Determinants of Investment for Nairobi's Informal Manufacturing Subsector

by

Abuodha Charles Henry Omog

A research paper submitted to the Department of Economics for the partial fulfilment of the degree of Master of Arts in Economics

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

C. H. MacAbuodha

Charles H.O. Abuodha

This paper has been submitted for examination with our approval as university supervisors.

Dorothy McCormick

Dr Dorothy McCormick

S.O. Noormohamed

Mr S.O.Noormohamed

This paper is dedicated to my father and mother

ACKNOWLEDGEMENTS

My heartfelt thanks to Mr C. J. Abuodha Ohene, and Mrs Domtila Atieno A.. bdha for the day to day upbringing and encouragement to myself for all these academic and non academic periods to this day that I finish this paper. With all appreciation I say thanks.

To both my supervisors Dr. Dorothy McCormick and Mr. S. O. NoorMohamed who sacrificed their busy time for my work, I express full gratitude and hope that I can say in words what I believe cannot pay in kind.

To my classmates Akara, J.Odera, Kiptui, Ken and all those who spent time to criticise and encourage me, I say thanks knowing very well that need not be enough.

To those out of class who gave me subsequent advice and encouragement, I say thanks: Prof.Ryan and Prof.Mukras without whom this scholarship might not have materialised, Dr.Ayako my econometric lecturer for occasional guidance, Karrol Yambo for those hours spent in proof reading my work giving occasional encouragement when I greatly needed it, Churchill Ochieng for his unending encouragement and Elly, Ken, Owano, Ariwi for their help. To all the others involved, I spare these familiar words thank you.

I take full responsibility for all the errors and ommissions in this paper.

Table of Contents Page number

Abstract xiii

CHAPTERS

Chapter One: *Background* 1

1.1: The existing debates. 1

1.1.1: Debates on the existence of the sector. 1

1.1.2: Debates on the potentiality of the sector. 4

1.2: Investment in the informal sector. 8

1.3: Statement of the problem. 9

1.4: Objectives of the study. 10

1.5: Significance of the study. 10

Chapter 2: *Literature review* 12

2.1: Theoretical literature. 12

2.1.1: Demand-for-investment functions. 13

2.1.2: Supply-of-investment functions. 20

2.2: Empirical literature. 29

2.2.1: The simple accelerator theory. 29

2.2.2: Estimations for the liquidity theory 21

2.2.3: Estimations with expected rate of profits as a proxy for desired level of capital. 30

2.2.4: Estimations for the neoclassical model. 31

2.2.5: D.U.Sastry's empirical work. 32

2.3: Literature on the informal sector. 33

2.4: Conclusions to literature review. 42

Chapter 3: *Methodology* 44

3.1: Field survey. 44

3.1.1: Nature of the field. 44

3.1.2: Products. 48

3.2: Data and data variables. 49

3.3: The model. 52

3.3.1: Estimation methodology. 56

3.4: Limitations of the study. 57

Chapter 4: *Description of the manufacturing informal sector:* 59

4.1: Incomes in the manufacturing informal subsector: 59

4.2: Savings in the informal manufacturing subsector: 61

4.3: Capital in the informal manufacturing subsector: 65

4.4: Investments in the informal manufacturing subsector: 51

4.5: Capital labour ratios in the informal manufacturing subsector: 52

4.6: Output in the informal manufacturing subsector: 71

4.7: Employment in the manufacturing informal subsector: 72

4.8: Year of starting business for the informal manufacturing subsector: 75

4.9: Desired level of capital in the manufacturing informal subsector 76

4.10: Initial level of investments in the informal manufacturing subsector: 78

4.11: Training in the informal manufacturing subsector: 80

4.12: Ratio of formal sector prices to formal sector prices: 81

Chapter 5: *Analysis* 83

5.1: The TSP package and econometric method used: 83

5.2: Equations estimated a[illegible] the results: 69

5.2.1 Estimations for the entire manufacturing subsector: 86

5.2.1.a: The general investment equation: 86

5.2.1.b: The general income equation: 91

5.2.1.c: The general output equation: 92

5.2.2 Equations on metalwork branch: 93

5.2.2.a: The investment equation for metalwork: 94

5.2.2.b: The income equation for the metalwork branch: 97

5.2.2.c: The output results for metalwork: 97

5.2.3 Equations for the woodwork: 99

5.2.3.a: The investment function for woodwork: 99

5.2.3.b: The income equation for woodwork: 101

5.2.3.c: The output equation for woodwork: 103

5.2.4: Equations for General Blacksmith: 104

5.2.4.a: The investment equation for general blacksmith branch: 104

5.2.4.b: The income equation for the General blacksmith branch: 105

5.2.4.c: The output equation for the general blacksmith branch 106

5.2.5: Effects of investments on labour: 107

5.2.5.a: Effects of investment on labour for the metalwork branch: 108

5.2.5.b: Effects of investment on labour for the woodwork branch: 109

5.2.5.c: Effects of investment on labour for the general blacksmith: 110

Chapter 6: *Conclusions and policy recommendations* 112

6.1: The investment function: 112

6.2: Effects of investments on macroeconomic variables: 113

6.2.1: Effects of investment on output: 113

6.2.2: Effects of investment on income: 114

6.2.3: Effects of investment on labour: 115

6.3: Policy recommendations: 116

6.4: Conclusions 131

7.0: References: 133

8.0: APPENDIX 1: *Survey Questionnaire* 139

9.0: APPENDIX 2: *Data* 147

10.0: APPENDIX 3: *Covariance matrices* 127

List of Tables

Table 1: Distribution of investments and incomes for the manufacturing subsector. 37

Table 2: Number of people engaged by type of activity. 39

Table 3: The order condition for identification. 56

Table 4: Percentage distribution of incomes for the informal manufacturing subsector by activity. 60

Table 5: Frequency distribution of savings for the informal manufacturing subsector by branches. 62

Table 6: Frequency distribution of capital for the informal manufacturing subsector. 65

Table 7: Frequency distribution for capital for the informal manufacturing subsector by branches. 66

Table 8: Frequency distribution for investments for the manufacturing subsector. 67

Table 9: Table showing distribution of investments (INV) for the informal manufacturing subsector by branches. 68

Table 10: Frequency distribution of capital labour ratios for the informal subsector. 69

Table 11: Frequency distribution for (KLRs) capital labour ratios for the informal subsector by branches. 70

Table 12: Frequency distribution for output for the informal manufacturing subsector. 71

Table 13: Frequency distribution for output for the informal manufacturing subsector by branches. 71

Table 14: Frequency distribution for full-time employment for the informal manufacturing subsector. 72

Table 15: Frequency distribution for full-time employment for the informal manufacturing subsector by branches. 73

Table 16: Frequency distribution for casual labourers for the informal manufacturing subsector. 74

Table 17: Frequency distribution of year of starting business for the manufacturing informal subsector. 75

Table 18: Frequency distribution for desired level of capital (DCAP) for the manufacturing informal subsector. 76

Table 19: Frequency distribution for the desired level of capital DCAP for the informal manufacturing subsector by branches. 77

Table 20: Frequency distribution for the amount of initial investments per entrepreneur in the manufacturing informal subsector. 78

Table 21: Frequency distribution for initial investments per branch in the informal manufacturing subsector. 79

Table 22: Frequency distribution for entrepreneur training for the informal manufacturing subsector by branches. 80

Table 23: Frequency distribution for the ratio of formal sector enterprises' to informal sector firms' prices (PIFI) for the informal manufacturing subsector. 81

Table 24: The t (statistic) and the coefficients of the general investment function. 86

Table 25: Table showing relation between investments and savings for the metalwork industry of the manufacturing subsector. 90

Table 26: The coefficients and the t statistic for the general incomes function. 91

Table 27: The coefficients and the t statistics for the general output equation. 92

Table 28: The investment equation results for the metalwork branch. 94

Table 29: Credit use for the metalwork branch. 95

Table 30: The income equation for the metalwork. 97

Table 31: The output equation for the metalwork branch. 97

Table 32: The investment function for woodwork. 99

Table 33: The income equation for the woodwork branch. 101

Table 34: The woodwork output equation results. 103

Table 35: Investme. equation for general blacksmith. 104

Table 36: The incomes equation for general blacksmith income branch. 105

Table 37: The output equation for the general blacksmith branch. 96

Table 38: Results for the general labour model: 107

Table 39: Labour equation results for the metalwork branch: 108

Table 40: Labour equation results for the woodwork sector: 109

Table 41: Effects of investment on labour for the general blacksmith sector: 110

Table 42: Comparison of significant variables per section in the informal manufacturing subsector. 112

Table 43: The coefficients and t(statistics) of investments (INV) on output in the branch in the informal manufacturing subsector. 113

Table 44: The coefficient and t(statistic) of investments (INV) on income for each firm type. 114

Table 45: The coefficients and t (statistic) for investments in the labour equation for each branch in the manufacturing subsector: 115

List of figures

Fig 1: Interlinkages between the formal, informal and the agricultural sectors: 6

Fig 2: An illustration of Rybczynski theorem using contract curve analysis, the case of an increase in labour Effect: 24

Fig 3: Map showing the areas in which informal sector firms were interviewed. 46

Fig 4: Interlinkages between investments and other

macro-economic variables: 53

Fig 5: Figure showing the circle of poverty in the woodwork branch. 65

Fig 6: Illustration of structurally ordered instrumental variables for our model. 84

Fig 7: Figure showing relation between saving and investments. 89

ABSTRACT

This paper studies the informal manufacturing subsector. As the informal manufacturing subsector is heterogenous, the paper, therefore, subdivides it into woodwork, metalwork and general blacksmith branches. A survey questionnaire was used to collect data from Nairobi area alone. An investment determination model was developed from existing literature on investment functions. The model was then estimated for the entire manufacturing subsector using two stage least squares (2SLS). This model is refered to in the text as the general model. Three sets of three equations, for each homogenous branch within informal manufacturing were regressed to cater for the sectors heterogeneuity. The significant variables in the general model are output, credit, and training. The significant variables in the metalwork branch estimations were income, output, and savings. Those in the woodwork branch are output and credit The investment function for general blacksmith (GBS) was unique in comparison to metalwork and woodwork investment functions. This could be attributed to very low demand for investments in the branch. In the GBS model, only training was a significant determinant of investment. Several policy recommendations are then given, such as: changing the relative prices of capital-intensive versus labour-intensive capital goods which would shift investment toward the latter, the increased use of extant institutions in the informal sector--i.e., *jua-kali* co-operatives--would enable more effective credit provision and savings mobilisation, and increasing the range of products through introduction of new products, thereby, generating employment.

CHAPTER 1

Background

In the background we shall analyse existing debates on the informal sector. There are two major debates. These are on the existence and productivity of the sector. We will also state the research problem, justify our study, and give the objectives of our study.

1.1: The existing debates

Before 1975, debates on the existence and development potential of the informal sector escalated. The section below gives the views of various authors on both of these issues. The paper accepts the existence of the sector and stresses that the sector's development potential is positive.

1.1.1: Debates on the existence of the sector

Academicians and planners have debated how to distinguish formal, small industries from informal ones. In the 1970s, debates on the existence of the formal sector escalated. Some argued that the only meaningful division was into the primary, secondary, and tertiary industrial sectors. Within these, there existed a continuum of activities ranging from small scale, labour intensive, using technologically simple forms to large-scale capital intensive industries using sophisticated technology. The others conceptualized the existence of the informal sector whose features differ

significantly from the well established formal sector. The informal sector has its own unique characteristics that require a more practical sectoral division. These include: ease of entry and exit due to the entrepreneurs' ability to bypass licencing, regulations, labour and patent right laws; low capital requirements; reliance on indigenous and adapted technology; small scale of operations; dependence on recycled and local resources; low cost skill acquisition outside the formal school system; ability to operate under highly competitive market conditions; low-cost illegal structures; and the fact that job profitability does not depend on access to wholesale supplies of parts and spares (ILO 1972).

