

CHAPTER III

MARKET INTEGRATION

The plan of this chapter is the following: first, the concepts of market integration will be briefly discussed. Next, the concepts and their empirical tests in literature used to determine whether international equity markets are integrated are presented. The literature review begins with the basis of correlation and then moves to discuss the equilibrium pricing model which can be classified into two groups: assuming no barriers to international investment or assuming the existence of international investment barriers. Lastly, the chapter presents the integration issue for money markets.

A. Two Views of Market Integration

One view of market integration holds that if markets are completely integrated, assets traded in different markets with identical risk characteristics will have identical expected returns regardless of the markets in which they are issued. Markets are said to be segmented if this condition does not hold. Segmentation may arise either because of direct impediments to international investment such as government restrictions on capital flow, limitations on foreign share ownership, and transaction taxes. Segmentation may also arise due to indirect barriers such as differences in accounting disclosure requirements and difficulty of obtaining information about stocks. Although there are many barriers on international investment, there are also many ways to avoid at least some of them. Therefore, not all the restrictions imposed by local governments are binding to foreign investors. While empirical studies that use any asset pricing model usually can be

classified in either fully segmented markets or fully international markets, it is obvious that asset markets seem to lie in between complete segmentation and complete integration. The extent to whether asset markets are internationally integrated or segmented is an important empirical question.

A second view of market integration refers the impact of local information on the asset returns as evidence of market segmentation. Many studies explore this issue by applying conditional asset pricing models where the expected returns are functions of global and local information variables. If the market returns are influenced by local rather than global information variables, one interpretation is that markets are segmented from the rest of the world. Empirical studies of market integration usually choose one of the two approaches described above.

B. Testing for Equity Market Integration

1. Basis of Correlation

In an attempt to determine whether international markets are integrated, several prior studies explore the basis of correlation in order to discriminate between segmentation and integration. The basic idea is that integrated markets should move together. As a result, these markets' returns should exhibit high correlation. Solnik (1977), among others, has shown some of the methodological problems associated with empirical studies testing for stock market linkages. Studies based on correlation analysis are subject to several limitations. One limitation is the statistical limitation resulting from substantial serial correlation of national stock market returns. This serial correlation will understate the true correlation between markets, leading to the conclusion that the markets are not

integrated. Another limitation comes because the non-stationary of national stock markets increases--the stationary assumption is a necessary requirement for tests of international stock market linkage. To overcome these problems and investigate the extent of integration, recent studies generally apply a methodological procedure based on the theory of cointegration¹. However, the cointegration itself does not imply market integration.

2. Equilibrium Pricing Models

Vast amount of literature classify models of international investment into two approaches. One model deals with markets, assuming that residents of one sub-market face no barriers to investment in another sub-market. Empirical tests that reject this model would imply market segmentation. A second model, on the other hand, assumes barriers to investment exist across countries' markets. If an empirical test is not able to reject the model with zero investment barriers, the result would be interpreted as supporting the evidence of market integration. However, models without international investment barriers are not compatible with two observed facts. These models cannot explain why assets which have the same covariance with the world market portfolio have different excess returns regarding different home countries, nor can the models explain why investors, on average, have more bias toward domestic stocks than predicted.

¹ See Arshanapalliel et al. (1995).

a) Models that Assume No Investment Barriers

Generally, the International Capital Asset Pricing Model (ICAPM) is employed to develop the international market integration tests. The International CAPM model of integration rules out relationships between expected returns and purely domestic factors. Thus, the world market index should be mean-variance efficient and the risk that should be priced is the systematic risk relative to the world market. On the other hand, segmentation implies that only domestic systematic risk should be compensated in asset pricing. Generally, this concept could be extended to other pricing models, for example the Arbitrage Pricing Theory. However, it is important to remember that these models are developed without investment barriers.

Several researchers have examined integration using models without investment barriers. Mittoo (1992) examines evidence of integration in the Canadian Stock Market with US stock markets using the ICAPM. Her results indicate more integrated markets over time. Bae (1995) investigates market integration for the South Korea Stock market. He finds that the Korean market commands higher risk premiums than the world market. However, there is some evidence that these premiums decline during later sub-periods. This supports the conclusion that the Korean market is becoming more integrated. Heston, Rowenhorst, and Wessels use data on 6,000 firms in the US and twelve European countries from 1978 to 1990. Their results support the hypothesis that markets are internationally integrated in the sense that the rewards for risks are identical across countries.

