Jia Miao

The Long-Run Effects of the Fed's Monetary Policy on the Dynamics among Major Asset Classes

International Journal of Management and Economics 51, 9-19

2016

International Journal of Management and Economics
No. 51, July–September 2016, pp. 9–19; http://www.sgh.waw.pl/ijme/

Jia Miao[1]
School of Accounting, Finance and Informatics, Kingston Business School, Kingston University, London, United Kingdom

The Long-Run Effects of the Fed's Monetary Policy on the Dynamics among Major Asset Classes

Abstract

It is well known that government monetary policies significantly impact financial markets. There have been numerous studies examining the relationship between monetary policy and the prices of financial assets, including equities and bonds. Little, however, has been done to explore the impact of major financial assets on changes in monetary policies.

This study examines the impacts of the Federal Reserve's monetary policy on the dynamics of major financial assets in the U.S. For this purpose, cointegration was tested for between equities, bonds and real estate markets in the period 1980 to 2014, whereas the U.S. monetary base M2 was used as an exogenous variable.

Our cointegration tests suggest that the exogenous component of the U.S. M2 significantly affected the interaction among major U.S. financial assets. These findings have implications for both policymakers and market practitioners in terms of portfolio allocation rules.

Keywords: monetary policy, cointegration and error correction models, portfolio management
JEL: E 44, E 51, E 52, E 58

Introduction

Central banks across developed and developing economies have aggressively expanded monetary supply in an attempt to stimulate demand in the wake of the financial crisis. It is commonly known that restrictive (accommodative) monetary policy leads to lower (higher) asset prices. While understanding how monetary policy affects economic activities remains a challenge to researchers, many studies examine the role of stock markets as monetary transmission mechanism channel. There are two channels through which stock prices respond to monetary news: the interest rate channel (where economic activities are affected primarily through consumption and investment via interest rate cuts or increases) and the credit channel (where such effects result from changes in the supply of bank credit and corporate balance sheets). Empirical evidence on the monetary policy transmission to equity markets is somewhat mixed. For example, Miron et al. [1994], Warner and Georges [2001] and Driscoll [2004] find little support for the credit channel, while Kashyap et al. [1993], Kashyap and Stein [2000] and Ehrmann and Fratzsher [2004] reach a contrary finding. While an empirically based consensus is lacking on the impact of monetary policies on stock prices, most studies focusing on bonds, e.g. Fleming and Remolona [1997], and more recently, Gagnon et al. [2011] and Hamilton and Wu [2012] found that the Fed's monetary policy directly impacts bond prices.

With recent technological developments, capital can now flow easily across borders and between different asset classes. Unlike previous studies that focus on the effects of monetary policy on one single asset class, this paper argues that the prices of major asset classes such as equities, bonds, and real estate are all endogenously determined, reflecting key fundamental economic factors like monetary expansion or contraction. As a result, restrictive (accommodative) monetary policy should lead to lower (higher) aggregate asset prices. For example, without monetary contraction, equity markets can still enter bear markets. However, funds can flow out of the equity markets and "fly to safety," which will propel the prices of safe assets such as government bonds. It is therefore important to investigate the impacts of monetary policy on different financial markets as a whole and examine how major financial assets prices respond to monetary policy changes.

Many studies have addressed the impact of unexpected monetary policy on daily or intraday stock returns, while fewer consider the longer-run effects on equity prices and treasury yields [Durham 2003]. This paper applies the long-run cointegration framework and treats the prices of major asset classes endogenously. Monetary policy, on the other hand, is treated exogenously in order to examine its impacts on the prices of major assets and their interaction.

The contributions of the paper are thus twofold: First, the paper examines the long-run direct impact of monetary policy on major financial markets and their interrelations. Second, it highlights the importance of market conditions for the allocation of capital among major asset classes. The findings of the paper should be useful to both policymakers and market practitioners.

This paper is organized as follows: we briefly review the relevant literature, and then describe the methodology employed. Next, the empirical results are presented, followed by concluding remarks.

