relationships between variables and verification of statistical significance of correlation and regression coefficients. In the SPSS environment, panel data can be analyzed using Analyze – Mixed Models – Linear. SPSS which applies Maximum Likelihood approach for doing panel data analysis. Sample statistics required for data analysis were calculated from the collected data and were reported in tables, histograms, and charts. The results of data analysis were reported in tables containing estimated correlation and regression coefficients, relevant test statistics, and the significance levels (*p*-values).

How Data Were Screened and Cleaned

To clean the data, I looked at the value of *z* scores. If the absolute value of *z* scores of some data was greater than 3.29, then those data were removed. The dependent variable was the expected rate of returns of publicly trading companies in the stock market, and the five independent variables were the overall rate of return for the whole stock market, which is the basic CAMP theory, company size as measured by the companies' market capitalization, the change in money supply M2, change in the Federal Funds Rate, and change in Federal Funds Futures. I employed linear regression, and all independent variables were put into SPSS simultaneously (the option, enter). I showed the model fit by normality plot.

Threats to Validity

Conclusion Validity

A threat to conclusion validity is when the researcher reaches a conclusion about the relationship that is not correct. Here, there are two types of errors about relationships: (a) to conclude there is no relationship when in fact there is one, and (b) to conclude there is a relationship when in fact there is not. In most cases, when the data sample is not as big, the researcher misses the relationship that exists because it might be hard to find relationships in the data at all. “We tend to have more problems finding the needle in the haystack than seeing things that aren't there” (Trochim, 2006, p. 65).

In the first type of error, no relationship is found while there is a relationship because of “the tiny needle and too much hay” or “signal-to-noise ratio problem” (Trochim, 2006). This happens when there are too many factors that make it hard to see the relationship. The noises that create threat to conclusion validity result from low reliability of measures due to, for example, poor wording in the questionnaire or a bad instrument design (Trochim, 2006). Noise is caused by, for example, disturbances outside the research area and other irrelevant events that can distract the researcher or the participants (Trochim, 2006).

Sometimes the researcher finds a relationship when there is not one. Researchers manipulate the data to get the results they wanted for support of their hypotheses. In other words, they are "fishing" for a specific result and they get it through analyzing the data repeatedly under slightly differing conditions or assumptions. Statistically, the researcher sets an arbitrary value for the level of significance. More importantly, there are errors due to the variety of assumptions that the researcher makes. In quantitative research this is referred to as the violated assumptions of statistical tests (Trochim, 2006).

Trochim (2006) suggested the following for conclusion validity. Good statistical power means to have the statistical power greater than 0.8 in value, which can be achieved by collecting more information and using a larger sample size. The second is to raise alpha level, for example, using 0.10 significance level instead of a 0.05 significance level. Finally, one can increase the effect size.

External Validity

External threat to validity is when researcher draws incorrect inferences from the sample data to other past and future situations. Threat to external validity impedes the generalization of the research findings. Cronbach (as cited in Trochim, 2006) has framed the issues related to external validity in two ways: generalizing from the finding of research to the cause and effect that they represent, and generalizing from the categorizing represented in a study to different categories. External validity is when the statistical inferences can be generalized from the population and setting studied to other populations and settings. Randomization and the appropriate sample size will eliminate the effects of intrinsic factors in the experiment. In this study, I used randomization and appropriate sample size to avoid threats to external validity in my research.

Internal Validity

Internal validity in causal relationship means the researcher can demonstrate that the only variable that caused the outcome was the independent variable and nothing else. Trochim (2006) explained that in order to have a causal relationship there must be "temporal precedence, co-variation of cause and effect, and no plausible alternative explanations" (p. 173). Even if one has the first two in a causal relationship, it is not certain that the intervention has caused the effect. These alternative explanations are threats to internal validity, and the researcher must rule them out to get a valid causal relationship. Internal validity exists if the effect is caused by independent variables and not by some extraneous variables. In this research, because I implemented random sampling, there was no threat to internal validity. Also, in my research, there was no measuring instrument; therefore, there was no threat to construct validity.

Ethical Procedures

In this research, there was no treatment of human participants; therefore, there were no ethical procedures. The data that I used were from public sources.

Summary

Asset pricing models have been the center of attention both in the academic circles and among financial practitioners. The emergence of modern finance theories started with the seminal works of Markowitz's mean-variance analysis and Sharpe's and Linter's capital asset pricing model (CAPM). CAPM extended the Markowitz model by introducing the risk-free asset, which investors could include with a portfolio on the efficient frontier through lending and borrowing at the fixed risk-free rate (Chiarella et al., 2013). Then, on the assumption that rational investors would select portfolios that yield highest expected return in excess of the risk-free rate per unit of risk taken, CAPM concluded that there exists one specific portfolio that can serve as the optimal portfolio for all investors. That single optimal portfolio consists of all risky assets weighted by their market capitalization and labeled the market portfolio. From here, the famous expected return-beta relationship of CAPM is deduced. The expected excess return of any security is linearly related to the beta of the security and the expected excess return on the market portfolio (Borys, 2011).

The CAPM model was criticized from the behavioral economists and psychologists who cast doubt on the validity of the basic assumption of CAPM, rationality of investors (Tversky & Kahneman, as cited in Levy, 2012). Although there was no merit in the claim of behavioral economists, it was empirically proven that individuals exacerbate their forecast in the business cycles. In other words, investors are excessively optimistic during boom market and excessively pessimistic during recession and make systematic errors in predicting future earnings growth (Levy, 2012; Spyroua & Kassimatis, 2009).

The analysis of asset pricing and its understanding has a lot of implications for investors in the stock market. Investors buy undervalued stocks and sell overvalued stocks every day and making correct decisions makes a difference for gain or loss for investors and on a macro level will help or hurt the overall economic stability. Moreover, the intertwining reaction between macroeconomic factors and micro decisions are a topic that has to be given more attention in the economic- financial research. Inclusion of time, business cycles, and unexpected shocks into asset pricing models were an effective way of solving the problem (Sehgal & Balakrishnan, 2013). Thus, what is needed is a comprehensive asset pricing model that encompasses all the relevant macroeconomic factors with the goal of a unified model of macro-finance asset pricing model.

Therefore, I developed a multifactor model based on CAPM assumptions but one more elaborate and suitable for current economic conditions. The whole structure of economy has gradually changed due to the growth and evolution of technology towards information technology. I focused on monetary factors and selected three key instrument of monetary policy for my project.

In this quantitative, explanatory I examined correlations and regressions amongst variables. The data for this study included the rate of return on the stock market and on individual publicly trading companies’ equity, market capitalization of the sample companies, change in money supply M2, change in Federal Funds Rate, and change in

Federal Funds Futures. The ex-post facto design was intended to examine correlational relationships between independent and dependent variables. In this research data were obtained from the existing financial databases, and the data collection process did not require use of survey instruments or interviews. The required data were obtained from different sources. Companies' balance sheets were obtained from Securities and Exchange Commission (SEC); monthly stock prices for every company were attained from Yahoo-finance website. For recording and storing data Excel worksheets were used, and the various features of Excel and SPSS were utilized to analyze the data and test the hypotheses.

In Chapter 4 the results of the study are presented.

Chapter 4: Results

The specific problem addressed in this research was the impact of monetary policy and certain firm-specific factors on the equity market. This problem is important because the impact of monetary policy on the economy and on economic resource allocation takes place through its impact on the equity market. Therefore, the purpose in this study was to develop a multiple regression model in which the dependent variable was the expected rate of returns of publicly traded companies in the stock market and the five independent variables were the rate of return for the whole stock market, companies' size as measured by their market capitalization, change in money supply M2, change in the Federal Funds Rate (FFR), and change in Federal Funds Futures (FFF). The CAPM was the theoretical foundation of this research. The research questions and the hypotheses addressed the significance of the above five independent variables in predicting the dependent variable. In this ex post facto study, I used existing panel data to examine relationships between variables. The statistical methodology adopted for testing the hypotheses was multiple regression, as expressed in Equation 12:

$$RR_{jt} = \beta_0 + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{jt} \qquad (12)$$

where

RR_{jt} = Rate of return on company's j stock during year *t.*

MR_t = Rate of return on the overall stock market during year *t.*

S_j = Company's *j* size, a dummy variable 1 if company is small size, 0 if company is large.

MS_t = Change in money supply M2 during year *t.*

FFR_t = Change in the Federal Funds Rate during time *t*.

FFF_t = Change in Federal Funds Futures during period *t*.

ε_{jt} = Regression residual.

Data Collection

Following Walden University's Institutional Review Board (IRB) approval of my IRB application (approval number 06-12-15-0389439, dated June 12, 2015), I started my data collection. Annual data were collected for the period January 2005 through January 2015 for the rate of return on the overall stock market; the rate of return on stocks of 60 small capitalization publicly traded companies' equity; the rate of return on 30 large capitalization publicly traded companies; the size of the sample companies as measured by their market capitalizations; money supply M2; the Federal Funds Rate; and Federal Funds Futures. The purpose was to examine correlational relationships between independent and dependent variables.

The required data were obtained from different sources. Companies' balance sheets were obtained from the Securities and Exchange Commission website (www.sec.gov), annual stock prices for every company in the sample and Russell 3000 stock index values were obtained from the Yahoo Finance website (www.finance.yahoo.com), and the related rates of return on equity were calculated. Data on money supply M2 and the Federal Funds Rate were obtained for the Federal Reserve website (www.federalreserve.gov), and data on Federal Funds Futures were obtained from CME-CMOT Group website (www.cmegroup.com).

Data Analysis

Descriptive Statistics

In quantitative statistical analysis, descriptive statistics are presented prior to inferential statistics. Descriptive statistics provide an overall view of the data—that is, a view of the central tendency, the spreads, the range, and the skewness of the data set. There were 11 data sets on annual rate of return of the stock market (N = 11) covering the period January 2005 through January 2015. The mean annual rate of return on the stock market for this period was 10.04% (M = 10.04%), with standard deviation of 17.54% (SD = 17.54%) and a negative skewness of -1.47 (SK = -1.47). For the same time period of 2005-2015, the annual rates of return of 30 large companies were calculated, which gave rise to 330 large company annual rates of return (N = 330), with mean 13.99% (M = 13.99%), standard deviation 45.33% (SD = 45.33%), and skewness 3.05 (SK = 3.05). The sample consisted of 60 small companies and, therefore, there were 660 data on annual rates of return of small companies (N = 660), with mean 15.22% (M = 15.22%), standard deviation 61.36% (SD = 61.36%), and skewness 3.05 (SK = 5.98). These descriptive statistics are shown in Table 2.

Table 2
Descriptive Statistics for the Independent and Dependent Variables of Equation 12

	N	*M*	*SD*	*SK*
Stock market rate of return (Russell 3000 stock index %)	11	10.04	17.54	-1.47
Large company stock rate of return (%)	330	13.99	45.33	3.05
Small company stock rate of return (%)	660	15.22	61.36	5.98
Change in Money supply M2 (%)	11	6.06	1.69	-0.5
Change in Federal Fund Rate (%)	11	-0.09	1.32	-0.7
Change in Federal Fund Futures (%)	11	0.32	1.06	1.72

The results shown in Table 2 are consistent with the CAPM model and with Markowitz's modern portfolio theory. According to CAPM and Markowitz's modern portfolio theory, in portfolio investments there is a positive relationship between risk and return; more expected return comes with more risk. As can be seen in Table 2, the more realized historical portfolio returns, the higher the risk becomes as measured by standard deviation of returns as a measure of risk. These results are also in line with Fama-French's findings, as discussed in Chapter 2. According to Fama-French, small capitalization stock portfolios have higher expected returns and higher risks as compared to large capitalization portfolios, and the results in Table 2 are consistent with this proposition.

