AN EMPIRICAL STUDY OF SPOT MARKET EFFICIENCY ON KENYA'S FOREIGN EXCHANGE BUREAUX

BY

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DECLARATION

This research project is my original work and has not been presented for any award in any other university or college.

Signed.....**Date**20/10/98

Paul Kibet Kurgat Arap Kigen

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

Signed.....**Date**3/11/98

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DEDICATION

To my parents;

Toiyoi, Siokwei and Kigen Arap Chemagut

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ACKNOWLEDGEMENT

... I do not cease to give thanks for you,
making mention of you in my prayers ...
Ephesians 1:16

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ABSTRACT

They are all plain to those who understand, and right to them that find knowledge ... - Proverbs 8:9.

In 1995, Kenya repealed the Exchange Control Act, an important feature in the liberalisation of trade and foreign exchange regimes. This called for a legalisation of the hitherto "black market" into the Foreign Exchange Bureaux.

This paper looks at the efficiency of the Foreign Exchange Bureaux markets in Kenya. The intention here is to ascertain whether information is widely and cheaply available to the market participants. Secondary data was obtained from Central Bank of Kenya and analysed using chi-square distribution, F-distribution and line graphs. The results obtained are discussed in this report.

The paper mainly found that the Foreign Exchange Bureaux market is generally inefficient as evidenced by the number of arbitrage opportunities that exist. However, possible benefits to Kenya from the introduction of the Forex Bureaux include an increased availability of foreign currency and reduced inconveniences which small-scale foreign currency buyers formerly experienced in the previous exchange control regime. The most important development is the increased level of economic activity in the country due to easy access to foreign currency.

CHAPTER I

INTRODUCTION

1.1 Background

The foreign exchange market deals with the buying and selling of foreign currencies to and from individuals, businesses, governments and other participants. Since independence, Kenya maintained restrictions on foreign exchange currency transactions, including amounts of foreign currency that could be purchased. The government licensed for specific foreign currency requirements only and kept an outright prohibitions of foreign currency handling in the hands of individuals. As a result of these restrictions, illegal markets developed in response to demand for foreign currency. Over the past two decades the trade and foreign exchange policies followed by Kenya have been nothing but restrictive. In 1971, for instance, a system of import licensing was introduced to control foreign exchange. The numerous foreign exchange restrictions that resulted led to the rapid development of a "black market". Because of the severity of the exchange controls, by the late 1970's, almost all the major international currencies were readily available in all quantities in the "black market".

The Exchange Control Act was repealed in 1995 and as at the end of 1997, Kenya's Foreign exchange reserves were US $1363 Million compared to US $ 857 Million in 1993. Studies done have shown that exchange control as a means to regulate capital was

never a solution as capital found its way out of the country because of lack of security for investments or limited investment channels (Killick, 1981). The bureaucratic red tape involved in obtaining foreign exchange approval raised the costs of doing business, which was subsequently passed on to the customer. Mckinnon (1979) clarified the role of international monetary arrangements in a multi-currency world. The most important aspect of a currency with respect to transactions involving other currencies is its convertibility. A currency is convertible if:

> Domestic residents wishing to buy foreign goods and services, not specifically restricted, can freely sell domestic for foreign currency in a unified market at a single but possibly variable exchange rate covering all current transactions inclusive of normal trade credit, whereas non-residents with balances in domestic currency arising from current transaction can sell them at the same foreign exchange rate or purchase domestic goods freely at prevailing domestic-currency prices (Mckinnon, 1979).

The increased inflow of private capital can be beneficial, particularly to the developing countries because it is a source of foreign exchange which may be used for financing imports, which in turn can lead to higher investment and economic growth. Central banks can purchase this private inflow for purposes of managing foreign exchange markets and servicing their governments' foreign debts. These short-term inflows also carry risks, which if not well managed, can damage stability of a country, depending on the prevailing exchange rate regime. A floating exchange rate regime forestalls the instability of a currency since it allows the exchange value of currency to be determined by the market forces. While a fixed or pegged exchange rate regime on the other hand would result in an overvalued or undervalued currency and would, more often than not, lead to attacks on the currencies by speculators, thus causing damage to the economy.

Until 1995 when the Forex Bureau system started, it was illegal to transact business in what was considered the "black market", and many dealers have faced the wrath of the law. Interestingly however, the more the government intervened through arrests, confiscation and prosecutions, the more divergent the prices on the official and illegal markets became. The "black market" therefore flourished. The government of Kenya decided in 1995 to license individuals, companies and financial institutions to open Foreign Exchange Bureaux where the general public could buy and sell foreign currencies. The introduction of the Forex Bureau concept therefore legalised a previously illegal market, giving rise to numerous advantages such as the ability of the government to receive tax revenue on the transactions in the market. It also instilled confidence in the foreign exchange market in general, which is necessary for a faster economic development in the country. One view proposed by Friedman (1953) is that because speculators buy low and sell high, their activity ensures that exchange rates reflect the fundamental determinants of currency values. In developing countries, the perception of policy makers on either flexible and fixed exchange rates is important as it may lead to positions that could trigger market interventions.

1.2 Definitions of Terms

Efficiency has two meanings in economic and finance literature. The first is in terms of optimality, were we question whether it is possible to improve the welfare of at least one participant in the economic system without worsening the welfare of any other participant. Where that possibility exists, then a state of economic efficiency has not been attained. The second meaning of efficiency examines the prices of commodities for possibilities of earning higher than "normal" profits, considering the risk taken. Again, where the possibility of abnormal profits exists, market efficiency has not been attained. In this study, market efficiency is more closely related to the second meaning.

Foreign exchange is the process according to which the currency of one country is exchanged into the currencies of other countries, While "*exchange rate*" is the price of a domestic currency in terms of a foreign currency (Exchange Control Act, 1967).

Travellers cheques/Drafts are documents intended to enable the person to whom the documents are issued to obtain foreign currency from some other persons on the credit of the person issuing them (Central Bank of Kenya, Amendment Act, 1995).

The classic definition by Fama (1970) of an *efficient market* is where prices "fully reflect" all available information. When this condition is satisfied, he argues, investors cannot earn an unusual profit by exploiting available information. Also, efficiency shows

whether information is widely and cheaply available to the market participants as defined by Brealy and Myers (1991). Peirson *et al* (1990) on his part defined an efficient market as one where it is not possible for market participants to make instantaneous risk-free profits.

Exchange rates governing "spot" trading are called *spot exchange rates*, and the deal is called a spot transaction. In the spot transaction, the seller has to deliver the foreign exchange (forex) to the buyer on the spot (usually within two days). "*Forward exchange rate*" on the other hand is where the contract is signed and the seller agrees to sell a certain amount of forex to be delivered at a future date at a price agreed upon in advance. Analogously, a buyer agrees to buy a certain amount of foreign exchange at a future date at a predetermined price.

Roll and Ross (1984) defines *arbitrage* as buying an asset in one market at a lower price and simultaneously selling an identical asset in another market at a higher price with no cost or risk. *Arbitrage profit* can be used as a measure of the efficiency of the Forex Bureau market and it is defined as the process of taking advantage of the existence of different prices for the same product (or substitute) at the same time but in different markets (Riehl and Rodriquez, 1977). If the market is efficient, one should expect absence of arbitrage profits while in an inefficient market, cases of arbitrage profits can be obtained.

1.3 The Research Problem

A few studies have been done on the foreign exchange market in Kenya. For example Dlamini (1987) focused on foreign exchange management through quantitative controls, and Sharpley (1984) examined the foreign exchange content of Kenyan agriculture. Empirical studies (Levich, 1979a, Frenkel and Levich, 1975) have clearly established the strong roles that arbitrage plays in international financial markets. These empirical tests of spot market and forward market efficiency have been based on small samples using statistical techniques. Rigorously tested academic models and performance studies of professional forecasters clearly demonstrate that arbitrage profit opportunities are available (Levich, 1979a).

In an efficient forex market, prices of foreign currency should be set so that "unusual profits" from arbitrage are quickly eliminated so that the participants are unable to take advantage of the market. Since efficient market means that it should not be possible for market participants to make instantaneous risk-free profits, any participant regardless of speculators in the market should be able to buy or sell to any Bureau since the rates available in all the Bureaux are the same. There will be no need of trend chasing by the participants. If foreign exchange markets are governed by the Efficient Market Hypothesis, then arbitrage should be continually equal to zero. On the other hand, if the market is inefficient then there will be arbitrage cases occurring at short intervals and participants in the market can take advantage of the inefficient market by buying at a lower price in one Bureau and selling to another Bureau at a higher price. In inefficient

market, arbitrageurs will be the main actors in the forex market. In theory, arbitrage profit is essentially risk free and can be completed in a matter of seconds, so any profit in excess of transaction costs is arbitrage profits. When licensing these Forex Bureaux, the government needs to know the type of participants in the market for efficient allocation of resources. Overall, it is not clear whether agents who pursue profitable trading opportunities in the market are irrationally wasting their resources. Although the weight from evidence from markets world-wide seems to lean toward market inefficiency, it is equally not clear if agents could systematically exploit these apparent inefficiencies. The major participants in the forex market plays a role in the Kenyan economy, hence, two questions are clear; Who are the participants in this Kenyan forex market?, and is the market efficient?

1.4 Objective of the Study

The study seeks to determine the efficiency of the market by looking at possible arbitrage opportunities on the Kenyan foreign exchange market.

1.5 Importance of the Study

i) The study will be of benefit to the Kenyan government in making policy decisions regarding the foreign exchange market.

ii) The study will generate information regarding operations of Bureaux to all participants in the Forex Bureaux in Kenya and any other interested party.

iii) Finally, the study will be useful to academicians as a basis for future research to be conducted on the Forex Bureau market of Kenya.

1.6 Organisation of the Study

The research is organised into five chapters. Chapter One covers the background of the study, the research problem, the objectives and importance of the study. Chapter Two covers literature review on Forex Bureau operations and the studies done on foreign exchange market. Chapter Three is the research design. The analysis and findings of the study are in Chapter Four, while Chapter Five bears the conclusions, limitations and policy recommendations.

CHAPTER II

LITERATURE REVIEW

2.1 Efficient Market Hypothesis

An asset market is efficient if prices fully reflect all available information so that economic profits cannot be earned through exploiting this information set (Fama, 1970). Grossman and Stiglitz (1980) argue that a precondition for Efficient Market Hypothesis (EMH) is that information and trading costs (i.e. the cost of getting prices to reflect information) are always zero. Thus, they suggest that market efficiency per se is not testable but it must be tested jointly with some model of equilibrium like an asset-pricing model. Fama (1970) notes that we can only test whether information is properly reflected in prices in the context of a pricing model that defines the meaning of "properly". Fama (1991) reported that instead of weak-form tests, which are only concerned with the forecast power of past returns, it should cover the general area of *tests for return predictability*. Instead of semi-strong form tests of the adjustment of prices to public announcements, he proposed changes in title to be *event studies* and instead of strong form tests of whether specific investors have information not in the market prices, he suggested the more descriptive title, *tests for private information*. He argues that event studies give the most direct evidence on efficiency because they come closest to allowing a break between market efficiency and equilibrium-pricing issues.

Continuing advances in communication technology and globalisation of markets makes the market more efficient. When asset and commodity markets are efficient (in the sense of reflecting information), economic agents who make decisions on the basis of observed prices will ensure an efficient allocation of resources. These agents (participants) in the foreign exchange market consist of two types; arbitrageurs and other investors. Arbitrageurs, also called "smart money" and "rational speculators", are investors who form fully rational expectations about asset returns. In contrast, the expectations and trading behaviours of other investors also known as "noise traders" and "liquidity traders" may be subject to systematic biases. In general, the efficiency studies suggest that the major foreign exchange markets exhibit behaviour that is characteristic of other asset markets. The speed with which information is exchanged between markets provides the opportunity for quick and efficient arbitrage between foreign exchange centres and between currencies.

The arbitrage between centres means that the difference between, say, the US dollar/Ksh exchange rates quoted in Nairobi and Kisumu will reflect only the cost of making transactions in the two centres. If the gap was larger than that, then a profit could be made by purchasing dollar for shillings hence making a profit. The arbitrage between currencies means that the rates of exchange between each of any three must be consistent, that is, ignoring transaction costs, if the sterling-shilling exchange rate is 1 sterling pound is equivalent to Kshs 100, and the dollar-sterling exchange rate is one sterling pound for 1.5

dollars, then the dollar-shilling rate must be 1 US dollar for Kshs 66.0 (i.e. 100/1.5). In this study, arbitrages between different Bureaux were analysed.