We shall look at each of the above characteristics of the informal sector and compare with the formal, from our own judgement, we will then conclude whether the informal sector actually differs from the formal sector. Entry into the large-scale formal sector is limited by factors such as monopoly power and undercutting by already established firms. Exiting the formal sector is subject to government intervention depending on employment capacity of the firm. It is impossible to by-pass licensing and registration by-laws when entering the formal sector. In the same way, international regulations on patent rights, blue-prints and product formulae are strictly adhered to. Skill acquisition in the large-scale sector takes the form of: high cost personnel training, importation of technology embodied capital goods, and copyrights from external firms. All these are expensive and cannot be compared to informal sector technology acquisition costs. Large-scale firms in Kenya operate either as monopolies or oligopolies with little or no competition from imports. Most of these firms, if subjected to open market operations, would dwindle or collapse. An example is the

Kenyan textile industry. Job profitability in the large-scale sector depends on supply of parts and spares. This is particularly true for the maintenance and assembly which form the majority of Kenya's large-scale and small-scale industries. Supply of parts comprises a predominant part of firm profitability. Informal sector firms differ from large-scale formal firms in character, we cannot categorize the two under the large-scale umbrella. Distinguishing between formal small-scale and informal is harder. High cost skill acquisition is prevalent in the formal sector unlike in the informal sector. The small-scale sector uses modes of production similar to those of large-scale. Skill acquisition in this sector is very costly due to: high costs of copyrights and good will, high costs of training personnel, risks of losing trained personnel to larger firms who are willing to pay higher wages, and lastly importing technology in the form of capital goods is not only costly but limited by import license quotas which favour large-scale firms. The informal sector, on the other hand, relies greatly on skills developed over time in the sector. There is cheap transfer of knowledge within the sector. Illegal transfer of skills from the formal sector to the informal sector at no costs to entrepreneurs in the sector further ensures low skill acquisition costs in the informal sector. Other differences between the two sectors arises from methods of operation, legality in terms of registration and other formal official requirements, willingness to adopt local innovations, government attitude, and factors determining job profitability. Operations in the formal small-scale sector like those in the formal large-scale sector are highly specialised. The only difference lies in the size of operations. Specialization is dominant in the formal small-scale subsector unlike the formal subsector. Small-scale firms are

registered unlike those of the informal sector. Informal sector firms are more willing to undertake local innovations without considering consumer tastes and market reactions to product. Small-scale firms, on the other hand, are less risk taking. Innovations are chosen according to their success in the large-scale formal sector. The choice of innovations in the informal sector depends on the profitability of innovation in the large-scale sector. Another difference lies in government attitudes towards the two sectors. Unlike in the informal sector, the small-scale sector income is taxed. The only form of taxation facing the informal sector is city council taxes charged on land incomes; incomes are not taxed.

From these few differences it is apparent that a more realistic definition and naming is required. We can comfortably say that the informal sector does exist. Moser (1978:2) stresses that "the existence and proliferation of small-scale enterprises (informal sector) is now taken as empirically given." The increase in the number of studies on the sector as a separate entity implies acceptance of the sector's existence.

1.1.2: Debates on the potentiality of the sector

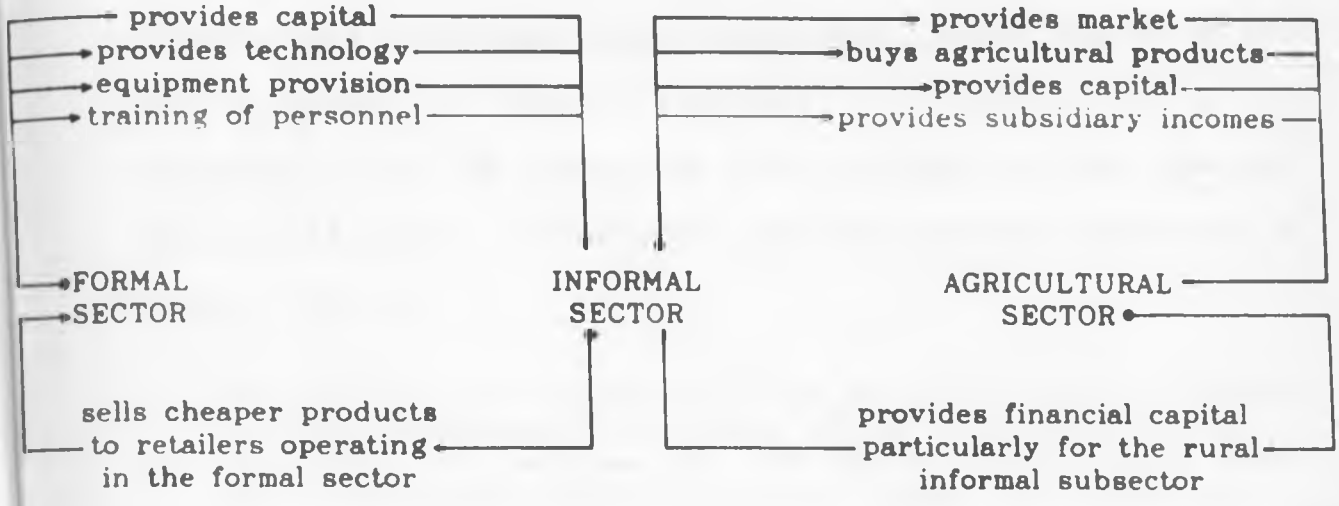
Over the past years attitudes regarding the potentialities of the sector took a drastic turn. Before 1972, economists and other development professionals considered the informal sector retarded with no development potential. Higgins (1976:19) refers to it as the traditional or the retarded sector in which techniques of production are traditional and highly labour-intensive, with very low productivity. Allen (1977: 17) concluded that the constraints that act on the informal sector disqualify it for serious consideration as a dynamic growth point in the Kenyan economy, since the

sector is limited in its ability to transcend barriers to entry into the formal sector. Collins Leys (1975: 37) argued that scarce savings in the economy would be more useful in the formal sector than in the informal sector. We must, however, acknowledge the fact that the informal sector has some impact on the Kenyan economy. One major source of this impact is the existing interlinkages between the sector and the agricultural and formal sector.

Figure 1 attempts to show some of these linkages. The informal sector provides market to agricultural produce as part of total demand for agricultural produce in the country. We observed that several implements used in the agricultural sector such as hoes, pangas, and rakes are manufactured in the informal sector, the informal sector also maintains other agricultural capital such as tractors, lorries, ox drawn ploughs, and farm carts. Both in the rural areas and urban areas, informal sector workers and entrepreneurs are also farm owners. This has the effect of subsidizing farm incomes, hence improving standards of living in the economy (Collier and Lal 86 :pp.264-265). The agricultural sector, on the other hand, provides financial capital to the informal sector (Ng'ethe, Wahome and Ndua : 87). This transfer of resources from the agricultural sector to the informal sector would have a positive structural effect on the economy depending on whether the informal sector uses these finances appropriately. The interlinkages between the formal sector and the informal sector are more complicated. The formal sector provides capital, technology, and trains informal sector entrepreneurs. Training of informal-sector entrepreneurs is not a planned process, but occurs through formal-sector workers joining the informal sector as entrepreneurs. The informal sector,

on the other hand, provides products to retailers in the formal sector.

FIG 1: Interlinkages between the informal sector and the economy



Some possible contributions of the informal sector are: the development of a locally owned technological base and income redistribution in the economy. Real contributions include employment generation, though the sector employs less than 1% of the nation's labour force it still does contributes to overall employment (Mc.Cormick 88:pp.258-259), alleviation of poverty caused by unemployment and lack of unemployment benefit facilities. These contributions together with the above illustrated linkages make us believe that the informal sector's role in Kenya's development is definitely beneficial.

There has been a definite shift in thought about the growth and employment potential of the sector. The informal sector previously considered redundant is currently considered a sector with a lot of development potential. This view is depicted by writers and seminar

presentations from the late 1970s to the present. House argues that with the same amount of investments in the informal sector 55 employment opportunities can be produced compared with only five opportunities in the formal sector. He implies, therefore, that the sector can with much less effort be used to increase national employment. (House 76:pp.15) In the fifth Federation of Kenyan Employers (FKE)/International Labour Organisation (ILO) top management policy workshop on the impact of structural adjustment programmes on the social economic development of Kenya, it was said:

> The most attractive component of the *Jua Kali*[1] sector is its ability to create employment. It would cost 320,000 shs to create one job in the formal sector whereas only 1,000 shs to create a single job in the informal sector. Hence the need to sponsor *jua kali* artisans in the importation of capital goods.[2]

In another seminar for small businessmen organised by Kenya Management Assistance Programme (K-MAP), it was noted that 76,000 jobs were created by *jua kali* artisans countrywide between 1974 and 1988. Though the formal sector registered growth of 3.5%, the informal sector registered a growth of 11%. It is hence obvious that the sector's potential on growth and employment has been recognised. With several ambitious targets put up for the sector, such as employing a large percentage of the nation's labour force (Kenya goverment: 1989-93 pp.168) there is need for definite policies to promote the sector.

[1] *Jua kali* is Swahili for hot sun. The term is readily used in Kenya to imply informal sector.

[2] Paper presented at the 5th ILO/FKE top management policy workshop."Impact of Structural Adjustments Programmes on the Social Economic Development of Kenya",

1.2: Investments in the informal sector

Investments in the informal sector can be divided into three kinds: capital formation, initial investment and overhead investment. Capital formation in this context excludes non-durable investment that do not change total capital stock. These non-durable investment can be referred to as operating expenses. An example of non-durable capital is the electrode used in welding or steel brushes in a drill.

We shall define capital formation as the change in capital stock.

Eq 1

$$I = K_t - k_{t-1}$$

capital formation	=	total capital stock at the present period.	- total capital stock in the past period.

Initial investment is incurred by entrepreneurs entering the sector. Initial investment is the value of investment an entrepreneur requires to start day-to-day firm operations. High initial investment reduces the ability of the sector to expand. This is because potential entrepreneurs will be discouraged by the high initial costs. Overhead investments are those investments that affect non-physical variables such as training, research, education, technical consultancy, management consultancy and all investments that occur at the macro level such as infrastructure. The costs of overhead investments are usually incurred by the policy makers, though in some cases entrepreneurs have been able to provide themselves with investments like electricity and water installation.

Several authors and institutions, recognising the sector's potential, have recommended certain policies. ILO recommendations adopted

by the kenya goverment include;

-increasing accessibility to credit facilities.

-establishment of raw ma[illegible]ial banks.

-education and training at all levels within and outside the sector.

-reorganisation of informal sector enterprises in order to provide improved inputs, infrastructural support and also to rationalise output.

-establishment of special assistance institutions.

In most cases these policies are aimed at increasing output and employment through changing the quantity and form of investment in the sector. This requires understanding the structure of investment in the sector. We will, therefore, analyse the direction, determinants and strength of the present investments in the sector.

1.3: Statement of the problem

Development strategies undertaken over the years include encouraging private sector expansion, encouraging transnational and foreign investors, import substitution, export promotion, decentralised rural development planning, agricultural development, and provision of basic needs. Development of the informal sector has gained recognition as a development strategy in the past few years. The emphasis given the sector in 1989-93 development plan shows that informal sector development is essential to national development.

Almost all policies presently applied and those recommended to the sector are aimed at increasing informal sector output and employment through initial investment, capital formation, and overhead investments. Yet

there are no thorough studies on investments in the sector. The current study hopes to fill this gap by examining the determinants of informal sector investment.

Despite minimal goverment policy implementation on the sector there has been no evaluation on the effectiveness of these inducements on macro economic targets, supported by empirical evidence. This study should improve this important aspect by examining the determinants of investment in the sector enabling us to analyse the sector's response, in achieving required macro economic objectives such as output, employment, and incomes.

1.4: Objectives of the study

1) Formulate and estimate a model of investment determination for the manufacturing informal subsector;

2) Assist planners, academicians and other interested bodies with information on the informal sector's potentiality and empirical evidence on investment determinant characteristics.

3) Analyse the effect of autonomously activating the quantity and form of investments in the sector on macro economic variables such as output, employment and incomes.

1.5: Signifance of the study

The study will provide knowledge of the factors influencing investments and investment decisions in the sector. This information should enable policymakers to access the appropriateness of prevailing policies and effectiveness of recommended policies, and to formulate constructive

and appropriate new policies.

Apart from the tangible macro economic targets such as output and employment, there are other subjective issues such as Kenyanisation, reduced imports, provision of intermediate and cheaper capital goods in all sectors of the economy and lastly need for a breakthrough in the formulae, blueprint, patents and copyrights system. The study analyses the effectiveness of the sector in achieving the above mentioned attributes. It, therefore, follows that the study is important to planners policy makers and the economy as a whole. The findings of this paper shall also serve as reference material for other studies on the sector.

