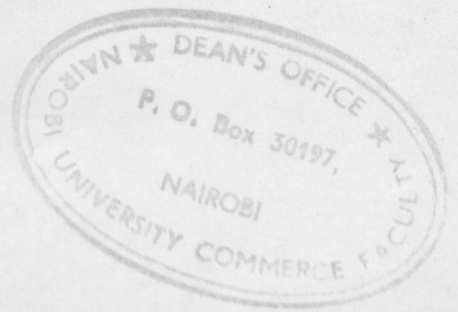


**TESTING THE EXISTENCE OF DIFFERENCES  
IN THE LEVEL OF UNDERPRICING  
BETWEEN PRIMARY AND SECONDARY  
OFFERINGS AT THE NAIROBI STOCK  
EXCHANGE**



**BY**

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**A MANAGEMENT PROJECT SUBMITTED IN PARTIAL  
FULFILMENT OF THE REQUIREMENTS OF THE DEGREE  
OF MASTER OF BUSINESS AND ADMINISTRATION  
(MBA) OF THE UNIVERSITY OF NAIROBI**

**AUGUST 1998**

Dedication

To my beloved parents, Mr Geoffrey Apaka Auko and Mrs Teresa Akumu Apaka,

Declaration in me a sense of hardwork and perseverance at early childhood.

This project is my original work and has not been submitted for a degree in any other University. To pursue further education and for her love and care to all family members.

Signed 

Dated 09/11/98

This project has been submitted for examination with my approval as the University supervisor.

Signed 

Dated 10/11/98

## Dedication

To my beloved parents, Mr Geoffrey Apaka Auko and Mrs Teresa Akumu Apaka, for instilling in me a sense of hardwork and perseverance at early childhood.

## Acknowledgement

To my late sister, Dorothy Adhiambo Apaka who gave me unwavering encouragement to pursue further education and for her love and care to all family members.

of Nairobi for the scholarship which enabled me to pursue MBA, and the subsequent support from the members of academia.

I am greatly indebted to my supervisor MR ERIC OBONYO ALELA for his constant guidance and constructive comments throughout the research process.

I would also like to thank members of the accounting department and particularly single out Mr Luther Oleno and Vincent Kamasara for their worthy contributions and stimulating discussions.

To the 1998 KISA chics and particularly Washington, Kennedy, Ely, John Bapiata and Madame Christine, I enjoyed every bit of your company and I wish you well.

I would also like to register my appreciation to Mr Julius Kiprotich for all the support he has accorded me.

My profound thanks also go to my brother (ii) Maurice Apaka and the rest of the family members for their prayers and inspiration.

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To accomplish this important landmark in my life, I needed every support that I could get from several individuals. I wish first and foremost to sincerely thank the University of Nairobi for the scholarship which enabled me to pursue MBA, and the subsequent support from the members of academia.

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**Abstract**

The study set out to examine difference in the pricing behaviour of primary and secondary offerings of common stock initial public issues occurring at the Nairobi Stock Exchange from the period 1980 to 1997. The study was specifically motivated to unearth whether the extent of underpricing is the same for the two types of offerings.

This objective was achieved by first obtaining the extent of underpricing in the whole market and subsequently in each category, thereby confirming existence of underpricing at the Nairobi Stock Exchange. Differences in levels/extent of underpricing between the two categories of offerings were tested using the Smith-Satterthwaite test.

Secondary data used in the analysis was obtained from the Nairobi Stock Exchange and Stock Brokers. The data analysis related to the pricing was analyzed by use of summary statistics. A statistical test was performed using the t-test to find out whether the underpricing was significant.

From the data analysis and findings, the research found no conclusive evidence to support the proposition that the extent of underpricing is the same for both primary and secondary types of offerings. Secondary offerings were underpriced at a higher level of 37.79 percent while primary offerings were underpriced at a lower 34.46 percent. These were statistically significant at 10%. The difference of

3.3 percent was also significant at 10%.

The findings also reveal that secondary offerings appear to go to the market at a

higher average offer price of Ks. 19.10 compared to the average offering price of primary offerings at Ks. 14.60. The difference in price was found to be statistically significant.

The major implication of the study is that it is advisable for promoters of the firms going public to separate the raising of funds for the firm (primary type) from the sale of personal holdings of shareholders (secondary type) in order to reduce the level of underpricing.

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# TESTING THE EXISTENCE OF DIFFERENCES IN THE LEVEL OF UNDERPRICING BETWEEN PRIMARY AND SECONDARY OFFERINGS AT THE NAIROBI STOCK EXCHANGE

## 1.0 Introduction;

The phenomenon of underpricing IPO shares remain a puzzle to Finance academicians. An Issuer should be aware that most IPOs are underpriced by a meaningful amount and that this underpricing is almost certainly related to the risk and uncertainty of the business. This is an important information to consider when the firm is making its Initial public offering.

The wave of privatization currently evident in Kenya has necessitated the need for the companies going public to correctly price their securities in order to attain the objective of full participation of the small investors. This can only be achieved if the securities are correctly priced. Most companies in Kenya have employed underpricing and attained successful floatations, with a good number recording oversubscriptions.

Underpricing with the due regard to the type of offering has become a major contemporary issue in Kenya's Capital market. Currently there are many State Owned Enterprises (SOE) earmarked for floatation at the Nairobi Stock Exchange. The question that begs is "to what extent should they underprice given their unique and different type of offerings". No doubt, other companies have come to the market basically to raise cheap finance to undertake heavy expansion programmes or simply to offset debt. This is radically and absolutely different from a situation whereby the existing shareholders dispose their holding to third parties and therefore the firm receives no funds in the process. The study sets out to unravel whether the extent of underpricing is the same irrespective of the various types of IPOs. More importantly and to the best of knowledge of the researcher, no study of this nature has been undertaken in Kenya.

Moko (1995) , Studying 10 firms found that the IPOs at the stock Exchange during the periods between 1984 and 1994 were at a discount on average. i.e. underpriced. He concluded that there's linear and positive relationship between the discount between the discount on offering price and the rate of subscription. No attempt was made to relate the underpricing to the respective types of offering.

Ritter(1991) reported that companies going public between 1975 and 1984 substantially under performed a comparison group of matching American stock. Exchange (AMEX) and NYSE for the three years following the offering date. He attributed the under performance to over optimism by investors at the time of the initial public offering (IPO)

The above two studies attempt to explain the return disparity in the two stock Exchanges without addressing the extent of underpricing in a given type of offering.

Logue (1973) and Prasad (1994) appear to be the studies that make some examination of the pricing behaviour for the different types of offerings. Logue (1973) found lower performance for higher proportions of secondary issues relative to the total issue.

Prasad (1994) found no difference in the level of underpricing for offerings compared to mixed offerings based on the first day excess returns. He therefore suggested expanding the study with a large sample (his sample was 35 firms) and including secondary offerings which were excluded from his study.

This is a major motivation for this study (by including secondary offerings)

The existence of the underpricing phenomenon has been well established for common stock initial public offerings. Earlier studies (as will be shown in literature review) have found that the average firm goes public with an offering price that is Lower than the price which prevails in the immediate after market. However, the extent of underpricing varies from firm to firm.

Most of the earlier empirical studies have concentrated on examining the underpricing of initial public offerings without due regard to the type of offering, even though an examination of the prospectus of various firms reveals that the mode of, and motivation for going public varies from firm to firm.

### 1.1 Types of offering:

Prasad (1990, 1994) points out that in, practice there are three types of offerings

- (i) The first type is that of pure primary offerings (which are referred to as primary offerings). Where only the Company offers shares to the public. In other words funds are raised by the firm through the issue of new shares to outside investors, and all the funds from the issue go to the firm after adjusting for the floatation costs. The purpose of the offering may be to expand operations or pay off debt. Many of the initial public offerings are observed to be primary offerings. In Kenya Examples of such firms include Rea Vipingo, Athi River Mining, Crown berger, Barclays etc.
- (ii) The second type is pure secondary offerings or secondary offerings, where only some of existing shareholders offer some or all of their shares to outside investors in the public offering. According to Prasad, the motivation for the firm going public appears to be “harvesting” by the existing shareholders. This could be the case when Barclays sold off its shares in the National industrial Credit, Sameer Investments sold its stake in Firestone, Pan African Insurance Company dispersed its shares in Kenya Finance Bank, Diamond Trust selling part of its stake in Nation, KNTC selling its shares in Uchumi, IDB selling its stake in EAO etc.

However, in Kenya the motivation for this type of offering has been majorly because of the Government's policy of privatization. The Government is currently disposing of its existing shareholding in Kenya Commercial Bank (three times) and has in the past sold its stake in National Bank of Kenya (two times), Kenya Airways, Uchumi, Housing Finance Company of Kenya, Tourism promotion services (Serena).

(iii) The third type is that of simultaneous primary and secondary offerings (referred to as mixed offerings) where both new shares of some existing shareholders are simultaneously made available for purchase by outside investors in the same public offering. This type, to the best knowledge of the researcher has not been experienced in the Nairobi Stock Exchange.

## 1.2 Statement of the Problem

In Kenya most of IPOs have been over subscribed by greater margins, Kenya Airways recorded a subscription rate of 96.4%, Kenya Commercial Bank 326%, National Bank of Kenya 300%, National Industrial Credit 77%, Crown Berger 104%, Housing Company of Kenya 400% among others.

