AN INVESTIGATION INTO THE ROLE OF DEPOSIT INSURANCE IN KENYA'S BANKING SECTOR STABILITY

By

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DECLARATION

This project is my original work and has not been presented for a degree in any other university.

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I wish to thank God for everything that and everyone who has made this work possible.

I tried to draw a list of all the persons to acknowledge…a few pages would not be sufficient…besides I'd hate to overlook anyone and I am only human…thus I cease to rake my mind and leave it to the Almighty God to acknowledge by way of blessing all who have had a positive role in this work.

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ABSTRACT

This paper focuses on the relationship between deposit insurance and systemic stability in the banking system, drawing on the Kenyan experience. Specifically the paper seeks to establish whether the introduction of the Deposit Protection Fund (DPF) has had a positive or negative effect on Kenya's Banking Sector stability

The study focused on two sets of time periods i.e. Pre-DPF (1969-1985) and Post-DPF (1986-2002) periods. A 2 group experiment design was used to compare the general levels of fragility for the two time periods.

The study finds that the level of banking sector stability is higher in the Pre-DPF than during the Post-DPF period. Overall results indicate that banking sector fragility is very high - *level IV* – the class with the highest level of fragility.

GLOSSARY

Banking Sector. Refers to Commercial Banks, Non-Bank Financial Institutions (NBFIs), and Mortgage Finance Companies – operating banking business under the Banking Act.

Banking Soundness. Lindgren (1998) – A sound banking system may be defined as one in which most banks are solvent and are likely to remain so.

Market Risk. The risk that market conditions will change the value of the underlying assets.

Default (Credit) Risk. The risk that debtors will be unwilling or unable to repay their debts.

Liquidity risk for banks. Is the risk that depositors will withdraw their deposits in large amounts or that banks will not have enough liquid assets to cover these withdrawals – synonymous to **Bank runs**.

Bank Contagion. A situation whereby a crisis in a bank or group of banks increases the probability of a crisis in other banks within the sector.

Nominal Exchange Rate. The price of one currency in terms of another currency.

Real Exchange Rate. The nominal exchange rate adjusted for differences in inflation.

Money Multiplier. The ratio of money supply to the monetary base.

Terms Of Trade. The average price of goods sold divided by the average price of goods bought by a nation.

Gross National Product (GNP). The total income earned by nationals (i.e. by residents of a nation). It includes the income that nationals earn abroad, but it does not include the income earned within a country by foreigners.

Gross Domestic Product (GDP). The total income earned domestically. It includes income earned domestically by foreigners, but it does not include income earned by domestic residents on foreign ground.

Fiscal Surplus. The amount by which budgetary revenues exceed budgetary outlays.

Broad Money. The definitions of money:

M0 – The narrowest concept, comprises currency held by non-bank public

M1 – Includes M0 and demand deposits held with commercial banks.

M2 – Includes M1 and time and savings and deposits held with commercial banks.

M3 - Includes M2 and time and savings deposits held with non bank financial institutions (NBFIs)

M3x – Includes M3 and residents foreign currency denominated deposits held with commercial banks.

M3xT - Comprises M3x and holdings of government securities by non-bank public.

Foreign Exchange Reserves. Foreign currencies held by the government or the central bank.

CHAPTER 1: INTRODUCTION

1.1 Background

1.1.1 Need For Deposit Insurance Schemes

Great disparity exists in the Deposit Insurance Schemes (DIS) implemented in various countries. Garcia (1999) in a study of 72 worldwide systems summarized the numerous differences that exist. They differ not only in the type of membership (compulsory or voluntary), range of deposits covered (foreign currency deposits, inter-bank deposits, or household deposits), funding (funded or un-funded), coverage (amount covered per deposit or depositor), premiums (risk-adjusted, ex post and / or pro rata), assessment base for premium calculations (all deposits, insured deposits, non-performing loans, credit accounts, balance sheet items, risk weighted assets plus total deposits) but they also differ on the basis of type of administration (private, joint or government only).

Despite these differences, Dale (2000) has identified two main objectives that all deposit insurance schemes hope to address i.e.:

1. Protection of depositor

2. Prevention of bank-runs

Arguments for the first – depositors need protection first because often ordinary depositors lack the ability to determine and monitor the credibility of the institutions in which they place their funds and second so as to mitigate the severity of the cost of deposit losses to individuals – are unanimously agreed upon whereas arguments for the financial stability rationale are more controversial.

This controversy is two-fold. One is between the two schools of thought on fragility of banks[1]. The other is on (de) stabilization effect that deposit insurance schemes have on the banking sector.

History reveals that the first formal system of deposit insurance schemes was established in the US in 1934 with the purpose of preventing the extensive bank runs that contributed to the Great Depression. At that time it was hailed as the most important contribution to stabilizing the US financial system, Friedman (1959). However,

> *32 years down the line the US Treasury in the wake of another banking crisis concluded that the deposit insurance scheme was partly to blame…Dale (2000).*

It is interesting to note that out of 72 explicit deposit insurance schemes surveyed by Garcia (1999) more than 50 had been introduced in the 1980-1990 period and yet in a different study by Demirguc-Kunt & Detragiache (1999) on banking crises around the world covering approximately the same period (1980-1997) concludes that "*explicit deposit insurance tends to be detrimental to banking stability*".

1.1.2 Kenyan Banking Sector

History

Nyamai (1989) identifies three of the earliest banks that operated in Kenya as: National Bank of India (1886), Standard Bank of South Africa (1910), and National Bank of South Africa (1916). In later literature, Kathanje (2000) identifies the earliest post independence banks as: Co-operative Bank of Kenya (1965), National Bank of Kenya (1968) and Kenya Commercial Bank (1971).

[1] More will be said about this in later parts of this document.

Structure

The following table shows the number and nature of institutions that constitute the Kenyan Banking Sector:

Table 1: Types Of Financial Institutions In Kenya As At 2002

Type Of Institution / Bureau	Feb 2001	Feb 2002
Commercial Banks	46	43
Operating	45	43
Under CBK statutory management	1	0
Building Societies	4	4
Mortgage Finance Companies	2	2
Non-Bank Financial Institutions	3	2
Operating	3	2
Under Central Bank statutory management	-	-
Total	55	51
Foreign Exchange Bureaus	48	48

Source: Central Bank Of Kenya

Significance Of The Financial Sector In Kenya

The health of the banking sector is paramount because banks:

- Facilitate financial intermediation between savers and borrowers
- Facilitate the execution of the monetary policy
- Provide a payment system

In the year 2001 the financial services sector, under which the Banking Sector falls, contributed 10.6% of GDP and was ranked number 4 after Tourism and Trade. The first two sectors were Agriculture & Manufacturing respectively.[2]

Bank Failure (1984 – 2003)

Gonzalez (1999) identifies three types of risks that influence bank failure:

1. Market risk

[2] See Appendix 1 for a listing showing what each sector contributed to the GDP for year 2001

2. Default risk

3. Liquidity risk

Obiero (2002) in a study of the Kenyan Banking sector identified the main cause of failure as[3]:

1. Ineffective board and management

2. High incidence of non-performing loans

3. Under-capitalization / insolvency

4. Poor lending practices

5. Run on deposits

6. Persistent violations of the Banking Act

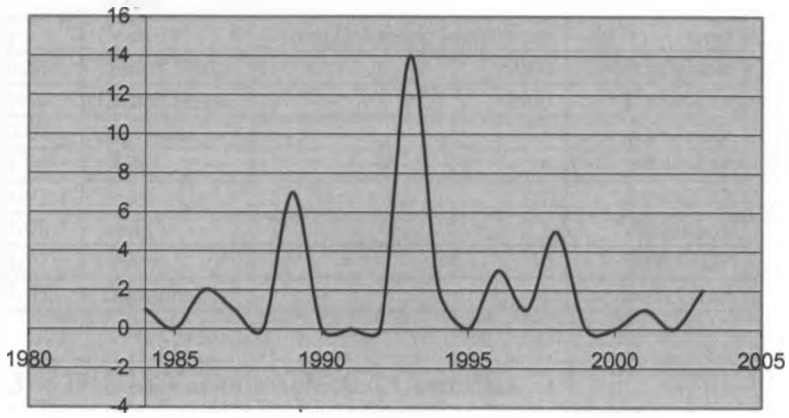
In the period 1984 - 1996 29 Kenyan banking institutions failed[4]. In 1998, five banks i.e. City Finance, Bullion, Prudential, Reliance and Trust banks went under for failure to meet Clearing House obligations. The first two, City Finance and Bullion were successfully revived and are now fully operation. Attempts to reopen Trust Bank were not so successful. In 2001 Delphis bank was intervened. However, it has since been revived and is currently in operation. In the more recent past Daima and Euro banks closed shop.

[3] The first three appear in order of their significance to the sector but those that follow thereafter have no particular order.

[4] A summary of the various banking institutions that have failed between 1984-1996 is provided in Appendix 2.

Following is a frequency chart depicting bank failure rate for this period:

Graph 1: Frequency Curve Of Failed Banking Institutions in Kenya



Cost Of Bank Failures

The government had to spend approximately Kshs. 200million to consolidate seven failing banks into what is now known as Consolidated Bank of Kenya.

Bank failures have also un-quantifiable costs such as business fold ups, unemployment[5] and general instability, Obiero (2002).

[5] Refer to Appendix 3 for a summary table showing data on employment in the banking industry for Kenya as at year 2002.

In a separate study, Murugu (1998) identified the costs of financial failure for various countries as follows:

Table 2: The Cost Of Financial Failures In Sampled Countries

Year	Country	No. Collapsed Institutions	Cost
1930-33	United States	9000	Not available
1980-94	United States	2600	$168billion
1980-84	Argentina	71	10% GDP
1981-83	Chile	16	19% GDP
1994-97	Brazil	17	18% GDP
1997-98	Japan	1	$91billion
1984-97	Kenya	30	10% GDP
1987-95	Tanzania	1	10% GDP

1.1.3 DIS In Various Selected Countries

The main DIS arrangements identified by Garcia (2000) were:

1. An explicit denial of protection (as in New Zealand)

2. Legal priority for the claims of depositors over other claimants during the liquidation of a failed bank (as in Australia) instead of a deposit guarantee.

3. Ambiguity regarding coverage

4. An implicit guarantee

5. Explicit limited coverage

6. A full explicit guarantee

The following paragraphs present some historical background to the different DIS arrangements existing in the US, EU, Japan and Kenya.

Federal Deposit Insurance Corporation (FDIC) – US

FDIC was established in 1933 and is the oldest existing formal DIS system in the world. From inception to 1982 the mandate of the FDIC was to:

- Fully compensate all depositors, insured and uninsured, in the event of a bank failing

- Arrange for mergers of weak institutions with the hope of averting failure

During the same period (1933 – 1982) 99.8% of all depositors of 620 banks that failed were fully compensated.

The presence of a full coverage for depositors was blamed for undermining the market discipline and encouraging excessive risk taking - consequently by 1984 a new approach was adopted. Within this new approach, insured depositors and other creditors were only paid on the basis of anticipated collections from the failed bank's receivership.

This did not work well because there was also the To Big To Fail (TBTF) concept to contend with. At that time it was thought that big institutions had to be prevented from failing at all costs as was witnessed in the Continental Illinois Crisis of 1984. The experience brought to light the fact that large institutions enjoyed unfair advantage over small institutions.

To address this, the policy of the FDIC was changed so that whenever possible all depositors and creditors of a failed institution were protected.

In the period between 1985 and 1990 the US despite witnessing the largest number of institution failure, FDIC was able to fully compensate 99% of all uninsured deposits.

By late 1980s studies indicated that poorly priced and structured deposit insurance scheme was the primary cause of instability in the US banking industry, as reflected in the following statement:

"Events have demonstrated that some criticisms levelled in 1930s against the idea of federal deposit insurance had considerable merit. The system has subsidized highly risky, poorly managed institutions. These institutions have exploited the federal safety net by funding speculative projects with insured deposits. The resulting costs have been borne by well run institutions and taxpayers" – United States Treasury (1991)

With this realization the Federal Deposit Corporation Improvement Act (FDICIA) was enacted to contain the level of moral hazard by:

- Introducing risk adjusted premiums
- Applying Structured Early Intervention and Resolution (SEIR)[6] to troubled banks
- Restricting the FDIC's power to bail out large banks i.e. the FDIC may only rescue a large institution with the recommendation of both the board of FDIC and Federal Reserve Bank to the effect that failure to do so 'would have serious adverse effects on economic conditions and financial stability'.
- Prohibiting the FDIC from protecting uninsured depositors or creditors.

As at 2000, the FDIC had met its target insurance fund reserve ratio (the ratio of the fund balance to insured deposits) of 1.25%.

Of interest are the facts that:

- Any loss incurred by the FDIC must be and is recovered using a method that hits hardest at the larger banks, and

[6] Also known as Prompt Corrective Action (PAC)

- The risk class of an institution is based on supervisory rather than market information.

So far, between 1980 and 2000, only one bank failed in 1997.

Deposit Guarantee Directive (DGD) – EU

The DGD, which came into effect in July 1995, has the following objectives:

- To increase stability and soundness of the banking system
- To protect savers
- To achieve competitive equality between institutions operating across borders within the EU

These, the DGD hopes to achieve by requiring member states to:

- Set a minimum coverage amount of €20,000 per deposit
- Not cover inter-bank deposits and apply national discretion on whether to cover deposits of large corporate bodies or not.
- Take full responsibility of both the deposit insurance and supervisory of home banks such that depositors at offshore branches are protected by the DIS of the country in which the head office operates.
- Allow offshore branches to join the host country's scheme if such a scheme is more generous than the home country's scheme by paying the difference in insurance premium.
- Pay compensations within 3 months of the deposits becoming unavailable.