The study by advising policy makers on investment shall definitely help businesses achieve required quantities and quality of investment goods.

CHAPTER 2

Literature Review

Literature review will consist of theoretical and empirical literature on investment functions and literature on investments in the informal sector. Since we are determining an investment function, it is important to review past studies on investments. This we can only do effectively by reviewing literature on demand and supply functions on investment. We shall also review available literature on investments in the informal sector. This enables us to pin down the variables likely to affect investments.

2.1: Theoretical literature

This section reviews demand and supply of investment. In order that we do this effectively, we shall look at investment functions developed over the years. Our paper will review demand-for-investment functions associated with each paradigm from the classical period to the present time. The investment functions to be reviewed include: Investment functions based on Keynes period (1936), classical investment models associated with James Hicks (1950), and other classical developments associated with Koyck (1954) and Chenery (1952), and neoclassical investment models such as Lucas's liquidity theory on investment (1967). This section will also analyse supply-of-investment functions and theories, including Eisner and Strotz (1963), Foley and Sidrausky (1971), and James Tobin's (1969) analysis on the supply of investment. Literature on the supply of investment goods has had little modification ever since 1963.

Supply of investment goods was considered a function of price and real factors such as labour and capital, by classical economists in their theory of value. These ideas did not change much until recent years when economists began analysing supply of investment. It is important to note that our review does not distinguish between inventory investment and physical investment (change in capital stock). Inventory investment are investment in product stock. We are more interested in investment on capital stock other than inventories. There should be no reason for us to include inventory investment in our study. Assuming that the determinants for physical capital stock is the same as those for inventory is not necessary. The study does not distinguish between short term analysis and long term analysis. Given that our study is a short run study we assume that the short run analysis holds for the long run. Hicks, Chenery and Keyck assume an the existence of desired level of capital. We assume desired level of capital in this analysis is autonomous and is given.

2.1.1: Demand for investment

Demand-for-investment functions analyse firm demand for investment goods. Keynes (1936) developed the first demand-for-investment function through the present value criterion (PV). In the present value criterion, firms' owners are assumed to have perfect knowledge of returns to capital. Individuals are assumed to have higher preference for cash balances at the present rather than in the future. This preference is caused by the opportunity cost of holding capital reflected by the market rate of interest. The value of returns to capital in period t+n in the future is valued in the present year by discounting this value from the present year t to the year t+n by the rate of interest. The summation of all

discounted cash flows from the particular investment is the present value of capital invested. Given different investment types, an individual would choose that investment good with the highest present value. If there was no need for choice between investment goods, then an individual would invest in that investment good if the present value of its returns at the present time is greater than zero. Keynes function form was as shown below.

eq 1.2

$$I = I(r).$$

Investments = Func(interest rates)

eq 1.3

$$PV_t = -C + R + R_{t+1}/(1+R) + R_{t+2}/(1+r)^2 + \ldots\ldots + R_{t+n}/(1+r)^{t+n}$$

where C =cost of starting project or initial costs

R =rate of return to capital or market rate of interest.

A firm can rank its projects according to these present values obtained. At different market rates of interest, firms will demand different levels of investment capital.

Keynes present value criterion had its problems. Calculating or obtaining future returns for a combination of investment goods at the present period is unrealistic.

Keynes later developed the marginal efficiency of investment (M.E.I) as an alternative criterion for investment decision. The marginal efficiency of investment was similar to the present value criterion in that they both incorporated the opportunity cost of capital concept by including the market rate of interest. Marginal efficiency of capital can be defined as the

rate of interest that discounts the present value of investment to zero. When M.E.I rises investments fall, whereas when M.E.I falls, investments increase. Keynes's M.E.I approach can be written as

eq 1.4 $I = INV(r,i)$ and $dI/dr < 0$ and $dI/di < 0$

where r is the market rate of interest,

i is the marginal efficiency of capital.

The M.E.I criterion was in no way an improvement of the present value criterion. It still involved obtaining future returns and the present value concept. Calculating M.E.I for a combination of investment goods is very tedious. Keynes analysis excluded determinants of investment demand variables autonomous of interest rates such as: demand for output and entrepreneurs' preferences. Other demand functions based on factors other than interest rates developed by neoclassical economists such as the accelerator investment functions gained more recognition.

Application of Keynes model to the informal sector is highly questionable. Even in the Kenyan formal industrial sector, investment decisions are not highly responsive to interest rates changes. They are more responsive to expected profits than to interest rates.[7] It is, therefore, unlikely that informal sector investment decisions respond to interest rates. Moreover, informal sector's relation with the Kenyan banking sector is through entrepreneur savings deposits, and attempts to borrow. The aggregate of loans extended to the informal sector is limited. Entrepreneurs, particularly in less developed countries, do not respond to interest rates when making investment decisions. Keynes analysis would be far from reality if used in any less developed country as an investment determination analysis. We do not use Keynes analysis in our model.

Hicks (1950) developed the traditional fixed accelerator principle. He argue[d] that increases in the growth rate of output was needed to increase the level of investments, such that investment is constantly a function of output.

eq 1.5

$$K_t = b\ Y^t$$

$$DK_t = b\ DY_t$$

$$K_t - K_{t-1} = b\ (Y_t - Y_{t-1})$$

eq 1.6

$$I = b\ DY_t$$

where

(K_t) is capital stock at time (t),

(Y_t) is output at time (t),

(DK_t) is desired level of capital at time (t),

(K_{t-1}) is past year's level of capital,

(Y_t) is output at time t and Y_{t-1} is past year level of output,

I is the level of investment,

and (DY_t) is the desired level of output.

The accelerator principle assumed that the difference between the desired level of capital stock (K) and past period capital stock (K_{t-1}) was achieved within one time period (t). In reality this difference could be increasing as other factors increase desired level of capital, or vice versa (Hicks: 1950). This led to the development of the flexible accelerator principle or model.

In their Flexible Accelerator Model, Chenery and Koyck (1954) argued that the difference between the desired capital stock and previous year capital stock was achieved over several years and not over a single time period t. This discrepancy was catered for by introducing the lagged adjustment variable a. The symbols used above hold this model as well.

eq 1.7

$$K_t - K_{t-1} = I_t = (1-a)(K_t - K_{t-1}) = a(Y_t - Y_{t-1})$$

The major disadvantage of the lagged adjustment (a) was that it had no basis in economic theory, it was fully a mathematical variable. This led to the introduction of the user's cost concept. The accelerator principles are more applicable to the informal sector than Keynes' functions. It does not involve interest rates, secondly output is an important variable in investment determination. This seems much more applicable.

Demand for investments in the informal sector could be determined by both output and desired levels of capital stock. Increased output would result in higher desired levels of capital, which would in turn result in increased investments provided the firm has adequate resources to finance the required investments. Problems of measuring desired level of capital can be overcome and a model developed that incorporates these variables. We shall say more of this is our model specification in chapter 3.

Lucas jr (1967) introduced the user's cost concept into the demand-for-investment function. He identified both external and internal costs of using capital. External costs arise from the interest rates opportunity costs, and price changes. The prices of investment goods can rise or fall with time depending on whether the external or internal costs rise or fall.

eq 1.9

$$dpi/dt < 0 \quad \text{or} \quad dpi/dt > 0$$

Internal costs increase users' cost through depreciation and adjustment costs. Depreciation costs (s) arise from the physical depreciation of the capital good. Adjustment costs increase as investments increase. They reduce marginal productivity in the short run after an increase in investments. Examples of adjustment costs are managerial adjustments, training costs, and administrative changes. Some characteristics of adjustment costs include :-

If C(I) = Adjustment Costs

then $C(I) > 0$, $C'(I) > 0$, $C''(I) > 0$ and $C(0) = 0$

The equations above represents the characteristics of adjustment costs. Adjustment costs are always greater than zero, increasing investments increases adjustment costs at an increasing rate and given no investment, adjustment costs equals zero. If we assume that investors do not analyse the changes in the prices of investment goods then dpi/dt = 0, since changes in the market price of investment goods shall not determine his demand for investment goods. The user cost function can now be written as below.

eq 2.0

$$C = (r + s)*Pi$$ In the event that investors do recognise changes in prices, then the users cost function becomes as below.

eq 2.1

$$C = (r + s)*pi - dPi/dt.$$

We can now rewrite the investment function as below

eq 2.2

$$I = I(Y,C,P) + sK.$$

Where I is investment,

Y is output,

C is the user's cost,

P is the price of the investment good,

s is the depreciation adjustment factor,

K is the total capital stock,

and sK is the total value on depreciation.

Lucas jr's adjustment cost analysis was more realistic than Keynes' analysis. Though Lucas's analysis included interest rates, he incorporated other factors such as price of investment goods, depreciation, and output which were more realistic as investment determinants. We cannot, however, include depreciation and users cost of capital used in this model into our informal sector model, for the reasons below. The informal sector is more responsive to changes in collateral security rather than interest changes *per se*. We will not therefore, include interest rates in our model. Measuring depreciation for informal sector investment goods in our study is not possible due to lack of resources and time.

The liquidity theory on investment developed by Tobin is one of the latest theories on investment. Tobin argues that the only bottleneck to investment is the supply of funds, such that the supply of investment schedule becomes very steep at the level of investment that exhausts the

supply of internal funds. The investment function can hence be written as shown below .

eq 2.3

$$K_t = e^{Lt}$$

where K_t is the desired capital stock at time t,

L is the liquidity position of the firm.

Measuring firm liquidity for the informal sector is difficult. The concept of firm liquidity used here does not only incorporate the firm's net worth only, which if given formal sector firms and a well developed monetary system can be estimated, but also incorporates how fast the firm in question can change its physical assets to cash. We therefore shall not include firm liquidity.

2.1.2: Supply of investment

Less has been written on the supply of investment than on the demand theory. Most work was done by Hugh Rose (1966) then developed by Eisner and Strotz(1973). We cannot segregate these two pieces of work, since Rose wrote on the supply of investment as part of unemployment. It was Eisner and Strotz who developed it to a full determinants-of-investment-supply study. Keynes only mentioned that the supply of investment was a function of its price.

Hugh Rose (1966) assumed a two-good economy producing investment and consumption goods. Due to fixed amounts of resources, these two goods are produced at increasing costs giving a concave production possibility frontier. Investment goods are assumed to be produced by labour-intensive methods and consumption goods by capital-intensive methods of production.

Constant returns to scale exist in production of both types of goods. Given the above assumptions, a contract curve can be obtained showing Pareto optimal production points of the two goods. The slope at this Pareto optimal point is given by -r/w where w is the cost of labour, and r, the cost of capital. The assumption of constant returns to scale enables us to say that there exists a one-to-one relation between relative prices of goods produced and factors of production. Investment supply, therefore, depends on the relative prices of capital and consumer goods Pk/Pc. The equilibrium level of capital or investment and consumption goods produced equals the relative prices of prices of factors of production.i.e

eq 2.4

$$Pi/Pc = w/r$$

If $I/K = I(Pi/Pc)$

and $I/K = I(w/r)$

then using Pc as a numeraire i.e Pc=1

implies

eq 2.6

$$I/K = I(r,x)$$

and $DI/Dr < 0$ and $DI/Dx > 0$.

Where I is investment,

I/K is ratio of investment to capital stock,

K is capital stock,

x is labour capital ratios.

r is interest rates,

Pi is price of investment goods,

and Pc is the price of consumption goods.

Eisner and Strotz used the ratio of investment goods to total capital stock, so as to cater for the differences in size and type of firms reflected in the total capital stock (K). K, therefore, only acts as a standardizing variable. We will, therefore, like Eisner and Strotz still refer to I/K as investment in Hugh's work. Given that the supply of investment goods is at the point where relative prices of consumption goods and investment goods equals the relative prices of factors of production, it follows that investment are a function of: prices of consumption goods and investment goods, and the prices of factors of production represented by equations 2.4. Since our interest is investment goods supply and not consumption goods we use consumption goods as the numeraire $Pc \equiv 1$. If we know Pi we know w and r since $r/w = Pi/Pc$. If, therefore, investment is a function of Pi, then investment is a function of r/w. r/w is directly determined by x capital labour ratios. Investment is a function of both interest rates and capital labour ratios.