However a number of questions arise relating to whether investors would distinguish amongst the three types of offerings (namely primary, secondary and mixed offering) while making their pricing and investment decisions.

Are investors indifferent between the choice of buying into a firm through the issuance of new shares by the firm or through the shares offered by existing shareholders (primary offerings vs secondary offerings)?

Will the investors be indifferent as to whether the shares are offered by the firm alone, or by the firm and existing shareholders simultaneously(primary offerings, Vs mixed offerings)? The investor may ask: why are existing shareholders selling out if the prospects for the firm are so great? Has the value of stock already reached its maximum?

**The null hypothesis of this study:**

The extent of underpricing is the same for all types of offerings of initial public offerings whether they are primary offerings or secondary offerings.

The study will only examine the extent of underpricing in primary Versus secondary offerings.

This is because these are the most common and prevalent types in Kenya.

(ii) Underwriters and Investment bankers: The results of this study will form a critical

their advisory roles and help them maintain a favourable reputation among the

### 1.3 Objective

The primary objective of this study is to investigate whether the extent of underpricing is the same for both primary and secondary types of offerings at the Nairobi stock exchange. This first objective will be achieved through another secondary objective by first confirming the existence of underpricing of IPOs in Kenya.

The expected trend would be for secondary offerings to be underpriced the most (viewed as most risky type of offering by investors) and primary offerings to be the least underpriced (viewed as the least risky type of offering investors). Such an expectation may be due to outside investors perception of higher risk in the case of firms with offerings in which the promoters of the firm are reducing their own holdings. Such dilution of ownership by the promoters may be viewed as being beyond any action required by the firm to continue its operations and growth.

correct state of knowledge by this work by way of literature review

#### 1.4 Importance of the study:

Determining the offering price is one of the critical steps in the process of going public. If the issue price is set too low, oversubscription can be achieved and the required funds obtained.

However the existing shareholders will experience a loss. If set too high, the issue may be unsuccessful and in the extreme case withdrawn

The findings of this study will be of valuable interest to the following groups:

- (i) **Firms going public:** The findings will enable them to correctly price their securities and thus record successful floatation. They will be able to appreciate how the type of offering affects the pricing mechanism
- (ii) **Underwriters and Investment bankers:** The results of this study will form a critical input in their advisory roles and help them maintain a favourable reputation among the investing public.
- (iii) **Investors:** The study will encourage and enlighten astute investors to make a “quick kill” during the “hot issues” period while at the same time dissuade them overpriced securities.
- (iv) **Academicians and Researchers:** The conclusions arrived at in this study will form the basis of further research in this highly unexplored area in Kenya

#### Overview of the Report:

The first chapter introduces the subject of research which ultimately leads to the statement of the problem. This is accomplished by way of some pertinent research questions resulting in formulation of hypothesis. Objective and importance of study is covered in this section.

The second chapter develops the conceptual framework of the study and finally reviews the current state of knowledge in this area by way of Literature review.

The third chapter captures the research design and methodology. It comprises the population, data collection methods and data analysis technique.

Chapter four consists of an analysis of the data collected and the findings of the study.

The final chapter will present the conclusions, recommendations and limitations of the study and makes suggestions for further research.

in unlisted or unquoted securities.

Going Public: The act of selling stock to the public at large by a closely held corporation or its principal stockholders. In Kenya this is quite popular with the Government's on going programmes of disinvestment through the Nairobi Stock Exchange.

Best efforts or underwritten issues: The firm going public and its investment banker must decide whether the banker will work on a best efforts basis or underwrite the issue.

In best efforts arrangement, the banker does not guarantee that the securities will be sold or that the company will get the cash it needs.

In an underwritten arrangement, the company does get a guarantee so the banker bears significant risks in the offering.

Underwriting: This is the process by which a company issuing new shares to the public enters into an agreement with an institution such as a bank under which the institution will agree for a fee to acquire a stated portion of any shares left unsold after a public issue of shares.

Underwriting is a requirement of the companies going public in Kenya and need to raise public finance.

Investment banker: This is a financial institution that underwrites and distributes new investment securities and helps firms design securities with features that are currently most attractive to investors, buy these securities from the firm and then reselling them.



## CHAPTER TWO

### 2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

#### 2.1 Definitions and Operationalizations:

Brigham (1992) defines and operationalize the following variables as here under:

**OTC (over the counter market).** This refers to the network of dealers that provides for trading in unlisted or unquoted securities.

**Going Public:** The act of selling stock to the public at large by a closely held corporation or its principal stockholders. In Kenya this is quite popular with the Government's on going programmes of disinvestment through the Nairobi Stock Exchange.

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Underwriting is a requirement of the companies going public in Kenya and need to raise public finance.

**Investment banker:** This is a Financial Institution that underwrites and distributes new investment securities and helps firms design securities with features that are currently most attractive to investors, buy these securities from the firm and then reselling them.

**Prospectus:** A document describing a new security issue and the issuing company.

**Underpricing:** Stocks are underpriced if they begin trading in the public markets at a price that is higher than the price of offering. If underpricing of new issues exists, one would expect a significantly positive value of the initial rate of return, the average percentage change in price from the offering price to the first published market price, adjusted for market effects.

## 2.2 Types of stock market transactions:

According to Brigham(1992), stock market transactions can be classified into three distinct types.

(i) Trading in the outstanding shares of established publicly owned companies: *the secondary market*. In this case, if an owner of shares of a company sells his or her stock, the trade is said to have occurred in the secondary market. Thus the market for outstanding shares or used shares is the secondary market. The company receives no new money when sales occur in this market. This basically is the secondary type of offering where existing shareholders sell their ownership portion and the company receive, no additional new funds. The receipts accrue solely to the shareholders.

(ii) Additional shares sold by established, publicly owned companies: *the primary market*. If a company decides to sell (or issue) an additional number of shares to raise new equity capital this transaction is said to occur in the primary market.

(iii) New public offerings by privately held firms: *the primary market*. This occurs for example if a company previously owned by a family or a closely held company decides to sell some stock to, raise capital needed for a major expansion program. This type of transaction is called *going public* - wherever stock in a closely held corporation is

offered to the public for the first time, the company is said to be going public. The market for stock that has recently gone public is called the Initial public offering (IPO) market.

It's also important to note that firms can go public *without raising any additional capital*. This is the case with secondary market offerings type.

### 2.3 Setting the offer price.

If a company is already publicly owned or is already quoted and trading, the offering price will be based on existing market price of the stock. For common stock, the most typical arrangement calls for the investment banker to buy the securities at prescribed number of points below the closing price on the last day of registration.

Investment bankers have an easier job if an issue is priced relatively low, but the issuer of the securities naturally wants as high price as possible. Therefore an inherent conflict of interest on price exists between the investment banker and the issuer.

Brigham (1992) observes that the announcement of a new stock offering by a mature firm is generally taken as a negative signal. He reckons that if the firm's prospects were very good, management would not want to issue new stock and thus share the rosy future with new shareholders. Because the announcement of a new stock offering is generally viewed as bad news, the price will probably fall when the announcement is made: therefore the offering price will probably have to be set at a price well below the pre-offering market. In Kenya various firms have gone public at prices lower than the pre-offer price. More recently for example KCB was offering its shares to the public at Ks 65 while the shares were trading at Ks 71, NBK offered its shares at Ks 15 while the trading price hovered at Ks 17.

Brigham.(1992) noted that the equilibrium price of a constant growth stock is found in accordance with the following equation:

$$P_0 = P_0 = D_1 / (K_s - g)$$

Where :

$P_0$ - market price. The price at which a stock sells in the market.

$P_0$  -Intrinsic value , the value of an asset that in the mind of a particular investor is justified by facts. It may be different from the assets current market price, its book value or both.

$g$ - the expected growth rate in dividends per share. This is the prediction of a marginal investor, defined as the representative investor whose actions reflect the beliefs of those people who are currently trading a stock.

$K_s$ - the minimum acceptable or required rate of return on the stock considering both its riskiness and the returns available on other investments.

$D_1$ - dividend the stockholder expects to receive at the end of the first year i.e the first dividend expected.

The values  $D_1$ ,  $K_s$ , and  $g$  are *estimates* made by the marginal investor.

Stockholders who regard a share as less risky than others assign a relatively low value for  $K_s$ .

The extent to which the demand curve can be shifted depends primarily on two factors;

- i) what investors think the company can do with the money - whether to repay debts or expand operations?

ii) How effectively the brokers promote the issue. This has been a common practice in Kenya. The extent to which this promotional campaign succeeds depends on the effectiveness of the investment banking firm.

If investors are convinced that the new funds raised will be used or invested in highly profitable projects that will substantially raise earnings and the earnings growth rate then the demand curve may be shifted back to or even to the right of the original curve, so the stock price might even go further above the initial offer price..

Final point. *If pressure from the new shares drive down the price of the stock, all shares outstanding, not just new shares will be affected.* Shareholders or the company in such a case would incur a loss. In a sense, that loss would be a floatation cost because it would be a cost associated with the new issue.

On the other hand if a company is going public for the first time, it will have no established price (or demand curve), so the investment bankers will have to estimate the equilibrium price at which the stock will sell after issue.