All other matters in the design of the DIS are left to the individual state's discretion.

Deposit Insurance Corporation (DIC) – Japan

The DIC was established in 1971 and is funded by the government, Bank of Japan (BOJ) and the banking industry.

Initially the coverage limit was set at ¥3m per depositor per institution and banks paid flat rate premiums.

In 1986 the Deposit Insurance Act strengthened the DIC by:

- Empowering it to assist in mergers of troubled institutions
- Raising the coverage limit to ¥10m
- Increasing the maximum funds available to the DIC from the BOJ from ¥50bn to ¥500bn.

The first Japanese bank failure, after the 2nd WW, occurred in August 1995 with the collapse of Hyogo Bank. In this incident all depositors were fully compensated.

By the end of 1995 when Japan was facing a looming system-wide financial crisis, the DIC had no option but to provide full coverage for all depositors as the financial system was too fragile.

Subsequently, by June 1996 further amendments to the Deposit Insurance Act were made:

- Empowering the DIC to restructure failing banks
- Creating two separate schemes:

CHAPTER 2: LITERATURE REVIEW

2.1 Fragility In The Banking System

Mugo (2001) observes it is difficult to precisely classify a banking system as 'sound' or 'unsound' because there is no benchmark measure of systemic insolvency that determines when a banking system is unsound or when a crisis will occur…

Some of the definitions for financial crisis are:

1. Mitchell (1913) – *financial crisis* is the process of intense liquidation of credit. This follows a boom period in which banks extend additional credit to thriving firms. When the boom ends the profitability of these firms deteriorates and banks call in loans previously advanced.

2. Friedman & Schwartz (1963) – a financial crisis is a situation where banks are forced to sell assets at a loss to replenish reserves. This follows major withdrawals by depositors leading banks to draw on reserves held at the central bank and sale assets so as to raise funds to meet this intense depositors demand.

As alluded to before, there is some controversy on the fragility of banks specifically there are two schools of thought, Dale (2000), viz:

- One school of thought proposes that banking and payment systems are not inherently unstable. Proponents of this school are Benston and Kaufman (1998).

- And another school holds that banking and payment systems are inherently fragile.

Further, failure to pay the premium attracts a penalty interest charge not exceeding 0.5% of the unpaid amount for every day outside the notice period on which the amount remains unpaid.

- Coverage

The maximum protected deposit coverage is currently set at KShs. 100,000 on deposits held in the same protected contributory institution and held in the same right and capacity per depositor, DPFB Annual Report, 1987.

Changes In The Law

Prior to 1989, DPFB operated as a Board without a legal personality. However, with the enactment of the Banking Act (1989) the DPFB became a legal entity capable of owning, acquiring and disposing property, to sue and be sued.

Further amendments to Sections 37(3) and 41 of the Banking Act enabled the Board to:

- Invest the Fund not only in Treasury Bills but also in Treasury Bonds and other Government securities.

- To acquire, hold or dispose shares, stocks, and debentures in a bank or a financial institution through the Fund.

Key facts are:

- Of the 37 institutions that failed between 1984-2003, 92.7% collapsed after the installation of the DPF

- The coverage of 100,000/= per depositor set in 1986 has never been revised to cater for inflation or changes in GDP

Lessons Learnt By Sampled Countries

It is difficult for a country to install a perfect DIS right at the start so that the design features of any DIS must undergo a metamorphosis, over time, to attain a "near perfect" DIS.

Ironically it is only the occurrence of a banking crisis that presents the "golden" opportunity to test the robustness of the existing DIS.

The weakness of the existing DIS, brought to light by a banking crisis pulls all parties concerned back to the drawing board for the purpose of re-evaluating and re-engineering the design features of the DIS with hope of getting it right.

Further, it is imperative to appreciate that a perfect DIS is designed only to cope with "normal" banking crises[12]. During abnormal times the government needs to intervene to arrest system wide failures.

1.2 Statement Of The Problem

Highlights within the Kenyan Banking Sector include the 1989 consolidation of 7 banks into the Consolidated Bank Of Kenya, the 1993 closure of 14 banking institutions and the 1998 closure of 4 banking institutions.

With the occurrence of each episode the concern about bank failure rate in Kenya continued to mount.

Studies indicate that *run on deposits* is a major cause of banking sector instability. In an effort to address this and to safe guard deposits the installation of a DIS is recommended.

In Kenya despite the creation of the DPF concern still exist as to the realization of a stable financial system. It is against this background and the

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[12] A normal banking crisis occurs when the failure of one or a few banks does not cause the entire industry to grind to a halt. Within the abnormal banking crisis, the failure of one or a few institutioins leads to an industry-wide disaster.

conclusion reached by Demirguc-Kunt & Detragiache (1999) in a study covering 61 countries which experienced 40 systemic banking crisis over the period 1980 – 1997 that "*explicit deposit insurance tends to be detrimental to banking [sector] stability*" that a Kenya specific study is warranted.

One of the three areas recommended for further research by Demirguc-Kunt & Detragiache (1999) for the purposes of policy advise is an investigation into "*whether the deposit insurance may be beneficial to stability in some types of countries even though on average, it has an adverse effect.*" This study thus seeks to investigate whether the introduction of DPF has had any impact on the Kenya banking sector stability.

1.3 Objective Of The Study

The objective of this study is therefore to establish if the introduction of the DPF has led to stability in the Kenyan Banking Sector.

1.4 Importance Of The Study

It is the author's hope that the study will:

1. Contribute to the existing body of knowledge in the area of deposit insurance schemes

2. Bring out areas for further research work.

3. Facilitate a better understanding of the Kenyan deposit insurance scheme

4. Facilitate some appreciation of the different deposit insurance schemes in place in selected countries.

5. Facilitate an understanding of good design features of DIS

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- And another school holds that banking and payment systems are inherently fragile.

In their work Benston and Kaufman (1998) concluded the following:

1. Banking systems are not more unstable than most other industries.

2. "The cost of individual bank failure is relatively small and not greatly different from the failure of any non-bank firm of comparable importance in the community."

3. Loans by the lender-of-the-last-resort to individual banks are neither necessary nor cost effective.

4. "The potential for all bank panics is reduced to almost zero when central banks acts intelligently."

A separate study Kaufman (1994) established empirically that:

1. 'Bank runs appear to be bank specific and rational'

2. 'The failure rate for banks [1870-92] has on average not been greatly different from that for non-banks'

3. 'There is no evidence to support the widely held belief that, even in the absence of deposit insurance, bank contagion is a holocaust that can bring down solvent banks.'

Others find that fragility in the banking sector is unique to the sector and is as a result of:

1. The fact that the banks' main asset class (commercial loans) is worthless in liquidation than on a on going-concern

2. Banks' loan portfolios are not public information, Dale (2000)

Temzelides (1997), Dale (2000) observe that "if the liquidation value of a banks' assets is worth less than the value of its liquid deposits a deposit run

can quickly be transformed into a solvency crisis which may spill over to healthy banks." This was the case in the South East Asia financial crisis of 1997[13].

2.2 Deposit Insurance

A deposit insurance scheme is one of the three measures that an economy has to facilitate and ensure a sound banking system and by proxy a sound financial system. The other two measures are:

- Lender-of-the-last-resort
- Bank regulation and supervision

Some authors argue that a deposit insurance scheme may only be effectively implemented and operated in the presence of an effective bank regulation and supervision.

There is agreement that once deposit insurance is introduced – whether for consumer protection or systemic reasons - government regulation is necessary to curb the excessive risk taking that would otherwise be encouraged by banks' access to risk insensitive deposit funding, Dale (2000).

Benston & Kaufman (1998) suggest that the regulation of banks is only necessary because of the moral hazard created by the presence of a deposit insurance scheme.

However, Feldstein (1991) finds that 'if banks are inherently fragile, then banks left to themselves will accept more risk than is optimal from a systemic point of view. Thus necessitating the presence of a bank regulation system even in the absence of a deposit insurance scheme'

[13] The crisis involved four countries Indonesia, Korea, Malaysia and Thailand, Aghevli (1999)

Those that believe that banks are not inherently fragile do not support the installation of either a deposit insurance scheme or a bank supervision system in an economy. Those that believe that banks are fragile advocate for deposit protection and regulation.

2.2.1 Reasons For Implementing Deposit Insurance

Garcia (1999) states that the objectives of a DIS may be categorized as:

1. Unrealistic Objectives:
    a. To avoid imminent crisis
    b. Resolve an existing crisis
2. Realistic Objectives:
    a. Protect small depositors
    b. Make clear the rules under which sound depository institutions operate and under which failed institutions will be closed or otherwise resolved.
    c. Help stabilize the financial system by establishing an incentive structure that will encourage good banking practices.

More elaborately, a DIS is put in place to:

1. Enhance stability of the financial system

One of the most paramount objectives of a DIS is to promote and maintain confidence in the financial system by reducing the incentives for panic withdrawals from banks. The danger of panic withdrawals lies in their contagious nature. Further, a sound banking system is the corner stone of an orderly payment system.

2. Protect small depositors

The other most paramount objective of a DIS is to protect the small depositors of whom it is believed are unable to determine the credit worthiness of the banking institutions into which they place their money due to information asymmetry.

3. Enhance competition by mitigating competitive barriers

It is a common belief that the larger the bank the more stable and sound it is. Hence large banks have no problems attracting customers. The presence of a DIS helps to somewhat level the playing ground by providing a safety net for the small banks' depositors in the event of a failure.

4. Minimize tax payer's burden

The failure of a bank is a costly affair; in the absence of a formal DIS such a cost is borne by the taxpayers. However where there is a well-designed DIS such costs are fully covered by the institutions in the banking industry.

Further, for a deposit insurance scheme to promote public confidence and contribute to the stability of the financial system, Hanc (2000) identifies the following prerequisites:

1. A sound legal system
2. Stable macroeconomic environment and consistent economic policies to maintain a sound banking system,
3. Effective regulation and supervision of the financial system,
4. Compliance by institutions with generally accepted accounting, auditing and regulatory standards, and
5. Effective disclosure requirements

2.2.2 Types Of Deposit Insurance Schemes

At this point it is helps to draw the distinction between deposit insurance schemes and ordinary insurance schemes. Dale (2000) identifies two main differences:

- Number of parties in the contract:

A regular insurance scheme has only two parties to the contract i.e. the insured and the guarantor while the DIS has three parties i.e. the depositor, the bank, and the DIS.

- Type of event insured

Regular insurance schemes cover *independent* events - car theft, burglary, accidents - whilst DIS compensate against bank failures, which are sometimes contagious and thus *dependent.*

In theory there are two types of DIS:

1. Implicit Deposit Insurance
2. Explicit Deposit Insurance

Implicit Deposit Insurance Schemes

Within an implicit scheme protection is provided by and at the discretion of the government and as such decisions on coverage and form of protection tend to be ad hoc and are not guided by pre-existing rules and procedures.

Forms of implicit schemes:

- A government, though not obliged by law, may finance a deposit insurance scheme from the current budget or through the central bank.

- In the event of bank failure a government can make direct payments to depositors or arrange for the failed bank's deposits to be assumed by another bank.

- A government may promote and financially support the merger of a problem bank. This would prevent the failure of the bank, thereby protecting its depositors.

- Alternatively a government may inject capital into the bank.

- Or a government may acquire some or the entire failing bank's non-performing assets at book value.

Explicit Deposit Insurance Schemes

In contrast to the implicit scheme within an explicit scheme there are clear guidelines and procedure on all aspects of a DIS i.e. coverage, membership, contribution, the funding process etc.

In the study of 72 countries by Garcia (1999) of the two schemes, the explicit DIS was most popular.

2.2.3 Risk Associated With The Implementation Of A Deposit Insurance Scheme

> *"[In the US] risks taken by individual depositors have been lowered so much such that depositors have become virtually indifferent to the soundness of their credit institutions"*[14]

This statement points to the root cause of the moral hazard associated with DIS. Poorly designed deposit insurance reduces the likelihood for insured depositors to exercise discipline in selecting and monitoring the financial health of their banks, encouraging banks to partake in excessive risk taking activities with cheap deposits.

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[14] Commission of the European Communities (1992), 'Proposal for a council Directive On Deposit Guarantee Schemes', 35 OJ European Commission (No C163) G. p.5

Moral Hazard

This occurs when:

1. The depositors, because of the presence of the DIS:
    a. Fail to pay critical attention to the soundness of an institution before deciding to place their deposits with it
    b. Fail to move their funds to more secure institutions
2. The bank owners and managers of the insured bank, knowing that runs are unlikely, take additional risks in their asset portfolio

Other than moral hazard, Garcia (1999) identifies two other disadvantages of a poorly designed DIS, these are:

1. Adverse Selection
2. Agency Problems

These problems arise because the DIS design has failed to provide incentives that induce all economic agents affected by the DIS contract to act positively.

Adverse Selection

The design of the DIS may be such that it is very attractive to the weaker institutions and repulsive to the stronger institution. This occurs when membership to a DIS is strictly voluntary and premiums charged are not risk adjusted.

Agency Problems

This occur when an employee or a contractor, acting as an agent for the principal that he / she represents, pursues his / her own interests rather that those of his / her employer. Of particular interest are two problems:

1. *Regulatory Capture* – This is when the agents place the interest of the industry whose deposits they guarantee above the needs of depositors and taxpayers.

2. *Political Capture* – This is when the agent becomes subservient to the influence of politicians who press for special treatment.

2.2.4 Best Practices

Having identified the major pitfalls of a DIS how does a country go about establishing a 'good DIS'?

