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International financial integration through the law of one price: The role of liquidity and capital controls

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ABSTRACT

This paper takes advantage of the fact that some stocks trade both in domestic and international markets to characterize the degree of international financial integration. The paper argues that the cross-market premium (the ratio between the domestic and the international market price of cross-listed stocks) provides a valuable measure of international financial integration and the effectiveness of capital controls. Using autoregressive (AR) models to estimate convergence speeds and non-linear threshold autoregressive (TAR) models to identify non-arbitrage bands, the paper shows that price deviations across markets are rapidly arbitraged away and bands are narrow, particularly so for liquid stocks. The paper also shows that regulations on cross-border capital flows effectively segment domestic markets. As expected, the effects of both types of capital controls are asymmetric but in the opposite direction: controls on outflows induce positive premia, while controls on inflows generate negative premia. Both vary with the intensity of capital controls.

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1. Introduction

As part of the process of increasing international financial integration, countries have experienced in recent years a migration of stock market activity from domestic markets to international markets.

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By now, many countries have several firms simultaneously trading equity in domestic stock markets and international financial centers. The growth of international markets as a source for financing and trading is generating a wedge within countries between large, liquid firms and the rest, and is influencing domestic stock market development around the world. Emerging economies have been particularly affected by this process.[1]

In this paper, we take advantage of this migration of stocks to international financial centers and the fact that two identical assets trade in domestic and international stock markets to study the degree of international financial integration, and how it is affected by liquidity and the imposition of capital controls. To do so, we measure international financial integration through the lens of the law of one price (LOOP). This law stipulates that two markets are integrated when identical goods or assets are priced equally across borders. We analyze the percentage price difference displayed by the (underlying) shares in domestic markets and the corresponding depositary receipts (DRs) in international markets (henceforth, the *cross-market premium*), controlling and testing for the presence of non-linearities.

The behavior of the cross-market premium provides a useful price-based measure of integration. If there are no restrictions to trading, the possibility of arbitrage implies that the prices of the depositary receipt and the underlying share would be equal, after adjusting for exchange rate and transaction costs. It follows that, in a fully integrated market, the cross-market premium should be approximately zero.[2] However, full integration of capital markets can be disrupted by several factors. Two of them are studied in this paper: liquidity and capital controls.

Liquidity affects the ability to perform arbitrage. Two mechanisms stand out. First, stocks may not be traded in all markets on a daily basis (i.e., stocks might be infrequently traded). Thus, it takes longer to effectively arbitrage a price difference, since the arbitrageur has to wait for trades to happen in both markets. Second, stock prices might be sensitive to the trading activity of particular investors because the market is not deep enough. Therefore, arbitrage activity might be hampered in the case of these non-liquid companies. In other words, there might be a liquidity premium that drives transaction costs upwards and reduces the scope for arbitrage.

Government controls on cross-country capital movement are also expected to affect the cross-market premium. The effects will vary by type of control and will be asymmetric. To the extent that these controls are effective in limiting the ability to transfer funds across borders, the cross-market premium would reflect the desire of investors to purchase the securities inside or outside the country.[3]

Controls on capital outflows would exert upward pressure on the price of the underlying stock relative to the depositary receipt, since investors can purchase the security domestically and sell it in the international market, without paying the tax to move funds outside the country. That is, though controls on outflows restrict the transfer of funds abroad, stocks can still be moved from the domestic market to the international one, effectively allowing investors to obtain cash outside the country through the sale of those securities. A higher price of the underlying stock would not be arbitraged away because it would involve the purchase of the DR abroad and the sale of the underlying stock in the domestic market. As controls on capital outflows restrict transferring the proceeds from that sale abroad, the price difference would persist. The asymmetry arises because arbitrage can take place when the DR is more expensive than the underlying stock, since there are no restrictions to enter funds into the country. Namely, the premium is expected to fluctuate above zero; negative premia will be arbitraged away.

Under controls on capital inflows, the opposite effects occur. These controls would push up the relative price of the DRs, as investors buy them abroad and sell them domestically, avoiding the

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[1] See Gozzi et al. (2008a, 2008b), Levine and Schmukler (2006, 2007), and references therein.

[2] In the absence of legal or technological barriers to cross-country capital flows, effective integration (price convergence) would still be affected by the intensity of transaction costs.

[3] Errunza and Losq (1989) describe some other channels through which capital controls may affect asset prices. They argue that, from a global diversification perspective, capital controls impede investors to hold directly country-specific risk. This would affect the price of securities after controls are dismantled, due to the probable rebalancing of investors' portfolios towards more efficient ones.

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