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The impact of NAFTA on North American stock market linkages



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ABSTRACT

Past research considered effects of trade or trade agreements on equity market linkages across countries. We investigate the impact of NAFTA on U.S., Canadian, and Mexican equity market linkages from December 1988 to July 2006. We employ a dynamic conditional correlation model to the stock markets of these three countries. We then test for the presence of a structural break coinciding with the NAFTA agreement. We find that NAFTA increased linkages between U.S. and Mexican equity markets and between Canadian and Mexican markets. No evidence arises of an impact of NAFTA on the linkages between U.S. and Canadian markets.

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1. Introduction

How did NAFTA affect equity market linkages among the U.S., Canada, and Mexico? Specifically to what extent did the enactment of NAFTA increase correlations across these markets? Answers to these questions are important for both investors and researchers. If stock market correlations among these countries have, indeed, increased after the enactment of NAFTA, then gains from asset diversification across these financial markets have diminished. Moreover, evidence of stronger market linkages across borders would support recent attempts to internationalize the traditional capital asset pricing model.¹

Previous studies on NAFTA and stock market returns mainly focus on long-run effects by examining cointegrating relationships among the markets, but they ignore the time-varying nature of the

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¹ See Mo and Wu (2007), Chen and Huang (2007), and Engel (1993) for current and past examples.

correlations. For example, using a cointegration and error correction model Darrat and Zhong (2005) examine the effect of NAFTA on the degree of equity market co-movements and find that NAFTA increased equity market linkages.² Moreover, they find that the stronger linkages across goods markets in a region provide the main reason behind the stronger equity market linkage observed in the post-NAFTA period. Aggarwal and Kyaw (2005) report that a cointegrating relationship exists among the equity prices of Canada, Mexico, and the U.S. only for the post-NAFTA period. Phengpis and Swanson (2006) also find that diversification opportunities have diminished since NAFTA due to greater interdependencies across these three markets. However, Ciner (2006) argues that the existence of a post-NAFTA cointegrating relationship arises solely from the integration of these markets in the late 1990s and is not general to the entirety of the post-NAFTA period. Ciner (2006) further reports that what drove these linkages was the information technology boom of the late 1990s. Ewing, Payne, and Sowell (1999) also did not find a cointegrating relationship among these markets even when NAFTA is taken into account and so find no effect of NAFTA on the integration of these markets.³ On the other hand, Ewing, Payne, and Sowell (2001) examine the transmission of stock return volatility across North American markets during the pre- and post-NAFTA periods using ARCH and VAR models. They find that the passage of NAFTA increased the degree to which these markets are integrated.

In this study we examine the impact of NAFTA on linkages among the U.S., Canadian, and Mexican equity markets using a different econometric methodology. Equity market integration is examined using an asymmetric version of the dynamic conditional correlation (DCC) model of Engle (2002). Such a model was used by Cappiello, Engle, and Sheppard (2006) to investigate the asymmetric dynamics in correlation of global equity and bond returns. This model estimates the DCC parameters and the time-varying conditional correlation among the returns taking into account asymmetries in correlation in addition to asymmetries in the variances of individual series. We estimate these conditional correlations over time for each of the three pairings among the equity markets of Canada, Mexico, and the U.S. This application differs from co-integration techniques that examine whether multiple series move together in the long run. Instead, DCC approaches focus on how correlations across markets evolve over time, including in the short run after temporary shocks. One could also allow correlations to evolve over time calculating them similarly to a moving average where one calculates the correlation at time t using market returns in the previous n periods. However, a disadvantage of this procedure is that it weights all pairs of returns in the previous n periods equally while giving zero weight to returns prior to period $t - n$. In considering various equity, bond, and foreign exchange markets, Engle (2002) reports that such a moving average performs the least well compared to alternatives, including DCC models.

To evaluate the impact of NAFTA on these conditional correlations, we follow Cappiello et al. (2006) and extend the model to allow for a possible structural break, such as occurred with the enactment of NAFTA, in these estimated correlations. Maghyereh and Al-Zuobi (2005) use a DCC model with a structural break to show that correlations between the Jordanian and U.S. equity markets have increased after entering a free trade agreement.⁴

Although not using DCC models, past research has also considered how trade flows influence equity market linkages across countries (Taylor & Tonks, 1989). Forbes and Chinn (2004) also find that bilateral trade flows create important links from shocks in large economies to financial markets in other countries. Beine and Candelon (2007) report that greater trade openness and financial liberalizations increase stock market co-movements across emerging economies. Presumably, these greater linkages influence correlations across markets. Other studies consider how trade flows increase business cycle synchronization by developing greater connections between the two economies (Frankel & Rose,

² Fernandez-Serrano and Sosvilla-Rivero (2003) also use co-integration techniques to examine stock market linkages among the U.S. and Mexico, among other countries.

³ Although not looking at NAFTA specifically, Gonzalez, Spencer, and Walz (2003) report that international factors were the primary causes of volatility in the Mexican stock market after 1995, perhaps due to greater integration after joining NAFTA. Moreover, Suliman (2005) also considers NAFTA's increase of capital flows as a possible reason why Mexican exchange rate movements have bigger effects upon U.S. interest rates than do movements in Japanese exchange rates.

⁴ Li and Zou (2008), Kenourgios, Samitas, and Paltalidas (2009), and Dijk, Munandar, and Hafner (2006) also consider DCC models with structural breaks to capture policy changes or global developments but not with respect to trade agreements.

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