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Examining the flight-to-safety with the implied volatilities

Ghulam Sarwar*

Department of Accounting and Finance, College of Business and Public Administration, California State University, 5500 University Parkway, San Bernardino, CA 92407-2397, USA

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ABSTRACT

This paper investigates the flight-to-safety phenomenon by examining the interactions between the stock market volatility (VIX) and volatilities of the Treasury note, gold, and silver markets. We find that increases in VIX lead to contemporaneous and delayed increases in the volatilities of T-note, gold, and silver prices. The VIX Granger causes the volatilities of T-note, gold, and silver markets, but the latter volatilities do not predict the stock market volatility. Changes in VIX explain more of volatility increases in T-note and gold prices during the financial crisis than in other periods. The leading positive effect of VIX on other expected volatilities, along with the possible negative asset correlations, complements the cross-market hedging and is consistent with the flight-to-safety phenomenon.

1. Introduction

In times of financial distress, risk-averse investors rebalance their portfolios toward less risky assets. This cross-market hedging strategy of investors in referred to as a flight-to-safety (flight-to-quality). The assets that serve as a hedge against losses in the equity market often fall in the high-quality, fixed-income asset and precious metals category. Boscaljan and Clark (2013) show that large increases in stock market uncertainty, as reflected in the market volatility index (VIX), trigger investors to tactically shift asset allocations to gold and gold-industry related investments. Baur and Lucey (2010) document a similar flight-to-safety evidence for the gold market following larger declines in stock returns. However, Beber, Brandt, and Kavajecz (2009) report that large flows into the Euro-area bond markets during periods of market stress are determined by asset liquidity, not credit quality.

Connolly, Stivers, and Sun (2005) show that bond returns rise while stock returns fall when VIX rises, and that VIX has negative relation with the future stock-bond correlations. Baele, et al. (2014) demonstrate that the flight-to-safety episodes coincide, inter alia, with increases in VIX, while Thomas (2015) shows that VIX can generally anticipate flights to safety. Chiang, Li, and Yang (2014) report that stock-bond correlations are negatively related to VIX but positively related to bond market uncertainty. Jubinski and Lipton (2012) demonstrate that Treasury and investment-grade bond yields fall when VIX rises, a pattern consistent with the flight-to-safety effect. Durand, Lim, and Zumwalt (2011) show that, in the Fama–French three-factor model, the market risk premium and the value premium are sensitive to changes in VIX which suggest that an increase in volatility is associated with the flight-to-safety effect.

* Corresponding author: Fax: (909)537-7514.
E-mail address: gsarwar@csusb.edu

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Two observations are noteworthy from the extant literature on the flight-to-safety effects. First, most studies examine either the gold market or the corporate and Treasury bond market, but not both. However, the flight-to-safety phenomenon may occur in multiple markets at the same time as risk-averse investors seek multiple assets to diversify their equity market risks. Second, previous studies examine the linkages between the expected stock market volatility and returns of stock, government and corporate bonds, and gold. No study uses the CBOE implied volatilities of the stock, Treasury bond, and precious metal markets to examine the flight-to-safety issues. Since the flight-to-safety strategy stems mainly from the cross-market hedging motives, an investigation of the interactions among the expected volatilities of stock, Treasury bond, and precious metal markets can provide new insights into the risk-diversification benefits of flight-to-safety strategies. The effectiveness of a flight-to-safety investment strategy will depend both on its expected returns and risks, or its return per unit of risk.

This study will focus on the relations among the expected volatilities of stock, Treasury note, gold, gold-miners, and silver markets in examining the flight-to-safety phenomenon. Our analysis will examine whether changes in stock market volatility (VIX) trigger contemporaneous, delayed, and Granger-cause changes in the expected volatilities of T-note, gold, and silver prices. An evidence in support of VIX Granger causing other asset volatilities would be consistent with the flight-to-safety hypothesis and will shed light on the benefits of cross-market hedging.