If the offering price is set below the true equilibrium price, the stock will rise sharply after issue and the company and its original stockholders will have given away too many shares to raise the required capital.

If the offering price is set above the true equilibrium price, the issue will fail or if the bankers succeed in selling the stock their investment clients will be unhappy when the stock subsequently falls to its equilibrium level. The recent unsuccessful rights issue of Kenya Breweries shares is a clear illustration of the phenomenon. The underwriter and the lead broker had set the price at Ks

53 while the market price preceding the offer stood at Kshs.47. Therefore its important that the equilibrium price be approximated as closely as possible.

**Procedure:**

Setting, the price of a new stock would involve selecting several similar firms with publicly traded common stock and making relevant comparisons. The similarity would be with respect to product mix, size, asset composition, and debt/equity proportions.

When analysing the companies its important to select reasonably normal years for all the companies (neither especially good nor especially bad in terms of sales, earnings and dividends). The Analyst would concentrate on such ratios as: *Earnings per share, price per share, Book value per share, market/book ratio, Total Assets, Total debts, sales*. The analyst then proceeds to calculate, earnings and dividend growth rates for the comparable companies, estimate the return on equity, dividend pay out ratios, debt to total assets ratios, P/E ratios for the comparable similar companies.

Finally, the analyst proceeds to determine the range of values for IPO price of the company by applying the similar firms P/E ratios to the data of the company whose price is to be estimated. Using the equation  $K=D1/po + g$ , the analyst estimates find the approximate K values, and then uses these values in the constant growth stock model to find the price at which the stock should be offered.

We would then be interested in selecting a price that will be low enough to induce investors to buy the stock but not so low that it will rise too sharply immediately after its issued.

## 2.4 Underpricing Puzzle:

IPOs are “underpriced” generally. Stocks are underpriced if they begin trading in the public markets at a price that is higher than the offering price.

This underpricing is a puzzle. The company going public, and any current shareholders of the privately owned firm who are selling as part of the public offering receive on average, the IPO price minus a commission or discount.

Underpricing is especially severe during the “hot issues periods” in the market. During such periods, the average issue sold in an IPO has increased in price by 25 percent to 50 percent immediately after issuance. In general the definition of a hot issue period is one in which issue values increase sharply after the IPO in the public market.

The larger or higher returns on IPOs in the public market generally occur on the **first trading day**. This simply means that the IPOs securities were sold at a price below their value.

**Why would issuers of IPOs willingly sell their stocks for less than their true value? A number of theories explain underpricing.**

One theory holds that issues are underpriced because the issuing companies owners do not know everything that the underwriters know. The assumption is that there’s an “**information assymetry**” between issuers and underwriters, and that without this assymetry issues would be fully priced.

A popular theory among academicians is that underpricing occurs to keep uninformed investors in the market. According to this theory, there are some well informed investors who regularly watch the IPO market. They see new issues and they can tell which ones are mispriced. They therefore buy only the underpriced issues and avoid all others.

An uninformed investor may place an offer to buy some shares in every offering irrespective of the type of offering. This uninformed investor will get to buy a lot of stock in the over priced or correctly priced offerings, but will obtain only a small portion of the offerings in which the informed investors are active. Unless the set of all offerings are underpriced on average, then uninformed investors would consistently lose money, they would leave the market and the market would breakdown. Early empirical evidence, as will be shown later is consistent with this theory. In particular it shows that offerings about which there's great uncertainty will tend to be more underpriced.

The most popular theory with underwriters and venture capitalist is what Brigham F.E. (1992) refers to as the "good taste in the mouth" theory. According to this theory if the company underprices its issue in an IPO, investors will be more receptive to future "seasoned" issues from the same firm. This is particularly the case with Kenyan firms where the Government offloads its stake in stages as in the case of Kenya Commercial Bank and National Bank of Kenya. In KCB, the Government initially disposed off 25 % and is currently planning to off load a further 25%.

In conclusion, these theories suggest that an IPO with less certainty concerning its value will tend to be more fully priced. This suggests some ways that firms can prepare themselves for public offerings at higher prices. For example offerings through more prestigious underwriters are on average less underpriced than offerings through less prestigious underwriters.



## 2.5 Review of the previous studies on IPO underpricing

### **Rationale for underpricing hypothesis:**

#### *2.51 Underwriter price support hypothesis*

Most current academic theories hold that the underpricing of IPOs is undertaken deliberately (Baron (1982) Rock (1986), Tinic (1988), Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch 1989).

Proponents of this view offer different rationales for intentional underpricing. Early theories held that the occurrence of positive IPO returns was a result of asymmetric information (Baron (1982), Rock (1986) and Beatty and Ritter (1986)).

In Baron (1982), underwriters are better informed about the appropriate price for IPO shares than the issuers because they possess better information about investors' demand for the securities.

The less certain the issuer is about the equilibrium price of its securities, the greater the demand for an investment banker's pricing advice. However, underwriters have incentives to recommend an offering price that is lower than the market clearing price, since underpricing reduces the effort necessary to sell the issue and reduces the probability that the underwriter will have to absorb unsold shares. This model predicts larger average underpricing for IPOs that are subject to greater uncertainty about their market-clearing prices.

Muscarella and Vetsuypens (1989) tested Barons' model by examining the IPO underpricing of the shares of 38 investment banks that marketed their own initial public offerings. Because the underwriter and the issuer are the same there should be no information asymmetry and hence less underpricing than in IPOs in which the issuer and the underwriter are not the same. Contrary to

Baron's theory, Muscarella and Vetsuypens found that self-underwritten IPOs by securities firms display underpricing comparable to that of other IPOs.

Rock (1986) proposed that there's information asymmetry between informed and uninformed investors. Because quantity rationing occurs rather than price adjustment when there's excess demand for shares the informed investors crowd out the uninformed investors for allocations of profitable issues. The allocations received by uninformed investors are biased towards less-profitable issues. Subsequently, to induce uninformed investors to participate in the IPO market, firms must underprice their IPOs to compensate the uninformed investors for this adverse selection.

Some aspects of Rock's theory have elicited controversies. First, the motivation for issuers to underprice to attract uninformed investors is not obvious. The extensive over subscription reported in Kenya alone and in other studies suggest that underpricing to attract uninformed capital is unnecessary. For example, Benveniste and Spindt (1989) note that all of the firm commitment IPOs placed by William Blair and Co. during the previous five years were oversubscribed in the pre-market period.

Ibbotson and Jaffe (1975), mention that it is not uncommon for underwriter to receive indications of interest for five times the number of shares available. Koh and Walter (1989) examined a sample of virtually all new public issues occurring in the Singapore stock exchange from its incorporation in 1973 to June 1987, to determine whether rationing occurs more often for "good" than for "bad" issues, a necessary condition if Rock is correct in arguing that uninformed investors face a *winners' curse*. Ninety percent of the IPOs occurring in Singapore stock market were oversubscribed. The average over subscription level was 29.4 times the offering size.

Several theorists have attempted to rationalize IPO underpricing as a signaling equilibrium phenomenon (Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989). A fundamental argument of these theories is that high-quality firms can afford to signal their type by underpricing their IPOs. Low-quality firms do not signal by underpricing their IPOs because they cannot recoup the cost of signal. The motivation for signaling is based on the assumption that the present value of the future benefit of IPO underpricing is greater than the immediate loss. This assumption lacks empirical support and in fact Ruud (1990) finds little evidence of any benefits accruing to the subsequent issuer via subsequent stock offering.

The above theories explicitly or implicitly assume that a deliberate decision is made by either the issuer or the underwriter to set the price below the expected market value. The effect of price support is to reduce the number of negative initial returns from what would otherwise be observed in free trading.

Underwriter price support (or stabilization) involves transactions that prevent or retard a decline in the market price of a security and is intended to facilitate a distribution. The Securities and Exchange commission prohibit security price manipulation but it has permitted price support on the grounds that it mitigates the underwriters losses stemming from temporary downward price pressure during selling period.

According to 1940 Securities and Exchange Commission release, stabilization is the buying of a security for the limited purpose of preventing or retarding a decline in its open market price in order to facilitate its distribution to the public.

## 2.52 Winner's curse

Much evidence suggests that IPOs of common stocks are systematically priced at a discount to their subsequent trading price (Smith 1986 and Ibbotson and Ritter (1993). In attempting to explain this puzzle, many academic researchers have looked to asymmetric information among the agents involved in IPOs.

One of the most convincing models supported by Matti (1993) is the one developed by Rock (1986), who applies the concept of winners' curse to the new-issue market. In his model, uninformed investors most often bid successfully for overpriced new issues, since informed investors crowd them out of underpriced new issues. If new issues were not, on average underpriced, uninformed investors would realize negative returns and withdraw from the new issue market. To prevent the result, the investment banker underprices new issues so that uninformed investors earn normal returns.

Matti (1993) provides evidence that the winners' curse decreases considerably the initial returns available to an uninformed investor. The fairness of the rationing principles generalizes the results to apply to any uninformed subscribers. The allocation rules are public information so investors can easily and accurately estimate the average allocation weighted initial returns.

It therefore emerges quite clearly that initial public offerings are underpriced. Smith (1986) summarised a number of papers that investigate underpricing and found that investors in IPOs earn excess returns of between 11% and 52%.