2.2 History of Kenyan Foreign Exchange

Kenya have come a long way from the days of controlled and command economy when government presence was felt in every face of the Kenyan economy. Apart from establishing the policies on how the economy should be run, it effected these policies as regulators. In those days of controlled economy, monopolies held sway and they were only answerable to themselves and to the government. While customer sensitivity was unheard of, their complaints were ignored as unnecessary irritation. Pricing was the prerogative of the government which kept them under firm control and therefore also checking inflation that wreaked havoc in the early 90's. For the foreign exchange, all were beholder to the Central Bank of Kenya, be it for an air ticket, medical or education fees. Foreign leisure travel was unheard of because the Government never wanted outflows of foreign exchange. The exchange control department of the Central Bank of Kenya straddled like a colossus over the Kenyan financial and commercial sectors, but is now dead, a victim of the liberalisation process.

The importation of goods and services is essential to economic growth in most developing countries. This means that these countries must look beyond their borders for items necessary to develop their economies to levels where they can produce these goods

and services. Most of the foreign exchange needed to buy goods and services must be obtained from export earnings. In the face of overwhelming balance of payments problems, Kenya found it necessary to introduce foreign exchange control regimes in an attempt to control foreign exchange. These measures were intended to monitor transactions in foreign exchange by residents and transactions in domestic currency by non-residents.

Exchange rate controls were dominant in most African countries before they instituted reforms. These exchange rate control policies seem to have been adopted on the basis of arguments that it ensured the stability of currencies. Ward (1965), Towers and Willet (1976) emphasised this attribute of a fixed exchange rate regime. The exchange rate expresses the value of the domestic currency in terms of its real purchasing power. The nominal exchange rate expresses the quantity of one currency in terms of another while the real exchange rate is perceived to send signals to domestic and external absorption and production. Levich (1979b) notes that these signals should be correct, otherwise, response would be distorted leading to adverse internal and external balances. Given this premise, the key issue is the deviation of the nominal exchange rate, which is directly determined from the equilibrium rate and if the deviation is non-zero, the implication is that the mechanism for determining the exchange rate is distortionary. Johnson (1985) emphasised this when he insisted that an inappropriate exchange rate tends to create instability in the foreign exchange market and to perpetuate widespread distortions in international economic transactions. Todaro (1977) argued that given the structure of less

developed countries' economies, the optimal exchange rate policy is a fixed rather than a flexible exchange rate regime. He made the point thus;

> Flexible exchange rates are not thought to be desirable especially in the third world ... because they are unpredictable, ... are susceptible to foreign and domestic currency speculation. Such unpredictable fluctuations can wreck havoc with both short and long range development plan.

The proponents of flexible exchange rate deny the propositions that fixed regimes generate stability and economic benefits. Quirk (1987), argued that a fixed exchange rate regime cannot guarantee stability since the rates must be adjusted from time to time. He asserts that the cost of controls and the rules governing foreign exchange allocation generate very high inefficiencies in the foreign exchange market and the economy as a whole, hence, a flexible regime is seen to generate efficient resource allocation. The historical experience of countries shows that some economies have at given points adopted more than one exchange rate regime. An efficient exchange rate regime may, among other things, depend on the character of the institutions, particularly their operational efficiency and credibility. The shift in exchange rate policy from controls to deregulation has made the market mechanisms dominant in the management of foreign exchange in most African countries today. Economic theory suggests that exchange rate convergence and the realisation of the economic benefits of a market directed exchange rate depend on essential characteristic of a competitive market (free entry and free exit, perfect information and mobility).

2.2.1 **Foreign Exchange Market Under Control System**

For the implementation of the Exchange Control Act, the government issued a set of exchange control administrative notices and instructions that defined the policy decided by the Ministry of Finance in collaboration with the Central Bank. The bank in turn delegated most of the routine decisions to "Authorised Dealers" (Commercial Banks). In order to enforce the provisions of the Exchange Control Act, the Act provided legal sanctions in the form of fines and imprisonment for offenders. According to the provision of the Exchange Control Act (1967), the exportation of goods of any class to any place outside Kenya was prohibited unless the Central Bank gave its consent or the Commissioner of Customs authorised on certain conditions. For example, he would only allow the exportation of goods which were going to be sold abroad if he was satisfied that the proceeds from the goods was to be received within a specified period, and that payment was to be made in an authorised manner.

Export documents were channelled through the commercial banks which retained copies of these forms, the original one being released to the exporter for the customs authorities and one of the copies was sent to the Central Bank of Kenya by the exporter's bank to give the Central Bank of Kenya a notice of an impending export. When the goods were cleared through customs, the custom copy was sent to the Central Bank of Kenya and upon receipt of sales, a certificate to that effect was prepared by exporter's bank and again dispatched to the Central Bank of Kenya. This was to ensure that not only does the country get a fair return, but that the money was actually received within a reasonable

time. Under the Exchange Control Act (1967), no residents, be it an individual, a private or a public institution was to borrow foreign currency without the consent of the Central Bank of Kenya. Borrowing by government corporations required Treasury's approval. The total amount to be spent on imports in any financial year and the broad priorities for the import of different categories of goods was decided by the government. The global foreign exchange allocations were decided in advance. To give effect to these decisions, the Central Bank of Kenya ensured not only that goods so authorised for importation came into the country, but also, that the price paid for the goods was in accordance with market prices for such goods in international markets. In order to ensure that contractual requirements in price, quantity and quality were met, the Central Bank in consultation with the government made arrangements with the General Superintendence Company (S.G.S) to check and make comparisons in prices, quality and quantity. When these requirements were met, "a clean report of findings'' was issued which enabled local banks in Kenya to effect payment to the suppliers abroad and when "a non-negotiable report of findings'' was issued, commercial banks would not effect payments as the report was not negotiable.

According to Exchange Control Act (1967), there were four phases of import administration; the first was license approval by the import management committee and its secretariat, the second phase was the ministerial approval especially on Import Schedule IIA, third phase was the foreign exchange release by the Central Bank of Kenya, and the last stage was the clearance and handling procedures at the port by customs and

import authorities. The list of imported items was divided into four schedules; Schedule IA contained items that could be imported freely, with licences issued and foreign exchange released virtually automatically subject to monitoring for excessive stocking. This schedule consisted of essential priority of imports such as raw material, capital goods, spare parts and medicines. Schedule IB contained items of slightly lower priority than those in IA, whose importation was intended to be subject to an annual allocation of foreign exchange to importers, the amount depending on the overall balance of payments situation. Within this annual amount, each importer was to be granted an annual shilling allotment, within which he could import any item on IB at any time during the year. Schedule IIA included imports of oil, which were regulated by the Ministry of Energy and imports of grains and fertiliser, which were controlled by the Ministry of Agriculture. Lastly, Schedule IIB was the most restrictive schedule which included items whose importation was discouraged because they could be produced locally, were luxurious goods, or they were goods regulated on grounds of public health, safety, morality or national defence.

2.2.2 Establishment of Forex Bureaux

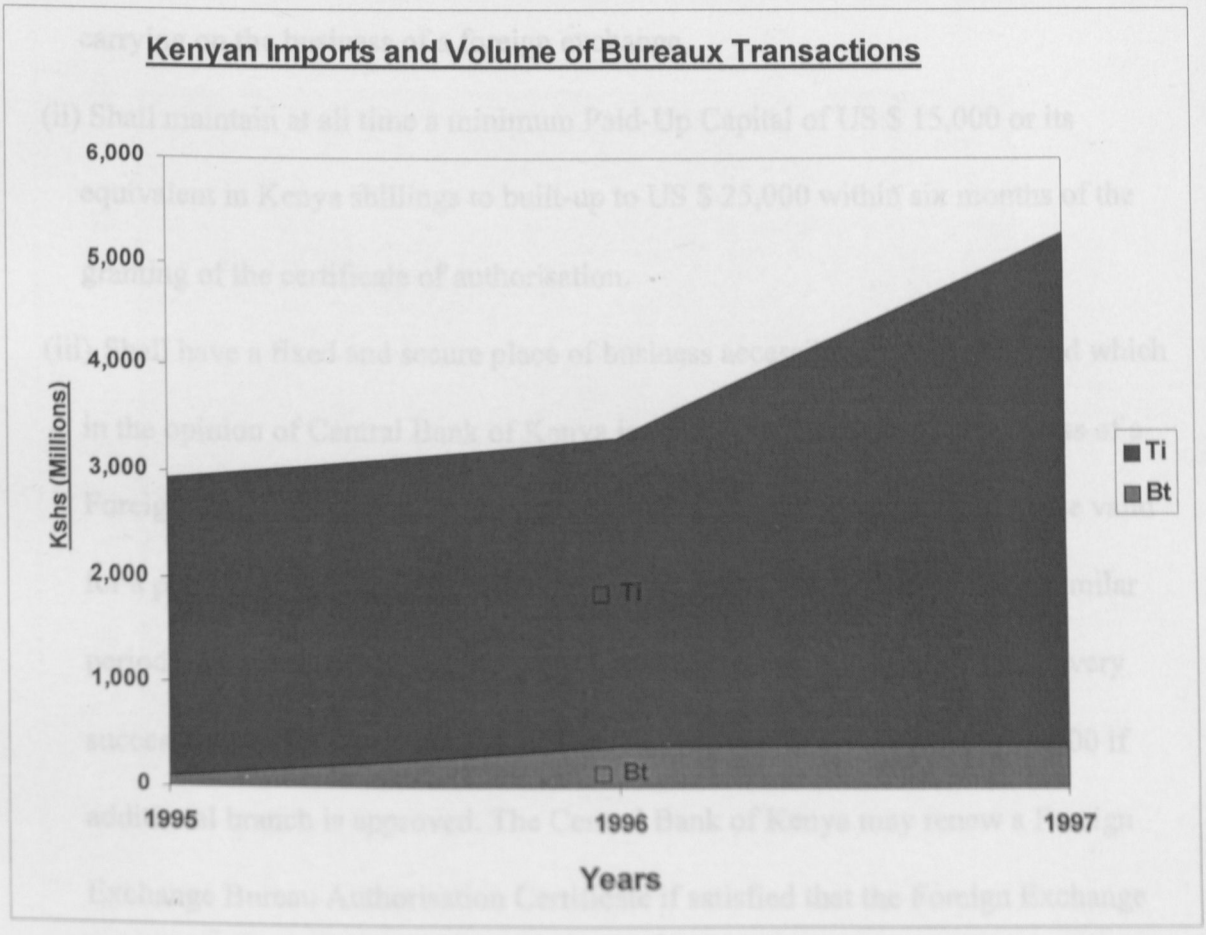
Kenya started the 1980's with many more favourable economic features than other sub-Saharan countries. The structure and dynamics of the economy in the late 1970's evolved out of the favourable policy environment of the past but economic management deteriorated in the late 1970's, which resulted in the intensification or emergence of a number of major distortions. As Mosley (1991) notes, "few country lending experience

have given World Bank so much cause for frustrations". Fairly rapid pace of trade liberalisation was postulated when the country was attempting to control one of its worst financial crises.

The lack of sufficient attention to the control of financial balances threatened to undercut the World Banks lending program altogether. But the World Bank soon found itself in the position of being unable to justify such releases and at the Consultative Meeting of November 1991, donors also expressed concern with the lack of transparency and accountability in the use of public funds. In September 1992, the World Bank decided to postpone disbursement of the second phase for ongoing operations because several sector -specific conditions had not been met (Mosley, 1992). In the first few Months of 1993, the Kenyan government completed many of the structural reforms required under the sectoral loans, but it was unable to maintain a satisfactory macroeconomics framework despite "a shadow program" agreed to with the International Monetary Fund (IMF). The reforms were sequenced and implemented with careful co-ordination with exchange rate changes. Later, the liberalisation process was complemented by other initiative like export promotion and by improved incentive structure resulting from price decontrols.

In 1993, the Exchange Control Act Cap 113 was revised and the exchange rate was allowed to float, with banks being allowed to act as dealers. Before 1993, foreign exchange control policy was used in the past by the government as a measure of allocating the little foreign exchange available through Central Bank of Kenya. The bulk

of importation paper work has been passed on to the commercial banks; they are an important focal point in the determination and allocation of foreign exchange. The Kenya's imports increased when the Forex Bureaux started operating. The increase of imports may be attributed to the increase in the volume of Bureaux transactions which most of it was used to finance the imports. Below are the volumes of both imports and Bureaux transactions from 1995 to 1997.



The above graph shows that Kenyan imports (Ti) rose very sharply in 1997 as the Forex Bureaux operations increased in the market hence less stringent import conditions. As the

volume of Bureaux transactions (Bt) increased, more imports were made indicating that most of the Bureaux transactions were for the procurement of imports.

