



ASSET PRICING IN EMERGING MARKETS:
MULTIFACTOR MODELLING APPROACH

BY

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ABSTRACT

Emerging markets are associated with developing economies and are structurally different from the developed markets. They offer higher expected returns as they are experiencing higher growth rates and potential for diversifying the risk in global portfolios as they are partially integrated with the developed markets. However, the structural differences coupled with partial integration limit the capability of the asset pricing models, originally designed for the developed markets, to capture risk and return dynamics of the assets in these markets and necessitate customization of the models to the local settings. Many asset pricing studies undertaken in this direction supplement the factors in developed market models with the factors that are unique to the emerging markets. However, the models have limited scope in explaining asset returns due to limited explanatory power of the factors included. This study proposes a multifactor asset pricing model with nine explanatory factors, which include returns on the local and global market portfolios, exchange rate, and returns on six mimicking portfolios that proxy for the common sources of risks associated with size, book to market value of equity, market liquidity, leverage, quality of earnings, and asset liquidity of firms. The last three factors in the model have not been tested in the emerging markets; among these, asset liquidity is introduced as an explanatory factor in asset pricing in this study. The model is tested in seven emerging markets, namely China, India, Indonesia, Malaysia, Thailand, South Africa, and Brazil using ten-year monthly data on non-financial firms over period of January 2004 to December 2013. Generalized method of moments (GMM) is applied for data analysis and model testing. The findings of the study reveal that the local market portfolio is the most dominant factor in all the markets. It subsumes the effects of the global market portfolio and the exchange rate in most of the markets. In addition, consistent cross-country behaviour of size related factor is observed in explaining returns on small and medium portfolios, and of book to market value of equity related factor in explaining returns on high book to market value portfolios. Other factors in the model exhibit different behaviours in different markets indicating presence of idiosyncrasies in the common sources of risks that drive returns in these markets. The newly introduced asset liquidity factor has strong impact on stock returns in four markets: India, Indonesia, Malaysia and South Africa. Furthermore, the new to emerging markets factors leverage and quality of earnings have noticeable influence on stock returns in two markets each; leverage in India and Malaysia, and quality of earnings in China and Brazil. The observed behaviour of the model in the markets studied mirrors the behaviour expected of asset pricing models in emerging markets, which are partially integrated with one another and are in different stages of economic lifecycle.

ملخص البحث

ترتبط في الغالب الأسواق الناشئة ذات الاقتصادات النامية، حيث تختلف هيكلياً من الأسواق المتقدمة. هذه الأسواق الناشئة تحقق عوائد أعلى مما هو متوقع وذلك بسبب معدلات النمو العالية وإمكانات تنوع المخاطر في المحافظ المالية عالمياً حيث أن هذه الأسواق مرتبطة بصورة جزئياً مع الأسواق المتقدمة. وبالرغم من هذه العلاقة الجزئية بين الأسواق الناشئة والمتقدمة، ألا أن الاختلافات الهيكلية بين السوقيين تحد من قدرة صيغ أو نماذج تسعير الأصول، حيث أن تلك الصيغ مصممة أصلاً للأسواق المتقدمة، لأستيعاب مخاطر وعوائد العمليات التجارية للأصول في هذه الأسواق وهذا يستوجب إيجاد نماذج أو صيغ لتسعير الأصول للأسواق الناشئة. والجدير بالذكر، أن العديد من الدراسات السابقة التي أجريت في الأسواق المتقدمة تعاملت مع محددات صيغ تسعير الأصول في الأسواق الناشئة كمحددات مكملة لنظيرتها في الأسواق المتقدمة. حيث كان نطاق تلك المحددات محدود في تفسير عوائد الأصول وذلك نتيجة إلى محدودية العوامل المدرجة في تلك الصيغ لتسعير الأصول. لذلك تقترح الدراسة الحالية أدرج تسعة عوامل تفسيرية في نموذج أو صيغة تسعير الأصول، والتي تشمل التالي: عوائد محافظ السوق المحلية والعالمية، سعر الصرف، العائد على ستة محافظ محاكاة والتي تقيس مصادر المخاطرة العامة والمرتبطة بالحجم، معدل قيمة السهم الأسمي إلى قيمته السوقية، السيولة السوقية، معدل المديونية (الفاعلية المالية)، نوعية المداخليل، السيولة الأصول للشركات. حيث أن العوامل الثلاثة الأخيرة (معدل المديونية، نوعية المداخليل، السيولة الأصول للشركات) في نموذج تسعير الأصول لم يتم اختبارها في الأسواق الناشئة. وقد تم اختبار هذا النموذج في سبعة أسواق ناشئة هي: الصين، الهند، إندونيسيا، ماليزيا، تايلاند، جنوب أفريقيا، والبرازيل. وقد تم ذلك باستخدام بيانات الشركات غير المالية لمدة عشر سنوات على أساس شهري من يناير 2004 إلى ديسمبر 2013. ولتحليل البيانات واختبار النموذج تم استخدام ((Generalized Method of Moments (GMM)). وقد أظهرت نتائج هذه الدراسة أن محفظة السوق المحلية لك دولة هي العامل الأبرز في جميع الأسواق السبعة في عملية تسعير الأصول. حيث بدى أن الأسواق المحلية أستوعبت الأثار المترتبة على عوامل المحفظة العالمية وسعر الصرف. بالإضافة إلى ذلك أشارت نتائج هذه الدراسة إلى أنه وعبر الأسواق السبعة الناشئة قيد الدراسة، برز الحجم للعوامل الداخلة في نموذج تسعير الأصول شارح لعوائد المحافظ المالية الصغيرة والمتوسطة، و معدل قيمة السهم الأسمي إلى قيمته السوقية شارح لعوائد المحافظ المالية الكبيرة. فيما يخص باقي العوامل الدخلة في النموذج المقترح في هذه الدراسة، فقد أظهرت تأثيرات مختلفة في مختلف الأسواق والتي تؤكد على وجود خصوصيات يتفرد بها كل سوق من حيث مصادر المخاطرة العام والعوائد في السبعة الأسواق الناشئة قيد الدراسة. كما أشار عامل سيولة الأصول التي لم تقس من قبل في الأسواق الناشئة أن لديها تأثير قوي على عوائد الأسهم في أربعة أسواق (الهند، إندونيسيا، ماليزيا، جنوب أفريقيا). أما فيما يخص معدل المديونية لديه تأثير ذو دلالة على سوقيين (هند وماليزيا)، أيضاً، نوعية المداخليل لديه تأثير قوي على سوقيين هما (الصين والبرازيل). علاوة على ذلك، لوحظ أن سلوك النموذج في الأسواق قيد الدراسة عكست السلوك المتوقع لنموذج تسعير الأصول في الأسواق الناشئة والتي تتكامل جزئياً مع بعضها البعض والتي تكون في مراحل مختلفة من دورة الحياة الاقتصادية.