Recent figures are reported in Ibbotson, Sindelar and Ritter (1988). For 2259 firms in 1980-1984 period, the underpricing calculated from offering price to first closing bid in the after market was 21%. That these are not annual returns makes the numbers quite striking.

The explanation for underpricing observed in the IPO market included the monopsony power of investment bankers (Ritter 1984), insurance against legal liability (Ibbotson 1975, Tinic 1988), asymmetric information (Baron 1982), Rock 1986, Allen and Faulhaber (1989), Grinblatt and Hwang (1989) Welch (1989), Benveniste and Spindt (1989)

### 2.53 Legal Liability Hypothesis

According to Ibbotson and Tinic, IPO underpricing could provide insurance against legal liability and the associated damages to investment bankers' reputation. Underwriters underprice new issues as a cheap way of lowering the probability that the price will fall after the issue, which in turn reduces the likelihood of legal action by disgruntled buyers..

### 2.54 Asymmetric Information Hypothesis:

This underlies several models of IPO underpricing. Benveniste and Spindt (1989) argue that underpricing has been rationalised as a way to induce investors to reveal their reservation prices to underwriters. Underwriters are likely to have incomplete knowledge of individual investors' demand schedules for an equity issue, which is one reason seasoned offerings are actively promoted and prior indications of interest are solicited. This argument is of practical relevance to Kenya where aggressive promotional campaigns through both electronic and print media have preceded IPOs.

Differences in information between the firm and investors can also induce underpricing. Allen and Faulher (1989) and Grinblatt and Hwang (1989) argue that high quality firms rely on IPO underpricing to signal their better quality.

Rock further argues that IPOs are underpriced because of the winners' curse faced by uninformed investors. If new issues were priced at their expected value, informed investors would submit bids when good issues were offered and withdraw from the market when bad

issues were offered. In the absence of underpricing uninformed investors would therefore face prospects of systematic losses and pull out of the market. Underpricing thus could be necessary to entice uninformed investors to subscribe to new issues.

The concept of underpricing of IPOs must however be put in proper perspective by looking at certain precautions. While most studies report excess initial returns, a majority of them ignore the transactions costs, cost of searching or the opportunity cost of funds. This therefore implies that the real return may be lower than implied.

Van Horne (1970) attempted to incorporate this dimension by using ask prices instead of bid prices based on the assumption that the cost of purchase for an investor net of transaction costs is approximated by the ask price and a commission of 1%.

Van Horne (1970) concluded that the findings changed from the prior studies and that not all IPOs will guarantee significant price increase.

The other precaution worth noting, is the enthusiasm generated by the issue which may temporarily contribute to rise in price. Davis (1976) attempted to show the influence of the firms' size, method of issue and market volatility on market discount on new issues of equity. He argued that the degree of enthusiasm generated by any specific issue will have an impact on the other offer price.

Mc Donald and Fisher (1972) reported that the greatest danger perhaps is that speculation in the new issue market is self generating and a sharp rise in price often creates demand for an issue.

### 2.55 Other Works

Earlier studies discussed above, have firmly established the existence of underpricing. The existence of underpricing varies from study to study. Various factors cause differences in the

levels of underpricing: differences in the data set of various studies such as the number of IPOs in the sample and the time periods over which the IPOs were issued.

There are also variations in the methodology. One variation is in terms of the after-market period used in the calculations: **the calculations of the extent of underpricing may be based on the first day returns, and or first week returns and or first month returns.** Another variation is that in some studies underpricing has been measured in terms of **first day excess returns, and/or first week excess returns and/or first month excess returns.**

Reilly and Miller (1987) examined 53 common stock initial public offerings over the 1963 -

1965 period and found the first week returns to be 9% and the first month returns to be 8.00%.

Ibbotson (1975) examined 128 common stock IPOs issued over the period 1960-1969 and found

the first month return from the date of offering to be 11.40%. However when MC Donald and

Fisher (1972) examined 142 IPOs issued in 1969, they found the first week returns to be 28.5%

and the first month returns to be 34.60 percent.

Logue (1973) found the average first day published returns to be 30.00 percent when he

examined 250 IPOs over the 1965-69 period.

Neuberger and Hammond (1974) found for 816 common stocks IPOs over 1965-1969 that the

first week and first month returns to be 17.10 percent and 19.10 percent respectively.

Ibbotson and Jaffe (1975) found the first month return average to be 16.83 percent for all

common stock IPOs issued during January, 1 1960 to October 31, 1970.

Reilly (1987) examined 486 IPOs over the period 1972 - 1975 and found the first week returns to

be 10.90 percent while the first month returns to be 11.60 percent.

Block and Stanley (1980)\* found lower returns for 102 IPOs issued over 1974-1978 with the first

week returns and first month returns being 5.96 percent and 3.36 percent respectively. In

contrast Neuberger and La Chapelle (1983)\* found higher average returns for 118 IPOs over 1975-1980 period with the first week returns being 27.70 percent and the first month returns being 26.50 percent.

Ritter (1984) while examining 1028 IPOs over the period 1977 - 1982 found the average first day returns to be 26.5 percent.

Beatty and Ritter (1986) examined 545 IPOs issued during 1981-1982 period and found the first day returns to be 14.10 percent. However Chalk and Peavy\* (1987) found the first day returns to be 21.67 percent for 649 common stock IPOs issued during 1975-1982.

Miller and Reilly (1987) found the first day return to be 9.87 percent for 510 common stock IPOs over the period 1982-1983.

A number of theoretical explanations (as discussed previously) have been offered to explain the observed phenomenon of underpricing. In summary the explanations include:

- ii) **Favour to investors (Logue 1973; Baron and Holmstrom, 1980);**
- ii) **Information asymmetry and offering value uncertainty (Baron 1982, Rock 1986; Muscarella and Vetsuypens, 1989)**
- iii) **Reduction of underwriters risk (Neuberger and La Chapelle 1983)**
- iv) **Regulations - ceilings (Brandt 1985, 1986)**
- v) **Offering value uncertainty (Smith 1986).**
- vi) **Maintenance of underwriter reputation (Beatty and Ritter 1986)**
- vii) **Legal liability, (Tinic, 1988, Alexander 1993, Drake and Vetsuypens, 1993).**

\* In Gosh D.K and Khaksari (1995)



Almost all the theoretical explanations are based on or related to the level of risk perceived by potential investors.

Logue (1973) argues that an investment Banker minimises his costs and risks and gains favour with investors by underpricing. Investors tend to avoid issue which would make their ex ante returns normal or below normal. To assure a positive initial return to investors, the offering price is set below the expected market value.

On average thus, new issues would tend to rise a premium and generate superior returns in the absence of special factors.

Smith (1986) posit that the average underpricing is greater for issues with greater price uncertainty. Baron (1982) based his explanation of underpricing on the information asymmetry existing between investment bankers and issuers. He set up a theoretical model which implies that the amount by which the issue is underpriced is related to the uncertainty about the value of the offering. By implication therefore, there would be a larger amount of underpricing if there's larger uncertainty about the market value of the issue.

It emerges quite clearly that earlier papers listed above including Moko (1995) studies concentrated on underpricing in the case of IPOs as whole without considering that the market may perceive pure primary offerings to be different from pure-secondary offerings as well as mixed offerings.

Logue (1973) and prasad ((1994) appear to be the only studies to make some examination of the pricing behaviour for the different types of offerings.

Logue (1973) found lower performance for higher proportions of secondary issues relative to the total issue. Logue theorised that the significance of the secondary variable could be due to a closer relationship with the secondary issuers.

Prasad (1994) examined a small sample of 35 firms of OTC firms over 1984-1992. Prasad found no difference in the level of underpricing for primary offerings compared to mixed offerings based on the first day excess returns. However he found mixed offerings to be underpriced more than the primary offerings (although only at 15% level of significance), based on the first month excess returns. Prasad suggested expanding the study with a larger sample and including secondary offerings (which were excluded from his sample). Both Affleck-Graves et al (1993) and Prasad (1995) compared the extent of underpricing in different segments of the capital market.

Prasad (1995) found that the NYSE firms are not significantly underpriced on average. He further found that there's significant difference in the levels of underpricing of OTC firms when compared to the NYSE firms.

In conclusion therefore, the behaviour of IPOs appear to differ depending on which market segment the shares are to be subsequently traded. In Kenya Common Stock IPOs are offered at the Nairobi Stock Exchange and subsequently traded there.

In Kenya, Moko.S (1995). studied a sample of 10 companies quoted for the first time between 1984 and 1994 and found that on average the IPOs offer a short period return of approximately 47.5%. This implies therefore that from his study, IPOs on average are underpriced by 47.5%. The level of discount was significant both at 5% and 10% levels of significance.

Mokos (1995) offers two reasons that would explain the excess returns on IPO in Kenya.

- i) Pressure upon companies to undervalue their shares. This is one of the anomalies being addressed in the development plan 1994-1996. Mwarania (1989) cited the introduction of capital issues committee in 1971 (A Government agency housed in the Ministry of

Finance) with the power to regulate the timing, distribution, quantity and the pricing of any public issues of shares and stocks. This is one of the major policy mistakes initiated by the Government which brought to an end a new burst of growth experienced in NSE over the period 1966-1972.

ii) The Government policy of privatization and ensuring parastatals are sold to indigenous Kenyans may imply that new issues previously held by the Government are undervalued to enable most Kenyans buy the shares. A clear example is the case of National Bank.

