International equity market integration: Theory, evidence and implications

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Abstract

We survey the literature on international equity market integration. In doing so, we examine the theory of integration, the burgeoning literature on empirical evidence, and the implications. It is clear from our review that significant methodological advances in recent years have provided a new perspective on the degree of such integration. Among the most important implications of the rapidly amassing evidence of substantial integration among both the developed and the emerging markets is the need for international investors to carefully monitor the risk associated with varying benefits of diversification.

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1. Introduction

The world’s economic and financial systems are becoming increasingly integrated due to the rapid expansion of international trade in commodities, services, and financial assets. The commodities and services trade linkage arises from the fact that increasing proportions of domestic production are exported to foreign countries, while increasing proportions of domestic consumption and investment use commodities and services that are produced overseas and are imported. At the same time, as this real international integration is occurring, however, both the level and pace of international financial integration have increased. The financial assets linkage arises because national and overseas residents,
whether households, corporations, or financial institutions, can increasingly decide whether to hold domestic assets such as bills, bonds, equity, or other assets in foreign countries. Although the so-called home bias still persists for households (whereby the share of domestic financial assets is above that which portfolio theory suggests would be optimal), this bias is decreasing over time for financial institutions. The actions of international investors who seek the best risk-return profiles in an increasingly integrated international financial system have fundamental effects on the ability of governments to pursue independent policy objectives. In particular, they impact directly and forcefully on the determination of exchange rates, they influence the levels of national income and employment, and they may eventually curtail the potential benefits of international diversification.

In this paper, we review the theory, evidence, and implications of international equity market integration. The literature is sufficiently vast that we cannot be fully inclusive of all articles published on the topic. Indeed, the task is even more daunting when one considers that equity market integration is but one facet of capital market integration, itself a subset of economic integration. Instead, we focus here on the seminal and most influential papers that have been written on the issue of equity market integration among the world’s developed markets. This makes sense in the context of a Special Issue of the *International Review of Financial Analysis* on international equity market integration for two reasons. First, the seminal and influential articles on defining, measuring, and drawing the implications of equity market integration among the developed markets have frequently served as the intellectual base for numerous studies of integration among the developing and emerging equity markets, and between these and the developed markets. Second, the range of papers in this Special Issue covers many of the important developing and emerging market regions including Asia, Central Europe, and Latin America. In addition, while these papers provide reviews of the relevant literature on integration among the developing and emerging markets, no one paper contextualises all the findings presented in this Special Issue. We therefore encourage the reader to seek out the papers in this Special Issue, which provide more comprehensive reviews. In Section 2, we provide a brief description of the common definitions of international financial integration. Section 3 turns the focus of attention to the challenges in measuring the degree of integration among the world’s developed equity markets. Section 4 examines the implications of international equity market integration. The final section introduces the papers in this Special Issue.

2. Defining international financial integration

International financial markets have developed rapidly throughout the last four decades. Watson et al. (1988) document this development in terms of internationalisation, securitisation, and liberalisation. In terms of internationalisation, the pace of activity in financial markets has grown faster than real output in the major industrial countries, but this has been accompanied by even faster growth in offshore financial market activity. Concerning securitisation, there has been a move away from indirect finance, through intermediaries, to direct finance through international bond markets. Liberalisation has resulted in the removal of domestic quantity and price restrictions, greater international
participation in domestic financial markets, more cross-border capital flows, and new financial instruments. It is universally accepted that the net effect of these developments has been to expand the set of states of nature against which market operators can insure and/or upon which they can speculate.

There are three basic approaches to defining the extent to which international financial markets are integrated. These fall into two broad categories—direct and indirect measures. The first approach, a direct measure, is couched in terms of the extent to which the rates of return on financial assets with similar risk characteristics and maturity are equalised across political jurisdictions. We call this a direct measure, because it invokes the law of one price. The second approach invokes the concept of international capital market completeness. The third approach is based on the extent to which domestic investment is financed from world savings rather than from domestic savings. Both these latter measures can be called indirect. A few words on each of these is appropriate here.