Garcia (1999) enumerated set of "B*est Practices*"[15] which if implemented during normal economic times will result in a 'good DIS'.

The '*Best Practices*' seek to:

- Identify prerequisites for a good DIS
- Avoid moral hazard
- Avoid adverse selection
- Reduce agency problems
- Promote credibility and integrity of the DIS during normal time.

Prerequisites for a good DIS

The successful implementation of *Best Practices* requires:

i) Realistic objectives

Realistic objectives, in addition to those mentioned earlier, will also include:

- Enabling small banks to compete favourably with large banks
- Requiring banks to contribute towards the resolution of failed peers.
- Setting upper boundaries for the loss the government may incur in the event of bank failures

[15] Refer to appendix 5 for summarized listing of the *Best Practices*. The set has been adopted and sanctioned by the IMF for all member countries.

ii) Careful choice between a public or private DIS

The choice between a public and a private DIS depends on the mandate of the DIS. A private scheme has the benefit of peer pressure in keeping the system sound. A public scheme is better able to cope with widespread failures.

iii) Definition of the DIS mandate

The choice is between narrow and broad mandates. A system with a narrow mandate restricts a DIS to (only):

- Insuring small deposits
- Setting and collecting premiums
- Managing the insurance fund
- Compensating insured depositors in failed member institutions
- Informing the public

A narrow mandate scheme may be suitably run by a private scheme.

The broad DIS has in addition to the mandate of a narrow scheme, the responsibility for the resolution of insured financial institutions that have been intervened.[16] The government should run a system that has a broad mandate.

iv) The presence of a good legal, judicial, accounting, financial and political infrastructure

While for the most part, this prerequisite is beyond the scope of this paper, it is a vital ingredient for a well functioning DIS.

There is need for a strong infrastructure of civil and commercial law to strengthen property rights.

Further, it is advised that internationally accepted accounting and auditing standards be adopted to facilitate realistic loan valuations and empower market discipline.

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[16] An intervened bank is one that has deteriorated so far that the supervisors take control temporarily or permanently from its owners and managers.

B) *Avoiding Moral Hazard*

i) Define the system explicitly in law and regulation - conduct a public awareness campaign

"A DIS needs to be designed to provide a set of inducements (that include both positive and negative reinforcements – carrots and sticks) to encourage all of the parties involved (small depositors, large depositors and other creditors, owners, board of directors, managers, borrowers, supervisors, judges, government officials and legislators) to act in ways that serve to strengthen the Banking System", Kane 1992.

Thus, the explicit definition of the DIS in law and / or regulation should clearly spell out:

- What qualifies as an insured deposit
- How the supervisor will obtain timely and relevant information on member banks
- How dissemination of information to the pubic will be conducted
- Institutions to be covered
- Instruments to be covered

ii) Give the supervisor a system of prompt remedial action

There is need for a well-formulated Lender Of the Last Resort (LOLR) and Supervisory functions.

Prompt remedial action by the supervision and regulation functions imply:

- The resolution of problem banks using PAC[17] or SEIR[18] approach
- The provision of a framework for the resolution of individual banks

[17] Prompt Corrective Action

[18] Structured Early Intervention and Resolution

iii) Resolve failed deposit institutions promptly

Supervisors should not exercise discretion in disciplining or closing a problem bank.

> *"Discretion exposes supervisors to political interference and experience has shown that they may be pressured to use the discretion inadvisably to postpone taking needed corrective actions", Garcia (1999).*

Two issues come to table:

a) The provision of a framework for the resolution of individual banks – specifically a clear legal framework spelling out when and how regulatory agencies will intervene, sell, or close troubled banks.

   Further,

   > *"The resolution framework should require that...the bank would be passed to the DIS for resolution immediately it has been intervened by the Supervisory Authority", Garcia (1999)*

b) The approach of the financial regulatory agencies towards the *Too big to fail* concept (TBTF).[19,20]

iv) Provide low coverage

The coverage amount should be selected such that majority of the small depositors are protected. Larger depositors and uninsured creditors should be

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[19] An argument for TBTF is that many banking systems are heavily concentrated and failure of a bank that represents 10-20% of the entire banking system's assets could have major systemic implications. An argument against TBTF policy is that often for political reasons the TBTF is used as an excuse not to take the necessary action.

[20] Even where the use of TBTF is justified it should not be used too frequently.

exposed to loss as a means of forcing them to monitor the condition of their banks.

It is recommended that:

a) Coverage is set per depositor and not per deposit. Where the coverage is per depositor a depositor may gain access to a larger coverage by simply splitting up the deposit into various accounts within the same institution.

b) The level of coverage per depositor in any institution should be between one or two times per capita GDP. Coverage may also be set at level that covers 80% of the number of deposits but only 20% of the total value of deposits in the system.

Considerations:

- Co-insurance

This is a system within which depositors are guaranteed a percentage of their deposit shortly after the institution is intervened. The percentage not paid shall only be available when and if the institution is successfully liquidated. Thus all depositors stand to make a certain amount of loss. The recommended practice is to provide full coverage for small depositors and apply a percentage coverage to larger depositors. This will ensure that depositors gain quick access to their funds.

- Inflation and coverage

Coverage should not be pegged to inflation as this will lead to frequent changes in the coverage amount - a potential source of confusion to the customer. It is better to peg coverage to the GDP. However if necessary every once in a defined interval of time, coverage may be adjusted to reflect inflation.[21]

iv) Net (offset) loans in default against deposits

How should the liquidator handle depositors who also have loan accounts at the intervened institution?

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[21] If such a practice is adopted one must ensure that the coverage amount is expressed in round numbers.

If the loan account is current then it is suggested that the DIS not call back the loan. Where the loan account is delinquent, the DIS should net off the depositor's holding against the loan account before compensating the depositor.

C) *Avoiding Adverse Selection*

i) Make membership compulsory

Membership should be mandatory for all institutions that qualify for coverage, including state owned banks. This will provide a broad base for cost absorption in the event of failure. Further, if membership is not mandatory, only weak institutions are likely to join the scheme.

ii) Apply risk-adjusted premiums

Once the DIS has gained sufficient experience, risk adjusted premiums are advocated for though they are difficult to implement. Newly set up DIS should apply flat rates until staff gain experience.

Banks may pay premiums based on the risk-adjusted assets rather than on all deposits. Alternatively, banks with high capital ratio and / or supervisory rating may be charged minimal or no premium at all.[22]

D) *Reducing Agency Problems*

i) Create an independent but accountable DIS

While a government backed scheme is likely to have greater credibility it is just as likely to suffer from political interference. To address the political interference angle:

- Make the DIS an independent organization accountable to the government and / or legislature
- Set up law that prohibits political interference
- Give the press freedom to report on actions of the DIS

ii) Have bankers on an advisory board, not the main board of a DIS

This is especially important where the DIS has access to financial support from the government.

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[22] The FDIC charges strong banks zero premiums.

Regulatory capture is the main agency problem within a government backed privately run DIS system. It is thus imperative not to allow bankers to dominate the DIS board of directors. The better approach is to have bankers form a special advisory committee to DIS board.

Further, DIS staff should be properly trained, held publicly accountable to the legislature and should be prevented from accepting honoraria and positions within member institutions for a number of years after they leave the DIS.

iii) Ensure close relations with the LOLR and the Supervisor

The potential for conflict between the LOLR and the DIS exists when the LOLR continues to provide LOLR assistance to troubled banks delaying closure of such institutions and increasing costs for the DIS. The following measures will hopefully take care of such inter-agency problems:

- Clarify the objectives and functions of different financial authorities
- Separate agencies should be responsible for the DIS, Supervisory authority and Monetary Policy functions.
- Include members of the Supervisory Agency Board and the Central Bank on the DIS Board.
- Enact in law the need for and modalities for exchange of information and close corporation among the regulatory agents

E) *Promoting Credibility And Integrity In Normal Times*

i) Set up the DIS when banks are sound

ii) Ensure adequate sources of funding (ex-ante or ex-post) to avoid DIS insolvency

It is possible to both accumulate a fund and to impose an additional levy ex-post (if the fund proves insufficient). Most countries prefer ex-ante funding (Garcia, 1999). It is recommended that an insurance fund is set up. Further an appropriate target for the fund should be set to cover failures during normal times. The amount set should be sufficient to cover the failure of one large bank / two medium banks or several small banks. The initial fund and premiums should be set such that the new DIS will attain its target in a short

time. Premiums are necessary to build, rebuild and maintain the fund and hence:

- Premiums should be regular and paid as a percentage of total insured deposits.
- Premiums should be paid directly to the DIS or deducted automatically from Central Bank Accounts.
- Premium levels should not exceed a legal limit that may overburden the institutions.
- The board should have the discretion of reducing the premiums whenever the fund has reached target levels.
- Premiums should be at a flat rate until such a time as when DIS staff have acquired adequate skill to implement risk based premium rates.
- Risk based premiums are preferred.
- Premiums should be expensed and thus should be tax deductible.

Further, there is also need for back up funding to help the DIS cope during hard times. Arrangements for back up funds include:

- A government guarantee
- Authority for the DIS to borrow from the market, Central Bank or National Debt Office with the approval of the Ministry Of Finance
- Authority to impose special additional ex-post levies

iii) Invest Fund Resources Wisely

The DIS should restrict expenses through efficiency, maximum recovery of assets of failed banks and investing wisely. Investments should be in government securities both domestic and foreign.

2.3 Determining Financial System Soundness

Gonzalez-Hermosillo (1999) identifies two types of studies on indicators of banking system crisis:

- Those that examine data on specific banks in an effort to explain why they have failed – microeconomic focus.

- Those that examine how changes in various macroeconomic variables have contributed to banking crisis.

Gonzalez-Hermosillo (1999) concludes that both macroeconomic factors and bank specific factors are important indicators of financial system soundness.

Hilbers, Krueger & Moretti (2000) identified a system of Macro-prudential Indicators (MPI) to measure financial system soundness. MPIs comprise both aggregated microeconomic and macroeconomic variables.

A commonly used tool in the analysis of individual institution's soundness is the CAMELS system standing for **C**apital adequacy, **A**sset quality, **M**anagement soundness, **E**arnings, **L**iquidity and **S**ensitivity to market risk, Hilbers et al (2000)[23].

[23] Appendix 6 expounds on the finer details of the CAMELS framework.

Table 3: Macroeconomic indicators relevant for the analysis of financial system soundness

Macroeconomic Factor	Specific Variables
Economic growth	Aggregate growth rate Sectoral Slumps
Balance Of Payments	Current account deficit Foreign exchange reserve adequacy External debt (including maturity structure) Terms of trade Composition and maturity of capital flows
Inflation	Volatility in inflation
Interest & Exchange Rates	Volatility in interest and exchange rates Level of domestic real interest rates Exchange rate sustainability Exchange rate guarantees
Lending & Asset Price Booms	Lending booms Asset price booms
Contagion Effects	Financial market correlation Trade spill-over
Other factors	Directed lending and investment Government recourse to banking system Arrears in the economy.

Source: Hilbers et al (2000)

Demirguc-Kunt & Detragiache (2000) further separate financial crisis literature in to two groups i.e. those that seek to explain financial crisis on the

basis of a single economic indicator and those that use various economic indicators to explain financial crisis.

Works on singular macroeconomic indicators include:

1. Gavin & Hausman (1996) and Sachs, Tornell & Velasco (1996) who focus on *credit growth* as a key indicator.

2. Mishkin (1996) selected *declines in equity prices*, whilst

3. Calvo (1996) picked the *ratio of broad money to foreign exchange reserves.*

Those who focus on multivariate studies include Honohan (1997) who after an analysis of several alternative indicators found that banking crisis arising from:

a) Macroeconomic problems are associated with:

    a. High loan to deposit ratios

    b. High foreign borrowing to deposit ratio

    c. High growth rates of credit

b) Government interventions are associated with:

    a. High levels of government borrowing

    b. High levels of central bank lending to the banking system

c) Micro-economic factors are not related to the abnormal behaviour exhibited by macroeconomic indicators

Rojas-Suarez 1998 in a study of micro-economic factors identifies the following important indicators:

- Deposit interest rates
- The spread between the lending and deposit rates
- Growth rate of credit
- Growth rate of inter-bank debt

Kaminsky & Reinhart (1999) analysed 15 micro-economic indicators on 20 countries that experience banking crises during 1970-95 period and found that the main indicators of financial crisis, in order of significance, are real exchange rate, equity prices and money multiplier.

Various other studies seeking to identify determinants of banking sector crises include works by Caprio & Klingebiel (1996), Demirguc-Kunt & Detragiache (1998), Dziobek & Pazarbasioglu (1997) and Lindgren, Garcia & Saal (1996).

For the purpose of this study focus is now drawn on one group of studies that seek to establish mathematical models that may be used to either predict or measure banking sector fragility / stability. These are works by:

1. Hardy & Pazarbasioglu (1990)

After an 8 year study on a sample of 50 countries of which 38 had suffered a total of 43 episodes of banking system crisis or significant problems Hardy & Pazarbasioglu established a multinomial logit model based on 3 classes of explanatory variables: real sector variables, banking sector variables and variables measuring shocks that directly or indirectly affect the banking sector.

The model:

a) Factors in regional differences

b) Distinguishes between periods in which banking sector difficulties may be incubating by have not yet reached crisis levels from normal periods of economic activity

c) Identifies the pre-crisis period year separately from the crisis year.

2. Murshed & Subagjo (2000)

   Surveyed 63 countries in the period between 1980-1997 and established a logit econometric model. The empirical methodology specification was primarily directed to making a rough comparison with the results from Demirguc-Kunt and Detragiache (1998) "hence the adoption of similar explanatory variables".

