



# Equity market integration in Central European emerging markets: A cointegration analysis with shifting regimes

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## Abstract

We investigate the existence of long-run relations between emerging Central European stock markets and the mature stock markets of Europe and the United States. Allowing for instability in these long-run relations, we obtain evidence of links between the Central European markets that is stronger than has previously been reported. We also show that the Central European markets display equilibrium relations with their mature counterparts, which persist after controlling for structural changes. It follows that Central European markets have become more integrated with global markets.

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## 1. Introduction

The degree of international equity market integration has attracted increasing attention in recent years. Motivated by the global scale of the October 1987 stock market crash and the subsequent Asian and Russian crises of 1997–1998, a voluminous empirical literature has examined the various aspects of international equity market relations. For example, Koedijk, Campbell, and Kofman (2002) and Longin and Solnik (1995) analyze the correlation structure between markets, Engel and Susmel (1993), Kearney (2000),

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Koutmos and Booth (1995), and Ng (2000) investigate volatility spillovers across markets, De Jong and de Roon (2001) report tests of the important international asset pricing models, and Claessens and Forbes (2001) and Rigobon (1999) study the degree of contagion across markets.

In addition to these studies, the cointegration methodology developed by Engle and Granger (1987) and Johansen (1988) has given rise to numerous studies of long-run comovements between stock markets, which have important implications for portfolio theory and diversification issues. Investigations into the existence of long-run stock market relations have traditionally focused on the mature markets of Western Europe and the United States and the emerging markets of Asia and Latin America. For example, Francis and Leachman (1998), Kasa (1992) and Richards (1995) have examined the existence of cointegration relations between the developed European and U.S. markets, Arshanapalli and Doukas (1996), Manning (2002), and Phylaktis (1999) have done similarly for the Asian markets, while Arbeláez, Urrutia, and Abbas (2001), Chen, Firth, and Rui (2002), and Choudhry (1997) have examined the Latin American markets. The developing markets of Central and Eastern (CE) Europe have been investigated to a smaller extent. Linne (1998) reports evidence of cointegration between the CE markets, although no cointegration relations with mature markets are found. MacDonald (2001) analyzes the stock market indices of CE countries, as a group, against each of three developed markets (Britain, Germany, and the United States). He documents significant long-run relations for each of the groupings. In contrast to this, however, Gilmore and McManus (2002) find no long-run links between the three CE markets and the United States. These authors focus exclusively on the interactions with the U.S. market, leaving out any connections with the important European stock markets. Jochum, Kirchgässner, and Platek (1999) scrutinize the effect of the 1997–1998 Russian crises on the long-run relations between the Vyshegrad countries (the Czech Republic, Hungary, and Poland), Russia, and the United States. Bivariate cointegration relations found in the pre-crisis period cease for all but two pairs of markets due to the predominance of short-run dynamics in the post-crisis period. Relying on the historical performance of the markets and the results of principal component analysis, they assume that a change in the long-run relations occurred on September 1, 1997. This approach, however, may suffer from exogenously imposed assumptions about the data generating process.

The existing literature therefore arrives at conflicting conclusions with regard to the presence of long-run links between the emerging European stock markets and their mature counterparts. This induces us to study further the patterns of these relations because of their implications for potential diversification benefits. In this paper, we contribute to the literature in two ways. First, we address a common assumption shared by all but one of the studies referred to above. With the exception of Jochum et al. (1999), these studies assume stable, long-run relations. But recent studies have highlighted the time-varying nature of intermarket relations (Bekaert & Harvey, 1995; Gelos & Sahay, 2000). Violation of the stability assumption is especially likely to occur over long periods, which constitute the focus of cointegration studies. Campos, Ericsson, and Hendry (1996) and Gregory and Hansen (1996) show that structural breaks have important implications for cointegration analysis because they deteriorate the power of cointegration tests and lead to the underrejection of the null hypothesis of no

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