Gultekin, Gultekin, and Penati (1989) test the hypothesis of market integration assuming the arbitrage pricing model to price assets from the Japanese and American stock markets. The rejection of the model leads to the conclusion that the markets are not integrated.

The latent-variable model is used to test the market integration issue with the models that do not assume the international investment barriers. For instance, Cumby (1990) and Campbell and Hamao (1992) study market integration and apply the single-latent variable model to their tests. The benefit of the latent-variable model is that it avoids the problem of a misspecified benchmark portfolio since the model does not require measurement of the benchmark portfolio's returns which may be unobservable. The models tested in these two papers are rejected. However, rejection of the model can come from two possible reasons: either the markets are not integrated or the models are misspecified.

b) Models that Assume Barriers Exist

Another strand of studies, pioneered by Black (1974) and Stulz (1981), developed a model with investment barriers, focusing on the restrictions imposed by asset pricing models. Black (1974) derived a single/partial equilibrium model to show investment barriers in international asset pricing. He claimed that the rejection of the Capital Asset Pricing Model (CAPM) may be from the incorrect market portfolio or wrong risk-free assets since investment barriers do exist and can take many forms: institutional constraints, exchange control, or taxes. Black discussed investment barriers in the form of taxes and used an example of a symmetric tax, meaning a tax that can be both positive and negative (where a negative tax can be interpreted as a subsidy).

Stulz (1981) improved on the results from Black by proposing asymmetric taxes. In practice, local governments do not pay subsidies to short sellers. Stulz obtained results that are similar to Black's results, except taxes are imposed on both sides (long and short positions). Therefore, the non-traded securities can exist in his model if the return of any securities fall between the lines (see Figure 3.1). The investors will not buy those securities since they have to pay higher tax (the returns are not high enough to compensate for the cost of investment barriers). If, however, the return of any securities lie outside these 2 lines, arbitrage will correct the price and the security will fall within the bounds.

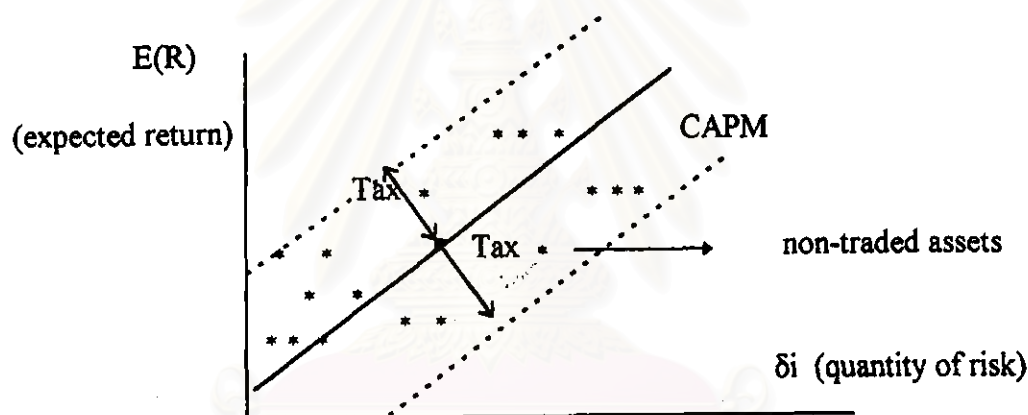


Figure 3-1: Existence of non-traded assets

Black (1974) and Stulz (1981) measure the deviations of asset returns from their equilibrium model of returns constructed assuming market integration and interpret the exhibited pricing deviations as evidence of investment barriers regardless of their source². If markets are integrated, the deviations or the barriers to investment would be zero. However, one difficulty arises when attempting to explain the source of market segmentation. The source can be the result of many

² See Wheatley (1988); for multifactor, see Korajczyk (1996).

barriers to international investment. It is important to note that within the assumptions of any asset pricing model, the empirical tests of market integration are joint tests of integration with the chosen pricing model.