Pooled Regression Results

In a pooled approach to panel data analysis, it is assumed that individual units have the same regression intercept and thus ordinary least square (OLS) is applied to find the common intercept and the regression coefficients. Results for the pooled regression approach are shown in Table 3.

Table 3
Multiple Regression Output for the Pooled Model

	B	*SE B*	*b*	*p*	*VIF*
Constant	14.22	9.08	-	0.118	
Market rate of return(%)	1.03	0.15	0.32***	0.000	2.45
Company size	1.22	3.60	0.01*	0.035	1.00
Money supply M2 change(%)	-1.51	1.26	-0.05^{ns}	0.232	1.58
Federal Fund Rate change(%)	-8.35	3.54	-0.19^{ns}	0.155	7.60
Federal Fund Futures change(%)	-7.00	4.92	-0.13^{ns}	0.155	9.52

* $p < 0.05$
*** $p < 0.001$
ns : Not significant
Note: $R^2 = 0.112$ ($p < 0.001$)

Data analysis for the pooling approach indicates a significant relationship between all the independent variables taken together and the dependent variable (R^2= 11.2%, $p <$ 0.001). However, market rate of return and company size are the only statistically significant predictors of companies' rate of return (*B* = 14.22, $p < 0.001$ for market rate of return and *B* = 1.22, $p < 0.05$ for company size). The other independent variables—money supply M2, Federal Funds Rate change, and Federal Funds Futures change—all have *p* values greater than 0.05.

The finding that market rate of return is a significant predictor of companies' rate of return on equity is consistent with CAPM theory, and the finding that company size is a significant predictor of companies' rate of return on equity is consistent with Fama-French's findings. Because the code for the dummy variable company size was 0 for large companies and 1 for small companies and the regression estimate for the intercept (*B*) was equal to 1.22, the regression results indicate that small companies had, on average, 1.22% higher rates of return on equity as compared to large companies. This finding is consistent with the descriptive statistics reported in Table 2.

However, the findings that monetary policy instruments, money supply M2, Federal Funds Rate change, and Federal Funds Futures rate are not significant predictors of companies' rate of return on equity are unexpected and are not supported by theory. Besides, high *VIF* factors for the Federal Funds Rate change and Federal Funds Futures change point to the possibility of multicollinearity, which distorts the regression results. One method to address this problem, which is consistent with theory, is to treat the monetary policy variables as moderator and mediator variables. According to CAPM, as posited by Sharpe, the market rate of return embodies all macroeconomic factors, including monetary policy instruments such as money supply M2, Federal Funds Rate change, and Federal Funds Futures change. Therefore, in the next few subsections, I modify the pooled regression model and treat the monetary variables as moderator and then as mediator variables.

Moderation occurs when the moderating factor (M) significantly affects the strength and direction of the relationship between the dependent variable (Y) and the independent variable (X). That means the interaction (combined) effect of X and M on Y is statistically significant, which in turn implies that in the linear regression of Y against X, the beta coefficient, is significantly different for different value ranges of M.

Mediation occurs when the relationship between outcome (Y) and predictor (X) can be explained through their relationship with the mediator (M) variable. "Mediation is tested through three regression models, (a) a regression predicting the outcome Y from the predictor variable X, (b) a regression predicting the mediator M from the predictor variable X, and (c) a regression predicting the outcome Y from both the predictor X variable and the mediator M" (Field 2013, p. 480). For mediation to occur, the predictor variable X must predict the outcome variable Y less strongly in model (c) than in model (a).

SPSS software does not have a separate function for moderation and mediation analysis. However, there is a method to add these moderation and mediation features to the SPSS software. Following Field's (2013) instruction, I downloaded and installed the PROCESS software from Andrew F. Hayes's website, http://www.afhaynes.com, and a new tab was added to the SPSS regression menu for moderation and mediation analysis. With this added feature, it is possible to conduct moderation and mediation analysis by including in the model one moderator/mediator and one continuous independent variable at a time.

Money supply M2 as the moderating variable. The model with money supply M2 as the moderator variable is expressed in Equation 13.

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 MS_t + \beta_3 MR_t \times MS_t + \varepsilon_{tj} \qquad (13)$$

where

RR_{jt} = Rate of return on company's j stock during year t.

MR_t = Rate of return on the overall stock market during year t.

MS_t = Change in money supply M2 during year t.

MR_t X MS_t = The interaction effect of money supply M2 with the market rate of return.

ε_{jt} = Regression residual.

The SPSS output for moderation effect of money supply M2 is reported in Table 4.

Table 4

The Effect of Change in Money Supply M2 on the Relationship Between Market Rate of Return and the Companies' Rate of Return on Equity

	B	*SE B*	*p*
Constant	14.91	1.73	p <0.001
Money Supply M2 change (%)	-1.57	1.17	p > 0.05
Market rate of return	0.73	0.16	p < 0.001
Money Supply M2 change (%) X Market rate of return (interaction effect)	0.38	0.22	p <0.05

Note: R = 0.33, R^2 = 0.11 (p < 0.001)

As can be seen from the results in Table 4, there is a significant positive moderation effect of money supply M2 on the relationship between market rate of return and companies' rate of return on equity (for the interaction effect B = 0.38, p < 0.05). Moreover, the output of the Johnson–Neyman method indicates that

1. When percentage change in money supply M2 is low (-1.69% or less when centered), there is nonsignificant positive relationship between market rate of return and companies' rate of return on equity, B = 0.08, t = 0.15, p = 0.88.
2. When percentage change in money supply M2 is at its mean value (-0.000% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, B = 0.73, t = 4.5, p = 0.000.

3. When percentage change in money supply M2 is high (1.69% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, $B = 1.38$, $t = 5.4$, $p = 0.000$.

The above findings indicate that there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of money supply M2. However, the strength of the relationship between market rate of return and rate of return on companies' equity increases as the percentage change in money supply M2 increases (because of increasing regression coefficient *B* values), and this relationship is not statistically significant when percentage change in money supply M2 is low.

Money supply M2 as the mediating variable. The mediation model with money supply M2 involves the following three regression equations:

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \tag{14}$$

$$MS_t = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \tag{15}$$

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 MS_t + \varepsilon_{tj} \tag{16}$$

The SPSS output for the mediation effect of money supply M2 on the relationship between market rate of return and companies' rate of return on equity is shown in Table 5.

Table 5

Regression Results for Money Supply M2 as the Mediator

Model	*B*	*SE B*	*p*	R^2
Total Effect (mediator not present, Equation 14)	1.04	0.097	p <0.001	0.105***
Direct Effect (mediator is present, Equation 16)	1.04	0.097	p <0.001	0.105***
Effect of Predictor on Mediator (Equation 15)	-0.001	0.003	p >0.05	0.0001^{ns}

*** p <0.001
ns: Not significant

As shown in Table 5, market rate of return is a significant predictor of companies' rate of return on equity both when money supply M2 is present in the equation (direct effect) and when money supply M2 is not present in the regression equation (total effect), and in both cases 10.5% of variations in the dependent variable is explained by variations of the independent variable(s), R^2 = 10.5%. However, per the regression results of Equation 15, the market rate of return is not a significant predictor of the money supply M2 and very little variation of money supply M2 is explained by variations of market rate of return, R^2 = 0.01%. This implies that there is no indirect effect of money supply M2 on the relationship between market rate of return and companies' rate of return on equity—that is, money supply M2 is not a mediator in this relationship. This result is also confirmed by Preacher and Kelley's kappa-squared test results, κ^2 = 0.002 for the indirect effect, 95% *Bca CI* [0.000, 0.001]. The confidence interval for κ^2 contains 0, so there is no mediation effect of money supply M2 on the relationship between market rate of return and companies' rate of return on equity.

The Federal Funds Rate as the moderating variable. The model for the Federal Fund Rate as the moderator variable is expressed in Equation 17.

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 FFR_t + \beta_3 MR_t \times FFR_t + \varepsilon_{tj} \qquad (17)$$

where,

RR_{jt} = Rate of return on company's j stock during year *t*.

MR_t = Rate of return on the overall stock market during year *t*.

FFR_t = Change in the Federal Funds Rate during year *t*.

MR_t X FFR_t = Interaction effect of the Federal Funds Rate with the market rate of return.

ε_{jt} = Regression residual.

The SPSS output for moderation effect the Federal Funds Rate is reported in Table 6

Table 6

The Effect of Change in the Federal Funds Rate on the Relationship Between Market Rate of Return and the Companies' Rate of Return on Equity

	B	*SE B*	*p*
Constant	15.30	2.29	p <0.001
Federal Fund Rate (%)	-3.69	2.69	p > 0.05
Market rate of return	1.07	0.16	p < 0.001
Federal Fund Rate change (%) X Market rate of return (interaction effect)	-0.46	0.95	p <0.05

Note: $R = 0.33$, $R^2 = 0.11$ ($p < 0.001$)

As can be seen from the results in Table 6, there is a significant negative moderation effect of change in the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity ($B = -0.46$, $p < 0.05$). Moreover, the output of the Johnson–Neyman method indicates that:

1. When percentage change in the Federal Funds Rate is low (-1.32% or less when centered), there is significant positive relationship between market rate of return and companies' rate of return on equity, *B* = 1.13, *t* = 8.34, *p* = 0.000.
2. When percentage change in the Federal Funds Rate is at its mean value (0.000% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, *B* = 1.07, *t* = 6.81, *p* = 0.000.
3. When percentage change in the Federal Funds Rate is high (1.32% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, *B* = 1.01, *t* = 4.05, *p* = 0.0001.

Above findings indicate that there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of Federal Funds Rate. However, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in the Federal Funds Rate increases (because of decreasing regression coefficient *B* values) and this relationship is statistically significant at all levels of the Federal Funds Rate changes.

The Federal Funds Rate as the mediating variable. The mediation model with the Federal Fund Rate involves the following three regression equations:

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \tag{18}$$

$$FFR_t = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \tag{19}$$

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 FFR_t + \varepsilon_{tj} \tag{20}$$

The SPSS output for the mediation effect of the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity is shown in Table 7.

Table 7

Regression Results for the Federal Funds Rate as the Mediator

Model	*B*	*SE B*	*p*	R^2
Total Effect (mediator not present, Equation 18)	1.04	0.097	p <0.001	0.105***
Direct Effect (mediator is present, Equation 20)	1.16	0.11	p <0.001	0.109***
Effect of Predictor on Mediator (Equation 19)	0.035	0.002	p <0.001	0.212***

*** p <0.001

As shown in Table 7, market rate of return is a significant predictor of companies' rate of return on equity both when the Federal Funds Rate is present in the equation (direct effect) and when the Federal Funds Rate is not present in the regression equation (total effect). Moreover, when the Federal Funds Rate is present 10.9% of variations in the dependent variable is explained by variations of the independent variable(s), R^2 = 10.9% which is higher than the R^2 = 10.5% for when the Federal Funds Rate is not included in the equation. Furthermore, per regression results of Equation 19, the market rate of return is a significant predictor of the Federal Funds Rate and 21.2% of variations of the Federal Funds Rate is explained by variations of the market rate of return, R^2 = 21.2%. This implies there is a significant indirect effect of the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity, that is, change in the Federal Funds Rate is a mediator in this relationship. This result is also confirmed by Preacher and Kelley Kappa-Squared test results, κ^2 = 0.035 for the indirect effect, 95% *Bca CI* [0.003, 0.075]. The confidence interval for κ^2 does not contains 0, so there is a mediation effect of the Federal Funds Rate change on the relationship between market rate of return and companies' rate of return on equity.

Federal Funds Futures as the moderating variable. The model with the Federal Funds Futures as the moderator variable is expressed in Equation 21.

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 FFF_t + \beta_3 MR_t \times FFF_t + \varepsilon_{tj} \qquad (21)$$

where,

RR_{jt} = rate of return on company's j stock during year *t*.

