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Return and volatility transmission between gold and stock sectors: Application of portfolio management and hedging effectiveness

Dilip Kumar*

Institute for Financial Management and Research, Nungambakkam, Chennai 600034, India

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Gold;
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VAR-ADCC-BVGARCH model;
Hedge ratio

Abstract The paper investigates the first and second orders moment transmission between gold and Indian industrial sectors with an application of portfolio design and hedging effectiveness using generalised VAR-ADCC-BVGARCH model. Our findings indicate unidirectional significant return spillover from gold to stock sectors. The negative values of estimated time varying conditional correlations are mainly observed during periods of market turbulence and crisis indicating the scope of portfolio diversification and hedging during these periods. We also estimate optimal weights, hedge ratios, and hedging effectiveness for the stock-gold portfolios. Our findings suggest that stock-gold portfolio provides better diversification benefits than stock portfolios.

Introduction

The stock markets in India have grown significantly in both value and volume in the last decade. This has also made available enormous investment and trading opportunities for market participants. Emerging markets such as India, provide opportunities to earn high returns in comparison to what can be earned by investing in developed markets. Hence, emerging markets have become an attractive haven of investment for major global financial institutional investors resulting in significant capital inflows from developed markets to emerging markets. However, emerging markets are more vulnerable to negative news and events happening elsewhere which usually results in institutional investments flowing in to or out of the market. This creates an environment of high volatility and uncertainty in these markets. The global stock markets also have been hit by a series of crises and turbulences over the past few decades. These crises have their origin in different economies but the spillover effects have been seen in important financial markets around the globe. Since 1999, the crises that hit India include the dot-com bubble crisis in 2000–2001, the US sub-prime crisis in 2007–2009, and the European debt crisis in 2010–2012. During these periods, the Indian stock market has shown excessive volatility and drastic drop in its values which has been a cause for concern to regulators,

* Tel.: +91 (0)44 2830 3542; fax: +91 (0)44 2827 9208.
E-mail addresses: dksic212@gmail.com, dilip.kumar@ifmr.ac.in
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policy makers, financial institutions, portfolio managers, and financial analysts. Moreover, the uncertainty created in the financial markets due to excess volatility and the crises coming one after the other has led major market participants to suffer considerably. Hence, portfolio managers and institutional investors need to be cautious while making investment decisions and look for potential hedging instruments. Baur and Lucey (2010) define hedge as an asset that is uncorrelated or negatively correlated with another asset or portfolio on average, specifically during times of market stress or crisis since the asset could exhibit a positive correlation in such periods and a negative correlation in normal times. Gold exhibits almost all the properties that serve the criteria to be a hedging instrument. In addition, gold is a highly liquid asset and a well developed market exists in India where daily trading in gold is possible.

Over the last five years, gold prices have risen significantly from $611.3 per ounce (on 10 January 2007) to $1835.52 per ounce (on 30 August 2011) in a global market with a few corrections in 2008. The drastic rise in gold price in 2008—2009 and 2011—2012 happened against the backdrop of the US sub-prime crisis and sovereign debt crisis in European countries, which indicates that gold is a safe asset for investment during the period of recession and crisis. In spite of the increase in gold price in India, the demand for gold has remained sustained because of its traditional use in marriages and festivals in the form of ornaments. Gold is considered to be a preferred choice of women globally, and due to its social and cultural importance, gold is widely used by women in most of the South Asian countries. Among all physical assets, gold is considered to be highly durable, universally acceptable, and easily divisible as it can be converted into gold bullion like bars and coins. Investors around the globe mainly invest in gold bullion because it is easily transportable and measurable and provides a hedge against inflation, political uncertainty, slow economic growth, and exchange rate movements (Capie, Mills, & Wood, 2005; Ghosh, Levin, Macmillan, & Wright, 2004; Mahdavi & Zhou, 1997; Worthington & Pahlavani, 2007). Gold prices are known to respond quickly to inflationary pressure. Hence, fluctuations in gold prices are of concern to policy makers, investors, financial institutions, central banks, and society at large.

Few studies have examined the significance of gold as a hedge against stocks. Sherman (1982) examines the impact of investment in gold for hedging inflation and for portfolio diversification and finds that gold can enhance the overall rate of return, provide portfolio diversification, and offer flexibility for portfolio managers to counterbalance price deterioration. Sherman (1986) again highlights the diversification benefits of inclusion of gold in stock portfolio. Jaffe (1989) finds that returns of gold and gold stocks are independent of the returns of common stocks and can be used to diversify stock portfolio. He finds that including gold in a stock portfolio not only increases the mean returns of the portfolio but also its standard deviation marginally; however, the increased returns compensate for/are more than the increased risk. Chua, Stick, and Woodward (1990) also observe similarly that gold bullion can be taken as meaningful investment for stock portfolio diversification in the long and short runs. Ghosh et al. (2004) examine the significance of gold as a hedge against political uncertainty, inflation, and currency risks. Capie et al. (2005) use more than thirty years of weekly data (from January 1971 to February 2004) to assess the extent to which gold serves as a hedge against sterling-dollar and yen—dollar exchange rates and observe time varying inelastic relationship between gold and these exchange rates. Their findings indicate that gold exhibits the exchange rate hedge property to a degree that appears to be dependent on macroeconomic and political events. Hillier, Draper, and Faff (2006) examine the role of precious metals such as gold, platinum, and silver as investment instruments in the financial market using daily data from 1976 to 2004. They find low correlations between these precious metals and stock market returns, which indicate that these metals can provide diversification benefit for stock portfolios. They also find that these precious metals exhibit hedging ability particularly during the period of crashes and crisis. Baur and Lucey (2010) investigate the constant and time-varying relations between U.S., U.K. and German stock and bond returns and gold returns to explore whether gold can act as a hedge and a safe haven and find that on average, gold is a hedge against stocks and a safe haven in extreme stock market conditions. We are not able to find any paper that investigates the role of gold for portfolio diversification and hedging in the context of the Indian stock market.

The central aim of this paper is to investigate the return and volatility transmission between gold and Indian industrial sectors and the role of gold as hedging instrument against various industrial sectors in India. We employ the vector autoregressive (VAR) asymmetric dynamic conditional correlation bivariate generalised autoregressive conditional heteroskedasticity (ADCC-BVGARCH) model with the error terms from the Student's t distribution. We also estimate the time varying conditional correlation between the gold and the Indian sectoral stock indices to examine their relationship over time. The conditional variances and covariance estimates from the ADCC-BVGARCH model are used to estimate the optimal hedge ratios and consequently, the optimal portfolio weights and hedging effectiveness for the stock-gold pairs in the context of portfolio management.

The remainder of this paper is organised as follows: the second section introduces the methodology of the study; the third section describes the data and discusses the preliminary results; the fourth section reports the empirical results; and the fifth section concludes with a summary of the main findings.

Table 1 Sample periods for the Indian sectoral indices.

	Sample period	No. of observations
CNX Auto	07-Jan-2004 to 30-June-2012	442
CNX Finance	07-Jan-2004 to 30-June-2012	442
CNX Energy	03-Jan-2001 to 30-June-2012	599
CNX Service	02-June-1999 to 30-June-2012	682
CNX Pharma	03-Jan-2001 to 30-June-2012	599
CNX Commodities	07-Jan-2004 to 30-June-2012	442