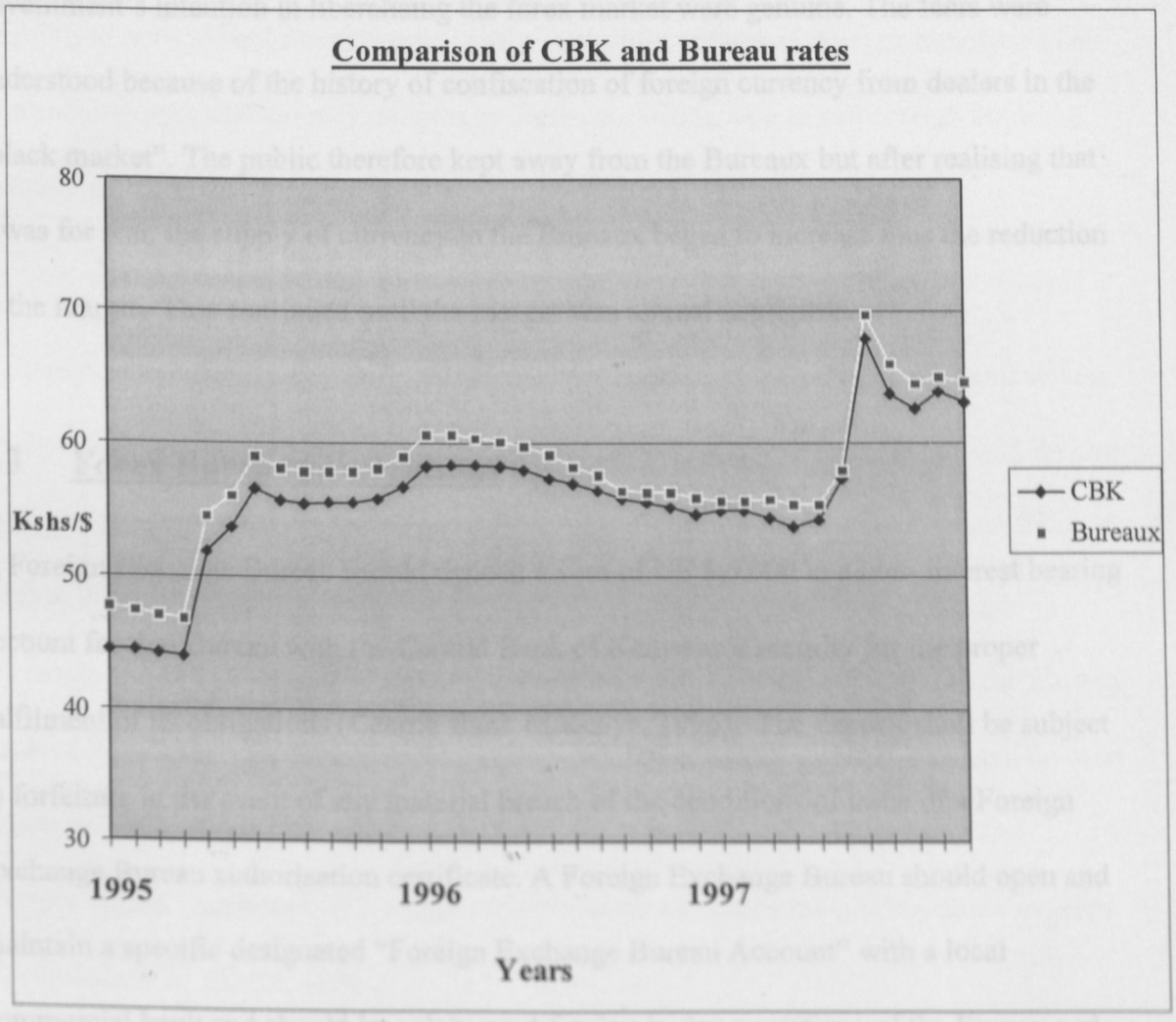
The Kenyan Government (Central Bank of Kenya, 1996) issued licenses to the applicants with the following terms and conditions;

(i) Shall be a registered company holding a valid certificate of registration issued under the Companies Act as a limited liability company with the main objective of carrying on the business of a foreign exchange.

(ii) Shall maintain at all time a minimum Paid-Up Capital of US $ 15,000 or its equivalent in Kenya shillings to built-up to US $ 25,000 within six months of the granting of the certificate of authorisation.

(iii) Shall have a fixed and secure place of business accessible to the Public and which in the opinion of Central Bank of Kenya is suitable in all respect for business of a Foreign Exchange Bureau. A Foreign Exchange Bureau certification shall be valid for a period of 12 months from the date of issue and may be reviewed for similar periods. Bureaux are required to pay an application fee of Kshs 5,000 and every successful applicant will pay Kshs 50,000 as registration fee and Kshs 25,000 if additional branch is approved. The Central Bank of Kenya may renew a Foreign Exchange Bureau Authorisation Certificate if satisfied that the Foreign Exchange Bureau is being operated in conformity with the provisions and guidelines of Central Bank of Kenya.

The divergence between the Central Bank of Kenya and Bureaux rates was so big in 1995 when the Bureaux started operating. The Central Bank of Kenya rates were lower than the Bureaux rates. This divergence became smaller as the Bureaux increased in the market. Due to a liberalised market, forces of demand and supply operated which led to convergence of the two market rates (CBK and Bureaux rates) as shown below.



It is clearly depicted from the graph that there were big margins in the US dollar to Ksh exchange rates between the Bureaux and the Central Bank of Kenya when the Bureau

system was first introduced in late 1995. However, the margin has fallen gradually and steadily and currently, the margin seems quite insignificant. The gradual reduction in the margin between the rates of Forex Bureaux and the Central Bank of Kenya might have been due to the increased supply of forex to the Forex Bureaux market.

When the Bureaux first came into existence, the public was not sure whether the government's intention in liberalising the forex market were genuine. The fears were understood because of the history of confiscation of foreign currency from dealers in the "black market". The public therefore kept away from the Bureaux but after realising that it was for real, the supply of currency to the Bureaux began to increase thus the reduction in the margin. This continued until the margin was almost negligible.

2.3 Forex Bureaux Operations

A Foreign exchange Bureau should deposit a sum of US $ 5,000 in a non- interest bearing account for that Bureau with the Central Bank of Kenya as a security for the proper fulfilment of its obligations (Central Bank of Kenya, 1996). The deposit shall be subject to forfeiture in the event of any material breach of the conditions of issue of a Foreign Exchange Bureau authorisation certificate. A Foreign Exchange Bureau should open and maintain a specific designated "Foreign Exchange Bureau Account" with a local commercial bank and should be solely used for day to day operations of the Bureau and should at all times have a minimum credit of US $ 2,500. The Bank with which the foreign exchange account is maintained should ensure that the account is at all times

maintained at minimum balance of US $ 2,500.

All Payments by residents to non-residents to or from abroad should be made through the Foreign Exchange Bureau commercial bank where its foreign currency account is operated. International organisations and diplomatic missions are not eligible to transfer any funds to or from Kenya through the Foreign Exchange Bureau but through their established normal banking channels. Individual diplomatic personnel or members of an international organisation may, subject to these conditions, buy or sell foreign currency through the Bureau.

A Foreign Exchange Bureau only engages in spot transactions such as buying and selling foreign exchange in cash, buying travellers cheques, personal cheques, bank drafts but not engaging in selling these instruments unless specifically approved by the Central Bank of Kenya. While transactions involving forward cover cannot be transacted. Foreign Exchange Bureau may buy and sell any currencies against Kenya shillings but the Central Bank of Kenya may, from time to time, direct that some or any currency shall not be used to buy or sell specified currencies. Also Bureaux should ensure that payments and receipts are not connected with illegal activities such as money laundering or tax evasion (Central Bank of Kenya, 1996).

Counterfeit or forged notes presented by customers should be seized, the customer issued with evidencing receipts and the counterfeit note(s) delivered to the Central Bank of Kenya. Under no circumstances should the forged note(s) be returned to the presenter or customer and a foreign exchange bureau should be free to competitively set exchange rates in all transactions with customers and between themselves and to deal exclusively in spot transactions and display the foreign exchange buying and selling rates in its premises. Such rates should be after taking care of commission. A Bureau is not bound to buy and/or sell currency at the rate displayed in its premises, even though the customer transacting in large quantities of currencies can negotiate for a favourable rate other than the one displayed. It should further display prominently in its premises a notice informing its customers that they are entitled to a receipt on any sale or purchase made by them.

A Foreign Exchange Bureau is required to complete Central Bank of Kenya statistical forms for all transactions above the equivalent of US $ 5,000 (Central Bank of Kenya, 1996). They are also expected to maintain internal records for values below the equivalent of US $ 5,000. The indicative closing Kenya Shilling exchange rates must be submitted to the Central Bank of Kenya every morning before 9:00 a.m. The Central Bank of Kenya shall then prepare a summary table of these rates which the Bureau may collect from the Bank at 11:00 a.m. the same day and they are required to submit weekly returns of these foreign exchange transactions, namely total purchases, sales and transfers in a prescribed form not later than 3:00 p.m. on the final working Monday of the week. Central Bank may at any time cause an inspections/examination of the Foreign Exchange

Bureau books of accounts or any other records to be made on its premises. It is the duty of every officer of the Foreign Exchange Bureau to produce to the officer of Central Bank of Kenya at a reasonable time such books of accounts and any other documents in the Foreign Exchange Bureau custody and furnish such statements or information relating to the affairs of Foreign Exchange Bureau as may be required by the examination officer. For the maintenance of sound management information systems and in order to facilitate collection of statistical data and information, a Foreign Exchange Bureau should maintain appropriate records. These should provide audit trails for use by internal auditors, external auditors and Central Bank of Kenya examiners. Where a Foreign Exchange Bureau is found to be in material breach of any of the conditions of issue of a Foreign Exchange Bureau authorisation certificate, the Central Bank of Kenya shall have the right to revoke the authorisation certificate. However, Bureaux are given adequate opportunity to answer the charges against it and thereafter the Central Bank's decision will be final.

2.4 International Foreign Exchange Markets

The extent to which a country's currency is traded in the world-wide market depends to some measure on local regulations that vary from country to country (McKinnon, 1979). The major participants in the international foreign exchange markets are the large multinational commercial banks. McKinnon (1979) reports that, the United States of America (USA) market is dominated by 25 large banks with half of them located in New York and the remainder in major financial centres. These banks operate at two levels in the foreign exchange market. First, at the retail level, banks deal with individuals and

corporations. Second, at the wholesale level, banks operate in the interbank market. Major banks transact directly with the foreign institutions involved. However, many transactions are mediated by foreign exchange brokers who preserve the anonymity of the parties until the transactions are concluded. The other major participants in the foreign exchange markets are the central banks of the various countries.

Central banks typically intervene in foreign exchange markets to smooth out fluctuations in a country's currency rate. Additional participants are non-financial businesses and individuals who enter the market by means of banks for various commercial reasons. Most payments are made by telephone or cable. The Society World-wide International Financial Telecommunication (SWIFT) and the Clearing House Interbank Payments System (CHIPS) have added a new dimension to the speed and efficiency with which the payment transfer and clearing process works. Ike (1991) notes that with the advent of free-floating currencies, multinational corporations engaged in international trade and investors have become increasingly concerned with minimising their exchange rate risks.

In the United Kingdom, residents have been able to invest freely abroad since October 1979 when foreign exchange control restrictions were fully lifted. Foreign currency is not traded in a physical market place; rather, it is traded in electronic information screens such as Reuters link banks. In total there are 300 participants including 50 large international banks in the foreign exchange market (Longworth, 1981). The banks operate as principals (operating their own account) and as agents for their own customers. They

therefore earn arbitrages and commission. The London foreign exchange market contains 12 foreign exchange brokers who link buyers and sellers of foreign currency and the largest volume of business is in US dollars and Deutsche marks. There is both a spot and a forward market in all the currencies and banks communicate with one another by telephone and telex which records messages on word processors. Trading in foreign exchange occurs continuously, as the markets are located around the World in different time zones. Two thirds of all transactions are conducted spot, and another 30% of all transactions are swaps involving the simultaneous purchase and sale of a specified amount of foreign exchange for two different maturities.

The integration of financial centres implies that there can be no significant difference between the dollar/Deutsche mark exchange rate quoted in New York at 9:a.m. and the dollar/ Deutsche mark exchange rate quoted in London time). If the Deutsche mark were selling for $ 0.30 in New York and $ 0.35 in London, profits could be made through arbitrage, the process of buying a currency cheap and selling it dear. If all traders tried to cash in on the opportunity, however, their demand for Deutsche marks in New York would drive up the dollar price of Deutsche marks there, and their supply of Deutsche marks in London would drive down the dollar price of Deutsche marks there. Very quickly, the difference between the New York and London exchange rates would disappear in the efficient market. Since foreign exchange traders carefully watch their computer screens for arbitrage opportunities, the few that arise are small and very short-lived.

The first explanation of why foreign exchange markets exist according to Melvin (1989) is that they provide power from individuals who normally deal in one currency to other people who generally transact business using different monetary units. Importing and exporting goods and services are facilitated by this conversion and can deal in terms of medium of exchange rather than having to rely on bartering. A second reason why efficient foreign exchange markets have developed is that they provide a means for passing the risks associated with changes in exchange rates to professional risk takers. This "hedging" function is particularly important to corporations in the present era of floating exchange rate. The third important reason for the continuing prosperity of foreign exchange market is the provision of credit.