2.1. The equalisation of rates of return

The first approach to measuring the extent of international financial integration is based on the logic that unrestricted international capital flows would, through seeking the best available return, lead to an equalisation of the rates of return across countries. In effect, this measure applies the law of one price to financial assets, whereby assets with identical cash flows should command the same return. Three forms of this measure have been used, based alternatively on the conditions of covered interest parity (CIP), uncovered interest parity (UIP), and real interest parity (RIP). Using the CIP condition implies that unrestricted international capital flows tend to equalise nominal interest rates across countries when they are contracted in a common currency. Using the UIP condition implies that unrestricted international capital flows tend to equalise nominal interest rates across countries despite exposure to foreign exchange risk. Using the RIP condition implies that free capital mobility tends to equalise real interest rates across countries. The difficulty in operationalizing this approach is that of finding financial assets that are sufficiently homogenous in terms of their risk profiles to allow meaningful comparisons to take place.

2.2. International capital market completeness

This definition is due to Stockman (1988) and asserts that financial integration is perfect when there exists a complete set of international financial markets that allows economic and financial market participants to insure against the full set of anticipated states of nature. This obviously requires the efficient operation of a more complete set of markets than presently exists. We shall see presently, however, that this approach provides a useful benchmark from which to assess the merit of deregulatory policy proposals.

2.3. Sourcing domestic investment

This definition of perfect capital mobility requires that for a country that is small in world financial markets, exogenous changes in national savings can be financed from
abroad, with no change in real interest rates. The Feldstein and Horioka (1980; FH) definition gained prominence in the literature following the original FH findings (which were corroborated in many subsequent studies) that national savings and domestic investment correlated quite well. It is now recognised, however (see Frankel, 1991), that the correlation of these variables does not have implications for the degree of mobility of international capital flows. The FH definition requires RIP, plus the condition that all determinants of domestic investment, other than the real interest rate, are uncorrelated with national savings. We conclude, therefore, that the two most useful definitions of financial integration are CIP and Stockman’s capital market completeness.

3. Measuring international equity market integration

Despite the lack of robust justification, much of the literature on measuring international equity market integration has focused on the quantity indicators of integration, as opposed to returns. The law of one price operates only in equilibrium, it does not specify the process towards equilibrium, and as such, is not capable of providing a full description of the integration process. In effect, these papers take as given that there is a degree of international integration, and that testing issues such as the share of domestic stocks in a well-diversified portfolio can identify deviations from full integration. Examples of this approach include Tesar and Werner (1995), Lewis (1999), and Ayuso and Blanco (1999). Although these authors have assembled ample evidence of home bias in the asset allocation decisions of investors, they do not inquire into the extent and evolution of international integration in asset markets which might cause this bias. Indirect studies of quantity indicators are exemplified by Bekaert, Harvey, and Lumsdaine (2003) who provide evidence on the significant steps in world equity market integration by identifying structural breaks in the size of international capital flows, and by Portes and Rey (2000) who examine the timing and complexity patterns of cross-border equity flows.

More interesting, and more in keeping with the concept of evaluating returns and prices as opposed to quantities, a significant number of researchers have evaluated the evolution of equity market correlations, the extent to which common stochastic trends in returns emerge and the specification of dynamic paths towards greater integration between the returns on equities. These are direct measures, and a caveat in respect of studies of this type is the difficulty in testing ex ante expectations using ex post realized returns. For example, markets that are subject to the same exogenous shocks (such as commodity market changes or political events) will artificially enhance the appearance of international equity market integration to the extent that comovement in returns will occur without integration.