The empirical studies that follow this approach are as follows: Wheatley (1988) applies the model suggested by Stulz (1981) using the consumption-based asset pricing model described by Breeden (1976). Wheatley empirically tests the model and finds that an asset pricing line for each country relates expected real returns to its real consumption. The tests provide little evidence against the joint hypothesis that equity markets are internationally integrated and that an asset pricing model holds.

Since the tests of international capital market integration are joint tests of an asset pricing model and market integration, it is ambiguous to make an absolute conclusion when the model is rejected. Khanthavit and Sungkaew (1993) attempt to overcome this problem by proposing an approach which allows separate tests of the model and market integration. In their approach, the specifications of the model can be examined before tests of market integration are performed. Therefore, they can reduce the likelihood of the rejection due to model misspecifications. They use an implication of the models of Black (1974) and Stulz (1981). Their approach employs the latent-variable technique using the GMM (Generalized Method of Moments) to test the system. Therefore, before interpreting the rejection of the zero investment barriers as evidence of market segmentation, the specifications of the model are tested separately.

Errunza and Losq (1985, 1989) also address the issues of market segmentation. They define a term called *mild segmentation* which means a subset

of investors cannot invest in certain assets. In this context, the investment barriers are not imposed by taxes but by ownership constraints. Since the ideas developed by Errunza and Losq make an important contribution to the tests in this paper, I will discuss their market structure in detail.

3. Imperfect Market Structure

Solnik (1977) suggests that "the efficient way to test for segmentation would seem to be to specify the type of imperfection which might create it and study its specific impact on portfolio optimality and asset pricing". In Errunza and Losq's studies (1985), the segmentation results from the specific imperfection relating to the assumed inability of a class of investors to trade in a subset of securities due to some institutional constraints. This market structure is labeled *mildly segmented* in their study. The basic assumption is that investors will have unequal access to markets. As a result, they assume two type of investors--unrestricted investors and restricted investors. Unrestricted investors can invest in all assets which consists of two subsets--eligible assets in which all investors can invest, and ineligible asset in which only local investors can buy. Restricted investors can only buy ineligible assets. In this framework, Errunza and Losq show that the return required by local investors (unrestricted investors) on the local securities will be higher compared to the return without such restrictions and the pricing will differ for eligible and ineligible assets.

The concept of *mild segmentation* developed by Errunza and Losq seems more descriptive than the models for international asset pricing with barriers such as Black (1974) and Stulz (1981). For example, the type of imperfection in the study by Black (1974) appears somewhat artificial. He assumes that there exists a subsidy for short-selling foreign securities. Although Stulz (1981) overcomes this problem

by proposing asymmetric taxes, he fails to specify the risk/return tradeoff for at least one class of assets which are not traded by all investors. The most important point made by Errunza and Losq's model is that it shows that the assumption of unequal access does not affect the required return on eligible securities. In contrast, the required return on ineligible securities is different from what the standard capital asset pricing model would suggest. The reason is that the ineligible securities would generally command a much higher risk premium which is proportional to the differential risk aversion and the market risk condition.

The experimental tests in this group of studies began with Solnik (1974). He tests an international asset pricing model in which deviations from relative purchasing power parity can occur while individuals choose portfolios that are mean-variance efficient. He finds little evidence against the hypothesis that equity markets are integrated. Errunza and Losq (1985) also test an international asset pricing model in which individuals choose portfolios that are mean-variance efficient. They find that there is evidence supporting market segmentation between the US and a group of nine less developed countries during 1976-1980.

Eun and Janakiramanan (1985) also pinpoint the effects of equity ownership restrictions on securities prices and find that local investors demand higher price discounts on securities as equity ownership constraints become more restrictive. Jorion and Schwartz (1986) investigate integration between the Canadian equity market and selected North American Stock Exchanges. They find evidence to support the segmentation of these markets. They also extend their work and examine the impact of interlisted securities to analyze the source of segmentation.

The results indicate that the source of segmentation can be traced to legal barriers based on the nationality of issuing firms.

Hietala (1989) adopts a view similar to Errunza and Losq (1985). Hietala investigates asset prices in a partially segmented market where citizens of a small country are allowed to hold only their domestic securities and other investors are essentially allowed to hold all securities. In such a market setting, she points out that local investors would be willing to pay less for their securities than foreign investors. Using data from the Finnish Stock Market, the results support her hypothesis that the market is partially segmented. The most striking point is that the study can specify the legal nature of the barriers into her empirical test on the Finish market.