3. Kathanje (2000) established a model for predicting banking sector fragility based on performance measures internal to commercial banks.

4. Demirguc-Kunt & Detragiache (2000) designed a multi-variate logit model that utilizes several macroeconomic indicators to both predict and measure banking system fragility. The study shall employ this model to measure the fragility of the banking sector.

2.3.1 The Multivariate Logit Model – DKD (2000)

The rest of this chapter is thus dedicated towards detailing the elements of the multivariate logit model by Demirguc-Kunt & Detragiache (2000):

The Fomulae

The out-of-sample probability of a banking crisis for country *i* at date *t* is:

Equation 1: Demirguc-Kunt & Detragiache (2000)

$$\rho_{it} = \frac{e^{[\beta Z_{it}]}}{\left(1 + e^{[\beta Z_{it}]}\right)}$$

where β = 1 * N vector containing N estimated coefficients of regression reported in Appendix 7.

Z_{it} = N*1 vector of out-sample values of the explanatory variables for country *i* at date t – These values can be true forecasts, estimates of past values, data for countries or time periods not included in the sample, or ranges of values to construct alternative scenarios.

Interpretation Of The Results

Demirguc-Kunt & Detragiache (2000) constructed a rating system based on four fragility classes:

Table 4:A Rating System For Banking Sector Fragility

Class	Probability Interval	Type I Error	Type II Error	No. of Observations	Crisis per observation
I	0.000-0.018	0.00-0.10	1.00-0.60	291	0.01
II	0.018-0.036	0.10-0.30	0.60-0.30	232	0.03
III	0.036-0.070	0.30-0.50	0.30-0.12	136	0.05
IV	0.070-1.000	0.50-1.00	0.12-0.00	107	0.17

Note: Class I is the lowest fragility class and class IV is the highest – Source: Demirguc-Kunt & Detragiache

Limitations Of The Model

As with all models the multivariate logit model has limitations and they are:

1. The regression coefficients used to compute the forecasted probability of a banking sector crisis are only estimates of the true parameters

2. New crises may be of a different nature than those experienced in the past, so that the coefficients derived from in-sample estimation may be of limited use out-of-sample. This problem may be particularly severe since banking crises tend to be rare events, and even though

the panel used for in-sample estimation was large (766 observations), crises only number 36.

3. Forecast of the explanatory variables are likely to incorporate errors these may, in turn distort the assessment of findings.

4. Although aggregate variables can convey information about the general economic conditions that tend to be associated with banking sector fragility, they are silent about the situation of individual banks or specific segments of the banking sector. So they would not detect crisis that may develop from specific weaknesses in some market segments and spread through contagion.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

For the purpose of establishing whether the introduction of the DPF has led to stability in the Kenyan Banking Sector, the study focused on two sets of time periods - pre-DPF (1969-1985) and post-DPF (1986 – 2002) periods; a 2-Group experiment design was used to compare the general levels of fragility for the two time periods.

3.2 Population

The pre-DPF population constitutes any month within the years 1969-1985; and the post-DPF population constitutes any month with the years 1968-2002.

3.3 Sampling

A computer random number generator was used to randomly select 30 months in both the *pre-DPF* and *post-DPF* eras as shown in the following table:

Pre- DPF		Post DPF	
YearSelected	MonthSelected	YearSelected	MonthSelected
1969	Apr	1986	Jul
1969	Oct	1987	Jul
1970	Feb	1987	Sep
1970	Jun	1988	Jun
1970	Nov	1988	Nov
1972	Dec	1989	Sep
1973	Mar	1990	Apr
1974	Jun	1990	Aug
1976	Mar	1990	Sep
1976	Jun	1991	Jan
1976	Jul	1991	Nov
1977	Feb	1992	Feb
1977	Jul	1992	Apr
1977	Nov	1992	Aug
1978	Dec	1992	Nov
1979	May	1994	Aug
1979	Jul	1997	Feb
1981	Oct	1997	Jul
1981	Nov	1997	Oct
1982	Nov	1998	Mar
1982	Dec	1998	Jul

Pre- DPF		Post DPF	
YearSelected	MonthSelected	YearSelected	MonthSelected
1983	Jan	1998	Nov
1983	Jul	1999	Jun
1983	Dec	1999	Aug
1985	Sep	2000	Aug
1985	Oct	2001	Feb
1985	Nov	2002	Feb

Table 5:Unique Randomly Selected Months

For each time period of interest the computer random number generator selected three pairs of identical months. This reduced the set of 30 to 27 randomly selected months.

3.4 Data Collection

For each time period, monthly data on the following variables were collected:

1. Explanatory variables capturing macroeconomic conditions:

- Growth rate of real GDP
- The change in terms of trade
- The rate of depreciation of exchange rate (relative to the US dollar)
- The rate of inflation
- The fiscal surplus as a share of GDP

2. Explanatory variables capturing characteristics of the financial sector:

- The ratio of broad money to foreign exchange reserves
- The growth rate of bank credit lagged two periods
- GDP per capita

The data used was secondary data from several publications, namely:

- DPFB Annual Reports
- Statistical Bulletins – CBK
- Monthly Economic Reviews – CBK
- Bank Supervision Annual Report

The raw economic data collected for each of the selected month is tabulated below:

YearSelected	MonthSelected	Term Of Trade	Forex Assets Held by CBK	Deficit Incl grants (cash basis) KSh M.	Deficit Incl grants (cash basis) as % of GDP KSh M.	Domestic Credit KSh M.	M2 KSh M.	Exchange Rate	Interest Rate	GDP at 1982 Prices KSh M.	Inflation Rate	Nominal GDP KSh M.	NFA KSh M.	GDP Per Capita KShs
1969	Apr	149	1197.88	8.002857653	0.07969985	1311.27	2475.54	7.143	4.12825667	32099.4	0.555031854	10041.24552	954.08	2909.926571
1969	Oct	149	1197.88	9.020556872	0.086593864	1288.81	2599.6	7.143	3.72487339	32099.4	-0.15025289	10417.08549	1173.32	2909.926571
1970	Feb	161	1279.3	0.150589597	0.001403266	1469.25	2812.14	7.143	3.57915724	34108.8	2.519798785	10731.36414	1320.41	2985.714286
1970	Jun	161	1341.66	0.142741319	0.001288468	1457.36	2961.29	7.143	3.44645505	34108.8	2.815377212	11078.37917	1331.44	2985.714286
1970	Nov	161	1472.28	0.161024813	0.001399083	1653.06	3336.26	7.143	4.55824542	34108.8	2.316881278	11509.31402	1488.62	2985.714286
1972	Dec	143	1310.38	-64.86965654	-0.455660536	3076.25	4295.14	7.143	3.4334411	38643.8	6.705337138	14236.4	1221.34	3143.561376
1973	Mar	139	1600.56	-82.09253696	-0.556104676	3140.31	4601.19	7.143	3.31375285	39067.95423	4.171190109	14762.06559	1514.5	3060.073176
1974	Jun	122	1402.38	-59.37137329	-0.323842644	4437.98	5839.14	7.143	5.67003579	40817.35306	16.36087228	18333.40187	1270.99	3076.375721
1976	Mar	133	1633.15	-153.5581468	-0.619685602	6533.32	7414.25	8.36	6.4262365	42641.28915	15.92320539	24780.00879	928.56	2970.690344
1976	Jun	133	1853.36	-145.6412212	-0.557266904	6537.77	7597.67	8.43	6.3301504	42862.05164	15.90274015	26134.9131	1233.07	2986.070199
1976	Jul	133	2233.63	-178.7757262	-0.672535358	6560.15	7670.61	8.42	6.298787858	42934.9557	11.77562782	26582.35347	1361.27	2991.149206
1977	Feb	174	2644.48	-124.7341556	-0.409770957	7367.34	9374.26	8.35	4.9363876	43575.34328	6.202298188	30439.9696	1893.36	2917.666105
1977	Jul	174	4685.38	-145.1323957	-0.424513239	7890.71	11450.64	8.21	0.9641013	44214.60091	13.91192183	34187.9551	3947.16	2960.468759
1977	Nov	174	4491.72	-133.3777	-0.358688111	8170.8	12180.61	8.144	1.38543693	44725.75536	19.2142378	37184.86782	3944.56	2994.694031
1978	Dec	139	2704.04	-184.0268804	-0.447068679	11919.94	14277.85	7.404	6.80840806	50392	12.40116024	41163	2115.03	3242.311157
1979	May	129	3363.17	-265.8846757	-0.618384478	12706.16	14404.08	6.636	6.85170423	51273.36585	7.353345417	42996.66066	2692.43	3169.914426
1979	Jul	129	3379.26	-320.3281808	-0.732919592	12525.37	14661.25	7.395	6.79205487	51614.20772	7.185262711	43705.77407	2891.66	3190.986567
1981	Oct	105	2116.87	-448.6765983	-0.755980053	19069.61	18590.46	10.454	10.19192226	56434.50563	10.28339146	59350.32232	68.18	3223.355359
1981	Nov	105	2681.48	-425.3343307	-0.708309883	19318.18	18586.72	10.176	10.2621197	56683.38876	11.87549529	60049.18768	767.32	3237.570754
1982	Nov	100	1905.19	-575.2823315	-0.851600689	24441.39	20569.75	11.071	10.2535443	58718.73996	20.7287051	67553.06081	-1724.6	3227.900608
1982	Dec	100	2897.31	-572.0868242	-0.838647614	23935.98	21442.22	12.725	11.942039	58892.4	14.42119469	68215.4	-1577.53	3237.447089
1983	Jan	94	2628.36	-261.0699605	-0.378760882	24650.87	21525.27	12.919	13.8802735	59047.30475	14.59684348	68927.38221	-1808.71	3126.677508
1983	Jul	94	4539.13	-295.5249624	-0.404562005	23957.38	21045.66	13.618	14.3212355	59943.84784	12.26817412	73048.12574	-533.85	3174.151329
1983	Dec	94	5463.39	-270.0809424	-0.35295932	25449.52	22837.63	13.796	14.7954738	60699	10.02856533	76519	-534.14	3214.138205
1985	Sep	92	5653.3	-455.9184525	-0.476891821	30429.36	26209.78	16.7497	14.5462133	65133.94476	11.76757292	95602.06992	-1743.62	3208.884854
1985	Oct	92	5311.455	-457.6077542	-0.474465378	30716.57	26918.36	16.541	13.8201328	65490.26673	11.91219743	96447.02755	-2173.68	3226.439399
1985	Nov	92	4969.61	-433.8008459	-0.445605702	30096.18	26918.36	16.2846	14.849192	65871.40345	11.23199432	97350.82917	-2173.68	3245.216447
1986	Jul	103	7479.8	-1095.8	-0.881390341	34753.92	33400.84	16.0609	13.5973292	68417.966	5.040366378	108965.0183	-315.69	3257.067759
1987	Jul	85	5061.22	86.09	0.060978158	59371.33062	38558.061	16.6219	13.3850749	71945.52252	8.88412465	125101.7567	-1683.0733	3312.866534
1987	Sep	85	4255.44	1243.18	0.880553216	61819.66004	39610.5129	16.8789	13.4208769	72498.98373	9.8235094	127466.377	-2770.24146	3338.351694
1988	Jun	88	4873.04	7521.61	5.32760974	66059.99377	39788.468	18.0846	14.3240837	75257.25534	12.26255712	141116.8988	-3417.26918	3355.205321