2.5 Research on Foreign Exchange Market Efficiency

Market efficiency is a major theme that has motivated numerous empirical studies of international financial markets like Fama (1970), Clendenning (1970), Aliber (1973), and Frenkel and Levich (1975). Tests of asset market efficiency, focusing on domestic equity and bond markets, began in the 1950s and gained increasing popularity and significance during 1970s. With establishment of floating exchange rates in most countries of the world, it was natural to begin the investigation of foreign exchange market efficiency. Studies done by Frenkel and Levich (1975) relied heavily on stock market techniques. Levich (1979a) argued that it is difficult to test whether investors' efficiency set and the actual spot exchange rate is equal to its equilibrium value unless there is some agreement

on what the equilibrium value is. Fama (1970) notes that equity markets and foreign exchange markets differ as firms might be characterised by their consistency in terms of directors, product lines, financial strategy and customers. He suggests that, for firms operating in a stable environment with mature products, investors can learn the risk/return properties of equities. In the foreign exchange market, spatial, triangular and covered arbitrages are elementary investment opportunities that promise a certain return with no exposure to risk (Buiter, 1983).

Some approaches have been proposed to test for spot market efficiency. One popular null hypothesis was that, under a regime of freely floating exchange rates, changes in spot exchange rates should be serially uncorrelated. Poole (1967) and Burt, Kaen and Booth (1977) reported empirical tests of this hypothesis. In general, these researches concluded that there are significant departures from random behaviour under floating exchange rates and therefore, the spot market was not efficient. However as suggested earlier, market efficiency requires a random behaviour of returns only if the equilibrium expected return is constant. Poole (1967) tested market efficiency in spot speculation and analysed the performance of investment strategies that use filter rules as guides for picking speculative positions. A filter rule is a mathematical rule that can be applied mechanically to produce buy signals and sell signals. An x per cent filter rule leads to the following trading strategy; "Buy a currency whenever it rises x per cent above its most recent trough; Sell the currency and take a short position whenever the currency falls x percent below its most recent peak." A filter rule produces profits when momentum or "bandwagon"

effects carry the exchange rate further in the direction indicated by the initial movement.

An early study by Poole (1967) reports filter rules profits for the Canadian dollar during the floating rate period 1950-1962, and for nine other series of flexible exchange rates in the post-First World War period. Poole found evidence of statistically significant first order serial correlation in exchange rate changes. Because profits are not adjusted for the interest expense of a short position, the interest income of a long position, or the cost of transacting, Poole believes his results do not conclusively reject market efficiency. Dooley and Shafer (1983) have conducted more comprehensive and rigorous studies of spot market efficiency. Dooley and Shafer reports filter rule profits for nine currencies using daily spot rates over the 1970s floating exchange rate period. Dooley and Shafer hypothesised that if the market is efficient, the filter rule profits adjusted to reflect the above costs should be a "fair game" process. Gross profits from the filter rule strategies imply net abnormal profits and therefore reject market efficiency. Since filter rule trading involves risk, the key question is whether unusual profit opportunities are available *ex ante* to spot speculators.

Levich (1979b) suggests performance tests based on a mean-variance model, but these raise further problems concerning the appropriate market portfolio and risk aversion measure. Goodman (1981) examined the performance of professional foreign exchange advisors that issue buy and sell signals based on technical analysis. Goodman reports that large profits in excess of the risk-free rate are generally available to users of these

professional signals. He suggests that these risks are small for investors who have enough capital to withstand big losses and who use professionals on a regular basis. To further support this case, he reports that if investors use a composite signal based on two or more advisors, the risk/return trade-off improves.

The speculative-efficiency approach boasts extensive literature. Shleifer and Summers (1990) argued that one such strategy is trend chasing;

> Proponents of this view argue that the key to investment success is not just predicting future fundamentals, but also predicting the movement of other active investors. We are reminded that market professionals spend considerable resources tracking price trends, trading volume, investor sentiment indexes, and many other gauges of demand for assets. Tracking these possible indicators of demand makes no sense if prices responded only to fundamental news and not to investor demand. They make perfect sense, in contrast, in a world where investor sentiment moves prices and so predicting changes in their sentiment pays.

The growth of the literature on efficient markets is motivated by the search for alternative formulations of market efficiency, and in particular for those formulations aimed at directly testing for existence of profitable trading opportunities. Examples are Bilson (1981), Dooley and Shafer (1983), and Hodrick and Srivastava (1984). There is growing evidence, mostly from stock market studies (Harris and Gurel, 1986; Shleifer, 1986; French and Roll, 1986; and Roll, 1988) that news alone do not move asset prices; but also uniformed changes in demand move asset prices. Changes in demand can also reflect investors' use of flexible trading strategies.

Grossman and Stiglitz (1980) have pointed out that if asset prices do fully and instantly reflect all available information, then presumably there will be no incentive for individuals to collect and process information since this will already have been reflected in market prices. They questioned how market prices simultaneously reflect all relevant information and give agents potential profits to induce arbitrage. As applied to the forex market, Grossman and Stiglitz suggested that the Efficient Market Hypothesis may be described as a joint hypothesis consisting of how equilibrium returns are determined, with the view that agents rapidly arbitrage away any profitable opportunities that may arise using the available information at their disposal.

Murphy (1977) argues that efficiency is not an accurate description of the capital market and may not even be a very good description of the capital markets and that there are serious problems with the risk/reward relationship, and perhaps even the statistical methods. Grossman and Stiglitz (1980) claimed that arbitrage profits cannot be perfectly eliminated when arbitrage is costly, but it should be noted that the existence of investors who choose to pay, in order to acquire and process information may not be due to the fact that they can consistently obtain a return on this outlay. Rather, it can be due to the point that necessary conditions for efficiency are far less stringent and are merely that information be readily available to a "sufficient" number of investors, that transaction costs be "reasonable", and that, in the absence of agreement about the implications of current information and expectations regarding price movements, there can be no evidence of consistent superiority or inferiority by significant participants in the market.

CHAPTER III

RESEARCH DESIGN

3.1 The Population

The population of interest in this study comprised of all operating Bureaux in the city of Nairobi as at December 1997.

At the end of December 1997, there were 38 registered Foreign Exchange Bureaux operating in Kenya and 31 of these Bureaux were based in Nairobi, 4 in Mombasa, 1 in Nakuru, 1 in Kisumu and 1 in Busia. Since 81% of the Foreign Exchange Bureaux were located in Nairobi, it justified the population of the study to be only those Bureaux in Nairobi as it represented a higher percentage of Bureaux in Kenya. Also, the rationale behind taking the population to be Bureaux in Nairobi was due to high economic activity in this city.

3.2 Sampling Design

The sample of the study was chosen from the population which was divided into two strata, that is, Bureaux that where operating before 1997 and Bureaux licensed to operate in 1997 and thereafter. Out of the 31 Bureaux, 21 started operating in 1995, 4 in 1996, and 6 in 1997.

Since Bureaux were legalised to operate in Kenya in the middle of 1995, the year 1997 was chosen as the population of interest because this period was found to be appropriate as most of the Bureaux had stabilised in terms of operational and set-up costs. More so, the year 1997 was the most current year during the research period with all available data. Hence the information that was generated from the data was to be timely for the users of this information.

The study used a sample size consisting of 21 Bureaux licensed in 1995 and 4 Bureaux in 1996. Bureaux licensed in 1997 were not included in the sample for consistency purposes as the Bureaux were licensed to operate during different dates in the year. The sample of the study therefore were all the 25 Bureaux operating prior to 1997.

3.3 Data Collection Method

The study entailed mainly the use of secondary data which was obtained from Central Bank of Kenya for all the 25 Bureaux under study. The data that was collected in the Central Bank of Kenya was the Forex Bureaux volume of transactions and the rates of the major two international currencies (Sterling pound, US Dollar) and two East African currencies {the Ugandan shilling (Ush) and Tanzanian shilling (Tsh)} from January to December 1997.

Osei (1996) selected dates (data points) at two weekly intervals to get 83 data points from 1988 to 1992 (5 years). Ayogu (1997) used 208 data points in testing for speculative efficiency and noisy trading from the period 1990 to 1993. The above studies justify this research using 292 data points for the period January to December 1997. Due to bulkiness of the data required, one year was sufficient for the researcher to generate the Forex Bureau rates from Central Bank of Kenya.

3.4 Techniques of Analysis and Presentation

The possible arbitrage profits were analysed between Bureaux in the sample. The number of cases the condition for arbitrage is satisfied is given as;

$$B_i - S_j > 0 \quad \text{or} \quad B_j - S_i > 0$$

Where,

B_i = *the buying rate for Bureau i in time t*

B_j = *the buying rate for Bureau j in time t*

S_i = *the selling rate for Bureau i in time t*

S_j = *the selling rate for Bureau j in time t*

If arbitrageurs have complete certainty about the future path of exchange rates, or in the case of uncertainty, arbitrageurs are risk-neutral (that is, they are only concerned with the highest expected return of their investment and not the risk) then arbitrageurs will go for the highest arbitrage. The researcher took the highest available arbitrage each day in each currency for analysis (Sterling Pound, US Dollar, Ushs and Tshs) and ignored the other

possible arbitrage opportunities available. Other aspects of structure, which were all analysed using graphs, include the volume of transactions. The main costs encountered in arbitrage analysis are transport and telephone costs. For arbitrage analysis in two locations (towns), the transport and telephone costs are substantial because of the long distances involved. In this research, the analysis of arbitrage is between Bureaux only based in Nairobi hence the costs of transport and telephone are assumed to be zero.

In the arbitrage analysis, the researcher analysed the highest arbitrage obtained on each of the four currencies for all operating dates (days) $t_1, t_2, \ldots, t_n$ in 1997 and obtained 292 data points in each of the four currencies (see appendix III). The null hypothesis of the study is that the market is efficient so arbitrage will be equal to zero. The research hypothesis, in contrast, holds that the market is inefficient and that arbitrage is greater than zero.

That is, $H_0: \mu = 0$

$H_1: \mu > 0$

Chi-square (χ^2) was used to test for the similarity ("goodness of fit") between the observed proportions and the expected proportion of cases for each type of currencies. The goodness of fit was done to determine how closely a set of observed frequencies corresponds to a given set of expected frequencies. chi-square tests how well the sample

results fit the population by matching the observed and the expected frequencies to ensure that the variation is not significant. When chi-square test statistic is small compared to chi-square critical value (tabulated critical value), then the fit is said to be good. The chi-square test statistic is in the form;

$$\chi^2 = \sum \frac{(fo-fe)^2}{fe}$$

$$= \text{The sum of } \frac{(Observed' \text{ frequency} - Expected' \text{ frequency})^2}{Expected' \text{ frequency}}$$

A fundamental assumption in the application of chi-square is that no systematic bias exists in the selection of subjects. More generally, it is assumed that the sample is representative of the population from which it is drawn. Any systematic selection will certainly distort the conclusions drawn in the study. Also, chi-square assumes that an outcome of an observation does not affect the likelihood of the other outcomes. A third assumption of this tests is that the categories of the independent variable must be exclusive and exhaustive. That is to say, an observation must be assignable to one and only one category for the categories to be considered exclusive. An observation of zero arbitrage category cannot be considered also to be in greater than zero arbitrage category.

Using the chi-square test statistic has some limitations. When there is one degree of freedom, the expected frequency for every cell should be at least ten (10) and the true distribution of the chi-square test statistic is an approximation. However, it is adequate if the sample frequencies are sufficiently large enough (at least five observations). After analysing arbitrage opportunities on the forex market, this study probed further to see if there was any difference in the mean arbitrage derived from each currency in the 25 Bureaux.

Thus testing the null hypothesis:

H_0: Ä$= Ä£= ÄU= ÄT

H_1: at least two of the mean arbitrage are not equal

Where Ä$ = arbitrage mean for US dollar.

Ä£ = arbitrage mean for Sterling pound

ÄU = arbitrage mean for Ugandan shilling

ÄT = arbitrage mean for Tanzanian shilling

Using statistical test of Analysis of Variance (ANOVA), the rates of 25 Bureaux were compared. Also, Descriptive statistics were used to show possible arbitrage opportunities in the year 1997.

