DETERMINANTS OF SUBSCRIPTION RATES OF PUBLIC

BY

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DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other College, Institution or University, other than the USIU in Nairobi, for academic credit.

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Date: 24TH OCTOBER 2001

This project paper has been presented for examination with my approval as the appointed University Supervisor.

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Deputy Vice Chancellor, Academic Affairs
TO MY FAMILY

CATHERINE, MARION, TERESIAH, PETER AND ESTER.
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ABSTRACT

Public share offerings in Kenya have been marked by a large investor's demand, culminating into high levels of over-subscription.

Over subscription impacts unfavourably to all the parties with a stake in public offerings. Over subscription represents excess demand over the available level of supply of stocks. Excess demand at a constant offer price results in rationing of available stocks to the willing investors. The firm providing the public offering suffers opportunity cost by failing to maximise the sale proceeds through upward adjustment of stock offer price to near equilibrium price. The willing investors who fail through stock rationing process suffer loss of investment opportunity and frustration. Persistent frustration to potential investors in stocks may depress demand on that company's stocks in future offerings, and may create price distortions in the stock market.

This study, therefore, sought to establish those factors that influence demand for public equity offerings of Kenyan companies at the Nairobi Stock Exchange (NSE). 20 public equity offerings which comprised all equity offerings at the NSE during the period 1984 to 1998 were studied. The study period was restricted to the time when market information at the NSE was available. The study draws from the existing economic theories on forces of supply and demand. It adopted multi-faceted approach by bringing together the interplay of various economic and stock market conditions in combination with the various other company and equity attributes. To accommodate wide and diverse range of variables acting simultaneously, the study adopted econometric analysis using a linear regression model. From econometric analysis this study found that demand for
equity offerings as represented by subscription rate was positively related to the magnitude and size of the following factors: level of under pricing or price discount, spacing between offerings, firm’s size and money supply in the economy. However, the study found that demand for equity offerings and hence subscription rate was negatively related to the following factors: offer price, size of the offering, offer period, dividend yield, P/E ratio, proportion of retained ownership, interest rate, rate of gross domestic product and Nairobi Stock Exchange index.

The study found that subscription rate or demand for equity is greater where the equity offering was an initial public offering (IPO) than for a seasoned public offering (SPO) that demand was greater where the proceeds on issue were applied into expansion of assets than where proceeds on issue were applied as an exchange for the of ownership, as is the case with privatisation of a government owned enterprise; and that demand was greater for equity offerings in locally owned firms than in foreign firms.

The most important factors on decreasing scale of importance based on increasing values of probability levels of statistical significance (shown in brackets) were the following: spacing between consecutive offerings (0.6%); level of under pricing or price discount (1.0%); offer price (1.1%); firm size (1.3%); size of offering (1.5%); dividend yield (1.9%); proportion of retained ownership (4.5%); whether offering is initial public offering as opposed to seasoned public offering (6.2%); P/E ratio (6.6%); and money supply in the economy (6.9%). The least important factors on reducing scale were: the nature of majority ownership either local or foreign (4.5%); the use of sale proceeds, either for asset investment or as an exchange of ownership (27.2%); the rate of growth of
gross domestic product (25.6%); interest rate of treasury bills (23.9%); Nairobi Stock Exchange index (17.6%); and length of offer period (13.9%).

The study was adversely impacted by the following limitations. The study period, between 1984 to 1998 was relatively short. The study period was selected on the basis of the time that market data was available at Nairobi Stock Exchange and at Capital Markets Authority the regulatory body for the capital market in Kenya. As a result, the size of the sample was restricted to 20 public offerings that were made available in the market between 1984 to 1998. Further the sample suffered asymmetric distribution problem with 75% or 15 out of 20 offerings being IPO and the remaining 25% being SPO. The sample suffered other sectoral imbalances with 60% of all offerings being in the finance and investment sector, 20% in commercial and services sector, 15% in industrial and allied sector and only 5% in agricultural sector. The findings were more representative of the dominant IPO market within finance and investment sector than representative of the overall economy. In addition the relatively small size of sample resulted with some inconclusive findings that were inconsistent with the existing theories.

Finally economic data obtained from the secondary sources and used in the study was in form of nominal values instead of inflation adjusted real values. Accordingly the study may have suffered from measurement errors.

However the study has developed seven economic models of subscription rates with varying but significant levels of explanatory powers.
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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Subscription rate of public offerings represents demand to supply ratio, expressed as a percentage. Over subscription occurs when subscription rate is greater than one hundred percent. Over subscription denotes excess demand over supply. Conversely, under subscription denotes surplus supply above demand level, and is represented by subscription rate lower than 100%. When subscription rate is 100%, supply and demand are in equilibrium, that is, the quantity of shares demanded by investors is equal to the quantity of shares offered by the issuer of the public offering.

Public share or equity offering is the sale of common stock to the public for firms that are listed at Nairobi Stock Exchange (NSE). All public equity offerings are subject to the rules and approval of the local regulatory body, Capital Markets Authority (CMA). Public equity offerings fall under two principal groups. Firstly, the sale of the first tranche of common stock to the public for a newly listed company is referred to as an Initial Public Offering (IPO). Secondly, the sale of other tranches of common stock after the IPO is referred to as Seasoned Public Offering (SPO). IPO and SPO are sold in the primary market, which is the market for new stocks. Trading of stocks already in the market is conducted in the secondary market. NSE is both a primary market and a secondary market. The sale proceeds from the secondary market go to the existing stock holders as an exchange for change of ownership. The firm does not benefit from the sale proceeds although management role is to maximize this value. The sale proceeds from
the primary market may accrue in full to the firm where the whole offering is new stock, or one part of the sale proceeds may accrue to the firm and other part to the existing owners where the offering contains part new stock and part old stock. Privatisation of government corporations represents change of ownership from government to private investors, and the sale proceeds accrue to the Government as the initial investor.

The objective of public offering is chiefly to raise finance from the individual and institutional investors. Firms sell public offerings to generate funds for investment. The other principal sources of finance include: retained earnings and depreciation, bank loans and overdrafts, debt instruments including corporate bonds and commercial papers; leasing, credit and debt discounting, among others. Equity financing may sometimes be more favourable than other sources of finance on the basis of lesser cost of capital. Besides, equity financing carries no obligation to pay dividends and has no maturity period. From the firm’s perspective, equity financing carries less risk than debt financing. However to investors, equity investment is risky, hence generally referred to as risk capital investment. Accordingly, investors require relatively higher returns from the equity investment than from other less riskier investments.

Equity investment is an integral part of private investment. Private investment and public investment constitute the national aggregate investment. Aggregate investment is the engine of economic growth. The higher the rate of investment the higher the rate of economic growth, and is represented by higher rate of Gross Domestic Product (GDP). The capital market plays the role of mobilisation of resources, and distribution of scarce resources from surplus units to the most productive units in the market economy. In Kenya, between 1964 and 1997, the average annual aggregate investment was about
20.7% of GDP, with private investment contributing about 80% of the aggregate investment (Ronge & Kimuyu 1997).  

The current global trend of economic liberalisation and privatisation of government commercial enterprises implies that the private sector will play a more expanded role in the economic growth of nations. As a result, equity financing together with other sources of capital will play an increasing role in support of private sector expansion in the economy. It is therefore imperative to examine those factors that influence capital mobilisation through equity financing. Equity financing may involve raising of capital through sale of shares to the public, which is referred to as a public offering. Subscription rate is the ratio of demand to supply of shares offered for sale to the public. Factors that influence demand and supply of public offerings have similar impact on equity financing. Higher demand of public offerings results in higher availability of equity financing, and vice versa. Prudent management of those factors affects favourably the level of demand of public offerings, and availability of equity financing. The higher the standard of management of these factors, the higher the probability of success and the more favourable conditions for maximising sale proceeds.

Subscription rate is a multi-variate function of factors that influence demand, supply and level of investment in the economy. These factors are principally affected by economic environment, market conditions, company and asset attributes. Economic conditions include GDP, money supply, interest rates and stock exchange index. Market conditions influence size and level of activity in the market. These conditions comprise of size of offering block, length of offer period and length of spacing between consecutive public offerings. Company attributes include company size or capitalization, proportion
of retained ownership, if majority ownership control is local or foreign, and if sale proceeds are used for asset financing or as an exchange for transfer of ownership. Asset attributes include level of offer price, price discount, price – earnings (P/E) ratio, dividend yield, and if the public offering is Initial Public Offering (IPO) or is Seasoned Public Offering (SPO).

Economic growth is measured by GDP. GDP is the product of national output and aggregate price level. GDP represents value of national output and fluctuates in form of business cycles. Positive economic growth period is referred to as boom period, and negative growth period is referred to as a recession. Higher GDP represents higher aggregate price and higher national output, and vice versa. GDP is a positive function of money supply, price and wage level, and is a negative function of unemployment in accordance with Okun’s law and Phillip’s curve (Samuelson & Nordhaus 1990)².

Higher GDP is associated with higher economic performance, higher aggregate investment and higher activity in the stock market. Accordingly higher GDP may be associated with higher demand in equity investment and hence higher subscription rates. Conversely, higher GDP is associated with higher aggregate price level translating to higher stock prices. Higher stock prices depress demand, and may be reflected ultimately in lower subscription rates.

There is no consensus among economists on the role of money supply in economic growth. Two schools of thought exist: The monetarists hold that money supply as controlled through monetary policy is the sole determinant of economic growth. Keynesian economists on the other hand agree on the importance of money supply in the economic growth, but postulate that it is the combination of monetary and fiscal policy
that control rate of economic growth. Both schools of thought find support of their stand points on velocity of money theory and quantity theory of prices, which hold that money supply is a positive function of aggregate price (Samuelson & Nordhaus 1990)\(^3\). Higher money supply reduces interest rates, reduces costs of capital and production, increases investment and hence stock prices and total output, reduces unemployment in accordance with Okun’s law and increases credit availability. However, higher money supply increases aggregate price level, and resultant inflation. On account of money supply favourably affecting investment, interest rates and resultant reduction in cost of capital and production, then higher money supply enhances demand for investment, including equity investment. As a result, subscriptions rate may be a positive function of money supply. However increase in money supply increases aggregate price level, including stock prices, and may exert downward pressure on demand for equity investment with attendant reduction in subscription rates.

Interest rate is compensation to owners for using money by borrowers. Its role is to induce savings, thus increasing capital stock, and allocating resources to the most productive and deserving sectors of the economy (Samuelson and Nordhaus 1990)\(^4\). Interest rate is a negative function of the level of money supply in the economy in accordance with forces of supply and demand. Lower interest rates imply lower cost of capital and production, and therefore enhances investment, including equity investment, higher national output with attendant higher labour employment in accordance with Okun’s Law. Higher interest rates produce opposite results, and may cause shift of investments from riskier capital market to less riskier and short-term money markets.
Higher interest rates negatively impact on demand for equity investment and translate to lower subscription rates, and vice versa.

Stock Market Index as represented locally by Nairobi Stock Exchange Index (NSE Index) is an indicator of price level in the stock market or stock exchange. Stock Market Index captures the economic performance and the business cycle of the economy (Samuelson & Nordhaus 1990)⁵. High growth phase or boom is represented by highly growing index and vice versa. Demand for equity investment is higher in boom period when stock market index is higher than in recession period when stock market index is lower. Therefore, subscription rate in theory is a positive function of NSE Index. However, higher NSE Index implies higher price level of stocks, which is a negative function of demand for stocks, and hence a negative function of subscription rate.

NSE is the only stock market in Kenya. It is an emerging market with relatively low trading volumes, low turnover and hence high illiquidity, high transaction costs and lengthy transaction period. The proposed introduction of electronic trading and development of a Central Depository System is currently under implementation but has not commenced operations. The market efficiency for NSE was found to be consistent with weaker form EHM (Dickinson & Muragu 1994)⁶. The above market conditions have an impact on the size of the market, level of trading and the capacity of the market to absorb in timely manner investment instruments coming into the market. The size offering, or the value of sale proceeds represents supply of equity in the market. From the forces of supply and demand, for a given offer price of stock there exists an equilibrium point where quantity of stock demanded is equal to quantity of stock supplied. Supply of stocks above the equilibrium quantity results in excess supply, which is represented by
under subscription, and vice versa. Subscription rate is therefore a negative function of size of offering. However larger block offerings carry larger price discount due to marketability problems (Pratt, Reilly & Schweih 1996) 7. Larger blocks give greater control, hence better stock valuation (Horne 1988) 8. Institutional investors prefer larger blocks of offerings. Arising from the above, demand as represented by subscription rate may be higher for bigger sized offerings than for smaller sized offerings. Public offerings are preceded by marketing advertisements in print and electronic media. Marketing effort takes time to penetrate the potential consumer segment. Further, some investors finance equity investment through borrowing from financial institutions. It takes time to arrange and obtain financial support to buy stocks. Arising from the above the length of the offer period may facilitate development of potential market demand to the full and hence increase subscription rate. Findings on day of the week and month seasonality fluctuations in demand and returns of stocks are widely reported (Keim 1983) 9, (French 1980) 10, (Fields 1931) 11. Keim finds higher stock returns in January for smaller firms. French finds lower stock prices on Friday and Monday. Fields finds higher stock prices before the end of the week, and lower prices on Monday. Cross finds that market index for S&P 500 rises on Friday and falls on Monday. Day of the week seasonality may have no significant impact on demand for public offerings with offer period greater than one week.

The spacing between consecutive public offerings ensures no crowding occurs in the market. Crowding refers to excess supply of investment instruments. NSE is a relatively small market with limited structural and financial capacity to accommodate large investment instruments at the same time.
Demand grows over time due to increase in disposable income, population growth and increasing level of awareness among the population, changing preferences of investors and other economic factors. Demand regenerates with time. Accordingly, larger spacing between consecutive offerings is more likely to meet with increased demand, and hence higher subscription rates.

Company related attributes have significant impact on demand of respective stock. Firm size may be represented by capitalization, which is the product of market size and the number of outstanding shares. Ngaru finds that investors in Kenya are more attracted and have better valuation for larger firms than smaller firms (Ngaru 1998)\(^\text{13}\). Other studies in the USA find smaller firms have higher risk, and attract a size premium in valuation than larger firms (Platt, Reilly & Schweis 1996)\(^\text{14}\). Similar findings on small firm-effect were found by Eugene and French (Eugene & French 1992)\(^\text{15}\). Demand as represented by subscription rate for a larger capitalised firm is higher than a lower capitalised firm. There is evidence of use of proportion of retained ownership as a signalling mechanism for higher firm quality (Downes & Heikel 1982)\(^\text{16}\). They found that the proportion of the retained ownership is positively related to market valuation. Leland & Pyle finding was that there is information asymmetry between existing and new investors. Firms used higher retained ownership to communicate expectations of existing investors to new investors of a better firm performance in future. (Leland & Pyle 1977)\(^\text{17}\).

A study by Morck et al. finds that higher retained ownership as a signalling device for higher quality, but finds that higher retained ownership may imply illiquid market for the firm’s stock due to entrenched management and poor performance (Morck et al.1988).\(^\text{18}\)
Nationality of majority ownership in a firm affects access to resources, size of the market, technology and management expertise used in operations. Foreign controlled firms may have superior technology and management skills and cheaper access to international finance and raw materials. They may gain access to bigger market, both local and international. On the other hand, local firms may enjoy more favourable local consumers support and more favourable tax incentives. However local firms are prone to more interference by government bodies, which may be adverse to their commercial activities. Jones finds that foreign banks in South Africa perform better than local banks due to better management and lesser interference by local parties (Jones 1998) 19.

The application of sale proceeds may affect firms’ future performance. Sale proceeds may be used for asset financing, thus increasing earning power which accrue additional returns in future. Increased future returns add value to the firm, and is reflected by higher stock valuation, and hence increased demand that translates to higher subscription rate. Sale proceeds may also be used to retire outstanding debt. Alternatively, sale proceeds may be used to buy part of existing investors holding. In this case the sale proceeds become an exchange for transfer of ownership. The firm does not benefit from the sale proceeds (Brigham & Gapenski 1991) 20. Accordingly, where sale proceeds are used to increase capital base, subscription rate is likely to be higher than when sale proceeds are used as exchange for transfer of ownership, and vice versa.

Each public offering has its own unique features that have some influence on demand. From economic theory, demand curve is downward sloping to the left (Samuelson & Nordhaus 1990) 21. From the demand curve, price is a negative function of demanded quantity. Kotlier and Armstrong report that the price affects the consumer
buying behaviour. Higher prices depress demand, and lower prices increase demand (Kotlier & Armstrong 1999) 22. Brigham and Gapenski report evidence of existence of an “optimal price” range in US stock markets at between 20 – 80 dollars per stock (Brigham & Gapenski 1991) 23. Evidence from Kenya for 20 public offerings at NSE between 1984 and 1998 shows unit offer price range between shillings 27- 51. Further evidence from NSE Market Reports show that stocks with higher prices are relatively inactive at NSE. Firms use stock splits and stock dividends to adjust market prices (Horne 1988) 24. Firms also use stock splits and stock dividends to signal higher firm quality (Grinblatt et al 1984) 25. Arising from evidence above, the lower the price, the greater the affordability and the greater the demand that translates to higher subscription rate, and vice versa.

Price discount represents under pricing of stock. It is the difference between the offer price and market price for stock already trading in the secondary market, or the market price shortly after commencement of trading for IPO. Evidence of price discount or under pricing of new stock is widely reported, both internationally and locally. Ibbotson and Ritter are reported by Jarrow, Maksimovic & Ziemba as having established evidence of global spread of under pricing in stock markets (Jarrow, Maksimovic & Ziemba 1995) 26. Similar findings were reported by Welch (Welch 1989) 27, Grinblatt and Hwang (Grinblatt and Hwang 1989) 28 and Allen and Faulhaber (Allen and Faulhaber 1989) 29. Various hypotheses have been developed to explain under pricing: winners curse hypothesis by Rock (Rock 1986) 30; costly information acquisitions hypothesis by Hanley (Hanley 1993) 31; cascade hypothesis by Welch (Welch 1992) 32; monopsony hypothesis by Baron and Holmstron (Baron and Holmstron 1980) 33. Litigation model hypothesis by Tinic (Tinic 1988) 34; signalling hypothesis by Grinblatt & Hwang and
Allen & Faulhaber. Other studies cite other reasons for under pricing including government regulatory body price influence, ownership dispersion hypothesis and market incompleteness hypothesis. Locally, Moko finds a weak positive relationship between under pricing and subscription rate (Moko 1995)\textsuperscript{35} for companies quoted at the NSE.

The implication of under pricing is to spur higher demand, which translates to higher subscription rate. Price discount may therefore be positively related to the subscription rate. Public offerings fall into either IPO or SPO group. SPO has an established market with market-determined price. However IPO is new in the market and hence has no market price. Findings from Grinblatt & Hwang, among others, show that IPO suffers from information asymmetry between existing investors and new investors and firms generally under price IPO more than SPO as signalling mechanism to communicate higher firm quality. Since IPO carry more price discount than SPO, it is more likely to generate higher demand that translates to higher subscription rate for IPO than for SPO.

Price-earning (P/E) ratio is the reciprocal of earnings to market price. P/E represents relative cost ratio. The higher the offer price per earnings, the higher the P/E ratio, and the more expensive the stock. Lower P/E ratio implies lesser expensive stock and creates greater demand due to affordability in accordance with downward sloping demand curve. Greater demand as represented by higher subscription rate, which is therefore, negatively related to P/E ratio.

Dividend yield is the ratio of dividend to market price. Dividend yield is a part measure of return on stock. The other part of return on stock is capital gain. The level of dividend declared is not uniform across firms, but is dependent on each firm’s dividend
policy. However, higher dividend yield implies higher return and hence higher valuation of stock by investors. Higher valuation generates higher demand as represented by a higher subscription rate.

1.2 PROBLEM STATEMENT OBJECTIVES AND IMPORTANCE OF THE STUDY

Demand for new equity issues in Kenya has far exceeded the available new stock supplied in the market. Evidence from NSE reports for the period 1984 to 1998 show that a total of 25 new issues were made available in the market. Out of the total, two issues were right issues, three issues were private placement issues, and the remaining twenty issues valued at about 10 billion shillings were public offerings in the form of IPOs and SPOs. The twenty public offerings were unevenly distributed across industrial sectors, with one in agriculture, twelve in finance and investment sector, four in commercial and services sector, and three in industrial and allied sector. Financial and investment sector dominated, contributing 60% of the total issues. In general public offerings showed much higher demand than private placement stock issues. Private placement stock issues registered a marginal excess demand as represented by subscription rates ranging from 103% to 106%. Public offerings registered high levels of over subscription with an overall average of 218%; and the following sector averages: 216% in agriculture, financial and investment; 190% in commercial and services; and 122 % in industrial and allied sector (Nairobi Stock Exchange 1998) 36. Only two issues were under subscribed. Finance and investment firms took eight slots of the top ten highest subscription rate companies.
Public offering is an important source of equity financing in the private sector. As expressed earlier in this section, private investment dominates aggregate investment, constituting to 80% of national investment in Kenya. The role of equity financing in supporting private sector through the sale of public offerings is widely recognised. Various stakeholders have varying interests and concerns in public offerings. The objective of the issuer is to raise capital at the lowest cost. Existing stockholders are interested in protecting their controlling interest and growth of their wealth through future price improvement. New investors are interested in investing in well-priced or underpriced stock with reasonable returns at acceptable level of risk. Government has an interest to promote an efficient capital market that could harness and mobilise savings and allocate financial resources to the most productive and deserving units in the private sector to achieve rapid economic growth and increase wealth of the nation. Under subscription has different implications to different stakeholders. To the issuer, the under subscription represents failure of the public offering, poor valuation of the stock by the market, and failure to raise the needed capital. Similar implications are applicable to existing investors together with possible decline in future stock prices and the attendant decline in shareholders' wealth. To new investors, under subscription implies their partial rejection of the stock based on the valuation of the underlying financial information and risks of the stock. Over subscription represents favourable valuation of the stock by investors. It leads to issuers meeting their full capital demand. It may enhance future improvement of stock prices and increase firms' capitalisation and shareholders wealth. However it may lead to rationing of available stocks to investors. This may cause investors to feel frustrated and may keep away from the stock in future. Further,
institutional investors may withdraw from taking uneconomic level of stockholding. In future stock prices may be affected adversely in the secondary market. Arising from the above, it may not be in the firm’s best interests to experience extreme conditions of either over subscription or under subscription due to adverse impacts on future stock prices and hence firms valuation and shareholders’ wealth. Ideally, the size of offerings put in the market should be close to the equilibrium, that is, quantity supplied should be equal to the quantity demanded by investors, taking into consideration the underlying economic, market, company and offering attributes associated with the stock.