Ibbotson and Jaffe (1975) studied the "Hot issue" markets. They focused on the hot issues market and defined them as periods in which the average first month performance (or after market performance) of new issues is abnormally high. They listed the dependency of new issue premia (after market performance) in a given month on the premia (and after market performance) of other new issues in past months. Their studies confirmed the existence and implications of hot issue markets. Serial correlations and runs tests indicate, that the first month series exhibit significant serial dependency. Investors thus should concentrate their purchases in months when new issue returns are expected to be highly positive..

Profit resulting from the dependency of the second month returns, though statistically significant are probably dominated by the transaction costs in the OTC market.

McDonald and Fisher (1972) investigated the price behaviour of unseasoned new issues of common stock immediately following the offering and over the subsequent year during the period 1969-70.

The theory of efficient market suggests that the price of the newly issued stock will adjust to reflect the available set of relevant information. To the extent that underpricing exists, the

difference between the offering price and subsequent market price constitute a "rent" that is distributed by the underwriter to initial purchasers of the stock. Mc Donald and Fisher (1972)

found that the rent, viewed as the initial rate of return was significantly positive during their period of study.

Their findings indicated significantly large returns for the initial subscribers, adjusted for market effects, in the first week following the offering. The evidence supports the efficient market notion of rapid adjustment of prices to available information so that subsequent returns from the first week to end of first year were not different for issues with large initial price increases as compared with returns on new issues as a whole.

From the prospectuses of the different firms information is drawn relating to the date of issue, offering price for each share, the first date of trading and the reason or motivation for going public.

3.3 Data collection:

### 3.3 Data collection:

The study will be purely based on secondary data obtained from the Nairobi Stock Exchange and stockbrokers. The following information will be specifically sought:

- (i) Issue price
- (ii) First recorded transaction price or bid price
- (iii) The stock exchange index at the time of issue and the date of the first trading after the quotation
- (iv) Prospectus- this will be used to find out the motivation for going public.

## CHAPTER THREE:

### 3.0 RESEARCH DESIGN AND METHODOLOGY

#### 3.1 Population:

The population of the study comprised all the quoted companies at the Nairobi Stock Exchange at the close of 1997. All companies qualify for the study in that at point in time they were listed for the first time in the Stock Exchange

#### 3.2 Sample:

The data relates to common stock initial public offerings of various firms that went public for the first time during the period starting 1980 up to the end 1997, for which prospectuses could be obtained from stockbrokers and the secretariat of the Nairobi Stock Exchange. The final sample relates to the data for 18 firms.

From the prospectuses of the different firms information is drawn relating to the date of issue, offering price for each share, the first date of trading and the reason or motivation for going public.

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- (iv) Prospectus- this will be used to find out the motivation for going public.

### 3.4 Data Analysis:

The study will basically employ descriptive statistics. Some of the descriptive statistics indicators that will be calculated include:

- (i) the average offering prices of the IPO.
- (ii) the standard deviation of the offering prices.
- (iii) the minimum offering price.
- (iv) the maximum offering price.

Further, a break up will be provided in terms of the two types of offerings, namely pure primary offerings (8 firms with an average offer price of Ks. 14.60) and pure secondary offerings (10 firms with an average offer price of Ks. 19.10)

T-statistic test will then be performed to test for levels of significance of underpricing.

### 3.5 Methodology:

The basic methodology followed in this study is similar to those used in earlier studies by McDonald and Fisher (1972), Reilly (1977), Neuberger and La Chapelle, Brandi (1985,1987) and Prasad (1994,1995).

In the first instance, the returns for each firm (for all the firms in the sample) are calculated for the one day period from the date of issue using the following equation based on the pricing data for each firm:

$$R_{j,1} = (P_{j,1} - P_{j,0}) / P_{j,0}$$

Where

$R_{j,1}$  is the one day return from the date of the issue for firm j.

$P_{j,1}$  is the closing stock price of the firm j on the issue date itself.

$P_{j.0}$  is the offering stock price of the firm  $j$ .

Data for the after market prices for each firm are obtained from Nairobi Stock Exchange daily price list.

Secondly, the corresponding market returns are calculated using values, of the 20-share NSE market index. The NSE-20 share index is used for this study since its the only index available and also formed from stocks listed at the Nairobi Stock Exchange. The market return based on the index is used to remove impact of any general movement in the share prices.

The equation for calculating the market returns is:

$$R_{mj.1} = (P_{mj.1} - P_{mj.0}) / P_{mj.0}$$

Where:

$R_{mj.1}$  is the one day return for the market index corresponding to the offering by firm;

$P_{mj.1}$  is the value of the market index corresponding to the offering by firm  $j$  (closing

value of the market index on the issue date itself)

$P_{mj.0}$  is the value of the market index corresponding to the offering stock price of the

firm  $j$ . (the closing value of the index on the day prior to the issue date for firm  $j$  or the opening

value of the index on the issue date)

Corresponding excess returns are then calculated for each firm using equation:

$$ER_{j.1} = R_{j.1} - R_{m.1}$$

Where:

$ER_{j.1}$  is the one day excess return corresponding to the issue by firm  $j$ .

$R_{j.1}$  is the one day return for firm  $j$ .

$R_{m.j.1}$  is the one day return for the market index corresponding to the offering by firm  $j$ .

## CHAPTER FOUR

The average (mean) excess returns are then calculated:

$$\text{Criteria } \text{AER1} = [(\sum \text{ER}_{j.1})/n]$$

Where: AER1 is the average one-day excess returns.

ER<sub>j.1</sub> is the one day excess return corresponding to the issue by firm j.

n is the number of firms.

The average (mean) excess return for each type of offering are then calculated after breaking up the sample into primary and secondary offerings.

For the purposes of testing; the null hypothesis, the study concentrates mainly on primary and secondary offerings.

Five levels of probability will be used for this study: 5 percent, 1 percent, 2 percent, 10 percent and 20 percent. By convention 5 percent is referred to as significant (\*), 1 percent is referred to as highly significant (\*\*) and 10 percent as also significant.

The significance of the difference is tested using the Smith-Satterthwaite test which is appropriate for smaller samples, as in the case of both primary (8) and secondary types of offerings (10).

Further, because the sample size is less than 30 observations, Z distribution is not the appropriate test statistic. Consequently the student t, or the t-distribution is used as the test statistic.

In this study, the computed value of the student t statistic is compared to the critical values (obtained from the student-t distribution tables) and decision is made.

A single decision procedure was adopted for the study since it requires no stipulation on the value of the population standard deviation and it may remain unknown. The decision rule is based on the student t.



## CHAPTER FOUR

### FINDINGS AND DATA ANALYSIS:

#### Criteria for decision making

In order to set up a rational basis for decision making, the researcher hypothesized that the null hypothesis,  $H_0$ , is true.

The researcher then examined the probability distribution of the test statistics under the above assumption and calculated the probability of obtaining as or more extreme a value than that which was actually obtained on the basis of the sample.

If the probability is small, it will be argued that the null hypothesis is unlikely to hold and will then be rejected.

Five levels of probability will be used for this study: 5 percent, 1 percent, 2 percent, 10 percent and 20 percent. By convention 5 percent is referred to as significant (\*), 1 percent is referred to as highly significant (\*\*), and 10 percent as also significant.

The significance of the difference is tested using the Smith-satterthwaite test which is appropriate for smaller samples, as in the case of both primary (8) and secondary types of offerings (10).

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Table 1

One day Excess Returns: Secondary

**Table 1**

**Level of underpricing**

**One day Excess Returns: Primary**

<u>Company</u>	<u>%</u>
Jubilee	10.38
Barclays	66.63
Kenya Finance Bank	32.23
Kenya Commercial Bank	34.70
Standard Chartered Bank	71.47
Crown Berger	18.41
Rea Vipingo	37.63
Athi River Mining	25.02

**Table 2****One day Excess Returns: Secondary**

<u>Company</u>	<u>%</u>
Nation Printers	38.79
Housing Finance Company	11.04
Uchumi	44.60
East Africa Oxygen	3.65
Coopers Motor Corporation	7.67
Firestone	14.85
National Bank	209.78
National Industrial Credit	-15.99
Kenya Airways	11.85
Tourism Promotion Services (TPS)	51.62

Number of offerings	18
Mean offering price (Ks.)	17.10
Standard deviation (Ks.)	10.00
Minimum offering price (Ks.)	7.00
Maximum offering price (Ks.)	52.00

It is quite evident from the above statistics that there appear to be differences in the average offering prices of both primary (Ks. 14.60) and secondary (Ks. 19.10) types of offerings.

**Table 3**

**Descriptive Statistics**

**Pure primary Offerings:**

No. of offerings	8
Mean offering price	14.60
Standard Deviation (Ks)	2.69
Minimum offering price (Ks)	10.50
Maximum offering price (Ks)	20.00

**Pure Secondary Offerings**

Number of offerings	10
Mean offering price (Ks)	19.10
Standard Deviation (Ks)	14.51
Minimum offering price (Ks)	7.00
Maximum offering price (Ks)	52.00

**Total Offerings**

Number of offerings	18
Mean offering price (ks.)	17.10
Standard deviation (ks.)	10.66
Minimum offering price (ks.)	7.00
Maximum offering price (ks.)	52.00

It is quite evident from the above statistics that there appear to be differences in the average offering prices of both primary (Ks. 14.60) and secondary (Ks. 19.10) types of offerings.