The sign of relationships above are based on Stolper Samuelson theorem, which states that: an increase in the price (Pi) of one good (I) and the price (Pc) of the other good (C), in the industry, remains constant, will increase rewards to the factor (w) used more extensively in the production of the good(I), and reduce the returns of the other factor of production (r) used in the production of good(C). Hence $DI/Dr < 0$, i.e as the cost of capital (r) rise, the supply of investment goods falls and vice-versa. An increase in the price of investment good also reflected in the cost of capital r, reduces rewards to capital, hence causing a real fall in the supply of capital goods. $DI/Dx > 0$ is based on Rybcyzynski theorem, which states an increase in one factor (L) while the other factor (K)

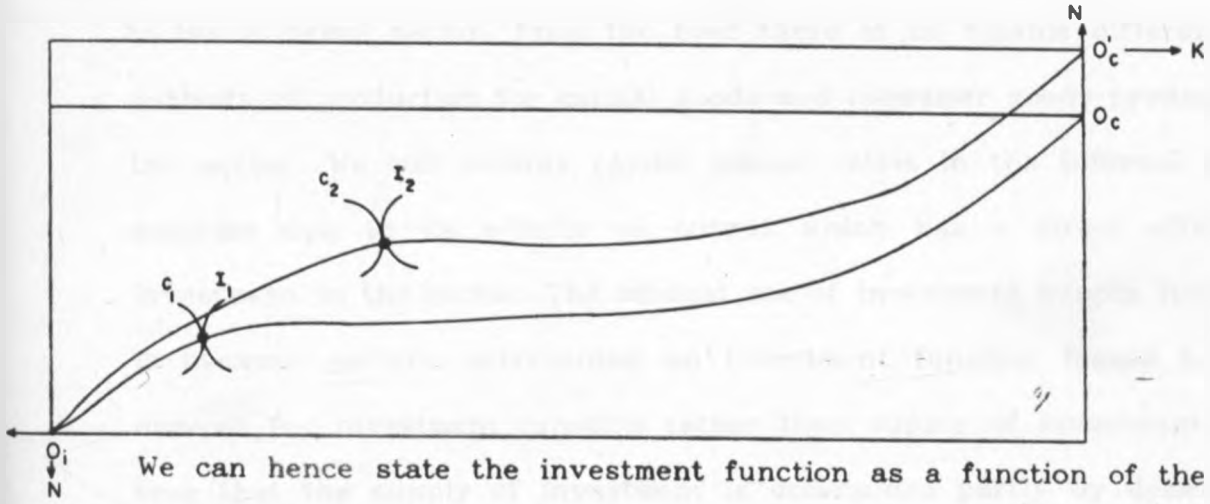
remains a constant, hence changing capital labour ratios, will increase the output of that industry which uses the increased factor more extensively. Increasing labour capital ratio's increases supply of investment goods. Whereas reducing labour capital ratios increases the supply of consumption goods but reduces the supply of investment goods.

Rose's work assumed the functioning of Rybzynsky and Stolper-Samuelson theories. It was Eisner and Strotz who clarified the actual process of occurrence through the contract-curve analysis. Their assumptions were not much different from Hugh Roses assumptions.

Eisner and Strotz (1973) also assumed: a two good economy producing investment and capital goods, investment goods were produced by labour intensive methods and consumer goods by capital intensive methods of production, thus the L/K ratio for investment goods is greater than the L/K ratio for consumer goods, and lastly constant returns to scale. From the constant to returns to scale assumption it follows that there will be a one-to-one relation between factor prices and prices of goods produced. If the economy's labour force increases while capital stock remains a constant, the relative prices of factors remains a constant since factor prices do not depend on factor supplies. This is consistent with the factor equalization theorem which states that if factor supplies does not affect factor prices then factor prices depend on factor intensities required for production. Investment goods production will then increase, whereas that of consumption goods fall. Given the contract curve, in figure 2, that shows tangency points of isoquants for investment and consumption goods represented by I/K and C/K respectively, an increase in labour,

represented by the upward extension of the edgeworth box, results in an increase in supply of investment goods, from I1 to I2 whereas that of consumption goods falls from C1 to C2. This is consistent with Rybzynski theorem, which states that an increase in one factor while the other factor and the prices of factors of production remain a constant will increase the output of the industry that uses more of the increased factor.

Fig 2: Figure showing effect of changes in labour on the supply of investment.



We can hence state the investment function as a function of the capital labour ratios.

eq 2.7

If Xi = (L/K)

then I = I(X) and DI/DX > 0

Where Xi is labour capital ratios,

I is investment,

L is labour,

and K is capital stock.

The supply of investment function is hence a function of capital labour ratios. For each different capital labour ratio we have different

supply curve given the market price of capital. Assuming that capital goods and bonds are close substitutes, then the market rate of interest (r) is representative of the cost of capital. Using w the wage rate as a numeraire once more investment are a function of both interest rates and capital labour ratios. The use of supply of investment functions in our informal sector model is questionable, mainly due to the underlying assumptions in the model. The assumption of the cost of factors not being a function of factor supplies is too strong. Factor prices such as price of unskilled labour, depending on supply of labour is comparatively more realistic. The other assumption of production of capital goods is manufactured by labour-intensive methods of production need not apply to the informal sector. From the field there is no notable difference in methods of production for capital goods and consumer goods produced in the sector. We will include capital labour ratios in the informal sector analysis due to its effects on output which has a direct effect on investment in the sector. The minimal use of investment supply functions is because we are determining an investment function biased towards demand for investment function rather than supply of investment. It is true that the supply of investment is determined partly by demand for investment. This occurs through price of investment goods. The informal sector consists of firms with low net worth compared to the formal sector. The firm entrepreneurs will therefore bias their choice of investment goods towards cheaper investment goods. The effect of price changes would be more of an inflationary effect which we cannot capture in our model as it analyses crossectional data. They therefore do not have a choice on the prices of these investment machines. The price variable in our crossectional

data would be a constant and there are no price effects. Hence attempting to capture supply effects through regressing the price variable, though logical, would not be helpful. Conceptually, therefore, incorporation of determinants of investment supply variables is more due to the relation between the variables and demand for investment than to effects on supply of investment. We, therefore, assume that the supply of investment goods is fixed in our model.

We shall look at a demand for investment function that assumes fixed supply of capital and see how this would relate to our study. This approach is referred to as the static approach. The static approach is associated with Foley and Sidrausky (1971) The static approach assumes that the demand for the stock of capital which is a decreasing function of both relative prices and the interest rate.

eq 2.8

$$D^i = D_k (r, Pi/Pc).$$

Since in a static model, the supply of capital is fixed, at K_t at any point in time the price of capital is determined instantaneously. An increase in the capital labour ratio shifts the production possibility frontier to the right as in Rybczinky theorem which has an effect of shifting the supply curve to the right. The interaction of the supply curves and the demand curves shows the equilibrium levels of investments supplied to the economy. The general supply-of-investment function is hence a function of the market rate of interest and capital labour ratios.

$$I = I(r,X).$$

Foley and Sidrausky assumed uncertainty, making demand for investment

a function of desired portfolio term. Portfolio desire was determined by relative rates of return. Both capital and bonds are held due to differential liquidity characteristics of risk aversion. The above model is appropriate to the analysis of informal sector's investment demand, because entrepreneur choice of investment is insensitive to interest rates. Secondly, capital labour ratios only affect the supply of investment and not the demand for investment goods. An investment function determining how investments are demanded in the informal sector is more of a demand for investment function. Capital labour ratios would be a stronger argument in a supply-for-investment function.

James Tobin (1969) in his"q" theory argued that investment was a function of a ratio of two valuations of capital "q".

eq 2.9a

$$\text{"q"} = \frac{\text{equity value of capital}}{\text{replacement cost of the physical capital}}$$

The higher the equity of the physical capital compared to its replacement cost, the greater the incentive to invest in physical capital. The lower the valuation of capital in the stock market as compared to its replacement cost, the greater the incentive to invest in already installed capital rather than undertake new installations.

eq 2.9b

$q = rp/r_t$ = expected rate of profit/rate of return of capital in stock market.

eq 3.0

hence $I = q(r_p, x, r_t)$

where $dI/dr_p > 0$ $dI/dx > 0$ and $dI/dr_t \gtrless 0$,

where r_t is rate of capital in stock market,

r_p is the expected rate of profit,

and x is capital labour ratios.

Tobin's "q" theory is applicable in highly developed money markets and where full knowledge of goods market exists. This is far from true for Kenya's informal sector. We can only hope that with time such variables such as expected rate of profit, and rate of return of capital in stock market can be included.

2.2: Empirical literature

Empirical literature on the performance of the above investment functions is then given, for Hicks, Lucas, Keyck and Chenery investment functions on the demand side. On the supply side, only Tobin's theories are empirically tested. There exists no empirical literature on investment functions for the informal sector, we shall therefore only review literature on manufacturing and investment in the sector without giving any empirical results.

J. Dale and Siebert (1963) tested the performance of four basic investment models. They derived and estimated four main investment models using General Motors Corporation data for the period 1943-63.

2.2.1: The simple accelerator theory

$$It = .20 + .07(Y_t - Y_{t-1}) + .42(I_{t-1} - sK_{t-1}) + .19K_{t-1}$$

$$R^2 = .62 \quad S.E = 0.19 \quad D.W = 2.21$$

Investment is a function of output, past levels of output, past investment levels, and past levels of capital stock. Investment is a function of differences in output, depreciation in already acquired capital goods, and past levels of capital stock. This model is a modified version of the simple accelerator theory, Dale and Siebert added past levels of capital stock in their model which is not included in the original simple accelerator model. Investment showed a significant positive relation to both the lagged variables, i.e both desired level of capital and lagged net investment.

2.2.2: Estimations for the liquidity theory

The other investment function tested by Dale and Siebert was Tobin's liquidity theorem. Investments was considered a function of firm liquidity. The variables used are past levels of liquidity, present level of firm liquidity and past levels of capital stock. L is the measure of the liquidity position of the firm and K the level of capital stock.

$$It = 0.23 + 0.30(Lt - Lt-1) + 0.49\ (Lt-1) + 0.40(Lt-1 - sKt-2) + 0.17Kt-1$$

$$R^2 = 0.61 \qquad S.E = 0.30 \quad D.W = 2.29$$

Investment is positively related to current and lagged changes in desired level of capital and to lagged net investment; L in this case was used as a proxy for desired level of capital. We note that the simple accelerator model performs much better than the liquidity model for time series data on the motor industry.

2.2.3: Estimations with expected rate of profits as a proxy for desired level of capital

A modified version of Tobin's "q"theory model was estimated. It incorporates both interest rates and expected rate of profits. The major differences with Tobin's model is that it does not incorporate preaent and past levels of capital stock. Expected profits were measured by the market value (mv) of the firm. When expected profits of a firm are high the firm is expected to have a higher market value presently.

$$It = 0.28 + 0.09(MV_t - MV_{t-1}) + 0.06(MV_{t-1} - MV_{t-2}) + 0.15K_{t-1}$$

$$R^2 = 0.64 \qquad S.E = 0.19 \quad D.W = 0.36$$

Investment at time t is a function of changes in the firm's market value and past levels of capital stock. Market value is a proxy measuring

expected rate of profits. A firm with high expected rates of profits, will have higher market value. The model lags this value over two past periods, and regresses them to investments.

2.2.4: Estimations for the neoclassical model:

The neoclassical model incorporates the adjustment cost approach into the liquidity model. The liquidity model was a function of depreciation interest rates, and inflationary effects on already purchased capital. Assuming that investors do not realise the effects of inflation on already purchased capital or investment, conditions for profit maximization are that marginal productivity of capital should equal the adjustment costs. Marginal productivity of capital is given as e.

eq 3.1 $NC = (P_t * Y_t)/e$

Desired level of capital is hence the level of capital stock that the above conditions will hold.

eq 3.2 $Kt^* = (Y_t * P_t)/e$

We can hence use NC as our desired level of capital our results are

$$I = 0.24 + \underset{(0.01)}{0.32(NCt - NCt-1)} + \underset{(0.01)}{0.02(NCt-1 - NCt-2)}$$

$$+\underset{(0.21)}{0.34(It-1 - Kt-2)} + \underset{(0.21)}{0.18Kt-1}$$

$R^2 = 0.70$ S.E $= 0.18$ D.W $= 2.03$

In this approach with NC as a proxy for desired level of capital the desired level of capital were insignificant, whereas past levels of investment and past levels of capital stock was significant. Investment hence occurred more as a result of past experiences on investments rather than due to liquidity factors and derived desired level of capital. The

neoclassical approach presents a more powerful estimate of investment functions in comparison to the liquidity and accelerator approaches determination of demand functions.