This study sets to examine those factors that influence demand and hence subscription rate, and establish their impacts on demand. The objective is to utilise existing literature to develop a subscription rate model using econometric techniques that could be used by stakeholders to harness various factors to achieving a close proximity of equilibrium position where quantity of public offering put in the market is about equal to the quantity demanded by the investors, that is, condition where there is no significant level of under subscription or over subscription.

1.3 HYPOTHESES

The following terms are used reversibly: positively related and negatively related, to represent positively related to and negatively related to respectively.

On the basis of existing literature and explanations referred to earlier in this section, this study makes the following hypotheses on public offerings.
HYPOTHESIS 1:
\[ H_0: \text{Subscription rate (S) is positively related to the percentage of retained ownership (} X_1). \]

HYPOTHESIS 2:
\[ H_0: \text{Subscription rate (S) is positively related to the size of the offering (} X_2). \]

HYPOTHESIS 3:
\[ H_0: \text{Subscription rate (S) is positively related to the size of the firm (} X_3). \]

HYPOTHESIS 4:
\[ H_0: \text{Subscription rate (S) is positively related to the length of the offer period (} X_4). \]

HYPOTHESIS 5:
\[ H_0: \text{Subscription rate (S) is positively related to the length of spacing between consecutive offerings (} X_5). \]

HYPOTHESIS 6:
\[ H_0: \text{Subscription rate (S) is positively related to the offer price (} X_6). \]

HYPOTHESIS 7:
\[ H_0: \text{Subscription rate (S) is positively related to the price discount (} X_7). \]
HYPOTHESIS 8:

H₀: Subscription rate (S) is negatively related to P/E ratio. (X₈).

HYPOTHESIS 9:

H₀: Subscription rate (S) is positively related to the dividend yield (X₉).

HYPOTHESIS 10:

H₀: Subscription rate (S) is negatively related to interest rate (X₁₀).

HYPOTHESIS 11:

H₀: Subscription rate (S) is positively related to GDP rate (X₁₁).

HYPOTHESIS 12:

H₀: Subscription rate (S) is positively related to the money supply (X₁₂).

HYPOTHESIS 13:

H₀: Subscription rate (S) is positively related to the NSE Index (X₁₃).

HYPOTHESIS 14:

H₀: Subscription rate (S) is greater for IPO than for SPO.
HYPOTHESIS 15:

$H_0$: Subscription rate (S) is greater when sale proceeds are used for asset financing than for transfer of ownership.

HYPOTHESIS 16:

$H_0$: Subscription rate (S) is greater for locally owned firm than for foreign owned firm.

1.4 SPECIFICATION OF SUBSCRIPTION RATE FUNCTION (MODEL)

The study adopts a multiple linear regression model of the following form:

$$S = A_0 + A_1X_1 + A_2X_2 + A_3X_3 + A_4X_4 + A_5X_5 + A_6X_6 + A_7X_7 + A_8X_8 + A_9X_9 + A_{10}X_{10} + A_{11}X_{11} + A_{12}X_{12} + A_{13}X_{13} + E$$

Where:

- $S$ = Subscription rate (dependent variable)
- $X_1$-$X_{13}$ = Independent variables, defined above.
- $A_0$ = Constant
- $A_1$-$A_{13}$ = Coefficient of independent variables
- $E$ = Error term, that captures effects of other factors not included in the model.
1.5 THE STUDY OVERVIEW

This study is arranged into five chapters. Chapter 1 contains the synopsis, covering the background, summary of existing literature, objectives, importance and hypotheses of the study. Chapter 2 presents existing literature and develops additional literature to underpin the theoretical framework of this study. Chapter 3 provides sources and procedures of data collection, and presents a statement of analysis methods adopted in the study. Chapter 4 contains the results of analysis and the findings of the study. Chapter 5 presents summary of findings, discussion, conclusions and recommendations from the study. Limitations and recommendations on areas for further research are made in this chapter. Summary statistics are presented in the appendices. Bibliography is provided at the end of the report.

REFERENCES


3: Ibid, pp 640-649

4: Ibid, p72

5: Ibid, pp 518-522


CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The rate of subscription of public offering is a proxy device for measurement of the level of demand for shares at the stock market. Stock market comprises of two distinct segments: the primary market for trading in new stocks and the secondary market for trading in existing stocks. This study is restricted to the primary market for publicly issued stocks at Nairobi Stock Exchange in the period 1984 to 1998. In general, demand for goods and services, and in particular demand for investment in stocks is affected by factors pertaining to economic and market environment, attributes of the issuing firm and other attributes pertaining to the asset. Economic performance may be measured in terms of the rate of growth of domestic gross product (GDP), the level of money supply in the economy and the rate of interest of treasury bills. Market conditions may be represented by the stock market index. The size, development and the capacity of the market may dictate the size of offering of stock that the market can absorb at a given time, the offer period and the spacing between consecutive offerings. Stocks possess different asset attributes with different levels of appeal to investors, including the following; type of offering, either the stock being an initial public offering (IPO) or a seasoned public offering (SPO); the use funds from the sale proceeds may be either in asset financing and retirement of loans or as an exchange for change of ownership; the offer price per stock in absolute term; the level of price discount or under pricing; the price earning ratio; and the dividend yield. The issuing company’s attributes are important factors in respect to assessment of the level of risk and valuation of stocks. Company’s attributes may be represented by the size of the firm, the ownership control, either local or foreign; and the percentage of retained ownership by existing shareholders as a favourable signalling mechanism.

Chapter 2 presents theoretical frame-work of this study, drawing from the existing economic and marketing theories on forces of demand and supply, with particular relevance to public equity
investment in Kenya from 1984 to 1998. The chapter is arranged into four distinct groups of factors in following order: economic factors, market conditions, assets attributes and company’s attributes.

2.2 ECONOMIC FACTORS

2.2.1 GROSS DOMESTIC PRODUCT

Gross domestic product, GDP, is the money value of the total output of goods and services produced inside a country in a year. In contrast, gross national product, GNP, is the total output produced by factors of production - labour, land and capital - owned by the country in one year. National output may be measured by either GDP or GNP. In Kenya GDP is used. Other more developed countries, including U.S.A adopt GNP since the larger economies generally hold substantial investments in foreign countries. This study is restricted to Kenya, and GDP will be used.

GDP measures and monitors national economic performance. It measures national output, which is equal to national income. It represents the sum of total output, including consumption, gross investment, government purchases of goods and services and net exports in one year. GDP may be measured either as the value of goods and services produced, or as the cost of resources used in the production. Both options, product approach and cost approach, result with similar GDP. The actual GDP based on market prices is referred as nominal GDP, whereas after allowing for inflation using GDP deflator, it is referred as real GDP. The change in GDP is referred as the rate of GDP. High GDP reflects high economic activity. High positive rate of GDP represents a high growth rate of national output, and vice versa.

GDP can be expressed as the product of the real output, Q, and aggregate price level, P, of the economy. ¹

Thus GDP = PQ

In Kenya GDP has seen major movement shifts. From 1964 - 1973, the GDP grew rapidly at an average annual rate of 6.6 percent. This was supported by high agricultural production and
import substitution industrialization. With the onset of 1973 international oil crisis, the economy suffered a decline and registered an average annual rate of 5.2 percent. The second oil crisis of 1977 imposed further pressure on the economy to register an average rate of 4.1 percent between 1980 - 1989. Other adverse factors during this period included diminishing returns on import substitution industrialization strategy, and market restriction due to the collapse of East African Community in 1977. The trend of GDP continued on the decline registering a rate of 2.5 percent between 1990 - 1995.

To halt the decline in the economy, the Government of Kenya accepted and started to implement liberalization of the economy in 1993. The adoption of liberalization policy marked a significant improvement in the economy with GDP growing at 3.0 percent in 1994, 4.9 percent in 1995, 4.6 percent in 1996, 2.3 percent in 1997 and 1.8 percent in 1998. 1997 was a national election year. Election expenditure and political uncertainty imposed adverse effect on the economy.

The private sector is the predominant contributor of GDP. In 1996, public sector contributed only 17 percent, but consumed 31 percent of GDP. Movement of GDP, as represented by the rate of GDP, is affected by various factors. The primary factors are the levels of aggregate demand and aggregate supply. Aggregate demand refers to the total quantity of goods and services in the economy that consumers are willing to buy at a given price level, other conditions held constant. Similarly, aggregate supply refers to the total quantity of goods and services in the economy that producers are willing to produce at a given price level, other conditions held constant. The interplay of aggregate demand and supply determines the total national output, GDP, and the price level representing the level of inflation in the economy.

Aggregate demand is affected by the following factors: Firstly, the level of consumption, which in turn is primarily dependent on disposable income. The higher the disposable income, the higher the level of consumption, and ultimately the higher the aggregate demand. Other factors
influencing consumption include wealth of households, aggregate price level and future expectations on income trend. Secondly, level of investment, which is in turn dependent on output, cost of capital, and expectations on monetary and fiscal policies. Higher output, lower cost of capital and favourable government policies favour higher investment which increases aggregate demand. Thirdly, government expenditure on goods and services build up aggregate demand. Fourthly, net exports increase aggregate demand. Net exports are determined by level of domestic output and income, relative prices across markets in different countries and exchange rate. Net exports are supported by higher domestic output, lower foreign price and high exchange rates. High domestic disposable income enhances imports, thus reducing net exports.\textsuperscript{5}

Aggregate supply is influenced by the price level and costs of production and the productive capacity of the economy. The productive capacity is determined by the nation's capital stock, labour and technology.\textsuperscript{6} Higher aggregate supply is supported by low cost of production, higher price level and higher capital stock created through past investment.

Economic management is vested on the government. The main objectives of economic management include: high and rapid economic growth; low unemployment; stable price level by controlling inflation; and favourable terms of trade by balancing exports and imports and maintaining a stable exchange rate. Governments have various policy instruments of economic management to achieve the objectives above. The principal policy measures include: fiscal policy involving government expenditure and taxation; monetary policy involving control of money supply, and hence interest rates and credit conditions; income policy, including government supported transfer schemes to underprivileged groups, wage controls and guidelines, all geared towards controlling rise in wages and price levels, hence control of inflation; foreign trade policy through trade agreements and maintenance of a stable exchange rate.
Different economic policies produce different impacts on the economy. Central Bank, under delegation of powers from the Central government exercises a relatively independent authority on monetary policy. Two options are available. First, when economy is in recession, that is when in decline, it can adopt expansionary policy to turn around the economy by increasing money supply. In recession time, output is low, aggregate demand is low, unemployment is high, interest rates are high, investment is low, profits are low, and stock market index is low due to lower profits and lower price level. To spur the economy, Central Bank may increase money supply through reduction of bank reserves, reduction of inter-bank discount rates and redemption of government bills and bonds. Increased money supply increases available credit, increases investment, reduces interest rates, increases aggregate demand which in turn increases output, provides more employment, increases wage and price levels, and may lead to inflation. High investment and low cost of capital lead to higher business profitability, and general improvement in stock prices and stock exchange index. From Phillip curve, unemployment is inversely proportional to GDP and wage level. Increase in GDP is marked by a rise in output and a greater demand for labour causing a decline in unemployment. With reduced unemployed labour, pressure is exerted on wages, forcing an upward rise in wages. General rise in wages increases price level, and may result in inflation. There is, therefore, a trade-off between inflation and unemployment. Similar relationship between GDP and unemployment is represented by Okun's Law. Okun's Law "states that for every 2 percent that GNP falls, relative to potential GNP, the unemployment rate rises 1 percentage point". 

Other monetary policy option may be used when the economy is in opposite business cycle, that is, economy is in rapid growth coupled with high inflation. To reduce economic growth and control inflation,

Central Bank may tighten money supply through increase of discount rates, increase of bank reserves, and sale of government bills and bonds. The effect on economy is reflected in increase in
interest rates, tightening of credit conditions, reduction of aggregate demand and resultant reduction in national output increase in unemployment, reduction of wages and price level, and ultimately reduction of inflation level. High interest rates and tight credit conditions discourage investment, and increase cost of production. Business profitability declines, and stock prices move downwards. Stock market index, as a barometer of price level in stock market decreases with the general decrease of aggregate price level and lower business profitability.

GDP and stock market index move in tandem. The performance of the overall economy as measured by GDP directly impacts on the activity and movement of price level in the stock market. Higher rate of GDP represents growth in the economy as a result of a higher aggregate demand. Higher aggregate demand results in higher national output, necessitating higher investment. Demand for stocks for investment increases prices in the stock market, with resultant improvement of stock market index.

Periods of high rate of GDP are boom times, with heightened demand for equity investment instruments, and vice versa. Also they are periods of high money supply, with attendant higher aggregate price level.

This study is based on the occurrence of high aggregate demand in times of high rates of GDP, and low aggregate demand in times of low or negative rate of GDP. Subscription rate of stocks is a proxy measurement device of demand for publicly offered stocks. The study will conduct an econometric testing that subscription rate is positively related to the rate of GDP.

There is no evidence of any other similar study in Kenya, or other part of the world.

2.2.2 MONEY SUPPLY

Money is any instrument that is commonly accepted as a medium of exchange or payment. Money supply refers to quantity of money in the economy. Money reduces transaction cost, and facilitates trade. Money removes need for a buyer to meet a seller.
There are two main groups of money supply. The transaction money, also referred to as narrow money and denoted as M1, that comprises of coins, paper currency and demand or checkable deposits in banks. The second group of money supply is the broad money, denoted as M2, which comprises the sum of M1 and saving deposits, money market funds including treasury bills and commercial papers, mutual funds and other near money or quasi money liquid assets. Coins and paper currency are referred as the fiat money, that is legal tender declared by the government. In the USA, fiat money comprises 25 percent of M1, but about 90 percent of transactions take place in bank checking system, with the remaining 10 percent by fiat money.\(^\text{11}\)

Nominal money supply refers to the actual level of money in circulation. Real money supply refers to nominal money after modification for inflation effect. Real money is the ratio of nominal money to consumer price index.\(^\text{12}\)

Thus, **Real Money = Nominal Money / Price Index**

Money serves an important role in the economy. It is used as a medium of exchange, thus enhancing speed and cost of trade; it is used a common unit of account, thus providing a uniform yardstick of value; it is used as a liquid asset and thus a store of value. Money is relatively riskless, and conforms to a low risk asset that may be held as part of a diversified portfolio asset holding. The cost of holding money includes loss of interest income, and opportunity cost.\(^\text{13}\)

The various different roles played by money create demand for money. Transaction demand is occasioned by need to hold money to meet transactions. Asset demand is created by the need by investors to hold part of wealth in a liquid money form, which is relatively risk free. From portfolio theory, money as a low risk asset may be held together with other higher risk assets.

Money supply in the economy, \(M\), is the sum of all domestic credits, \(D\), and foreign reserve, \(R\).\(^\text{14}\) Foreign reserves include net exports, that is, the difference between exports and imports, and foreign credits and grants.
Money supply function is expressed as:

\[ M = D + R \]

Movements in money supply reflect changes in the two components of the money supply function. Domestic credits may increase or decrease depending on changes in the monetary and fiscal policies adopted by the government.

Foreign reserves may rise or fall depending on terms of trade, exchange rate, external government borrowing, donor funding, and private foreign direct investment (FDI). FDI causes either capital inflow or capital outflow, which is referred to as capital flight.

The use of money supply as a tool for economic management is widely recognized by economists. There exist two main schools of thought on money supply. First, the monetarist economist group founded by the famous American economist, Milton Friedman, believes that money supply is the primary determinant of economic growth. The concept of "velocity of money" helps to explain monetarist view. Velocity of money is the speed of transactions in turning money in supply to total national output. Velocity of money, \( V \), is defined as the ratio of total output, GDP, to the money supply:  

**Thus; \( V = \frac{P \, Q}{M} = \frac{GDP}{M} \), where \( P \) is price level and \( Q \) is total quantity.**

Monetarists hold that \( V \) is stable in short-run, and in extreme case is a constant. From the function of velocity of money, total output, GDP, is proportional to money supply, \( M \).

Second, Keynesian economist group, named after the famous British economist, John Maynard Keynes, holds that money supply and other fiscal variables working in combination determine the economic performance. Both groups agree on role of money supply as the main driver in economic growth, but give differing emphasis on the scope of its contribution.  

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From the monetarists standpoint, growth of money supply determines total output, GDP in the short-run as represented by the function of velocity of money. By re-arranging velocity function:

\[ V = \frac{GDP}{M} = \frac{PQ}{M} \]

Then,

\[ P = \frac{MV}{Q} = M(V/Q) \]

Therefore, \( P = KM \), where \( K = (V/Q) = \text{Constant on long-run} \)

Therefore, monetarists hold money supply to be proportional to aggregate price level in the long-run. This supports the classical economist belief on "quantity theory of prices" that states that aggregate price level move proportionally with money supply.\(^{17}\) The implication of quantity theory of prices is that demand for money rises proportionally with price level, and stable money supply produces stable prices.

Rapid growth of money results in rapid increase in price level, that is inflation. Extreme growth of money produces hyperinflation. Low growth of money produces low change in price level, that is, low inflation. The American economist Milton Friedman is quoted in the New Pelgrave Dictionary of economics, 1987, as having said that "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced by a more rapid increase in the quantity of money than output."\(^9\)

All governments are responsible for their nations economic management to achieving higher standards of life of their people.

The objectives of economic management include rapid growth in national output, low unemployment and control of inflation. Since money supply is a primary determinant of economic growth, governments closely monitor and control the money supply in their economies. Two fundamental policy options are available for economic management. Monetary policy is exercised by
Central bank, under delegation of powers from the Central government. The primary objectives of monetary policy are control of money supply in the economy, credit conditions and interest rates to maintain steady economic growth, low unemployment and low inflation. Central bank uses various instruments of monetary policy. These include: setting statutory bank reserves or cash ratios for deposits held by banks on monthly and daily basis; setting discount rates at which banks borrow money from the Central bank; and conducting open market operations (OMO) to sell and buy treasury bills. The adjustment in bank reserves has a far higher effect on the money supply due to bank's ability to create more money through the money supply multiplier, which is defined as the inverse of reserve ratio.

The second economic option is the fiscal policy. Fiscal policy refers to government's taxation and expenditure policy. Public sector is an important contributor and user of GDP. Government spending on goods and services contributes to GDP. The higher the expenditure the higher its contribution to the GDP. Taxation affects the disposable income. The higher the taxation, the lower the disposable income, and the lower the consumption and investment. Government may operate transfer schemes to assist certain underprivileged population groups, for example the unemployed, the aged, or the sick. Transfer schemes increase income. The fiscal measures above contribute either to an increase or a decrease of money supply in the economy.

Comparatively, monetary policy is more used than fiscal policy in regulating money supply. Fiscal policy takes longer time to legislate, and effects of government spending on the economy take more time to be felt. On the other hand, monetary policy takes longer time to legislate, and effects of government spending on the economy take more time to be felt. On the other hand, monetary policy can be adjusted faster by central bank and have immediate impact on the economy. Most central banks enjoy some relative independence of operation from the government. This independence
further increases unbiased economic assessment and modification of economic variables for the general good of the country.

Money supply has fundamental impacts on performance of the economy. As described above, and from the concept of velocity of money, and quantity theory of prices, money supply is proportional to total output, GDP, and aggregate price levels. The higher the money supply, the higher the output and price level in the economy. Higher money supply lowers interest rates, reduces cost of capital, increases investment, reduces unemployment, increases wages and price levels. Higher money supply increases peoples' income and thus increases aggregate demand, culminating with increased output. Increased output demands more labour, thus reducing unemployment. With low unemployment, pressure is exerted on wages upwards and price level rises.

The economy experiences expansion and boom. The cost of rapid expansion is increase of price level, resulting in inflation. Inflation is unwelcomed companion of rapid economic growth due to increase in money supply. Phillip curve captures the relationship between wage and price level that is inversely proportional to unemployment. Further, Okun law, "states that for every two percent that GDP falls the unemployment rises by one percentage point."

Decrease in money supply, or tight money conditions causes opposite impacts on the economy including increase in interest rates leading to higher cost of capital, tight credit conditions, contraction of economy leading to lower output, lower investment, increase in unemployment, reduced wage and price level leading to lower inflation. Increase in cost of capital and reduction in investment leads to lower profitability of businesses, put pressure on stock markets, activity reduces, and stock prices drop down. Investments tend to shift from capital market to short-term treasury bills due to higher interest rates in the money market.

Depressed price level of stocks and low market activity in the stock market from lower money supply exert negative impact on demand of investment in stock. Investors prefer other
investments with higher returns and liquidity to stocks. Public offerings floated in a depressed economic period are likely to suffer from reduced aggregate demand. Reduced aggregate demand will be exhibited by a lower demand to buy the offered stocks, leading to lower a subscription rate. This study shall conduct empirical testing that subscription rate of public offerings is positively related to money supply in the economy.

There is no evidence of any other similar study in Kenya, or other parts of the world.

