



**STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
END OF SEMESTER EXAMINATION
BACHELOR OF BUSINESS SCIENCE: ACTUARIAL SCIENCE, FINANCIAL
ECONOMICS & FINANCIAL ENGINEERING
BSA 3216/BSE 3214/BSF 3218: RESEARCH METHODS**

DATE: 11th December 2024

Time: 2 Hours

Instructions

Answer question one and any other two questions

Total marks: 40

Question one (20 marks)

- a) Below is an extract from the introduction in Othieno & Biekpe (2019). The paper is titled *Estimating the conditional equity risk premium in African frontier markets*. Read the Introduction provided below and discuss how the introduction addresses the four key questions that an introduction should answer. Provide examples from the text to support your answer. **[10 marks]**

Introduction

The Equity Risk Premium (ERP) is perhaps one of the most significant concepts in finance, and its estimation has been at the core of modern finance research and practice. The importance of the ERP stems from its pervasive use in financial research and applications such as determining market efficiency, setting asset allocation decisions, cost of capital determination and forecasting growth of investment portfolios among others. Despite its importance, the estimation of the ERP remains a contentious, yet impromptu, issue (See Duan and Zhang, 2014; Damodaran, 2016). The haphazard approach to ERP estimation can be attributed to the well documented limitations of the five predominantly used ERP estimation methods namely: historical estimation, demand side estimation, supply side method, survey-based approach and the implied ERP estimation (Ibbotson and Chen, 2001; Ilmanen, 2011; Damodaran, 2016).

The historical approach, which extrapolates the historically realized equity premium, despite its ease of use, is based on the contentious underlying assumption that the realized rate of return is a fair estimation of the investors' ex-ante required rate of return (Welch, 2000; Aggarwal and Goodell, 2008). This view assumes that investors have 'rational expectations' and that the required risk premium is constant (Mehra and Prescott, 1985). However, as documented by researchers such as Modigliani and Cohn (1979) and Campbell and Voulteenaaho (2004), this assumption of constant required returns does not hold. The second major problem with historical estimation of the ERP is that it exacerbates the obvious disconnect between the fundamentals-based approach to forecasting pay-offs and a returns-based approach to estimating risk (Ibbotson and Sinquefeld, 1976; Welch, 2000; Dimson et al., 2003; Damodaran, 2016).

Both the demand side model (Sharpe, 1964; Lintner, 1965; Mehra and Prescott, 1985 and Song, 2008) and the supply side model of Grinold and Kroner (2002) require inputs that

are difficult to obtain and potentially admit some significant measurement errors for the inputs, especially in markets where data is difficult to obtain. Factor inputs required for demand side models such as the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) are difficult to obtain just like their counterparts required for the supply side model including dilution, repurchases and long-term return growth rates. Finally, the accuracy of ERP estimates in the implied methodology is dependent on whether the valuation model used is correct and the reliability and availability of the model's inputs (Ahern et al., 2011; Lanne and Saikkonen, 2006).

The common pitfall among the four methods discussed above is their inability to capture the forward-looking nature of the ERP. This is a crucial omission since the models that don't capture the forward-looking attributes of the ERP fail to portray the ERP as the compensation for holding an asset that will yield an uncertain return (Duan and Zhang, 2014). Further, increasing economic turbulence in recent times calls for a keen examination of volatility and uncertainty in asset prices, which in turn necessitates forward-looking estimation of the ERP.

The survey-based method is perhaps the most used approach by researchers and analysts in trying to deal with the problem of backward looking estimation of the ERP (Welch, 2000; Graham and Harvey, 2001). This method, however, faces serious problems such as respondent biases, varied type and format of questions posed to the respondents together with sample biases and difficulty in data collection among others as outlined in Duan and Zhang (2014). In addition, the reported average risk premia vary significantly across countries yet there is no accompanying explanation for such variations. Despite these challenges, the survey-based approach is commonly used in Africa due to ease of access to databases as explained by Fernandez et al. (2014) and Damodaran (2016).

The ERP is obviously a forward-looking concept and as such any attempt at pricing should endeavor to provide forward-looking estimates for this important measure. The estimation of the pricing of exposures to fundamental and economic factors in ERP are subject to a lot of turbulence. Such turbulence in macroeconomic factors and financial markets calls for keen examination of the resultant volatility and uncertainty in asset prices. If markets are turbulent, and the expected returns are not consistent with the realized returns, it is imperative to estimate futuristic risk premia.

This paper outlines a method for directly estimating the forward-looking ERP from asset returns in eight African Equity markets. The paper employs the consumption-based model to estimate the coefficients of risk aversion and the equity risk premia in frontier equity markets in Africa. First, we link the stochastic discount factor (SDF) to conditional volatility using the Bilinear GARCH (BGARCH) used in Biekpe (1996) and Biekpe and Moore (2000). BGARCH is used for modelling volatility in this paper because it allows direct, yet simple, extraction of the risk premium through comparison of the conditional correlation between the Stochastic Discount Factor (SDF) and the asset returns (Duan and Zhang, 2014).

We then proceed to establish whether the equity risk premia estimated using the consumption-based framework are time varying. To this end, we employ rolling window and recursive estimation methods to benefit both from more recent economic dynamics while using sufficient observations for meaningful econometric estimation (Chou et al., 1992; Bonga-Bonga, 2010; Ahern et al., 2011; Donadelli and Prospero, 2012).

Our work is relevant in the following three ways: First the estimation of conditional risk premia provides forward-looking estimates of the Equity Risk Premia. These estimates

are important as they can be used together with the fundamentals-based forecasts of pay-offs in valuations. This way, the apparent disconnect between a fundamentals-based approach to forecasting pay-offs and a returns-based approach to estimating risk can greatly be resolved (Nekrasov and Ogneva, 2011). In their approach, Nekrasov and Ogneva (2011) incorporate risk measurement as an integral part of cash flow forecasting, focusing on how cash flow predictions change if future economic circumstances change.