2.2.5: D U Sastry's empirical work

Sastry did cross-sectional analysis on eight firms in India, testing the flexible accelerator and liquidity models.

Model 1

$$It = 0.1439 + 0.0004\ dS(t)/K_{t-1} + 0.8318\ drent_t/K_{t-1} + 0.0655\ ddet(t)/Kt\text{-}1$$

(17.302) (-0.36) (8.247) (4.6300) $[R^2=0.135]$

$$I(t) = 0.1852 + 1.0102\ dS(t)/NW_{t-1} + 0.07208\ drent_t/NW_{t-1} + 0.085\ dDET_t/NW_{t-1}$$

(14.741) (0.2152) (10.2947) (4.8853) $[R^2=0.285]$

Where dI_t = change in investments at time t

I_t = gross investments at time t

dS_t= change in sales

$drent_t$ = change in gross retained earnings at time net of taxes but gross of depreciation

ddet = change in the stock of net debt where net debt is the total liabilities at the end of the period.

NW_{t-1} = net worth at the end of the past period

The explanatory power of the fixed accelerator approach was much less than that of liquidity approach with net debt of the firm as a proxy for firm liquidity. This is consistent with Jorgensen and Dale's analysis in the past pages. Net worth and past levels of capital stock were used as

correction factors, to cater for difference in firm sizes. The significant variables in the flexible accelerator equation was output gross income net of taxes and depreciation. For the liquidity or the monetarists approach Sastry's model, showed no significance in the liquidity proxy. From all the above tested variables, firm incomes, profits, previous experiences in investment, and capital stock remained the most significant variables.

2.3: Literature on investments in the informal sector

There is very little literature on investments and investment decisions on the informal sector. We will, therefore, analyse possible entrepreneur behaviour and factors that possibly determine investment decisions.

To better understand the decision to invest, we need to examine the different types of entrepreneurs in the sector. According to Rempel (1974: pp.2), there are those entrepreneurs who have made a conscious decision to invest and have rejected wage labour, and those who temporarily eke out a living without having fully rejected wage labour. Those entrepreneurs who have rejected wage labour, are possibly those previously in wage employment either in the informal or formal sector, determined to make an independant living. They aim at increasing their incomes, hence expanding their firms, through investmenents. On the other hand, those who temporarily eke out a living are not determined to increase firm incomes or expand their firms. They have little faith in their businesses, and constantly hope to obtain some formal wage employment. They do not, therefore, invest. These two groups are found side by side within the informal sector. Rempel, however, did not consider changing

attitudes. Just like subsistence farmers through extension services and other incentives can be made to change to commercial farmers, so can those entrepreneurs who temporarily eke out a living be transformed to the fulltime risk taking entrepreneurs by extension services and training clinics. For this reason, we will not segregate these two groups.

The theory of investments in the informal sector need not differ from normal macro and micro theory presently available. The factors that determine investments in the formal sector should be the very ones that determine investments in the informal sector. The sector is definitely monetised and entrepreneurs at all levels make conscious investment decisions. Theory suggests that decision to invest is determined by the differences between potential and real output. This difference could either be quantitative or qualitative, as reflected in the market value of the product. It is this difference that determines a firms desired level of capital. The section below attempts to clarify a firm's desired level of capital in the informal sector.

There exists a desired level of capital for each firm in the sector (K^*) which could include all rental capital and all that capital used in stages of production undertaken outside the firm. There is evidence that there exist stages of production that are not undertaken within the firms. Some of these such as precision glass cutting, are undertaken in formal sector firms; others like woodcarving are undertaken within the informal sector itself.

We could argue that two types of capital mentioned above cannot be regarded as desired level of capital since the firms enjoy economies of scale by sharing equipment, and that it would be cheaper for individual

firms to pay for certain stages of production to be done externally.

We should, however, note that informal sector firms use labour-intensive technology, and the economies of scale that the firms would enjoy due to individual owning of capital-intensive machinery would be limited. From the field it was noted that firms owning and renting capital do not necessarily have extra capital. They only lend them out when producing at under capacity. There are no firms specialized in renting capital. The firms using labour intensive rental capital would be faced by diminishing marginal productivity particularly if demand for output increases above normal levels, and firms respond to the increased need for labour. This results in diminishing marginal productivity as labour is increased, and supply of capital is strained by renting. Even if output does not increase, rental capital of the above described form would reduce labour marginal productivity in both the firms involved in the renting. This is due to high machinery depreciation for the firm lending out the machine, and production hours wasted due to time lags between when machinery is available and when needed, for the firm borrowing the machine. Hiring of capital is hence a sign of greater desired levels of capital to actual capital or the need for investments. These firms by expanding would increase economies of scale. Expansion takes the form of increasing labour or capital. Firms involved in renting would unconsciously increase labour and rely on rental capital, thereby causing diminishing productivity.

Some firms do own and rent out capital intensive capital. For these firms, renting out of services is profitable. Those using their capital would not necessarily face diminishing productivity. Their decisions to invest will depend on the costs of hiring capital services versus costs of owning the

capital. It is more of the entrepreneurs' choice as to whether to install or use external rental capital. His choice between use of external capital in stages of production requiring capital intensive methods of production and owning the capital internally in the firm is determined by demand for his produce, costs of using rental capital per unit of production versus costs of acquiring capital. The foregoing discussion correctly assumes that individual entrepreneurs would know their desired levels of capital, and such information can be obtained from them directly. Entrepreneur choice of investments is determined by his desired level of capital.

There are several factors that determine desired level of capital, such as consumer demand for firm output versus the firm's production capacity, depreciation, and the cost versus returns to owning an investment good. K^* from theory is accepted as a determinant of investment by both classical and neo-classical economists. Any policies to increase investment must be achieved by altering entrepreneur's desired level of capital.

Several informal sector studies stress the need for improved informal sector financing. By implication they accept the existence of a desired level of capital. The following analysis will, therefore, include data on desired levels of capital. They imply that informal sector entrepreneurs cannot finance investments with their earnings from their respective firms. Credit is needed to finance the difference between actual savings and desired level of savings. We should look at how the informal sector finances its investments. The rural informal sector finances most of its investments from agricultural incomes (Ng'ethe N, Wahome J and Ndua G: 1987 pp.75). The case could hold for the urban informal sector.

House (1976) argued that incomes generated by the sector were high enough, thus a great majority of firms managed through their own initiative to increase business investments. Accepted sources of financing investments by most papers in the informal sector are: a) financing from profits, b) financing from agricultural profits, c) gifts and loans from spouses and relatives d) to a limited level loans from agencies.

Profits and savings have been accepted as the main source of financing business investments. Table 1 shows firm incomes vis a vis capital invested .

Table 1: (1978) Distribution of Investments and Incomes for the Manufacturing sub-sector

Kshs of	% Distribution ofKshs Capital Invested	Kshs	% Distribution Monthly Income
0 - 1,000	20.7	0-1,000	57.6
1001- 6,000	51.6	1,001-6,000	31.6
6,001-15,000	16.2	6,001-15,000	10.8
15,001-40,000	9.9	15,001-40,000	0.0
40,001-100,000	1.1	40,000-100,000	0.0
TOTAL	99.5%		100.0%

Source: House .J; (1978)," A Reservoir of Dynamic Entrepreneurs or a Residual Pool of Surplus Labour", IDS, UON, Working Paper No 347, pp.20 and pp.17.

Credit facilities are presently availed by ILO/UNHCR, JLB Joint Loan Bank (KIE) Kenya Industrial Estates, Small Enterprises Finance Company (SEFCO), and Friedreich Ebert Foundation (FEF). Most of these credit bodies require collateral security that the entrepreneurs do not have. *Jua Kali* artisans have begun regional based offices that act like co-operatives to provide collateral security.

Investments could be affected by level of training. Nature and the level of training is reviewed generously in articles on the informal sector.

Several articles include training as a major argument in almost all informal sector forums. Its effect in investment is still unknown. Experience tells us that training gives exposure to the particular worker or stuuent in using capital equipment in production. These trained workers hence vie for the same equipment they were trained with. Training, can, therefore, affect investment through K^* the level of desired capital.

Other factors that informal sector forums have included as determinants of investments are profits, income, market size, capital availability output and at the same time analysed the impact of investments in the informal sector.

In the section below we shall review the importance of investments on macro economic variables in the economy as conveyed by other authors writing on the informal sector. In the background we divided investments into initial investment, capital formation, and overhead investment. Initial investment causes horizontal expansion of the sector whereas capital formation causes vertical expansion of the sector. Overhead investment refer to both infrastructural development and nonphysical investment such as the training of entrepreneurs, labour etc. Each one was then defined. It is important to note overhead investment causes both a vertical and horizontal growth of the sector. Vertical expansion of the sector refers to quality improvement and diversification of output, improved skills of entrepreneurs and labourers in the sector, and an enlarged technological base. Horizontal expansion refers to increased quantity in output labour and entrepreneurship. Overhead investment will reduce government harassment and individual sceptism about investments. Individuals reluctant

to invest due to constant harassment would invest hence increasing output in the sector. On the other hand potential entrepreneurs discouraged by infrastructural bottlenecks would join the sector.

We shall now look at the employment potential of the sector. Table 2 below shows the employment potential of the informal sector for Siaya, Nyeri, Meru and Uasin Gishu.

Table 2

No of people engaged by type of activity

Type of activity	No of people employed	No of enterprises	Average per activity
Manufacturing	157	97	1.6
Trade	484	286	1.7
Servicing	142	69	2.7
Total	783	452	1.7

Source: Ngethe N, Wahome J, and Ndua G; (1984)," The Rural Informal Sector in Kenya: Report of a Survey in Nyeri, Meru, Uasin Gishu and Siaya Districts", IDS, UON. Consultancy Report no 16, pp.35.

The average number of people employed per firm was 1.7 for the rural informal sector, with trade and services relatively higher than manufacturing. Ng'ethe, Wahome and Ndua (1984) argue that to increase employment opportunities through the informal sector, there is need for horizontal proliferation of the sector rather than vertical expansion. They imply that initial investment and not capital formation should be used as a policy tool to increase employment. If capital formation can cause employment, then a double strategy should be used.

What should worry us is whether increased capital formation would result in reduced labour, i.e would increased capital formation result in factor

substitution in favour of capital or labour? The other consideration for contemplation is the stability of the employment so formed by the two growth types. Between horizontal expansion and vertical expansion, which of the two would cause sustained employment as opposed to temporary employment?

We look at the first consideration on the effects of capital formation. Presently it is generally agreed that the informal sector is labour intensive. The cost of capital in the present economy is high, and informal sector entrepreneurs face a bottleneck when trying to import capital. They are often forced to obtain it from the formal sector at high costs. As a result, entrepreneurs faced with options of factor substitution frequently choose labour in preference to capital. What we are insinuating is entrepreneurs invest only if there is derived demand of investment generated by increase in demand for output. If demand for output is a constant it is unlikely that investment would occur. This belief is not binding, we shall analyse investment decisions in detail in the following chapters.

The next consideration was the establishing sustained employment. We can not ascertain the sector's ability to create sustained employment in this paper we shall leave this to further research.

The importance of capital formation in the sector entails: improved quality of products, increased speed in production, ensuring all stages of production are undertaken internally hence reducing production costs and to a macro level to diversify production in the sector. Capital formation is thus a necessary condition for the formation of a self sustaining industrial base. One danger that excessive capital formation would cause is the spare

acquisition dilemma. Presently the profits of firms in the sector does not depend on spare acquisition and availability. This would however not arise if th informal sector starts production of its own capital goods. Importation of spares to maintain high technology imported consumer and capital goods and importation of intermediate goods, and increase value added of goods produced locally persist as formal sector industrial characteristics. Several firms are engaged in customer servicing, or simply importing and servicing of equipment in the formal sector. It hence follows that profits depend greatly on spare acquisition in the formal sector. This mode of operation can only be solved if the particular consumer and capital goods are manufactured locally, or the local content of product production is increased. The same would apply for the informal sector if excessive capital formation occurs. There is need for a check on capital formation levels to remain within required levels.