MR_t = Rate of return on the overall stock market during year *t*.

FFF_t = Change in Federal Funds Futures during year *t*.

MR_t X FFF_t = Interaction effect of Federal Funds Futures with the market rate of return.

ε_{jt} = Regression residual.

The SPSS output for moderation effect of Federal Funds Futures is reported in Table 8.

Table 8

The Effect of Change in Federal Funds Futures on the Relationship Between Market Rate of *Return and the Companies' Rate of Return on Equity*

	B	*SE B*	*p*
Constant	13.62	2.08	p <0.001
Change in Federal Fund Futures (%)	1.51	3.41	p > 0.05
Market rate of return	1.28	0.19	p < 0.001
Federal Fund Futures change (%) X Market rate of return (interaction effect)	-0.09	0.08	p <0.05

Note: $R = 0.33$, $R^2 = 0.11$ ($p < 0.001$)

As can be seen from the results in Table 8, there is a significant negative moderation effect of change in Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity ($B = -0.09$, $p < 0.05$). Moreover, the output of the Johnson–Neyman method indicates that:

1. When percentage change in Federal Funds Futures is low (-1.03% or less when centered), there is significant positive relationship between market rate of return and companies' rate of return on equity, $B = 1.38$, $t = 5.81$, $p = 0.000$.
2. When percentage change in Federal Funds Futures is at its mean value (0.000% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, $B = 1.28$, $t = 6.54$, $p = 0.000$.
3. When percentage change in Federal Funds Futures is high (1.06% when centered), there is a significant positive relationship between market rate of return and companies' rate of return on equity, $B = 1.18$, $t = 6.27$, $p = 0.0001$.

Above findings indicate that there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of Federal Funds Future. However, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in Federal Funds Futures increases (because of decreasing regression coefficient *B* values) and this relationship is statistically significant at all levels of Federal Funds Futures changes.

Federal Funds Futures as the mediating variable. The mediation model with Federal Fund Futures involves the following three regression equations:

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \qquad (22)$$

$$FFF_t = \beta_0 + \beta_1 MR_t + \varepsilon_{tj} \qquad (23)$$

$$RR_{tj} = \beta_0 + \beta_1 MR_t + \beta_2 FFF_t + \varepsilon_{tj} \qquad (24)$$

The SPSS output for the mediation effect of Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity is shown in Table 9.

Table 9

Regression Results for Federal Funds Futures as the Mediator

Model	*B*	*SE B*	*p*	R^2
Total Effect (mediator not present, Equation 22)	1.04	0.097	p <0.001	0.105***
Direct Effect (mediator is present, Equation 24)	1.18	0.137	p <0.001	0.107***
Effect of Predictor on Mediator (Equation 23)	-0.043	0.001	p <0.001	0.492***

*** p <0.001

As shown in Table 9, market rate of return is a significant predictor of companies' rate of return on equity both when Federal Funds Futures is present in the equation (direct effect) and when Federal Funds Futures is not present in the regression equation (total effect). Moreover, when Federal Funds Futures is present 10.7% of variations in the dependent variable is explained by variations of the independent variable(s), $R^2 = 10.7\%$ which is higher than the $R^2 = 10.5\%$ for when Federal Funds Futures is not included in the equation. Furthermore, per regression results of Equation 23, the market rate of return is a significant predictor of Federal Funds Futures and 49.2% of variations of Federal Funds Futures is explained by variations of the market rate of return, $R^2 =$ 49.2%%. This implies there is a significant indirect effect of Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity, that is, change in Federal Funds Futures is a mediator in this relationship. This result is also confirmed by Preacher and Kelley Kappa-Squared test results, $\kappa^2 = 0.033$ for the indirect effect, 95% *Bca CI* [0.00, 0.078]. The confidence interval for κ^2 does not contains 0, so there is a mediation effect of Federal Funds Futures change on the relationship between market rate of return and companies' rate of return on equity.

Fixed Effects (FE) Regression Results

Beck (2001) wrote,

> In the FE model each unit j has its distinct intercept β_{0j} and each β_{0j} is a nonrandom constant. The regression equation is solved using OLS by including $N-1$ dummy variables in the model which take values of 1 if $i = j$ and 0 if $i \neq j$. This model is often referred to as Least Square with Dummy Variables. (p. 54)

The slope is the same for all units and the intercepts differ according to cross-sectional units, or time, or both cross-sectional units and time. The fixed effect model can be expressed as in Equations 25-27:

$$RR_{tj} = \beta_{0j} + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{tj} \quad (25)$$

$$RR_{tj} = \beta_{0t} + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{tj} \quad (26)$$

$$RR_{tj} = \beta_{0tj} + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{tj} \quad (27)$$

where,

RR_{jt} = Rate of return on company's j stock during year *t.*

MR_t = Rate of return on the overall stock market during year *t.*

S_j = Company's ***j*** size, a dummy variable 1 if company is small size, 0 if company is large.

MS_t = Change in money supple M2 during year *t.*

FFR_t = Change in the Federal Funds Rate during time *t.*

FFF_t = Change in Federal Funds Futures during period *t.*

ε_{jt} = Regression residual.

In the SPSS environment, the fixed effect model for panel data analysis is accessed through the Analyze, Mixed Models, Linear, and then selecting Fixed Model. The output for fixed model is presented in Table 10.

Table 10

Fixed Effect Model Estimates for the Regression Model

	B	*SE B*	*t*	*p*
Constant	14.22	9.05	1.57	0.117
Market rate of return(%)	1.03	0.15	6.82***	0.000
Company size	1.22	3.60	0.331^{ns}	0.735
Money supply M2 change(%)	-1.51	1.26	-1.20^{ns}	0.230
Federal Fund Rate change(%)	-8.35	3.54	-2.362*	0.018
Federal Fund Futures change(%)	-7.00	4.92	-1.43^{ns}	0.155

* p <0.05
*** p < 0.001
ns : Not significant

In the fixed effect model, the estimates for regression coefficients are similar to those estimated in the pooling method without mediation and moderation. There is a positive correlation between the companies' rate of return on equity and the market rate of return (*B* = 1.03), and small companies show on average 1.22% higher rate of return on equity (*B* = 1.22). But all the three monetary policy instruments, money supply M2, Federal Funds Rate, and Federal Funds Futures had negative impact on the companies' rate of return on equity, with the highest negative impact being for the Federal Funds Rate change *(B* = - 1.51 for money supply M2, *B* = -8.35 for Federal Funds Rate, and *B* = -7.00 for the Federal Funds Futures). However, in the fixed effect model results, there were only two statistically significant predictors for the companies' rate of return on equity; the market rate of return with *B* = 1.03, *p* = 0.000 and the Federal Funds Rate percentage change with *B* = -8.35 and *p* = 0.018.

Furthermore, as shown in Table 11, there is a significance positive covariation between the residuals of the regression model. This positive covariance can be interpreted as the common effect of time related factors on individual company's performance.

Table 11

Estimates of Covariance Parameters in the Fixed Effect Model

Parameter	*Estimate*	*SE*	*Wald Z*	*p*	*95% Confidence Interval*	
					Lower Bound	*Upper Bound*
Residual	2832.86	127.33	22.25	.000	2593.98	3093.75

Dependent Variable: Company's rate of return on equity.

Random Effects (RE) Regression Results

"In RE model it is assumed that each intercept β_{0j} contains a constant term, which is the same for all units, and a random term, which is different for each unit" (Beck, 2001, p. 56). So, the RE model is expressed as shown in Equation 28:

$$RR_{tj} = (\beta_0 + u_j) + \beta_1 MR_t + \beta_2 S_j + \beta_3 MS_t + \beta_4 FFR_t + \beta_5 FFF_t + \varepsilon_{tj} \quad (28)$$

where,

RR_{jt} = Rate of return on company's j stock during year *t*.

MR_t = Rate of return on the overall stock market during year *t*.

S_j = Company's *j* size, a dummy variable 1 if company is small size, 0 if company is large.

MS_t = Change in money supple M2 during year *t*.

FFR_t = Change in the Federal Funds Rate during time *t*.

FFF_t = Change in Federal Funds futures during period *t*.

ε_{jt} = Regression residual.

Other variants of the random effect model include fixed intercept, random slope as shown in Equation (29) and random intercept, random slope as shown in Equation (30):

$$Y_{jt} = \beta_0 + (\beta_j + v_j)X_{jt} + \varepsilon_{jt} \tag{29}$$

$$Y_{jt} = (\beta_0 + u_j) + (\beta_j + v_j)X_{jt} + \varepsilon_{jt} \tag{30}$$

The RE model is solved using general least square (GLS) approach (Beck, 2001).

In the SPSS environment, the random effect model for panel data analysis is accessed through the Analyze, Mixed Models, Linear, and then selecting Random Model. The output for random model is presented in Table 12.

Table 12

Random Effect Model Estimates for the Regression Model

	B	*SE B*	*t*	*p*
Constant	14.22	9.08	1.57	0.118
Market rate of return(%)	1.03	0.15	6.80***	0.000
Company size	1.22	3.60	0.338^{ns}	0.735
Money supply M2 change(%)	-1.51	1.26	-1.20^{ns}	0.232
Federal Fund Rate change(%)	-8.35	3.54	-2.355*	0.019
Federal Fund Futures change(%)	-7.00	4.92	-1.42^{ns}	0.155

* p <0.05

*** p < 0.001

ns : Not significant

For the random effect solution, the regression coefficients had the same values and signs as the results for the fixed effect solution. The test statistics for the regression coefficients were slightly different from those of the fixed effect model. However, the statistical significance of regression coefficients were the same as those of the fixed effect solution, that is the regression estimate for market rate of return and the Federal Funds Rate were statistically significant (for the market rate of return $B = 1.03$, $p = 0.000$ and for the Federal Funds Rate percentage change $B = -8.35$ and $p = 0.019$).

Furthermore, as shown in Table 13, there is a significance positive covariation between the residuals of the regression model. This positive covariance can be interpreted as the common effect of time related factors on individual company's performance. However, the intercept variance is zero, implying that the companies have the same intercept as in the pooling of data method.

Table 13

Estimates of Covariance Parameters in the Random Effect Model

Parameter	*Estimate*	*SE*	*Wald Z*	*p*	*95% Confidence Interval*	
					Lower Bound	*Upper Bound*
Residual	2850.14	128.49	22.18	.000	2609.10	3113.44
Intercept Variance	0	0				

Dependent Variable: Company's rate of return on equity.

Verifying the Assumption of Multiple Linear Regression

The assumptions underlying the multiple regressions are listed below and the verification of the assumptions are described after the assumption list:

1. Normality: The residuals have a normal distribution with mean 0 and standard deviation σ.
2. Independence: each residual is independent of other residuals.
3. Homoscedasticity: The variance of residual is constant and is independent of the predicted value.
4. No strong multicollinearity: The predictors are not highly correlated.
5. Linearity: the mathematical relationship between the outcome variable and the predictors is linear.

To test the normality assumption, using SPSS software I plotted the histogram and normal P-P plot of the standardized residuals. The mean of residuals is shown to be zero, and the residuals are not far from the 45 degree line and on its both sides. Therefore the assumption of normality is met. The histogram of the standardized residual and the normal P-P plot produced in SPSS are shown in Figure 2 and Figure 3, respectively.