Literature Review

Monetary Policy Transmission to Asset Prices: the Empirical Evidence

Most studies that analyze the effects of monetary policy on financial markets concentrate on stock markets. However, their empirical results are somewhat mixed. For instance, Thorbecke [1997] and Conover et al. [1999] reported empirical evidence of a strong positive relationship between expansionary monetary policy and stock market returns. Similarly, Rigobon and Sack [2003], Ehrmann and Fratzscher [2004] and Sousa [2010] found a significant negative relationship between contractionary monetary policy and stock market performance. On the other hand, Tarhan [1995], Durhan [2003], and more recently, Laopodis [2010] did not find a consistent relationship between monetary policy and stock market returns in the U.S. They further argued that "the volatile nature of this relationship is mainly the product of changes in monetary policy authorities' operating regimes" [p. 291].

In addition to the studies of the impact of monetary policy shocks on daily or intraday stock returns, several others examined longer-run effects on equity prices. For instance, by examining monthly and quarterly performance, Jensen and Johnson [1995] found that expected stock returns were significantly greater during periods of monetary expansion. However, according to the recent study by Durham [2003], changes in the exogenous component of the federal funds rate affected changes in treasury yields but not stock returns.

While empirical evidence supporting the existence of an impact on stock prices is lacking, most bond market studies, e.g. Fleming and Remolona [1997], and more recently, Gagnon et al. [2011] and Hamilton and Wu [2012] found that Fed's monetary policy has a direct impact on the prices of bonds.

A few other publications have investigated the impact of monetary policy on real estate markets, which are often approximated by real estate investment trusts (REITs) returns. Chen and Tzang [1988] and He et al. [2003] both reported a significant relationship between long-term government bonds' yields and equity REITs. On the other hand, contrasting evidence was presented by Liang, et al. [1995], who argued that interest rate risk tends to be insignificant for equity REITs. Mueller and Pauley [1995] did not find any significant relationship between REIT prices and interest rates, regardless of the direction of interest rate changes.

Most studies have focused on interest rates as the key monetary policy indicator, fewer have examined the impacts of monetary supply. It is argued that expansionary (restrictive) monetary supply may lead to lower (higher) interest rates, which will propel (depress) stock prices. However, conducting a time series analysis, Kraft and Kraft [1976] found no relationship between monetary supply and stock prices. More recently, Alatiqi and Fazel [2008] did not find any long term cointegration between monetary supply and stock prices.

Taking a different perspective, Rigobon and Sack [2001] argued that the stock market and monetary policy decisions are endogenously related: the monetary policy responds to the stock market at the same time the stock market reacts to the monetary policy. However, recent empirical work by Durham [2003] found little evidence suggesting that monetary policy responds to the exogenous components of changes in financial asset prices.

Extending the existing literature, this paper applies long-run cointegration and treats the prices of major asset classes endogenously. At the same time, monetary policy is treated exogenously in order to examine its impact on prices of major assets and their interaction.

Asset Market Dynamics

Stocks and bonds are the two primary asset classes in asset allocation and portfolio management. Previous literature indicated a strong relationship between stock and bond prices. For instance, Lim, et. al, [2000] empirically showed that international bond and stock markets are significantly interrelated. Cowan and Joutz [2004] also found that macroeconomic variables impacts both equity and bond markets. However, the correlations between stock and bond returns were deemed conditional and have varied considerably in developed countries (see for instance, Figure 1 in Baele, et al., [2010 p. 2376] which shows the change of the correlations between stock prices and bond prices). More recently, Migiakis and Bekiris [2009] found substitution effects among stocks and bonds in the long run. Bansal, et al., [2014] also demonstrated such "flight-to-quality style influence" among equity returns and returns of longer term Treasuries. Evidence from some REIT studies (e.g. Mengden and Hartzell [1986], Ennis and Burik [1991], and Gyourko and Keim [1992]) indicated that REIT and stock market performance are highly correlated.

While other studies explored various economic factors driving the stock and bond correlation over time (e.g. stock market uncertainty by Connolly et al., [2007], macroeconomic news by Brenner et al., [2009], and business cycle indicators by Andersen et al., [2007]), little has been done to examine the impact of monetary policy.

Unlike prior research, this paper examines the impacts of the Federal Reserve's monetary policy on the dynamics of major financial assets in the U.S. For this purpose, cointegration was tested for between equities, bonds and real estate markets in the period 1980 to 2014, whereas the U.S. monetary base M2 was used as an exogenous variable.

Cointegration

Cointegration with Exogenous Variables

Harasty and Roulet [2000] argued that cointegration theory is more in line with how financial markets behave: i.e. although fundamental factors drive market prices over the long run, market prices often deviate from their "true" intrinsic values substantially in the short run. In this sense, there is an arbitrage opportunity arising from the gap between fundamental long term values and short term markets deviations, as the latter are not deemed sustainable.

