



## Market structure and the cost of capital

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### ARTICLE INFO

#### Article history:

Accepted 2 January 2013

#### JEL classification:

G15

F36

C32

#### Keywords:

Finance

International asset pricing

Firm's cost of capital

Segmentation

### ABSTRACT

We contribute to the finance literature in two main ways. First, we present a theoretical capital asset pricing model (CAPM) to price assets in different market structures. Second, we use our model to analyze whether when markets are partially segmented using the local or the global CAPM yields significant errors in the estimation of the cost of capital for a sample of firms from developed and emerging countries.

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## 1. Introduction

In recent years, both developed and emerging capital markets have experienced numerous changes including removal of investment barriers, economic reforms, introduction of country funds and depository receipts (DRs) as well as other financial innovations. One of the aims of these changes is to develop financially integrated stock markets which should lead to a lower cost of capital, greater investment opportunities, and higher savings and growth made possible by international risk sharing (Carriero et al., 2007; Stulz, 1999). The same period has known a succession of severe crises of different origins and effects: the 1997–1998 Asian crisis, the 2001 US recession, the 2007–2009 global crisis. These changes have increased the exposure of national markets to global risk factors as well as their degree of integration into the world market. However, since today's national markets are neither perfectly integrated nor strictly segmented markets (Arouri et al., 2012; Bekaert and Harvey, 1995; Carriero et al., 2007). Investigating the effects of these integrating changes on the international risk-return trade-off and cost of capital of firms is crucial for rational decision-making and capital budgeting. In this paper, we present an international capital asset pricing model (CAPM) for

partially segmented stock markets and use it to assess, under the hypothesis of partial segmentation, the pricing errors made by investors who use domestic or global asset pricing models to price assets and compute the cost of capital of firms.

Our model permits to investigate the consequences of changes in the degree of stock market integration on the cost of capital of firms and the prices of assets under different market structures. If capital markets are fully integrated, investors face common and country-specific risks, but price only common risk factors because country-specific risk is fully diversified internationally. In this case, the same asset pricing relationship (the global model) applies in all countries and expected returns should be determined solely by global risk factors. In contrast, when capital markets are strictly segmented the asset pricing relationship (the domestic model) varies from one country to another and domestic risk factors determine expected returns. In other words, given their exposure to systematic global risk, assets traded in different locations will yield different expected returns (Karolyi and Stulz, 2002). When capital markets are partially segmented, investors face both common and country-specific risks and price them both. In this case, expected returns should be determined by a combination of local and global risk sources. Thus, the degree of integration determines the value of the risk premium expected on different assets and thus the prices of asset as well as the cost of capital of firms.

Stock market integration dynamic is affected by both institutional and behavioral factors. First, financial integration is a result of economic, institutional, legal and political factors. In particular, integration depends on

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the harmonization of stock exchange rules and the ability of foreign investors to access domestic assets as well as the ability of domestic investors to access foreign investment opportunities. In fact, access to worldwide investment opportunities, through direct means and homemade diversification, increases the exposure of domestic assets to global factor and therefore improves the national stock market integration level. However, we should mention that although regional and international harmonization of exchange trading rules encourages greater investor activity, it often allows flexibility in the implementation of clauses and therefore this partially harmonization could create partially integrated markets (Cumming et al., 2011). Second, behavioral factors such as risk aversion, relative optimism, and information perception may also affect the desire to invest abroad and thus market integration. Therefore, even in the absence of institutional barriers to international investments, indirect barriers can still discourage foreign investors and prevent world stock market integration. Thus, the process of stock market integration is complex, gradual and takes years, with occasional reversals and most domestic stock markets should be between the two theoretical extremes of strict segmentation (integration zero) and perfect integration (Bekaert and Harvey, 1995; Carrieri et al., 2007). Therefore, assessing the degree of market integration can appropriately be addressed only within the context of an international capital asset pricing model.