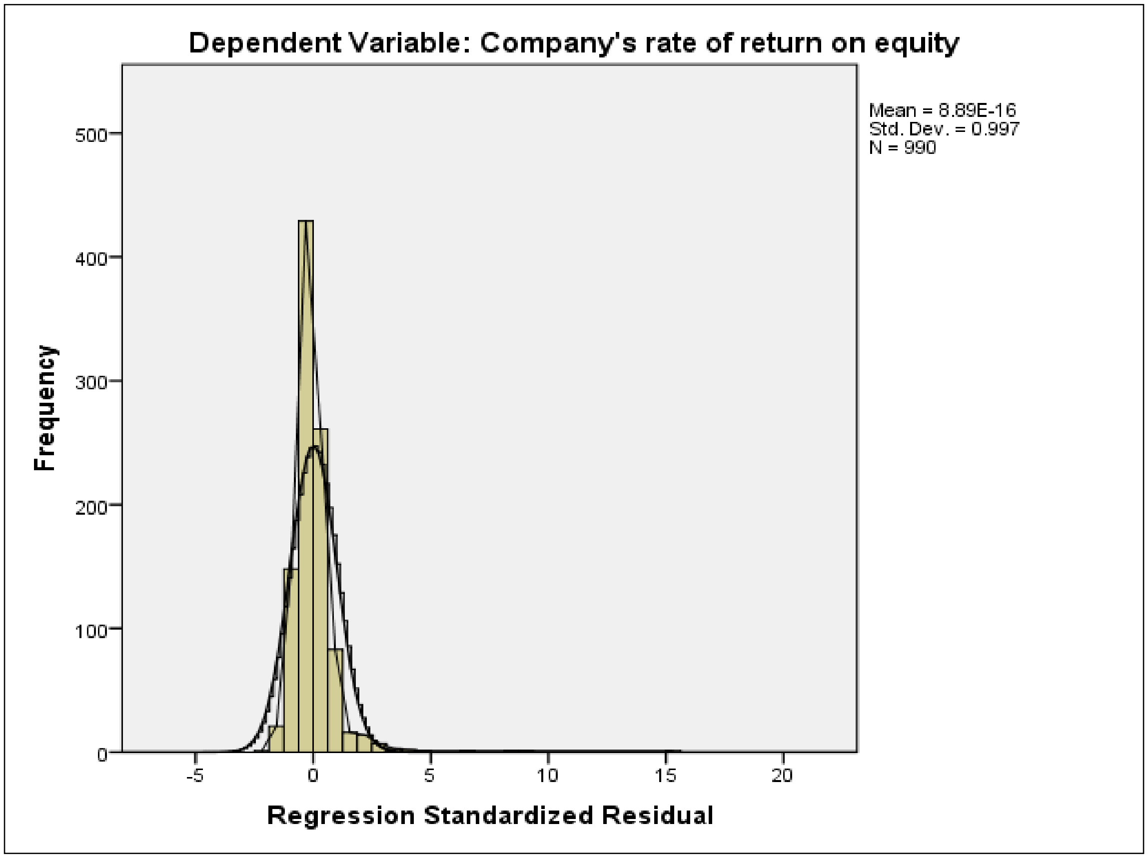

Figure 2. Histogram of multiple regression standardized residuals (test for normality).

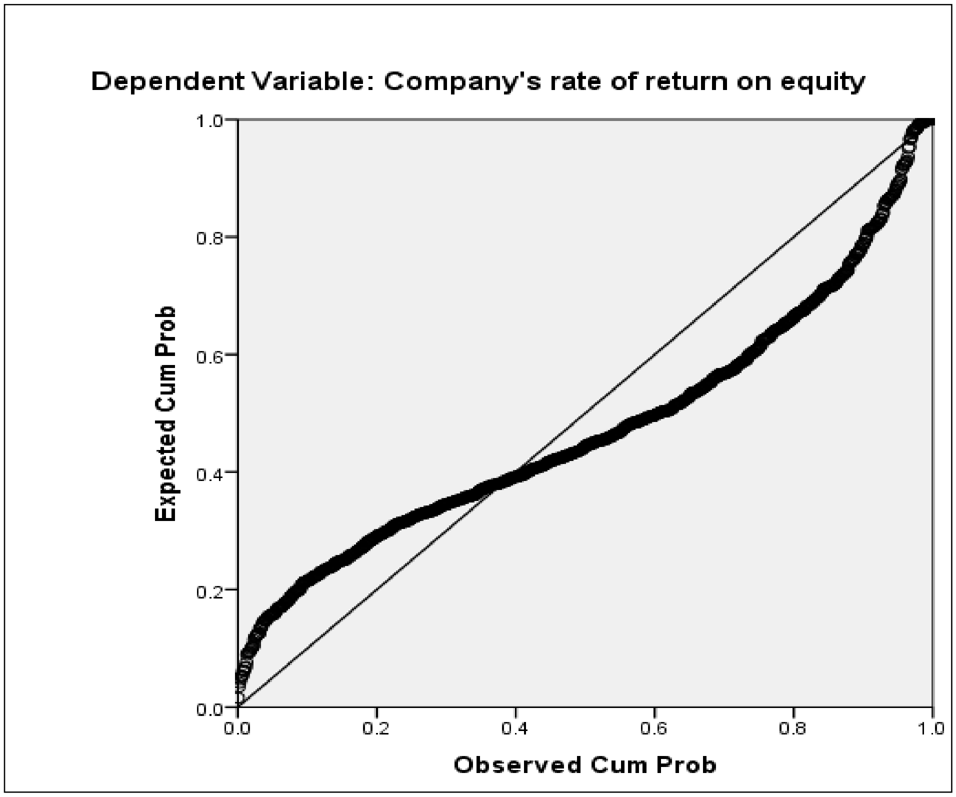

Figure 3. Normal P-P plot of regression standardized residual (test for normality).

To test for the independence of residuals, I looked at Durbin-Watson test statistic (*DW*) in the regression output. The result is *DW* = 1.97, implying the assumption of independence is met (Field, 2011). This result also implies there is no autocorrelation in the time series data.

To test for homoscedasticity, using SPSS software I plotted company's rate of return on equity (the dependent variable) against regression standardized residual. The scatterplot does not funnel out, therefore, there is no evidence of heteroscedasticity. This implies that the findings of this study can be generalized. The plot of regression standardized against regression standardized predicted values is shown in Figure 4.

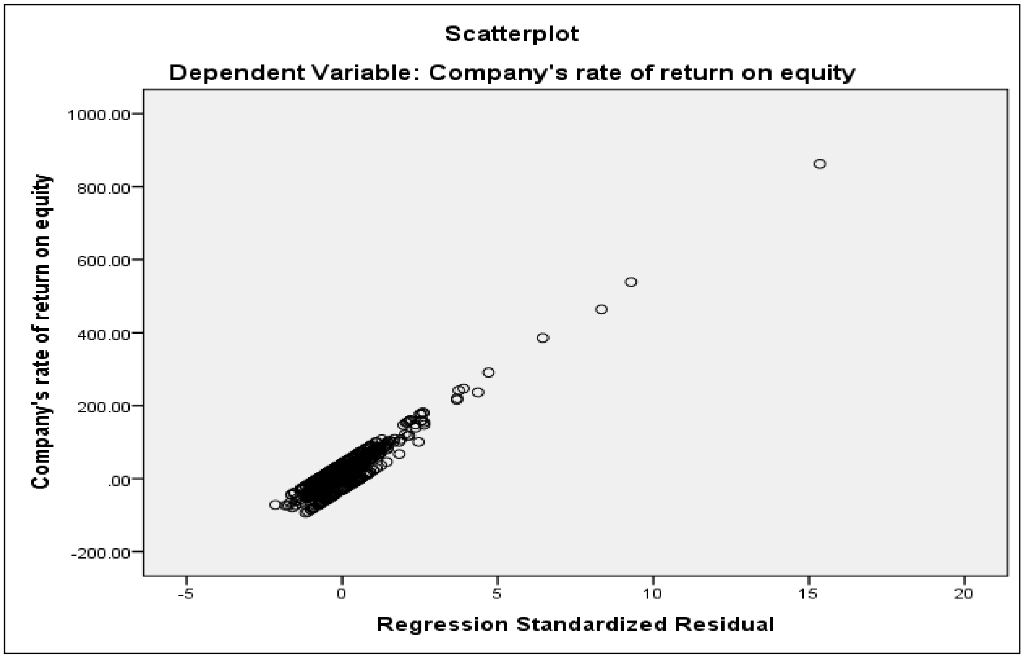

Figure 4. Plot of company's rate of return on equity against regression standardized residuals (test for heteroscedasticity).

To test for multicollinearity, I looked at the VIF numbers above 10. Thus, the assumption of no multicollinearity is met which means the results can be generalized. However, the VIF for the Federal Funds Rate and the VIF for the Federal Funds Futures were close to 10 and this led me to modify the regression model and treat the monetary instrument variables and regression moderators and regression mediators.

To test for linearity assumption, I looked at the scatter plot of regression standardized predicted values against regression standardized residuals. The scatter plot does not show any curvature shape. Therefore, the assumption of linearity is met, as is shown in Figure 5.

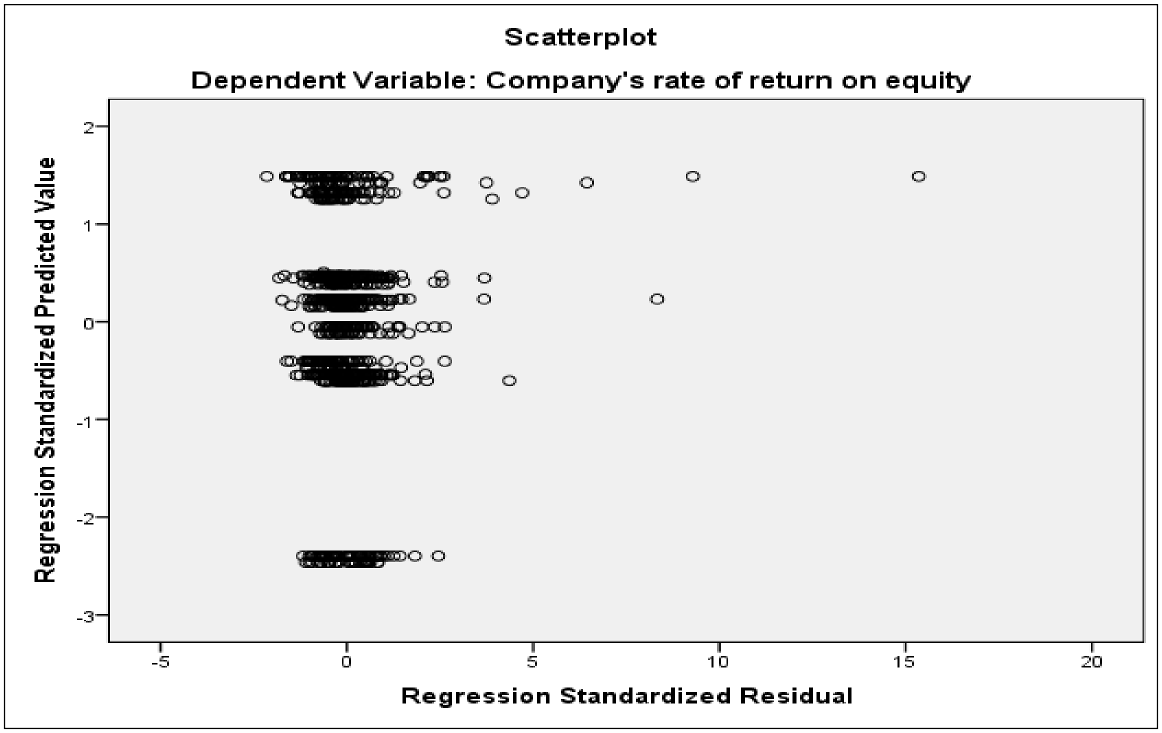

Figure 5. Regression standardized predicted values against regression standardized residuals (test for linearity).

Summary

The general problem in the current study was to examine the major factors that determine asset prices in the equity market. The specific problem that was the impact of monetary policy and certain firm specific factors on the equity market. This problem is important because (a) most individuals are directly or indirectly involved in the stock market, (b) there is a close connection between stock market and the whole economy, and (c) the impact of monetary policy on the economy and on the economic resource allocation takes place through its impact on the equity market.