APPROVAL PAGE

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DECLARATION

I hereby declare that this dissertation is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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To
my mentor and guide,
my eldest brother

Nisar Hussain Hakim, IFS

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CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Emerging markets are associated with developing countries that are in different stages of economic lifecycle (Barry, Peavy, & Rodriguez, 1998; Herbert, 1996; Pereiro, 2010). They are characterized by higher returns with higher volatility, lower liquidity, lower trading, asymmetric information, and weaker infrastructure (Fama & French, 1998; Harvey, 2000; Kohers, Kohers, & Kohers, 2006; Eom & Park, 2011; Bekaert & Harvey, 1997). The emerging markets are structurally different from developed markets and are expected to behave differently (Pereiro, 2010; Demirtas & Zirek, 2011).

Recently, emerging markets have been witnessing an increasing role in the global marketplace (Foster & Young, 2013). They have arisen as attractive investment destinations for investors all over the world as they offer higher expected returns due to their growth rates that are higher than those of the developed markets (Hooker, 2004). Importantly, along with higher returns, emerging markets proffer opportunities for diversifying the associated higher risks. The potential for diversification exists due to their low integration with the global market (Soenen & Johnson, 2008; Bekaert & Harvey, 1995) and with one another (Fama & French, 1998). The low integration of emerging markets facilitates diversification of risk through creation of portfolios that combine investments in different emerging markets and/or investments in emerging markets and developed markets (Fama & French, 1998; Soenen & Johnson, 2008). Furthermore, emerging markets are becoming

increasingly important sources of funds for the local investments (Hearn, Piesse, & Strange, 2010).

The sustenance of the role of emerging markets in global marketplace and in local economies is contingent on investors' ability to optimally gauge the risk and return dynamics of the stocks and other investment vehicles traded thereon. In this regard, asset pricing theory provides a sophisticated and reliable framework. Harvey (2000) states that asset pricing theory helps in: 1) identifying and measuring risks of investing in stocks, 2) assigning rewards for the identified risks, 3) appreciating difference in expected returns on different stocks, and 4) understanding time-varying nature of the expected stock returns.

The asset pricing theory owes its origin to the seminal work of William Sharpe (1964) on market equilibrium theory on asset prices in the United States (US). The subsequent works on asset pricing that led to the emergence of a number of asset pricing models for capturing various dimensions of risks and returns also focus on the US market. The models could be extended seamlessly to other developed markets due to their full integration with the US market. Emerging markets, on the other hand, are partially integrated with the developed markets (Bekaert & Harvey, 1995), which impairs the ability of the asset pricing models to explain stock returns in these markets (Harvey, 1995). Emerging markets' partial integration with and structural difference from the developed markets necessitates customization of the models to the local settings (Foster & Young, 2013; Dash & Mahakud, 2013; Pereiro, 2010).

