Research paper

Regionally integrated asset pricing on the African stock markets: Evidence from the Fama French and Carhart models

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A B S T R A C T

The study explores regionally integrated asset pricing on the African Stock Markets (ASMs) via the Fama-French model. It investigates the ability of the model to capture African equity returns at the regional level. It also explores the question of absolute versus relative measures of size and BM when securities are pooled across markets. Absolute proxies may have potential confounding effects or may be appropriate in integrated markets. The study achieves this by scaling the size and BM of each firm by its cross-sectional means or cross-sectional standard deviations for the security's market on the portfolio formation date. The analysis employs the Fama-French model in a cross-country setting. Evidence is provided that both size and BM effects exist on the pooled ASMs. The BM effect, however, appears stronger than the size effect. Also, the pricing errors are higher when size and BM are measured relative to their individual country averages rather than to that of the entire pooled sample. We observe lower mispricing when size and BM are estimated in relation to their cross-sectional standard deviations for the respective countries. Evidence is provided that asset pricing on the ASMs is largely not regionally integrated. The evidence shows that the effect of illiquidity in describing the returns of a pooled sample could be overstated by uncontrolled disparities between the characteristics of the pooled markets if the markets exhibit some degree of segmentation.

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1. Introduction

We investigate whether asset pricing on the African Stock Markets (ASMs) is conducted in a regionally integrated way or is national in character and its implications for the integration and potential diversification gains across the ASMs. We explore this through the size and book-to-market (BM) effects in equity returns. The market capitalisation of equities has been found to correlate negatively with average stock returns (Banz 1981; Reinganum, 1981). High BM equity firms have also been observed to earn higher returns on average than low-BM equity firms (Fama & French, 1992; Rosenberg, Reid, & Lanstein, 1985). Fama and French (1993) suggest a three-factor model to capture the size and BM effects in US stock returns. Fama and French (1996) note that by excluding the Jegadeesh and Titman (1993) momentum effects, the model captures much of the Capital Asset Pricing Model's (CAPM) anomalies. As a result, Carhart (1997) proposes a four-factor model that augments the Fama-French model with a momentum factor.

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While there have been numerous tests of these models around the world, there has been little investigation of the models in Africa. The scant evidence on these models in Africa is understandable, given that the ASMs are largely small. In many of the countries the small number of listed companies makes it difficult to apply the portfolio methodology that underlies the models. Yet, it could be argued that it is important to the current and future growth of the ASMs that the models be investigated in Africa. It would seem important to the development of these markets that we can answer such fundamental questions as: does a firm size or book-to-market effect exists? Are there any consequences of these effects for regional level financial market integration?

Prior African studies such as Basiewicz and Auret (2010) and Bundoo (2011) and applied the Fama-French model to explain average stock returns on some ASMs. These studies may lack power owing to the small sample size. In order to address the small sample size problem that characterises many of the ASMs, this paper pools capital markets across countries within Africa. This approach enables us to accumulate a large enough sample to allow a reasonable application of the portfolio methodology that underpins the models. The idea of pooling across capital markets is comparable to the estimation of global factors, or even comparable to the estimation of the factors in a single country characterised by a highly diverse industry base. In effect, the factors estimated in a single country—a country that happens to have a large enough sample size to facilitate the portfolio methodology—are an average of individual industry factors. Similarly, our pooling approach provides estimates of the average factors across the selected ASMs.

The pooling technique also enables us to explore the question of whether assets on the ASMs are priced in a regionally integrated manner or at the individual country level. If financial markets are efficient and integrated then there should be only one set of risk factors that describe equity returns (Fama & French, 2012; Hou, Karolyi, & Kho, 2011). We expect a regional model's mispricing to be insignificant if assets are priced in a regionally integrated way, and if the model is correct. The approach is consistent with Fama and French (2012), Griffin (2002), Heston et al. (1995), Korajczyk (1996) and Levine and Zervos (1996), who employ the mispricing from a global factor model to make inferences about financial market integration. Stock markets are integrated if international factors describe asset returns (Beckers, Connor, & Curds, 1996; Heston, Rouwenhorst, & Wessels, 1995; Schotman & Zalewska, 2006; Sewell, Stansell, Lee, & Below, 1996). If the ASMs are regionally integrated, then regional factors should describe equity returns.

The study makes a contribution to the extant literature on integrated asset pricing. Fama and French (2012); Griffin (2002) and Hou et al. (2011), have examined integrated asset pricing in the developed markets. We contribute to these studies by examining whether the size and BM effects are captured by an African regional asset pricing model. This is important, as the choice of a local, regional or global factors model could significantly influence the cost of capital for valuing international firms, for risk management and the performance evaluation of global portfolio managers (Hou et al., 2011). To the best of our knowledge this is the first paper to explore this issue at the African regional level.

The study also makes a contribution in providing evidence that both factors—size and BM—explain the cross-section of average stock returns on the ASMs. This is a good result indicating that risk factors that are priced in developed capital markets are also priced in the small ASMs. Another contribution of the paper arises from the methodology of pooling across countries, and a question about the relevance of "relative" versus "absolute" size and BM. A reasonable question is whether firm size, for example, should be compared to the average firm size of the overall pooled sample or compared to the average firm size of firms in the same country. This paper provides evidence that both size and BM are ranked by investors in relation to the individual country averages, and not relative to the overall pooled sample. This supports the hypothesis that the ASMs are less integrated regionally. The paper shows that the Global Financial Crisis (GFC) did not significantly impact on regionally integrated asset pricing in the ASMs.

The remainder of the paper is organised as follows: Section 2 reviews the related African literature. Section 3 describes the cross-country pooling methodology to be employed in the paper. The data is described in Section 4. Section 5 presents and discusses the evidence of the study. The conclusion is presented in Section 6.

2. Related African literature

Basiewicz and Auret (2010) investigate the applicability of the Fama-French model on the South African market (SAM). They observe that the model describes returns on the SAM in a significant manner and that the model's mispricings are largely small. Also, size but not BM predicts returns after risk adjustment with the model. This may be an indication of incomplete risk adjustment, or that the model does not fully capture the size effect on the SAM. They attribute the persistence of the size premium post risk adjustment to market microstructure effects.

Bundoo (2011) applies the Fama-French model to the Mauritius market. In order to control for the small sample size problem, Bundoo constructed the Fama-French factors at the intersection of two size and BM portfolios. Bundoo also used these size and BM portfolios and the two BM portfolios as test assets. This notwithstanding, the cross-section of assets and the time span of the data used in the study were small and therefore likely to introduce small sample bias. Bundoo finds evidence of the size and BM effects and argues that the model captures these effects on the Mauritius market.

Hearn (2011), Hearn and Piesse (2010a), and Hearn et al. (2010) relied on a three-factor model to explain the cross-section of equity returns in some African markets. Hearn finds evidence that the size effect was least significant in Morocco, and significantly higher in Egypt and Tunisia. Hearn and Piesse document the firm size effect in a sample spanning West African, London and Paris equity markets. Hearn et al. note the size effect in a sample consisting of East African and London markets. These studies controlled for the small sample problem by relying on a universe of stocks across their sampled