4. Testing for Money Market Integration

Although much of the research has focused on the extent to which equity markets are integrated by characterizing the predictable components in excess rates of return on equity, money markets have not been subject to much empirical research. Money market integration studies have begun with simple studies of the relationship between US dollar domestic market yields on major world currencies. Later studies have progressed to examine real interest rate convergence between the US and major industrial countries. Market integration can be caused by capital mobility in the money markets. When barriers to international capital mobility have been eliminated, the international integration of money markets are expected to increase. Moreover, the development and growth of new financial instruments such as currency and interest rate swaps should further stimulate international financial integration.

These liberalization processes yield a higher degree of integration of domestic and world markets. One assumption is that the international integration of money markets would reduce divergence between interest rates at home and abroad and increase the degree to which yields in different national markets move together over time. An alternative view of the integration question is the effect of macroeconomics policy on interest rates. From this viewpoint, the process of determining interest rates will be significantly different under alternative degrees of market integration. For example, in the case of full market integration, some form of interest arbitrage will hold: domestic interest rates will depend on global factors such as world interest rates. In contrast, with pure market segmentation, the interest rates will be determined by conditions prevailing in the domestic money market and domestic inflation.

Swanson (1996) surveys the money market integration literature over the past decades. The study finds global money market integration increasing over time, although there is prevalent evidence that market segmentation remains.

Several approaches have been taken to measure money market integration. One method is through analysis of the time-series properties of the interest-parity differential. If markets are integrated, similar assets should yield similar returns across countries when adjusted for the risk of currency depreciation. Therefore, the covered interest differential should decrease as evidence of capital account liberalization. Frankel and Levich (1977) tested covered interest rate parity allowing transaction costs into the analysis. They found some evidence against parity but the results were not strong. The deviation of interest rate parity may not come from the segmentation of markets; it may be the effect of information lags or

time-series of interest rate parity differential³. Frankel (1989) used covered interest differentials to examine financial market integration between Eurodollar rates and the interest rates of Pacific Basin nations (Hong Kong, Japan, Malaysia and Singapore) and concluded that the financial markets of these Pacific Basin nations are well integrated with those of the rest of the world.

As the trend of liberalization continues, the interesting issue has begun to shift away from investigating the equalization of interest rates between different nations toward examining how interest rates are in fact determined once the domestic financial market has been liberalized. The interesting issues concern financial liberalization such as the relation between investment and interest rate and the impact of real interest rates caused by changes in the value of savings. Feldstein and Horioka (1980) studied domestic saving and investment behavior and evidence of the home-country bias in typical investment portfolios. They investigate the evidence on saving-investment correlation, home-country bias and other matters with implications for the degree of capital market integration/segmentation. They found evidence that changes in regulations and tax requirements can also affect the relative returns of foreign and domestic investment.

The measurement of the degree of international capital mobility was first outlined by Edwards and Khan (1985). Their empirical evidence indicates that in Singapore, only open economy factors appear to matter in determining interest rates whereas in Colombia, both domestic monetary disequilibria and open

³ See Cumby & Obstfeld (1981) for tests of time-series of interest rate parity differential.

economy conditions have influenced nominal interest rates during 1970 and 1985. Therefore, they concluded that in terms of their model, the Singaporean economy can be regarded as a fully integrated market while Columbia can be characterized as a partially integrated economy. Reisen and Yeches (1993) extend the Edwards and Khan model using time-varying parameter estimations for Korea and Taiwan during the 1980s. Their findings indicate no trend towards more financial openness. This evidence is obviously not consistent with a move to greater openness for these two countries.

To sum up, the empirical work finds inconclusive evidence to support either market segmentation or market integration regardless of the sample assets or sample periods tested. From the empirical findings outlined above, the answer to the question of whether markets are internationally integrated or segmented remains a challenge because the answer is different depending on your perspective—correlation of returns between markets, macro-policy effectiveness, or even different causes of barriers. A model that will yield greater insight would be beneficial since several issues in financial economics cannot be addressed without some assumption about whether markets are integrated or segmented.

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