Most studies on the informal sector have analysed the effectiveness of the ILO recommendations. They have concentrated on analysing the development potential of the sector. Econometric papers have analyzed how policies on training and education would affect output and employment. Non econometric studies give detailed descriptive analyses on the employment potential of the sector. Others have concentrated on the sector in general, others on the effects of present municipal and government laws on the sector's development. In general these papers agree in principal that the sector's growth potential is positive. Investments have only been a topic in passing in all these papers. This study hopes to develop an investment function for the sector.

2.4: Conclusions to literature review

Theoretical literature on investment suggests that investment is a function of: interest rates, incomes, desired level of capital stock, adjustment costs, liquidity position of the firm, capital-labour ratios, and expected rate of profits.

Interest rates are both the opportunity cost of capital and the cost of producing investment goods. Assuming desired level of capital K^* is set by potential output, investments would be determined by the difference between desired levels of capital and actual levels of capital K. Realised level of output is a function of realised levels of capital stock. It follows that investment is a function of output. Adjustment costs have a negative impact on investments. They are the costs of installing and acquiring capital. The liquidity position of the firm determines the firm's ability to acquire credit. The capital-labour ratio determines the supply of investment. The expected rate of profit from the given investment is positively related to investments. Note the investor invests if and only if expected rate of profits is greater than zero. We can summarise determinants of investment from informal sector literature as profits, incomes, credit availability, and output. We shall incorporate these variables into our model, and hope to obtain a representative investment function. Our inability to collect data prohibits us from including the liquidity position of the firm, as a determinant of investment. Interest rates are also excluded, partly because for the two year period of our study they are are fairly constant. The Kenyan monetary market is still relatively undeveloped, and entrepreneurs do not react to changes in interest rates. Including interest rates would be unrealistic.

The variables considered in our model as direct determinants of investments are output, income, training, savings, credit, and type of firm. Since some of these variables such as output and income are not autonomous to the model, we shall incorporate subsidiary equations to estimate these variables.

CHAPTER 3

Methodology

This section describes: the field, products produced by firms in the study, data collection methodology, data variables, the model generated, and estimation methodology.

3.1: Field survey

The study analyses only the manufacturing subsector. This choice was made due to the growth potentiality of the manufacturing sector as compared to other sections such as repair or maintenance and trade sectors of the informal manufacturing sector. Within the manufacturing subsector we have concentrated our analysis on metal work, woodwork and general blacksmith. I consider these the main branches of the manufacturing subsector. Unlike the other branches in the manufacturing subsector, they have the highest value added to products produced in the sector, several innovations occur in these branches which are unique from those of their counterparts in the formal sector. A survey questionnaire was used to obtain required data (see Appendix).

3.1.1: Nature of the field

Nairobi's informal sector exists in clusters in different areas of the city. This geographical distribution could be a result of the informal sector's inability to gain access to strategic areas such as the industrial area. General blacksmith institutions are found mainly in on the outskirts of residential areas, unlike metal work and woodwork firms, where they form pseudo industrial areas. Metal work and woodwork firms are found both on the outskirts and within the residential areas themselves. GBS firms cause

a lot of noise pollution from hammering and cutting of metal sheets. It could be for this reason that GBS sector firms are located on the outskirts of residential premises. Most metalwork firms a. found in market centers or in the backyard of individual residential homes. This is due to the high demand for electricity by this section of the manufacturing subsector. Capital goods in this sector are mainly electricity dependant. Location of metalwork firms is hence restricted by infrastructural factors. Larger metalwork firms are also found in the outskirts of residential areas. Woodwork firms are the most dispersed of the three sections. Smaller woodwork firms with low levels of capital stock requiring no electricity, with most machines are manually operated, are located virtually anywhere within residential areas. Larger woodwork firms are found alongside larger metalwork firms in market centers or in pseudo industrial sites alongside metal work firms. The nature of the firms does not allow them access to the city centre. For these reasons and others the branch's firms form scattered clusters in market areas, residential areas, and to the eastern outskirts of the city. Notably large clusters are found in Eastleigh/Pangani area, Gikomba/Shauri Moyo area, Kibera, Dagoretti Corner, Kawangware, Uthiru/Kangemi area, Kirinyaga road, Dandora, and Githurai areas. Smaller clusters are found in Umoja, Outer-ring, Makadara, Parklands, Embakasi, and Kayole. Other areas of the city also have much smaller clusters (See map in the next page).

For our study, crossectional data was collected from a designed questionnaire. Samples were taken from each of the clusters mentioned above. For optimal results to be obtained, the size of the sample drawn from the jth stratum should depend on the Nj (the size of the jth

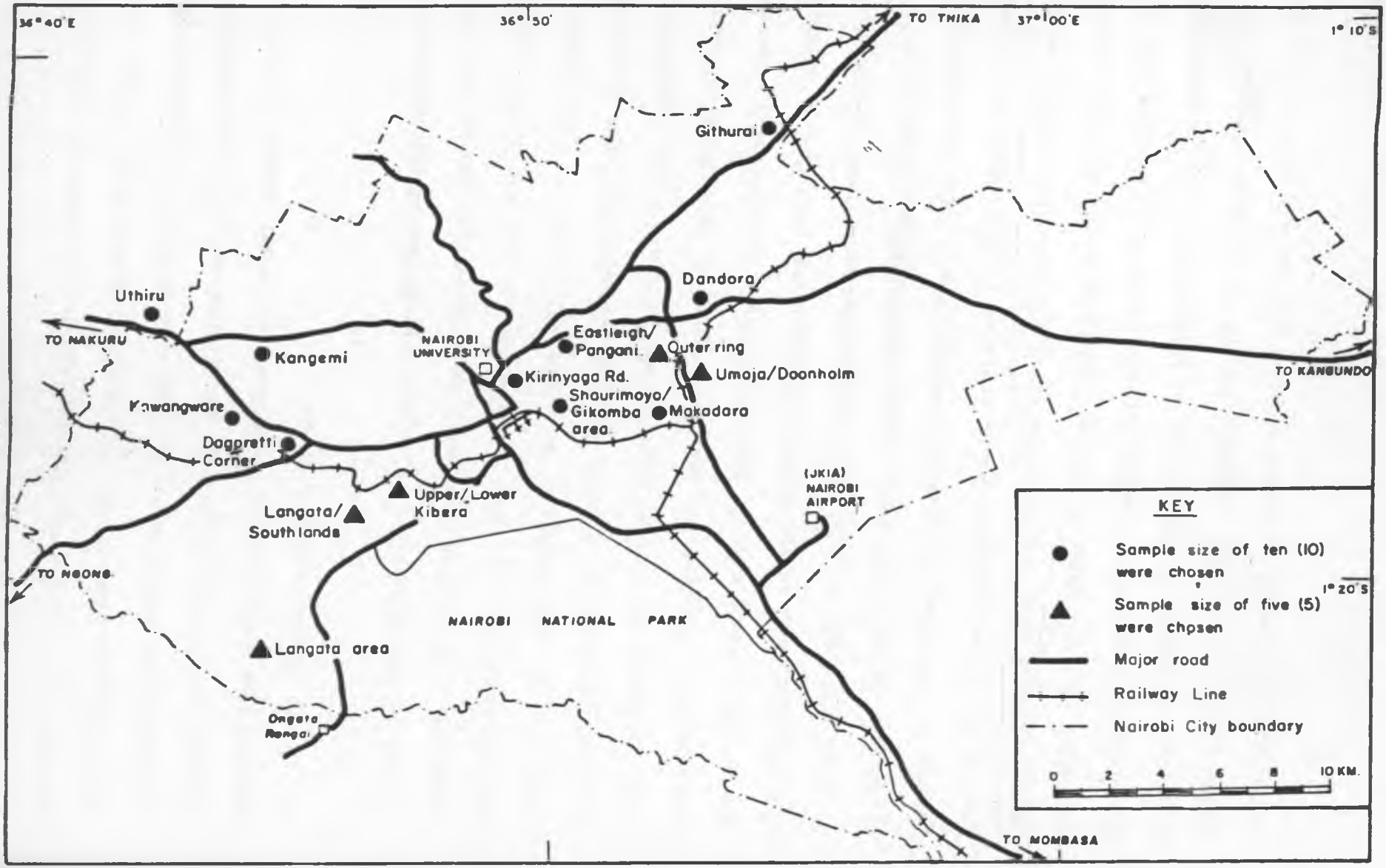


Fig 3 NAIROBI CITY: MAP SHOWING THE AREAS IN WHICH INFORMAL SECTOR FIRMS WERE INTERVIEWED

stratum). We incorporated this concept in our choice of samples. Thus larger samples were chosen from larger clusters. Some clusters in the informal sector had notably more firms than others. Since obtaining sample sizes for each of the clusters for the informal sector is quite difficult, we assumed that a choice of ten firms from each larger cluster, and five from the smaller clusters was appropriate.

Since we did not have data on the current size of the manufacturing subsector, we used House's work to estimate the current size of the informal subsector. In 1978, House estimated the size of the informal manufacturing sub-sector to be about 472 firms in total (House W, Kabagambe D, and Green T:1977). Kenya management assistance program (K-MAP) estimated the annual growth rate of the informal subsector at approximately 3.5% over the past five years. We used these estimate to predict the present size of Nairobi's informal manufacturing subsector. The population size of the Nairobi manufacturing subsector, is estimated at about 900 firms in total from House's argument. House estimated the employment levels of Nairobi's informal manufacturing subsector as 4500 persons in 1975. Then using K-MAP average growth rate, the employment level of the sector presently can be estimated at about 6500. The average employment was given at approximately 5 per firm. The estimate of the population size can hence be put at 1300 firms in the Nairobi's informal manufacturing subsector. A sample size of 120 was then obtained from the population. A sample size of 120 fits as representative of the population. Taking 1,200 as the current population size of the sector in order to obtain a representative sample, we collect a sample size equal to or more than 12%

of the population or 120 firms. Out of our sample a total of 17 firms were less than a year old. These questionnaires were eliminated from the rest as they could not provide adequate information on monthly, weekly or annual incomes estimates. The enterpreneurs in these firms could not estimate monthly, weekly, three month or annual sales. Investments consisted of meager equipment of values less than 300shs. Most machines used were borrowed or rented. It followed that neither output nor incomes could be estimated. furthermore, initial investment from current investment for these firms remains an unsolved issue. We, however, assumed that a sample size of 102 is representative of the population. Entrepreneurs co-operation with the interviewer was generally good.

3.1.2: Products

The type of firms in the manufacturing subsector can be divided into three groups. These are general blacksmith, metalwork, and woodwork. The products manufactured in general blacksmith include gutters, pails, water-tanks, jikos, wheelbarrows, chicken-feeders, etc. These products, do not need large amounts of capital as compared to the metal work products. Metal-work products include metal windows, doors, welding machines, metal furniture, car bodies, metal cutters, and lathe machines for wooden products. These products in comparison to general blacksmith products need large amounts of capital stock for production. Woodwork products are mainly household wooden produce. They include chairs, tables, sideboards, wall units, single and double beds, doors, windows, and other wooden products. Products are made from local materials, using labour-intensive methods of production.

3.2: Data and data variables

A total of 13 variables collected from the questionnaire, are used in the regression model. We shall look at how each variable is obtained in the text below. Theoretical literature noted that desired level of capital stock K^* played an important role in the demand for investment. In order to incorporate this variable, we shall use DCAP[3]. DCAP is collected directly from the questionnaire.

Level of training TRAN is measured on a scale from 0 to 6. Zero (0) represents no training, (1) represents on the job training or informal sector training, (2) represents formal sector training, (3) represents certificate trade test 3, (4) represents certificate trade test 2, (5) represents certificate trade test 1, (6) represents any higher levels of training. Formal sector training takes a higher score because the individual with formal sector training also receives on the job informal sector training.

TOP or type of firm is introduced so as to capture the heterogeneity of the sector. The study analyzes the informal manufacturing subsector, which includes woodwork, metalwork, and general blacksmiths. The variable TOP has therefore the important function of ensuring that the existing differences between these firms are captured.