The purpose of this study was to develop a multiple regression model in which the dependent variable was the expected rate of returns on equity of publicly trading companies in the stock market. The five independent variables were the rate of return for the entire stock market, companies' size as measured by their market capitalizations, change in money supply M2, change in the Federal Funds Rate (FFR), and change in Federal Funds Futures (FFF). The research question and the hypotheses addressed the statistical significance of the above five independent variables in predicting the dependent variable. The theoretical foundation of the research was the capital asset pricing model (CAPM). In this quantitative study with an ex-post facto design, I used existing panel data to examine relationships between variables.

The findings align with previous research and show consistency with the newly focused unconventional monetary policy of the Federal Reserve. The findings show a positive relationship between risk and return, which is consistent with the CAPM model and in line with Markowitz modern portfolio theory of risk/ return relationship. The results also indicate small capitalization stock portfolios have higher expected returns and higher risks as compared with large capitalization portfolios; this result aligns with findings of Fama-French as cited in Sehgal and Balakrishnan (2013). As a whole, in all statistical tests conducted in this study, the market rate of return and the company size were significant predictors of companies' rate of return on equity, which is consistent with CAPM and Fama-French findings.

Results also indicate that the monetary policy instruments, change in money supply M2, change in Federal Funds Rate, and change in Federal Funds Futures are not direct significant predictors of companies' rate of return on equity. However, in a further modification of the model and including the three monetary instruments as mediator and mediator, I obtained completely different results. As a moderator, all three monetary policy instruments affect companies' rate of return on equity, money supply has a significant positive moderation effect, and both the Federal Funds Rate and Federal Funds Futures have a significant negative moderation effect on companies' rate of return on equity. This means that a positive change in money supply or expansionary monetary policy accelerates the relationship between companies' rate of return and market rate of return because of investors' change of expectations resulting from the change in money supply. Moreover, both the Federal Funds Rate and Federal Funds Futures as mediators have significant indirect effects on the relationship between market rate of return and companies' rate of return on equity. These findings show the forward-looking nature of the equity market and how expectations, specifically unpredicted expectations, affect the equity market.

The findings of this study are in line with the findings of the early work of Bernanke and Kuttner (2003), according to which the unanticipated element of monetary policy and monetary policy surprises show significant effects on the equity prices through changing the equity premium. Moreover, these finding are consistent with the theoretical basis for the newly used unconventional monetary policy instruments of quantitative easing and forward leading. In other words when the Federal Reserve changes the short-term interest rate, its effect on the equity market is not because of the change in the real interest rate but because it changes investors' expectations about the future outlook of the economy and future change of interest rate (Bernanke & Kuttner, 2003).

Thus, the findings support the importance of expectations in equity pricing of companies. Monetary policy by Federal Reserve thus affects the equity market to the extent it changes the investors' expectations. The findings of this study are also consistent with the newly adopter quantitative easing and forward-leading policy of the Federal Reserve, which mainly aims at changing investors' expectations in the equity market to affect the rate of growth of production and employment in the economy. In Chapter 5, I elaborated on the implication of these research findings.

Chapter 5: Discussion, Conclusions, and Recommendations

This research addressed major factors that determine equilibrium asset prices in the capital market. The specific problem and the major contribution of the research concerned the effect of the monetary policy of the Federal Reserve on the U.S. stock market. Financial markets, specifically the equity market, are forward-looking markets. Financial economic theories propose that investors invest in a specific stock when the expected rate of return for that stock is commensurate with the risk they are taking when they invest in that stock. Thus, the risk/return relationship is the fundamental principle in all theories of equity pricing. I applied the same principle in developing a model for my research.

With this theoretical background and with reference to the past literature and my past experiential knowledge, I selected five independent variables as risk factors that investors would consider in purchasing a specific stock. Then I calculated the correlational relationship between these five independent variables and one dependent variable, rate of return on companies' equity. The independent variables were the expected rate of return on the overall stock market, companies' size, the Federal Funds Rate change, Federal Funds Futures change, and the growth of broad money supply M2. The dependent variable was the expected rate of return on companies' equity.

The study was quantitative, and I examined the effect of independent variables market return of return, companies' size, change in money supply M2, change in Federal Funds Rate, and change in Federal Funds Futures on the dependent variable, which was the expected rate of return of companies' equity. The design was ex post facto, in which I collected time series of cross-section data (panel data) on the realized rate of return on the equity of a sample of 90 publicly traded U.S. corporations. I collected annual data for the 10-year period from January 2005 through January 2015. Data included market rate of return on the overall stock market, rate of return on stocks of 60 small capitalization publicly traded companies' equity, as well as rate of return on 30 large capitalization publicly traded companies, money supply M2, Federal Funds Rate, and Federal Funds Futures. Multiple regression methodology was used to analyze data and examine the relationships between independent and dependent variables of the model.

My focus was to (a) make a distinction between macro and micro elements that affect investors' decisions and describe a relationship between them, (b) analyze the effect of changes in the monetary policy instruments of the Federal Reserve on the equity market, (c) explain the impact of investors' expectations on the equity market, and (d) analyze and evaluate the effect of unconventional policies of the Federal Reserve that were implemented through managing the Federal Reserve's balance sheet and its public communications with the equity market.

Key Findings

The results from descriptive analysis of data indicated the following:

1. There is a positive relationship between risk and return; more expected return comes with more risk.
2. Small capitalization stocks have higher expected returns and higher risks as compared to large capitalization stocks.

The results from pooled regression and application of ordinary least square (OLS) showed the following:

1. There is a significant relationship between all the independent variables taken together and the dependent variable ($R^2 = 11.2\%$, $p < 0.001$).
2. The independent variable company size is a statistically significant predictor of companies' rate of return.
3. The market rate of return is a statistically significant predictor of the companies' rate of return.
4. The other independent variables—money supply M2, Federal Funds Rate change, and Federal Funds Futures Rate change—have *p* values greater than 0.05 and are not statistically significant predictors of company's rate of return on equity.

The results from a modified model with monetary policy instruments as moderator and mediator suggested the following:

1. Change in money supply M2 as moderator has a significant positive effect on the relationship between the dependent variable and independent variables. In other words, whereas there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of money supply M2, the strength of the relationship increases as the percentage change in money supply M2 increases. However, increase or decrease of money supply does not have an indirect effect on the relationship between market rate of

return and companies' rate of return on equity; that is, money supply M2 is not a mediator in this relationship.

2. Change in the Federal Funds Rate as a moderator has a significant negative effect on the relationship between market rate of return and companies' rate of return on equity. In other words, although there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of the Federal Funds Rate, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in the Federal Funds Rate increases. Thus, when the Federal Funds Rate is included in the regression model, 10.9% of variations in the dependent variable is explained by variations of the independent variable(s), $R^2 = 10.9\%$, which is higher than the $R^2 = 10.5\%$ when the Federal Funds Rate is not included in the regression model. Furthermore, per the regression results of Equation 19, the market rate of return is a significant predictor of Federal Funds Rate, and 21.2% of variations of the Federal Funds Rate is explained by variations of the market rate of return, $R^2 = 21.2\%$. This suggests that there is a significant indirect effect of the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity; that is, a change in the Federal Funds Rate is a mediator in this relationship.
3. Federal Funds Futures as a moderator has a significant negative effect on the relationship between market rate of return and companies' rate of return on

equity (B = -0.09, $p < 0.05$). Thus, there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of Federal Funds Futures. However, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in Federal Funds Futures increases. As shown in Table 9, when Federal Funds Futures is present in the regression model, it accentuates the effect of market rate of return on company's equity (R^2 = 10.7%, which is higher than the R^2 = 10.5% for when Federal Funds Futures is not included in the model). Furthermore, per regression results of Equation 23, 49.2% of variations of Federal Funds Futures is explained by variations of the market rate of return, R^2 = 49.2. Thus, the market rate of return is a significant predictor of Federal Funds Futures, and there is a significant indirect effect of Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity. This means the change in Federal Funds Futures is a mediator in this relationship.

Interpretation of Findings

Risk/Return

The first finding in the descriptive data analysis, shown in Table 2, is the relationship between risk and return for a specific stock in the equity market. Investors require higher return if they invest in a riskier asset. As can be seen in Table 2, the more realized historical portfolio returns are, the higher the risk becomes as measured by the standard deviation of returns. For example, two stocks are priced differently if one is riskier than the other. This finding is in line with the risk/return relationship, which was theoretically explained by both the CAPM model and the Markowitz modern portfolio theory. Both the CAPM and Markowitz modern portfolio theory posit that there is a positive relationship between risk and return; that is, more expected return comes with more risk (Berger, 2011).

Markowitz (as cited in Berger, 2011) explained the risk-return relationship on the basis of portfolio of risky assets. Markowitz computed the risk that was inherent in each portfolio with mathematical formulation, and he suggested that for any level of risk that an investor could tolerate, there is an optimal portfolio of assets that would yield a maximum rate of return for the investor. Markowitz called these portfolios *efficient portfolios*. Then Markowitz suggested that there are different efficient portfolios for different risk tolerance levels. He further postulated that if the maximum return for each efficient portfolio were plotted against the level of risk for that portfolio on a two-dimensional graph, the result would be a smooth curve, which Markowitz called *the efficient frontier*. The CAPM, on the other hand, was a model for describing equilibrium in the equity market and was developed by Sharpe and Linter. The base of the model is a simple linear relationship between the expected rate of return of each asset and the risk inherent in that asset, for any individual asset or portfolio of assets (Chiarella et al., 2013).

Market Rate of Return

In a pooled approach to panel data analysis, it is assumed that individual units have the same regression intercept, and thus ordinary least square (OLS) is applied to find the relationship between the independent variables and the dependent variable. Data analysis for the pooling approach indicated a significant relationship between all the independent variables taken together and the dependent variable (R^2= 11.2%, $p < 0.001$). However, the market rate of return is one independent variable that shows statistically to be a significant predictor of companies' rate of return ($B = 14.22$, $p < 0.001$ for market rate of return).

The above finding is in line with the CAPM, in which market rate of return is a determining factor in a company's stock value. The CAPM suggests that the total risk of investing in an asset could be divided into two components, systematic and nonsystematic risks, whereas in a well-diversified portfolio, the nonsystematic risk is eliminated. The systematic risk, which is related to the economy as a whole, cannot be eliminated by diversification. The important outcome from this analysis is that if investors hold well-diversified portfolios, then only systematic risk will affect investors' realized returns. Thus, the expected returns on a security can be explicitly estimated by knowing its systematic risk, the risk-free rate, and the expected rate of return from the general market of risky assets (Patterson, as cited in Spyrou & Kassimatis, 2009). Thus, the CAPM market rate of return is a proxy for systematic risk and is a determining factor in a company's equity pricing. However, according to the CAPM, the degree of sensitivity of each stock in relation to the change in market rate of return varies according to the specific features of the stock. The conditions that differentiate various stocks include industry affiliation, financial constraints, and the company's size.

Company's Size

A company's size is another independent variable that has been shown to be a statistically significant predictor of companies' rate of return ($B = 1.22$, $p < 0.05$). This is in line with the work of a number of economists. Fama-French (as cited in Sehgal & Balakrishnan, 2013) for the first time added the company's size, defined as market capitalization, into their asset pricing model and concluded that company size is a significant predictor of companies' rate of return on equity. Fama-French, who called their model FFM, added the company's size as measured by market capitalization and value as measured by book equity to market equity to the traditional CAPM. Then, Fama-French (as cited in Sehgal & Balakrishnan, 2013) documented their model as the three factor model (FF3), which was used in many empirical tests and was claimed to have outperformed all theoretical asset pricing.