In the recent decades, the finance literature has introduced new theoretical works in the field of risk–return trade-off and asset pricing in different market structures (Bell, 1995). Overall, one can classify the available models in two categories: theoretical domestic asset pricing models in which it is assumed that markets are strictly segmented (Ross, 1976; Sharpe, 1964 among others) and theoretical international asset pricing models in which it is assumed that markets are perfectly integrated (Adler and Dumas, 1983; Grauer et al., 1976; Solnik, 1974 among others). However, there are only few theoretical asset pricing models for partially segmented markets, the most known are those developed in the vein of Black (1974) and Errunza and Losq (1985) in which a specific investment barrier is generally introduced and its effects on the equilibrium returns are derived.<sup>1</sup> For instance, Black (1974) presents a model of international asset pricing in the case of partially segmented markets. The author develops a two country-model in the presence of explicit barriers to international investment in the form of a tax on holdings of assets in one country by foreigners. This model was extended by Stulz (1981) and Cooper and Kaplanis (2000). The authors show that capital budgeting rules depend largely on the level of taxes that discourage the foreign investors from investing internationally. A more general two-country model is proposed by Errunza and Losq (1985) (EL-85 hereafter). This model enables to characterize the mild segmentation of domestic markets. However, some of its hypotheses are too restrictive. In fact, the authors assume that all domestic assets can be traded by all investors (both domestic and foreign investors), whereas foreign assets are not accessible to domestic investors because of restrictions imposed by the foreign government. EL-85 show that the foreign assets are priced according to the traditional global CAPM, but there is a super risk premium, proportional to the conditional market risk, for the restricted assets.

Errunza and Losq (1989) (EL-89 hereafter) extend the EL-85 model to a multicountry framework. However, alike EL-85 the authors reduce segmentation factors to the only effects of capital flow restrictions and thus their model is again built on a simple explicit formalization of segmentation factors. More precisely, they distinguish between two types of securities: securities that can be traded by any investor in the world (*the core of the market*), and restricted securities (*the periphery of the market* constituted of  $N$  segments such that no investor can trade on more than one segment). No cross-investment between segments in the periphery is allowed and investors in the core are

denied access to the periphery segments. Thus, segments (countries) in the periphery are assumed to be completely segmented. The authors establish that in a number of cases, their multi-country model leads to significantly different asset pricing relationships compared to the EL-85 two-country model. In particular, it allows analysis of integrative changes in the world market structure.

Nevertheless, stock market integration is a complex and gradual process involving many different kinds of explicit and implicit barriers, and the models discussed above are clearly not flexible enough to investigate the complexities of the market integration. In the absence of an established theoretical model that specifies the continuous economic mechanism moving a market from segmentation to integration, Bekaert and Harvey (1995) propose a purely empirical model of time-varying market integration that allows for the relative importance of global and domestic information on stock returns to change over time. This model is simply an econometric combination of a domestic CAPM and an international one. The integration measure is modeled as a function of national and global variables. An alternative *ad-hoc* model is developed by Carrieri et al. (2007) who adopt a time-varying version of two-country EL-85 model. The results of the empirical tests confirm the findings of previous works and argue that developed markets are highly integrated in the world market while emerging markets have low integration degrees (Adler and Qi, 2003; Hardouvelis et al., 2006).

The current paper aims to fill this gap by presenting a model in order to better understand the complex mechanisms that move a national stock market from segmentation to integration and to investigate the effects of this transformation on the cost of capital of firms and on the prices of assets. Instead of imposing restrictions on assets as in all previous models, we hypothesize that there are different types of investors and assume simply that some investors do not want and/or do not have access to foreign assets as a result of explicit and/or implicit barriers on inflows and/or outflows, barriers which may make markets partially segmented. Starting from that, we derive the equilibrium asset pricing relationship and investigate the effects of changing market structures on the prices of assets and the cost of capital of firms. The main theoretical implication of our model is that if investors do not hold all international assets, the world market portfolio is not efficient and the traditional global CAPM must be augmented by a new factor which reflects the proportion of the domestic risk undiversifiable internationally because of segmentation. The more integrated the markets, the greater the decrease in the premium required on this additional risk factor, and the lower the cost of capital. If markets are perfectly integrated, our model converges to the traditional global CAPM.

The Fig. 1 illustrates the main issues examined in this paper as well as our contribution to previous works on stock market integration and asset pricing models. The partial integration of national stock markets is the maintained hypothesis and thus asset returns are determined by a combination of local and global risk factors.<sup>2</sup> We contribute to the financial literature by presenting a model to directly price assets in that context. A pricing error may arise from an individual firm if the domestic CAPM (which prices directly local risk factors and potentially indirectly global factors through their effects on local factors) or the global CAPM (which prices directly global risk factors and potentially indirectly local factors through their effects on global factors) is used to compute the cost of capital instead of the partially segmented CAPM (which prices directly both local and global risk factors). The size of this pricing error depends on the degree of integration of the studied stock market into the world capital market. We contribute to previous works by assessing these pricing errors for a sample of firms from developed and emerging countries.

<sup>1</sup> For more works on portfolio and market efficiency, please see Guesmi and Nguyen (2011) and Aroui et al. (2012) and references therein.

<sup>2</sup> Indeed, all empirical studies confirm that the two extreme cases of strict segmentation and perfect integration are rejected and that markets are actually partially segmented, but at different levels (Karolyi and Stulz, 2002).

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