CHAPTER IV

4.0 DATA ANALYSIS AND FINDINGS

The aim of this study was to determine whether it is possible to obtain arbitrage profits between Bureaux in the sample. All the 292 data points were analysed to see if arbitrage existed in each of the four currencies. The number of cases the condition for arbitrage was satisfied was given as; $B_i - S_j > 0$ or $B_j - S_i > 0$. If the difference between Bureau buying rates and selling rates were greater than zero, only the highest arbitrage on that day was recorded. On the contrary, if the difference between Bureau buying rates and selling rates were less than zero or equal to zero, a zero (0) was recorded. This procedure was done for all the four currencies for 292 days (see appendix III). After obtaining the possible arbitrage profits, it was grouped into two; those that had greater than zero arbitrage and those with zero arbitrage. The number of frequencies a zero and greater than zero occurred was tabulated as below:

Arbitrage observed	*Frequency US Dollar*	*Frequency Ster. pound*	*Frequency UG. Shilling*	*Frequency TZ. Shilling*	*Totals*
Zero (0)	238	172	4	0	414
0 <	54	120	288	292	754
Totals	292	292	292	292	1168

Using chi-square , these arbitrage opportunities frequencies were all subjected to the goodness-of-fit test. The results showed the chi-square test statistic at 5% significance level with 6 degrees of freedom to be 649.488 ($\chi^2 = 649.88$, D.F = 6). Since the obtained chi-square statistic of 649.88 exceeds the critical value of 12.167 at alpha 5% level, it leads to a rejection of the null hypothesis that the arbitrage opportunities are equal to Zero. It would be concluded that there's very significant differences between zero and greater than zero arbitrage opportunities. This is consistent with some researches that have shown that arbitrage opportunities are available in the forex market. This shows that information of Bureau pricing around the city is not readily available hence those with such information will beat the market consistently in making arbitrage profits.

The analysis of variance was used to compare the mean arbitrage opportunities available in the four currencies. The observed variance ratio (F^*) was 52.291 and the theoretical value of $F_{0.05}$ at the 5% level of significance with 3 degrees of freedom is given as 2.60. Since $F^* > F_{0.05}$, the null hypothesis is rejected, that is, we accept that there is a significant difference in the mean arbitrage of the four currencies. We may therefore infer that arbitrage opportunities in Nairobi city is actually different, that is, the alternative hypothesis (H_1) is true at 5% level of significance. This is also consistent with the findings by Osei (1996) that Bureau pricing in Ghana is actually different and it was possible to obtain arbitrage.

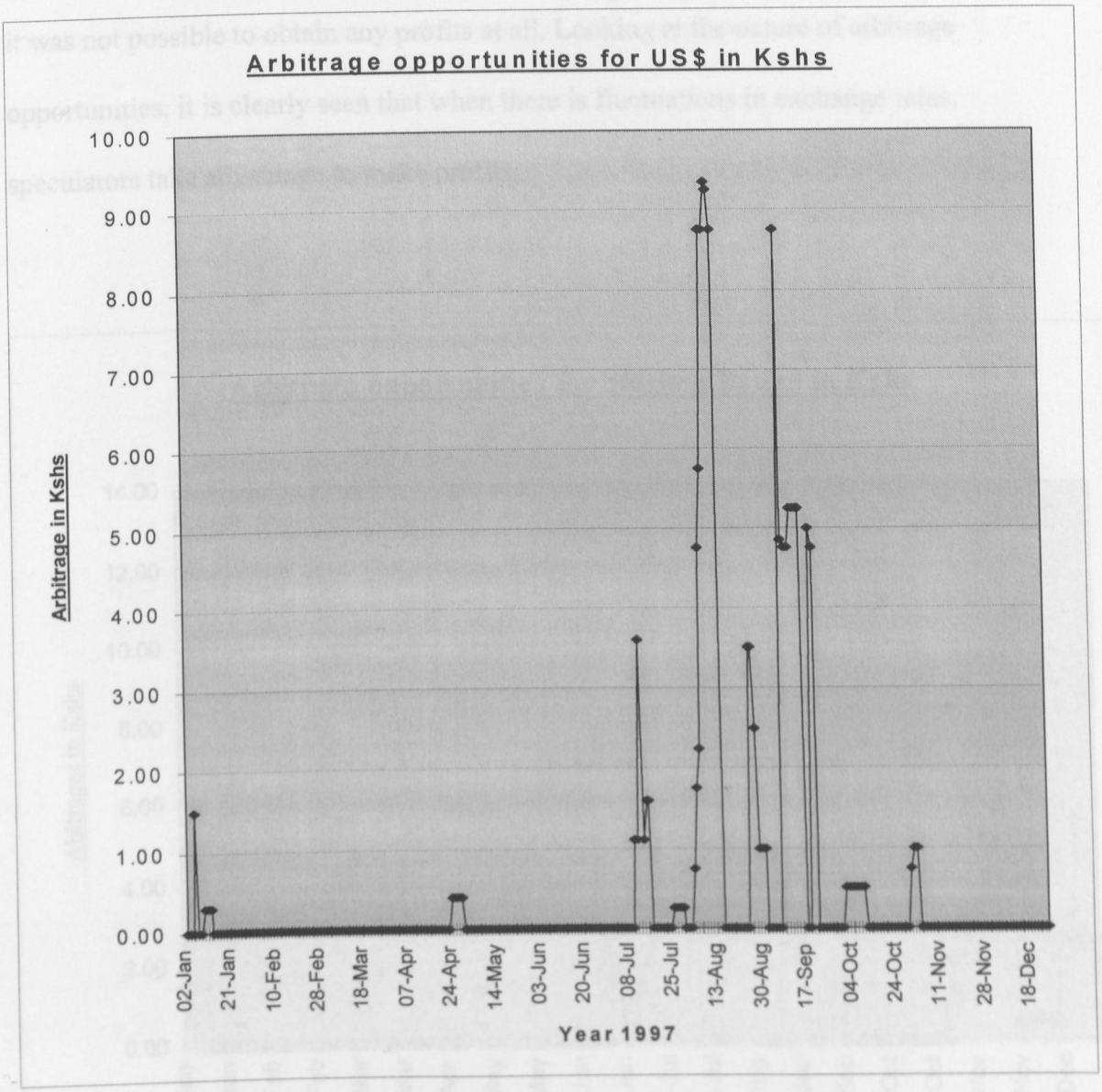
For the US dollar and the Sterling Pound, it was harder to obtain arbitrage from the market as compared to the Ugandan and Tanzanian shillings. The currency with more occurrences of arbitrage was the Tanzanian shilling, followed by Ugandan, Sterling pound and finally the US dollar. The table below shows the possible arbitrage from the dollar, pound, Ushs and Tshs in Kenya shillings.

Descriptive statistics	*Dollar*	*Pound*	*Ushs*	*Tshs*
Mean	0.506164384	1.278938356	0.83914384	1.990445205
Standard Error	0.094472455	0.139203852	0.03019778	0.047440273
Standard Deviation	1.61434602	2.37871646	0.51601995	0.810659742
Sample Variance	2.606113073	5.658291996	0.26627658	0.657169217
Kurtosis	15.3463083	9.710520964	1.32999812	-1.145212469
Skewness	3.884556408	2.840357406	1.06021886	-0.145195824
Range	9.35	13	2.6	3.3
Minimum	0	0	0	0.4
Maximum	9.35	13	2.6	3.7
Sum	147.8	373.45	245.03	581.21
Count	292	292	292	292
Confidence Level(95.000%)	0.185162335	0.272834132	0.05918648	0.092981089

From the descriptive statistics above, it was found that the currency with the highest arbitrage that can be obtained from the market is the Tanzanian shilling with arbitrage profits of Kshs 581.21, followed by Sterling pound with Kshs 373.45, Ugandan shilling with Kshs 245.03 and US dollar with Kshs 147.80. From the table above, the results show that at 95% confidence level , the population mean arbitrage lies between Kshs 0.5 and Kshs 0.18 for the US dollar. For the Sterling pound, 95 times out of 100 mean arbitrage will be between Kshs 1.2 and Kshs 0.27, between Kshs 0.83 and Kshs 0.05 for

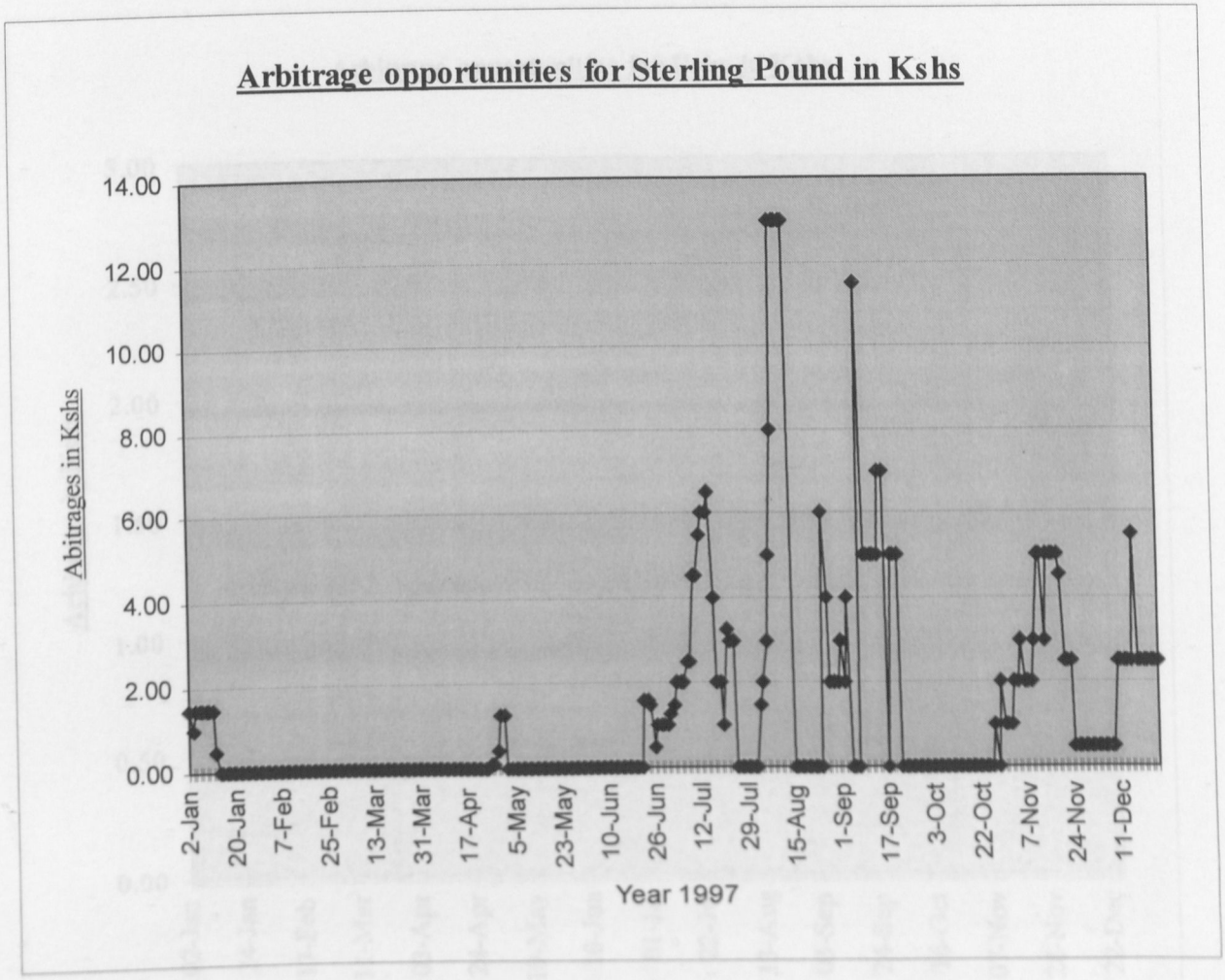
the Ugandan, and finally between Kshs 1.9 and Kshs 0.09 for the Tanzanian shilling. The results in both cases of analysis are as expected and indicate that information is not widely and cheaply available on the Forex Bureaux market, hence the inefficiency of the market.

It is clearly depicted from the graphs of arbitrage opportunities shown below that the arbitrages available depends on the economic situation in the country. In all the four currencies, the arbitrageurs could gain a lot of profits between the months of July 1997 and September 1997 because of the political situation prevailing in the country at the time. There were riots from political unrest which caused fears, both in foreigners and Kenyans.