The relationship between specific firm conditions and the equity value of companies has been studied by other economists as well. Borys (2011) concluded that each stock reacts in a different manner to U.S. monetary policy shocks. This was evidenced due to specific firm financial constraints, low cash flows, small size, industry affiliation, poor credit ratings, low debt-to-capital ratio, high price-earnings ratio, or high Tobin's *q* (the market value of a firm's assets divided by the replacement costs). Financially constrained firms are impacted more when credit market conditions weaken due to the fact that in the down cycle, the present value of firms' collateral would fall with rising interest rates and the firms' balance sheet would worsen (Bernankea & Gertler; Kiyotaki & Moore, as cited in Borys, 2011).

Information asymmetries among firms would make it difficult for small nonpublic firms “to access bank loans when credit conditions become tighter as banks tend to reduce credit lines first to those customers about whom they had the least information” (Gertler & Hubbard, as cited in Borys, 2011, p. 420). In other words, firms with low debt-to-capital ratios and high price-earnings ratios are more affected by changes in U.S. monetary policy. One factor that repeatedly tested positive in a relationship between monetary policy and stock prices was financially constrained firms. These firms had lower liquid assets and were more dependent on external financing. The evidence has shown that financially constrained firms are more affected by changes in interest rates than firms that are less constrained. Taking the size of firms as a measure for the degree of credit constraints, the empirical testing evidenced that smaller firms were more vulnerable in financial cycles and more affected by monetary shocks (Borys, 2011).

Monetary Policy Instruments

With OLS, the findings showed that money supply M2, Federal Funds Rate change, and Federal Funds Futures Rate change do not significantly affect the outcome, that is, companies’ rate of return on equity. However, when the model was modified and these variables were treated as moderator and mediator, the results changed. Increase in money stock M2 as a moderator showed a significant positive effect on the relationship between the dependent variable and independent variables. In other words, the findings indicate that while there is a positive relationship between market rate of return and rate of return on companies’ equity at all levels of money supply M2, the strength of the relationship increases as the percentage change in money supply M2 increases. However, the results did not indicate an indirect effect of money supply M2 on the relationship between market rate of return and companies' rate of return on equity; that is, money supply M2 is not a mediator in this relationship.

In regard to the Federal Funds Rate, the results indicated a significant negative moderation effect of change in the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity. In other words, although there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of the Federal Funds Rate, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in the Federal Funds Rate increases. This suggests that when the Federal Funds Rate is present, 10.9% of variations in the company's rate of return is explained by variations of the market rate of return (R^2 = 10.9%), which is higher than the R^2 = 10.5% for when the Federal Funds Rate is not included in the equation. Furthermore, per regression results of Equation 19, the market rate of return is a significant predictor of the Federal Funds Rate, and 21.2% of variations of the Federal Funds Rate is explained by variations of the market rate of return, R^2 = 21.2%. This implies that there is a significant indirect effect of the Federal Funds Rate on the relationship between market rate of return and companies' rate of return on equity; that is, a change in the Federal Funds Rate is a mediator in this relationship. This can be interpreted as the fact that changes in the market rate of return are a signal for the Federal Reserve to adjust its decision on changing the Federal Funds Rate, indicating the mutual relationship between monetary policy and macrovariables in the economy.

The results showed there is a significant negative moderation effect of change in Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity (*B* = -0.09, $p < 0.05$). This implies that there is a positive relationship between market rate of return and rate of return on companies' equity at all levels of Federal Funds Futures. However, as a mediator, the strength of the relationship between market rate of return and rate of return on companies' equity decreases as the percentage change in Federal Funds Futures increases. As shown in Table 9, when Federal Funds Futures is present in the equation, it accentuates the effect of market rate of return on company's equity (R^2 = 10.7% which is higher than the R^2 = 10.5% for when Federal Funds Futures is not included in the equation). Furthermore, per regression results of Equation 23, 49.2% of variations of Federal Funds Futures is explained by variations of the market t rate of return, R^2 = 49.2%%. This implies that the market rate of return is a significant predictor of Federal Funds Futures. There is a significant indirect effect of Federal Funds Futures on the relationship between market rate of return and companies' rate of return on equity; that is, change in Federal Funds Futures is a mediator in this relationship.

Economic interpretations of all these findings follow:

1. A change of the money stock by FOMC does not have immediate direct effect on the economy; it affects the investors' expectation and equity prices first and then affects the macro variables in the economy.
2. Changes in the short-term interest rate, such as Federal Funds Rate, by FOMC, affects long-term interest rates and thereby affects investment and

employment as long as it changes the equity market through changes of investors' expectations. This is one reason that FOMC adopted the policy of large asset purchases, the so-called quantitative easing (QE), in order to lower the long-term interest rate in the 2008 recession.

3. The significant effect of the Federal Funds Rate as a mediator reflects the fact that there is a mutual relationship between market rate of return and monetary policies of FOMC. In other words, market rate of return, which is the sign of the health in the economy, is a signal for Federal Reserve on its decision to change the Federal Funds Rate. This indicates the mutual relationship between monetary policies of FOMC and macro variables in the economy and is the foundation for the lean against the wind theory, which is further elaborated in this chapter.
4. The closest indicator for unexpected or the surprise part of the FOMC monetary policy is changes in the Federal Funds Futures. Therefore, Federal Funds Futures is the closest proxy indicator for future economic outlook and future monetary policy direction of FOMC, which suggests Federal Funds Futures greatly affect the investors' expectations and thus the equity prices.

These results confirm the findings of Bernanke and Kuttner (2003) in which the unanticipated element of monetary policy and monetary policy surprises "show a significant effect on equity prices through changing the equity premium" (p. 420). Moreover, this is the theoretical basis for the newly used unconventional monetary policy instruments of quantitative easing and forward leading. When the Federal Reserve changes the short-term interest rate, its effect in the equity market is not because of the change in the real interest rate but because of the effect this change has on investors' expectation about future outlook of economy and future change of interest rate (Bernanke & Kuttner, 2003).

One of the important points confirmed by this research finding is the importance of expectations in equity pricing. Expectation has two components, the expected part and the unexpected or surprise part. Federal Funds Futures is a proxy for future economic outlook and future trend of monetary policy by FOMC and, therefore, represents the unexpected part. Thus, Federal Funds Futures can be used by investors as a proxy for the risk involved in the purchase of a stock. It determines the expected rate of return investors demand to invest in a stock. The conclusion is that (a) the monetary policy of the Federal Reserve affects the equity market as far as it changes the investors' expectations; and (b) it supports the use of unconventional monetary policy by FOMC, quantitative easing, and forward leading. Both these policies mainly aim at improving the consumer sentiment and changing the investors' expectations in the equity market.

In the financial crisis of 2007-2008, Federal Reserve monetary policy was to lower the long-term real rate of interest to promote investment and increase employment. The traditional monetary policy to achieve this goal was to reduce short-term interest rates, such as the Federal Funds Rate. Thus, at the onset of crisis, the FOMC started reducing the Federal Funds Rate at a speedy level. Within sixteen months the Federal Funds Rate was dropped from 5¼% to nearly zero, the so-called zero bound territory

(Bernanke, 2009). Nevertheless, lowering the Federal Funds Rate was not effective in lowering the long-term rate; therefore, asset prices did not rise.

The reason for ineffectiveness of traditional monetary policy was the state of panic in the economy. In the fourth quarter of 2008 and the first quarter of 2009, the global economic activity showed the weakest performance in decades (Bernanke, 2009). Asset prices were falling due to lack of demand and injection of liquidity by the Federal Reserve. Lack of public confidence was so strong that none of the efforts by the Federal Reserve could raise consumers' sentiment and investors' expectation. Consequently, none of the policies could affect the equity market, because the traditional monetary instruments of adding liquidity to the economy and changes of short-term interest rates were not working in a state of panic.

Under these circumstances, the FOMC adhered to unconventional policies in order to (a) reduce the long-term interest rate to help the borrowers by lowering their interest payment and (b) to boost consumer confidence and give assurance to the investors for a better economic outlook for the future. The two unconventional policies that were adopted by FOMC were QE and forward-leaning guidance about the Federal Funds Rate (Bernanke, 2009). The initial purpose of QE programs by the FOMC was to raise asset prices. The FOMC achieves this goal by purchasing government bonds from the public and replacing it with reserves. This policy action reduces long-term interest rates and raises asset prices. In fact, the level of interest rates is determined by the ratio between liquid (reserves) to illiquid (bonds) liabilities of the Central Bank (Gwilym, 2013). Due to the arbitrage effects, the QE policy was expected to raise the corporate equity prices and home values (Engen, Laubach & Reifschneider, 2015). However, the main purpose of forward guidance and QE of FOMC is to reduce risk premium and to improve the consumer confidence, business mood, and investors' assessments of risks (Engen et al., 2015).

Thus, the FOMC through its forward guidance, can change the public's perception about the future economic outlook and monetary policy. If the FOMC puts the wording of announcement in a way to promote the future economic outlook, it increases asset prices in the equity market. Thus, both QE and forward guidance are theoretically based on the fact that equity market is forward looking. The goal of FOMC in both of these actions is to change the investors' perception about the future economic outlook and future monetary policy of Federal Reserve. The findings of the current research show that QE or expansionary monetary policy as a moderator strengthens the relationship between market rate of return and companies' rate of return on equity, in line with the findings of Bernanke (2009, 2010) and Engen et al. (2015). Moreover, the surprise component of the policy guidance of FOMC, which reflects the FOMC's view of future economic outlook, is usually reflected in the change of Federal Funds Futures. This, is in line with the result of my research, in which Federal Funds Futures as a moderator is the accentuating force in the capital market. Bernanke and Kuttner (2003) studied the surprise component of FOMC announcements and came up with the same result.

With regard to the Federal Funds Rate and Federal Funds Futures, my findings show that both of these, as moderators, have a significant negative effect on the companies' rate of return on equity. The negative effect is in line with the theory that higher interest rate reduces asset prices, and the significant effect is caused by the impact of changes in interest rates on investors' expectations about the future outlook of the economy and, thus, future monetary policy of FOMC. This is in line with the findings of economists who have proposed that when the FOMC announces the Federal Funds Rate, some part of it has already been expected by investors and some part is a surprise. The market reacts more to the unexpected part of announcements than to the expected component, which has already been discounted in the equity prices. Thus, although investors should look for some criteria to see the surprise component of Federal Funds Rate, the closest they can find is the Federal Fund Futures (Doh & Connolly 2013).

The fact that both Federal Funds Rate and Federal Fund Futures show significant effects as mediators in my research shows the mutual effect of interest rate changes on macro variable and asset prices, and, therefore, on the FOMC monetary policy, the so-called leaning against the wind. The important dialogue among researchers has been whether monetary policy should react to asset mispricing or asset price bubbles. In this regard, there are two opposing views: leaning against the wind and cleaning after bubble bursts. As cited in Gwilym (2013) Bernanke and Gilchrist argued that monetary policy should focus on inflation rather than being influenced by asset price bubbles. On the contrary, Cecchetti et al. (as cited in Gwilym, 2013) suggested that the monetary policy should react to the asset mispricing, or what was known in the literature as leaning against the wind.

The strong criticism of leaning against the wind came from Bernanke because the nature of bubbles varies, and there should be a distinction between asset price movements caused by a change in economic activity and the price changes that are the result of noise trading (Bernanke & Gertler, as cited in Gwilym, 2013). Moreover, Cecchetti et al. (2000), the promoter of leaning against the wind, and Greenspan (2002) found it difficult to distinguish between asset price changes due to economic activity and the movements due to exuberance. Therefore, this lack of feasibility was a reason for not attempting to target asset prices in conducting monetary policy (Gwilym, 2013).