Year Selected	Month Selected	Term Of Trade	Forex Assets Held by CBK	Deficit Incl grants (cash basis) KSh M.	Deficit Incl grants (cash basis) as % of GDP KSh M.	Domestic Credit KSh M.	M2 KSh M.	Exchange Rate	Interest Rate	GDP at 1982 Prices KSh M.	Inflation Rate	Nominal GDP KSh M.	NFA KSh M.	GDP Per Capita KShs.
1988	Nov	88	5096.04	2511.62	1.556228178	68001.32802	43088.2833	18.2335	13.933506	76803.87912	14.36130153	149252.9783	-3854.96509	3424.158677
1989	Sep	79	5986.82	4713.77	2.567935952	78912.851	49890.393	21.8541	14.4723535	80059.96144	12.36024276	166888.0268	-3774.439	3458.313669
1990	Apr	71	4821.89	9712.75	5.291246692	88441.318	52692.41	23.1413	14.5	82215.26662	14.56544079	180179.0408	-3634.032	3466.804412
1990	Aug	71	4428.67	1990.25	0.954954367	89667.769	55632.048	23.2322	15.52	83327.87888	14.4596967	187748.497	-6056.631	3513.720383
1990	Sep	71	4068.3	3725.24	1.787430828	93582.448	57803.402	23.3344	15.52	83601.35319	16.16897637	189609.03	-6205.606	3525.252085
1991	Jan	82	5888.05	7152.15	3.431718064	103943.278	61728.721	24.7208	17.29	84623.28615	18.75274636	197741.1646	-5553.948	3457.257268
1991	Nov	82	4152.66	-5053.8	-2.080760072	119472.763	73356.579	28.3665	16.95	86073.62054	15.96435219	218961.7337	-9357.005	3516.510215
1992	Feb	79	4972.85	-4081	-1.68023702	121659.33	77299.013	29.318	17.19	86300.66973	14.55060555	227133.8055	-7668.125	3419.202446
1992	Apr	79	5473.11	-6649	-2.737538825	126001.226	75999.127	31.5288	18.05	86370.12595	23.18504594	232916.7762	-7243.679	3421.954278
1992	Aug	79	4989.32	-5109.4	-1.708578573	126607.342	83450.47	32.8914	17.76	86505.31232	32.32612686	244172.474	-8991.587	3427.310314
1992	Nov	79	4152.66	-20951.48	-7.006155284	134773.297	94038.125	35.7942	18.01	86607.52527	30.64470833	252682.7873	-5841.981	3431.359955
1994	Aug	101	42148	-13343.5	-3.081813386	159639.626	133550.261	54.8125	23.6	88606.92987	21.47843295	378183.4341	31424.978	3312.903981
1997	Feb	102	49178	-11283	-1.958899058	279234.9307	251552.444	54.9411	21.44	98547.62871	11.90495621	544854.3082	50046.0644	3397.022706
1997	Ju	102	53438	-1053	-0.160256288	283959.4186	258384.707	58.9139	18.45	99502.66382	8.871884782	583736.2693	56745.1154	3429.943599
1997	Oct	102	40887	-8778	-1.33592564	299685.5105	258232.62	63.9858	27.15	100066.6244	8.741266979	606696.5691	55812.2423	3449.383812
1998	Mar	100	47222.52	-16989	-2.585559432	326967.6807	271207.876	59.8922	26.74	100926.8124	8.14451	641291.2442	45043.4609	3392.95409
1998	Jul	100	47780.25	2736	0.381844042	339408.8	280513.757	59.0472	24.67	101508.7409	11.68021055	664437.223	38872.343	3412.517343
1998	Nov	100	48635.66	7600	1.060677893	344660.837	283450.184	60.0472	17.66	102094.3411	2.963008221	687729.2407	38140.795	3432.20403
1999	Jun	86	46593.31	7469	1.042395156	359739.116	292164.838	72.9111	11.44	102978.3274	1.764816777	718795.026	47488.861	3379.330141
1999	Aug	86	49090	-3110	-0.404392877	373456.844	287548.126	75.1722	14.84	103215.2435	6.8537004	726881.4125	46238.331	3387.104765
2000	Aug	84	65537.54	-3272	-0.386932513	382182.9454	294179.785	77.6078	9.25	103472.3715	5.909916153	778599.7192	73850.051	3317.59181
2001	Feb	101	71303.16	-2238	-0.264656163	381325.119	290122.775	78.0806	15.3	103591.0258	5.224439494	811074.0804	85657.266	3247.774824
2002	Feb	76	81237.9	-15943	-1.732283293	380196.2345	306854.977	78.11	10.611	104930.4873	-2.24214355	897498.2834	89258.621	3219.911847
2002	Jul	76	86088.82	-7296	-0.741330819	389028.3762	319938.997	78.7356	8.6336	105411.3295	2.11	933143.3526	102624.58	3233.843336

Table 6:raw economic data collected for each of the selected month

The data was transformed by calculation of the growth rates and changes in the various variables as shown below for use in the DKD – Multivariate Logit Model:

YearSelected	MonthSelected	Growth Rate Of Real GDP	Change In TOT	Rate Of Depreciation KShs Vs Dollar	Real Interest Rate	Rate Of Inflation	Fiscal Surplus As Share Of GDP	Ratio Of M2 - CBK Forex Reserves	Growth Of Bank Credit Lagged 2 Periods	GDP Per Capita Growth Rate
1969	Apr	0.060001849	0.000000000000	0.0000000000	0.035732248	0.005550319	0.0796998504	2.066600995	-0.0138339167	0.0000000
1969	Oct	0.061300575	0.000000000000	0.0000000000	0.038751263	-0.001502529	0.0865938643	2.170167296	-0.0171284327	0.0000000
1970	Feb	0.062599301	0.080536912752	0.0000000000	0.010593585	0.025197988	0.0014032661	2.198186508	0.1400051210	0.0260445
1970	Jun	0.097778096	0.000000000000	0.0000000000	0.006310778	0.028153772	0.0012884675	2.207183638	-0.0080925642	0.0000000
1970	Nov	0.115367493	0.000000000000	0.0000000000	0.022413641	0.023168813	0.0013990826	2.266049936	0.1342839106	0.0000000
1972	Dec	0.132956891	0.111801242236	0.0000000000	0.032718960	0.067053371	-0.4556605359	3.277782017	0.8609427365	0.0528674
1973	Mar	0.010975997	0.027972027972	0.0000000000	0.008574373	0.041711901	-0.5561046757	2.874701671	0.0208240553	-0.0265585
1974	Jun	0.044778358	0.122302158273	0.0000000000	0.106908365	0.163608723	-0.3238426436	4.163735935	0.4132299041	0.0053275
1976	Mar	0.044685311	0.090163934426	0.1703765925	0.094969689	0.159232054	-0.6196856025	4.539846309	0.4721382250	-0.0343539
1976	Jun	0.005177199	0.000000000000	0.0083732057	0.095725898	0.159027402	-0.5572669044	4.099403246	0.0006811238	0.0051772
1976	Jul	0.0017009	0.000000000000	-0.0011862396	0.054768399	0.117756278	-0.6725353582	3.434145315	0.0034231856	0.0017009
1977	Feb	0.014915296	0.308270676692	-0.0083135392	0.012659104	0.062022982	-0.4097709573	3.544840574	0.1230444426	-0.0245668
1977	Jul	0.014670169	0.000000000000	-0.0167664671	0.129478205	0.139119218	-0.4245132395	2.443908498	0.0710392082	0.0146702
1977	Nov	0.011560761	0.000000000000	-0.0080389769	0.178288009	0.192142378	-0.3586881111	2.711791919	0.0354961721	0.0115608
1978	Dec	0.126688629	0.201149425287	-0.0908644401	0.055927522	0.124011602	-0.4470686791	5.280202956	0.4588461350	0.0826853
1979	May	0.017490194	0.071942446043	-0.1037277147	0.005016412	0.073533454	-0.6183844783	4.282887871	0.0659583857	-0.0223287
1979	Jul	0.006647542	0.000000000000	0.1143761302	0.003932078	0.071852627	-0.7329195916	4.338597800	-0.0142285317	0.0066475
1981	Oct	0.093390911	0.186046511628	0.4136578769	0.000914686	0.102833915	-0.7559800533	8.782050858	0.5224787771	0.0101438
1981	Nov	0.004410123	0.000000000000	-0.0265926918	0.016133756	0.118754953	-0.7083098826	6.931515432	0.0130348759	0.0044101
1982	Nov	0.035907366	0.047619047619	0.0879520440	0.104751608	0.207287051	-0.8516006893	10.796692193	0.2652014838	-0.0029869

YearSelected	MonthSelected	Growth Rate Of Real GDP	Change In TOT	Rate Of Depreciation KShs Vs Dollar	Real Interest Rate	Rate Of Inflation	Fiscal Surplus As Share Of GDP	Ratio Of M2 - CBK Forex Reserves	Growth Of Bank Credit Lagged 2 Periods	GDP Per Capita Growth Rate
1982	Dec	0.002957489	0.000000000000	0.1493993316	0.024791557	0.144211947	-0.8386476136	7.400733784	-0.0206784475	0.0029575
1983	Jan	0.002630301	0.060000000000	0.0152455796	0.007165699	0.145968435	-0.3787608816	8.189620143	0.0298667529	-0.0342151
1983	Jul	0.015183472	0.000000000000	0.0541063550	0.020530614	0.122681741	-0.4045620054	4.636496421	-0.0281324756	0.0151835
1983	Dec	0.012597659	0.000000000000	0.0130709355	0.047669085	0.100285653	-0.3529593204	4.180120768	0.0622831044	0.0125977
1985	Sep	0.073064544	0.021276595745	0.2140982894	0.027786404	0.117675729	-0.4768918214	4.636191251	0.1956752033	-0.0016345
1985	Oct	0.005470603	0.000000000000	-0.0124599247	0.019079353	0.119121974	-0.4744653784	5.067982314	0.0094385817	0.0054706
1985	Nov	0.005819746	0.000000000000	-0.0155008766	0.036171976	0.112319943	-0.4456057022	5.416594059	-0.0201972421	0.0058197
1986	Jul	0.038659607	0.119565217391	-0.0137369048	0.085569629	0.050403664	-0.8813903414	4.465472339	0.1547618336	0.0036519
1987	Jul	0.051558921	0.174757281553	0.0349295494	0.045009503	0.088841246	0.0609781579	7.618333317	0.7083347899	0.0171316
1987	Sep	0.007692782	0.000000000000	0.0154615297	0.035973675	0.098235094	0.8805532162	9.308206172	0.0412375703	0.0076928
1988	Jun	0.038045659	0.035294117647	0.0714323801	0.020615266	0.122625571	5.3276097398	8.165019778	0.0685919936	0.0050485
1988	Nov	0.020551158	0.000000000000	0.0082335247	0.004277935	0.143613015	1.5562281781	8.455248251	0.0293874422	0.0205512
1989	Sep	0.042394764	0.102272727273	0.1985685688	0.021121107	0.123602428	2.5679359521	8.333371139	0.1604604395	0.0099747
1990	Apr	0.026921137	0.101265822785	0.0588997030	0.000654408	0.145654408	5.2912466919	10.927750322	0.1207467083	0.0024552
1990	Aug	0.013532915	0.000000000000	0.0039280421	0.010603033	0.144596967	0.9549543671	12.561795754	0.0138673985	0.0135329
1990	Sep	0.003281907	0.000000000000	0.0043990668	0.006489764	0.161689764	1.7874308285	14.208244721	0.0436575934	0.0032819
1991	Jan	0.012223881	0.154929577465	0.0594144268	0.014627464	0.187527464	3.4317180638	10.483729078	0.1107133893	-0.0192879
1991	Nov	0.017138715	0.000000000000	0.1474750008	0.009656478	0.159643522	-2.0807600715	17.664961495	0.1494034564	0.0171387
1992	Feb	0.002637849	0.036585365854	0.0335430878	0.026393945	0.145506055	-1.6802370201	15.544207648	0.0183018032	-0.0276717
1992	Apr	0.000804817	0.000000000000	0.0754075994	0.051350459	0.231850459	-2.7375388254	13.885912580	0.0356889685	0.0008048
1992	Aug	0.001565198	0.000000000000	0.0432176296	0.145661269	0.323261269	-1.7085785732	16.725820352	0.0048103976	0.0015652
1992	Nov	0.001181581	0.000000000000	0.0882540725	0.126347083	0.306447083	-7.0061552836	22.645274354	0.0644982737	0.0011816
1994	Aug	0.023085807	0.278481012658	0.5313235105	0.021215670	0.214784330	-3.0818133863	3.168602567	0.1845048652	-0.0345216

YearSelected	MonthSelected	Growth Rate Of Real GDP	Change In TOT	Rate Of Depreciation KShs Vs Dollar	Real Interest Rate	Rate Of Inflation	Fiscal Surplus As Share Of GDP	Ratio Of M2 - CBK Forex Reserves	Growth Of Bank Credit Lagged 2 Periods	GDP Per Capita Growth Rate
1997	Feb	0.112188729	0.009900990099	0.0023461802	0.095350438	0.119049562	-1.9588990581	5.115141811	0.7491580108	0.0253912
1997	Ju	0.009691102	0.000000000000	0.0723101649	0.095781152	0.088718848	-0.1602562883	4.835224129	0.016919401	0.0096911
1997	Oc	0.005667794	0.000000000000	0.0860866451	0.184087330	0.087412670	-1.3359256399	6.315763446	0.0553814764	0.0056678
1998	Mar	0.008596153	0.019607843137	-0.0639737691	0.185954900	0.081445100	-2.5855594322	5.743189394	0.0910360004	-0.0163594
1998	Jul	0.005765847	0.000000000000	-0.0141086819	0.129897894	0.116802106	0.3818440416	5.870914384	0.0380499968	0.0057658
1998	Nov	0.005768963	0.000000000000	0.0169356041	0.146969918	0.029630082	1.0606778932	5.828032024	0.0154740745	0.0057690
1999	Jun	0.008658524	0.140000000000	0.2142298059	0.096751832	0.017648168	1.0423951558	6.270531928	0.0437481644	-0.0154052
1999	Aug	0.002300641	0.000000000000	0.0310117390	0.079862996	0.068537004	-0.4043928769	5.857570299	0.0381324339	0.0023006
2000	Aug	0.002491177	0.023255813953	0.0324002756	0.033400838	0.059099162	-0.3869325133	4.488721807	0.0233657556	-0.0205228
2001	Feb	0.001146730	0.202380952381	0.0060921711	0.100755605	0.052244395	-0.2646561628	4.068862797	-0.0022445438	-0.0210445
2002	Feb	0.012930285	0.247524752475	0.0003765340	0.128531435	-0.022421435	-1.7322832935	3.777239158	-0.0029604253	-0.0085791
2002	Jul	0.004582483	0.000000000000	0.0080092178	0.065236000	0.021100000	-0.7413308189	3.716382650	0.0232304819	0.0043267

Table 7:Data for the Multivariate Logit Model

3.5 Data Analysis

The collected monthly economic data for the pre-DPF and post-DPF periods were plugged into the Multivariate Logit Model of Demirguc-Kunt & Detragiache (2000) to yield the continuous dependent fragility variable *Fv*.

Using this data, the study sought to:

1. Determine the trend of banking sector fragility in Kenya.

2. Check whether the introduction of DPF has led to a change in the level of banking sector stability.

3.5.1 The Trend Of Banking Sector Fragility In Kenya

For the purpose of measuring the trend of fragility a time series analysis of the post-DPF period for the fragility variable, *Fv*, was conducted.