Three main threads are evident in this literature: testing the segmentation of equity markets via the international CAPM, testing the extent and determinants of changes in the correlation or cointegration structure of markets, and the more recent literature that recognises the essentially static nature of these tests and derives time-varying measures of integration.
3.1. The international CAPM

One of the difficulties with using the CAPM and its derivatives is how to specify what is expected from the model. One set of models typically assumes that all the world’s capital markets are in fact perfectly integrated, and therefore the source of asset risk can be associated purely with the covariance of the local returns with the world market portfolio. This set includes studies of the international CAPM (see Grauer, Litzenberger, & Stehle, 1976), the world consumption-based model (see Wheatley, 1988), world arbitrage pricing theory (see Solnik, 1983), world multibeta models (see Ferson & Harvey, 1993, 1994), and world latent factor models (see Bekaert & Hodrick, 1992; Campbell & Hamao, 1992). Of course, the other extreme is a model where the standard CAPM model is applied to the returns of a single country. In that case, the implicit assumption is that the market is either perfectly segmented from the world market or it represents an adequate proxy to the world market. Neither of these approaches is based on inherently plausible assumptions, and not surprisingly, they have performed unspectacularly in empirical tests.

A more realistic approach by Errunza and Losq (1985) and Errunza, Losq, and Padmanabhan (1992) derives an international CAPM in which segmentation can be other than either of the extreme cases. The key weakness of this approach, however, is that the degree of segmentation is assumed to remain constant over time. A development by Baekert and Harvey (1995) and De Santis and Imrohoroglu (1997) allows the degree of segmentation to vary over time, smoothly in the case of Baekert and Harvey, in a regime change by De Santis and Imrohoroglu, and subsequently extended by Phylatkis and Ravazzolo (2002). These papers show that the degree of integration generally rises over time, but that the degree of integration is closely related to the degree of currency risk and currency instability.

3.2. Correlations and cointegration

A significant number of papers have examined the international integration of equity markets from the perspective of increasing correlations in their returns over time. The argument here is that if the correlation structure demonstrates instability over time, then, assuming that the trend is towards increased correlation, this indicates greater integration. Early papers, such as Panton, Lessig, and Joy (1976) and Watson (1980) found stability, but the preponderance of literature indicates that there is instability in the relationship (see, e.g., Fischer & Palasvirta, 1990; Longin & Solnik, 1995; Madura & Soenen, 1992; Makridakis & Wheelwright, 1974; Maldonado & Saunders, 1981; Meric & Meric, 1989; Wahab & Lashgari, 1993) and that this is determined primarily by real economic linkages between countries (see, e.g., Arshanapalli & Doukas, 1993; Bachman, Choi, Jeon, & Kopecky, 1996; Bodurtha, Cho, & Senbet, 1989; Bracker & Koch, 1999; Campbell & Hamao, 1992; Roll, 1992).

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2 A late version of this paper was presented at the symposium whose papers form this special issue.
Parallel to these contributions is a literature that uses cointegration measures to assess the degree of international integration in equity markets. Cointegration has an intuitive appeal to researchers of integration. Bernard (1991) points out that a necessary condition for complete integration is that there be \( n - 1 \) cointegrating vectors in a system of \( n \) indices. In this vein, Kasa (1992) examines the major equity markets over the 1974–1990 period and finds a single cointegrating vector indicating low levels of integration, while Chan, Gup et al. (1992) examine the Asian markets and find in favour of segmentation, as do Allen and Macdonald (1995). Chan, Gup, et al. (1997) expanded their previous study and find a decrease in integration during the 1980s. Similar results for world markets are found by Arshanapalli and Doukas (1993). Gallagher (1995) finds no evidence of cointegration between Irish and either German or UK equity markets. All these measures, however, use the Engle–Granger methodology. Studies that have used the more sophisticated Johansen multivariate approach generally find stronger evidence of integration. Thus, Chou, Ng, et al. (1994) for the G7 countries, Hung and Cheung (1995) for the Asian markets, Kearney (1998) for Irish–European markets, Gilmore and McManus (2002) for U.S.–Central European markets, and Ratanapakorn and Sharma (2002) and Manning (2002) for Southeast Asian, European, and U.S. markets, all find evidence of integration. This is not unanimous however, with Kanas (1988) finding contrary results.