The rest of the paper is organized as follows. Section 2 discusses the expected relations among asset volatilities. Section 3 describes the data. Section 4 explains the research methods. Section 5 discusses the results. The summary and conclusions are provided in the final Section 6.

2. Discussion of interrelations in asset volatilities

The VIX represents the expected short-run volatility of the U.S. stock market (Whaley, 2009). If volatility is priced, an increase in volatility raises the equity risk premium and the expected return on equity, leading to a contemporaneous decline in stock prices. The immediate fall in the stock prices lowers the current period return but raises the expected future return. This negative relation between current stock return and expected volatility is known as asymmetric volatility (Bekaert and Wu, 2000; Wu, 2001). As stock market uncertainty rises, risk-averse investors may find T-bond and gold more attractive to cut equity losses (Connolly, Stivers, and Sun, 2005). Thus, the risk premia of T-bond and gold would fall, which would generate a contemporaneous increase in their prices and thus higher current returns on T-bond and gold. Hence, an increase in VIX is expected to lower current stock returns but raise current bond and gold returns, yielding negative stock-bond and stock-gold return correlations.

How would an increase in VIX affect the volatilities of Treasury bond and gold prices? We hypothesize that the expected volatilities in the T-bond and gold markets will also rise for the following reasons. Some of the market-wide risks reflected in VIX are also risks for the T-bond and gold markets. The current stock and bond prices can be represented as the expectation of future cash flows discounted at the risk-adjusted discount rates. The discount rates reflect both a risk-free discount rate and a risk premium including the expected inflation premium. For both stocks and T-bonds, the discount rates are uncertain which may change as economic conditions, systematic risk, and monetary policies change. Thus, this common risk may increase the expected price volatilities of both stocks and T-bonds, possibly raising stock volatilities more than bond volatilities since expected cash flows are also uncertain for stocks. However, the stochastic discount rates are not a direct risk factor for gold whose volatilities may rise due to the safe-haven and inflation-hedge properties of gold. As risk-averse investors reallocate their investments from stocks to gold in a bid to hedge risks, the price of gold will rise. Investors interpret this price increase as an indication of safe-haven purchases and a signal of increased uncertainty in the general economic and financial conditions, thereby causing higher gold price volatility. Badshah, Frijns, and Tourani-Rad (2013) report positive spillover from the stock market volatilities to gold volatilities. Baur (2012) finds that both gold returns and volatility rise in times of higher stock market volatility, which he refers to as an inverted asymmetric volatility. Further, Kodres and Pritsker (2002) and Connolly, Stivers, and Sun (2005) demonstrate that, with cross-market hedging, a price shock in one asset market can generate price shocks in a related non-shocked asset market due to the wealth and asset substitution effects. This evidence would also suggest that expected volatilities in the stock, Treasury bond, gold, and silver markets may all rise in times of heightened market uncertainty. It is worth emphasizing that these rising volatilities, along with the possible negative correlations in contemporaneous stock-bond and stock-gold returns, may lower the risk of a cross-market portfolio. Baur (2012) demonstrates the existence of such risk diversification benefits for a stock-gold portfolio.

3. Data

This study uses the daily closing values of VIX, 10-year U.S. Treasury note implied volatility (VXTYN), SPDR Gold Trust ETF implied volatility (GVZ), Market Vectors Gold Miners Fund ETF implied volatility (VXGDX), and iShares Silver Trust ETF implied volatility (VXSLV). All data came from the CBOE web site and cover varying time periods depending upon when CBOE started that volatility index. The VXTYN (T-note) and GVZ (gold) data are from January 3, 2004, and June 3, 2008, respectively. The VXGDX (gold miners) and VXSLV (silver) data are available only from March 16, 2011. The sample data end on November 30, 2014. These volatilities are derived from actively traded options and calculated using the same methodology that is employed for VIX (CBOE, 2015). The VIX reflects the expected (implied) 30-day volatility of the S&P 500 index. Similarly, VXTYN, GVZ, VXGDX, and VXSLV represent the expected 30-day volatility of the respective asset market.