Recognizing the need for customized models, many studies have proposed extended versions of the asset pricing models for emerging markets. The proposed model have been successful in not only characterizing the emerging markets but also identifying a number of factors that explain cross sections of stock returns in these

markets. However, the models have fallen short of providing comprehensive explanation of the stock returns most likely due to limited explanatory power of the set of factors used in models or exclusion of the factors, from the models, that drive stock returns. Therefore, this study investigates the issue thoroughly and proposes an alternative multifactor model capable of providing better explanation of the risk and return dynamics of the stocks in emerging markets.

1.2. PROBLEM STATEMENT

Sharpe's (1964) seminal work on market equilibrium theory of asset prices that brought forth the capital assets pricing model (CAPM) marks the birth of the asset pricing theory (Fama & French, 2004). CAPM defines investment universe as consisting of a risky market portfolio and a risk-free asset. The model assumes that market portfolio alone is sufficient to explain risk and return relationship of risky assets traded in a market. However, subsequent studies discovered a number of additional return-relevant factors, such as size (Banz, 1981), book to market value of equity (Stattman, 1980; Rosenberg, Reid, & Lanstein, 1985), earnings power ratio (Ball, 1978; Basu, 1983), leverage ratio (Bhandari, 1988). These additional factors, labelled as the anomalies of CAPM (Fama & French, 1996), redefined the boundaries of the asset pricing theory and triggered need for multifactor asset pricing models. The multifactor models incorporate, besides market portfolio, the additional factors that affect stock returns and make up for the deficiencies of the CAPM.

The pioneering work of arbitrage pricing theory (Ross, 1976; Connor, 1984; Wei, 1988) in multifactor modelling uses state-space framework to develop theory for modelling the number and relevance of factors that explain stock returns. The resultant theoretical models, along with Merton's intertemporal capital asset pricing

model, recommend inclusion of all factors that define investment opportunity sets for the investors. However, except market portfolio from CAPM, the theoretical multifactor models do not identify the factors. Chen, Roll, & Ross (1986) try to fill this void by proposing a model that identifies six economic variables *a priori*. They do not claim that the variables are exhaustive, as demanded by the theoretical models, and suggest that any variable that can complete the state of nature of price determination in an economy should be taken as a systematic risk factor. The continued efforts of researchers in similar studies led to the identification of a number of return-relevant factors and emergence of a number of multifactor models, like Fama & French three-factor model (1993), Carhart four-factor model (1997), and Pastor & Stambaugh five-factor model (2003).

The growth of stock markets in other developed nations in 1970s in tandem with decreasing share of US market in the world market capitalization triggered need for internationally-compatible asset pricing models. In particular, the need for international models was prompted by the difference in consumption and investment opportunity sets available to the investors in different markets (Stulz, 1995). Moreover, deviation from purchasing power parity (PPP) among nations exposes investors to another dimension of risk, that of the currency exchange risk (Solnik B. H., 1974). Under these conditions, investors in different countries are expected to use different indices to evaluate assets and may arrive at different values for the same asset (Adler & Dumas, 1983). Nevertheless, despite the differences between US and other developed markets, extension and customization of models to the settings in the markets outside US was made easy by their full integration with the US market.

Over the last three decades, emerging market, the markets associated with developing nations, have come to fore as attractive investment destinations for

investors around the globe. These markets offer higher expected returns as they are experiencing higher growth rates and potential for the diversification of the risks in global portfolio as they are partially integrated with the developed markets (Bekaert & Harvey, 1995; Soenen & Johnson, 2008). However, the same partial integration coupled with emerging markets' structural difference from the developed markets (Pereiro, 2010; Demirtas & Zirek, 2011) poses unique challenges in customizing asset pricing models to the local settings. In this regard, researchers have put forth number of asset pricing models that attempt to cater to the unique conditions in the emerging markets. These models borrow factors judiciously from the developed market models on the ground that the drivers of returns in emerging markets are qualitatively same as those in the developed markets (Rouwenhorst, 1999). In addition, the models incorporate factors that relate to the distinctive nature of emerging markets. However, the models proposed in these studies have limited scope in explaining stock returns in the emerging markets. The possible reasons for shortfalls in the models are:

1. *Ignoring risks systemic in the global market:* Most of the models tend to ignore the component of the risk that is systemic in the global markets and do not provide mechanism for testing whether local market is capable of capturing it.
2. *Omitting return-relevant factors:* Omission of some critical return-relevant factors such as exchange rate may result in model misspecification (Carrieri, Errunza, & Majerbi, 2006; Phylaktis & Ravazzolo, 2004), while that of other factors that have proven to be return-relevant in emerging markets leaves out explanation of the returns offered by those factors.
3. *Ignoring return-relevant factors:* Factors, like information risk or quality of earnings and leverage, that have been tested and established as priced factors