However in the total market the average firm goes public at Ks. 17.10.

This average offering prices and the associated levels of underpricing (along with their differences) are examined further as her under

**Table 4**

Mean Excess Returns: Primary Versus Secondary Offerings

	Primary offerings First day (%)	Secondary offerings First day (%)	Differences in offering. First day(%)
Mean	34.46	37.79	-3.33
Standard Deviation	26.12	63.85	
n	8	10	
Degree of freedom	7	9	12
t-value	3.73	1.87	-0.15

Notes:

n = number of observations

For each group degrees of freedom = (n-1)

t-value =  $\frac{\bar{x}}{\sqrt{S^2/n}}$

Type of	Level	Critical	1-tail	2-tail	1-tail	2-tail
		value	test	test	test	test
Primary	34.46	3.73	9.23	1.493	2.986	2.784
Secondary	37.79	1.87	28.19	1.258	2.821	2.262

X = average excess returns for the offerings

S = standard deviation of excess returns

For differences between groups, the researcher used Smith-Satterthwaite test;

$$df = \frac{\{(S_1^2/n_1) + (S_2^2/n_2)\}^2}{\{(S_1^2/n_1)^2/(n_1 - 1) + (S_2^2/n_2)^2/(n_2 - 1)\}}$$

The degrees of freedom are rounded off to the next lowest whole number.

$$t\text{-value} = \frac{X_1 - X_2}{\sqrt{\{(S_1^2/n_1) + (S_2^2/n_2)\}}}$$

Where:

$X_1$  = average excess returns for primary offerings

$X_2$  = average excess returns for secondary offerings

$S_1$  = standard deviation of excess returns for primary offerings

$S_2$  = standard deviation of excess returns for secondary offerings

$N_1$  = number of primary offerings

$N_2$  = number of secondary offerings

Levels of significance:

Table 5

Type of offering	Level of under pricing	Computed t-statistic	S.E	T-test*				
				1%	2%	5%	10%	20%
Primary	34.46	3.73	9.23	3.499	2.998	2.365	1.895	1.415
Secondary	37.79	1.87	20.19	3.250	2.821	2.262	1.833	1.383

\*Critical values with relevant degrees of freedom

For differences between groups: Mean Excess Returns (Underpricing)

**Table 6**

Computed Statistics	T-test				
	1%	2%	5%	10%	20%
-0.15	3.055	2.681	2.179	1.782	1.356

**Table 7**

Mean offerings prices: Primary Versus Secondary Offerings.

	Primary offerings First day (Ks)	Secondary offerings First day (Ks)	Difference in offer- ings. First day (Ks.)
Mean	14.60	19.10	-4.53
Standard deviation	2.69	14.51	
Number of			
Observations, n	8	10	
Degrees of freedom	7	9	9
T-value	15..35	3.16	- 0.96

Notes:

n = number of observations

For each group: degrees of freedom = (n - 1)

$$t\text{-value} = \frac{x}{\sqrt{S^2/n}}$$

For differences between groups: Mean offering prices

Where:  $X$  = average excess returns for the offerings

$S$  = standard deviation of excess returns

For differences between groups: (Smith-Satterthwaite Test)

$$df = \frac{\{(S_1^2/n_1) + (S_2^2/n_2)\}^2}{\{(S_1^2/n_1)^2/(n_1 - 1) + (S_2^2/n_2)^2/(n_2 - 1)\}}$$

The degrees of freedom are rounded to the next lowest whole number

$$t\text{-value} = \frac{X_1 - X_2}{\sqrt{\{(S_1^2/n_1) + (S_2^2/n_2)\}}}$$

Where:

$X$  = average mean offering price for primary offerings

$X$  = average for secondary offerings

$S$  = standard deviation of mean offering price for primary offerings

$S$  = standard deviation of mean offerings price for secondary offerings

$N$  = number of primary offerings

$N$  = number of secondary offerings

**Table 8**

Type of offering	Mean offering prices	Computed t statistics	S.E	T-test				
				1%	2%	5%	10%	20%
Primary	14.60	15.35	0.95	3.499	2.998	2.365	1.895	1.415
Secondary	19.10	3.16	4.59	3.250	2.821	2.262	1.833	1.383



For differences between groups: Mean offering prices

Table 9

Computed statistic	1%	2%	5%	10%	20%
-0.96	3.250	2.821	2.262	1.833	1.383

As may be seen from table 4, primary offerings tradable at the Nairobi Stock Exchange are underpriced by 34.46 percent on average. However this level of underpricing was found to be statistically significant since the computed t-statistic was above all the critical t-values.

In contrast, secondary offerings are underpriced at a higher level of 37.79 percent which is significant at only 10% level.

The difference in underpricing of 3.33 percent is however found to be statistically significant at only 10%.

Similarly, secondary offerings appear to go to the market at a higher average offer price (Ks. 19.10) compared to the average offering price of primary offerings (Ks. 14.60).

The difference in price of Ks. 4.50 is found to be statistically significant at 10%. Probably these results have been greatly influenced by the small sample sizes.

Even though these preliminary results appear to be in line with the expected trends examination of larger samples is required to judge the support for the above results.

<u>Company</u>	<u>Offer price</u>	<u>Net Asset value per Share</u>	<u>Offer price as % of Net Asset value</u>	<u>Relative undervaluation overvaluation</u>
JIC	14.50	29.07	49.88	undervalued (50%)
BBK	16.00	31.54	51.73	undervalued (48%)
KFB	13.00	13.62	95.45	undervalued (4.55%)
KCB	20.00	26.65	75.05	undervalued (25%)
SCB	14.50	9.92	146.17	overvalued (46%)
CB	16.00	15.08	106.10	overvalued (6%)
RV	10.50	6.55	160.30	overvalued (60%)
ARM	12.25	56.64	21.62	undervalued (78%)
NPP	11.50	28.08	40.95	undervalued (59%)
HFCK	7.00	10.00	70.0	undervalued (30%)
Uchumi	14.50	19.00	76.32	undervalued (24%)
EAO	26.50	39.83	66.53	undervalued (33%)
CMC	10.00	66.31	15.08	undervalued (85%)
FIR	35.50	21.32	166.52	overvalued (65%)
NBK	10.00	14.00	71.42	undervalued (29%)
N. I. C.	52.00	11.87	438	overvalued (338%)
KQ	11.25	5.19	216.76	overvalued (117%)
TPS	13.00	13.63	95.37	undervalued (4.63%)

## CHAPTER 5: SUMMARY, CONCLUSIONS AND IMPLICATIONS

Another contemporary method of valuation involves looking at the resources an organization own, i.e. the Net asset value. Many companies have based their pricing mechanism in terms of the Networth of an entity. This involves setting the offer price above or below or at par with the Net Asset Value.

In this connection therefore, the researcher attempted to relate issue price to Net Asset Value per share with an objective of finding out whether the issue price was below or above the Net Asset value per share.

Using this analysis, a share is undervalued if the offer price is below the Net Asset value per share while over valued if the price is above the net asset value per share.

Using this methodology, CMC (from the secondary type) emerges as the most undervalued security at 85% while Kenya Finance Bank (from the primary type) is the least underpriced at 4.55%. These levels of underpricing are statically significant at both 5% and 10% levels. This confirms the previous findings.

Data Analysis further reveals that most of the issues (67%) were actually undervalued relative to the asset value or worth of a share in terms of the asset share.

## Implications:

The implication emanating from this study is that it may be advisable for providers (stock brokers and underwriters of new issues) to consider separating the raising of funds for the firm

## CHAPTER 5: SUMMARY, CONCLUSIONS AND IMPLICATIONS

in order to reduce the level of underpricing. This is particularly important in Kenya today.

The findings of this study appear to provide support for the expectation that secondary offerings would be underpriced the most followed by least underpricing in the case of primary offerings.

These results however have been influenced by the small sample sizes.

From the total sample studied, the average underpricing (as measured by the mean excess returns) for primary and secondary type of offerings is 34.46 percent and 37.79 percent respectively.

The difference in the mean first day excess returns (level of underpricing) provides an initial

conclusion that the market considers secondary offerings to be more risky than primary offerings.

In the analysis, secondary offerings exhibits a fairly large standard deviation of mean excess returns (Ks. 63.85) compared to primary offerings (26.12). This dispersion provides the inherent risk (variability) in each type of offerings.

The t-values show statistically significant support for the conclusion that the market views secondary offerings as more risky than primary offerings. The difference in the mean first day excess returns of 3.33 percent is found to be significant at only 10%.

It would be therefore rational to confirm that the average firm at the Nairobi Stock Exchange goes public at a discount of 36.3 percent. However, the extent of underpricing differs depending on the type of offering: whether primary (34.46 percent) or secondary (37.79 percent).