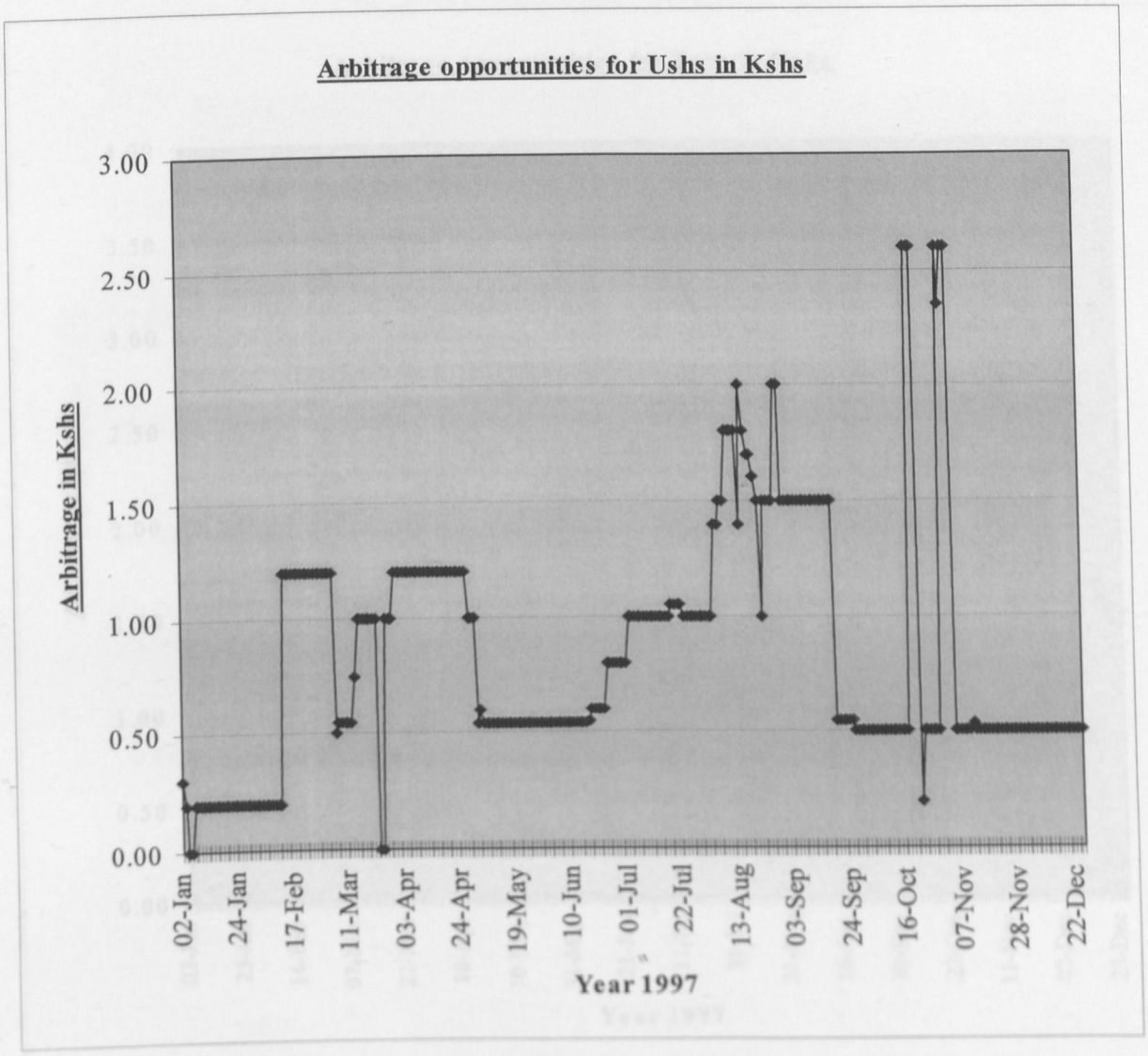
The US dollar in 1997 could fetch arbitrage profits as high as Kshs 9.50 in the month of August. In January, Kshs 1.50 profits could be obtained within a short period. Thereafter, it was not possible to get any profits through arbitraging until April. In July, arbitrage profits rose very sharply, then decreased sharply again to zero. The only months arbitrageurs would make gains of more than Kshs 1.50 were July, August, September and part of October. In the months of February, March, May, June, November and December,

it was not possible to obtain any profits at all. Looking at the nature of arbitrage opportunities, it is clearly seen that when there is fluctuations in exchange rates, speculators take advantage to make profits.



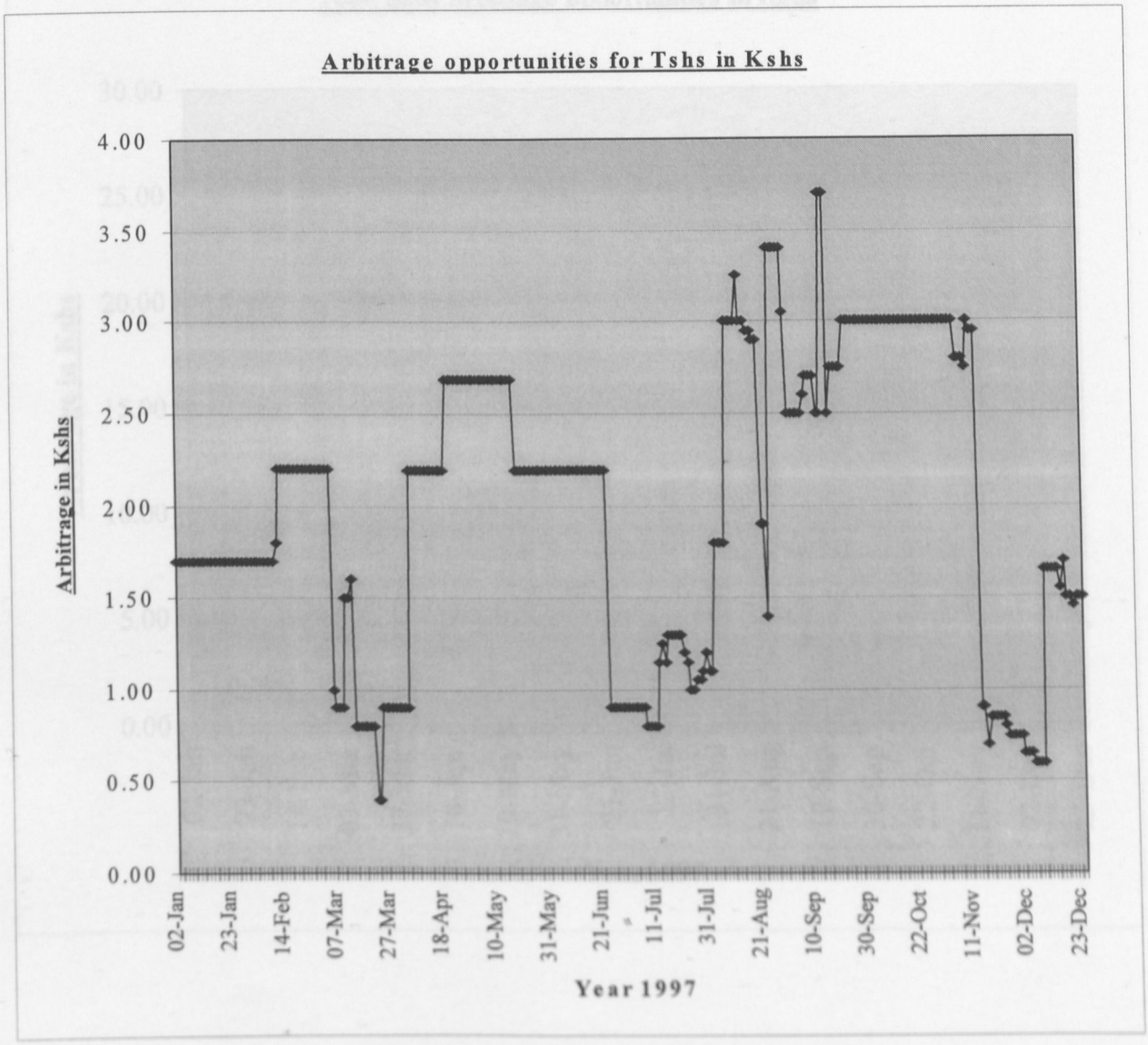
The Sterling pound was the most volatile currency as can be seen above. The amount of arbitrage that could be obtained was as high as Kshs 13.00 but this was not occasionally experienced. Between January 1997 and June 1997, there was hardly any arbitrage profits in sterling pound obtained. But at the beginning of July 1997, the arbitrage profit

fluctuated wildly as seen from the above graph. It can be concluded from the sterling pound currency that less arbitrage can be obtained from arbitraging with this currency consistently because the opportunities of getting profits is inconsistent over time.



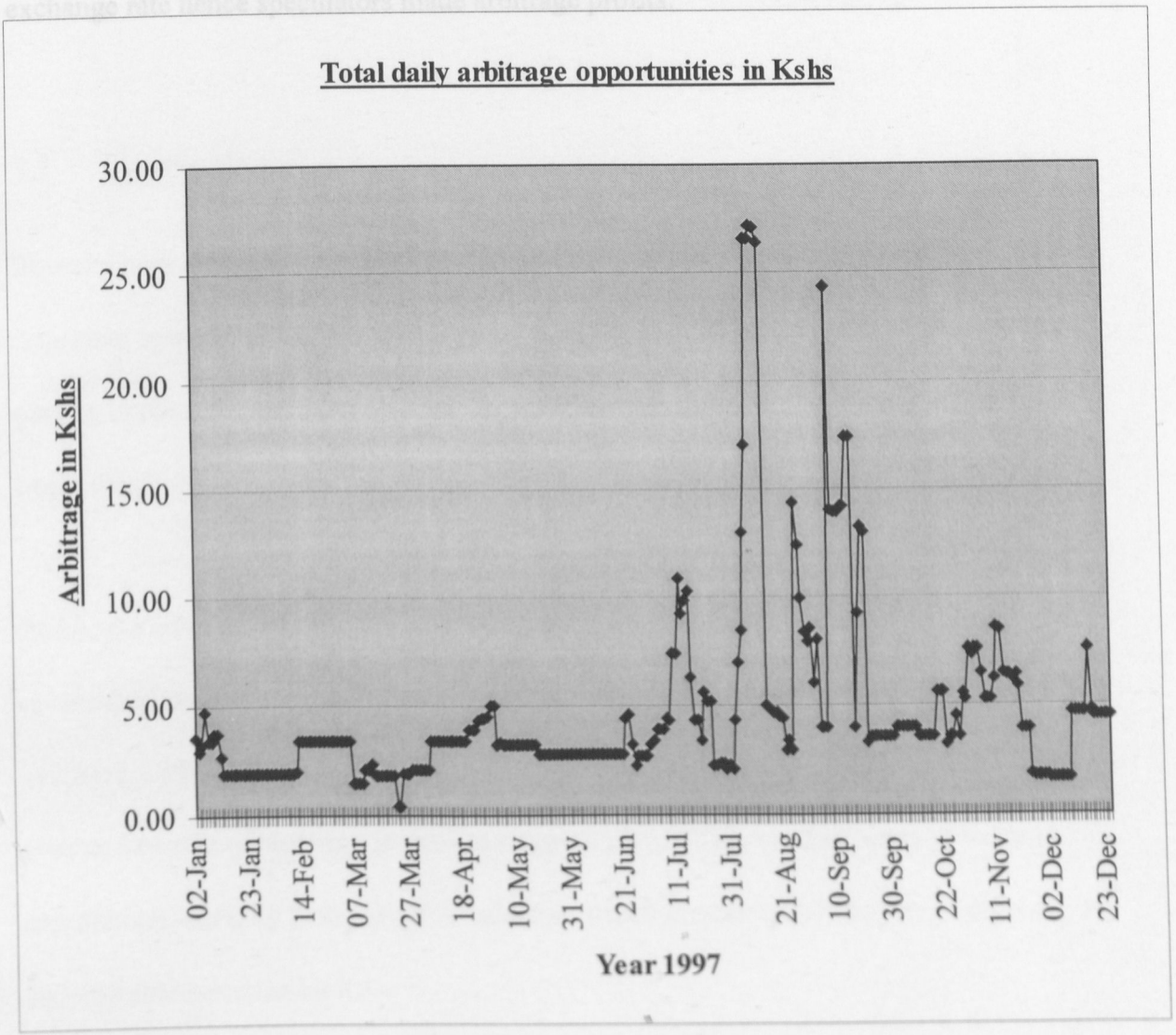
The Ugandan shilling has more constant arbitrage opportunities compared to the sterling pound and the US dollar. From the above graph, it is clearly shown that daily arbitrage

opportunities on average amounts to Kshs 1.00. An arbitrageur venturing in this currency can be sure of getting at least a profit on a daily basis, unlike the sterling pound and the US dollar.



The Tanzanian shilling was the most profitable currency among the four currencies. From the above graph, it is shown that on average, the arbitrage opportunities was between

Kshs 1.50 and Kshs 2.00. On daily arbitraging, there was at least a profit of between Kshs 0.40 and Kshs 3.80.



The above graph shows the total arbitrage that was possible to obtain in the forex market. It is clearly revealed from the above graph that the highest arbitrage profits could be obtained between the month of July and September 1997. For all the currencies, the

arbitrage was high between this period. This is a clear indication that the volatility of the exchange rate affects the possible arbitrage profits in the forex market. There was a lot of political unrest in Kenya between July and August which led to the volatility of the exchange rate hence speculators made arbitrage profits.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Bureaux have improved the foreign exchange sourcing in Kenya, and one of the important sources of foreign currency on the Forex Bureau market is from the tourists. By putting in place the right policies for the promotion of tourism, the country will be improving currency availability in the market at the same time.

Before the advent of liberalisation, a currency's value could only change through revaluation or devaluation. However, a liberalised market does not mean devaluation becomes a thing of the past, as authorities will tend to influence a currency trend through purchase or sale of currency in the open market place. This method tends to be more commercial -friendly than abrupt devaluation which creates uncertainty and can result in considerable commercial loss.

The Forex Bureau market has helped small-scale users of foreign currency, since 85.6% of the number of transactions on the market are below US$ 1,000. Big time users have also benefited, although large volume purchases are difficult to execute because of constant unavailability of currency.