3.3. Time-varying estimates

A weakness in the studies mentioned above is that their focus on comparative statics misses the important element of time variation in equity risk premia. The seminal works by Campbell (1987), Harvey (1989, 1991), and Bekaert and Harvey (1995) all show that the risk premium on equities is indeed time varying. Thus, any attempt to model the integration of markets without taking account of this time variation may yield confusing and partial results. A variety of measures have been deployed to address this problem. Koch and Koch (1991) use a simultaneous equation model, estimated over a number of contiguous subperiods, to find significant and increased linkages among world equity markets. Similar in spirit with this is the finding of increased integration by Longin and Solnik (1995), who use correlation and covariance matrix estimates. Hardouvelis, Malliaropoulos, et al. (1999) estimate an explicit equilibrium asset-pricing model with a time-varying measure of integration and find that among European equity markets, integration increases substantially over time. Rangvid (2001) and Aggarwal, Lucey, and Muckley (2003) use dynamic cointegration methodologies and find that there has been a significant increase in integration among European markets. In contrast to this, however, Sentana (2000) and Fratzscher (2001) find that integration has been slow and partial.

4. Implications of increased international equity market integration

It is fair to conclude that although the findings of the studies mentioned in the previous section are mixed, the bulk of the evidence suggests that international equity market integration has progressed over time. Increasing integration of equity and capital markets, in general, can be expected to have three broad sets of implications if the integration spurs
greater development of the financial sector (see Pagano, 1993). First, the attractiveness of international portfolio diversification will weaken as returns are equalised across countries. Second, the more complete are the world’s capital markets, the more robust will be the economies of the individual states. Third, household savings rates will consequently change over time. The former two elements are likely have positive effects on economic growth while the latter is more uncertain.

International portfolio diversification is justified only if there are gains from it. With increasing integration of international equity markets, the diversification benefits will tend to decline as the correlations become increasingly positive and strengthen. This concept has been well known for at least several centuries and has been quantified and modelled since at least the early years of the 20th century. Goetzmann et al. (2002) demonstrate, using over 150 years of capital market history, that a few key facts keep emerging. First, the periods when diversification benefits tend to be of the highest potential (with low correlations between international indices) tend also to be periods that present investors with the greatest difficulty in diversifying. These tend to be periods of war and significant international tension. Second, the periods that have the highest correlations (and thus the lowest diversification benefits) are during the turn of the 19th century, during the Great Depression, and during the late 20th century, which tend to be periods when markets are generally bearish in tendency. Thus, the third finding is that diversification benefits are nonconstant and may be least available when they are most needed. Interestingly, it is not clear why these shifts in correlations and linkages occur over the long run. Roll (1992) proposes Ricardian specialisation, Heston and Rouwenhorst (1994) suggest that national cultures and economic predilection dominate industrial explanations, while Chen and Knez (1995) and Korajczyk (1996) suggest that the lack of integration drives the issue, without addressing why this integration has not occurred.

Martin and Rey (2000) provide one of the few theoretical models of the effect of financial integration on economic and corporate conditions. They demonstrate and provide evidence from other studies that corroborates their findings that financial integration leads to a reduction in the cost of capital (a finding that is also supported by Hardevoulis, Malliaropoulos, et al. (1999) in the EMU context and Stultz, 1995, 1999). It also leads to an increase in the average price of financial assets (as demonstrated in empirical findings by Martin and Rey (1999) and Lombardo and Pagano (1999) via a demand effect, which raises the number of risky projects accepted and thus increases the opportunity set.