### Implications: *the study and suggestions for further research*

The implication emanating from this study is that it may be advisable for promoters (stock brokers and underwriters of new issues) to consider separating the raising of funds for the firm through public offerings (primary type) from the sale of their personal holdings (secondary type) in order to reduce the level of underpricing. This is particularly important in Kenya today, especially with the government on-going programme of divestment through the Nairobi Stock Exchange, and attempt to maximize revenue collection in a bid to narrow the budget deficit. The difference in the underpricing of secondary and primary offerings is significant at 10 percent. It would therefore be appropriate for existing shareholders to harvest their investment at the time the firm is going public to raise additional funds to expand operations as in the case of Athi River Mining and Rea Vipingo. They may realize relatively less, due to the underpricing, if the firm goes public specifically for the purpose of harvesting (case of Barclays in National Industrial Credit, Sameer Group in Firestone, Government through privatization programmes). Both the firm and the existing shareholders are better off with pure – primary offerings with the shareholders harvesting or disposing their stakes in the after market.

Another obvious implication from the study is that because on average the initial public offerings are underpriced, short-term holding would be highly profitable to the initial subscribers. This is glaringly illustrated in the case of National Bank of Kenya shares. Thus short-term investor can earn a higher return as opposed to buying after the offer in the market.

From the analysis, the researcher found no conclusive evidence to conclude that the extent of underpricing is the same for primary and secondary types of offerings. The null hypothesis was thus rejected.

### Limitation of the study and suggestions for further research

For future research, further examination is required using larger samples. The sample analyzed here is small.

Also, the research could be extended using a one month period, one week period from the date of the offering since Brandi (1987) suggests that it may take four weeks or more for the IPO to reach market equilibrium.

The researcher also suggests that this study could be extended to assess impact of the trading system on the signaling behaviour of IPOs as a whole as well as for the three types of offerings.

NPP	Nation Printers & Publishers
HFCK	Housing Finance Company of Kenya
EAO	East African Oxygen (Now BOC)
CMC	Coopers Motors Corporation
FIR	Firestone East Africa (1969) Ltd
NBK	National Bank of Kenya
NIC	National Industrial Credit
TFS	Tourism Promotion Services (Kenya)
KQ	Kenya Airways

# LIST OF COMPANIES QUOTED ON THE NAIROBI STOCK EXCHANGE

**KEY:**

- JIC - Jubilee Insurance Company
- BBK - Barclays Bank of Kenya
- KFB - Kenya Finance Bank
- KCB - Kenya Commercial Bank
- SCB - Standard Chartered Bank
- CB - Crown Berger
- RV - Rea Vipingo
- ARM - Athi River Mining
- NPP - Nation Printers & Publishers
- HFCK - Housing Finance Company of Kenya
- EAO - East African Oxygen (Now BOC)
- CMC - Coopers Motors Corporation
- FIR - Firestone East Africa (1969) Ltd
- NBK - National Bank of Kenya
- NIC - National Industrial Credit
- TPS - Tourism Promotion Services (Serena)
- KQ - Kenya Airways

# LIST OF COMPANIES QUOTED ON THE NAIROBI STOCK EXCHANGE

## A Equities

### AGRICULTURAL

Brooke Bond Kenya Ltd. \*  
*Eaagads Ltd.*  
George Williamson Kenya Ltd. \*  
Kakuzi Ltd. \*  
*Kapchorua Tea Co. Ltd.*  
*K.P.C.U Ltd.*  
Limuru Tea Co. Ltd.  
Ol Pejeta Ranching Ltd.  
Rea Vipingo Plantations Ltd.  
*Sasini Tea & Coffee Ltd. \**  
*Theta Group Ltd.*

### COMMERCIAL AND SERVICES

A. Baumann & Co. Ltd.  
*African Tours & Hotels Ltd.*  
*Car & General (K) Ltd.*  
*CMC Holdings Ltd.*  
*Express Kenya Ltd.*  
*Hutchings Biemer Ltd.*  
*Kenya Airways Ltd. \**  
*Kenya Hotels Ltd.*  
Lonhro Motors (E.A) Ltd. \*  
*Marshalls (E.A) Ltd.*  
Nation Printers & Publishers Ltd. \*  
*Pearl Drycleaners Ltd.*  
*Phillips International Ltd. (Currently Suspended)*  
*The Standard Newspapers Ltd.*  
*Uchumi Supermarkets Ltd. \**  
*T P S (Serena) Ltd.*

\* Companies that constitute the NSE 20-Share Index

## B Bonds

*Treasury Bond Issue 3/97 due Feb 1998*  
*Treasury Bond Issue 4/97 due July 1998*  
*Treasury Bond Issue 5/97 due October 1998*  
*Treasury Bond Issue 1/98 due February 1999*  
*East African Development Bank Bond due 1999*

NB: Locally controlled companies are marked out in italics above, including the Bonds.

### FINANCE AND INVESTMENT

Barclays Bank of Kenya Ltd. \*  
*CFC Bank Ltd.*  
Chancery Investments Ltd.  
*City Trust Ltd.*  
*Diamond Trust Bank (K) Ltd. \**  
*Housing Finance Co. of K. Ltd. \**  
*I.C.D.C Investments Co. Ltd.*  
*Jubilee Insurance Co. Ltd.*  
*Kenstock Ltd.*  
*Kenya Commercial Bank Ltd. \**  
*Kenya Finance Bank Ltd. (Currently Suspended)*  
*National Bank of Kenya Ltd.*  
*NIC Bank Ltd*  
*Pan Africa Insurance Co. Ltd.*  
Standard Chartered (K) Ltd. \*  
Regent Undervalued Assets Africa Fund

### INDUSTRIAL AND ALLIED

Athi River Mining company Ltd.  
B.A.T Kenya Ltd. \*  
Bamburi Cement Ltd. \*  
BOC Kenya Ltd. \*  
Carbacid Investments Ltd.  
Crown Berger (K) Ltd.  
Dunlop (K) Ltd.  
E.A. Cables Ltd.  
E.A. Packaging Industries Ltd. \*  
*E.A. Portland Cement Ltd.*  
Firestone East Africa (1969)  
*Kenya Breweries Ltd. \**  
*Kenya National Mills Ltd. \**  
*Kenya Oil Co. Ltd.*  
*Kenya Orchards Ltd.*  
*Kenya Power & Lighting Co Ltd. \**  
Total Kenya Ltd. \*  
*Unga Group Ltd.*



## COMPARATIVE DATA OF RECENT NEW ISSUES

Company (Issuer)	Securities	Type of Issue	Subscription Open	Issue Price	Dividend Yield	PE	Underwriter	Sponsoring Brokers	Rate of Subscriptions
				*Sum Raised	*New Shareholders	Ratio	*Privatization(=P)		
1. Jubilee Insurance Co. Ltd.	800,000 Shs.5/= Ord. Shares	Public Issue	28/05/84 to 13/05/84	Shs.14.50 *Shs.11.5m.	12.07%	4.43	Diamond Trust of Kenya Ltd. (1.5%)	Ngonye Karuki & Co. Ltd.	220%
2. Barclays Bank of Kenya Ltd.	5 million Shs.10/= Ord. Shares	Public Issue	07/04/86 to 21/04/86	Shs.16/= *Shs.80m.	15.6% *40,000	2.16	None	Francis Drummond & Co. Ltd AND Francis Thuo & Partners Ltd	613%
3. Kenya Finance Corporation Ltd.	2,276,460 Shs.10/= Ord. Shares	Private Placing	09/06/87 to 31/07/87	Shs.13/= *Shs.29.59m.	11.5%	8.78	None	Ngonye Karuki & Co. Ltd.	103%
4. Kenya Commercial Bank Ltd.	7.5 million Shs.10/= Ord. Shares	First Public Issue	28/06/88 to 19/07/88	Shs.20/= *Shs.150m.	15% *110,000	2.15	- None (=P)	Francis Thuo & Partners Ltd	327%
5. Total Oil Products (E.A.) Ltd.	2.7 million Shs.5/= Ord. Shares	Private Placing	26/09/88 to 02/11/88	Shs.18.25 *Shs.49.275m.	15.6%	3.15	None	Ngonye Karuki & Co. Ltd.	106%
6. Nation Printers & Publishers Ltd.	2.5 million Shs.5/= Ord. Shares	Public Issue	07/11/88 to 30/11/88	Shs.11.50 *Shs.28.75m.	9.6% *57,000	5.30	Diamond Trust of Kenya Ltd. (1.5%)	Ngonye Karuki & Co. Ltd.	113%
7. Standard Chartered Bank Kenya Ltd.	21 million Shs.5/= Ord. Shares	Public Issue	16/10/89 to 8/11/89	Shs.14.50 *Shs.304.5m.	12.07% *57,000	6.30	None	Francis Drummond & Co. Ltd. AND Ngonye Karuki & Co. Ltd.	233%
8. Kenya Commercial Bank Ltd.	9 million Shs.10/= Ord. Shares	Second Public Issue	10/09/90 to 02/10/90	Shs.33/= *Shs.297m.	12.12%	3.67	None (=P)	Francis Thuo & Partners Ltd.	147%
9. Trade Bank Ltd.	16 million Shs.5/= Ord. Shares	Private Placing	01/03/91 to	Shs.8.50 *Shs.136m.	15%	9.24	None	Ngonye Karuki & Co. Ltd AND Dyer & Blair Ltd	100%
10. Kenya Finance Corporation Ltd.	3.26 million Shs.10/= Ord. Shares	Public Issue	22/10/91 to 18/11/91	Shs.12.50 *Shs.40.75m.	16%	5.63	Pan African Ins. Co. Ltd.	Ngonye Karuki & Co. Ltd.	110%
11. Housing Finance Co. of Kenya Ltd.	18 million Shs.5/= Ord. Shares	Public Issue	07/10/92 to 4/11/92	Shs.7/= *Shs.126m.	14.28% *19,766	9.86	None (=P)	Ngonye Karuki & Co. Ltd.	303%
12. Ceroma-Berger Kenya Ltd.	8.63 million Shs.5/= Ord. Shares	Public Issue	9/11/92 to 01/12/92	Shs.16/= *Shs.138.08m.	14.06% *2,220	1.01	None	Shah Munge & Partners AND Francis Thuo & Partners	100%
13. Unchumi Supermarkets Ltd.	16 million Shs.5/= Ord. Shares	Public Issue	17/11/92 to 08/12/92	Shs.14.50 *Shs.232m.	15.52%	3.75	None (=P)	Francis Thuo & Partners Ltd.	100%
14. E.A. Oxygen Ltd. (IIBP)	1.6 million Shs.5/= Ord. Shares	Divestiture	01/03/93 to 31/03/93	Shs.26.50 *Shs.42.4m.	6.3%	5.14	Industrial Dev. Bank (=P)	Francis Thuo & Partners Ltd.	100%
15. CMIC Holdings Ltd. (The Treasury)	2 million Shs.5/= Ord. Shares	Divestiture	22/03/93 to 22/04/93	Shs.10/= *Shs.20m.	11%	5.05	*Treasury PRPC (=P)	Dyer & Blair Ltd	120%
16. National Industrial Credit Ltd. (Barclays Bank of Kenya Ltd)	17,929,286 Shs.5/= Ord. Shares	Offer for Sale	15/08/94 to 14/09/94	Shs.52= *Shs.932m.	3.37% *22,903	8.20	*Vendor Barclays Bank of Kenya Ltd.	Shah Munge & Partners Ltd.	70%
17. Firestone E.A. (1969) Ltd. (Samsar Inv. + Bridgestone Firestone)	40 million Shs.5/= Ord. Shares	Offer for Sale	19/09/94 to 14/10/94	Shs.35.50 *Shs.1420m.	5.2% *1,251	11.45	*Vendor Samsar Inv. Ltd. AND Bridgestone Firestone Inc.	Shah Munge & Partners Ltd. AND Dyer & Blair Ltd.	101%
18. National Bank of Kenya Ltd. (The Treasury)	40 million Shs.5/= Ord. Shares	Offer for Sale	04/10/94 to 02/11/94	Shs.10/= *Shs.400m.	15% *38,522	5.95	*Vendor Treasury (=P)	Francis Thuo & Partners Ltd.	330%
19. REA Vipingo Plantations	12 million Shs.5/= Ord. Shares	Private Placement	5.5.95 to 31.5.95	Shs.8.50 *102m.	20%	6.03	None	Shah Munge & Partners Ltd. AND Ngonye Karuki & Co. Ltd.	100%
20. Unchumi Supermarkets Ltd.	7.5 million	Offer for	16.5.95	Shs.5.00					