In terms of efficiency, the many cases of arbitrage opportunities existing on the Forex Bureaux market show that the market is inefficient. This situation is easily understood by looking at the communication facilities available in the country and the cost of information dissemination. More importantly, because the Forex Bureaux market deals only in the physical cash transactions, buying from low priced Bureaux is not easily achieved even if minimum distances separate Bureaux because of the risks involved in transporting large amounts of cash.

Currently, the requirements to be fulfilled to establish and operate a Bureau include minimum paid-up capital of US$ 25,000, annual tax payment as revenue to the government, maintenance of a mandatory minimum balance of the equivalent of US $ 2,500 at all times and non-interest bearing account with Central Bank of Kenya of US $ 5,000. The authorities need to take a second look at the entry and maintenance requirements for this industry, as the incidence of black marketing may be reduced substantially by lowering the entry requirements so that many "black market" operators can register their businesses. If this is not done, black markets will always coexist with the Bureaux to the disadvantage of both the government(loss of tax) and the Bureaux operators (competitive disadvantage).

5.2 Limitations of the Study

Admittedly, the efficient market hypothesis is a fairly limited concept, more so with the assumption that information is cost less being untenable in developing countries, Kenya included. This research has attempted to simplify the basic properties of an efficient market. However, future efforts should be directed towards the extension or modification of the EMH concept currently being challenged. Such efforts could be in terms of redefining some generalised form indicators of market efficiency to be applicable both to advanced and emerging markets.

Despite the opening up of the forex market through the Bureau system, some black market activities are still going on. A good reason why they still exist may be due to the requirements for the establishment of Forex Bureaux. However, the premium is so small such that looking at the risks involved, it may not be worth purchasing from the black market. The survey showed that "black marketing" was still a worry to Bureaux operators located in the city centres where these black marketers are prevalent. Even though there are problems associated with the Forex Bureaux, most Kenyans readily admit that they have removed inconveniences and bureaucracy, especially where small sums of foreign currency are involved. Whatever its shortcomings, the Forex Bureau system is a vast improvement on the exchange control system.

The results obtained are only based on the data for the period 1997. Any interpretations deviating from the findings of this research as regards the efficiency of forex market may occur if the period is outside the study period (i.e. 1997).

5.3 Policy Recommendations

Policy makers are well advised not to be overly concerned about the allocative implications of apparent inefficiencies uncovered from the market studies. Therefore, if the characteristics of the new autonomous market are similar to the parallel/black market that it seeks to absorb, then an activist intervention policy, based mainly on market stability imperatives, should be strongly resisted.

A major limitation of the market is low currency availability hence the Kenyan government can therefore improve on currency availability by encouraging tourism.

In closing, this research deem it necessary to cast a look at the future of the foreign exchange market. In the new environment, Forex Bureaux face several challenges. First, decisions must be made quickly on merger prospects with parallel market operatives. Second, the surviving Forex Bureaux must confront the challenge of competing on an even playing field with commercial banks. Third, all participants face the task of contending with the unknown effects of occasional Central Bank of Kenya intervention in the currency market.

It seems inevitable that competitive pressures will lead Forex Bureaux and black market operators to cut corners to stay profitable. Economic theory of regulation teaches that just as financial institutions change in response to regulation, the regulatory authorities change their regulations in response to financial innovation. Both players (regulators and regulatees) thus "continuously adapt to each other much like riders on a seesaw"(Burt, Kaen and Booth, 1977). Economic analysis predicts that a change in the economic environment will stimulate a search for innovations that are likely to be profitable.

There is need to know that there exist a difference between the exchange rates of different Bureaux hence the best Bureau to buy and sell the foreign exchange. Participants can exploit the inefficiencies in the market by arbitraging.

5.3 Recommendations for Future Research

This research was to establish whether there existed any arbitrage in the forex market and the findings are that it really exists. A further investigation can be done to determine the factors which can lead to fluctuations on the possible arbitrage profits over time. Also, research can be done to establish the relationship between the exchange rate prevailing in the country and possible arbitrage profits. This research concentrated on arbitrage opportunities between Bureaux. Further research can be done to investigate whether arbitrage exist between various currencies (triangular arbitrage).

APPENDICES

APPENDIX I

POPULATION OF THE RESEARCH STUDY

1. Acesafe Forex Bureau Ltd.
2. Aristocrats Forex Bureau Ltd.
3. Bay Forex Bureau Ltd.
4. Blue Nile Forex Bureau Ltd.
5. Capital Forex Bureau Ltd.
6. Central Forex Bureau Ltd.
7. Chase Forex Bureau Ltd.
8. Continental Forex Bureau Ltd.
9. Crown Bureau De Change
10. Downtown Cambio Bureau Ltd.
11. Finerate Forex Bureau Ltd.
12. Forex Bureau Afro Ltd.
13. Giant Forex Bureau Ltd.
14. Goldfield Forex Bureau Ltd.
15. Greenland Forex Bureau Ltd.
16. Jodeci Forex Bureau Ltd.
17. Maxfair Forex Bureau Ltd.
18. Metropolitan Forex Bureau Ltd.
19. Middletown Forex Bureau Ltd.
20. Muthaiga Forex Bureau Ltd.
21. Nairobi Bureau De Change Ltd.
22. Nairobi Forex Bureau Ltd.
23. Orion Forex Bureau Ltd.
24. Overseas Forex Bureau Ltd.
25. Pearl Forex Bureau Ltd.
26. Redfox Forex Bureau Ltd.
27. Secas Forex Bureau Ltd.
28. Solid Exchange Bureau Ltd.
29. Speedy Forex Bureau Ltd.
30. Sterling Forex Bureau Ltd.
31. Taipan Forex Bureau Ltd.
32. Travellers Forex Bureau Ltd.
33. Village Market Bureau Ltd.
34. Yaya Centre Forex Bureau Ltd.

APPENDIX II

LIST OF FOREX BUREAUX UNDER STUDY

1. Acesafe Forex Bureau Ltd.
2. Aristocrats Forex Bureau Ltd.
3. Bay Forex Bureau Ltd.
4. Blue Nile Forex Bureau Ltd.
5. Continental Forex Bureau Ltd.
6. Crown Bureau De change
7. Central Forex Bureau Ltd.
8. Chase Forex Bureau Ltd.
9. Finerate Forex Bureau Ltd.
10. Jodeci Forex Bureau Ltd.
11. Metropolitan Forex Bureau Ltd.
12. Nairobi Bureau De Change Ltd.
13. Nairobi Forex Bureau Ltd.
14. Solid Exchange Bureau Ltd.
15. Speedy Forex Bureau Ltd.
16. Taipan Forex Bureau Ltd.
17. Travellers Forex Bureau Ltd.
18. Yaya Centre Forex Bureau Ltd.
19. Sterling Forex Bureau Ltd.
20. Orion Forex Bureau Ltd.
21. Giant Forex Bureau Ltd.
22. Redfox Forex Bureau Ltd.
23. Overseas Forex Bureau Ltd.
24. Secas Forex Bureau Ltd.
25. Greenland Forex Bureau Ltd.

APPENDIX III

DAILY POSSIBLE ARBITRAGES

Date	1 US DOLLAR (Kshs)	1 STERLING POUND (Kshs)	UGANDAN SHS (100) (Kshs)	TANZANIAN SHS (100) (Kshs)	TOTAL Arbitrages (Kshs)
02/01/97	0.00	1.50	0.30	1.70	3.50
03/01/97	0.00	1.00	0.20	1.70	2.90
06/01/97	0.00	1.50	0.00	1.70	3.20
07/01/97	1.50	1.50	0.00	1.70	4.70
08/01/97	0.00	1.50	0.20	1.70	3.40
09/01/97	0.00	1.50	0.20	1.70	3.40
10/01/97	0.30	1.50	0.20	1.70	3.70
12/01/97	0.30	1.50	0.20	1.70	3.70
13/01/97	0.30	0.50	0.20	1.70	2.70
14/01/97	0.00	0.00	0.20	1.70	1.90
15/01/97	0.00	0.00	0.20	1.70	1.90
16/01/97	0.00	0.00	0.20	1.70	1.90
17/01/97	0.00	0.00	0.20	1.70	1.90
18/01/97	0.00	0.00	0.20	1.70	1.90
20/01/97	0.00	0.00	0.20	1.70	1.90
21/01/97	0.00	0.00	0.20	1.70	1.90
22/01/97	0.00	0.00	0.20	1.70	1.90
23/01/97	0.00	0.00	0.20	1.70	1.90
24/01/97	0.00	0.00	0.20	1.70	1.90
27/01/97	0.00	0.00	0.20	1.70	1.90
28/01/97	0.00	0.00	0.20	1.70	1.90
29/01/97	0.00	0.00	0.20	1.70	1.90
30/01/97	0.00	0.00	0.20	1.70	1.90
31/01/97	0.00	0.00	0.20	1.70	1.90
03/02/97	0.00	0.00	0.20	1.70	1.90
04/02/97	0.00	0.00	0.20	1.70	1.90
05/02/97	0.00	0.00	0.20	1.70	1.90
06/02/97	0.00	0.00	0.20	1.70	1.90
07/02/97	0.00	0.00	0.20	1.70	1.90

08/02/97	0.00	0.00	0.20	1.70	1.90
10/02/97	0.00	0.00	0.20	1.70	1.90
11/02/97	0.00	0.00	0.20	1.70	1.90
12/02/97	0.00	0.00	0.20	1.80	2.00
13/02/97	0.00	0.00	1.20	2.20	3.40
14/02/97	0.00	0.00	1.20	2.20	3.40
15/02/97	0.00	0.00	1.20	2.20	3.40
17/02/97	0.00	0.00	1.20	2.20	3.40
18/02/97	0.00	0.00	1.20	2.20	3.40
19/02/97	0.00	0.00	1.20	2.20	3.40
20/02/97	0.00	0.00	1.20	2.20	3.40
21/02/97	0.00	0.00	1.20	2.20	3.40
24/02/97	0.00	0.00	1.20	2.20	3.40
25/02/97	0.00	0.00	1.20	2.20	3.40
26/02/97	0.00	0.00	1.20	2.20	3.40
27/02/97	0.00	0.00	1.20	2.20	3.40
28/02/97	0.00	0.00	1.20	2.20	3.40
01/03/97	0.00	0.00	1.20	2.20	3.40
03/03/97	0.00	0.00	1.20	2.20	3.40
04/03/97	0.00	0.00	1.20	2.20	3.40
05/03/97	0.00	0.00	1.20	2.20	3.40
06/03/97	0.00	0.00	0.50	1.00	1.50
07/03/97	0.00	0.00	0.55	0.90	1.45
08/03/97	0.00	0.00	0.55	0.90	1.45
10/03/97	0.00	0.00	0.55	0.90	1.45
11/03/97	0.00	0.00	0.55	1.50	2.05
12/03/97	0.00	0.00	0.55	1.50	2.05
13/03/97	0.00	0.00	0.75	1.60	2.35
14/03/97	0.00	0.00	1.00	0.80	1.80
15/03/97	0.00	0.00	1.00	0.80	1.80
17/03/97	0.00	0.00	1.00	0.80	1.80
18/03/97	0.00	0.00	1.00	0.80	1.80
19/03/97	0.00	0.00	1.00	0.80	1.80
20/03/97	0.00	0.00	1.00	0.80	1.80
21/03/97	0.00	0.00	1.00	0.80	1.80
22/03/97	0.00	0.00	0.00	0.40	0.40
24/03/97	0.00	0.00	0.00	0.40	0.40
25/03/97	0.00	0.00	1.00	0.90	1.90

26/03/97	0.00	0.00	1.00	0.90	1.90
27/03/97	0.00	0.00	1.00	0.90	1.90
28/03/97	0.00	0.00	1.20	0.90	2.10
31/03/97	0.00	0.00	1.20	0.90	2.10
02/04/97	0.00	0.00	1.20	0.90	2.10
03/04/97	0.00	0.00	1.20	0.90	2.10
04/04/97	0.00	0.00	1.20	0.90	2.10
05/04/97	0.00	0.00	1.20	0.90	2.10
07/04/97	0.00	0.00	1.20	2.19	3.39
08/04/97	0.00	0.00	1.20	2.19	3.39
09/04/97	0.00	0.00	1.20	2.19	3.39
10/04/97	0.00	0.00	1.20	2.19	3.39
11/04/97	0.00	0.00	1.20	2.19	3.39
12/04/97	0.00	0.00	1.20	2.19	3.39
14/04/97	0.00	0.00	1.20	2.19	3.39
15/04/97	0.00	0.00	1.20	2.19	3.39
16/04/97	0.00	0.00	1.20	2.19	3.39
17/04/97	0.00	0.00	1.20	2.19	3.39
18/04/97	0.00	0.00	1.20	2.19	3.39
19/04/97	0.00	0.00	1.20	2.19	3.39
21/04/97	0.00	0.00	1.20	2.69	3.89
22/04/97	0.00	0.00	1.20	2.69	3.89
23/04/97	0.00	0.00	1.20	2.69	3.89
24/04/97	0.40	0.00	1.20	2.69	4.29
25/04/97	0.40	0.10	1.20	2.69	4.39
26/04/97	0.40	0.10	1.20	2.69	4.39
28/01/00	0.40	0.40	1.00	2.69	4.49
29/04/97	0.00	1.30	1.00	2.69	4.99
30/04/97	0.00	1.30	1.00	2.69	4.99
02/05/97	0.00	0.00	0.54	2.69	3.23
03/05/97	0.00	0.00	0.60	2.69	3.29
05/05/97	0.00	0.00	0.54	2.69	3.23
06/05/97	0.00	0.00	0.54	2.69	3.23
07/05/97	0.00	0.00	0.54	2.69	3.23
08/05/97	0.00	0.00	0.54	2.69	3.23
10/05/97	0.00	0.00	0.54	2.69	3.23
12/05/97	0.00	0.00	0.54	2.69	3.23
13/05/97	0.00	0.00	0.54	2.69	3.23