2.2.3 INTEREST RATES

Interest is the payment made for use of money. Interest rate is the amount of money paid for unit money per unit time. Nominal interest rate or money interest rate, is the rate of return per unit money per unit time. Real interest rate is nominal interest rate less rate of inflation, or alternatively, real interest rate is the rate of return in goods per unit of goods invested. Inflation is the percentage increase in aggregate price level.

Payment of interest is justified on the basis of providing compensation for deferred consumption, and loss of buying power over the holding period, that is, compensation for inflation. Interest rates derive their functions from the above rationale. Interest rates ration scarce capital resources to the investments with the highest returns, and they induce investors to sacrifice current consumption with expectations of higher consumption in the future. They enhance savings, and increase nation's capital stock.

Interest rates have various attributes. Term or maturity refers to the holding period, risk refers to the level of default to pay interest and the principal; liquidity refers to the asset ease of conversion to cash quickly, and with minimal loss of value; and administrative costs refer to cost of managing and collection of interest. The attributes in an asset determine the level of interest rate, all other factors held constant.
Risk-free interest rate is the interest rate offered on short-term treasury bills, denoted as TB rate. TB rate is relatively riskless. It is backed by the full faith, credit, and taxing powers of the government. Other interest rates have varying degrees of risk, and carry a premium to compensate for risk. TB rate is composed of compensation for deferred consumption and compensation for inflation. Other interest rates comprise of TB rate and a risk premium.

TB rate at a given time is determined by the market forces of supply and demand for money in the economy. The supply of money in the economy is regulated by the Central Bank under delegation of powers from the government. Demand for money is influenced by the monetary and fiscal policies that the government has adopted for economic management. Money supply and TB rate are closely related economic variables with fundamental impacts on economic performance of a country. Movement in money supply has immediate effect on interest rates, and ultimately on total output, and other related economic parameters.

Money supply has been treated in another section of this study. It is important to use some information from the money supply section to show linkage with interest rates, and further develop implications of interest rates on economic performance.

Central Bank is the implementing agency for country's monetary policy. Monetary policy is geared towards meeting the national goals of stable price levels, low unemployment and high economic growth. Towards meeting these ultimate goals, the central bank sets out other intermediate targets, including money supply, bank reserves or cash ratios, and interest rates.

Central Bank uses three primary monetary instruments, namely setting of discount rates at which commercial banks borrow from the Central Bank; setting of bank reserves, that is, minimum cash ratio to be maintained at Central Bank at zero interest; and intervening through open market operations (OMO) by buying and selling government short-term bills. 24
Adjustment of monetary instruments affect money supply and credit conditions in the economy. Increase in discount rate (rate of interest for banks borrowing from Central Bank) increases cost of borrowing from Central Bank, and reduces money in the bank system for lending, ultimately tightening credit facilities and vice-versa. Tight credit exerts pressure on interest rates upwards. Increase of cash ratio, or bank reserves sucks off money in circulation, producing tight money and credit conditions forcing interest rates to rally upwards. Decrease of cash ratios pump in more money into the economy, leading to favourable credit conditions and reduction of interest rates. Direct intervention through open market operations causes increase and decrease of money supply in the economy when treasury bills are sold and bought from the market respectively. Ultimately interest rates are determined by interplay of money supply and demand in the economy. The higher the money supply, the lower the interest rates, and vice versa. Alternatively government may adopt long-term fiscal policies entailing changes in taxation and expenditure to produce similar economic results.

Since interest rate represents cost of capital, the higher the interest rate, the higher the cost of production. Higher cost of production translate into higher market prices that ultimately leads to lower aggregate demand, and lower total output. Lower output has adverse ramifications on demand for labour. Unemployment increases with lower output. High interest rates reduces people's wealth, and business returns and profits. Aggregate price level falls down. General investment level is reduced. Firms defer capital investment, and nation's capital stock slumps down.25 The economy may enter into recession, unless changes are put to halt and turn around the economy.

Increasing money supply would generate opposite economic environment: credit facilities would increase, and interest rates would fall; cost of capital would fall, and investment would rise; disposable income would increase and aggregate demand would rise leading to higher output, higher labour demand and lower unemployment in accordance with Phillip's curve; and due to increased
pressure from aggregate demand and reduced available labour, the aggregate price level and wages would rise. The economy will experience rapid growth, but inflation may also arise, in accordance with Okun’s law. Inflation is the dilemma of rapid economic growth, or expansionary policy.

Low interest rates regime is associated with high money supply and culminates with rapid economic growth or boom, coupled with high inflation. Conversely, high interest rates regime is associated with relatively lower money supply, that is, tight money supply that leads to a slump, or recession. Both extreme conditions are unfavourable. The government is responsible to develop and implement suitable monetary and fiscal policies that strike the best balance to ensure economic growth that offers highest employment opportunities at an acceptable level of price inflation.

Stock market is a segment of the national economy. Factors affecting the aggregate market have similar effects on the stock market. High interest rates increase cost of products and reduces people's value of assets, that is, peoples wealth. Businesses suffer higher cost of production, which in turn translates into lower profits, and lower asset returns. Investment decreases and investors shift investments from capital market to money market which has higher returns, and lesser risk. Stock market suffers double curse, and experience low activity and a reduction in general price level. Stock market index dips to reflect the fall in the general price level. The converse is true with lower interest rates.

In cognisance of the effect of interest rates on the overall economy, and stock market in particular, this study finds its foundation. Subscription rate is a proxy measure for demand in public offerings. The lower the interest rate the higher the aggregate demand, and the higher the demand to invest in stocks. Consequently, this study will econometrically test that subscription rate is inversely proportional to treasury bill interest rates. Further, the higher the interest rates \( r \), the greater will be the discount rates, which implies lower asset values.
There is no evidence of any other similar study in Kenya, or elsewhere in the world.

2.3 STOCK MARKET CONDITIONS

2.3.1 NAIROBI STOCK EXCHANGE INDEX

Stock market, or exchange is an organized market where common stocks are traded. Stock market index, or stock exchange index is a weighted average of prices of selected stocks in the basket. Nairobi Stock Exchange (NSE) is the only stock market in Kenya where common stocks of listed, or publicly floated, companies are traded. Nairobi Stock Exchange Index, NSE 20 Index, is the weighted average of prices of 20 largest and most heavily traded companies listed at NSE.

NSE index was started in 1966 which is taken as the base year, and was set at 100. NSE index uses a geometric mean methodology with no weights as compared to other indices that use arithmetic means that are based on Laspyres index format. Companies included in NSE 20 index were chosen on the basis of high capitalization, high turnover, high size of market share and market trading volume. The 20 companies in NSE Index contributed about 75% of market trade turnover, 66% of market stock volume, and 75% of total capitalization. The companies are distributed across all economic sectors, with 4 in agriculture, 4 in commercial, 4 in finance and investment and 7 in industrial and allied sector. Therefore, NSE index contains a fair representative sample, and is relatively a fair parameter of market performance at NSE. Market activities at NSE is dominated by the top 10 highly capitalized firms. The market has had other indices: Standard Chartered 25 Index, and AMMI 27.

The history of NSE is relatively short. NSE was started in 1954. In 1997, it comprised of 54 listed companies with a total market capitalization of Kenya shillings - 120 billion (US dollars 2 billions) and an annual turnover of Kshs. 6.1 billions (US dollars 102 million). In comparison, New York Stock Exchange, the world's largest stock market had in 1990 a market capitalization of US dollars 3 trillion. Comparatively, NSE is a young emerging market with low turnover,
capitalization, high transaction costs and low trading activity. NSE suffers from many problems ranging from low level of development and technology adoption, low market listing, managerial impediments and regulatory constraints. Various positive changes have been made, or are in advanced stages of implementation. In 1990, the government established a regulatory body, Capital Markets Authority, CMA, under CMA Act, Cap 485A of 1989. CMA was charged with development of a vibrant capital market in Kenya through facilitation, research and development, formulation of regulations and licensing of all stakeholders in the capital market in Kenya. CMA has produced rules and changes in legislation to achieve a more favorable investment environment in capital market. The government restructured NSE in 1991, culminating into incorporation as a limited public company. Other development included the establishment of a trading floor, and change of mode of trading from the old "call over" to "open-cry" system. Further changes at NSE are expected with establishment of Central Depository System, electronic trading system, establishment of second board. Over the counter (OTC) for non-listed firms, and development of other board to deal in new security instruments - Unit trusts, corporate bonds, commercial papers, mortgage backed bonds and mutual funds. Suggestions have been made to government to give tax incentives to encourage listing.

Further effort by CMA and NSE is being made to simplify listing rules, harmonize listing rules across borders, particularly in East African region, and to allow cross border listing in East Africa, and later with other areas. Creation of a credit rating firm is a top priority in this effort, as well as licensing of dealers to act as market makers to increase market activity and thus generate market liquidity.\(^{30}\) NSE, through the Association of Kenya Stock Brokers is promoting introduction of a code of ethics for self-regulation of the market in preference to high regulation by CMA.

NSE index has shown mixed trend. From the base year, 1966, with an index of 100, there was systematic growth until February 1994 when it peaked at 5030. From March 1994 NSE index
has been on decline, with a low of 2610 in December 1998.\textsuperscript{31} The period from 1966 to February 1994 marked an upward price rise stock market, or a bull market. The decline of prices in the from March 1994 marked the start of a bear market phase.

Two studies have been carried out on NSE. The efficiency of a stock market refers to the speed of absorbing information and incorporating it into stock prices. Dickinson and Muragu find that NSE was consistent with weak-form market efficiency, but their data was not conclusive.\textsuperscript{32} Parkinson has used movements of stock market index as measurement of stock price volatility, and hence a proxy measure of market systematic risk, beta. Parkinson has derived betas for various sectors of NSE from 1974 to 1978.\textsuperscript{38}

Policies on individual stocks show high volatility, which is explained by Efficient Market Theory, EMH. EMH holds that information in the market is quickly absorbed and incorporated into stock prices. Since in-coming information cannot be predicted, and is erratic, then stock prices move erratically, or move in a random walk. Stock market index represents the aggregate price movement of the whole market, which is determined by the business cycles. Business cycles are major fluctuations in the economic performance involving total national output, incomes and employment level. The two business cycles are comprised of a boom cycle, or an expansion cycle, and a recession cycle, or a contraction cycle. Boom cycle represents a period of high growth in national output, high incomes and high employment. Recession cycle represents a period is declining national output, low incomes and low employment level. Boom period is associated with high growth of stock market prices and indices, and recession period is associated with declining stock market prices and indices.\textsuperscript{34}

Stock market prices and indices stimulates movements in national economic performance. It's explained in other sections of this report, economic management is conducted through government's monetary and fiscal policies. Monetary policies refer to adjustments of financial
instruments including discount rates, bank reserve and open market operation by Central Bank to set desired level of money supply, credit conditions and interest rates to support the pace of the planned economic development. Similarly, fiscal policies may be used through adjustment of taxation level and government expenditures to achieve the desired money supply in the economy.

The level of money in the economy is the central drive of economic performance. The higher the money supply, the lower the interest rates and the better the credit conditions. Conversely, the lower the money supply the higher the interest rates and the tighter the credit conditions. In turn higher interests and tighter credit conditions increase cost of capital, cost of production, and translates into lower national output, higher price level and higher unemployment, and vice-versa. Businesses are affected by higher production cost, lower output, and effects translate into lower profits. Investment level declines with lower income and high interest rates. Ultimately demand for stocks declines along side reduced investment and reduced aggregate demand. Therefore, stock market prices and indices decline with reduced demand.

Subscription rate is a proxy measure of demand of stocks. Since demand for stocks is proportional to the stock market index, it then follows that subscription rate is proportional to the stock market index. This study shall econometrically test the relationship that subscription rate of public offerings is positively related to the stock market index.

There is no evidence of similar study in Kenya.

2.3.2 SIZE OF OFFERING

Size of offering is the product of the number of shares offered for sale and the unit subscription price. Alternatively, size may be taken as the total number of shares on offer for sale. This study adopts the former definition of size in terms of capitalisation or total sale proceeds since it captures a better picture of the impact of the public offering in the stock market.
A large block of public issue enjoys economies of scale. It reduces unit cost of floatation, and translates to lower unit subscription price.

Larger investment blocks are more attractive to bigger investors. Corporate investors and fund managers prefer to buy stocks in large tranches than in small size. Consequently, larger public offering increases demand by institutional investors.

Studies have been done in other countries on size effect of public offerings. The size of block presents marketability problems. Larger blocks are more difficult to market than smaller blocks. Larger blocks carry larger price discount to enhance marketability. Conversely, large blocks affect controlling interest by dilution of existing control and transferring control to new investors, almost immediately. A swing vote may enhance the value of a larger block than a smaller block. In addition, large block causes dilution of earnings per share, in the short term, and may dampen future growth in earnings per share. There is possibility of adverse effect on shareholders wealth on account of reduced earnings per share. Currently, there’s no empirical evidence to support adverse impact on shareholder’s wealth. Some companies mitigate effects of dilution of control and earnings per share through right issue to existing investors prior to public issue.

This study recognizes that there is higher demand by institutional investors and there is higher price discount for larger public offerings, than for smaller block of offerings. Accordingly, subscription rate as a proxy demand measure for stocks is likely to be higher for a larger offering than a smaller offering. This study sets out to test that subscription rate is positively related to the size of offering.

2.3.3 OFFER PERIOD

The offer period is the length of time from the opening to the closure of sale of a public offering. Other attributes of offer period may translate into other definitions. The offer period may adopt seasonality conditions, that is, changes in the market place at different months of the year, weeks, or
days of the week. This study is focused on the length of time between commencement to completion of public issue. However, studies on effects of seasonality are cited for a more holistic approach.

In Kenya, there are several parties involved in a public offering. The issuer or the firm offering stocks for sale is the principal party. The issuer works in association with auditors and financial advisors. An underwriter, generally a large commercial bank is contracted to guarantee the success of the issue. The underwriter undertakes to purchase any outstanding stock at pre-determined price at the end of sale. Approvals of the regulating body, Capital Markets Authority, CMA, and Nairobi Stock Exchange are obtained in advance. One or more firms of reputable brokers are hired as sponsoring brokers. Arrangements are made with all brokers to sell the offering to interested investors. Generally, arrangements are also made with the main commercial banks to extend loans to qualified investors to buy the stock. All public offerings are associated with much publicity, advertisement and promotion in the both print and electronic media. The marketing effort commences well in advance, and is maintained throughout the offer period.

On the account of the large parties involved, the need to allow the marketing effort to reach and influence potential investors, and the need to allow adequate time for investors to complete financial arrangements with their bankers, it is important to allow sufficient offer period to ensure success of a public issue. There is evidence to support the observation from the high level of activity that marks the close of a public offering. For reputable firms making public offerings, there is a moderate rush at the opening date, followed by a relatively moderate activity middle phase, and the last phase of major rush at the closing time. This study recognizes this phenomenon, and argues that if there no adequate time is allowed in the period for sale, and particularly at the end phase, then an important segment of potential investors may fail to purchase the stock. A large proportion of the stock on sale may remain unsold, thus culminating to a partial failure of the offering. Conversely, if adequate time is allowed all interested investors would succeed to subscribe. Demand may exceed the
available stock, resulting in over-subscription. It is therefore, the objective of this study to test that higher offer period is associated with higher subscription rate.

Several studies have been carried out on seasonality. Stock returns have been found to be higher on certain days of the week, certain months of the year, and before major social events, for example holidays. Keim found that higher returns for small firms occur in January. French documented the existence day of week effect. He found that stock prices are depressed on Friday, when markets close, and on Monday when markets open.

Fields found that prices of stocks rose immediately before weekend, and fell on Monday for the period 1915-1930. Cross found that Standard & Poors, S & P 500, Composite Index rose to 62% on Friday and fell to 39.5% on Monday for the period 1953 - 1970, with mean return of 12% on Friday, and negative 0.18% on Monday. French found that between 1953-1977, S & P 500 return on Monday was negative 0.17%, and was positive on other days of the week with Wednesday and Friday showing the highest returns. Rogalski using Dow Jones Industrial Average between 1974-1984 found that there was a significant negative return from Friday close to Monday’s opening and no significant change between Monday’s opening and Friday’s closing, thus supporting the weekend effect.

Most offer periods extend over several weeks. The day of the week effect, and the weekend effect may, therefore not influence demand and hence subscription rate. However, the month effect may have some impact. The empirical evidence available for month effect is sparse, and was restricted to returns on small firms. Further studies in the area are required.

2.3.4 SPACING OF OFFERING

The spacing of offering represents the number of days between the closing date of one public offering and the opening date of the next succeeding public offering.
From economic theory and based on findings from empirical testing, demand varies inversely with price with all other conditions held constant. This is referred as the law of downward-sloping demand curve. Similarly, the law of diminishing returns holds that supply curve slopes upwards and to the right, that is suppliers are willing to supply more goods at a higher price. Market equilibrium in a competitive market occurs when price and quantity are at equilibrium point where amount willingly supplied is equal to the amount willingly demanded. During the offer period of a public offering, the quantity of stock demanded by investors is proportional to the subscription price. The supply represents the number of stocks available. The supply may match the demanded quantity at the subscription, resulting to full subscription of the offering. Higher supply relative to demand results to excess supply, leading to undersubscription, whereas lower supply leads to shortage, that culminates with oversubscription of the offering.

Floatation of a second public offering represents an increase of supply of equity in the stock market. Since the quantity demanded at a given price is constant for a given period, increase in supply of shares would result in excess supply, that is, undersubscription. To guarantee success of public offering, there is need to widen time spacing between two successive offerings to allow growth of demand in the market, that is, shift of demand curve to the right side.

Demand is influenced by other factors beside price. Firstly, increase in average level of income increases aggregate demand. Secondly, increase in population increases the size of the market. The bigger the market, the higher the aggregate demand. Other factors include changes in customers' tastes and preferences, existence of related products, and special influences, including anticipated economic changes. To allow time for these factors to make a significant change on demand in the market, it is prudent to spread out the spacing.

This study recognises the need to allow sufficient time for market demand to develop, and shall attempt to test that subscription rate is positively related to the spacing between two successive
public offerings. There is no evidence of any other similar study in Kenya, or any other place in the world.

2.4 ASSET ATTRIBUTES

2.4.1 TYPE OF OFFERING

This research is restricted to primary market of public offerings. Public offering is an offer for sale to the public of shares of listed firms. Listed firms are those companies which have satisfied conditions of public listing established by Kenya's Capital Markets Authority, CMA Act, CAP 485A, Laws of Kenya. The study excludes right issue, bonus issue and private placement of stocks. Right issue provides existing shareholders with exclusive right to purchase new shares or shares sold by a withdrawing investor. Bonus share issue is an offer by the firm to the existing shareholders to receive additional shares from the retained earnings in proportion to their existing share holdings.

The study focuses on the two main types of public offerings: Initial Public Offering (IPO), and Seasoned Public Offering (SPO). IPO is the first public offer of sale of stocks after the listing of a firm. Seasoned Public Offering is any other public offer of sale of stocks of a company after IPO.

Floatation of IPO and SPO is governed by conditions established by CMA Act, and as modified from time to time. Current regulation requires that IPO shall make available to the public at least 20% of issued shares. In addition, IPO and SPO have stringent financial disclosure requirements before approval by CMA.

There are two different methods of price determination for IPO and SPO. Firstly, the price may be determined by the issuer, in association with the underwriter and financial consultant. In Kenya, this method of fixed price is generally used. The other method involves a 2-stage tender system. In the first stage, one tranche of shares is sold at a fixed price determined by the issuer, underwriter and financial consultant. In the second stage, the other tranche is sold by the tender
The fixed price established by the tender process is called strike price. The latter method is widely used in Singapore.\textsuperscript{47}

Extensive studies have been carried out on IPO and SPO. Various signaling devices to show quality of IPO have been used. The choice of recognized underwriters, auditors and advisors, has been widely used.\textsuperscript{48,56} In Kenya, firms have used the top commercial banks as underwriters. The reputation of the underwriters, auditors and advisors is taken by the potential investor as a good rating of the issuer, and the investment product on offer. Proportion of retained owner's equity is also used to signal quality.\textsuperscript{49,50} The higher the proportion, the higher the quality of IPO. The proposed application of proceeds from IPO affects future expectation on firm's returns.\textsuperscript{51,52} Finally, there is extensive evidence of underpricing of IPO to signal quality.\textsuperscript{53,54,55}

Allen et al. constructed models which showed that good firms underpriced new issues (IPO) and subsequently used seasoned offerings to sell at market prices, after establishing good quality of the firm in the secondary market.

In Singapore, IPO floated in 1994 with fixed pricing method were found to be on average 29.3\% underpriced, and attracted high subscription rates.\textsuperscript{47} Underpricing was found to be greater with fixed price method than with tender system of floatation of IPO. Tender system was more preferred by good firms than weaker firms.

Tender system affords opportunity to good firms to reveal favourable information, and thus obtain a higher strike price with attendant higher proceeds from the sale. However, weaker firms are at a disadvantage with tender system due to their inherent unfavourable information that may result in lower strike price and lower total proceeds from the sale. Under-subscription may occur with weaker firms, and may adversely affect future stock performance of the firms. Consequently, tender system is generally preferred by older, larger and better performing firms. This confirms with the notion that better quality firms underprice their IPO to signal quality.
Seasoned Public offering occurs after IPO, and after trading in the secondary market. Trading in secondary market is market driven, and share prices fluctuate dependent on the market evaluation of available relevant information from the firm. At a given time, there is a temporary equilibrium between the stock price and market assessed net present value of future streams of returns.

Unlike IPO, which are new products and have no established market driven price, SPO occurs after similar stocks have traded in the secondary market. The pricing of SPO is therefore, more market driven, and less uncertain than for IPO. It is therefore, generally the practice for good firms to underprice IPO more than SPO.\(^53\) The objective is to ensure successful floatation of IPO through quality signaling, and thereafter recoup loss through future floatations of SPO with a more favourable investor confidence created by good performance of the stock in the secondary market.