On the contrary, if detecting and alleviating asset bubbles is impossible before they occurring, then monetary policy should be used to clean up after the crisis by interest rate cut and safeguard the economy after the bubble bursts (Bernanke & Gertler, as cited in Gwilym, 2013). The pendulum of opinions has now turned in favor of leaning against the wind monetary policy in order to offset asset price bubbles (Gwilym, 2013).

Limitations of the Study

This research employed an ex-post facto design using existing data. Thus, the results of the study are affected by operational definitions of the concepts and by the way they are measured. The estimated risk premiums for the market in the regression analysis depend on how these variables are defined and measured. Furthermore, in this study the Russell 3000 Stock Index was chosen as the proxy for the market portfolio. Using other proxies for the market portfolio could have affected the results. As the empirical data used to test the hypotheses are related to the common stocks of public trading companies in the U.S. stock market for the period January 2005 to January 2015, the conclusions of this study may not be generalized to assets other than stocks, stocks of nonpublic companies, or the stocks trading in other countries' stock markets.

Recommendations

From a theoretical point of view, my recommendations follow:

1. New asset pricing models should focus more on the no homogeneity behavior of investors. This line of thought was considered in the evolutionary capital asset pricing model or ECAPM suggested by Chiarella et al. (2013). This theory incorporated the adaptive behavior of agents with heterogeneous beliefs in the asset pricing models. The inclusion of heterogeneous behavior of agents improves the model in a way that it explains the long-term swing of market prices away from the fundamental prices, asset bubbles, and market crashes. Prospect theory, which was proposed by Kahneman and Tversky (as cited in Levy 2012)), who won the Nobel Prize in Economics in 2002, delivered the same line of thinking.. According to this theory, the behavior of an actual investor is different from the economic rational person, which is one of the assumptions in CAPM (Levy, 2012).
2. It has been demonstrated repeatedly that the Walrasian-Hicksian general equilibrium model, which is the base of CAPM, does not rule the state of the market in the new economy; therefore, there must be more attention on factors that inherently create disequilibrium and suggest a need for preemptive actions. In this regard, there are two new school of thoughts: (a) one in which the economy is analyzed as a whole (Kolozsi, 2013), and (b) the ones that deny state of equilibrium completely (Minsky, as cited in Argitis, 2013). Kolozsi proposed an institutional matrix of the state and society that includes

the behavior of economic actors (investors) and the economic policy as a part of the institutional matrix. This model suggests monetary policy should not only be concerned about the general cost of living; it should also focus on financial stability as a whole. Furthermore, Minsky (as cited in Argitis, 2013) also challenged the Walrasian- Hicksian general equilibrium model and emphasized the incorporation of the institutional principle in economic analysis. Minsky criticized the illusion of self-regulated economy and proposed there is no inherent equilibrating tendency. Thus, “natural” instability and unemployment are among the fundamental characteristics of this type of financial economy, especially after the rise of securitization as a norm of banking practice.

3. The role of banking industry as a creator of money should be incorporated in the future asset pricing models. Minsky (as cited in Argitis, 2013) considered banks as fundamental institutions in the process of creating capital and financial assets in the economy, which he called the Wall Street economy. Minsky stated that banks could increase the money supply whenever they had the same beliefs that borrowers are in strong positions in collateral assets and can repay them. Attention to this point is important because, if future cash flows turn out to be lower than expected, then borrowers might be unable to meet their debt service commitments. Banks would then decrease the supply of credit, after which the supply of money would be decreased, as happened in

financial crisis of 2007-2008. It also emphasizes the role of expectations in economic analysis (Minsky, as cited in Argitis, 2013).

From a practical point of view and the role of monetary policy, my recommendations follow:

1. I recommend greater emphasis on the forward leading announcements and more transparency by FOMC. Since application of forward guidance by the FOMC as a continuous practice after the financial crisis of 2008, private investors get used to capturing the signs about future monetary policies from the announcements and consider those in their investment decision making. Announcements are supplementary tools that reveal the unexpected part of the future monetary decisions of the FOMC. Economists who have studied the importance of unexpected part of announcements have found the expected component of announcements has already been included into the equity price; it is the surprise component that would change asset prices in the equity market. In other words, asset prices do not respond to what financial markets already anticipated (Bernanke & Kuttner, 2003; Doh & Connolly, 2013).
2. As the findings of my research reveal, the FOMC should follows the policy of lean against the wind and include macroeconomic circumstances as a determining factor in the monetary policy. Then, monetary policies can alleviate fluctuations and to some extent prevent bubbles in the asset market. Cleaning after-the-bubble-burst brings about the results similar to the 2008

crisis. Greenspan (as cited in Woodward, 2000) argued that bubbles are mostly caused by exuberance in the market.

3. The FOMC eventually has to take steps to normalize the trend of monetary policy and to raise the Federal Funds Rate. I would like to emphasize the point that was recommend by Bernanke (2009), who stated that the Federal Funds Rate should be in the same range as the interest rate it pays on excess reserve balances. Moreover, because of the progress in the economic conditions, the FOMC should normalize the Federal Reserve's securities holdings. The FOMC should limit the holding of securities to the extent that is necessary for implementing an efficient monetary policy.
4. Federal Reserve policies should aim at reducing the systematic risk; some have suggested that Federal Reserve should take on the role of systemic risk authority. However, putting any new responsibility for the Federal Reserve should be authorized by Congress. Perhaps the current research can help Congress expand the Federal Reserve’s supervisory role in the economy. Thus, effectively identifying and addressing systemic risks, one of the goals of this research, would seem to help decision making in this matter.

Implications

The findings of this research can help monetary authorities to be better prepared in the event that the economy experiences another deep and prolonged recession. One of the important points that was elaborated in the literature review, and the focus of this research, is the preemptive policy actions to prevent similar financial crisis like the 2008 crisis. The current findings show the importance of expectations in the equity pricing and investment in assets. Private sector expectations toward the future outlook of the economy and future policies of the Federal Reserve play a significant role in setting asset prices in the market. Moreover, this research reveals the importance of forward leading of the Federal Reserve in order for investors to decide with more knowledge in investing in stocks of different companies. In addition, this research shows the mutual interaction between Federal Reserve monetary policy stimulus and the macro variables in the economy.

In fact, these results confirm that the Federal Reserve has a tendency toward the lean against the wind theory. As Bernanke (2009) and others have shown, because of the good work of the FOMC in the dealing with the last recession, the private sector is now more confident that the FOMC would do whatever it takes to fulfill their duty of the financial provider of the last resort. Therefore, the stimulus effect of monetary policy tools on asset prices and macro variables will be speedier in the event that another financial crisis occurs. Thus, it is easier for the FOMC to implement its policies and put downward pressure on real long-term interest rates over time. The results of this research demonstrate that the stimulus effect of FOMC monetary policies on the equity market. Therefore, the effect on the real economy is limited to the extent that those policies affect the private sector's expectation in regard to the economy and future monetary policies of Federal Reserve (significantly positive effect of M2 as a moderator and the Federal Funds Rate and Federal Funds Futures as moderators and mediators). Thus, the results of this research can help monetary authorities to realize the importance of more FOMC transparency and more forward-leading policies in order to preempt stock market crashes.

According to new suggestions, macro prudential policies by the government is a solution to reduce the systematic risk (Bernanke, 2009). The purpose for macro prudential, as Bernanke stated, is to reduce pro-cyclicality and to control the factors that create exuberance and intensify cyclical fluctuations in the market. In this case, there is less systematic risk for investors and more flexibility in downturns (Bernanke, 2009). In order to have such an authority, it requires a lot of in depth analysis of the financial markets. Therefore, the findings of this research will help the government address this issue.

In addition, individual and institutional investors' knowledge about how the equity market works is the key to their proper decision making in the purchase of different stocks that consequently affect the allocation of resources in the economy. The current research shows the importance of forward looking of the financial markets. The importance of expectations and unforeseen economic events can guide investors toward the right signal and what they should look for. The knowledge about the Federal Funds Futures and its importance in showing the unexpected part of FOMC announcements can lead investors towards the appropriate monetary tool to look at before investing in the equity market.

Conclusions

It was a long journey since I decided to do a research study on equilibrium under conditions of risk. This line of thinking took me to the equity market, a perfect example of a risky market. How do investors decide what to buy or sell in the equity market? How do they differentiate between the present and future cash flows? The simple answer to all these is the risk/return relationship. Risk is due to an unforeseen future; if the future could be forecasted completely, there would be no risk involved in purchase of an asset. That is, the equity market is forward looking: The price of a specific stock is determined by expectations about future returns and risks.

1. The financial economic theories have proposed that investors invest in a specific stock when the expected rate of return on that stock justifies the risk they are taking when they purchase that stock. Thus, the risk/return relationship is the fundamental principle in all theories of equity pricing. I applied the same principle in developing a model for my research. Therefore, the general problem I addressed in this research was to study the major factors that determine equilibrium asset prices in the capital market. However, the specific problem was to examine the effect of monetary policy of the Federal Reserve on the U.S. stock market. This research was intended to accomplish the following: Make a clear distinction between macro and micro elements that influence investment risk and affect investors' decision in the equity market.

   This problem is important because macro variables constitute the systematic risk which is out of control of the private investors and companies. However, systematic risk can be controlled by monetary authorities and it can be alleviated. In fact, risk management is one of the preempt solution to stop deep financial crisis like 2008. Moreover, the fact that systematic risk can be controlled through monetary policy changes supports incorporation of monetary policy instruments in asset pricing models.

2. Analyze how the change in the monetary policy of Federal Reserve affects and is affected by the equity market.
3. Explain the important role of newly used forward guidance of Federal Reserve in preventing bubbles in the equity market through leading the investors towards future economic outlook and future monetary policies.

Based on this background, I developed a multiple regression model in which the dependent variable was the expected rate of return on equity of publicly trading companies in the stock market and the five independent variables were the rate of return for the whole stock market, companies' size as measured by market capitalization, money supply M2, change in the Federal Funds Rate (FFR), and change in Federal Funds Futures (FFF). Capital asset pricing model (CAPM) was the theoretical foundation of this research. This study is quantitative with the ex-post facto design, and I used existing panel data to examine relationships between variables. The statistical methodology adopted for testing the hypotheses was multiple regression. Annual data were collected for the period January 2005 through January 2015.

The results of the research are as follows: (a) there is a risk/return relationship in the stock market; (b) the effect of company's size and market rate of return on companies' equity is significant, which supports the theories suggested by CAPM and Fama French; (c) growth of money supply M2 significantly affects equity market as a moderator; it implies that increase in money supply affects the strength and direction of the relationship between the company's equity value and the market rate of return; and (d) both the Federal Funds Rate and Federal Funds Futures have significant negative effect on companies' equity as a moderator and both have significant indirect effect on the relationship between market rate of return and companies' rate of return on equity as a mediator.

An economic interpretation of all these findings implies the following:

1. Changes of the money stock by FOMC do not have immediate direct effect on the economy. It affects the investors' expectation and equity prices first and then affects the macro variables in the economy.
2. Changes in the short-term interest rate such as the Federal Funds Rate by the FOMC affects long-term interest rates, and therefore investment and employment, as long as it changes the equity market through changes of investors' expectations. This is one reason that FOMC adopted the policy of large asset purchases, the so-called quantitative easing in order to lower the long-term interest rate in the 2008 recession.
3. The significant effect of the Federal Funds Rate as a mediator reflects the mutual relationship between market rate of return and monetary policies of the FOMC. In other words, the market rate of return, which is the sign of the health of the economy, is a signal for Federal Reserve for its decision to change the Federal Funds Rate. This shows the mutual relationship between

monetary policies of the FOMC and macro variables in the economy and is the foundation for lean against the wind theory.

4. Federal Funds Futures change is the closest indicator for unexpected or the surprise part of the FOMC monetary policy. Therefore, Federal Funds Futures is the closest proxy indicator for future economic outlook and future monetary policy direction of the FOMC.
5. Federal Funds Futures greatly affects the investors' expectations and equity prices.