Secondly, whereas other researchers have confronted the estimation of the conditional equity risk premia, most of the work use a GARCH (1,1) framework (Ahern et al., 2011; Lanne and Saikkonen, 2006). The GARCH (1,1) framework ignores the covariance between independent variables and their lagged values, which may be important in modelling the volatility of asset returns (Motelle and Biekpe, 2015). This paper addresses this limitation by modelling the volatility using the BGARCH framework that incorporates the covariance structure of the equity risk premium. In addition, our analysis is greatly enhanced by employing rolling window estimates and recursive estimates to capture the time-varying attributes of the ERP.

Lastly, our analysis uses data from six frontier markets and two emerging markets in Africa. African markets are often neglected in asset pricing literature, especially using the consumption-based framework. It is evident from sifting through the literature on the ERP estimation in Africa that studies are scant and the little attempt by authors at dealing with ERP estimation has fallen victim of the disconnect between a fundamentals-based approach to forecasting pay-offs and a returns-based approach to estimating risk. In fact, most of the research in Africa has majorly focused on analyzing the volatility structure of stock returns with little focus on consumption-based asset pricing. In addition, most studies have focused on South Africa (Bonga-Bonga, 2010; Mangani, 2008; Samouilhan, 2007; Chinzara and Aziakpono, 2009). Recently, Li et al (2015) examine the issue of cash flow forecasting and cash flow risk in South Africa yet they don't link it to the ERP. Donadelli (2013) on the other hand studies the effects of the global integration process on emerging stock market excess returns using data from 28 markets including 6 African markets. To the best of our knowledge, the only research that employs the SDF framework in tackling the asset pricing issue in African markets is by Kodongo and Ojah (2014), although they focus on currency pricing. Therefore, our work provides reference for applying the SDF framework using a unique, yet often neglected, dataset from African Frontier markets.

b) Read the problem statement provided below from a research project by Momanyi(2016) titled *Determinants that Influence Financial Performance of Microfinance Institutions in Kenya: Case Study of Nairobi County*. Give your assessment of the extent to which it meets the purposes of a problem statement. Support your response with relevant examples from the text provided **[10 marks]**

Micro Finance is a tool that has been accepted over time to offer poor people access to basic financial services such as loans, savings, money transfer services and micro finance. There are scanty studies on the financial performance of MFIs as most scholars have carried out studies on social performance of MFIs. There are also very few studies on financial performance of MFIs that is relevant to Kenya. In addition the microfinance sector in Kenya is at its growth stage hence there is need for studies to be done that will enable it be financially viable and sustainable as they serve the unbanked. While most of the institutions are fanned for social reasons, primarily poverty alleviation and offering financial services to the unbanked and mostly those

in the low income bracket, this objective cannot be achieved if the firms do not operate in a profitable environment.

A profitable MFI will expand its base and be able to reach its target clients besides offering them financial products and services at a much reduced cost and little logistics compared to the established commercial banks. A study on the determinants of MFIs' performance in central and Eastern Europe by (Hartaska, 2005) present evidence in a multidimensional context. However, she estimates different equations for each of the indicators. The study undertaken by (Gibson, 2012) attempted to investigate the factors that determine the financial performance of the 30 MFIs that are registered and regulated by the AMFI. The study focused on twenty eight different variables. With this study the weighted influence of a particular determinant is hard to establish. In a study to examine the determinants of financial performance of deposit taking MFIs, (Ongaki, 2012) found that there is a positive relationship between profit ratio and interest income ratio . This study differs from that of Gibson as it focuses on factors other than interest income ratio .

Empirical evidence indicates that studies focusing on Microfinance and In particular determinants of financial performance of MFIs are limited . The studies undertaken have been broad and focusing on a wide range of issues without narrowing down to specifics like the study by (Gibson, 2012). Most of the studies carried out advocates for further research on the factors which that have continued to cause poor financial performance of Is in the..Sub- Saharan region which has a higher poverty index. Most of the evidence in regard to MFIs performance largely focuses on the developed economies and the findings are not necessarily relevant to the sub-regions needs and Kenya in particular.

This study will focus on identifying the influence of the determinants of performance on financial performance of MFIs in Kenya.

Question 2 (10 marks)

- a) Give an example of a question about investors, their behaviour or opinions that would be best answered by an experiment. **[1mark]**
- b) State a possible hypothesis for the experiment and **[2 marks]**
- c) Provide a brief outline on how you would carry out the experiment, clearly stating your dependent and independent variables and how the treatment would be assigned. **[7 marks]**

Question 3 (10 marks)

A company wants to improve office efficiency and paper work flow by redesigning office space and purchasing new furniture and organization elements. They have asked you to propose an observation study to examine the use of office space by white-collar and managerial workers.

- a) Briefly describe any two types of information that might be observed?
- b) State three observer effects briefly state how they are likely affect the validity or reliability of the data collected.

Question 4 (10 marks)

- (a) What is the difference between qualitative and quantitative research? Include mention of possible differences in purpose, method, data sources, and data analysis. **[5 marks]**
- (b) Discuss a research scenario where a mixed method approach would be more appropriate than applying only quantitative or qualitative methods. **[5 marks]**

Question 5 (10 marks)

Distinguish between the following

- (a) Observational study and an experimental study
- (b) Open and closed survey items
- (c) Statistic and Parameter
- (d) Experimental design and quasi-experimental design
- (e) Reactive and non-reactive observation. **[10 marks]**