3.5.2 The Effect of DPF On Banking Sector Fragility

As mentioned earlier, theoretically, there are three factors that influence banking sector stability, viz:

- Lender-of-last-resort (LOLR)
- Bank Supervision and regulation
- Deposit Insurance Scheme

The first two are core functions of the CBK and have been in place since the installation of CBK in 1966. Within the scope of this study these two factors were assumed to remain constant[24] for the period of interest.

[24] A later study may address the different qualitative levels of the 3 factors and their impact on banking sector stability in Kenya.

The focus was on the interaction between the fragility dependent variable *Fv* and the (2 level) categorical independent variable *DISv*, which took a value of 1 in the post-DPF era and 0 during the pre-DPF period. To establish this the T- test for two independent samples shall be used to compare the means of the pre-DPF period to the post-DPF period. Further a computer random number generator was used to draw from each period a randomised sample of 50 observations each. The hypothesis:

$$H_O : \mu_{pre-DPF} \geq \mu_{post-DPF}$$
$$H_A : \mu_{pre-DPF} < \mu_{post-DPF}$$

The test statistic:

Equation 2: Berenson et al (2002)

$$t = \frac{(\overline{X}_1 - \overline{X}_2) - (\mu_1 - \mu_2)0}{\sqrt{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)}}$$

$\overline{X}_1$ = *mean of the sample taken from population* 1
S_1^2 = var *iance of the sample taken from population* 1
n_1 = *size of the sample taken from population* 1
$\overline{X}_2$ = *mean of the sample taken from population* 2
S_2^2 = var *iance of the sample taken from population* 2
n_2 = *size of the sample taken from population* 2

The test assumes both samples have a normal distribution. Testing for normality was done using the Box & Whiskers Technique.

3.5.3 Computing Tool

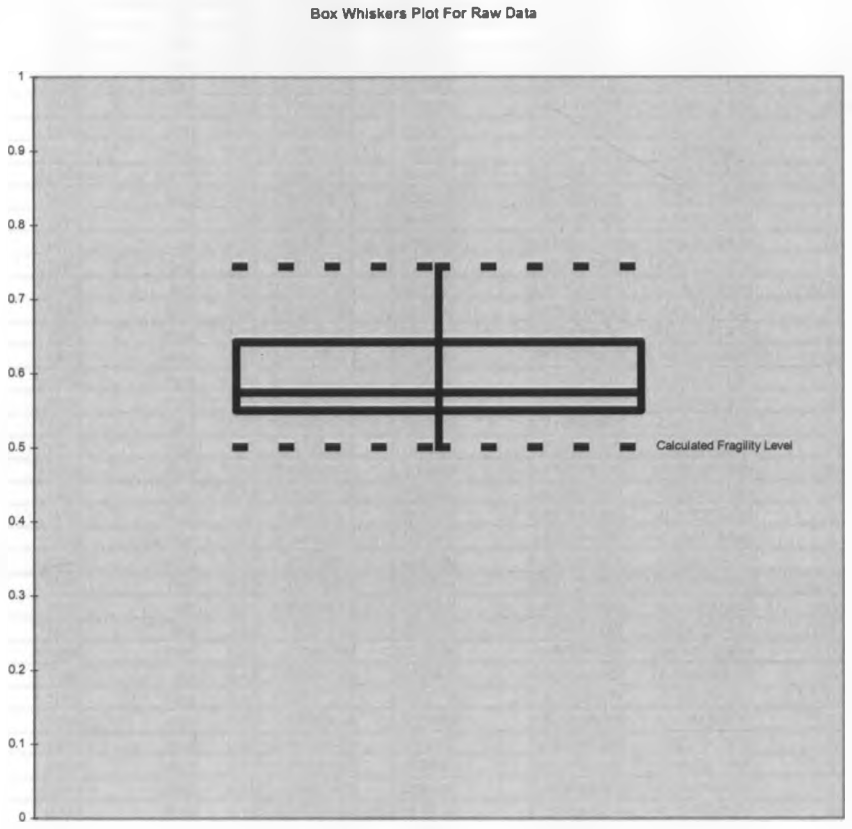
The statistical tool of choice is the SPSS and MS Excel computer packages.

CHAPTER 4: DATA ANALYSIS & FINDINGS

4.1 Assessing The Effect Of DPF On Banking Sector Fragility

The fragility level variable (Fv) obtained from the multivariate logit model was tested:

1. To check if it is normally distributed using the *Box-&-Whiskers Plot* technique:



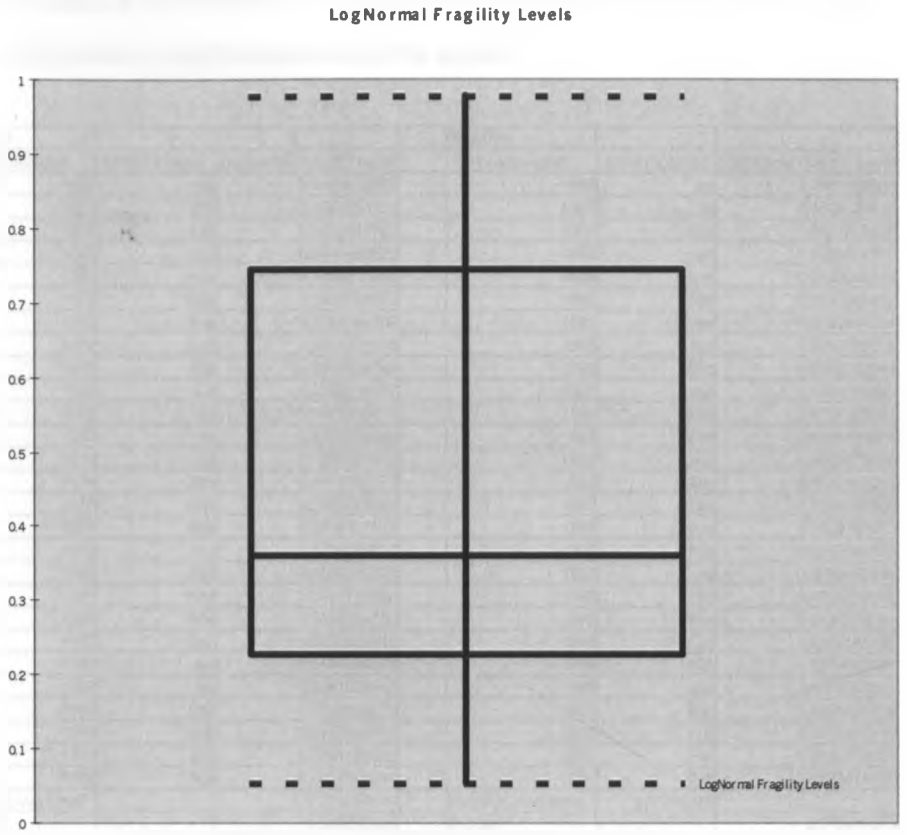
Graph 2:Whiskers Plot for Fv obtained using raw data

An inspection of the plot obtained for *Fv* showed that variable is skewed to the right. Using the Lognormal function, *Fv* was transformed:

YearSelected	MonthSelected	BZ	Exp(BZ)	1+ Exp(BZ)	Calculated Fragility Level	Ln Fragility Levels	LogNormal Fragility Levels
1965	Apr	0.13	1.14276484	2.142765	0.533313231	-0.628646352	0.1490010397
1965	Oct	0.14	1.15103834	2.151038	0.535108241	-0.625286233	0.1562583311
1970	Feb	0.13	1.14395035	2.143950	0.533571288	-0.628162593	0.1500317703
1970	Jun	0.13	1.13795196	2.137952	0.532262647	-0.630618214	0.1448486825
1970	Nov	0.13	1.14256938	2.142569	0.533270657	-0.628726184	0.1488313998
1972	Dec	0.17	1.19060888	2.190609	0.543505912	-0.609714694	0.1928748675
1973	Mar	0.15	1.16476314	2.164763	0.538055696	-0.6197932	0.1686156708
1974	Jun	0.25	1.2806158	2.280616	0.561521937	-0.577104438	0.2847781015
1976	Mar	0.25	1.28735892	2.287359	0.562814567	-0.574805071	0.2919669748
1976	Jun	0.23	1.25424683	2.254247	0.556392855	-0.586280661	0.2569614907
1976	Jul	0.18	1.19529195	2.195292	0.544479722	-0.607924579	0.1973966011
1977	Feb	0.20	1.22115632	2.221156	0.549784052	-0.59822971	0.2229789090
1977	Jul	0.12	1.13056422	2.130564	0.530640762	-0.633670017	0.1385771446
1977	Nov	0.14	1.15229197	2.152292	0.535379023	-0.624780329	0.1573708372
1978	Dec	0.30	1.35094883	2.350949	0.574639827	-0.554011822	0.3604627801
1979	May	0.24	1.2727345	2.272735	0.5600014	-0.579815996	0.2764106524
1979	Jul	0.24	1.26731913	2.267319	0.558950487	-0.581694385	0.2706858119
1981	Oct	0.53	1.6952702	2.695270	0.628979684	-0.463656322	0.6809139770
1981	Nov	0.41	1.50495306	2.504953	0.600790923	-0.509508287	0.5200753288
1982	Nov	0.65	1.91382009	2.913820	0.656807912	-0.420363674	0.8069554766
1982	Dec	0.43	1.53971575	2.539716	0.60625515	-0.500454343	0.5530056645
1983	Jan	0.52	1.67824338	2.678243	0.626620938	-0.467413485	0.6685264370
1983	Jul	0.28	1.31968782	2.319688	0.568907509	-0.564037409	0.3267025545
1983	Dec	0.25	1.28924756	2.289248	0.563175252	-0.574164416	0.2939849043
1985	Sep	0.27	1.30825887	2.308259	0.566773028	-0.567796359	0.3143840704
1985	Oct	0.30	1.35433741	2.354337	0.575252045	-0.552946995	0.3641189922
1985	Nov	0.33	1.38929577	2.389296	0.581466635	-0.542201687	0.4016554316
1986	Jul	0.24	1.26495172	2.264952	0.558489486	-0.582519486	0.2681899684
1987	Jul	0.51	1.67324247	2.673242	0.625922447	-0.468528802	0.6648126215
1987	Sep	0.67	1.96187378	2.961874	0.662375889	-0.411922075	0.8274253926
1988	Jun	0.89	2.42516734	3.425167	0.708043461	-0.345249801	0.9399824770
1988	Nov	0.66	1.92830529	2.928305	0.658505552	-0.417782327	0.8133668344
1989	Sep	0.72	2.05263194	3.052632	0.672413831	-0.396881308	0.8603256452
1990	Apr	1.07	2.91548201	3.915482	0.744603602	-0.29490328	0.9780844734
1990	Aug	0.89	2.43555527	3.435555	0.708926237	-0.344003796	0.9413300802
1990	Sep	1.08	2.87279645	3.872796	0.74178865	-0.298690915	0.9762052342
1991	Jan	0.91	2.49662927	3.496629	0.714010287	-0.336857909	0.9486054533
1991	Nov	1.03	2.79786065	3.797861	0.736693868	-0.305582849	0.9724380790
1992	Feb	0.92	2.50588202	3.505882	0.714765073	-0.335801359	0.9496174677
1992	Apr	0.73	2.08204016	3.082040	0.675539595	-0.392243508	0.8695479099
1992	Aug	0.96	2.6690281	3.669028	0.727448258	-0.318212406	0.9642459037
1992	Nov	1.03	2.78794632	3.787946	0.736004706	-0.306518766	0.9718900808
1994	Aug	0.01	1.00513456	2.005135	0.501280353	-0.690589747	0.0539168212
1997	Feb	0.21	1.22785526	2.227855	0.551137805	-0.595770401	0.2297565622
1997	Jul	0.31	1.36819013	2.368190	0.577736606	-0.548637212	0.3790406985
1997	Oct	0.34	1.4061738	2.406174	0.584402423	-0.537165453	0.4195899383
1998	Mar	0.22	1.247298	2.247298	0.555021185	-0.588748994	0.2497278151
1998	Jul	0.42	1.52254125	2.522541	0.603574372	-0.504886012	0.5369185499
1998	Nov	0.46	1.58937572	2.589376	0.613806527	-0.488075502	0.5974005499
1999	Jun	0.49	1.63746518	2.637465	0.620848075	-0.476668872	0.6372383301
1999	Aug	0.37	1.44109672	2.441097	0.590348064	-0.527042978	0.4561091708
2000	Aug	0.27	1.31564457	2.315645	0.568154798	-0.565361367	0.3223413115
2001	Feb	0.25	1.2891837	2.289184	0.563163061	-0.574186064	0.2939166126
2002	Feb	0.15	1.15787735	2.157877	0.536581631	-0.622536573	0.1623675558
2002	Jul	0.20	1.22145327	2.221453	0.549844233	-0.598120253	0.2232781231
				Mean	0.601093663	-0.515005372	
				Std. Dev	0.068163454	0.10919379	

Table 8: Normalization of the Fv variable

The normalized *Fv* variable had mild departures from normality as shown below:



Graph 3:Whiskers Plot for Fv obtained using normalized data

2. To check if the variances for the *pre-DPF* and *post-DPF sets* –shown in the table below - may be assumed to be equal.