14/05/97	0.00	0.00	0.54	2.69	3.23
15/05/97	0.00	0.00	0.54	2.69	3.23
17/05/97	0.00	0.00	0.54	2.69	3.23
19/05/97	0.00	0.00	0.54	2.69	3.23
20/05/97	0.00	0.00	0.54	2.19	2.73
21/05/97	0.00	0.00	0.54	2.19	2.73
22/05/97	0.00	0.00	0.54	2.19	2.73
23/05/97	0.00	0.00	0.54	2.19	2.73
24/05/97	0.00	0.00	0.54	2.19	2.73
26/05/97	0.00	0.00	0.54	2.19	2.73
27/05/97	0.00	0.00	0.54	2.19	2.73
28/05/97	0.00	0.00	0.54	2.19	2.73
29/05/97	0.00	0.00	0.54	2.19	2.73
30/05/97	0.00	0.00	0.54	2.19	2.73
31/05/97	0.00	0.00	0.54	2.19	2.73
03/06/97	0.00	0.00	0.54	2.19	2.73
04/06/97	0.00	0.00	0.54	2.19	2.73
05/06/97	0.00	0.00	0.54	2.19	2.73
06/06/97	0.00	0.00	0.54	2.19	2.73
07/06/97	0.00	0.00	0.54	2.19	2.73
09/06/97	0.00	0.00	0.54	2.19	2.73
10/06/97	0.00	0.00	0.54	2.19	2.73
11/06/97	0.00	0.00	0.54	2.19	2.73
12/06/97	0.00	0.00	0.54	2.19	2.73
13/06/97	0.00	0.00	0.54	2.19	2.73
14/06/97	0.00	0.00	0.54	2.19	2.73
16/06/97	0.00	0.00	0.54	2.19	2.73
17/06/97	0.00	0.00	0.55	2.19	2.74
18/06/97	0.00	0.00	0.60	2.19	2.79
19/06/97	0.00	0.00	0.60	2.19	2.79
20/06/97	0.00	0.00	0.60	2.19	2.79
21/06/97	0.00	0.00	0.60	2.19	2.79
23/06/97	0.00	1.60	0.60	2.19	4.39
24/06/97	0.00	1.60	0.80	2.19	4.59
25/06/97	0.00	1.50	0.80	0.90	3.20
26/06/97	0.00	0.50	0.80	0.90	2.20
27/06/97	0.00	1.00	0.80	0.90	2.70
28/06/97	0.00	1.00	0.80	0.90	2.70

30/06/97	0.00	1.00	0.80	0.90	2.70
01/07/97	0.00	1.00	0.80	0.90	2.70
02/07/97	0.00	1.30	1.00	0.90	3.20
03/07/97	0.00	1.50	1.00	0.90	3.40
04/07/97	0.00	2.00	1.00	0.90	3.90
05/07/97	0.00	2.00	1.00	0.90	3.90
07/07/97	0.00	2.00	1.00	0.90	3.90
08/07/97	0.00	2.50	1.00	0.90	4.40
09/07/97	0.00	2.50	1.00	0.80	4.30
10/07/97	1.10	4.50	1.00	0.80	7.40
11/07/97	1.10	4.50	1.00	0.80	7.40
12/07/97	3.60	5.50	1.00	0.80	10.90
14/07/97	1.10	6.00	1.00	1.15	9.25
15/07/97	1.60	6.00	1.00	1.25	9.85
16/07/97	1.60	6.50	1.00	1.15	10.25
17/07/97	0.00	4.00	1.00	1.30	6.30
18/07/97	0.00	2.00	1.05	1.30	4.35
19/07/97	0.00	2.00	1.05	1.30	4.35
21/07/97	0.00	1.00	1.05	1.30	3.35
22/07/97	0.00	3.25	1.05	1.30	5.60
23/07/97	0.00	3.00	1.00	1.20	5.20
24/07/97	0.00	3.00	1.00	1.15	5.15
25/07/97	0.25	0.00	1.00	1.00	2.25
26/07/97	0.25	0.00	1.00	1.00	2.25
28/07/97	0.25	0.00	1.00	1.05	2.30
29/07/97	0.25	0.00	1.00	1.05	2.30
30/07/97	0.00	0.00	1.00	1.10	2.10
31/07/97	0.00	0.00	1.00	1.20	2.20
01/08/97	0.00	0.00	1.00	1.10	2.10
02/08/97	0.75	1.50	1.00	1.10	4.35
04/08/97	1.75	2.00	1.40	1.80	6.95
05/08/97	2.25	3.00	1.40	1.80	8.45
06/08/97	4.75	5.00	1.50	1.80	13.05
07/08/97	5.75	8.00	1.50	1.80	17.05
09/08/97	8.75	13.00	1.80	3.00	26.55
11/08/97	8.75	13.00	1.80	3.00	26.55
12/08/97	9.35	13.00	1.80	3.00	27.15
13/08/97	9.25	13.00	1.80	3.00	27.05

14/08/97	8.75	13.00	1.40	3.25	26.40
15/08/97	0.00	0.00	2.00	3.00	5.00
16/08/97	0.00	0.00	1.80	3.00	4.80
18/08/97	0.00	0.00	1.70	2.95	4.65
19/08/97	0.00	0.00	1.70	2.95	4.65
20/08/97	0.00	0.00	1.60	2.90	4.50
21/08/97	0.00	0.00	1.50	2.90	4.40
22/08/97	0.00	0.00	1.00	1.90	2.90
23/08/97	0.00	0.00	1.50	1.90	3.40
25/08/97	0.00	0.00	1.50	1.40	2.90
26/08/97	3.50	6.00	1.50	3.40	14.40
27/08/97	3.50	4.00	1.50	3.40	12.40
28/08/97	2.50	2.00	2.00	3.40	9.90
29/08/97	1.00	2.00	2.00	3.40	8.40
30/08/97	1.00	2.00	1.50	3.40	7.90
01/09/97	1.00	3.00	1.50	3.05	8.55
02/09/97	0.00	2.00	1.50	2.50	6.00
03/09/97	0.00	4.00	1.50	2.50	8.00
04/09/97	0.00	0.00	1.50	2.50	4.00
05/09/97	0.00	0.00	1.50	2.50	4.00
06/09/97	0.00	0.00	1.50	2.50	4.00
08/09/97	8.75	11.50	1.50	2.60	24.35
09/09/97	4.85	5.00	1.50	2.70	14.05
10/09/97	4.75	5.00	1.50	2.70	13.95
11/09/97	4.75	5.00	1.50	2.70	13.95
12/09/97	5.25	5.00	1.50	2.50	14.25
13/09/97	5.25	5.00	1.50	2.50	14.25
15/09/97	5.25	7.00	1.50	3.70	17.45
16/09/97	5.25	7.00	1.50	3.70	17.45
17/09/97	0.00	0.00	1.50	2.50	4.00
18/09/97	0.00	5.00	1.50	2.75	9.25
19/09/97	5.00	5.00	0.55	2.75	13.30
20/09/97	4.75	5.00	0.55	2.75	13.05
22/09/97	0.00	0.00	0.55	2.75	3.30
23/09/97	0.00	0.00	0.55	3.00	3.55
24/09/97	0.00	0.00	0.55	3.00	3.55
25/09/97	0.00	0.00	0.55	3.00	3.55
26/09/97	0.00	0.00	0.50	3.00	3.50

27/09/97	0.00	0.00	0.50	3.00	3.50
29/09/97	0.00	0.00	0.50	3.00	3.50
30/09/97	0.00	0.00	0.50	3.00	3.50
01/10/97	0.00	0.00	0.50	3.00	3.50
02/10/97	0.50	0.00	0.50	3.00	4.00
03/10/97	0.50	0.00	0.50	3.00	4.00
04/10/97	0.50	0.00	0.50	3.00	4.00
06/10/97	0.50	0.00	0.50	3.00	4.00
07/10/97	0.50	0.00	0.50	3.00	4.00
08/10/97	0.50	0.00	0.50	3.00	4.00
09/10/97	0.50	0.00	0.50	3.00	4.00
11/10/97	0.00	0.00	0.50	3.00	3.50
13/10/97	0.00	0.00	0.50	3.00	3.50
14/10/97	0.00	0.00	0.50	3.00	3.50
15/10/97	0.00	0.00	0.50	3.00	3.50
16/10/97	0.00	0.00	0.50	3.00	3.50
17/10/97	0.00	0.00	0.50	3.00	3.50
18/10/97	0.00	0.00	2.60	3.00	5.60
21/10/97	0.00	0.00	2.60	3.00	5.60
22/10/97	0.00	0.00	2.60	3.00	5.60
23/10/97	0.00	0.00	0.20	3.00	3.20
24/10/97	0.00	0.00	0.50	3.00	3.50
25/10/97	0.00	0.00	0.50	3.00	3.50
27/10/97	0.00	1.00	0.50	3.00	4.50
28/10/97	0.00	0.00	0.50	3.00	3.50
29/10/97	0.00	2.00	0.50	3.00	5.50
30/10/97	0.75	1.00	0.50	3.00	5.25
31/10/97	1.00	1.00	2.60	3.00	7.60
01/11/97	1.00	1.00	2.35	3.00	7.35
02/11/97	0.00	2.00	2.60	3.00	7.60
03/11/97	0.00	2.00	2.60	3.00	7.60
05/11/97	0.00	3.00	0.50	3.00	6.50
06/11/97	0.00	2.00	0.50	2.80	5.30
07/11/97	0.00	2.00	0.50	2.80	5.30
08/11/97	0.00	2.00	0.50	2.80	5.30
10/11/97	0.00	3.00	0.50	2.75	6.25
11/11/97	0.00	5.00	0.50	3.00	8.50
12/11/97	0.00	5.00	0.53	2.95	8.48

13/11/97	0.00	3.00	0.50	2.95	6.45
14/11/97	0.00	5.00	0.50	0.90	6.40
15/11/97	0.00	5.00	0.50	0.90	6.40
17/11/97	0.00	5.00	0.50	0.70	6.20
18/11/97	0.00	5.00	0.50	0.85	6.35
19/11/97	0.00	4.50	0.50	0.85	5.85
20/11/97	0.00	2.50	0.50	0.85	3.85
21/11/97	0.00	2.50	0.50	0.85	3.85
22/11/97	0.00	2.50	0.50	0.85	3.85
24/11/97	0.00	0.50	0.50	0.80	1.80
25/11/97	0.00	0.50	0.50	0.75	1.75
26/11/97	0.00	0.50	0.50	0.75	1.75
27/11/97	0.00	0.50	0.50	0.75	1.75
28/11/97	0.00	0.50	0.50	0.75	1.75
01/12/97	0.00	0.50	0.50	0.75	1.75
02/12/97	0.00	0.50	0.50	0.65	1.65
03/12/97	0.00	0.50	0.50	0.65	1.65
04/12/97	0.00	0.50	0.50	0.65	1.65
05/12/97	0.00	0.50	0.50	0.60	1.60
06/12/97	0.00	0.50	0.50	0.60	1.60
08/12/97	0.00	0.50	0.50	0.60	1.60
09/12/97	0.00	0.50	0.50	0.60	1.60
10/12/97	0.00	2.50	0.50	1.65	4.65
11/12/97	0.00	2.50	0.50	1.65	4.65
13/12/97	0.00	2.50	0.50	1.65	4.65
15/12/97	0.00	2.50	0.50	1.65	4.65
16/12/97	0.00	2.50	0.50	1.65	4.65
17/12/97	0.00	5.50	0.50	1.55	7.55
18/12/97	0.00	2.50	0.50	1.70	4.70
19/12/97	0.00	2.50	0.50	1.50	4.50
20/12/97	0.00	2.50	0.50	1.50	4.50
22/12/97	0.00	2.50	0.50	1.45	4.45
23/12/97	0.00	2.50	0.50	1.50	4.50
24/12/97	0.00	2.50	0.50	1.50	4.50
31/12/97	0.00	2.50	0.50	1.50	4.50

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