It is therefore, recognized by this study that there is a marked difference in appeal to investors for IPO from that of SPO due to the inherent difference in their underpricing. IPO are more underpriced than SPO. Accordingly, the demand for IPO is likely to be higher than for SPO. This study sets to test that subscription rate is higher for IPO than SPO, based on evidence of higher underpricing of IPO than SPO.

2.4.2 USE OF FUNDS

Use of funds represents the application of proceeds from the public offering. Proceeds from a public offering in the primary market may be applied into two distinct areas: Firstly, funds may be applied in financing of firm’s assets or retiring of debts. Secondly, funds may be paid to some of investors withdrawing from the firm. Privatisation or sale of government ownership right to private investors is a good example of the second option of application of proceeds from an offering. The proceeds are taken by the government. The firm does not directly benefit from the sale. It is a transfer of ownership.\(^57\)
In majority of public offerings, the primary objective is to raise money at a relatively lower cost. This is referred as equity financing. Investors acquire an ownership interest with right to vote and share in profits and hold residual claim. Firms raise capital for investment in expanding assets, acquisition of new technology, diversification into new products and markets. Alternatively, firms may use part or full proceeds on retiring old debts. Besides equity financing, there are other sources of capital: borrowing from banks, borrowing through debt instruments, including corporate bonds, commercial paper, leasing, credit and debt discount, among others. These are referred as debt financing. Equity financing has superior advantages over debt financing. In equity financing there is no obligation to pay dividend and there is maturity period. From the perspective of the firm, equity financing is less risky than debt financing. The converse is true in the perspective of the investor, that is, investment in equity is riskier than in debt instruments.

Application of sale proceeds towards increasing firm’s economic assets increases prospects of higher returns in the future. Higher returns arise from utilization of better technology, more innovative products, higher output, higher productivity and efficiency, higher market share, better trained manpower, superior management, among others. Higher returns translate into higher dividends and or greater capital gain in firm’s valuation by investors. On the other hand, change of ownership transfers sale proceeds from new owners to the original owners. There is no direct change in firm’s assets, and hence firm’s future performance may remain unchanged. Consequently, investors may make less favourable valuation of firm’s assets and returns where funds are used to pay original owners than where funds are to be used to expand firm’s investments.

In recognition of importance of disclosure on how proceeds from public offerings are used, most sale prospectus documents contain information on how funds shall be used.
This study sets to test that subscription rate is higher for public offerings where funds shall be used for financing than where funds shall be used as an exchange for ownership, that is, privatization for government owned enterprises.

2.4.3 OFFER PRICE

Offer price represents the subscription price which is the price per share in the public offering. This study focuses on the primary market. Primary market is the market for trading new stocks. In contrast, secondary market is the market for selling and buying existing stocks in the market. Price is the amount charged for a product or a service.

In marketing, price is a fundamental element in consumer buying behaviour. Price is the most important, and the most flexible of the four elements of marketing mix: price, product, place and promotion. It affects buyer’s choice, the higher the price, the lower the demand. Firms adopt different pricing strategies to achieve various objectives. Low pricing is used for survival; high pricing is used for profit maximization; and other pricing strategies are used for increasing market share, product quality leadership and to build effective barriers of entry.\(^{58}\)

From empirical marketing studies, it has been found that certain factors contribute to consumers reduced sensitivity to price: high quality products that are unique, exclusive and prestigious; products without equivalent substitutes; and where total expenditure is low compared to average consumer’s income.\(^{59}\)

From economics, prices coordinate the decision of producers and consumers in a market. Price is the balance wheel in the market mechanism. Higher prices discourage consumption, but encourage production. Conversely lower prices encourage consumption, but discourage production.\(^{60}\) In equity market, price movement in the stock market are represented by movement in the stock market index. The higher the index, the higher the prices of stocks in the market.
In a perfectly competitive market, prices are determined by the forces of supply and demand. Demand varies inversely with price due to downward sloping curve. Due to the law of diminishing returns, supply curve is upward-sloping to the right. At the market equilibrium, the quantity demanded equals the quantity supplied at the equilibrium price. There are no shortages or surplus at the equilibrium condition.\textsuperscript{51}

Besides price, demand is influenced by other factors. Firstly, increase in average level of income increases resources for consumption and investment, thus increasing demand. Secondly, the size of population determines the size of the market, and consequently raises demand. Thirdly, increase in prices of substitute products exerts pressure for consumers to shift to the product, thus increasing demand in the product. Fourthly, other special influences, for example, an expectation of future change in taxation, has a positive or negative impact on demand.\textsuperscript{62,63} On the other hand, supply is affected by the following factors: cost of production, including prices of inputs and technology; price of related goods; market conditions, including level of competition, level of government imposed tariffs and quota; special influences, including anticipated changes in government regulations, and any expected future changes in prices.\textsuperscript{62} Factors that have impacts on demand and supply, ultimately exert either a positive or a negative influence on the market price.

Price determination of stocks is based on assessed valuation of the firm’s expected future returns.

Value is an ambiguous term and assumes various definitions. Intrinsic value is the amount that represents the market consensus, taking into consideration all information in the market. Fair market value is the acceptable value that buyers and sellers are willing to trade at. Market value is the value derived in a competitive and open market. Investment value is a specific value derived for a particular investor, for example insurance value and collateral value, are both derived taking into consideration specific attributes of the investor.\textsuperscript{64} In equity market, the intrinsic value applies.
the market. Determination of price of IPO is more difficult than for SPO. In Kenya, it is the issuer in association with financial advisor, and the underwriter who establish price of stock. The practice adopted in Kenya is the fixed price method, where all shares are sold at one fixed price to all investors. In comparison, Singapore uses two methods: fixed price and tender system.\(^69\) The first tranche of shares is issued through a tender system, where shares are sold at a fixed price to investors above a minimum price. This minimum price is called the strike price. In the second tranche shares are sold at the fixed strike price established from the tender system.

Brigham and Gapenski reported that there is a "--- widespread belief in the financial circles that an optimal price range exists in stock."\(^70\) In New York Stock Exchange the “Optimal price” exists between US dollars 20 to 80 per share. Where market price rises above the range, the firms opt to declare stock split, thus increasing the number of outstanding shares and therefore bringing down the stock price within the optimal price range. The stock split is a price adjustment mechanism. Shareholders wealth remains unchanged. However stock split has other important effects. It makes shares affordable to a greater number of investors, thus increasing market liquidity and trading activity. It reduces earnings and dividend per share. In early stage after stock split, price is reduced, but with increased demand pressure is exerted on the price, and price increases in the long run, thus increasing shareholders wealth.\(^71\)

Stock dividend is similar to stock split. They are based on dividend policy of the firm, and are used to lower the stock price in the market.\(^72\) For successful performance after stock split and stock dividend, dividend is generally increased to back up the split, and to support future price rise. Stock dividends are used for small price adjustment, and stock splits are used for major adjustment. Effects of stock splits and stock dividends are supported by findings of empirical studies by Grinblatt, Masulis and Titman. They showed significant and positive price change at the time of announcement of stock split and dividend, thus confirming stock undervaluation before announcement, and price
increase after the announcement. Price increase after the split is accounted for by favourable signaling effect on firm’s better future performance.

For an issuer, it is important to recognize the impacts of a stock dividend or stock split before putting new stock for sale. Since the existing shareholders wealth is not affected, and recognising that the lower the price, the higher the demand becomes, then there is opportunity to guarantee success of a public offering by issuing a stock dividend to existing shareholders, and then offering for sale new stock at reduced price. Besides, it has been established that there is a trading optimal price range in stock market that enables affordability of stocks by a larger number of investors. There is evidence in Kenya that some major public offerings are preceded by bonus share issue. It is instructive that prices at NSE, on average, range between shillings 27-51. Stocks with inordinate high prices show no activity in the market.

This study recognizes the importance of price per share as mechanism to influence demand. The higher the price, the lower the affordability, and the lower the demand. Consequently, lower price increases demand, and attracts higher subscription. The study is geared towards testing this phenomenon, that subscription rate is positively related to the offer price.

There is no evidence of earlier study on relationship of price and subscription rate. However, Moko’s study on price and subscription rate was focused on price discount and subscription rate, and will be highlighted in price discount section in this study.

2.4.4 PRICE DISCOUNT

Price discount or underpricing refers to the difference between the stock market price and the stock subscription offer price, expressed as a percentage of the subscription offer price. Market price is taken to be the price of stock in the market shortly after the commencement of trading. The length of period is generally taken as the close of first day of public trading, but may be extended to several weeks. Price discount, that is, underpricing is represented by initial returns on stocks.
Ibbotson and Ritter are reported by Jarrow, et al. to have made findings that "undepricing phenomenon exists in every nation within a stock market, although the amount of underpricing varies from country to country." Variation of underpricing between countries is partly accounted for by restriction on subscription price imposed by some government regulatory bodies. From the same source, the following short-run underpricing of IPO was reported: USA, (1960-92) - 15.3%; UK (1959-90)-12.0%; Germany (1978-92) - 11.1%; France (1983-92) - 4.2%; Canada (1971-92) - 5.4%; Hong Kong (1980-90) - 17.6%; Japan (1970-91) - 32.5%.

Large empirical literature exists that shows evidence of underpricing of IPO and SPO in many countries. IPO are on average, more underpriced that SPO. This can be explained by the fact that SPO have an established secondary market with developed market price. On the other hand, IPO are new to the market, and suffer higher risk of price certainty than SPO. Potential investors, therefore demand higher compensation for lack of information for new issues, IPO, than for SPO. Ibbotson finds distribution of initial returns in USA for 120 IPO highly skewed with positive mean, and a median near zero. Further he finds that after one to 2 month seasoning the hypothesis of market efficiency is consistent with the returns. Welch, Grinblatt and Hwang, Allen and Fanhaber, and Allaindeen and Lam present similar evidence of underpricing of public offerings.

Substantial work has been done to develop theories to explain the phenomenon of underpricing. These theories focus on the relationship between investors, issuers and investment bankers or underwriters. The theories are not mutually exclusive and neither does one of them provide definitive explanation, but collectively they provide a body of knowledge that helps to explain most of the patterns that are observed. Firstly, underpricing has been explained by the "Winners curse hypothesis" by Rock. Rock groups investors into two categories: perfectly informed, and completely uninformed investors. Uninformed group of investors suffers information disadvantage, and buy shares both when they are underpriced and when they are overpriced. By contrast perfectly
informed group buys shares only when they are underpriced where they compete with uninformed group and may result in rationing due to excess demand. Perfectly informed group does not buy shares when they are overpriced, thus overpriced shares are allocated to full demand of uninformed investors. Uninformed investors, therefore face a "winners curse". Due to information asymmetry between investors, uninformed investors will only submit purchase order when IPO is underpriced to compensate them for the selection problem.

Secondly, underpricing is used to induce regular investors to review their valuation of firm’s stock by attracting them through reduced price in the pre-sell phase of firm commitment floatation method. Hanley provides the “costly information acquisition hypothesis.”

Thirdly, Welch has developed the “Cascade hypothesis.” Irrespective of whether one investor has favourable information on firm’s offering, the investor refrains from buying the stock until other investors show interest to buy. To induce the first group of investors to make purchase, firms initially underprice to create a “cascade”, and then adjust price upwards when demand is developed.

Fourthly, underwriters are better informed of firm’s valuation than the issuers. There is information asymmetry between issuers and underwriters, except for the more sophisticated and informed issuers. Underwriters take advantage of their superior knowledge to underprice new issues, which permit them to expend less marketing effort and reduce their risk for guaranteeing the public offering. Baron and Holstrom have developed “Monospony hypothesis.”

Fifth, the threat of litigation for material omission, and wrongful disclosure by the affected investors has put pressure on underwriters to underprice offerings to avoid frequency and severity of law suits. Tinic has developed the “litigation model hypothesis”.

Sixth, the “signaling hypothesis” by Allen and Faulhaber, Welch, and Grinblatt and Hwang have been developed. They are called quality signaling models. There is information asymmetry between internal investors and management on one hand, and the external potential investors on the
other hand. High value firms, generally choose to underprice their offerings to distinguish themselves from low value firms, and to signal their favourable valuation and future prospects. They plan to re-coup loss through future public seasoned offerings, with improved market prices.

Seventh, some government regulatory bodies impose restrictions on setting of offer price based on multiples of earning ratios. For example in Japan before 1989 they used price to earnings, market to book value, or dividend yield of three comparable firms. When firms with low multiples are chosen, underpricing may result. Further underpricing may also occur for firms with future high growth potential.

Eighth, issuers, particularly government privatisation schemes, have other objectives for the sale, besides maximising sale proceeds. Re-distribution of wealth may dictate underpricing and widespread sale to the general public to win favour with voters and increase ownership dispersion. The strategy was used in privatisation of British Airways and British Steel by Prime Minister, Margaret Thatcher’s government to give the electorate “a taste of capitalism.” Similarly, underpricing was used in the case of Recruit Cosmos IPO in Japan, where underpriced shares were sold to high ranking politicians, that resulted in the resignation of Prime Minister Takeshita in April 1989. This led to reforms of regulatory framework introduced in 1989 in Japan.

Ninth, new issues have over-allotment option up to 115%.

Underwriters are allowed to sell upto 115%, and after the sale participate in the secondary market to buy from investors willing to sell, upto 15%, and hence stabilize prices in the aftermarket. Findings show higher initial returns in these issues, indicating underpricing. Rund developed stabilization hypothesis.88

Tenth, issuers may achieve a dispersed ownership through underpricing to generate excess demand, and allocate shares through rationing to a large number of small investors. This increases market liquidity, and may ultimately increase shareholder’s wealth through price improvement in the
market. It also offers protection, to management, as it reduces possibility of challenge to their actions. However, creation of an entrenched management may be adverse to long-term interests of shareholders. Booth and Chua developed “ownership dispersion hypothesis.”

Eleventh, IPO may be construed as a discrete market segment, different from the broader capital market. As a separate market it carries diversifiable risk, and investors in this market would demand compensation for incomplete market. IPO market is, therefore, incomplete, and underpricing is required to cover for diversifiable risk. Mauer and Senbet model was developed to explain “market incompleteness hypothesis.”

Underpricing is one of the three anomalies associated with IPO. Other anomalies are that IPO show long-term underperformance as compared to other stocks in the market; and returns on IPO show cyclic movements of high returns referred as "hot issue market" and lows. Various theories have been advanced to explain these patterns, but fall outside the scope of this study.

The implication of underpricing on IPO, and to lesser extent on SPO, creates excess demand.

This study recognizes this finding, and set out to test that the level of underpricing, that is, whether the level of price discount has positive relationship with increased demand, and hence higher subscription rate. Moko carried a similar study in Kenya, and found a weak positive relationship, but results were not conclusive.

2.4.5 PRICE EARNING RATIO

Price to earnings is the ratio of subscription price to earnings per share at the time of sale. It is denoted as P/E. It is one of the financial ratios used for analyzing firm’s financial condition and performance. It is a profitability ratio. P/E index is equivalent to the reciprocal of the rate of return on common equity with market value of stock used instead of networth. It relates earnings to cost of investment, and captures efficiency of firm’s operations. To internal stakeholders, for example, management, it is a proxy for measuring internal performance and tool for internal control. To
external stakeholders, for example investors, it is an important yardstick to gauge firm’s profitability and returns. Since it is a generic index, it allows relative comparison between one firm to others in the industry for the present, past and future periods. However, it is important to distinguish the market price per stock from the subscription price. As noted elsewhere in this study, the setting of subscription price may be lower than the market price due to underpricing and other factors described in this study.

There is no consensus by investors in the use of P/E ratio for making investment decisions. Some investors are of the opinion that cash flow, that is, the sum of net profit and depreciation, is a better proxy for gauging returns than considering net profits. P/E suffers from subjectivity in the accounting standard used to assess and allow for depreciation and bad debt provisions. P/E index is historical, and applies to the past and present times. Future earnings cannot be forecast on the basis of the past earnings. Dixon reports on findings by Maurice Kendal on volatility of stock prices. Stock prices change at random, that is, take a random walk. The implication is that future prices cannot be predicted from the past prices. Other empirical studies have confirmed the findings. Fama presented similar findings. Since the present value of stock is dependent on the relevant information in the market, and since future cannot be predicted, consequently stock price movement reflect the ever changing state of incoming information in the market.

Inspite of the fundamental weaknesses in P/E ratio, it is widely used by investors as indicator of past performance, and as a guide for assessment of offer price. Some government regulators, for example Japan, impose that setting of offer price be based on certain multiples of P/E ratios. Since P/E index represents inverse rate of return, the lower the P/E index, the higher the return on the stock. Investors are attracted to stocks with higher returns. Therefore, demand is negatively related to the P/E index. On this basis, this study intends to test that whether higher demand as reflected by
a higher subscription rate is associated with lower P/E ratio. Alternatively, subscription rate has a negative relationship with P/E ratio or is inversely proportional to P/E index.

Omosa carried out a study on “Predictive ability of selected asset pricing models”, and found that future prices at NSE cannot be predicted by capital pricing models. Asienwa study on relationship between price and financial ratios found that financial ratios were significant independent variables for determining offer price at NSE. There is no evidence in Kenya of any study relating subscription rate to financial ratios, particularly P/E ratio.

2.4.6 DIVIDEND YIELD

Dividend yield is the ratio of dividend (D) to the subscription price (P) at the time when offer for sale is made. Dividend is the amount of money per share declared by the firm’s board of directors for distribution to common stockholders. Dividend is the difference between total earnings and retained earnings, dividend by the number of outstanding shares. The power to set the level of dividend is vested with the directors of the company. The role of investors is restricted to voting on accepting the recommendations of directors in the Annual General Meeting of the Company, but investors have powers to remove directors.

Dividend represents part of earnings accrued by the shareholders. The other parts of earnings are represented by retained earnings, and capital gain in stock value. Consequently, it may be argued that dividend does not capture the true earnings of stocks. The discretionary power of directors to vary dividend per share from time to time introduces uncertainty in prediction of future dividends. Firms follow different dividend policy to achieve certain objectives. Similarly, investors have different appeal to dividends from various strategies of dividend policy.

Like other financial ratios, dividend yield (D/P), is historical. It is based on past financial information. For efficient market, new information is reflected in the stock prices. Since future
cannot be predicted from the past, future stock prices are dependent on in-coming information, and take a random walk. Dividend yield as an historical index suffers fundamentally as a predictor of future earnings.

Different investors have varying levels of income requirements and tax exposures. Consequently, the firm's dividend policy must satisfy various segments of investors on the mix of dividend and capital gain. Some investors may be attracted by higher dividend-earnings ratios than capital gain. The converse may be true for another segment of investors.

Among the other sources of capital, internal capital from retained earnings is the most predominant for firms in industrial western countries, accounting for 66.9% in the United States of America between 1970 to 1985. Debt dominates equity as an external funding source. In periods of low internally generated equity, the proportion of debt financing tends to increase to finance the shortfall. It is therefore, prudent for firms to exercise high retention of earnings through lower declaration of dividends to develop a reasonable pool of retained earnings to finance the firm.

There is evidence of an optimal stock price range in the market that would enhance price-earning ratios, and ultimately maximize firm's value. Brigham and Gapenski present findings in the USA that show the optimal stock price ranges between 20 to 80 dollars. In New York Stock Exchange, shares are sold in lots of 100. The cost of shares within the optimal price range is generally affordable by small potential investors. To correct movement of market stock prices, firms may make price adjustment through issuance of stock dividends or stock splits to bring prices within the optimum range. Stock splits are used for major price adjustments, and stock dividend are used for minor adjustment.

In Kenya, average prices at Nairobi Stock Exchange fall between 27 to 51 shillings for the more actively traded stocks. Stocks with high prices have little or no activity in the market and are thus illiquid. This provides local credence to findings of optimal price range in the USA.
Consistent higher dividend yields generally represent higher returns. Investors are more attracted to stocks with relatively higher returns for a given risk. Firms with consistent dividend yields as opposed to irregular dividends create higher demand by attracting more investors. This study sets to test that higher subscription rate, as represented by increased demand is positively related to higher dividend yields, that is, subscription rate is positively related to the dividend yields.

2.5 COMPANY ATTRIBUTES

2.5.1 FIRM SIZE

Firm’s size may be measured in terms of capitalisation. Capitalisation is the product of price per share and the number of outstanding shares. There are other perspectives of firm’s size, including physical facilities, volume of production, turnover, market share and market reach, among other considerations. This study is restricted to capitalisation as a measure of a firm’s size.

High capitalisation indicates availability of high financial resources and high asset base. Firms with high capitalisation are generally older, larger and better performers than those with lower capitalisation. They have bigger investments in physical facilities, technology, manpower, products, marketing and research and development. They are able to innovate and develop at a faster rate new products into the market, they enjoy large economies of scale, they are able to obtain and maintain higher quality managerial staff, and enjoy favourable conditions with regards to market entry barriers. High capitalised firms enjoy higher valuation by potential investors on account of reduced risk.

Ngaru reported that Kenyan investors have a favourable perception of larger sized companies, and promoters of public offerings exploit this phenomenon through information disclosures on their turnover asset base, market share and products.102

In USA, a higher size premium is applied in the discount rate for companies with smaller capitalisation than 150 million dollars - i.e less capitalisation than those firms quoted in Standard & Poor's 500 (S & P 500).103 Empirical studies in USA have proven that larger companies tend to be
less risky than smaller companies. This culminates to lower discount rate, and consequently a higher price for larger firms than for smaller firms. Smaller firms have therefore, higher unsystematic risk, leading to a higher discount rate and lower price. Ironically, in general, smaller firms have higher returns than larger firms, based on higher earning-price ratio. Smaller firms have higher risks, hence higher returns.

From empirical findings from USA, and other countries, smaller firms, on account of higher returns may be more attractive than larger firms. Conversely, smaller firms have larger risk than bigger firms. However, it has been found that in Kenya more investors are attracted to larger sized companies. This study attempts to test the Kenyan phenomenon, that is, whether investors show greater demand of stocks in higher capitalised firms, or subscription rates are higher for more capitalised firms than lower capitalised firms. The study will test that subscription rate is positively related to the firm size, that is, level of capitalisation of the firm.

