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The role of Chinese stock market in global stock markets: A safe haven or a hedge?

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ABSTRACT

The contribution of the study is threefold. First, the paper proposes a new empirically testable definition for a safe haven and a hedge from the viewpoint of extreme and regular dependences measured by a modern statistical tool of copulas. Second, this paper investigates the extreme and regular dependences between the Chinese and the G7 stock markets, using a mixture copula specification, and the results reveal that the Chinese stock market has been not only a hedge but also a safe haven for the G7 stock markets all these years. Finally, this study suggests that the Chinese stock market is the target market for global stock fund managers and international investors, who are seeking a hedge or a safe haven for their portfolios, under turbulence.

1. Introduction

Continuing economic reforms and opening-up of China in recent years have stimulated the development of the Chinese financial markets (Chan, Fung, & Thapa, 2007). Meanwhile, the Chinese stock market has grown to one of the most important markets in the world and become integrated over time with foreign stock markets (Laurence, Cai, & Qian, 1997; Xu, 2000). However, the Chinese stock market still appears immune to foreign shocks (Rösch & Schmidbauer, 2008). The low degree of international dependence of the Chinese stock market leads to one interesting question: is the Chinese stock market a good candidate of safe haven or hedge? A safe haven is defined by Kaul and Sapp (2006) as "an ideal venue to park money during periods of uncertainty", and Baur and Lucey (2009) add that a safe haven is an asset that investors prefer holding when uncertainty increases. In other words, a safe-haven stock market should provide safety against crises and prevent itself from large shocks from another market. Therefore, such a market gives investors larger chance of survival under extreme turbulence. Hence, this study defines a safe haven as a market that is less dependent with the other market and generates low probability of joint crash, given the other collapses. That probability is known as extreme dependence or conditional probability of contagion, defined by Costinot, Roncalli, and Teiletche (2000). If the Chinese stock market is a safe haven, we expect low and insignificant extreme dependence between the Chinese and the other stock markets.

Moreover, a hedge, a related concept to a safe haven, defined as that a market does not co-move with another *on average* (Baur & Lucey, 2009), is also investigated. The study interprets the term "co-movement on average" as "regular dependence", defined as the dependence between markets in regular market condition. In the study, regular dependence is measured by correlation

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coefficients, which is the expectation of standardized co-movement. If the Chinese stock market serves as a hedge, it should have low and insignificant regular dependence.

From the definitions of a safe haven and a hedge, a market which is a hedge does not necessarily imply a safe haven, and vice versa. To investigate whether the Chinese stock market serves as a safe haven or a hedge (or both), the study estimates extreme and regular dependences simultaneously from a mixture copula composed of a Clayton copula and a Normal copula, where the former captures the pattern that markets collapse together and the latter contains correlation coefficient for measuring regular dependence and exhibits no extreme dependence.

The contribution of the study is threefold. First, the paper proposes a new empirically testable definition for a safe haven and a hedge from the viewpoint of extreme and regular dependences measured by a modern statistical tool of copulas. Second, since the Chinese stock market is one of the largest emerging markets in the world, though imperfect, incomplete and highly regulated by government (Chan et al., 2007), the results provide interesting insights regarding the role of the Chinese stock market in the world. Third, a safe haven is especially essential to asset allocation of global stock funds, which hold large position of stocks from markets all over the world. This study sheds lights for stock fund managers and global investors on seeking safe-haven markets under turbulence. The structure of the paper is as follows. Section 2 discusses the specification of the mixture copula and the estimation for extreme and regular dependence; Section 3 presents data description and empirical results; finally Section 4 discusses and concludes.

2. Regular and extreme dependences: A mixture copula specification

Baur and Lucey (2009) provide the definitions of a hedge and a safe haven from the prospect theory and expected utility framework. In their paper, a hedge is explicitly defined as an asset is uncorrelated with another on average, and a safe haven is defined as an asset is uncorrelated with another in times of market stress or turmoil. They use one regression to obtain the correlation between returns of two assets and the correlation between returns of one asset and the extreme returns of the other. The former is expected insignificant if the asset is a hedge, and the latter is expected insignificant if the asset is a safe haven. Our paper, in the same manner but different approach, uses the copula approach to capture the regular and extreme dependences at the same time.

The copula approach is one of the most important developments in modeling multivariate distribution and dependence structure and has become popular in the statistical literature recently, e.g. Genest and Rivest (1993) and Nelsen (1999). Mendes (2005), Hu (2006), Patton (2006) and Lai, Chen and Gerlach (2009) have applied copula method to their recent empirical studies in stock markets, exchange rates and hedging strategy of stock index spot and futures, respectively. This approach states that any k-dimensional joint distribution function can be decomposed into k marginal distributions and one copula function that completely describes the dependence among the k variables. Since the marginals and the joint distribution constructed via a copula do not necessarily belong to the same family, modeling joint distributions beyond the typical multivariate normal or multivariate Student-t distributions becomes flexible.

When studying the dependence between the returns of two stock markets ($R_{1,t}$ and $R_{2,t}$), we employ a two-dimensional copula C with uniform margins $U(0,1)$. Since the stock returns for individual market can be mapped into one uniform margin by the corresponding distribution function, Sklar's Theorem proves that the bivariate distribution function F for $R_{1,t}$ and $R_{2,t}$ with corresponding univariate distributions F_1 and F_2 can be written as

$$F(R_{1,t},R_{2,t}) = C(F_1(R_{1,t}),F_2(R_{2,t});\theta_c) \tag{1}$$

for some copula C with parameter θ_c. Given $u_{1,t}=F_1(R_{1,t})$ and $u_{2,t}=F_2(R_{2,t})$, Eq. (1) can be re-written as

$$C(u_{1,t},u_{2,t};\theta_c) = F(F_1^{-1}(u_{1,t}),F_2^{-1}(u_{2,t})) \tag{2}$$

where F_i^{-1} s are the inverse cumulative distribution functions. Since $u_{i,t}$ is the cumulative probability of the stock returns in market i, the smaller number of $u_{i,t}$ indicates the worse market condition.

Assuming all cumulative distribution functions are differentiable, copula density is then given by

$$c(u_{1,t},u_{2,t};\theta_c) = \frac{f(F_1^{-1}(u_{1,t}),F_2^{-1}(u_{2,t}))}{\prod_{i=1}^{2} f_i(F_i^{-1}(u_{i,t}))} \tag{3}$$

where f_i s are the density functions of individual stock returns. Therefore,

$$c(F_1(R_{1,t}),F_2(R_{2,t});\theta_c) = \frac{f(R_{1,t},R_{2,t})}{\prod_{i=1}^{2} f_i(R_{i,t})} \tag{4}$$