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Dynamics of the co-movement between stock and maritime markets

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ABSTRACT

This study demonstrates the existence of economically significant information spillovers between stock markets and markets for shipping freight by sea. Using multivariate correlation models on the returns of the Dow Jones Industrial Average (DJIA) and the Baltic Dry Index (BDI), we find mutual feedback between the two markets, which becomes stronger during the periods of financial turmoil. Results also suggest that the extent of information spillover between the markets varies over time, depending on market-specific conditions. We conclude that, being an indispensable factor for price discovery, such a relationship provides a link between two markets that are otherwise rather distinct with respect to the assessment of available information and real activity.

1. Introduction

It has been already validated that agents in financial markets take the linkage between financial and economic activity as given and form their investment decisions accordingly. However, contemporary developments in financial markets, especially after the most recent global financial turmoil, make it necessary to ask updated questions which may add valuable information for investors. Basically, investors' decision function compares the expected and realized returns of the assets they own. Among numerous endogenous factors affecting investors' decision function, interaction between different markets and asset classes is an emerging and important issue both on macro and micro levels. Every signal that contains information about the possible interdependencies and spillovers between the real economy and the capital markets will be valuable. In that regard, interaction of stock markets and markets for shipping freight by sea (i.e. maritime markets), respectively as a benchmark for asset prices and a proxy for assessing the path of real economic activity enters the realm of this study.

Intuition regarding the importance of the proposed interdependency originates from the strong connection between financial development and economic activity. The insight of McKinnon (1973) and Shaw (1973) hypotheses and contemporary studies such as Bencivenga, Smith, and Starr (1996) and Levine and Zervos (1998), all formulated why finance matters for the real economy. On contrary, Ross (1976), later Roll and Ross (1980) and Chen, Roll, and Ross (1986) explained that although financial development affects the real economy at the macro level, there are also factors coming from the real economy that is influencing the asset prices directly and the capital markets indirectly. Yet, the common property of both approaches is observing the link from a macro perspective without focusing on the dynamics of real economy. Therefore, the general link between finance and

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economic growth needs to be expanded by focusing on more specific areas that are expected to contain the information set that we regard as factors affecting the investors' decision function.

Co-movements without a restriction on the exogeneity have been investigated in numerous influential studies. The primary focus is on understanding and estimating the linkage of two or more financial markets while recent studies on co-movement analysis have focused on the combinations of stock prices on one hand and commodity prices, exchange rates or equity markets on the other (see Antoniou, Pescetto, & Violaris, 2003; Bartram, Taylor, & Wang, 2007; Bhar & Hammoudeh, 2011; Kim, Moshirian, & Wu, 2006; Lin, 2012; Martens & Poon, 2001; Savva, 2009; Wahab, 2012). Specifically, studies with methodologies similar to our study; Erdogan and Schmidbauer (2005) for currency and stock markets, Chiang, Jeon, and Li (2007) for a number of Asian stock markets, Li and Zou (2008) for Chinese capital markets (bond vs. stock markets), Savva, Osborn, and Gill (2009) for US and European stock markets, Lin, Menkveld, and Yang (2009) for Chinese and Western capital markets, Aslanidis, Osborn, and Sensier (2010) for US and UK capital markets, and Syllignakis and Kouretas (2011) for Central and Eastern Europe (CEE), US, German and Russian stock markets, have all remarked that the markets in question experienced a process of co-movement in varying degrees. In our belief, all findings are crucial, yet should be evaluated carefully. The presence of high level of co-movement mainly suggests a lesser degree of efficiency in portfolio diversification while the efficiency of portfolio construction is a clustered motivation for most of the aforementioned studies. Furthermore, findings of high level of co-movements should signal the contagion effects evident for the bad as well as good events spreading over different markets. Therefore, the possible high correlation between the markets under investigation will contain the previously mentioned concern about how a finance or real economy related event can spread over the financial markets and real economy. In both cases, the result will be the evolution of the information set that should be valuable for investors' decision function in an area which is relatively less explored in the literature.

In order to observe the interconnection between financial markets and real economy, international trade will be our benchmark to assess the developments in the real side of the economy. Financial development and international trade are endogenously correlated with economic growth from separate channels (for international trade and growth issue, see Barro, Mankiw, & Sala-I-Martin, 1995; Coe & Helpman, 1995; Grossman & Helpman, 1994; Rivera-Batiz & Romer, 1991; for finance and economic growth linkages, revisit Bencivenga et al., 1996; Chen et al., 1986; Levine & Zervos, 1998; Roll & Ross, 1980). One way to talk about the path of the international trade is to go over the trade volumes. Moreover, as already discussed by Krugman (1991), focusing on the transportation costs will yield more accurate information about the international trade developments. Among different channels, by concentrating on the seaborne trade we discuss how transportation costs in maritime markets act as a representative measure for the international trade[1] and how the uncertainty in financial side of the economy is correlated with real side of the economy through maritime markets. Within this approach, markets for shipping freight by sea entered the agenda of numerous studies where only the risk structure of the market is investigated across different transportation markets and time spans (Erdogan, 1996, 1997; Goulielmos, 2008; Kavussanos, 1996; Kavussanos & Nomikos, 1999). On the other hand, it seems more meaningful to use a general representative index to control for the asset prices. Eventually, we focus on the contagion effect between these two markets. For this purpose, DJIA represents the stock markets while BDI stands for the representation of maritime markets.

Given such a framework regarding the interdependency between these two markets; any hints about the structure of the relationship between financial markets and real economy should be providing information for investors. Therefore, this study applies a multivariate framework without making a restriction on the exogeneity of real and financial side of the economy. It is noteworthy to remark that such an objective is highly influenced as well as inspired by the recent concerns of Tong and Wei (2008), and Reinhart and Rogoff (2009). These studies regard financial side of economy as an exogenous factor of the process and explain the spillover of the financial crisis from financial markets towards the real economy through employment and output growth. Although we prefer to approach the subject from a different perspective, allowing financial markets to be endogenous, an emphasis on the effects of the most recent global financial turmoil is an additional motivation to examine the co-movements between these two markets.

Then, we evaluate the endogenous interaction between stock markets and maritime markets to obtain valuable hints about not only the univariate behavior but also the dynamic behavior lying in the core of certain events. The responsiveness to internal and external shocks leads to complexity of the dynamics of the relationship between the two markets. Thus, a deeper understanding requires an analysis far beyond a simple univariate approach. Interactions on return level, such as a vector autoregressive setup, are far from being able to reveal the required risk dynamics. While modeling volatility has been subject to increasing attention by using univariate autoregressive conditional heteroscedasticity family models, the co-movements among markets started to gain popularity in recent empirical studies (see Bauwens, Laurent, & Rombouts, 2006). Moreover, Bollerslev, Engle, and Nelson (1994) underline the efficiency gains in using multivariate models to observe volatility and co-movements. Although the multivariate generalized autoregressive conditional heteroscedasticity (M-GARCH) models are fashionable and informative, the number of parameters increases along with the dimension of the model as the specification and estimation procedures of M-GARCH models become more complex. Our special interest is on those models allowing for a dynamic setup so that the risk spillover effects can be observed in a timely manner.

Accordingly, this study aims to unfold a dynamic relationship among two markets which is beneficial for both markets' participants through realizing an informative feedback. First, a meaningful co-movement pattern with a term structure provides that maritime

[1] As discussed by Hummels (1999), the seaborne trade represents more than eighty percent of the world trade transportation in volume and more than half in value. Hence, among different modes of transportation, we believe that focusing on the maritime transportation will yield more information with respect to other modes of transportation.