[3] See page 39 DCAP or K^* or desired level of capital. We shall use the concept explained in this page when trying to capture it in our model.

KIR or capital labour ratios is be obtained by dividing the value of total capital by the number of labourers in the firms. These are obtained from table 3 and table 4 of the questionnaire.

PIFI is a ratio of formal to informal sector product prices. The denominator is obtained by summing the prices of each good produced in an informal sector firm. The numerator is obtained by summing the corresponding formal prices for each of the goods produced by the informal sector firm. Some products produced in the informal sector are sold to the formal sector. This made it easier for us to collect information on price differentials in the sector.

Income INC was obtained by subtracting total revenue from total costs. The questionnaire enables us to calculate total revenue, which could be used as a proxy for output (OUT), by giving data on amounts of each product produced, and sold together with the price at which the product was sold. Total costs are obtained from the amount of input in each product, and their respective prices. These are obtained in table 1. Costs of labour were obtained from the questionnaire from table 3. Other costs such power, water, rent and license costs are also available from the questionnaire, see questions 4.0 to 7.0. We can hence calculate firm's income net of all costs and taxes. Output OUT is obtained directly from the questionnaire, and is valued at the current market prices. Income and output are obtained over the years 1987-88.

Credit (CRED) is obtained from the questionnaire, see question 11.5. we do not include interest rates in our analysis. Exclusion of interest rates

is due to the nature of our data. In crossectional data, interest rates are about constant over the period in this case the two year period. Changes in interest rates would be a requiremen for us to use them in our regression analysis. Secondly subjective values such as how to value interest rates for an individual who has not taken any credit v/s another who has acquired credit at no cost, is another obstacle. We subtract annual cost of finance or interest rates from income figures for those entrepreneurs who are already paying back there loans.

For savings, (SAV) we use only those savings earned from business, these is the same as the value obtained from the questionnaire, see question 12.0 and 12.1. Here we should note that we require the average amount of savings an individual is willing to keep without expenditure on non firm consumption. The entrepreneurs are able to specify this amount. The amount, however, changes with time. In most cases it increases. It is, therefore, important we know if the present saving level differs from the past ones. If it does, then we use the average of the two years 1987 and 1988. 7/

Investment INV is obtained over the years 1987 and 1988 and includes all machinery bought for use in production over the two year period above. Total capital stock CAP includes all capital acquired by the firm over the entire period. We exclude capital that is out of order or not currently in use, this is because such capital is replacable. Initial level of capital (INVP) is the capital the entrepreneur had when beginning business. Labour (LAB) includes only full-time workers and those part-time workers who have worked in the firm for more than 1 year without

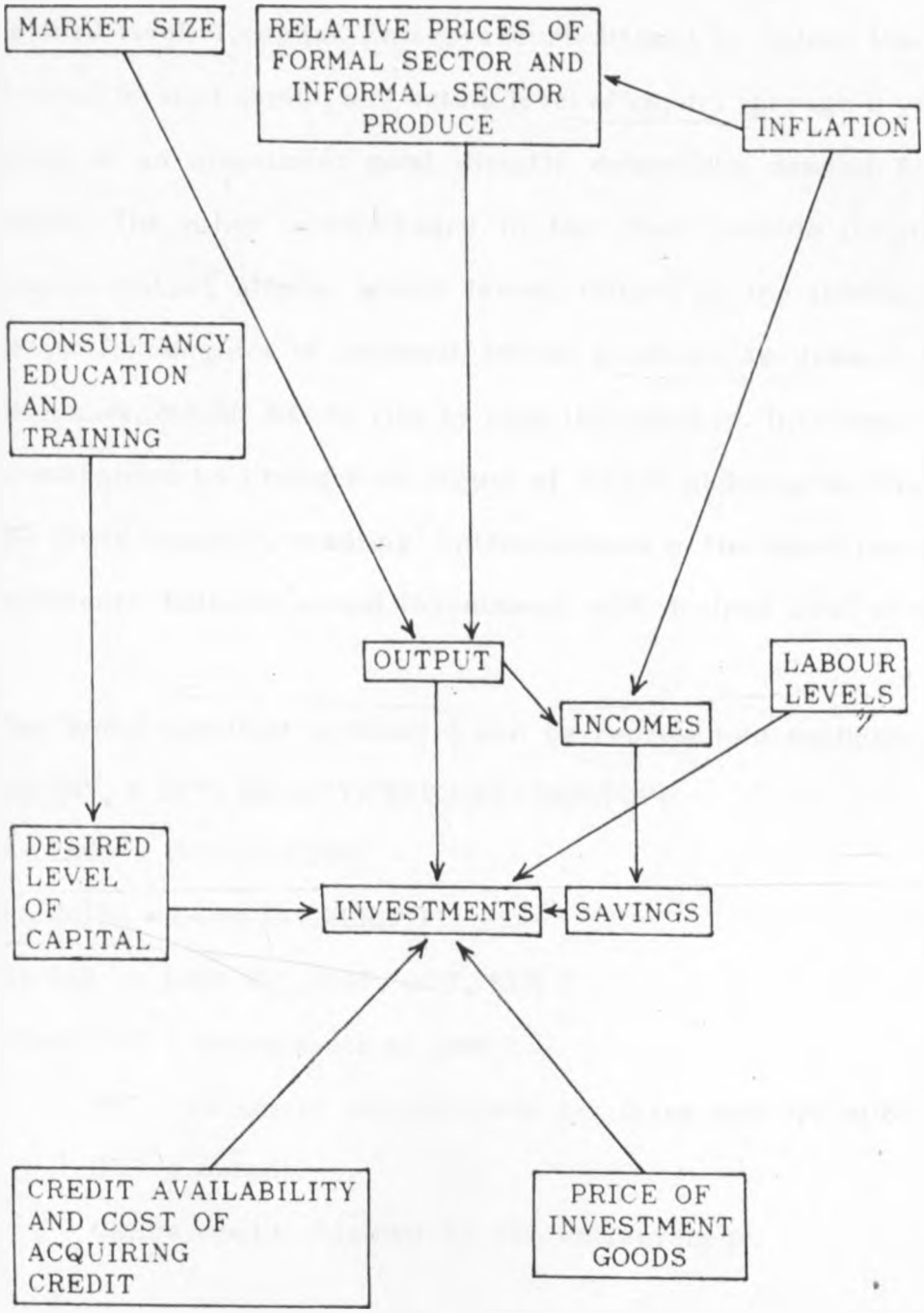
any breaks over their entire working period. Data on casual labour and family members was also be collected and are displayed in descriptive analysis in the next chapter.

3.3: The model

The interlinkages between investment and other macro economic variables are quite complex. We shall attempt to capture some of these interlinkages in a consistent set of mathematical equations. Investment, directly or indirectly, affects output. When it does not affect output directly it facilitates economic and technical efficiency, thus increasing incomes of the entrepreneurs by reducing their total costs. This, however, assumes that entrepreneurs are rational beings and will not invest if the investments would result in adjustment costs exceeding the gains from the investment. The entrepreneurs should, therefore, have some knowledge of investment goods they choose. Investment also increases incomes through output. This can only occur if the market for the output in question is not exhausted. It is, however, important to note that the profit from a given investment good can either be positive or negative in the long run, depending on whether the good requires constant spare change of nondurable parts. The effects of investment on employment can also be negative or positive. Investment would definitely result in an indirect increase in employment only if the market for output is not exhausted and the firm is operating at full capacity. If the assumption of full capacity does not hold, then investment would result in factor substitution at the expense of labour.

The model specified in figure 4 below can be modelled mathematically as in the page after the following one.

Fig 4: Interlinkages between Investments and Other Macro Economic Variables



Relative prices of formal sector prices to informal sector prices affects investments through output. The ratio affects demand for informal sector produce, this is then reflected in the supply of output. Output affects incomes directly. Incomes determine savings and savings determine investments.

Consultancy, training, and education affect investments through desired level of capital. Entrepreneurs attempt to reduce the gap between desired level of capital and actual level of capital through investments. The price of an investment good directly determines demand for investment goods. The other interlinkages in the chart include output effects on labour. Output affects labour levels. Output in the informal sector is a proxy for demand of informal sector produce. As demand for products increases, output has to rise to meet this demand. Increases in output are accompanied by changes in inputs of labour and capital. Credit increases the firms liquidity, enabling entrepreneurs in the short run to cut off the difference between actual investments and desired level of investment.

The model specified in chart 3 can be represented mathematically as:

3.3 INV_t = INV(INC,OUT,CRED,SAV,TRAN,TOP) ·

3.4 INC = INC(OUT,INV)

3.5 OUT = OUT(INV,KLR,PIFI)

3.6 LAB = LAB(INV, CAP, OUT, KLR)

Where INV = investments at time t

INC = income of entrepreneur net taxes and operation expenses.

OUT = output,

CRED= credit obtained by the entrepreneur.

SAV = savings

TRAN= training

TOP = type of firm

PIFI= ratio of formal sector prices to informal sector prices.

KLR = capital labour ratios

CAP = total levels of capital stock.

LAB = number of labourers per firm.

INVP= initial level of investment.

DCAP= desired level of capital.

The main equation on the model is the investment equation. Investment is a function of income, output, credit, savings, training, and type of firm. The above function is consistent with the determinants of investments mentioned in our literature review. Some variables within our investment equation are determined by investment itself and other variables. We, therefore, cannot estimate equation 3.3 as it is. We proceed to explain these equations. Income, is determined by output, and investments. Output is determined by investments, ratio of formal and informal sector prices, capital labour ratios. In our objectives of our study, we mentioned that we would analyse the effects of investments on macro economic variables such as employment. In order to achieve objective, we have incorporated eq 3.6 into our model which we shall estimate using ordinary least squares.

3.3.1: Estimation methodology

The model consist of four equations and four endogenous variables. Equation 3.3 to 3.5 form a set of simultaneous equations. Equation 3.6 can be estimated using ordinary least squares. To enable us to choose an econometric model for estimation, we shall attempt to identify each equation in the system. The most useful rule for the purpose of identification is called the order condition. It states that, if an equation is to be identified, the number of predetermined variables excluded from the equation must be greater than or equal to the number included less one (Pindyck and Rubinfeld, 1981: pp.326-7).

If we let M be the number of endogenous variables in each equation and K be the number of all predetermined variables included in a particular equation, identification can be represented as below:

If (K-r) > (M-1) then the equation is over-identified

If (K-r) = (M-1) then the equation is just-identified

If (K-r) < (M-1) then the equation is under-identified

Table 3: The Order Condition for Identification

Equation	No of Excluded Pre-determined Variables	No of Endogenous Variables Less One	Sign	Sign Of Identification
3.3	6	3	>	Overidentified
3.4	7	2	>	Overidentified
3.5	5	1	>	Overidentified

Given that equation 3.3 to 3.5 in our simultaneous set of equations are overidentified we would recommend either (2SLS) two stage least squares or (MLE) maximum likelihood estimators as the accepted econometric

methods. Because of its convenience when using probability models, we shall use 2SLS for our first three structural model equations. The last employment equation uses ordinary least squares.

3.4: Limitations of The Study

Information on the informal sector is limited. Recorded data on the sector is limited between 1982 to the present year. Studies on the sector are constrained by this aspect. Most of the studies are undertaken with cross-sectional data, which might make the findings unique to a particular time period.

Another limitation of the study is it does not analyze inventory investments, but assumes that physical business investments in themselves shall serve as a representative of investments in general. However, though firms in the sector particularly woodwork firms have product inventory, they are unlikely to affect decisions to invest on physical capital. Non exclusion of inventory investment is not likely to affect our study. On the other hand, it would be of interest to analyse determinants of inventory investments.

The paper has not incorporated non-economic factors that determine investment, such as individual ability to face risk. There are also high possibilities of omitting other macro and micro economic factors due to scarcity of literature on investment in the informal sector in Kenya. This could limit the accuracy of our results.

The study analyzes a total of 120 firms and considers the sample as representative of the entire informal manufacturing subsector in Kenya.

Note that the findings of this paper do not necessarily hold for

non-manufacturing activities in the entire informal sector in Nairobi, nor can conclusions about informal manufacturing subsector be generalised to the whole ation.