The long and short-run equations of a basic error correction model follow

$$Y_t = \beta_0 + \beta X_t + e_t \quad (1)$$

and

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 M_t - \alpha_3 e_{t-1} + \mu_t \quad (2)$$

respectively, where Y is the dependent variable, X is the set of explanatory variables in both equations, M is a proxy for the stance of monetary policy, and e_{t-1} is the error correction term.

This analysis employs the widely used VAR-based cointegration tests using the methodology developed in Johansen's works [1991, 1995].

Johansen proposed two different likelihood ratio tests: the trace test and the maximum eigenvalue test, shown in Eqs. (3) and (4), respectively.

$$J_{trace} = -T \sum_{i=r+1}^{k} \ln(1-\hat{\lambda}_i) \quad (3)$$

$$J_{max} = -T \ln(1-\hat{\lambda}_{i+1}) \quad (4)$$

where T is the sample size and $\hat{\lambda}_i$ is the ith largest canonical correlation of ΔY_t with Y_{t-1} after correcting for lagged differences and deterministic variables when present.

In our study, we first calculate the trace statistic J_{trace} to test the hypothesis there is no cointegrating vector against that of at least one cointegrating vector. If the null hypothesis is rejected, we can conclude that the price series are cointegrated. We also perform tests for H_0: $r \le j - 1$ against H_1: $r \ge j$ for j = 1, 2, 3. We further conduct the maximum eigenvalue test J_{max} to check the cointegrating rank determined by the trace procedure carried out earlier. In the maximal eigenvalue test, the hypothesis is H_0: $r \le j - 1$ against H_1: $r = j$.

The Data

The data set used in this study is comprised of major U.S. asset classes (i.e. the Dow Jones industry stock index, the U.S. benchmark 10 year government bond index and new private housing units in U.S. real estate markets), and U.S. monetary aggregate supply M2. The stock, bond and real estate markets are the largest asset classes, according to estimates of Ibbotson et al. [1985] for the U.S. and Doeswijk et al. [2014] for the global markets.

The 35 year period examined encompasses 136 quarterly observations for each data series. Our empirical investigation also includes a robustness look at the weekly horizon.[2] The specific time period chosen covers different market conditions: market turbulences such as "Black Monday", the Long-Term Capital Management (LTCM) and the dot.com bubbles as well as prolonged periods of positive equity returns. As a result, it provides a basis for investigating the effects changing market conditions have on the examined relationships between major U.S. assets and aggregate monetary supply.

Empirical Results

Unit Root Test

Exhibit 1 provides a set of ADF statistics for each of the data series used in the subsequent analysis. We test for the null hypothesis that the time series is stationary. If the null hypothesis cannot be rejected, the time series contains at least one unit root. The critical value of the t-statistic depends on whether the drift and trend terms are included in the equation. The empirical results are reported in Table 2. The ADF tests find that each data series examined is non stationary I (1), but upon a first transformation becomes I (0) stationary. This fulfils the necessary condition for cointegration that each of the variables should be cointegrated of the same nonzero order.

TABLE 1. ADF unit root tests for underlying series

	Monthly (1994–2014)				Quarterly (1980–2014)			
	Level		First difference		Level		First difference	
	Constant	Trend	Constant	Trend	Constant	Trend	Constant	Trend
DJI	–2.30	–2.61	**–17.77****	**–17.81****	–1.35	–1.55	**–10.95****	**–10.98****
U.S. bond	–1.44	–3.11	**–15.42****	**–15.39****	–1.93	–4.13	**–13.75****	**–13.70****
U.S. Real Estate	–0.90	–1.28	**–21.18****	**–21.13****	–1.71	–2.23	**–8.84****	**–8.86****
U.S. M2	1.07	–2.76	**–11.93****	**–12.00****	–0.90	–2.10	**–6.24****	**–6.26****

Note: Statistical significance is highlighted in bold and is denoted by * and ** at the 5% and 1% levels respectively.

Source: own elaboration.

The Long-Run Structure

We then use the Johansen [1991] method to test for the cointegration among variables. For these models, the trace and maximum eigenvalue statistics for testing the null hypothesis of no cointegration (r = 0) against the alternative hypothesis that there are r = 1 cointegration relationships among these variables are summarized in Table 2.