2.5.2 COMPANY OWNERSHIP: LOCAL - FOREIGN

Company ownership may be put into two main categories: local and foreign owned. Other ownership classifications may be made. This study is restricted to ownership based on sovereign status. The objective is to establish and compare the impact of local conditions on locally and foreign controlled firms, and ultimately assess the level of attraction of potential investors to each group of companies.

Locally owned firms are those in which majority stock holding is held by Kenyan investors. Local firms are generally run by local directors with local managers. They are relatively small to medium size in both service and production sectors. They generally serve local and regional markets, with low to medium technology consumer goods, agricultural processed goods, and low technology capital goods.
Foreign owned firms are those in which majority stock holding is held and controlled by foreign investors. Foreign owned firms generally have foreign directors exercising managerial and technical control, and may have local directors representing minority interest of local investors. Top management position are retained for foreigners, and with other junior positions filled by local staff. Foreign owned firms are generally larger, use higher state of cutting edge technology drawing, from international branch network, are producers of services, consumer goods and capital goods. They generally serve a larger market encompassing local, regional and international spectrum.

Foreign owned firms have a larger competitive market than locally owned firms. They have better access to resources, including financial resources and technology. They have better credit rating, and hence can obtain financial credit at a lower cost, thus lowering production cost and attaining higher market competitiveness. Employment of superior technology reduces production cost and increases innovation of new products, thus further enhancing competitiveness. The quality of management is more superior for foreign owned firm than local firms. Foreign owned firms are able to source highly trained and experienced staff on a global scale. Application of superior management translates into higher return on investment. Besides, foreign managers are subject to higher standards of practice in the global market, beyond the local requirements. Degree of integrity and ethics may be higher in the international realm, than in the local market. Accordingly, it may be more likely that foreign owned firms are run more professionally and ethically than local firms in Kenya.

The economic and regulatory environment in Kenya may have enhanced differences between locally owned and foreign owned firms. Kenya enjoyed a healthy growth of 6.6% in GDP from 1964 to 1973. From 1974, the growth rate started to decline, reducing to 5.2% (1974-1979), 4.1% (1980-1989), 2.5% (1990-1995), 4.6% (1996), 2.3% (1997), and 1.8% (1998).\textsuperscript{108}
Lending interest rates have been volatile and inordinately high as compared with rates on treasury bills. The resultant effect has been higher cost of capital. The exchange rate has remained unstable, coupled with downward losses of purchasing power of local currency, with resultant effect of higher production costs where imported inputs are used. The condition of infrastructure has been poor, and worsening over time. There has been major disrepair of road network, rail network, and operational inefficiency of port and airport facilities. Telephone and data communication has remained un-developed and in poor state of operation. Power and water supply have remained inadequate, and unreliable.

All these factors have had adverse impact on all firms operating in Kenya, but have exerted a heavier toll on locally owned firms. Foreign owned firms are able to obtain cheaper financial resources and imported inputs from outside markets. Due to their wider market access to resources and economies scale, foreign owned firms are able to compete with their products in the global market.

Apparently, no study has been done in this area. Williams conducted a study on factors affecting foreign owned banks in Australia. He found that the size of foreign bank was a positive function of obtaining full banking license, the size of the parent company, time of operation in the country, and was a negative function of net interest margin and fees charged in Australia. He further established that profitability was a positive function of interest margins and fees. Jones carried a study on foreign banks in South Africa, and concluded that foreign banks were more successful than local banks. He attributed the findings to better management and supervision, and lower influence exerted on foreign boards of directors by local interested parties. In Kenya, there is widespread evidence of political interference in banking sector with resultant poor lending policies that have culminated to high level of loan losses.
The above theoretical perspectives explain the better performance and returns of foreign owned firms as compared to local firms. Based on better performance and returns for foreign owned firms than locally owned firms, there may be greater demand by investors in foreign firms than in locally owned firms. Consequently subscription rate, as a proxy device to gauge demand, may likely be higher for foreign owned firms than for locally owned firms. This study shall test whether subscription rate on public offerings is higher for foreign owned firms than locally owned firms.

2.5.3 PERCENTAGE OF RETAINED OWNERSHIP

The level of retained ownership after a public offering is an important factor to new investors in the firm. Ownership represents level of control. The proportion of retained ownership is a signaling device to potential investors and other stakeholders, including customers, creditors, suppliers, employees and government. The higher the proportion of ownership, the higher the control interest, and vice versa.

Various studies have been conducted, culminating with important findings. Downes and Heikel have established a positive relationship between retained ownership and market valuation. Percentage of retained ownership after a public offering is used by investors as a signal for firm’s value. The higher the retained ownership, the higher the value given to the firm because of information asymmetry. On the other hand, high retained ownership may imply illiquid market, and hence adversely affect firm’s stock valuation. Further, high retained ownership may be associated with management entrenchment, and poor corporate performance resulting in a low firm value. Leland and Pyle have established evidence of Information asymmetries. Existing investors have access to, and possess better information on the firm than the potential investors. Higher retained ownership is therefore, used as a signaling mechanism for good future prospects of the firm to new investors, and vice versa.
This study takes cognisance of influence of high retained ownership by current investors on better valuation of a firm’s stock. Higher retained ownership denotes better expectations on firm's future returns, and hence better valuation. It also denotes positive faith by existing owners on future performance of the firm. It generates demand by shifting the demand curve to the right. At a given price level, the quantity of stocks demanded by investors increases with increase in proportion of retained ownership. Consequently, subscription rate as a proxy measure of demand increases with increase in retained ownership. This study will test that subscription rate is positively related to the percentage of retained ownership.

There is no evidence of similar study in Kenya.

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12 Ibid. p457
13 Ibid. p504
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CHAPTER 3: RESEARCH DESIGN

Chapter 3 presents the design of this research encompassing sources of data, methodology of data collection and analysis methods used in the study. The study is restricted to public offerings occurring between 1984 to July 1998.

3.1 POPULATION

The population of the study comprised of 54 public firms listed at Nairobi Stock Exchange (NSE) as of July 1998. NSE was created in 1954, and the 54 public companies listed at the exchange must have issued Initial Public Offerings (IPO) at the time of listing, and may have issued other subsequent offerings, which are referred as Seasoned Public Offerings (SPO). This study is restricted to public firms, which had put into the market IPOs and SPOs prior to July 1998, hence all the 54 companies quoted at NSE qualify as members of the population of this study. Names of companies forming the population are presented in Appendix 1.

3.2 SAMPLE

The sample of the study is restricted to public offerings, IPOs and SPOs, which were put at the NSE in the period between 1984 to July 1998. The dates have been chosen on the basis of available information. There is no record of information for offerings made before 1984. July 1998 was the commencement date of this research. Arising from the restrictions stated above, all other public issues except IPOs and SPOs within the study period are excluded. Accordingly, right issues and private placement issues are excluded from the sample. Between 1984 to July 1998, 25 new public issues were made available at NSE. Out of the total, two issues were right issues and three
issues were private placement issues. The remaining 20 issues were IPOs and SPOs that constitute the sample of this study. IPOs dominated, accounting for 15 issues (75% of total sample), with the remaining 5 issues (25% of the total sample) being SPOs. Information on study sample is presented in Appendix 2.

3.3 METHODOLOGY OF DATA COLLECTION

The study used both primary and secondary data. Primary data was obtained from published sources, including International Monetary Fund's "International Financial Statistics Yearbook"; Kenya's Ministry of Finance and Planning "National Development Plan", and "Economic Review"; and Central Bank of Kenya's "Quarterly Reports". Primary data was obtained for the following economic parameters: GDP, interest rates (Treasury bill rates) and money supply. Secondary data was obtained from the following unpublished sources: Company Prospectuses for offer price, offer period, type of offering (IPO or SPO), P/E ratio, dividend yield, company capitalization, majority ownership (local or foreign), proportion of retained ownership, and use of sale proceeds (asset financing or exchange for transfer of ownership); NSE Market Reports on NSE index, subscription rates, offer price, and size of offering; Capital Market Authority's Annual Reports on subscription rates, offer price, company capitalization, and NSE index; and local print media, particularly Daily Nation on stock market prices (used in determining price discount), subscription rates, and dates for first trading (used in determining spacing between offerings).

Data collected for companies in the sample is presented in Appendix 3 to Appendix 6.
3.4 DATA ANALYSIS TECHNIQUES

Price discount, offer period, spacing between offerings, size of offering and firm capitalization were computed by the method of summary statistic. The overall analysis adopted econometric technique using a multiple linear regression model. Statistical significance tests were conducted using t-tests and F-tests. Regression analysis was conducted using a computer software, "LIMDEP". Computer input data was prepared from data in Appendix 3 to Appendix 6. A summary of computer input data is presented in Appendix 7. Results of analysis from the computer are presented in Appendix 8 to Appendix 14 for Regression Model 1 to 7 respectively.
CHAPTER 4: DATA ANALYSIS, INTERPRETATION AND RESEARCH

FINDINGS

This chapter presents data obtained from various sources described in Chapter 3 and is presented in a summarised and organised form. The data is subjected to first-level analysis to obtain computed variables including price discount, length of offer, spacing between consecutive offerings, monetary value or size of offerings and company capitalisation. The derived variables together with other variables obtained directly from the data are then used to construct the basic multiple linear regression model or equation based on the hypotheses of this research as described in Chapter 1. The hypotheses set the following relationships: Firstly, that subscription rate is positively related to proportion of retained ownership ($X_1$), the size of offering ($X_2$), the size of the firm ($X_3$), the length of offer period ($X_4$), the length of spacing between consecutive offerings ($X_5$), the offer price ($X_6$), the level of price discount ($X_7$), the level of dividend yield ($X_9$), the rate of GDP ($X_{11}$), the level of money supply ($X_{12}$) and the level of NSE Index ($X_{13}$). Secondly, that subscription rate is negatively related to price earning (P/E) ratio ($X_8$), and obtaining interest rate of treasury bills ($X_{10}$). Thirdly, subscription rate is greater for IPO than SPO, is greater where sale proceeds are used for asset financing than where used for transfer of ownership, and is greater for locally owned firm than for a foreign owned firm. The relationships are represented by the subscription rate linear multiple regression model shown here below:

$$S = A_0 + A_1 X_1 + A_2 X_2 + A_3 X_3 + A_4 X_4 + A_5 X_5 + A_6 X_6 + A_7 X_7 + A_8 X_8 + A_9 X_9 + A_{10} X_{10} + A_{11} X_{11}$$

$$+ A_{12} X_{12} + A_{13} X_{13}$$

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Where

$S = \text{subscription rate (Dependent Variable)}$

$X_1$ to $X_{13} = \text{independent variables, as defined above}$

$A_0 = \text{constant}$

$A_1$ to $A_{13} = \text{coefficients of independent variables, which may be positive or negative representing positive or negative relationship respectively.}$

The subscription rate is taken as the dependent variable, with the other sixteen variables constituting the independent or explanatory variables. Within the study period, 1984 to 1998, there were twenty public offerings, out of which five were SPO and the remaining fifteen were IPO. Due to the limited number of public offerings in the study period as compared to sixteen independent variables, it was not possible to conduct separate analysis for IPO and SPO. Regression equation requires some degree of freedom, that is, the number of observations must exceed the number of variables whose coefficients are to be determined. To resolve the problem, the primary regression model or equation adopted thirteen independent variables, namely, $X_1$ (retained ownership), $X_2$ (size of offering), $X_3$ (size of firm), $X_4$ (offer period), $X_5$ (spacing between consecutive offerings), $X_6$ (offer price), $X_7$ (price discount), $X_8$ (P/E ratio), $X_9$ (dividend yield), $X_{10}$ (interest rate), $X_{11}$ (GDP rate), $X_{12}$ (money supply), $X_{13}$ (NSE index). The remaining three variables, namely, IPO versus SPO, application of sale proceeds to asset financing versus transfer of ownership, and local ownership versus foreign ownership were introduced one at a time, by creating other models using a unique technique where IPO, local firms and the use of sale proceeds for asset financing were assigned as 1(one), and
the alternative variables of SPO, foreign firms and sale proceeds being applied for ownership transfer were assigned as 0 (zero). Using this technique it was possible to analyse one primary regression model (Model 1), and six other derivative regression models (Model 2 to 7), without violating requirement for existence of sufficient degrees of freedom.

Regression analysis adopted LIMDEP computer software that was chosen on the basis of availability. Input data for computer analysis is presented in Appendix 7. Output from regression analysis is presented in Appendix 8, 9, 10, 11, 12, 13 and 14 for Regression Model 1, 2, 3, 4, 5, 6 and 7 respectively.

Statistical significance tests were conducted at 5% and 10% level of significance to test the existence of relationships, the strength of relationships, and the overall explanatory power of independent variables to the changes in the dependent variable. In addition, significance tests determine whether the relationships are the result of chance and do not reflect similar relationships for other sets of observations. The T-tests have been carried out to test the significance of the coefficients of independent variables; the F-tests have been carried out to test the overall significance of the regression models; and R-squared values have been evaluated to obtain the overall explanatory power of the regression models. Other tests have been conducted to test the existence of other inherent weaknesses in the regression models, including Durbin-Watson statistic for autocorrelation. Other weaknesses in the models including heteroscedasticity, specification and measurement errors, simultaneous equation and identification problems, and multicollinearity, could not be tested due to limitation of time and resources.

Results of statistical significance tests are presented in this chapter.
4.1 SIZE OF OFFERING ($X_2$)

The size of offering is the monetary value of the offering on sale to the public, and is represented by the magnitude of the sale proceeds. It is the product of the number of shares and the unit offer price.

Therefore, $X_2 = P \times N$ where $X_2 = \text{Size of offering}$

$P = \text{Offer price}$

$N = \text{Number of Shares}$

The sizes of offerings for 20 public offerings in the period 1984 to 1998 are presented in Table 1 here below.
TABLE 1: SIZES OF PUBLIC OFFERINGS (X$_2$)

<table>
<thead>
<tr>
<th>FIRM WITH PUBLIC OFFERING</th>
<th>NUMBER OF SHARES</th>
<th>UNIT OFFER PRICE (KSH)</th>
<th>SIZE OF OFFERING (KSH)</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Jubilee</td>
<td>800,000</td>
<td>14.40</td>
<td>11.6m</td>
</tr>
<tr>
<td>2)</td>
<td>BBK</td>
<td>5,000,000</td>
<td>16.00</td>
<td>80.0m</td>
</tr>
<tr>
<td>3)</td>
<td>KCB</td>
<td>7,500,000</td>
<td>20.00</td>
<td>150.0m</td>
</tr>
<tr>
<td>4)</td>
<td>Nation Printers</td>
<td>2,500,000</td>
<td>11.50</td>
<td>109.3m</td>
</tr>
<tr>
<td>5)</td>
<td>SCB</td>
<td>21,000,000</td>
<td>14.50</td>
<td>304.5m</td>
</tr>
<tr>
<td>6)</td>
<td>KCB</td>
<td>9,000,000</td>
<td>33.00</td>
<td>297.0m</td>
</tr>
<tr>
<td>7)</td>
<td>Kenya Finance</td>
<td>3,261,970</td>
<td>12.50</td>
<td>40.8m</td>
</tr>
<tr>
<td>8)</td>
<td>Uchumi</td>
<td>16,000,000</td>
<td>14.50</td>
<td>232.0m</td>
</tr>
<tr>
<td>9)</td>
<td>Crown Berger</td>
<td>8,638,000</td>
<td>16.00</td>
<td>138.0m</td>
</tr>
<tr>
<td>10)</td>
<td>HFCK</td>
<td>18,000,000</td>
<td>7.00</td>
<td>126.0m</td>
</tr>
<tr>
<td>11)</td>
<td>Firestone</td>
<td>40,000,000</td>
<td>33.50</td>
<td>1,420.0m</td>
</tr>
<tr>
<td>12)</td>
<td>NBK</td>
<td>40,000,000</td>
<td>10.00</td>
<td>400.0m</td>
</tr>
<tr>
<td>13)</td>
<td>NIC</td>
<td>17,929,286</td>
<td>52.00</td>
<td>718.0m</td>
</tr>
<tr>
<td>14)</td>
<td>Rea Vipingo</td>
<td>8,000,000</td>
<td>10.50</td>
<td>84.0m</td>
</tr>
<tr>
<td>15)</td>
<td>Kenya Airways</td>
<td>235,423,896</td>
<td>11.25</td>
<td>2,600.0m</td>
</tr>
<tr>
<td>16)</td>
<td>NBK</td>
<td>40,000,000</td>
<td>15.00</td>
<td>600.0m</td>
</tr>
<tr>
<td>17)</td>
<td>KCB</td>
<td>11,880,000</td>
<td>50.00</td>
<td>594.0m</td>
</tr>
<tr>
<td>18)</td>
<td>TPS (Serena)</td>
<td>9,025,100</td>
<td>13.00</td>
<td>117.3m</td>
</tr>
<tr>
<td>19)</td>
<td>Atiu River Mining</td>
<td>23,000,000</td>
<td>12.25</td>
<td>281.8m</td>
</tr>
<tr>
<td>20)</td>
<td>KCB</td>
<td>28,000,000</td>
<td>65.00</td>
<td>1,800.0m</td>
</tr>
</tbody>
</table>

SOURCES: RESEARCH FINDINGS, PROSPECTUSES, PRINTMEDIA (LOCAL)

4.2 **COMPANY CAPITALISATION (X$_3$)**

Company capitalisation or size is the product of the number of outstanding shares and the market price at the time of making the offering.

Therefore:

\[ X_3 = P_m \times N_s \]

where \( X_3 \) = Company Capitalisation

\( P_m \) = Market price per unit or stock offer price

\( N_s \) = Number of outstanding shares

Figures of Company Capitalisation for firms making public offerings in the period 1984 to 1998 are presented in Table 2 here below.
TABLE 2: COMPANY CAPITALISATION (X₃)

<table>
<thead>
<tr>
<th>FIRM WITH PUBLIC OFFERING (1)</th>
<th>COMPANY CAPITALISATION (KSHS) (2)</th>
<th>DATE (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jubilee</td>
<td>57.6m</td>
<td>1984</td>
</tr>
<tr>
<td>2 BBK</td>
<td>272.0m</td>
<td>1986</td>
</tr>
<tr>
<td>3 KCB</td>
<td>750.0m</td>
<td>1988</td>
</tr>
<tr>
<td>4 Nation Printers</td>
<td>109.3m</td>
<td>1988</td>
</tr>
<tr>
<td>5 SCB</td>
<td>1195.0m</td>
<td>1989</td>
</tr>
<tr>
<td>6 KCB</td>
<td>1851.3m</td>
<td>1990</td>
</tr>
<tr>
<td>7 Kenya Finance</td>
<td>112.5m</td>
<td>1991</td>
</tr>
<tr>
<td>8 Uchumi</td>
<td>580.0m</td>
<td>1992</td>
</tr>
<tr>
<td>9 Crown Berger</td>
<td>345.1m</td>
<td>1992</td>
</tr>
<tr>
<td>10 HFCK</td>
<td>322.0m</td>
<td>1992</td>
</tr>
<tr>
<td>11 Firestone</td>
<td>6,216.3m</td>
<td>1994</td>
</tr>
<tr>
<td>12 NBK</td>
<td>2,000.0m</td>
<td>1994</td>
</tr>
<tr>
<td>13 NIC</td>
<td>1,828.1m</td>
<td>1994</td>
</tr>
<tr>
<td>14 Rea Vipingo</td>
<td>586.0m</td>
<td>1996</td>
</tr>
<tr>
<td>15 Kenya Airways</td>
<td>5,193.0m</td>
<td>1996</td>
</tr>
<tr>
<td>16 NBK</td>
<td>3,000.0m</td>
<td>1996</td>
</tr>
<tr>
<td>17 KCB</td>
<td>5,610.0m</td>
<td>1996</td>
</tr>
<tr>
<td>18 TPS (Serena)</td>
<td>502.8m</td>
<td>1997</td>
</tr>
<tr>
<td>19 Athi River Mining</td>
<td>918.8m</td>
<td>1997</td>
</tr>
<tr>
<td>20 KCB</td>
<td>7,293.0m</td>
<td>1998</td>
</tr>
</tbody>
</table>

SOURCES: RESEARCH FINDINGS, PROSPECTUSES, PRINTMEDIA (LOCAL)

4.3 LENGTH OF OFFER PERIOD (X₄)

Length of the offer period is the time the offering remains open in the market for the public to make a purchase. It is the difference in time between the closing date and the opening date for sale of an offering measured in days. The computed offer periods for public offerings in the period 1984 to 1998 are presented in Table 3.

Therefore,

\[ X₄ = T_c - T_o \]

where \( X₄ = \text{Offer Period} \)

\( T_c = \text{Closing Date} \)

\( T_o = \text{Opening Date} \)
4.4 SPACING BETWEEN CONSECUTIVE OFFERINGS ($X_s$)

Spacing between two consecutive offerings is the difference in time between the opening date of the second consecutive offerings and the closing date of the immediate preceding public offering, measured in days.

Therefore,

$$X_s = Toj - Tci$$

where $X_s$ = Spacing

$Toj$ = Opening date of second offering

$Tci$ = Closing date of immediate preceding offering.

The computed spacing times are presented in Table 3.