# NAIROBI STOCK EXCHANGE LIMITED

## SHARE ISSUES 1984 - 1996

YEAR	COMPANY	TYPE OF ISSUE	SECURITIES	ISSUE PRICE (KSHS.)	DIVIDEND YIELD	SUBSCRIPTION OPEN	SUBSCRIPTION RATE	AMOUNT RAISED
1984	Jubilee Insurance Co.	Public	800,000	14.40	12.07%	28/5 - 13/6 1984	220%	11.6M
1986	Barclays Bank (K) Ltd.	Public Issue	5,000,000	16.00	15.6%	7/4 - 21/4 1986	613%	80M
1987	Kenya Finance Corporation Ltd.	Private Placing	2,276,460	13.00	11.5%	9/6 - 31/7 1987	103%	29.6M
1988	Kenya Commercial Bank Limited	First Public Issue	7,500,000	20.00	15%	28/6 - 19/7 1988	327%	150M
1988	Total Oil Products Ltd.	Private Placing	2,700,000	18.25	15.6%	26/9 - 2/11 1988	106%	49.275M
1988	Nation Printers & Publishers Ltd.	Public	2,500,000	11.50	9.6%	7/11 - 30/11 1988	133%	28.75M
1989	Standard Chartered Bank Ltd.	Public Issue	21,000,000	14.50	12.07%	16/10 - 8/11 1989	233%	304.5M
1990	Kenya Commercial Bank Limited	Public Issue	9,000,000	33.00	12.12%	10/9 - 2/10 1990	147%	297M
1991	Kenya Finance Corporation	Public Issue	3,261,970	12.50	16.00%	22/10 - 11/11 1991	110%	40.8M
1992	Uchumi Supermarkets Ltd.	Public Issue	16,000,000	14.50	15.52%	17/11 - 08/12 1992	103.20%	232M
1992	Crown Berger	Public Issue	8,638,000	16.00	14.06%	09/11 - 01/12 - 1992	104%	138M
1992	HFCK	Public Issue	18,000,000	7.00	14.28%	07/10 - 04/11 - 1992	400%	126M
1994	Firestone E.A (1969) Ltd.	Public Issue	40,000,000	33.50	5.20%	19/9 - 12/10 1994	101%	1420M
1994	National Bank of Kenya Ltd.	Public Issue	40,000,000	10.00	15.00%	4/10 - 2/11 - 1994	300%	400M
1994	National Ind. Credit Ltd.	Public Issue	17,929,286	52.00	3.37%	15/8 - 14/9 - 1994	77%	718M
1995	Rea Vipingo	Private	12,000,000.00	8.50	20%	5/05 - 31/05/95		102M
1996	Rea Vipingo	Public Issue	8,000,000	10.50	16%	4/03 - 20/03/96	216%	84M
1996	Kenya Airways	Public Issue	235,423,896	11.25	8.4%	25/03 - 19/4/96	94.6%	2.6B
1996	National Bank of Kenya	Second Public Issue	40,000,000	15.00	10%	20/05 - 18/06/96	subscription	still open

1US\$ = 58.2 Kenya Shillings (May 30 1996)

NAIROBI STOCK EXCHANGE  
CAPITAL RAISED IN NEW ISSUES SINCE 1980

YEAR	COMPANY	ISSUER	TYPE OF ISSUE	INSTRUMENT	AMOUNT RAISED KES (MILLIONS)
1980	Bamburi Portland Co.	Private Co.	Public	Common Equities	60.62
	Pan African Paper Mills	Govt.	Private Placement	Debenture Stock	20.00
1981	Bamburi Portland	Private Co.	Rights	Common Equities	23.93
1982	Kenya Oil Co.	Private	Loan Option	Common Equities	10.42
1983	Diamond Trust	Private Co.	Public	Common Equities	10.06
1984	Jubilee Insurance Co.	Private	Public	Common Equities	11.60
1985	---	---	---	---	---
1986	Kenya Oil Co.	Private	Public & Loan Option	Common Equities	100.00
1987	Barclays Bank of Kenya	Private	Public	Common Equities	80.00
1988	Kenya Finance Corporation	Private	Private Placement	Common Equities	29.60
	Kenya Commercial Bank	Govt.	Public	Common Equities	150.00
	Total Oil Co.	Private	Private Placement	Common Equities	49.30
1989	Nation Printers & Publishers	Private	Public	Common Equities	28.80
	Barclays Bank	Private	Rights	Common Equities	42.80
1990	Standard Chartered Bank	Private	Public	Common Equities	304.50
	Kenya Commercial Bank	Govt.	Public	Common Equities	297.00
1991	ICDC	Govt.	rights	Common Equities	126.00
	Kenya Finance Corporation	Private	Public	Common Equities	40.75
1992	Housing Finance Co.	Govt.	Public	Common Equities	126.00
	Crown-Berger Kenya	Private	Public	Common Equities	138.10
	Uchumi Supermarkets	Govt.	Public	Common Equities	232.00
1993 ✓	CMC Holdings	Govt.	Public	Common Equities	20.08
	E.A. Oxygen	Govt.	Public	Common Equities	42.40
1994	National Industrial Credit	Private	Public	Common Equities	727.20
	Firestone E.A. Ltd.	Private	Public	Common Equities	1,410.94
	National Bank of Kenya	Govt.	Public	Common Equities	400.00
	Kenya Finance Bank	Private	Rights	Common Equities	61.90
1995	Rea Vipingo Plantations	Private	Private Placement	Common Equities	102.00
	Uchumi Supermarkets	Govt.	Public	Common Equities	22.00
1996 *	Rea Vipingo Plantations	Private	Public	Common Equities	84.00
	Kenya Airways	Govt.	Public	Common Equities	2,664.00
	National Bank of Kenya	Govt.	Public	Common Equities	600.00
	GRAND TOTAL				8,016.00

\* Up to June 1996

## APPENDIX F

Student *t*-Distribution

df	Level of significance for one-tailed test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for two-tailed test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
$\infty$	1.282	1.645	1.960	2.326	2.576	3.291

Source: This table is abridged from Table III of Fisher and Yates: *Statistical Tables for Biological, Agricultural, and Medical Research*, published by Oliver and Boyd Ltd., Edinburgh, by permission of the authors and publishers.

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