TABLE 2. Johansen cointegration test on different sets of variables

	Monthly (1994–2014)		Quarterly (1980–2014)	
	Trace	Max	Trace	Max
U.S. Stock and U.S. M2				
r = 0	13.52835	13.46367	3.580357	3.337369
r ≤ 1	0.064680	0.064680	0.242988	0.242988
U.S. bond and U.S. M2				
r = 0	9.894578	9.231288	**29.04380****	**29.03011****
r ≤ 1	0.663290	0.663290	0.013686	0.013686
U.S. House and U.S. M2				
r = 0	2.265179	1.754606	5.292014	5.252357
r ≤ 1	0.510573	0.510573	0.039657	0.039657
U.S. Stock, U.S. Bond and U.S. House				
r = 0	26.18083	15.07577	23.69543	17.97939
r ≤ 1	11.10507	9.718437	5.716044	4.087401
U.S. Stock, U.S. Bond and U.S. House (M2 as Exogenous series)				
r = 0	**35.11174****	**22.62750***	**31.55034***	**24.34342***
r ≤ 1	12.48424	9.652938	7.206915	6.114848

Note: Statistical significance is highlighted in bold and is denoted by * and ** at the 5% and 1% levels respectively.
Source: own elaboration.

The empirical analysis results of the two datasets with j = 1 and 2 are reported in Table 2.[3] For the quarterly dataset (1980 to 2014), both the Jtrace (0) and Jmax (0) statistics are significant for U.S. bond and U.S. M2 at the 1% level. However, these statistics are insignificant between U.S. Stock and U.S. M2, or between U.S. House and U.S. M2. These results are in line with previous empirical findings that Fed monetary policy has direct impacts on the prices of bonds, but there is little evidence of such impacts on stock prices.

There is also no significant cointegration relationship among major asset classes. However, when we use M2 as an exogenous factor, the long-run cointegration relationship among major asset classes becomes significant, as confirmed by the trace and the maximal eigenvalue test, which are both significant at the 5% level.

Similar results are found at the monthly level (1994 to 2014), except that there is no cointegration relationship found between the U.S. monetary supply M2 and U.S. government bond prices. This may be due to the additional disturbances at the higher frequency data level.

Our empirical findings confirm that there exists a significant long-run relationship between major asset classes, determined exogenously by the monetary supply. The results are consistent at both the quarterly and monthly intervals over the long sample period tested. The long-run cointegration relationship also implies there is a short-run error correction mechanism (ECM). Not only do our findings confirm the direct impacts of monetary policy on major financial markets and their interrelations, but they also highlight the importance of market conditions for the allocation of capital among major asset classes.

Concluding Remarks

It is well known that monetary policies have significant impacts on financial markets. An increase in the money supply is widely understood as positively effecting asset prices.

Our results indicate that monetary policy has a limited impact on the prices of single financial asset over the long run. The only exception is our finding that this impact becomes significant on bond prices at a quarterly frequency. These results add to the body of academic work finding that monetary policy directly impacts bond prices, but not stock (or any other major financial asset) prices.

We argue that the monetary expansion should have a long-run effect on the financial markets as a whole. Our cointegration model accommodates both the short-run economic dynamics and long-run economic equilibrium between major asset classes. In particular, our model indicates that the monetary policy is the exogenous factor to determine the long-run trends of major asset class prices. The model is also able to explain some well-documented economic activities such as "fly to quality", where investors move their capital from riskier to the safest investment vehicles in response to market uncertainty. However, our findings suggests that such deviation is likely temporary, and long-run equilibrium is soon restored.

Our findings have implications for policymakers and practitioners. First, monetary policy has a significant and direct long-run impact on the prices of the major assets. Unlike previous studies with mixed findings on the impacts on single asset class, this paper finds that restrictive (accommodative) monetary policy leads to lower (higher) aggregate asset prices. Over time, the Fed has tried to achieve its macroeconomic goals of price stability, sustainable economic growth, and high employment in part by influencing the size of the money supply [Newyorkfed.org, 2016]. However, in July 2000, the Fed announced that it was no longer setting target ranges for money supply growth due to the weaker connection between money supply growth and the performance of the U.S. economy [Newyorkfed. org 2016]. This paper suggests otherwise.