**TABLE 3: OFFER PERIOD ($X_d$), SPACING OF CONSECUTIVE OFFERINGS ($X_s$)**

<table>
<thead>
<tr>
<th>FIRM WITH PUBLIC OFFERING (1)</th>
<th>DATE SALE OPENING (2)</th>
<th>DATE SALE CLOSING (3)</th>
<th>OFFER PERIOD (4) = (3) - (2) DAYS</th>
<th>SPACING OF CONSECUTIVE OFFERINGS (5) = (2)² - (3)² DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Jubilee</td>
<td>28-5-1984</td>
<td>13-6-1984</td>
<td>17</td>
<td>395</td>
</tr>
<tr>
<td>2  BBK</td>
<td>7-4-1986</td>
<td>21-4-1986</td>
<td>15</td>
<td>663</td>
</tr>
<tr>
<td>3  KCB</td>
<td>28-6-1988</td>
<td>19-7-1988</td>
<td>22</td>
<td>819</td>
</tr>
<tr>
<td>4  Nation Printers</td>
<td>7-11-1988</td>
<td>30-11-1988</td>
<td>22</td>
<td>172</td>
</tr>
<tr>
<td>5  SCB</td>
<td>16-10-1989</td>
<td>8-11-1989</td>
<td>23</td>
<td>322</td>
</tr>
<tr>
<td>6  KCB</td>
<td>10-9-1990</td>
<td>2-10-1990</td>
<td>24</td>
<td>307</td>
</tr>
<tr>
<td>8  Uchumi</td>
<td>17-11-1992</td>
<td>8-12-1992</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>10 HFCK</td>
<td>7-10-1992</td>
<td>4-11-1992</td>
<td>28</td>
<td>331</td>
</tr>
<tr>
<td>11 Firestone</td>
<td>19-9-1994</td>
<td>12-10-1994</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>12 NBK</td>
<td>4-10-1994</td>
<td>2-11-1994</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>13 NIC</td>
<td>15-8-1994</td>
<td>14-9-1994</td>
<td>31</td>
<td>616</td>
</tr>
<tr>
<td>14 Rea Vipingo</td>
<td>4-3-1996</td>
<td>20-3-1996</td>
<td>17</td>
<td>516</td>
</tr>
<tr>
<td>15 Kenya Airways</td>
<td>25-3-1996</td>
<td>19-4-1996</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>16 NBK</td>
<td>20-5-1996</td>
<td>18-6-1996</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>17 KCB</td>
<td>16-9-1996</td>
<td>15-10-1996</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>18 TPS (Serena)</td>
<td>24-3-1997</td>
<td>14-4-1997</td>
<td>22</td>
<td>240</td>
</tr>
<tr>
<td>19 Athi River Mining</td>
<td>10-7-1997</td>
<td>23-7-1997</td>
<td>14</td>
<td>78</td>
</tr>
<tr>
<td>20 KCB</td>
<td>24-4-1998</td>
<td>15-5-1998</td>
<td>22</td>
<td>271</td>
</tr>
</tbody>
</table>

**SOURCES:** RESEARCH FINDINGS, PROSPECTUSES
4.5.1 PRICE DISCOUNT / UNDERPRICING (X₇)

Price discount or under pricing is the ratio of difference between the first day trading market price and the offer price, expressed as a percentage of the offer price. If the first trading market price is greater than the offer price, the resultant ratio is positive and reflects under pricing. Conversely, if the market price is lower than offer price then the ratio is negative, and implies that the offer price was at a premium.

Therefore,
\[ X_7 = \frac{P_m - P_o}{P_o} \times 100 \]

where \( X_7 \) = Price discount or under pricing  
\( P_o \) = Offer Price  
\( P_m \) = Market price at first trading

Figures of price discount (under pricing) were computed and presented in Table 4 here below.

**TABLE 4: PRICE DISCOUNT / UNDERPRICING (X₇)**

<table>
<thead>
<tr>
<th>FIRM WITH PUBLIC OFFERING (1)</th>
<th>DATE (2)</th>
<th>OFFER PRICE (3)</th>
<th>INITIAL MARKET PRICE (KSHS) (4)</th>
<th>PRICE DISCOUNT / UNDERPRICING (5) = (4) – (3) x 100 (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jubilee</td>
<td>1984</td>
<td>14.40</td>
<td>15.50</td>
<td>7.6%</td>
</tr>
<tr>
<td>2 BBK</td>
<td>1986</td>
<td>16.00</td>
<td>26.25</td>
<td>64.1%</td>
</tr>
<tr>
<td>3 KCB</td>
<td>1988</td>
<td>20.00</td>
<td>27.00</td>
<td>35.0%</td>
</tr>
<tr>
<td>4 Nation Printers</td>
<td>1988</td>
<td>11.50</td>
<td>11.50</td>
<td>0</td>
</tr>
<tr>
<td>5 SCB</td>
<td>1989</td>
<td>14.50</td>
<td>25.00</td>
<td>72.4%</td>
</tr>
<tr>
<td>6 KCB</td>
<td>1990</td>
<td>33.00</td>
<td>34.00</td>
<td>3.0%</td>
</tr>
<tr>
<td>7 Kenya Finance</td>
<td>1991</td>
<td>12.50</td>
<td>12.50</td>
<td>0</td>
</tr>
<tr>
<td>8 Uchumi</td>
<td>1992</td>
<td>14.50</td>
<td>21.00</td>
<td>44.8%</td>
</tr>
<tr>
<td>9 Crown Berger</td>
<td>1992</td>
<td>16.00</td>
<td>19.00</td>
<td>18.8%</td>
</tr>
<tr>
<td>10 HFCK</td>
<td>1992</td>
<td>7.00</td>
<td>7.75</td>
<td>10.7%</td>
</tr>
<tr>
<td>11 Firestone</td>
<td>1994</td>
<td>33.50</td>
<td>40.50</td>
<td>20.9%</td>
</tr>
<tr>
<td>12 NBK</td>
<td>1994</td>
<td>10.00</td>
<td>31.00</td>
<td>210.0%</td>
</tr>
<tr>
<td>13 NIC</td>
<td>1994</td>
<td>52.00</td>
<td>52.00</td>
<td>0</td>
</tr>
<tr>
<td>14 Rea Vipingo</td>
<td>1996</td>
<td>10.50</td>
<td>14.45</td>
<td>37.6%</td>
</tr>
<tr>
<td>15 Kenya Airways</td>
<td>1996</td>
<td>11.25</td>
<td>12.00</td>
<td>6.7%</td>
</tr>
<tr>
<td>16 NBK</td>
<td>1996</td>
<td>15.00</td>
<td>17.00</td>
<td>13.3%</td>
</tr>
<tr>
<td>17 KCB</td>
<td>1996</td>
<td>50.00</td>
<td>58.00</td>
<td>16.0%</td>
</tr>
<tr>
<td>18 TPS (Serena)</td>
<td>1997</td>
<td>13.00</td>
<td>19.65</td>
<td>51.1%</td>
</tr>
<tr>
<td>19 Athi River Mining</td>
<td>1997</td>
<td>12.25</td>
<td>12.50</td>
<td>2.0%</td>
</tr>
<tr>
<td>20 KCB</td>
<td>1998</td>
<td>65.00</td>
<td>70.00</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

**SOURCES:** RESEARCH FINDINGS, PROSPECTUSES, PRINT MEDIA (LOCAL)
4.5.2 OTHER VARIABLES

Data on other variables, namely $X_1$ (retained ownership), $X_6$ (offer price), $X_8$ (P/E ratio), $X_9$ (dividend yield), $X_{10}$ (interest rate), $X_{11}$ (GDP rate), $X_{12}$ (money supply), $X_{13}$ (NSE index), type of offering (IPO or SPO), use of sale proceeds (asset financing, charge of ownership), and status on ownership (local or foreign) were obtained directly from secondary sources, and are presented in Appendices 3,4,5 and 6.

4.6 REGRESSION ANALYSIS RESULTS

Multiple regression analysis using computer software, LIMDEP, was conducted for seven different models as indicated here below using successive discriminant technique, and input data in Appendix 7.

- Model 1 - Comprises all public offerings in the sample (IPO and SPO)
- Model 2 - Comprises IPO only
- Model 3 – Comprises IPO and SPO where sale proceeds were used for asset financing only.
- Model 4 - Comprises IPO and SPO with majority local ownership only.
- Model 5 - Comprises IPO with majority local ownership only.
- Model 6 – Comprises IPO where sale proceeds were used for asset financing only.
- Model 7 – Comprises IPO with majority local ownership, and where sale proceeds were used for asset financing only.

Output from computer analysis of the seven regression models is presented in Appendix 8 to Appendix 14 for Model 1 to Model 7 respectively.

Further analysis was carried out on the results to test the statistical significance using t-test and F-test.
4.6.1 RESULTS ON SUBSCRIPTION RATE MODELS

4.6.1.1 MODEL 1

NOTE: Comprises all public offerings in the sample (both IPO and SPO), without qualification.

\[ S = +1700.5 - 8.3857X_1 - 0.4815X_2 + 0.1741X_3 - 1.6454X_4 + 0.6316X_5 - 15.9670X_6 + 1.2903X_7 - 25.536X_8 - 32.7400X_9 - 32.1840X_{10} - 2.7886X_{11} + 0.0038X_{12} - 0.1970X_{13} \]

(NB: \( R^2 = 0.36 \))

4.6.1.2 MODEL 2

NOTE: comprises IPO only without qualification.

\[ S = +2810.6 - 12.8400X_1 - 0.6286X_2 + 0.2503X_3 - 14.635X_4 + 0.8197X_5 - 25.483X_6 + 1.9176X_7 - 33.5800X_8 - 45.6500X_9 - 27.6680X_{10} - 19.0780X_{11} + 0.0036X_{12} - 0.2171X_{13} - 261.2000 \text{ TI} \]

(NB: \( R^2 = 0.60 \))

4.6.1.3 MODEL 3

NOTE: Comprises both IPO and SPO, but where sale proceeds are applied for asset financing.

\[ S = +1648.0 - 7.9222X_1 - 0.4752X_2 + 0.1705X_3 - 0.2061X_4 + 0.6275X_5 + 16.2360X_6 + 1.2715X_7 - 29.7220X_8 - 33.5710X_9 - 32.4290X_{10} - 3.2223X_{11} + 0.0040X_{12} - 0.2112X_{13} + 29.5820 \text{ UF} \]

(NB: \( R^2 = 0.25 \))
4.6.1.4 MODEL 4

NOTE: Comprises both IPO and SPO, with majority local ownership only.

\[ S = +1723.1 - 8.4848X_1 - 0.4881X_2 + 0.1762X_3 - 1.9504X_4 + 0.6326X_5 - 16.1410X_6 \\
+ 1.3052X_7 - 25.6920X_8 - 33.4380X_9 - 32.4860X_{10} - 2.3368X_{11} + 0.0038X_{12} \\
- 0.2004X_{13} + 7.6081 \text{ MO} \]

(NB: \( R^2 = 0.24 \))

4.6.1.5 MODEL 5

NOTE: Comprises IPO, with majority local ownership only.

\[ S = +2885.4 - 13.0840X_1 - 0.6155X_2 + 0.2520X_3 - 15.2470X_4 + 0.8503X_5 - 26.2460X_6 \\
+ 1.9461X_7 - 34.1650X_8 - 43.7450X_9 - 24.8570X_{10} - 25.1570X_{11} + 0.0033X_{12} \\
- 0.1997X_{13} - 312.5500 \text{ TI} - 48.4560 \text{ MO} \]

(NB: \( R^2 = 0.57 \))

4.6.1.6 MODEL 6

NOTE: Comprises IPO, with sale proceeds applied in asset financing only.

\[ S = +2866.4 - 12.1930X_1 - 0.6382X_2 + 0.2539X_3 - 12.4470X_4 + 0.8457X_5 \\
- 28.4390X_6 + 1.9867X_7 - 49.7130X_8 - 51.2610X_9 - 27.5530X_{10} - 24.0440X_{11} + 0.0045X_{12} \\
- 0.2702X_{13} - 316.8700 \text{ TI} + 101.8800 \text{ UF} \]

(NB: \( R^2 = 0.64 \))
4.6.1.7 MODEL 7

NOTE: Comprises IPO with majority local ownership and where sale proceeds are applied in asset financing.

\[ S = +2882.4 -12.3500X_1 -0.6329X_2 +0.2540X_3 -12.9110X_4 +0.8518X_5 \\
-28.3020X_6 +1.9868X_7 -47.8610X_8 -49.9670X_9 -26.7010X_{10} -25.2920X_{11} +0.0043X_{12} \\
-0.2581X_{13} -325.6900 \text{ TI} +89.0520 \text{ UF} -14.9330 \text{ MO} \]

(NB $R^2 = 0.53$)

4.6.2 t-TEST

A t-test is used to test the significance of individual coefficients of independent variables. It tests whether each of the coefficients is significantly different from zero. The coefficients on the other hand represent the nature of relationships between independent variables and the dependent variable, that is, they capture the nature and strength of correlation between dependent and independent variables in the regression model (McGuigan, Moyer & Harris, 1993)\(^1\).

A t-test is carried out using the Null Hypothesis at selected levels of significance:

\[ \text{Ho} : A_i = 0 \quad (\text{coefficient is not significantly different from zero, hence no relationship exists}) \]

Against an Alternative Hypothesis:

\[ \text{Ha} : A_i \neq 0 \quad (\text{coefficient is significantly different from zero, hence there exists a relationship}) \]

Generally, the commonly used levels of significance are 5% and 10%. Most computer softwares calculate the significance level at which one can reject the Null Hypothesis. The Null Hypothesis is rejected if the calculated level of significance is less
than the selected level of significance. At 5% and 10% the computed occurrence levels of significance must be less than 0.05 and 0.10 respectively for rejection of Null Hypothesis. Rejection of Null Hypothesis, implies that the relevant independent variable has a significant relationship with the dependent variable.

The summary of coefficients of independent variables and their t-statistics is prepared from output data in Appendix 8 to 14, and is presented in Table 5. Alternatively, a summary of coefficients and levels of probability at which they become statistically significant is presented in Table 6. The results are presented for the seven regression models.
### TABLE 5: REGRESSION RESULTS: COEFFICIENTS OF INDEPENDENT VARIABLES AND t-STATISTICS.

<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLE</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
<th>MODEL 5</th>
<th>MODEL 6</th>
<th>MODEL 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT COEFFICIENT</td>
<td>+1700.5</td>
<td>+2810.6</td>
<td>1648.0</td>
<td>+1723.1</td>
<td>+2885.4</td>
<td>+2866.4</td>
<td>+2882.4</td>
</tr>
<tr>
<td>T-VALUE</td>
<td>+2.434</td>
<td>+3.689</td>
<td>+2.103</td>
<td>+2.177</td>
<td>+3.648</td>
<td>+3.981</td>
<td>+3.474</td>
</tr>
<tr>
<td></td>
<td>-1.528</td>
<td>-2.655</td>
<td>-1.276</td>
<td>-1.397</td>
<td>-2.619</td>
<td>-2.657</td>
<td>-2.321</td>
</tr>
<tr>
<td>X2</td>
<td>-0.48158</td>
<td>-0.62863</td>
<td>-0.47527</td>
<td>-0.48818</td>
<td>-0.61552</td>
<td>-0.63824</td>
<td>-0.63299</td>
</tr>
<tr>
<td>X3</td>
<td>+0.17416</td>
<td>+0.25031</td>
<td>+0.17051</td>
<td>+0.17625</td>
<td>+0.25202</td>
<td>+0.25394</td>
<td>+0.25401</td>
</tr>
<tr>
<td></td>
<td>+2.419</td>
<td>+3.710</td>
<td>+2.146</td>
<td>+2.175</td>
<td>+3.620</td>
<td>+3.986</td>
<td>+3.476</td>
</tr>
<tr>
<td></td>
<td>-0.231</td>
<td>-1.757</td>
<td>-0.022</td>
<td>-0.236</td>
<td>-1.768</td>
<td>-1.546</td>
<td>-1.358</td>
</tr>
<tr>
<td>X5</td>
<td>+0.63166</td>
<td>+0.81979</td>
<td>+0.62755</td>
<td>+0.63267</td>
<td>+0.85305</td>
<td>+0.84573</td>
<td>+0.85188</td>
</tr>
<tr>
<td></td>
<td>+3.209</td>
<td>+4.564</td>
<td>+2.925</td>
<td>+2.935</td>
<td>+4.503</td>
<td>+4.956</td>
<td>+4.301</td>
</tr>
<tr>
<td>X7</td>
<td>+1.2903</td>
<td>+1.9176</td>
<td>+1.2715</td>
<td>+1.3052</td>
<td>+1.9461</td>
<td>+1.9867</td>
<td>+1.9868</td>
</tr>
<tr>
<td></td>
<td>+1.192</td>
<td>+2.110</td>
<td>+1.078</td>
<td>+1.095</td>
<td>+2.074</td>
<td>+2.312</td>
<td>+2.016</td>
</tr>
<tr>
<td>X8</td>
<td>-25.536</td>
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<td>-25.692</td>
<td>-34.165</td>
<td>-49.713</td>
<td>-47.861</td>
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<td>-1.121</td>
<td>-1.180</td>
<td>-2.042</td>
<td>-2.503</td>
<td>-1.949</td>
</tr>
<tr>
<td></td>
<td>-1.213</td>
<td>-1.306</td>
<td>-1.123</td>
<td>-1.114</td>
<td>-1.125</td>
<td>-1.379</td>
<td>-1.146</td>
</tr>
<tr>
<td></td>
<td>-0.129</td>
<td>-1.014</td>
<td>-0.137</td>
<td>-0.097</td>
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**SOURCE: RESEARCH FINDINGS**

**LEGEND**

S = Subscription Rate, X1 = Retained ownership, X2 = size of offering, X3 = size of firm, X4 = offer period, X5 = spacing between offerings, X6 = offer price X7 = price discount, X8 = P/E Ratio, X9 = Dividend yield, X10 = Interest Rate, X11 = GPD Rate, X12 = Money supplyX13 = NSE Index, TI = IPO = 1, Versus SPO = 0, UF = Asset Financing = 1, Versus Transfer of ownership = 0, MO = Local ownership = 1, Versus Foreign ownership = 0

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<thead>
<tr>
<th>INDEPENDENT VARIABLE</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
<th>MODEL 5</th>
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</table>

**SOURCE:** RESEARCH FINDINGS
4.6.3 F-TEST

F-test is a joint hypothesis test, which applies to the overall regression model as opposed to the t-test, which is applicable to individual coefficients of independent variables. F-test measures the “fit” of the whole regression equation/model. F-test represents the explanatory power of all independent variables in the regression model to account for change in the dependent variable. F-test uses the Null Hypothesis against the alternative hypothesis as shown below.

Generally the adopted significance levels are at 5% to 10%. F-values at those levels of significance are compared with the critical F-values derived from normal distribution. Most computer softwares calculate the F-values as shown in the computer output data in Appendix 8 to Appendix 14. The criterion for rejection of the Null Hypothesis is that the calculated F-statistics should be greater than the corresponding critical F-values from the normal distribution. The rejection of the Null Hypothesis implies that there is existence of statistically significant relationship between the independent variables and the dependent variable of the model. Alternatively, the computer calculates the “probability value” which represents the level at which F-value becomes significant.

Thus, Null Hypothesis:

\[
\text{Ho: } A_i = 0 \quad \text{(coefficient is not significantly different from zero, hence no relationship)}
\]

Against Alternative Hypothesis:

\[
\text{Ha: } A_i \neq 0 \quad \text{(coefficient is significantly different from zero, hence relationship exists)}
\]
The summary of F-statistics together with the corresponding "probability values" are presented in Table 7.

4.6.4 COEFFICIENT OF DETERMINATION (R-SQUARED)

Coefficient of determination ($r^2$) is a measure of the proportion of total variation in the dependent variable that is explained by the independent variables. It measures the overall fit of the regression model to the observations in the sample. The coefficient of determination ranges in value from 0 (when no relationship exists) to 1 (when all variations in the dependent variable are explained by the independent variables). It is the ratio of unexplained errors to the total errors (sum of explained and unexplained errors).

Coefficient of determination indicates presence of association that is correlation, but does not imply the causation. The existence of cause and effect relationship cannot be established from statistical tests, but can only be inferred from economic reasoning (McGuigan, Moyer & Harris 1993).

The summary of results of coefficients of determination for the seven regression models is presented in Table 7.

4.6.5 DURBIN WATSON STATISTIC

Durbin Watson statistic (d) measures the presence of predictable pattern in successive values of the error term (e) in the regression model. Existence of significant and predictable pattern of the error term in the regression function is called autocorrelation. Durbin Watson statistic varies from 0 to 4. Durbin Watson statistic indicates the existence or lack of existence of first order autocorrelation. Autocorrelation may be either positive (when d is less than 2), negative (when d is greater than 2) or may be absent (when d = 2). Autocorrelation may be caused by seasonal and cyclic changes in
values of independent variables, or existence of non-linear relationships, or omission of significant explanatory variables in the regression model. Autocorrelation affects accuracy of the regression function to provide estimation of regression constant and coefficients. It further adversely affects the results and validity of t-tests.

The summary of Durbin Watson statistics is presented in Table 7.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
<th>MODEL 5</th>
<th>MODEL 6</th>
<th>MODEL 7</th>
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<td>ADJUSTED COEFFICIENTS OF DETERMINATION ($r^2$)</td>
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<td>1.43</td>
<td>2.71</td>
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<td>F-DISTRIBUTION AT LEVEL 5%</td>
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<td>5.86</td>
<td>5.86</td>
<td>8.70</td>
<td>8.70</td>
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<td>0.36</td>
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<td>4</td>
<td>4</td>
<td>3</td>
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</table>

SOURCE: RESEARCH FINDINGS
4.7 RESEARCH FINDINGS

This section presents findings of the research. The primary aim of the study was to test hypotheses using econometrics as a tool of economic analysis. In line with the hypotheses multiple linear regression models were developed. Using LIMDEP computer program, data from the sample was analysed and results are presented in the preceding sections of this chapter. From these results certain inferences can be made including: The nature of relationship between the dependent variable and independent variables; the strength of relationships and statistical significance tests to demonstrate the validity of the results against occurrence by chance. The signs of coefficients of independent variables denote the nature of relationship with the dependent variable. Positive coefficients represent a positive relation, that is, the dependent variable is directly proportional to the corresponding independent variable, and negative coefficient represents a negative relation, that is, the dependent variable is inversely proportional to the corresponding independent variable. The strength of the relationship refers to the explanatory power of the independent variables, both individually and jointly, to the changes in the dependent variable. The magnitude of coefficients of independent variables and the coefficients of determination \( r^2 \) represent the strength of relationships between dependent and independent variables. The greater the magnitude, the greater the explanatory power. F-statistics and t-statistics represent statistical significance tests that provide control against chance occurrence to the findings.