Pre- DPF				Post DPF		
YearSelected	MonthSelected	LogNormal Fragility Level		YearSelected	MonthSelected	LogNormal Fragility Level
1969	Apr	0.1490010397		1986	Jul	0.2681899684
1969	Oct	0.1562583311		1987	Jul	0.6648126215
1970	Feb	0.1500317703		1987	Sep	0.8274253926
1970	Jun	0.1448486825		1988	Jun	0.939982477C
1970	Nov	0.1488313998		1988	Nov	0.8133668344
1972	Dec	0.1928748675		1989	Sep	0.8603256452
1973	Mar	0.1686156708		1990	Apr	0.9780844734
1974	Jun	0.2847781015		1990	Aug	0.9413300802
1976	Mar	0.2919669748		1990	Sep	0.9762052342
1976	Jun	0.2569614907		1991	Jan	0.9486054533
1976	Jul	0.1973966011		1991	Nov	0.9724380790
1977	Feb	0.2229789090		1992	Feb	0.9496174677
1977	Jul	0.1385771446		1992	Apr	0.8695479099
1977	Nov	0.1573708372		1992	Aug	0.9642459037
1978	Dec	0.3604627801		1992	Nov	0.9718900808
1979	May	0.2764106524		1994	Aug	0.0539168212
1979	Jul	0.2706858119		1997	Feb	0.2297565622
1981	Oct	0.6809139770		1997	Jul	0.3790406985
1981	Nov	0.5200753288		1997	Oct	0.4195899383
1982	Nov	0.8069554766		1998	Mar	0.2497278151
1982	Dec	0.5530056645		1998	Jul	0.5369185499
1983	Jan	0.6685264370		1998	Nov	0.5974005498
1983	Jul	0.3267025545		1999	Jun	0.6372383301
1983	Dec	0.2939849043		1999	Aug	0.4561091708
1985	Sep	0.3143840704		2000	Aug	0.3223413115
1985	Oct	0.3641189922		2001	Feb	0.2939166126
1985	Nov	0.4016554316		2002	Feb	0.1623675558
Fragility Level Mean		0.314754589		Fragility Level Mean	0.64016265	
Std.Dev		0.183090345		Std.Dev.		0.310469073

Table 9: Lognormal FV for the Pre & Post DPF periods

The F-test for differences in two variances was used and showed that the two variances are not equal:

F – Test	
Level of Significance	0.05
Population 1 Sample	
Sample Size	27
Sample Standard Deviation	0.18309
Population 2 Sample	
Sample Size	27
Sample Standard Deviation	0.310469
F-Test Statistic	0.347772
Population 1 Sample Degrees of Freedom	26
Population 2 Sample Degrees of Freedom	26
Two-Tailed Test	
Lower Critical Value	0.455724
Upper Critical Value	2.194305
p-Value	0.009074
Reject the null hypothesis	

Table 10: F-Test for equality in variance in Fv for pre & post DPF periods

The data, sub-divided into *pre* and *post-DPF* periods, formed the basis of a two group experimental design. The *Separate-Variance t-test*[25] was used to test the hypothesis:

$$H_O : \mu_{pre-DPF} \geq \mu_{post-DPF}$$
$$H_A : \mu_{pre-DPF} < \mu_{post-DPF}$$

The results in the following table indicate that the null hypothesis be rejected. The alternate hypothesis is accepted; this infers that the level of banking sector fragility *pre-DPF* is less than *post-DPF* era.

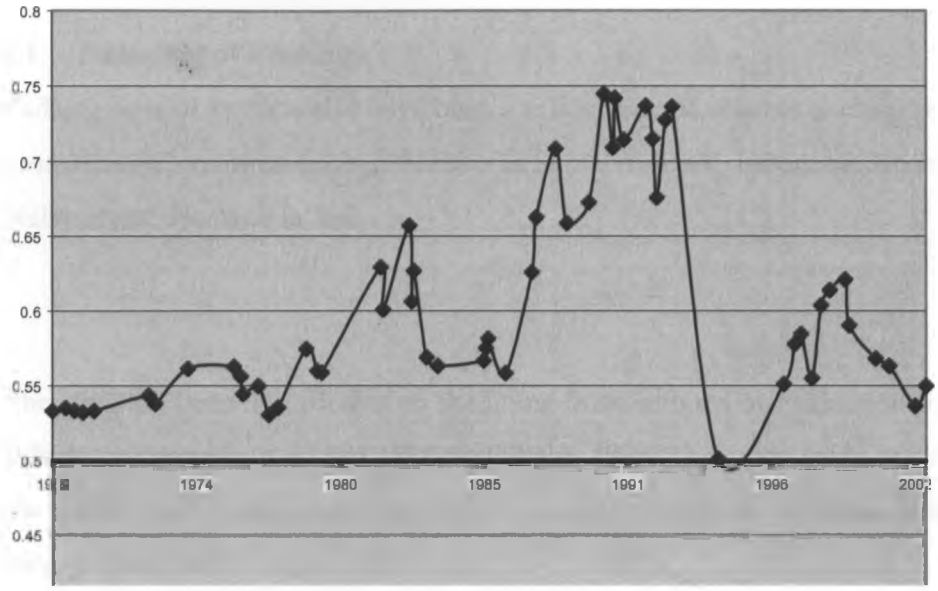
t-Test: Two-Sample Assuming Unequal Variances		
	LogNormal Fragility Level	LogNormal Fragility Level
Mean	0.314754589	0.64016265
Variance	0.033522074	0.096391045
Observations	27	27
Hypothesized Mean Difference	0	
Df	42	
t Stat	-4.691197127	
P(T<=t) one-tail	1.44126E-05	
t Critical one-tail	1.681951289	
P(T<=t) two-tail	2.88252E-05	
t Critical two-tail	2.018082341	

Table 11:t-Test: Two-Sample Assuming Unequal Variances

[25] Pg. 354 of Berenson et-al 2002.

4.2 The General Trend of Fragility of the Banking Sector in Kenya

Graph 4: Kenyan Banking Sector Fragility Level



The level of Kenyan Banking Sector fragility as shown below seems to be consistently above the 0.5 point qualifying for the highest level of fragility as per the DKD 2002 classification.

CHAPTER 5: CONCLUSION

5.1 Summary of Findings

Banking failures in the world have been a major issue of concern rocking the economies of countries such as Mexico in South America, Indonesia, Korea, Malaysia and Thailand in Asia.

The story has been no different on the home front with major banking sector failures occurring in the 1984-1996 period and 1998. The study made use of the multivariate logit model by DKD (2000) to establish whether these failures constituted a crisis or not.

The findings of this study are two-fold:

1. The general level of banking sector fragility in Kenya for the period 1969-2002 has been consistently at *level IV*, the highest class of fragility. During the 1991-1995 Kenya's banking sector was at its weakest point ever.

2. Despite the general high level of fragility in the sector an analysis of the Kenya Banking Sector fragility for the randomly selected months during the years 1969-2002 reveals that fragility levels *pre-DPF* were at lower levels than at *post-DPF* period. This finding confirms those of an earlier study by Demirguc-Kunt & Detragiache (1999) on banking crises around the world which concludes that "*explicit deposit insurance tends to be detrimental to banking stability*" i.e. for Kenya the introduction of the DPF may have been detrimental to the banking sector stability.

In the interpretation of this finding the limitations of the study should also be considered.

5.2 Conclusions

This paper finds that the level of banking sector stability has deteriorated since the introduction of the DPF in Kenya. The element of moral hazard associated with the DIS function may have some contribution to the observation.

Given the high costs associated with bank failure episodes it is recommended that further investigation into the impact of the Bank Supervision, LOLR and DIS functions be conducted so that corrective measures on the design features of each function may be taken in the hope of attaining the perfect mix and thus a stable banking sector.

A good institutional environment is necessary to contain the moral hazard brought about by the introduction of the DIS.

5.3 Limitations of Study

This study has two major limitations, viz:

Factors that influence the stability of the banking sector:

1. There are three factors that influence banking sector stability, viz:

- Lender-of-last-resort (LOLR)
- Bank Supervision and regulation
- Deposit Insurance Scheme

This study focused on the impact of the DIS on banking sector stability. The first two factors which are core functions of the CBK and have been in place since the installation of CBK in 1966 were assumed - due to constraints in resources - to remain constant for the period of interest.

2. The differences in quality of the DIS function for the time period of study:

The study did not delve into the quality and presence of specific design features of a DIS function and the possible impact of these on the level of stability. This is important because in DKD 2002, Nigeria which has a DIS function in place was reported to have the least level of fragility recorded for all the countries sampled – supporting Garcia 1999:- *the design features of a DIS are critical for the DIS to have a correct effect on the banking sector stability.*

5.4 Suggestions For Further Research

Further research is recommended in the following areas:

- A study into the evolution of the LOLR function of the CBK
- A study into the evolution of the Bank Supervision function of the CBK
- A study into the evolution of the DIS function in Kenya
- A comparison of the design features of the DPF to those recommended by Garcia 1999
- An analysis of the different qualitative levels and there possible interactions with the level of fragility in the Kenyan Banking Sector

Further research into the areas suggested above is necessary to form a solid foundation against which possible corrective action may be taken to:

- Reform any of the three functions - LOLR, Bank Supervision and DIS – found wanting,
- Streamline and harmonize the functions for the benefit of the stability of the Kenyan Banking Sector.

APPENDICES

1. CONTRIBUTION TO THE GDP (2001) BY MAJOR ECONOMIC SECTORS - KENYA

Main Sectors	Share In Real GDP in 2001	2001/[1]	2002/[2]
Agriculture	24.1	25.196	25.458
Manufacturing	13.0	13.649	13.739
Trade, Tourism & Hotels	12.7	13.247	13.340
Financial Services	10.6	11.055	11.212
Building & Construction	2.4	2.479	2.555
Transport & Communications	6.2	6.522	6.641
Government	14.7	15.287	15.353
Others	16.3	17.263	17.373
Est. Real GDP (1982 prices)	100	104.697	105.672
Nominal GDP (at factor cost)	772.893		
Overall GDP Deflator	7.4		
GDP at Mkt. Prices	895.278		

Notes:

1. From the Economic Survey, 2002

2. Based on selected economic activities

Sources: Central Bureau of Statistics and Central Bank of Kenya

2. KENYAN BANKING INSTITUTIONS THAT FAILED IN THE PERIOD 1984-1996

	NAME OF INSTITUTION	DATE CLOSED / (STATUS)	REASON(S) FOR FAILURE
1.	Rural Urban Credit & Finance Co. Ltd	December, 1984 (under official receivership)	Interference by Directors in day to day operation High incidence of non-performing loans
2.	Continental Bank of Kenya Ltd.	August, 1986 (Under official receivership)	Poor lending practices leading to unsatisfactory asset quality.
3.	Continental Credit Finance Ltd	August, 1986 (Under official receivership)	Poor lending practices leading to unsatisfactory asset quality.
4.	Capital Finance Ltd.	January, 1987 (Under official receivership)	Ineffective Board and Management
5.	Business Finance Co. Ltd.	December, 1989 (Consolidated Under Consolidated Bank of Kenya Ltd.)	Interference by shareholders and Directors. Adverse dominant influence on the Board Poor asset quality.
6.	Estate Finance Co. of Kenya Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Adverse dominant influence on the Board. Poor asset quality.
7.	Home Savings and Mortgages Co. Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Under-capitalization. Insider loans (Unsecured). Ineffective Board of Directors High incidence of non-performing loans.
8.	Nationwide Finance Co. Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Poor credit policies and insider lending (unsecured). Under-capitalization Unsatisfactory asset quality.
9.	Union Bank of Kenya Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Mismanagement Poor credit policies.
10.	Jimba Credit Corp. Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Borrowing 'short' and lending 'long' (mismatch). Credit concentration
11.	Kenya Savings and Mortgages Ltd.	December, 1989 (Consolidated under Consolidated Bank of Kenya Ltd.)	Mismatch of resources which involved borrowing 'short' and lending 'long'. Liquidity problems. Insolvency.
12.	Nairobi Finance Corp. Ltd	April, 1993 (Under liquidation by Deposit Protection Fund)	Disagreement among the shareholders. Under-capitalization Poor asset quality.
13.	Middle Africa Finance Co. Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Credit concentration (Unsecured). Non-performing placements. Under-capitalization.
14.	Trade Bank Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Under-capitalization Over-reliance on high cost funds. Credit concentration to companies (unsecured and non-performing).
15.	Trade Finance Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Under-capitalization Over-reliance n high cost funds. Credit concentration to group

			companies (unsecured and non-performing).
16.	Diners Finance Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Domino effect triggered by collapse of Trade Bank. Under-capitalization.
17.	Central Finance (K) Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Lending of unsecured loans. Under-capitalization Heavy reliance on parastatal deposits.
18.	Allied Credit Ltd.	August, 1993 (Under liquidation by Deposit Protection Fund)	Under-capitalization Lending of unsecured loans mainly to shareholders and directors.
19.	United Trustee Finance Ltd.	August, 1993 (wound up by the High Court of Kenya on March 6, 1995)	Insider loans (unsecured) Under-capitalization Serious mismanagement
20.	Inter-Africa Credit Finance Ltd.	June, 1993 (Under liquidation by Deposit Protection Fund)	Unsecured advances especially to Directors and shareholders. High incidence of unsecured insider loans Heavy reliance on parastatal deposits.
21.	Exchange Bank Ltd. April, 1993 (voluntary liquidation)	April, 1993 (voluntary liquidation)	Persistent violation of the Banking Act and the CBK Act, hence licence was revoked by the Minister of Finance.
22.	International Finance Co. Ltd.	April, 1993 (Under liquidation by Deposit Protection Fund)	Unsecured credit concentration mainly to insiders. Heavy reliance on parastatal deposits.
23.	Pan African Credit & Finance Co. Ltd.	October, 1993 (Under liquidation by Deposit Protection Fund)	Persistent violation of the Banking Act and CBK Act, hence licence was revoked by the Minister of Finance.
24.	Pan African Bank Ltd.	October, 1993 (Under liquidation by Deposit Protection Fund)	Persistent violation of the Banking Act and CBK Act, hence licence was revoked by the Minister for Finance.
25.	Post Bank Credit Ltd.	May, 1993 (Under liquidation by Deposit Protection Fund)	Malpractices in the clearing-house. Credit concentration.
26.	Thabiti Finance Co. Ltd.	1994, (Under liquidation by Deposit Protection Fund)	Under-capitalization Unsecured advances especially to Directors and shareholders. Over-reliance on parastatal deposits.
27.	Meridian BIAO (K) Ltd.	April, 1996 (Under liquidation by Deposit Protection Fund)	Non-performing Bank placements with foreign banks Malpractices by Directors
28.	Kenya Finance Bank Ltd.	July, 1996 (Under liquidation by Deposit Protection Fund)	Non-performing loans
29.	Heritage Bank Ltd.	September, 1996 (Under liquidation by Deposit Protection Fund)	Non-performing loans. Malpractices by Directors.