The analysis of the economic, in particular the growth effect of increased equity market integration has also yielded some interesting findings. It is generally accepted (see, e.g., Bekaert et al., 2003; Demirguc-Kunt & Levine, 2001; Goldsmith, 1969; King & Levine, 1993a,b; Levine & Zevros, 1998) that increased financial development has a positive relationship and is a major cause of economic development. The main drivers of this increased development are typically seen to be the increased rigour of legal practices, the increased supply of capital to local economies, and the increased competitive forces acting on local financial intermediaries. This set of findings also holds if the focus is not macroeconomic, but rather industrial (see Rajan & Zingales, 1998) or even firm level (see Demirguc-Kunt & Maksimovich, 1998), analyses. A useful summary of these and other studies is provided by Giannetti, Guiso, Apelli, Paduna, and Pagano (2002). These findings, however, are not homogenous, with for example, Gourinchas and Jeanne
(2003) noting that under not unrealistic assumptions, increased integration can lead to negligible increases in wealth.

5. The papers in this special issue

The first two papers in this Special Issue address topics related to the market microstructure of the international integration process. Broadly speaking, they address completeness issues and fall under the second definition of integration discussed earlier. The remaining papers are more in the spirit of the first definition. Three papers use varying methodologies to examine the integration processes in three different regions of the world, namely, the Asia-Pacific region, the Central European emerging markets, and Latin America. The final paper examines equity market integration in a small open economy, focusing on one of the world’s most open economies, Ireland.

The paper by Karlo Kauko and Suomen Pankki, entitled “The Links between International Securities Settlement Systems: An Oligopolistic Theoretic Approach,” presents a theoretical model of the securities settlement industry. Because pooling payments can help to use liquidity efficiently, issuers prefer settlement systems in which a large number of securities are issued. If the central securities depositories (CSDs) establish a mutual link that enables investors to make transactions with foreign securities, cost savings can be achieved via the increased liquidity induced. The main focus of the paper, however, is on the competition between two national CSDs and the impact of a securities link on this competition. The authors conclude that if policy makers want to enhance the international integration of equity markets, they should focus on eliminating the fundamental causes of the obstacles to cross-border settlement.

The paper by Iftekhar Hasan and Heiko Schmiedel, entitled “Networks and Equity Market Integration: European Evidence,” is an insightful contribution, motivated by a recognition of the fact that the combined processes of deregulation, globalization, and technological developments have altered the business strategies of stock exchanges around the world. They investigate the extent to which the adoption of network strategies by the exchanges helps to create additional value in the provision of trading services. Using panel data from all the major European exchanges over the period 1996–2000, they examine the consequences of network cooperation on a number of stock market performance measures. More explicitly, they show that adopting network strategies are associated with higher market capitalization, lower transaction costs, higher growth, and enhanced international integration. Combining the insights from this paper with that from Kauko and Pankki, the policy implication is that there is no fundamental reason to choose to encourage either cooperation or competition between exchanges. Either can, through very different mechanisms, lead to a more efficient and more liquid trading system, which is both a driver and a part of increased integration.

The paper by Patricia Chelley-Steeley, entitled “Equity Market Integration in the Asia-Pacific Region: A Smooth Transition Analysis,” uses the nonlinear smooth transition logistic trend model of Granger and Terasvirta (1993) to test for equity market integration in a sample of four Asia-Pacific countries (Korea, Singapore, Taiwan, and Thailand) over the period from January 1990 to January 2000. Using this methodology allows Chelley-
Steeley to examine the process of equity market integration by identifying the deterministic structural changes in her data and modelling them as a series of smooth transitions between regimes. This model has not previously been applied to the study of equity market integration, and its usefulness is clearly demonstrated in showing how equity market integration has changed over the period of the study. Chelley-Steeley finds that there has been a significant move towards both local and global integration during the late 1990s in most of the Asia-Pacific countries that she considered. The pace of global integration appears to be greatest in Thailand. When focusing on local integration, she finds that Singapore is experiencing the fastest rise in integration. By way of contrast, she finds no reduction in equity market segmentation, either globally or locally, in Taiwan.