One of the important points confirmed by this research is the importance of expectations in equity pricing. Expectations have two components: the expected part and the unexpected, or surprise part. Federal Funds Futures is a proxy for future economic outlook and future trends of monetary policy by the FOMC and, therefore, represents the unexpected part. Thus, Federal Funds Futures can be used by investors as a proxy for the risk involved in the purchase of a stock, which therefore determines the expected rate of return they demand to invest in that stock. This conclusion shows that (a) implementing monetary policy by the Federal Reserve affects the equity market as far as it changes the investors' expectations, and (b) it justifies the use of unconventional monetary policy by the FOMC, quantitative easing, and forward leading. Both these policies mainly aim to improve consumers' sentiment and at change investors' expectations in the equity market.

References

Abdymomunov, A., & Morley, J. (2011).Time variation of CAPM betas across market volatility regimes. *Applied Financial Economics, 21*, 1463–1478. Retrieved from http://www.tandfonline.com/toc/rafe20/current

Al-Suwailem, S. A. (2011). Behavioral complexity. *Journal of Economic Surveys, 25*(3), 481–506. doi:10.1111/j.1467-6419.2010.00657

Alves, P. (2013). The Fama-French model or the capital asset pricing model: International evidence. *International Journal of Business and Finance Research*, *7*(2), 79-89. Retrieved from http://www.theibfr.com/ijbfr.htm

Argitis, G. (2013). The illusions of the “new consensus” in macroeconomics: A Minskian analysis. *Journal of Post Keynesian Economics*, *35*(3), 483-502. doi:10.2753/PKE0160-3477350309

Balvers, R. J., & Huang, D. (2009). Money and the C-CAPM. *Journal of Financial and Quantitative Analysis*, *44*(2), 337-368. doi:10.1017/S0022109009090176

Beck, N. (2001). Time-series-cross-section data. *Statistica Neerlandica*, *55*(2), 111-133. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN %291467-9574

Berger, D. (2011). Testing the CAPM across observed and fundamental returns. *Applied Financial Economics, 21*, 625–636. Retrieved from http://www.tandfonline.com /toc/rafe20/current

Berger, W., & Kibmer, F**.** (2009). Why do monetary policymakers lean with the wind during asset price booms? *Frontiers in Finance and Economics, 6*(*1*), 155–174. Retrieved from https://ffejournal.wordpress.com/

Bernanke, B. S. (2009). *The crisis and the policy response*. Lecture in London School of Economics, London, England.

Bernanke, B. (2010, January). *Monetary policy and the housing bubble*. Remarks at the American Economic Association Meetings, Atlanta, GA.

Bernanke, B., S., & Kuttner, K. N. (2003). What explains the stock market's reaction to Federal Reserve policy? Mimeo, Board of Governors and Federal Reserve Bank of New York.

Blanchard, O. (2012). Monetary policy in the wake of the crisis. In Blanchard et al. (Eds.), *Leading economists reassess economic policy* (pp. 4-228). Cambridge, MA, MIT Press.

Blinder, A. S. (2010a). How central should the central bank be? *Journal of Economic Literature*, *48*(1), 123–133. http://dx.doi.org/10.1257/jel.48.1.123

Blinder, A. S. (2010b). Quantitative easing: Entrance and exit strategies. *Federal Reserve Bank of St. Louis Review, 92*(6), 465-479. Retrieved from https://research.stlouisfed.org/publications/review/

Borys, M., M. (2011). Testing multi-factor asset pricing models in the Visegrad Countries. *Journal of Economics and Finance*, *61*(2), 118-137. Retrieved from http://www.theibfr.com/ijbfr.htm

Brue, S. L., & Grant, R. R. (2013). *The evolution of economic thought*. Thousand Oaks, CA: Cengage Learning.

Canuto, O. (2011). How complementary are monetary policy and prudential regulation? *Economic Premise 60*, World Bank. Retrieved from http://www.worldbank.org/

Canuto, O., & Cavallari, M. (2013). Asset prices, macroprudential regulation, and monetary policy. *Poverty Reduction and Economic Management (PREM*) *Network, 16*. Retrieved from https://www.worldbank.org/economicpremise

Chen, S. S. (2007). Does monetary policy have asymmetric effects on stock returns? *Journal of Money, Credit and Banking, 39*(2), 667-688. Retrieved from https://jmcb.osu.edu

Chiarella, C., Dieci, R., He, X., & Li, K. (2013). An evolutionary CAPM under heterogeneous beliefs. *Annals of Finance, 9*, 185–215. doi:10.1007/s10436-012-0215

Dempsey, M. (2013).The CAPM: A case of elegance is for tailors? *ABACUS, 49,* 82-87. doi: 10.1111/j.1467-6281.2012.00389.x

Doh, T., & Connolly, M. (2013). Has the effect of monetary policy announcements on asset prices changed? *Federal Reserve Bank of Kansas City*. Retrieved from http://www.KansasCityFed.org

Ehrmann, M., & Fratzscher, M. (2004). Taking stock: Monetary policy transmission to equity markets. *Journal of Money, Credit and Banking, 36*(4), 719-737. http://dx.doi.org/10.1353/mcb.2004.0063

Engen, E. M., Laubach, T., & Reifschneider, D. (2015). The macroeconomic effects of the Federal Reserve's unconventional monetary policies. *Finance and Economic Discussion Series 2015-005*. Board of Governors of the Federal Reserve System. doi:10.17016/FEDS.2015.005

Febrian, E., & Herwany, A. (2010). The performance of asset pricing models before, during, and after an emerging market financial crisis: Evidence from Indonesia. *The International Journal of Business and Finance Research, 4*(*1*), 85-97. Retrieved from www.theibfr.com/ijbfr.htm

Federal Reserve Bank of San Francisco. (n.d.). Home page. Retrieved from http:// http://www.frbsf.org/

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Los Angeles, CA: Sage.

Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research methods in the social sciences* (7th ed.). New York, NY: Worth.

Gabaix, X. (2011). Disasterization: A simple way to fix the asset pricing properties of macroeconomic models. *American Economic Review, 101*(3), 406–409, *doi=10.1257/aer.101.3.406*

G*Power 3.1. (2014). *Manual.* Retrieved from http://www.gpower.hhu.de/

Gürkaynak, R., S., Sack, B., P., & Swanson, E., T (2007). Market-based measures of monetary policy expectations. *Journal of Business & Economic Statistics, 25*(2), 201-212. Retrieved from http://www.tandfonline.com/toc/UBES20/current.

Gwilym, R. A., (2013). The monetary policy implications of behavioral asset bubbles. *Southern Economic Journal, 80*(1), 252-270. doi:10.4284/0038-4038-2011.242

Harjoat S., Bhamra, H., S., Kuehn, L., A., & Strebulaev, I., A. (2010).The aggregate dynamics of capital structure and macroeconomic risk. *The Review of Financial Studies, 23*(12). doi:10.1093/rfs/hhq075

Hojat, S. (2013). Unpublished paper submitted to Walden University.

Hojat, S. (2014). Unpublished paper submitted to Walden University.

Kauppi, H., & Saikkonen, P. (2008). Predicting U.S. recessions with dynamic binary response models. *Review of Economics and Statistics, 90*, 777–791. Retrieved from http://www.mitpressjournals.org/loi/rest

Kim, S., W., & Lee, B.S. (2008). Stock returns, asymmetric volatility, risk aversion, and business cycle: Some new evidence. *Economic Inquiry*, *46*, 131–148. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291465-7295/issues

Kolozsi, P. P. (2013). Monetary policy, interest groups, financial crisis. *Journal of Financial Economics, 5*(2), 35-55. Retrieved from http://jfe.rochester.edu/

Levy, H. (2010). The CAPM is alive and well: A review and synthesis. *European Financial Management, 16*(*1*) 43–71. doi:10.1111/j.1468-036X.2009.00530.x

Levy, H. (2012). Two paradigms and Nobel Prizes in economics: A contradiction or coexistence? *European Financial Management, 18*(*2*), 163–182. doi:10.1111/j.1468-036X.2011.00617.x

Magni, C. A. (2010). CAPM and capital budgeting: Present/future, equilibrium/disequilibrium, decision/valuation. *Journal of Financial Economics, 8*(*1*), 7-32. Retrieved from http://jfe.rochester.edu/

Moosa, I., A. (2013). The capital asset pricing model (CAPM): The history of a failed revolutionary idea. *Abacus 49,* 62-68, doi: 10.1111/j.1467-6281.2012.00385.x

Nyberg, H. (2012). Risk-return tradeoff in U.S. stock returns over the business cycle. *Journal of Financial and Quantitative Analysis, 47*(*1*), 137–158. doi:10.1017/S0022109011000615

Rao, S., & Ramachandran, V. (2010). Stock returns and macro variables: The Indian evidence. *International Journal of Business Insights & Transformation, 1,* 29-38. Retrieved from http://www.ijbit.org/

Rudebusch, G. D., & Williams, J. C (2009). Forecasting recessions: The puzzle of the enduring power of the yield curve. *Journal of Business and Economic Statistics, 27*, 492–503. Retrieved from http://www.tandfonline.com/toc/UBES20/curren.

Sehgal, S., & Balakrishnan, A. (2013). Robustness of Fama-French three factor model: Further evidence for Indian stock market. *SAGE Publications 17*(*2*) 119–127. doi:10.1177/0972262912483526

Singleton, R., A. & Strait, B., C. (2005). *Approaches to Social research*. New York, NY: Oxford University Press.

Spyroua, S., & Kassimatis, K. (2009). Time-variation in the value premium and the CAPM: Evidence from European markets. *Applied Financial* Economics, *19*, 1899–1914. Retrieved from http://www.tandfonline.com/toc/rafe20/current

Trochim, W. M. (2006). *The research methods knowledge base* (2nd ed.). Retrieved from http://www.socialresearchmethods.net/kb/ (version current as of 06/03/11)

Curriculum Vitae

Simin Hojat

Education

PhD Candidate, Management with Finance specialization, Walden University, expected graduation, fall 2014.

M. Phil (Post Master): Economics; University of Oxford, England. Majors: general theory, international economics, applied econometrics, and economics of underdeveloped areas.

Post BA: Economic Development; University of oxford, England.
BA: Economics; University of Tehran, Iran.

Teaching Experience

2010-Present Strayer University, teaching online and on campus courses in economics.

1978-1989 University of Banking & Finance, Tehran; adjunct faculty, teaching part-time courses in macro and micro economics, international trade and exchange rate.

1973-1978 University of Computer Science & Planning, Tehran: Assistant Professor in Economics, member of planning committee and assistant to the head of planning department. Teaching courses in macro and micro economics, economic growth, and development.

1972-1973 University of Oxford, England: tutoring in economics and supervising economic research projects**.**

Professional Experience

2006-Present Alpha Beta Investment Research; Chief Economist, Writing research reports on U.S. public companies and economic sectors, supervising research analysts.

1989-2006 Zima Investments: Business Consultant, advising clients on their investment priorities , real estate versus financial .Conducting short sale transactions and negotiations with lenders to reduce clients' debt and final proof of real estate contracts . In charge of marketing, business development, and final contract administration in the company.

1978-1989 Central Bank of Iran: Chief Economist; advisor to the Governor on national and international macroeconomic issues, head of economic research team, responsible for writing periodic research reports to the Governor. Director of International Relations Department, coordinating, and sending delegations to international economic organizations.

International Presentations:

1984 Conference on Socio Economic Development: Salzburg, Austria.

1982 Conference on International Monetary Problems: International Monetary Fund, Washington D.C.

1979 Conference on International Debt: United Nations Conference on Trade and Development (UNCTAD), Manila, Philippines

Professional Licenses:

California real estate broker license

Personal Information

US Citizen, married with two daughters.