Secondly, the economic restrictions of cointegration between major asset classes have important implications for return dynamics and optimal portfolio allocation rules, especially over long investment horizons. Our results imply that optimal asset allocation based on the ECM specification can be quite different from traditional asset allocations that ignore the cointegrating relation. A practical application of the model may suggest that the market practitioners follow the cointegration-based strategic allocation over the long run, while adopting a short-run ECM-based tactical allocation.

Notes

[1] Author's e-mail address: J. Miao@kingston.ac.uk

[2] To examine the relationship at higher frequency, we also use monthly data. However, due to availability we can only obtain monthly data of the past 20 years from 1994 to 2014, which encompasses 240 monthly observations for each data series.

[3] The results for j = 3 are available upon request.

References

Alatiqi, S., Fazel, S. (2008), Can Money Supply Predict Stock Prices?, *Journal for Economic Educators*, No. 8, pp. 1–6.

Andersen, T.G., Bollerslev, T., Diebold, F.X., Vega, C. (2007), Real-Time Price Discovery in Stock, Bond and Foreign Exchange Markets, *Journal of International Economics*, No. 73, pp. 251–277.

Baele, L., Bekaert, G., Inghelbrecht, K. (2010), The Determinants of Stock and Bond Return Comovements, *Review of Financial Studies*, Vol. 23, No. 6, pp. 2374–2428.

Bansal, N., Connolly, R., Stivers, C. (2014), The Stock-Bond Return Relation, the Term-Structure's Slope, and Asset-class Risk Dynamics, *Journal of Financial and Quantitative Analysis*, No. 49, pp. 699–724.

Brenner, M., Pasquariello, P., Subrahmanyam, M. (2009), On the Volatility and Comovement of U.S. Financial Markets around Macroeconomic News Announcements, *Journal of Financial and Quantitative Analysis*, No. 44, pp. 1265–1289.

Chen, K.C., Tsang, D.D. (1988), Interest Rate Sensitivity of Real Estate Investment Trusts, *Journal of Real Estate Research*, No. 3, pp. 13–22.

Connolly, R., Stivers, C., Sun, L. (2007), Commonality in the Time Variation of Stock–Bond and Stock–Stock Return Comovements, *Journal of Financial Markets*, Vol. 10, No. 2, pp. 192–218.

Conover, C.M., Jensen, G.R., Johnson, R.R., Mercer, J.M. (1999), Monetary Environments and International Stock Returns, *Journal of Banking and Finance*, Vol. 23, No. 9, pp. 1357–1381.

Cowan, A., Joutz, F. (2006), An Unobserved Component Model of Asset Pricing across Financial Markets, *International Review of Financial Analysis*, Vol. 15, No. 1, pp. 86–107.

Doeswijk, R., Lam, T., Swinkels, L. (2014), The Global Multi-Asset Market Portfolio, 1959–2012, *Financial Analysts Journal*, Vol. 70, No. 2, pp. 26–41.

Driscoll, J. (2004), Does Bank Lending Affect Output?, *Journal of Monetary Economics*, Vol. 51, No. 3, pp. 451–71.

Durham, J.B. (2003), Does Monetary Policy Affect Stock Prices and Treasury Yields? An Error Correction and Simultaneous Equation Approach, *Federal Reserve*, Working Paper.

Ehrmann, M., Fratzscher, M. (2004), Taking Stocks: Monetary Policy Transmission to Equity Markets, *Journal of Money, Credit and Banking*, Vol. 36, No. 4, pp. 719–737.

Ennis, R., Burik, P. (1991), Pension Fund Real Estate Investment Under a Simple Equilibrium Pricing Model, *Financial Analyst Journal*, Vol. 47, No. 3, pp. 20–30.

Fleming, M.J., Remolona, E.M. (1997), What Moves the Bond Market?, *Federal Reserve Bank of New York Economic Policy Review*, No. 14, pp. 31–50.

Gagnon, J., Raskin, M., Remache, J., Sack, B. (2011), The Financial Market Effects of the Federal Reserve's Large-Scale Asset Purchases, *International Journal of Central Banking*, No. 7, pp. 3–43.

Gyourko, J., Keim, D. (1992), What does the Stock Market Tell Us About Real Estate Returns?, *AREUEA Journal*, No. 20, 457–485.

Harasty, H., Roulette, J. (2000), Modelling Stock Market Returns: An Error Correction Model, *Journal of Portfolio Management*, No. 26, pp. 33–46.