The paper by Svitlana Voronkova, entitled “Equity Market Integration in Central European Emerging Markets: A Cointegration Analysis with Shifting Regimes,” uses the Gregory and Hansen (1996) residual-based test for cointegration that allows for a structural break in the cointegrating relations. In this regard, it is similar in spirit with Chelley-Steeley, both testing for changed regimes, although with very different methodologies and consequent underpinnings. Voronkova applies her methodology to a comprehensive dataset of daily data for the three most advanced emerging Central and Eastern (CE) equity markets (the Czech Republic, Hungary, and Poland), and four developed markets (Britain, France, Germany, and the United States) over a period of almost 10 years, from September 1993 to April 2002. In doing so, she investigates whether her chosen modelling strategy provides evidence on the existence of long-run relations between the markets over and above those that are detectable by conventional cointegration analysis. She finds that the Gregory–Hansen test does indeed reveal several equilibrium relations that are not picked up by the more conventional tests. She finds six additional cointegration vectors: one within the group of emerging CE markets and the other five between the emerging CE and the developed markets. Her results show that long-run relations do not cease after a structural change has occurred. This provides a stronger indication of integration between the emerging CE and the developed markets, and it suggests that the benefits of long-term diversification in these markets may be declining.

The paper by Mahua Barari, entitled “Equity Market Integration in Latin America: A Time-Varying Integration Score Analysis,” extends the methodology developed by Akdogan (1996) to measure the degree of integration of domestic equity markets with other markets in and beyond the region. Barari highlights the time-varying nature of integration by calculating integration scores over different time windows. This provides additional insights into the historical evolution of a country’s regional and global financial integration. She uses a sample of six Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela) and calculates their respective integration scores against a regional Latin America index and a global index of both developed and emerging markets. Barari finds a pattern of increased regional, relative to global, integration for most Latin American markets during the late 1980s and the first half of the 1990s. The pace of global integration accelerated around the mid-1990s, however, and this has outpaced regional integration in his sample of Latin American markets in recent years.

Taken together, the three papers on measuring integration provide a rich set of additional evidence supportive of the contention that equity market integration has continued, and indeed may have speeded up. Chelley-Steeley and Barari find that the
extent of global integration is high and rising. Voronkova finds that there are deeper and more complex relationships between markets than was heretofore suspected. The implication of increased integration is that the gains from portfolio diversification across borders is reduced; these papers indicate that it may well also be the case that portfolio diversification across economic blocs is of reduced attractiveness.

Voronkova’s findings are also of interest from the perspective of previous findings, although this being outside the remit of her work is not discussed. We recall from Section 3 that in moving from bivariate to multivariate cointegration, the evidence for integration was strengthened. Voronkova’s paper advances this nexus of evidence further, demonstrating again that as we deploy more sophisticated, finely grained approaches to the problem, we find stronger and stronger evidence of integration.

The paper by John Cotter, entitled “International Equity Market Integration in a Small open Economy: Ireland January 1990–December 2000,” examines the extent to which the equity market in Ireland is integrated with the markets of its main trading partners, including Britain, Germany, and the United States. Ireland is a particularly interesting case that has been examined by many researchers from around the world. It is one of the most open economies in the world, and it has enjoyed remarkable economic success in recent times. Cotter examines the nature of bivariate cointegrating relations for the Irish equity market with the other major markets, and he follows this up with an examination of the linkages using multivariate GARCH techniques. He completes his analysis with an interesting case study approach to determine the role of dual listing with ADRs on the return and volatility linkages. Cotter’s main results are that return interactions for the Irish equity market were strongest during the mid-1990s, with the British market having the dominant relation. The presence of ADRs has contributed to the return and volatility linkages from the United States. Overall, significant interactions of a direction and magnitude that are expected in the context of a small open economy are verified.

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**References**


