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A long-run relationship between stock price index and exchange rate: A structural nonparametric cointegrating regression approach

Athanasios Tsagkanos*, Costas Siriopoulos

Department of Business Administration, University of Patras, University Campus – Rio, P.O. Box 1391, Patras 26500, Greece

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ABSTRACT

In this paper we estimate the relationship between stock prices and exchange rates in EU and USA during the period of recent financial crisis (2008–2012) and compare the results with those in a previous period where stock markets were operating under normal conditions. According to the portfolio balance effect theory in periods of financial crisis there is a causal relationship from stock returns to exchange rate returns. Previous studies detect this relationship in short-run but not in long-run level. However, they use, for testing the long-run relationship, standard linear cointegrating regression models that suffer from biased estimations and cannot detect non-linear relationships. To overcome these problems, we examine the long-run relationship adopting a more advanced econometric model, the structural nonparametric cointegrating regression. The results exhibit a causal relationship from stock prices to exchange rates that is long-run in EU and short-run in USA. The finding of long-run relationship with this direction is particularly important because it is presented for first time in relative literature and shows the need for a new pattern of economic policy in EU.

1. Introduction

In the economic literature, we frequently meet research papers that investigate the relationship between stock prices and exchange rates. The researchers are extended both in theoretical

* Corresponding author. Tel.: +30 6938113026.
E-mail addresses: atsagkanos@yahoo.gr, atsagkanos@gmail.com (A. Tsagkanos), siriopoulos@upatras.gr (C. Siriopoulos).

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andempirical level. The main reason is the influence that both have in the development of a country's economy. Additionally, the investors are interested in order to predict future trends for the economy and the enterprises. Generally, there is no consensus neither in theoretical nor in empirical level regarding the direction of this relationship albeit the theory focus on unidirectional causality from exchange rates to stock prices.

The previous proposition has been formulated by Dornbusch and Fisher (1980) as the good market hypothesis (international trading effect) that is confirmed by Kim (2003). The fluctuations in exchange rates have direct impact in business profitability and international competitiveness of the firms. More precisely, the appreciation of exchange rate decreases the sales of exporters, the earnings and thereby the stock prices. On the other hand, the importers face lower prices for their products, increase the earnings and attain rise of their stock prices. The adverse effects are presented when exchange rate depreciates.

The necessity for hedging and diversification of portfolios by investors (because of the changes in previous relationship) is covered by means of portfolio balance models (Frankel, 1983). However, these models provide theoretically a reverse unidirectional causality from stock prices to exchange rates. The boosting of the stock market attracts investors increasing the demand for domestic assets and currency. The result is the appreciation of domestic currency. The upward of asset prices leads to the same result in another way. The demand for domestic money is higher increasing the interest rates and appreciating the domestic currency. In contrast to precedent theories the theory of asset market models by Frenkel (1976) supports the absence of any relationship between exchange rates and stock prices. The changes are due to different factors that lead the market of exchange rates and the market of stock prices to be fully segmented. However, Ajayi and Mougoue (1996) point out that there are certain common factors such as the interest rates that may join the two markets.

Although in the economic theory seems to prevail the good market hypothesis, in empirical level there is a strong disagreement not only for the direction of the relationship between stock prices and exchange rates but also for the existence or not of this relationship. A first clue for correlation between exchange rates and stock prices provides Aggarwal (1981). He explains the correlation based on good market hypothesis but he did not find in which direction is moving this correlation. Bahmani-Oskooe and Sohrabian (1992) were the first that used cointegration analysis for testing the direction of the correlation between stock prices and exchange rates. They concluded absence of long-run relationship between the two markets but found bidirectional causality. The non-significance of long-run relationship between the two markets is confirmed by other studies (Granger et al., 2000; Nieh and Lee, 2001; Smyth and Nandha, 2003; Kollias et al., 2010) that use cointegration tests.

However, Najang and Seifert (1992) found that volatility of exchange rates is positively affected by absolute differences in stock returns using GARCH models for daily data from Canada, UK, USA, Japan and Germany. Instead, the study of Mohamad and Mahmood (2001) in Malaysia during the economic crisis in Asia (1997–1999) showed that contemporaneous squared returns and absolute returns in exchange rate are able to explain stock returns volatility and not vice versa. The authors used GARCH (1,1) in order to take into account the nonlinear dependence of the data generating process. Finally, Ajayi and Mougoue (1996) applying error correction model and causality test in Canada, UK, USA, Japan, Germany, France, Netherlands and Italy inferred that currency depreciation has both negative long-run and short-run effect on the stock market.

More potential mixed evidence is presented in short-run relationship between the two markets. Using Granger causality test Wu (2000) and Hatemi-Irandoust (2002) found unidirectional causality from stock market to exchange rates in Singapore and Sweden, respectively. On the other hand, Abdalla and Murinde (1997) using data from 1985 to 1994 in India, Korea, Pakistan and the Philippines concluded that exchange rates cause stock prices. The same direction of causality was proposed by Smyth and Nandha (2003) in India and Sri Lanka. Kollias et al. (2010) using rolling Granger causality tests for euro-dollar and two composite European indices indicate that causality is time-variant. Under normal conditions the direction is located from exchange rates to stock prices whereas under stressful conditions holds the reverse direction. The findings are moving on the same wavelength with Pan et al. (2007) claiming that the outlined theories cannot properly explain the relationship between stock prices and exchange rates.