Figure 1: Source – *A Guide to Wise Management Of Loans From Banking Institutions, CBK January 1997.*

APPENDICES

3. EMPLOYMENT IN THE KENYA BANKING INDUSTRY (2002)

Category	Banks	NBFIs	Under CBK Management	Grand Total
Management	3,170	175	3,345	88
Supervisory Sec. Heads	2,011	97	21	2129
Clerks & Secretarial Staff	6,479	268	72	6,819
Other Categories	1,662	100	46	1,808

Figure 2: Source BSD Annual Report 2000.

APPENDICES

4. INSTITUTIONS UNDER DPF

1. Pan African Bank Group:
    1. Pan African Bank (IL) Ltd
    2. Pan African Credit & Finance (IL) Ltd.
2. Trade Bank Group
    1. Trade Bank (IL) Ltd
    2. Trade Finance (IL) Ltd.
    3. Diners Finance (IL) Ltd.
    4. Ari Bank Corporation (IL) Ltd.
    5. Heritage Bank (IL) Ltd.
3. Trust Bank
4. Mafco Group
    1. Nairobi Finance (IL) Ltd
    2. Inter Africa Credit Finance (IL) Ltd
    3. Central Finance (K) (IL) Ltd
    4. Middle Africa Co. (IL) Ltd
    5. Allied Credit (IL) Ltd.
    6. International Finance (IL) Ltd.
5. Reliance Bank (IL) Ltd
6. Thabiti Bank (IL) Ltd
7. Prudential Bank (IL) Ltd
8. Fortune Finance (IL) Ltd
9. Euro Bank (IL) Ltd
10. Kenya Finance Bank (IL) Ltd
11. Prudential Building Society (IL) Ltd
12. Daima Bank (IL) Ltd
13. Post Bank Credit (IL) Ltd
14. Meridian Biao Bank (IL) Ltd

5. BEST PRACTICES FOR DIS'

	Best Practice	Departures from Best Practices	Practical Issues To Be Resolved
1.	Avoid incentive problems	Agency problems, moral hazard and adverse selection.	Which incentives are best/ How to incorporate them in law and regulation?
2.	Define the system explicitly in law and regulation	The system is implicit and ambiguous.	How to amend the laws and regulations to ensure transparency and certainty.
3.	Give the supervisor a system of prompt remedial actions	The supervisor takes no, or late remedial actions.	Should these remedial powers be mandatory or discretionary?
4.	Ensure that the supervisor resolves failed depository institutions promptly	Forbearance: banks that should be resolved continue to operate.	The types and importance of closure policies. Should the DIA be involved?
5.	Provide low coverage	There is high, even full coverage.	Which types of institutions should be included in the DIS and which deposits should be covered; what is the appropriate level of coverage; should there be coinsurance?
6.	Make membership compulsory	The scheme is voluntary.	How to avoid adverse selection?
7.	Pay deposits quickly	There are delays in payment.	How to effect prompt payment?
8.	Ensure adequate sources of funding to avoid insolvency	The DIS is under-funded or insolvent.	Whether to choose a funded or ex-post DIS? What are the appropriate levels for premiums and the accumulated fund? Whether to have back-up funding from the government?
9.	Risk-adjusted premiums	Flat rate premiums.	How to set premiums according to risk?
10.	Organize good information	Bad information.	What data do supervisors need?
11.	Make appropriate disclosure	Little, or misleading disclosure.	What data do supervisors need?
12.	Create and independent, accountable DIS agency	Political interference and lack of accountability.	Designing the DIA and its board of directors to avoid political interference, but promote accountability?
13.	Have bankers on an advisory not the main board	Bankers are in control.	How best to avoid conflicts of interest?
14.	Ensure close relations with the Lender of last resort and the supervisor.	Relationships are weak.	Poor lender-of-last-resort report policies that raise costs to the DIS; sharing information.
15.	Begin an explicit, limited DIS when the banking system is sound.	Begin when the system is weak so coverage is set high to avoid runs.	How to resolve banking problems so that the DIS can commence?

Source: Adapted from Garcia (1999), p. 9.

6. AGGREGATED MICRO-PRUDENTIAL INDICATORS

CAMEL Factor	Issues For Consideration
Capital adequacy	Aggregate capital ratios Frequency distribution of capital ratios
Asset quality	For Lending Institution: Sectoral credit concentration Foreign-currency –denominated lending Non-performing loans and provisions Loans to public sector entities Risk profile of assets Connected lending Leverage ratios For borrowing entity: Debt-equity ratios Corporate profitability Other indicators of corporate conditions Household indebtedness
Management soundness	Expense ratios Earnings per employee Growth in number of financial institutions
Earnings and probability	Return on assets Return on equity Income and expense ratio Structural profitability indicators
Liquidity	Central bank credit to financial institutions Deposits in relation to monetary aggregates Segmentation of inter-bank rates Loans to deposits ratios Maturity structure of assets and liabilities Measures of secondary market liquidity
Sensitivity to market risk	Foreign exchange risk Interest rate risk Equity price risk Commodity price index
Market-based indicators	Market prices of financial instruments Indicators of excess yields Credit ratings Sovereign yield spreads

Figure 3: Adapted form Evans, Leone, Gill & Hilbers (2000)

7. ESTIMATED COEFFICIENTS FOR THE MULTI-VARIATE LOGIT MODEL DKD (2000)

Explanatory Variable	Estimated coefficient
GDP Growth	-0.172* (0.034)
Change in terms of trade	-0.021 (0.018)
Depreciation	0.007 (0.006)
Real interest rate	0.065* (0.016)
Inflation	0.020** (0.010)
Ratio of fiscal surplus to GDP	0.066 (0.036)
Ratio of M2 to reserves	0.013* (0.005)
Credit growth $_{t-2}$	0.015** (0.008)
GDP per capita	-0.039 (0.033)
Number of crisis	36
Number of observations	766
Model χ^2	61.46*
AIC[a]	249

Figure 4:Demirguc-Kunt & Detragiache (2000)

REFERENCES

1. Aghevli B. B., 1999,'The Asian Crisis: Causes & Remedies', Finance & Development, June 1999, © International Monetary Fund.
2. Benston G. & Kaufman, G., 1998, 'Deposit Insurance In The FDIC Improvement Act. The Experience To-Date', Federal Reserve Bank of Chicago Economic Perspectives, Vol. 22, No. 2, pp 2-20.
3. Berenson M. L., Levine D. M & Krehbiel T. C., 2002, "Basic Business Statistics: Concepts And Applications", © Prentice Hall.
4. Calvo, G. A., 1996, "Capital Flows and Macro-Economic Management: Tequilla Lessons", International Journal Of Finance & Economics 1 (3): 207-224
5. Caprio G. & Klingebiel D., July 1996, "Bank Insolvencies – Cross-country Experience", Policy Research Working Paper 1620, The World Bank.
6. Central Bank Of Kenya publications:
   - Monthly Economic Review – March 2003
   - Statistical Bulletin – December 2002
   - A Guide To Wise Management Of Loans From Banking Institutions – January 1997
   - Bank Supervision Report – 1999
7. Chamber J., William C., Beat K., & Paul T., 1983), "Graphical Methods For Data Analysis", Wadsworth
8. Chatfield, C., 1980, "The Analysis Of Time Series: An Introduction", 2nd Edition, Chapman & Hall.
9. Dale, R., 2000, 'Deposit Insurance In Theory & Practice', Journal Of Financial Regulation and Compliance, Vol. 8, No. 1, 2000, pp 36-56, © Henry Stewart Publications, 1358-1988.
10. Demirguc-Kunt A. and Detragiache E., 1998, "Financial Liberalization

and Financial Fragility", World Bank Research Working Paper No. 1917, WB. Washington DC.

11. Demirguc-Kunt A. and Detragiache E., 1999, 'Does Deposit Insurance Increase Banking Stability? An Empirical Investigation', IMF Working Paper.
12. Demirguc-Kunt A. and Detragiache E., 2000, "Monitoring Banking Sector Fragility: A Multivariate Logit Approach", The World Bank Economic Review, Vol. 14, No. 2: 287 – 307.
13. DPF Publications:
    - Annual Report of the Board of the Deposit Protection Fund – 1987 –1990
14. Dziobek C and Pazarbioglu C (1997), "Lessons from systemic bank restructuring: A survey of 24 countries", IMF Working Paper. December.
15. Feldstein M., 1991, "The Risk Of Economic Crisis", Chicago, p.15.
16. Friedman M. & Schwartz A., (1963), A Monetary History of the United States, 1867-1960. Princeton University Press.
17. Friedman, M., 1959, 'The Control Of Money. A Program For Monetary Stability', Bronx NY, Furdham University Press, p. 21
18. Frydl E. J., 1999, "The Length & Cost Of Banking Crises", IMF Working Paper 99/30 IMF, Washington DC.
19. Garcia G. G. H., 1999, "Deposit Insurance: A Survey Of Actual and Best Practices", IMF Working Paper WP/99/54, © 1999 International Monetary Fund.
20. Gavin, M. & Hausman R., 1996, "The Roots of Banking Crises: The Macro-Economic Context," In Demirguc-Kunt A. & Detragiache E., 2000, "Monitoring Banking Sector Fragility: A Multivariate Logit Approach," The World Bank Economic Review, Vol 14, No. 2: 287-307.
21. Gonzalez-Hermosillo B., 1999, 'Determinants Of Ex-Ante Banking System Distress: A Macro-Micro Empirical Exploration Of Some

Recent Episodes', IMF Working Papers 99/33 (Washington: IMF).

22. Greene, W. H., 1997, "Econometric Analysis", 3rd Ed., Saddle River, NJ: Prentice Hall.
23. Hanc G., 'The Necessary Political & Economic Steps', Establishing A Deposit Insurance System © FDIC, Basel 11-12 May 2000.
24. Hardy D. C. & Pazarbasioglu C., 1990, "Determinants and Leading Indicators of Banking Crises: Further Evidence", IMF Staff Papers, Vol 46, N0 3, Sep – Dec 1999, © 1999 International Monetary Fund.
25. Hilbers P., Krueger R. & Moretti M., 2000, "New tools for assessing financial system soundness", Finance & Development, Sept. 2000.
26. Honohan P., 1997, "Banking system failures in developing and transition countries diagnosis and prediction, " BIS Working Paper 39, Bank for International Settlement, Basel.
27. Kane E. J., 1992, "How incentive-incompatible deposit-insurance funds fail", Journal of Financial Services Research, 4, pp 51-91.
28. Kathanje, M. N., 2000, ' An Evaluation Of Financial Performance Of The Kenyan Banking Sector For The Period 1987-1999', University Of Nairobi.
29. Kaufman G., 1994, 'Bank Contagion: A Review Of The Theory & Evidence', Journal Of Financial Services Research, April, pp 124-50.
30. Lindgren C. J., Garcia G. & Saal M., 1996, "Bank Soundness And Macroeconomic Policy", IMF: Washington DC.
31. Mishkin F. S., 1996, "Understanding Financial Crises: A Developing Country Perspective", NBER Working Paper 5600, National Bureau Of Economic Research, Cambridge, Mass.
32. Mitchell, W. 1913, "Business Cycles", Berkeley, California. University of California Press, cited in Mugo J.M. (2001).
33. Mugo J. M., 2001, 'Applicability Of Financial Crisis Predictive Model To Bank Failures In Kenya', University Of Nairobi.
34. Murugu J. K., "Bank Failures and Supervisory Response", Paper presented to the 12th East African Central Banking Course, Nairobi, July

1998.

35. Mushred S. M. & Subagjo D., September 2000, "Prudential Regulation of Banks in Less Developed Economies", The United Nations University, WIDER, Working Papers No. 199.
36. Nyamai C.M. (1989), The Structure and Growth of the Banking Industry in Kenya, U.O.N. MBA Project.
37. Obiero, D., 2002, 'The Banking Sector Regulatory Frame Work In Kenya: Its Adequacy In Reducing Bank Failures", University Of Nairobi, pp 20-26.
38. Rojas-Suarez L., 1998, "Early Warning Indicators Of Banking Crises: What works for developing countries?" Research Department, Inter-American Development Bank, Washington D.C.
39. Rossi, M. 1999, "Financial fragility and economic performance in developing countries: Do capital controls, prudential regulation and supervision matter?" IMF Working Paper No. 99/66.
40. Sachs J., Tornell A. and Velasco A., 1996, "Financial Crises in Emerging Markets: The Lessons from 1995", Brookings Paper on Economic Activity 1 (1996): 147-198.
41. Temzelides T., 1997, ' Are Bank Runs Contagious?' Federal Reserve Bank Of Philadelphia Business Review, Nov-Dec 1997, pp3-14.
42. United States Treasury (1991), 'Modernizing The Financial System: Recommendation For Safer, More Competitive Banks', Washington DC, pp 1-11.