Hamilton, J., Wu, J. (2012), The Effectiveness of Alternative Monetary Policy

Tools in a Zero Lower Bound Environment, *Journal of Money, Credit and Banking*, Vol. 44, pp. 3–46.

He, L.T., Webb, J.R., Myer, F.C. (2003), Interest Rate Sensitivities of REIT Returns,

International Real Estate Reviews, Vol. 6, No. 1, pp. 1–21.

Ibbotson, R.G., Siegel, L.B. and Love, K.S. (1985), World Wealth: Market Values and Returns, *Journal of Portfolio Management*, No. 12, pp. 4–23.

Jensen, G.R., Johnson, R. (1995), Discount Rate Changes and Security Returns in the US, 1962–1991. *Journal of Banking and Finance*, No. 19, pp. 79–95.

Johansen, S. (1991), Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models, *Econometrica*, Vol. 59, No. 6, pp. 1551–1580.

Johansen, S. (1995), Likelihood-based Inference in Cointegrated Vector Autoregressive Models, *Oxford University Press*, New York.

Kashyap, A.K., Stern, J.C., Wilcox, D.W. (1993), Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance, *American Economic Review*, Vol. 83, No. 1, pp. 78–98.

Kashyap, A.K., Stern, J.C. (2000), What Do A Million Observations on Banks Say about the Transmission of Monetary Policy?, *American Economic Review*, Vol. 90, No. 3, pp. 407–428.

Kraft, J., Kraft, A. (1976), Determinants of Common Stock Prices: A Time Series Analysis, *The Journal of Finance*, No. 32, pp. 417–425.

Laopodis, N. (2010), Dynamic Linkages Between Monetary Policy and the Stock Market, *Review of Quantitative Finance and Accounting,* 35, No. 3, pp. 271–293.

Liang, Y., Mclntosh, W., Webb.J.R. (1995), Intertemporal Changes in the Riskiness of REITs *Journal of Real Estate Research*, No. 10, pp. 427–443.

Lim, E., Gallo, J. and Swanson, P. (2000), "The Relationship between International Bond Markets and International Stock Markets", *International Review of Financial Analysis*, Vol. 7, No. 2, pp. 181–190.

Mengden, A., Hartzell, D. (1986), *Real Estate Investment Trusts – Are They Stocks or Real Estate?*, Salomon Brothers, Inc, New York.

Migiakis, P.M., Bekiris, F.V. (2009), Regime Switches between Dividend and Bond Yields, *International Review of Financial Analysis*, No. 18, pp. 198–204.

Miron, J., Romer, C.D., Weil, K. (1994), Historical Perspectives on the Monetary Transmission Mechanism, in: N.G. Mankiw (ed.), *Monetary Policy*, University of Chicago Press, Chicago, IL.

Mueller, G.R., Pauley, K.R. (1995), The Effect of Interest Rate Movements on Real

Estate Investment Trusts, *Journal of Real Estate Research*, Vol. 10, No. 3, pp. 319–326.

Newyorkfed.org. (2016), *The Money Supply*, [online], available at: https://www.newyorkfed.org/aboutthefed/fedpoint/fed49.html, accessed: August 9, 2016.

Pearce, D.K., Roley, V. (1985), Stock Prices and Economic News, *The Journal of Business*, Vol. 58, No. 1, pp. 49–67.

Rigobon, R., Sack, B. (2003), Measuring the Response of Monetary Policy to the Stock Market, *Quarterly Journal of Economics*, No. 118, pp. 639–669.

Sousa, R.M. (2010), Housing Wealth, Financial Wealth, Money Demand and Policy Rule: Evidence from the Euro Area, *The North American Journal of Economics and Finance*, Vol. 21, No. 3, pp. 88–105.

Thorbecke, W. (1997), On Stock Market Returns and Monetary Policy. *Journal of Finance*, Vol. 52, No. 2, pp. 635–654.

Tarhan, V. (1995), Does the Federal Reserve Affect Asset Prices? *Journal of Economic Dynamics and Control*, Vol. 19, No. 5/7, pp. 1199–1222.

Warner, E.J., Georges, C. (2001), The Credit Channel of Monetary Policy Transmission: Evidence from stock returns, *Economic Inquiry*, Vol. 39, No. 1, pp. 74–85.