4.7.1 FINDINGS ON HYPOTHESES

The comparative summary of research findings and hypotheses is presented in Table 8. The nature of relationships in the hypothesis is derived from the signs of
coefficients of independent variables. Positive sign denotes direct positive relationship
and negative sign denotes negative relationship.

The strength of relationships between the dependent variable (subscription rate)
and each independent variable is represented by the level at which coefficients of
independent variables become statistically significant as shown in Table 8. The following
inferences can be made from Table 8.

1. Nine research hypotheses have been found to be consistent with the findings of
the study. Subscription rate of public offerings in Kenya have been found to be positively
related to: firm size (X₃), spacing between the offerings (X₅), level of price
discount/underpricing (X₇) and the level of money supply (X₁₂). Subscription rates of
public offerings in Kenya were found to be negatively related to the offer price (X₆), P/E
ratio (X₈), interest rate (X₁₀). Subscription rates were found to be relatively higher for
IPO (T=1), than for SPO (T=0) based on comparative evaluation of regression function of
IPO and combined IPO and SPO.

Similarly subscription rates were found to be higher where sale proceeds were applied in
financing assets (UF=1) than where sale proceeds were applied in change of ownership
(UF=0). The findings were statistically significant at different probability levels. X₃, X₅
and X₆ were significant at 5%; X₈, X₁₂ and TI at 6%; X₇ at 8%; X₁₀ and UF have
relatively poor levels of significance at 24% and 27% respectively. Relatively high levels
of significance represent inconclusive results.

2. Seven hypotheses were inconsistent with the findings of the research. Subscription rates of public offerings in Kenya were found to be negatively related to:
retained ownership (X₁) at 5 % significance, size of offering (X₂) at 5% significance,
offer period \((X_4)\) at 17%. Subscription rates were found to be higher for firms with local majority ownership \((MO=1)\) than for foreign firms \((MO=0)\) at a poor level of significance of 45%.
<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLE</th>
<th>RESEARCH FINDINGS</th>
<th>HYPOTHESIS RELATIONSHIP</th>
<th>CONCLUSION</th>
</tr>
</thead>
<tbody>
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<td>1 RETAINED OWNERSHIP (X1)</td>
<td>S α _ 1 (Negative) X_1</td>
<td>S α X_1 (Positive)</td>
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<td>S α X_3 (Positive)</td>
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<td>S α X_5 (Positive)</td>
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</table>

SOURCE: RESEARCH FINDINGS

LEGEND

S = SUBSCRIPTION RATE (%)
T_{1} = IPO, T_{0} = SPO
UF_{1} = ASSET FINANCING, UF_{0} = CHANGE OF OWNERSHIP
MO_{1} = LOCAL, MO_{0} = FOREIGN
S α X_i — DENOTES POSITIVE RELATIONSHIP
S α \_ 1 / X_i — DENOTES NEGATIVE RELATIONSHIP

100
3. The overall explanatory power as represented by the adjusted coefficients of determination \( r^2 \) for the seven regression models varied widely as shown in Table 7. The overall significance levels as represented by F-statistic indicated a wide spread. Generally IPO models showed higher levels of adjusted \( r^2 \) and F-ratio than the combined models with IPO and SPO. Model 6 comprising of IPO with sale proceeds applied into asset financing showed the highest explanatory power with adjusted \( r^2 = 0.64 \) at 12% significance level. Following the decreasing order of explanatory power, the other regression models were: Model 2 comprising all IPO with adjusted \( r^2 = 0.60 \) at 11%; Model 5 comprising IPO with majority local ownership with adjusted \( r^2 = 0.57 \) at 17%; Model 7 comprising local IPO where sale proceeds are applied to asset financing with adjusted \( r^2 = 0.53 \) at 26%; Model 1 comprising all IPO and SPO with adjusted \( r^2 = 0.36 \) at 23%; Model 3 comprising IPO and SPO where sale proceeds are applied to asset financing with adjusted \( r^2 = 0.25 \) at poor significance of 35%; and Model 4 comprising locally owned IPO and SPO with adjusted \( r^2 = 0.24 \) at a poor significance level of 36%.

On the whole, the regression models showed good explanatory power of independent variables on variations of the dependent variable, the subscription rates of public offering in Kenya. For the IPO, the models could explain for 53% to 64% of variations in the subscription rate. However for the combined IPO and SPO, the models explanatory power reduced to explain between 24% and 36% of variations in the subscription rate. Similarly the overall level of statistical significance of the models increased from the range of 11% to 26% for IPO to a higher range of between 23% to 36% for combined IPO and SPO.
The summary of research findings on explanatory power of regression models in a descending order of magnitude is presented in Table 9.

4. Durbin Watson statistic (d) was found as 2.11, 2.37, 2.11, 2.12, 2.48, 2.43 and 2.47 for models 1 to 7 respectively. The d-values were found to be marginally greater than 2, indicating a weak form of negative autocorrelation.

**TABLE 9: REGRESSION MODEL EXPLANATORY POWER**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MODEL 6</th>
<th>MODEL 2</th>
<th>MODEL 5</th>
<th>MODEL 7</th>
<th>MODEL 1</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOSITION</td>
<td>IPO WITH PROCEEDS FOR ASSETS</td>
<td>ALL IPO</td>
<td>IPO LOCAL AND PROCEEDS USED FOR ASSETS</td>
<td>ALL IPO + SPO</td>
<td>IPO + SPO WITH PROCEEDS USED FOR ASSETS</td>
<td>IPO + SPO LOCAL</td>
<td></td>
</tr>
<tr>
<td>EXPLANATORY POWER - ADJUSTED ($r^2$)</td>
<td>0.64</td>
<td>.60</td>
<td>0.57</td>
<td>0.53</td>
<td>0.36</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>DURBIN WATSON STATISTIC (d)</td>
<td>2.43</td>
<td>2.37</td>
<td>2.48</td>
<td>2.47</td>
<td>2.11</td>
<td>2.11</td>
<td>2.12</td>
</tr>
</tbody>
</table>

SOURCE: RESEARCH FINDINGS

**LEGEND (DURBIN WATSON STATISTIC)**

- $d = 0$ – ZERO AUTOCORRELATION
- $d > 2$ – NEGATIVE AUTOCORRELATION
- $d < 2$ – POSITIVE AUTOCORRELATION

**REFERENCES**


2. Ibid. p. 153
CHAPTER 5: CONCLUSION

Chapter 5 presents the summary of research findings, discussion and conclusions. Factors that have significant impact on the study are outlined under limitations and the probable ramifications of the findings are covered under the study implications. Finally the study makes a statement of recommendations on possible areas of further study in the future.

5.1 MODELS FOR SUBSCRIPTION RATES

MODEL 1 (NB: $R^2=0.36$; F=23%)

NOTE: Comprises all public offerings in the sample (both IPO and SPO), without qualification.

$$S = +1700.5 - 8.3857X_1 - 0.4815X_2 + 0.1741X_3 - 1.6454X_4 + 0.6316X_5$$
$$- 15.9670X_6 + 1.2903X_7 - 25.536X_8 - 32.7400X_9 - 32.1840X_{10} - 2.7886X_{11} + 0.0038X_{12}$$
$$- 0.1970X_{13}$$

MODEL 2 (NB: $R^2=0.60$; F=11%)

NOTE: comprises IPO only without qualification.

$$S = +2810.6 - 12.8400X_1 - 0.6286X_2 + 0.2503X_3 - 14.635X_4 + 0.8197X_5 - 25.483X_6$$
$$+ 1.9176X_7 - 33.5800X_8 - 45.6500X_9 - 27.6680X_{10} - 19.0780X_{11} + 0.0036X_{12}$$
$$- 0.2171X_{13} - 261.2000 TI$$

MODEL 3 (NB: $R^2=0.25$; F=35%)

NOTE: Comprises both IPO and SPO, but where sale proceeds are applied for asset financing.
\[ S = +1648.0 - 7.9222X_1 - 0.4752X_2 + 0.1705X_3 - 0.2061X_4 + 0.6275X_5 - 16.2360X_6 \\
    + 1.2715X_7 - 29.7220X_8 - 33.5710X_9 - 32.4290X_{10} - 3.2223X_{11} + 0.0040X_{12} \\
    - 0.2112X_{13} + 29.5820 \text{ UF} \]

**MODEL 4 (NB: } R^2=0.24; F=36\%\)**

**NOTE:** Comprises both IPO and SPO, with majority local ownership only.

\[ S = +1723.1 - 8.4848X_1 - 0.4881X_2 + 0.1762X_3 - 1.9504X_4 + 0.6326X_5 - 16.1410X_6 \\
    + 1.3052X_7 - 25.6920X_8 - 33.4380X_9 - 32.4860X_{10} - 2.3368X_{11} + 0.0038X_{12} \\
    - 0.2004X_{13} + 7.6081 \text{ MO} \]

**MODEL 5 (NB: } R^2 = 0.57; F=17\%\)**

**NOTE:** Comprises IPO, with majority local ownership only.

\[ S = +2885.4 - 13.0840X_1 - 0.6155X_2 + 0.2520X_3 - 15.2470X_4 + 0.8503X_5 - 26.2460X_6 \\
    + 1.9461X_7 - 34.1650X_8 - 43.7450X_9 - 24.8570X_{10} - 25.1570X_{11} + 0.0033X_{12} \\
    - 0.1997X_{13} - 312.5500 \text{ TI} - 48.4560 \text{ MO} \]
MODEL 6 (NB: $R^2 = 0.64$; $F=12\%$)

NOTE: Comprises IPO, with sale proceeds applied in asset financing only.

\[ S = +2866.4 - 12.1930X_1 - 0.6382X_2 + 0.2539X_3 - 12.4470X_4 + 0.8457X_5 \\
-28.4390X_6 + 1.9867X_7 - 49.7130X_8 - 51.2610X_9 - 27.5530X_{10} - 24.0440X_{11} + 0.0045X_{12} \\
-0.2702X_{13} - 316.8700 \text{ TI} + 101.8800 \text{ UF} \]

MODEL 7 (NB: $R^2 = 0.53$; $F=26\%$)

NOTE: Comprises IPO with majority local ownership and where sale proceeds are applied in asset financing.

\[ S = +2882.4 - 12.3500X_1 - 0.6329X_2 + 0.2540X_3 - 12.9110X_4 + 0.8518X_5 \\
-28.3020X_6 + 1.9868X_7 - 47.8610X_8 - 49.9670X_9 - 26.7010X_{10} - 25.2920X_{11} + 0.0043X_{12} \\
-0.2581X_{13} - 325.6900 \text{ TI} + 89.0520 \text{ UF} - 14.9330 \text{ MO} \]

\[ \text{MO} = \text{Local ownership} = 1, \text{ Versus Foreign ownership} = 0 \]

5.2 SUMMARY OF FINDINGS

The study has made some important findings on the relationship between subscription rates of public offerings in Kenya and certain micro-economic and stock market factors and certain other features pertaining to firms and types of offerings in the market place. Nine hypotheses were accepted as consistent with, and seven hypotheses were rejected as inconsistent with the existing literature and theories. However the
findings were found to be inconsistent with seven hypotheses and at variance with existing literature and theories.

**The nine hypotheses, which are consistent with the findings are:**

- Subscription rate is positively related to the following: firm size, spacing between offerings, price discount or underpricing, and money supply.
- Subscription rate is negatively related to the following: offer price, P/E ratio, and interest rate (TB rate).
- Subscription rate is relatively higher for IPO than SPO.
- Subscription rate is relatively higher where sale proceeds are planned to be applied in asset financing (either asset expansion or debt reduction) than when used for change of ownership.

**The findings on the following seven hypotheses that are inconsistent (that is the findings were contrary to hypotheses and existing theories)**

- Subscription rate is negatively related to the following: proportion of retained ownership by existing investors, the size of offering, the offer period, the dividend yield, the growth rate of GDP, and the level of NSE index
- Subscription rate is greater for firms with majority local ownership, than for foreign firms.

The overall explanatory power of the regression models ranged from relatively high to relatively low. Regression models for IPO produced higher explanatory power than SPO, ranging from 64% (IPO with sale proceeds applied in asset financing) to 53% (IPO with local ownership and sale proceeds used in asset financing) at statistical significance levels of between 11% and 26%. For regression models with combined IPO and SPO, the
explanatory power was considerably reduced to between 24% and 36% at significance
levels of between 23% and 36%.

5.3 DISCUSSION

The findings of the study were in support of nine hypotheses, and were
inconsistent with the remaining seven hypotheses. On closer examination of coefficients
of corresponding independent variables and levels of statistical significance, the
following inferences could be made:

- Significance levels for offer period, GDP, NSE index and the status of majority
  ownership of the firms in the sample were relatively insignificant. Accordingly
  the size and sign of the respective coefficients of independent variables are
  sample sensitive, and the findings are not free from occurrence by chance. The
  findings on these variables are therefore inconclusive. The Durbin Watson
  statistics indicate that the regression models suffer a weak form of negative
  autocorrelation. Autocorrelation has an adverse impact on estimation accuracy of
  the regression model. Economic parameters in the regression models are closely
  related and may give rise to autocorrelation.

- The subscription rate was taken as positively related to the size of offerings in the
  hypothesis. This was based on observation of higher interest by institutional
  investors for higher stock holdings and hence higher demand with resultant higher
  subscription rates. The condition holds true where public offering attracts more
  institutional investors than individual investors. However treating institutional and
  individual investors as equal then the higher the supply as represented by a larger
  size of offering, the greater the level of excess supply is likely to be with resultant
lower subscription rate based on laws of supply and demand. The findings are therefore compatible with the laws of supply and demand, excluding influences of special groups of investors.

- Proportion of retained ownership is widely used as a signaling mechanism for high quality firms. Although most studies have found a positive relationship, a few - (Myres) – have found a negative relationship. However, higher retained ownership denotes higher management entrenchment and may cause negative effect on new investors with resultant lower subscription rates as shown by the findings in this study.

- Nominal GDP growth rates are reported before being adjusted for inflation using a GDP deflator to obtain real GDP growth rates. The study used nominal GDP growth rates reported in various secondary sources. Inherent measurement errors may have affected the findings.

- Nominal interest rates as reported in various secondary sources were used in the study in lieu of real interest rates. It is likely that the inherent measurement errors may have had an adverse impact on the findings.

- Effects of inflation and implications of the time value of money during the study period may have affected those variables that are sensitive to these factors. These variables include: money supply (nominal money supply used in the study instead of real money supply), offer price, (actual price used instead of price modified to a base period), firm capitalization or size, and size of offering (based on actual market price and actual offer price respectively, instead of base year modified market price and modified market price respectively). The impact of the inherent
measurement errors on the findings could not be ascertained, but may have had some effects on the findings.

- The relatively higher explanatory power of regression models for IPO, ranging from 53% - 64% with relatively lower statistical significance levels of 11%, 12%, 17% and 26% indicates that the independent variables in the regression functions are jointly responsible for most of the variations in the dependent variable, the subscription rate. Therefore the respective multiple linear regression models have a close "fit" between the dependent variable and the independent variables for IPO. The adopted regression models are therefore more suited to IPO.

- The relatively lower explanatory power of regression models for combined IPO and SPO ranging from 24% to 36%, with relatively higher statistical significance levels of 24% to 36% indicates that the independent variables do not contribute to significant proportion of variations in the dependent variable, the subscription rate. The respective linear regression models may be less suited to combined IPO and SPO, or may be subject to specification errors, or some other significant factors may be omitted from the regression functions.

- The weak form of negative autocorrelation found may have some impact on the accuracy of coefficients of independent variables and results of t-tests. However the impacts are likely to be minor since the magnitude of negative autocorrelation is low.
5.4 CONCLUSION

The study has established a series of multiple linear regression models that explain a significant proportion of variations of subscription rates of public offerings in Kenya, particularly of IPO. For IPO, the independent variables could account for between 53% and 64% of variations in subscription rates. However for the combined IPO and SPO, the explanatory power reduced considerably to between 24% and 36% of variations in subscription rates.

The nature of correlation between subscription rates and independent variables and the strength of the correlation has been established by the signs and magnitudes of coefficients of independent variables. Nine hypotheses were found to be consistent with the findings and existing literature. On the basis of levels of statistical significance, some of the most important factors that influenced subscription rate (on reducing scale) were: spacing between consecutive offerings, level of underpricing or price discount, stock offer price, firm size, size of offering, dividend yield, proportion of retained ownership and whether the offering was IPO or SPO. However, seven hypotheses were found to be inconsistent. Of the seven hypotheses that were inconsistent with the findings of the study, four of them had statistically insignificant levels, indicating inconclusive findings. Measurement errors due to failure to allow for effects of inflation and the time value of money to the affected variables may have contributed to the problem, among other factors.

The following nine hypotheses are consistent with the findings. Subscription rate is positively related to the following factors: firm size, spacing between offerings, price discount or underpricing, and money supply. Subscription rate is negatively related to
the following factors: offer price, P/E ratio and interest rate. Subscription is greater for
IPO than for SPO, and is greater where sale proceeds are applied in asset financing than
where they are used for exchange of ownership. The findings on four of the seven
hypotheses found to be inconsistent with the findings, but found to have insignificant
probability levels are: Subscription rate is negatively related to: offer period, GDP, NSE
index, and that subscription rate is greater for locally owned firms than for foreign firms.
The findings on the remaining three hypotheses that were inconsistent, but were
statistically significant are: Subscription rate is negatively related to the proportion of
retained ownership, perhaps due to higher degree of entrenched management; and
subscription rate is negatively related to dividend yield, perhaps due to investors
preference of return in form of capital gain to dividend. The latter is a surprising finding.
Perhaps the investing population segment in Kenya has unique attributes that contribute
to this observation. This finding gives rise to a potential area of study in future.

5.5 IMPLICATIONS

The findings of this study make an important contribution to the determination of
factors influencing subscription rates of public offerings in Kenya. The findings are
useful to all stakeholders in public offerings. The findings provide an empirical basis for
predicting the possible level of subscription rate in a given set of existing economic and
market conditions, and with certain firm and offering features. To the issuers, financial
analysts and underwriters, the subscription rate models may be used to manage and
determine various options of offer price, price discounts, size of offerings and the most
ideal timing to make the offering. The objectives would be maximisation of sale proceeds
and making a successful offering through the manipulation of variables. It is important to
stress that the models are for estimation, and do not on their own account guarantee results. To investors, the findings are useful in evaluating the offer price as a basis of making a decision to invest, or otherwise. To market regulators, the findings are useful in assessing, for approval purposes, the offer price, the size of offering and the timing for sale. Other potential users may use the models for prediction of possible results given a set of variables to meeting their special needs. Academic institutions may use the models for training and research.

5.6 LIMITATIONS

The study was restricted to the period between 1984 and 1998 due to the availability of data. CMA and NSE do not hold comprehensive records of data on public offerings before 1984. Accordingly, the size of sample was restricted to 20 public offerings made between 1984 and 1998. The sample suffered asymmetric sectoral distribution, with 60% of the sample in the finance and investment, 20% in commercial and services, 15% in industrial and allied, and 5% in agriculture. Movements of business cycles in the economy affect each industrial sector differently. The findings of this study are therefore more representative of the finance and investment sector which dominates the sample than for application in the overall economy.

The number of variables in the regression models (maximum of 16) with a restricted sample of 20 for IPO and SPO, 15 for IPO and 5 for SPO, posed as an analysis problem due to the requirement of degrees of freedom for the regression equation. The number of variables could not be reduced due to the risk of omitting a significant variable. To resolve the problem, the analysis adopted a sequential discriminant technique where all 20 observations were retained in all models, but with certain
variables attached values of either 1 or 0 in different models to achieve the desired composition.

The study adopted average annual values of variables. However, there is generally wide variability and movement of data in one year. As a result, the annual average value may not be a representative value for the variable. Perhaps a weighted value may be more representative.

The form of presentation of data from the secondary sources was sometimes inappropriate. Economic parameters – interest rates, GDP rate and money supply – were reported in nominal term instead of real term. Other variables with monetary function – offer price, firm capitalisation and size of offering – were not corrected for inflation effects. The regression analysis was therefore exposed to measurement errors. The presentation of available data was therefore inadequate with regard to correction for inflation.

The specification of subscription rate models adopted linear regression functions. There may be specification errors since the models could assume other functions including multiplicative regression functions, among other options.

Other factors may have been omitted in the models. Of particular importance is the marketing of the offering, including levels of expenditure and promotion.

5.7 RECOMMENDATIONS

From problems cited under the section on limitations above further studies may spring from the findings of this research:

- The size of the sample of public offerings in Kenya will grow with time. This study may be repeated with a larger sample, perhaps more widely distributed
across the industrial sectors. Separate studies on iPO and SPO may be possible with a larger sample.

- Related variables may be compounded and the study repeated with fewer independent variables with likely improvement on regression problems of autocorrelation, heteroscedasticity (when error term is not random and does not have uniform variability about the theoretical regression line), and multicollinearity (when there is presence of a high degree of intercorrelation between independent variables). Perhaps more superior findings may be obtained.

- Using real values instead of nominal values to preclude inflation effects the study may be repeated, thus avoiding measurement errors, perhaps with better results.

- The study may be repeated using a larger sample and more variables, including the cost of marketing and promotion of sale of public offerings to test whether other significant factors were omitted in the models adopted in this research.

- Other forms of models may be tested, including multiplicative models among others, to improve on any probable inherent errors of specification.
APENDIX 1: POPULATION

Note: Grouped by industrial sectors

A) AGRICULTURAL SECTOR
1. Brooke Bond
2. Eaagads
3. George Williamson
4. Kakuzi limited
5. Kapchorua Tea Company Limited
6. Limuru Tea
7. Rea Vipingo
8. Sasini Tea & Coffee
9. Theta Group Limited

B) COMMERCIAL AND SERVICE SECTOR
10. African Lakes Corporation PLC
11. A. Bauman Company
12. CMC Holding Limited
13. Car and General (K)
14. Express Kenya
15. Hutchings Biemer
16. Kenya Airways Limited
17. Lonrho Motors East Africa Limited
18. Marshalls (EA) Limited
19. Nation Media Group
20. Pearl Drycleaners
21. Tourism Promotion Services
22. Standard Newspapers
23. Uchumi Supermarkets Limited.

C) FINANCE AND INVESTMENT SECTOR
24. Barclays Bank of Kenya
25. City Trust Limited
26. CFC Bank Limited
27. Diamond Trust Bank
28. ICDC Investment Company
29. Housing Finance Company of Kenya Limited
30. Jubilee Insurance Company
31. Kenya Commercial Bank
32. National Bank of Kenya
33. National Industrial Credit Bank
34. Regent Undervalued Assets
35. Pan Africa Insurance
36. Standard Chartered Bank

(D) INDUSTRIAL AND ALLIED SECTOR
37. Athi River Mining Limited
38. British American Tobacco
39. Bamburi Cement Limited
40. BOC Kenya Limited
41. Carbacid Investments
42. Crown Berger
43. Dunlop Kenya Limited
44. East African Cables
45. East African Packaging
46. East African Portland Cement
47. East African Breweries
48. Firestone East Africa Limited
49. Kenya National Mills
50. Kenya Oil Company
51. Kenya Orchards
52. Kenya Power and Lightning
53. Total Kenya
54. Unga Group
APPENDIX 2: SAMPLE

Note: Grouped by industrial sectors, and by the type of public offering (IPO or SPO)

A) AGRICULTURAL SECTOR
   1. Rea Vipingo (IPO)

B) COMMERCIAL AND SERVICE SECTOR
   2. Nation Printers (IPO)
   3. Uchumi Supermarkets (IPO)
   4. Kenya Airways (IPO)
   5. Tourism Promotion Service- TPS (Serena) (IPO)

C) FINANCE AND INVESTMENT SECTOR
   6. Jubilee Insurance Company (IPO)
   7. Barclays Bank (IPO)
   8. Kenya Commercial Bank (IPO)
   9. Standard Chartered Bank (IPO)
  10. Kenya Commercial Bank (1st SPO)
  11. Kenya Finance Corporation (IPO)
  12. Housing Finance Company of Kenya (IPO)
  14. National Industrial Credit (1st SPO)
  15. National Bank of Kenya (1st SPO)
  16. Kenya Commercial Bank (2nd SPO)
  17. Kenya Commercial Bank (3rd SPO)

D) INDUSTRIAL AND ALLIED SECTOR
  18. Crown Berger (IPO)
  19. Firestone (EA) (IPO)
  20. Athi River Mining (IPO)
### APPENDIX 3- DATA ON OFFERING ATTRIBUTES/FEATURES

<table>
<thead>
<tr>
<th>NAME OF FIRM</th>
<th>DATE</th>
<th>SUBSC. RATE</th>
<th>TYPE OF OFFERING</th>
<th>OFFER PRICE (KSH)</th>
<th>PRICE DISC. (%)</th>
<th>P/E RATIO</th>
<th>DIVIDEND YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Jubilee Insurance</td>
<td>Jun 1984</td>
<td>220</td>
<td>IPO</td>
<td>14.4</td>
<td>7.6</td>
<td>4.43</td>
<td>12.07</td>
</tr>
<tr>
<td>2) Barclays Bank (BBK)</td>
<td>Apr 1986</td>
<td>613</td>
<td>IPO</td>
<td>16.00</td>
<td>64.1</td>
<td>2.1</td>
<td>15.60</td>
</tr>
<tr>
<td>3) Kenya Commercial Bank (KCB)</td>
<td>Jul 1988</td>
<td>327</td>
<td>IPO</td>
<td>20</td>
<td>35</td>
<td>2.13</td>
<td>15.00</td>
</tr>
<tr>
<td>4) Nation Printers</td>
<td>Nov 1988</td>
<td>133</td>
<td>IPO</td>
<td>11.5</td>
<td>0</td>
<td>5.3</td>
<td>9.60</td>
</tr>
<tr>
<td>5) Standard Chart Bank (SCB)</td>
<td>Nov 1989</td>
<td>233</td>
<td>IPO</td>
<td>14.5</td>
<td>72.4</td>
<td>6.3</td>
<td>12.07</td>
</tr>
<tr>
<td>6) KCB</td>
<td>Oct 1990</td>
<td>147</td>
<td>SPO(1)</td>
<td>33</td>
<td>3</td>
<td>3.67</td>
<td>12.12</td>
</tr>
<tr>
<td>7) Kenya Finance Corporation</td>
<td>Nov 1991</td>
<td>110</td>
<td>IPO</td>
<td>12.5</td>
<td>0</td>
<td>8.48</td>
<td>16.00</td>
</tr>
<tr>
<td>8) Uchumi Supermarket</td>
<td>Dec 1992</td>
<td>103.2</td>
<td>IPO</td>
<td>14.5</td>
<td>44.8</td>
<td>3.76</td>
<td>15.52</td>
</tr>
<tr>
<td>9) Crown Berger</td>
<td>Dec 1992</td>
<td>104</td>
<td>IPO</td>
<td>16</td>
<td>18.8</td>
<td>7.37</td>
<td>14.06</td>
</tr>
<tr>
<td>10) Housing Finance Company</td>
<td>Nov 1992</td>
<td>400</td>
<td>IPO</td>
<td>7</td>
<td>10.7</td>
<td>9.86</td>
<td>14.28</td>
</tr>
<tr>
<td>11) Firestone</td>
<td>Oct 1994</td>
<td>101</td>
<td>IPO</td>
<td>33.5</td>
<td>20.9</td>
<td>10.03</td>
<td>5.20</td>
</tr>
<tr>
<td>12) National Bank of Kenya (NBK)</td>
<td>Nov 1994</td>
<td>300</td>
<td>SPO(1)</td>
<td>10</td>
<td>210</td>
<td>5.56</td>
<td>15.00</td>
</tr>
<tr>
<td>13) National Industrial Credit(NIC)</td>
<td>Sept 1994</td>
<td>77</td>
<td>IPO</td>
<td>52</td>
<td>0</td>
<td>10.1</td>
<td>3.37</td>
</tr>
<tr>
<td>14) Rea Vipingo</td>
<td>Mar 1996</td>
<td>216</td>
<td>IPO</td>
<td>10.5</td>
<td>37.6</td>
<td>6.73</td>
<td>16.00</td>
</tr>
<tr>
<td>15) Kenya Airways</td>
<td>Apr 1996</td>
<td>94.6</td>
<td>IPO</td>
<td>11.25</td>
<td>6.7</td>
<td>3.4</td>
<td>8.40</td>
</tr>
<tr>
<td>16) NBK</td>
<td>Jun 1996</td>
<td>250</td>
<td>SPO(1)</td>
<td>15</td>
<td>13.3</td>
<td>8.12</td>
<td>10.00</td>
</tr>
<tr>
<td>17) KCB</td>
<td>May 1996</td>
<td>150</td>
<td>SPO(2)</td>
<td>50</td>
<td>16</td>
<td>1.77</td>
<td>12.00</td>
</tr>
<tr>
<td>18) TPS (Serena)</td>
<td>Apr 1997</td>
<td>428</td>
<td>IPO</td>
<td>13</td>
<td>51.1</td>
<td>7.6</td>
<td>7.69</td>
</tr>
<tr>
<td>19) Athi River Mining</td>
<td>Jul 1997</td>
<td>162</td>
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### LEGEND

- **nub**: Number of firms issuing public offering (1 = Jubilee, 2 = BBK, 3 = KCB, 4 = Nation printers, 5 = SCB, 6 = KCB, 7 = Kenya finance, 8 = Uchumi, 9 = Crown Berger, 10 = HFCK, 11 = Firestone, 12 = NBK, 13 = NIC, 14 = Rea Vipingo, 15 = Kenya Airways, 16 = NBK, 17 = KCB, 18 = TPS (Serena), 19 = Athi River Mining, 20 = KCB)
- **ti**: Type of offering (I = IPO, 0 = SPO)
- **uf**: Use of sale fund/proceeds (1 = asset financing, 0 = change of ownership)
- **Mo**: Majority ownership (1 = local, 0 = foreign)
- **S**: Subscription rate (%) - dependent variable

### Xi
- Independent variable of regression Model
  - x1 = Retained ownership, x2 = Size of offering, x3 = Company Capitalisation, x4 = Offer period, x5 = Spacing between offerings, x6 = Offer price, x7 = Price discount/underpricing, x8 = P/E Ratio, x9 = Dividend Yield, x10 = Interest rate, x11 = GDP, x12 = Money Supply, x13 = NSE Index
## APPENDIX 8:
REGRESSION MODEL 1-IPO AND SPO

### LIMDEP Estimation Results

**Page 1**

- **Current sample contains** 20 observations.

### Ordinary least squares regression  
**Weighting variable = ONE**

- **Dependent variable is S1**  
  Mean = 218.09000, S.D. = 137.7

- **Model size: Observations = 20, Parameters = 14, Deg.Fr. = 6**

- **Residuals: Sum of squares= 72116.7 Std.Dev. = 109.63**

- **Fit:**  
  R-squared = 0.79990, Adjusted R-squared = 0.36

- **Model test: F[ 13, 6] = 1.84, Prob value = 0.23**

- **Diagnostic: Log-L = -110.2819, Restricted(A=0) Log-L = -126.3**

- **Amemiya Pr. Crt.=20433.059, Akaike Info. Crt. = 12.**

- **Autocorrel: Durbin-Watson Statistic = 2.10918, Rho = -0.05**

### Variable Coefficient Standard Error t-ratio P[^\prime T^\prime|t] Mean of X

| Variable | Coefficient | Standard Error | t-ratio | P[^\prime T^\prime|t] | Mean of X |
|----------|-------------|----------------|---------|-----------------------|-----------|
| Constant | 1700.5      | 698.52         | 2.434   | 0.05085               | 72.00     |
| X1       | -8.3857     | 5.4880         | -1.528  | 0.17737               | 501.2     |
| X2       | -0.48158    | 0.20192        | -2.385  | 0.05440               | 1937.     |
| X3       | 0.17416     | 0.71995E-01    | 2.419   | 0.05193               | 23.05     |
| X4       | -1.6454     | 7.1241         | -0.231  | 0.82502               | 262.0     |
| X5       | 0.63166     | 0.19681        | 3.209   | 0.01838               | 21.59     |
| X6       | -15.967     | 6.0481         | -2.640  | 0.03854               | 31.08     |
| X7       | 1.2903      | 1.0827         | 1.192   | 0.27835               | 30.08     |
| X8       | -25.536     | 19.849         | -1.286  | 0.24568               | 6.112     |
| X9       | -32.740     | 15.227         | -2.150  | 0.07509               | 11.81     |
| X10      | -32.184     | 26.537         | -1.213  | 0.27079               | 18.76     |
| X11      | -2.7886     | 21.646         | -0.129  | 0.90170               | 3.180     |
| X12      | 0.38141E-02 | 0.22796E-02    | 1.673   | 0.14533               | 0.186E1   |
| X06      | -0.19708    | 0.21280        | -0.926  | 0.39011               | 1788.     |

### LIMDEP Estimation Results

**Run log line 13**
CURRENT SAMPLE CONTAINS 20 OBSERVATIONS.

ORDINARY LEAST SQUARES REGRESSION

DEPENDENT VARIABLE IS S1

MODEL SIZE: OBSERVATIONS = 20, PARAMETERS = 15, DEG.FR. = 5

RESIDUALS: SUM OF SQUARES = 37890.5, STD.DEV. = 87.05

FIT: R-SQUARED = 0.89486, ADJUSTED R-SQUARED = 0.60

MODEL TEST: F[14, 5] = 3.04, PROB VALUE = 0.11

DIAGNOSTIC: LOG-L = -103.8460, RESTRICTED(α=0) LOG-L = -126.3

AMEMIYA PR. CRT. = 13261.682, AKAIKE INFO. CRT. = 11.85

AUTOCORREL: DURBIN-WATSON STATISTIC = 2.37318, RHO = -0.18

VARIABLE COEFFICIENT STANDARD ERROR t-RATIO P[3T3<0] MEAN

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STANDARD ERROR</th>
<th>t-RATIO</th>
<th>P[3T3&lt;0]</th>
<th>MEAN</th>
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| TI       | -261.20     | 122.90         | -2.125  | 0.08693   | 14

LIMDEP ESTIMATION RESULTS

RUN LOG LINE 14

CURRENT SAMPLE CONTAINS 20 OBSERVATIONS.
APPENDIX 10:
REGRESSION MODEL 3-IPO AND SPO WITH SALE
PROCEEDS USED FOR ASSET FINANCING

° Ordinary least squares regression  Weighting variable = ONE
° Dependent variable is S1  Mean = 218.09000, S.D. = 137.7
° Model size: Observations = 20, Parameters = 15, Deg.Fr. = 5
° Residuals: Sum of squares = 71065.2  Std.Dev. = 119.21
° Fit: R-squared = 0.80282, Adjusted R-squared = 0.25
° Model test: F[ 14, 5] = 1.45, Prob value = 0.35
° Diagnostic: Log-L = -110.1350, Restricted(α=0) Log-L = -126.3
° Autocorrel: Durbin-Watson Statistic = 2.11182, Rho = -0.05

Variable Coefficient Standard Error t-ratio P[^3T^-0t] Mean of

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<th>t-ratio</th>
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□

° LIMDEP Estimation Results  Run log line 15
° Current sample contains 20 observations.

124
APPENDIX 11:
REGRESSION MODEL 4-IPO AND SPO WITH
MAJORITY LOCAL OWNERSHIP

Ordinary least squares regression Weighting variable = ONE

Dependent variable is S1 Mean = 218.09000, S.D. = 137.7

Model size: Observations = 20, Parameters = 15, Deg.Fr. = 5
Residuals: Sum of squares = 71945.1 Std.Dev. = 119.95

Fit:
R-squared = 0.80037, Adjusted R-squared = 0.24

Model test: F[ 14, 5] = 1.43, Prob value = 0.36

Diagnostic: Log-L = -110.2580, Restricted(α=0) Log-L = -126.3


Autocorrel: Durbin-Watson Statistic = 2.12475, Rho = -0.06

Variable Coefficient Standard Error t-ratio P[|T|>|t|] Mean

| Variable | Coefficient | Standard Error | t-ratio | P[|T|>|t|] | Mean |
|----------|-------------|----------------|---------|-----------|------|
| Constant | 1.7231      | 791.65         | 2.177   | 0.08146   | 72.00|
| X1       | -0.48818    | 6.0729         | -1.397  | 0.22120   | 501.2|
| X2       | 0.22905     | 0.81045E-01    | 2.175   | 0.08166   | 193.7|
| X3       | 0.17665     | 0.2800         | -0.236  | 0.82312   | 23.05|
| X4       | -0.63267    | 0.21554        | 2.935   | 0.03243   | 262.0|
| X5       | 6.8068      | 2.371          | 0.06385 | 21.59     | 31.08|
| X6       | 1.1924      | 1.095          | 0.32361 | 31.08     | 6.112|
| X7       | -25.692     | 21.765         | -1.180  | 0.29092   | 6.112|
| X8       | -33.438     | 17.843         | -1.874  | 0.11980   | 11.81|
| X9       | -32.486     | 29.166         | -1.114  | 0.31602   | 18.76|
| X10      | -2.3368     | 24.042         | -0.097  | 0.92635   | 3.180|
| X11      | 0.38594E-02 | 0.25284E-02    | 1.526   | 0.18744   | 0.1861E

Run log line 16
Current sample contains 20 observations.

Ordinary least squares regression Weighting variable = ONE
**APPENDIX 12:**
**REgression Model 5-IPo with**
**Majority Local Ownership**

- Dependent variable is \( S1 \)  
  \( \text{Mean} = 218.09000, \text{S.D.} = 137.7 \)
- **Model size:** Observations = 20, Parameters = 17, Deg.Fr. = 3
- Residuals: Sum of squares = 26611.2, Std.Dev. = 94.18
- Fit: R-squared = 0.92616, Adjusted R-squared = 0.53
- Model test: \( F[16, 3] = 2.35 \), Prob value = 0.26
- Diagnostic: Log-L = -100.3123, Restricted (\( \alpha = 0 \)) Log-L = -126.3
  Amemiya Pr. Crt. = 16410.213, Akaike Info. Crt. = 11
- Autocorrel: Durbin-Watson Statistic = 2.46811, Rho = -0.23

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<th>t-ratio</th>
<th>( P[^2]'T[^2]t )</th>
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- **LIMDEP Estimation Results**
  Run log line 17
  Page 6
  Current sample contains 20 observations.
- Ordinary least squares regression
  Weighting variable = ONE
APPENDIX 13:
REGRESSION MODEL 6- IPO WITH SALES
PROCEEDS USED FOR ASSET FINANCING

- Dependent variable is S1 Mean = 218.09000, S.D. = 137.7
- Model size: Observations = 20, Parameters = 16, Deg.Fr. = 4
- Residuals: Sum of squares = 32253.8 Std.Dev. = 89.79
- Fit: R-squared = 0.91051, Adjusted R-squared = 0.57
- Model test: F[ 15, 4] = 2.71, Prob value = 0.17
- Diagnostic: Log-L = -102.2354, Restricted(\alpha=0) Log-L = -126.3
- Autocorrel: Durbin-Watson Statistic = 2.48103, Rho = -0.24

| Variable | Coefficient | Standard Error | t-ratio | P[|T|<t] | Mean |
|----------|-------------|----------------|---------|---------|------|
| Constant | 2885.4      | 790.97         | 3.648   | 0.02181 | 12.00|
| X1       | -13.084     | 4.9965         | -2.619  | 0.05888 | 7.600|
| X2       | -0.61552    | 0.18081        | -3.404  | 0.02717 | 50.12|
| X3       | 0.25202     | 0.69623E-01    | -3.620  | 0.02236 | 1937.|
| X4       | -15.247     | 8.6218         | -1.768  | 0.15173 | 23.05|
| X5       | 0.05035     | 0.18884        | 4.503   | 0.01080 | 262.0|
| X6       | -26.246     | 6.8344         | -3.840  | 0.01846 | 21.59|
| X7       | 1.9461      | 0.93822        | 2.074   | 0.10672 | 31.08|
| X8       | -34.165     | 16.735         | -2.042  | 0.11075 | 6.112|
| X9       | -43.745     | 14.142         | -3.093  | 0.03646 | 11.81|
| X10      | -24.857     | 22.103         | -1.125  | 0.32367 | 217.8|
| X11      | -25.157     | 20.730         | -1.214  | 0.29166 | 3.180|
| X12      | 0.33551E-02 | 0.19064E-02    | 1.760   | 0.15323 | 0.1861|

Run log line 18

Current sample contains 20 observations.
APPENDIX 14:
REGRESSION MODEL 7-IPO WITH MAJORITY
LOCAL OWNERSHIP AND WITH SALE PROCEEDS
USED FOR ASSET FINANCING

° Model size: Observations = 20, Parameters = 16, Deg.Fr.
4° Residuals: Sum of squares = 26973.2 Std.Dev. = 82.11
756° Fit: R-squared = 0.92516, Adjusted R-squared = 0.64
450° Model test: F[ 15, 4] = 3.30, Prob value = 0.12
882° Diagnostic: Log-L = -100.4474, Restricted(α=0) Log-L = -126.3
711° Amemiya Pr. Crt. = 12137.928, Akaike Info. Crt. = 11.
645° Autocorrel: Durbin-Watson Statistic = 2.43153, Rho = -0.21
576°

| Variable | Coefficient | Standard Error | t-ratio | P[>|t|]<0.05 | Mean of X |
|----------|-------------|----------------|---------|-------------|-----------|
| Constant | 2866.4      | 720.03         | 3.981   | 0.01639     |           |
| X1       | -12.193     | 4.5896         | -2.657  | 0.05659     | 72.00     |
| X2       | -0.63824    | 0.16490        | -3.870  | 0.01799     | 501.2     |
| X3       | 0.25394     | 0.63706E-01    | 3.986   | 0.01632     | 1937.0    |
| X4       | -12.447     | 8.0420         | -1.548  | 0.19659     | 23.05     |
| X5       | 0.84573     | 0.17065        | 4.956   | 0.00773     | 262.0     |
| X6       | -29.439     | 6.6153         | -4.299  | 0.01266     | 21.59     |
| X7       | 1.9867      | 0.95914        | 2.312   | 0.08181     | 31.08     |
| X8       | -49.713     | 19.863         | -2.503  | 0.06657     | 6.112     |
| X9       | -51.261     | 13.504         | -3.796  | 0.01917     | 11.81     |
| X10      | -27.553     | 19.978         | -1.379  | 0.23993     | 18.76     |
| X11      | -24.044     | 18.176         | -1.323  | 0.23646     | 3.180     |
| X12      | 0.45253E-02 | 0.18357E-02    | 2.465   | 0.06931     | 0.1861E   |
|+06       |             |                |         |             |           |
| X13      | -0.27024    | 0.16500        | -1.638  | 0.17681     | 1788.0    |
| TI       | -316.87     | 123.92         | -2.557  | 0.06283     | 0.7500    |
| UF       | 101.88      | 80.071         | 1.272   | 0.27217     | 0.5500    |

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BIBLIOGRAPHY


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