The study does not investigate in detail the existing interlinkages between the informal and the formal sector.

CHAPTER 4

Description of the manufacturing informal sector:

This chapter looks at the distribution of variables and some of their characteristics in the informal sector. It also analyses the variables. This section enables us to systematically and meaningfully display data, at the same time provide our econometric findings below with adequate statistical support. We first look at income.

4.1: Incomes in the manufacturing sector

Contrary to popular expectations, wages for entrepreneurs in the informal sector were not low. On average, entrepreneur incomes in the sector were 15,290 shs monthly. The lowest figures was 1,900shs and the highest was 143,634shs monthly. These incomes are high enough to encourage entry into the sector. From the survey it was noted that most informal-sector entrepreneurs were previously in formal sector wage employment as manual labourers or in the informal sector as labourers. These incomes are definitely higher than average non-professional staff incomes and labourer incomes in the informal sector. For horizontal expansion to occur in the informal sector, there is need for entrepreneur entry into the sector. Incomes such as these should, therefore, be maintained or increased.

Table 4: Percentage distribution of incomes for the informal manufacturing subsector by activity.

Monthly incomes in shs	Metalwork	Woodwork	GBS	subsectors[4]
0 - 2,000	6.1%	17.0%	10.5%	12.0%
2,001 - 8,000	33.0%	44.7%	57.0%	40.0%
8,001 - 20,000	48.48%	19.1%	15.8%	34.0%
greater than 20,001	12.12%	19.1%	15.8%	14.0%
Totals	99.99%	99.9%	99.1%	100.0%

M1 = 16,755shs S.D of M1 = 24,141 n = 33

W2 = 16,581shs S.D of M2 = 27,455 n = 50

G3 = 9,347shs S.D of G3 = 10,163 n = 19

M = 15,290 S.D = 24,019 max = 143,634 min = 1,900

The values above M1, W2, G3 represent the averages of entrepreneur incomes for metalwork, woodwork, and general blacksmith respectively, and M represents the population mean. Max represents the maximum value of the variable, and Min represents the minimum value of the variable. We used the t statistic to test the difference between means. We choose the t test, due to our small sample size in the GBS branch of 19. A sample size of 19 is not normally distributed. The most appropriate test is hence the t test. This argument holds for the whole of this section. We, therefore, test the null hypothesis that there is no significant difference between the two means. General blacksmith incomes appears lower than those of metal work or woodwork respectively, but neither the difference between means for metalwork and woodwork nor the difference between means of the woodwork and GBS sector were significant at 5% level.

40% of the people in the sector had incomes between 2,000 shs and

[4] The column on subsector represents percentage frequency for the entire nufacturing subsector.

8,000shs, whereas 74% had incomes between 2,000shs and 20,000shs. A larger percentage of the people, therefore, lay in the middle income group of the national economy. Although we cannot be sure that informal sector would have an equity effect on the economy, we can conclude that expansion of informal manufacturing would improve the living standard of those joining the sector. This is based on the fact that average labour incomes, estimated at 1357shs per month without overtime payments, are much higher than the minimum casual labourer wages presently of slightly over 560shs.

4.2: Savings in the informal manufacturing subsector

The table below shows the distribution of savings in the informal manufacturing subsector. M represents the mean value of savings in the entire manufacturing subsector. Average annual savings are given as 14,319 shs. It is important to note that these savings could be used to finance activities other than those related business. We shall, therefore, be very cautious about making conclusions on savings. 43.1% of individuals in the sample did not save. Average monthly savings including non savers were estimated at 1,193shs. If we exclude nonsavers average incomes will be estimated at 2,098shs. This sounds reasonable compared to average monthly income of 15,690shs. Theoretically investments are financed by savings. The average value of investments as revealed by this research over two years is 14,453shs. Over two years assuming that all savings are strictly spent on investments, savings would amount to 28,638 shs. This implies that those entrepreneurs who save have the potential of financing their own investments if all savings from firm businesses are strictly used

only for investments, and firm operations and the structure and form of investments in the sector do not change. By constancy in the structure and form of investment, we mean the prices of capital goods in the sector do not change due to any external factors such as training, intensive formal sector advertisements of capital goods etc and internal factors such innovations accompanied by change in prices of innovated good. At this juncture we conclude that savings could be sufficient to finance investments provided the entrepreneurs have saving potential. We noted that about 50% of entrepreneurs in the sector do not save. It should be of interest to know how these are distributed over the sector.

Table 5: **Frequency distribution of savings for the informal manufacturing subsector by branches.**

Annual savings in kshs	Metalwork	Woodwork	GBS	subsector
0	34.4%	54.9%	36.8%	43.1%
1 - 5,000	34.4%	17.6%	31.5%	16.7%
5,001 - 30,000	25.0%	15.7%	26.3%	23.5%
30,001 - 55,000	3.1%	3.9%	5.2%	8.8%
greater than 55,000	3.1%	8.0%	0.0%	7.8%
Total	100.0%	100.1%	99.8%	99.9%

M1 = 12,960.1 S.D = 28,441 n = 33

W2 = 14,411.6 S.D = 26,492 n = 50

G3 = 16,768.4 S.D = 25,281 n = 19

M =14,319shs s.d=26,262 max=160,000shs min=0shs

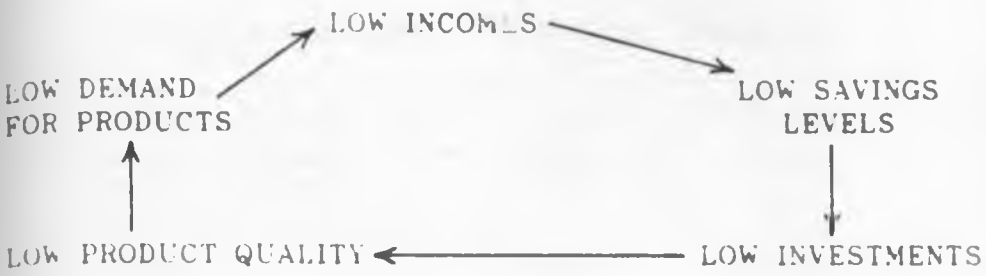
The mean annual savings for the metalwork branch was estimated at 12,960shs whereas that of woodwork was estimated at 14,412shs. The mean for GBS or general blacksmith was given as 16,768shs. We test the

hypothesis that there is no difference between the means of the GBS branch and the woodwork branch. The t statistic is given as 0.289, implying we do not reject the null hypothesis. We then test the null hypothesis that the is no difference in mean savings between the woodwork and the metalwork branches. Our t statistic is 0.054. There is no significant difference in the mean of the two observations.

Woodwork had a higher percentage of non savers than the other branches of the informal sector. In table 4 woodwork had the largest number of entrepreneurs with incomes of less than 1,000shs per month. The savings percentage frequency of entrepreneurs in woodwork was 17% as compared to and 10% and 6% for GBS and woodwork respectively. This shows that savings could be determined by income. Hence to increase savings, incomes have to be increased if savings are determined by income. To increase self financed investments there is need for policies to increase incomes in the sector. A puzzling fact is that the woodwork sector had the highest numbers of non savers at the same time the highest average level of savings. This suggests that those who can save in the woodwork sector save large amounts of their income. This can only be explained in the context of investment needs, measured by DCAP or desired level of capital. The average amount of DCAP for the woodwork sector was 100,000shs, that of general blacksmith was 15,094shs, and metalwork was approximately 32,000shs. These differences were significant at 10% level. This explains why individuals in the woodwork sector with saving potential saved much more than those in the metalwork sector. The high value of DCAP is due to the high costs of capital for this particular sector, entrepreneurs in the branch stressed the importance of capital to improve the quality of

products which has a direct effect on demand, particularly in this sector. There are several formal sector firms providing these very products. Some, such as African Retail Traders (ART), provide these products at lower costs than others. The industry as a whole (informal and formal sector inclusive) is highly competitive. Formal sector displays and aggressive formal sector advertising have made consumers have perfect knowledge on product quality in relation to its price. Utility satisfaction greatly depends on the quality of products as much as it depends on price. Quality of produce here refers to durability and beauty of product. Durability of product depends mainly on the wood used in manufacturing the product. Hardwoods are more durable. Product beauty on the other hand depends on the finishing touch. It is this aspect that makes capital goods important in the sector. Precision machinery in the sector notably changes the beauty of the product. Entrepreneurs in the sector know this and know that job profitability depends very much on product quality. Precision machines are mostly imported capital goods with only a few such as the plane cutter and wood lathe machines being manufactured locally. They are, therefore, quite expensive. The capital goods produced in the informal sector though efficient and durable do not produce the required level of quality precision as per informal sector entrepreneurs. Since credit provision in the sector is limited, the entrepreneurs in the sector can only finance these much needed investments through savings. This explains the high savings rate in the sector for those individuals with saving capability. On the other hand, those with low incomes, low savings hence low investments suffer from a poverty circle which can only be broken through by provision of loans.

FIG 5: **Figure showing circle of poverty in the woodwork branch.**



Low incomes result in low incomes which result in low savings, which further result in low investments causing low demand for product due to poor quality of products, hence eventually low incomes and savings once again. This, on the other hand, explains why savings are low in this branch of the manufacturing subsector.

4.3: Capital stock in the informal manufacturing subsector

Table 6: **Frequency distribution of capital for the manufacturing subsector**

Value of Capital In shs	Frequency
0 - 5,000	29.4%
5,001 - 30,000	56.8%
30,001 - 55,000	5.9%
greater than 55,00	17.8%
Total	99.9%

M = 22,976.6 S.D = 34,447.0 Max = 275,000 Min = 200.0

The average amount of capital in the sector is worth 22,976 shs. Most informal manufacturing subsector firms have capital worth between 5,000shs and 30,000shs. The largest amount of capital was worth 275,000shs and the lowest was 200shs. We shall now look at the distribution of capital by branches.

Table 7 **Frequency distribution for capital for the informal manufacturing subsector by branches.**

Value of capitalin shs	Metalwork	Woodwork	GBS
0 - 1,000	3.0%	6.3%	47.4%
1,001 - 10,000	15.2%	27.1%	36.8%
10,001 - 20,000	39.4%	33.3%	15.8%
20,001 - 30,000	21.2%	8.3%	0.0%
30,001 - 40,000	3.0%	2.1%	0.0%
greater than 40,000	18.1%	22.9%	0.0%
Totals	99.9%	100.0%	100.0%

M1 = 26,526shs S.D = 22,379 n = 33

W2 = 23,118shs S.D = 42,038 n = 50

G3 = 4,505shs S.D = 5,980 n = 19

About half of the GBS branch had capital stock of less than 1000shs in value. The other half had capital of between 1,000 to 10,000shs. This implies that the GBS branch needs little capital stock. The average amount of capital in this sector is worth 4,505 shs as compared to 26,526 shs and 23,118 shs for metalwork and woodwork respectively. These firms tend to be labour intensive. Although there was no significant difference between means of the three sub branches at 5% level of significance, at 10% level of significance, the difference between means capital stock between metalwork and woodwork was significant

4.4: Investments in the informal manufacturing subsector:

TABLE 8: **Frequency distribution for investments for the manufacturing subsector.**

Value of Investments In Shs	Frequency
0	11.0%
1 - 5,000	29.0%
5001 - 30,000	42.0%
30001- 55,000	13.1%
greater than 55,000	4.9%
TOTAL	100.0%

M = 14,453.70 shs S.D = 30,323.23 Max = 275,000 Min = 0 T = 4.813

Mean investments in the sector are worth 14,453.78 shs. Most annual firm investments lie between 2,500shs and 15,000shs. Only 5% of entrepreneurs in the sector were able to finance investments over 27,000shs.

Table 9: **Table showing distribution of investments INV for the informal manufacturing subsector by branches.**

Value of INV in shs	Metalwork	Woodwork	GBS
0	3.2%	11.8%	25.0%
1 - 2,000	0.0%	17.6%	50.0%
2,001 - 5,000	6.5%	9.8%	5.0%
5,001 - 8,000	29.0%	13.7%	15.0%
8,001 - 11,000	6.5%	7.8%	5.0%
11,001- 14,000	9.6%	13.7%	0.0%
greater than 14,001	45.2%	25.5%	0.0%
Total	100.0%	99.9%	100.0%

M1 = 16,168. S.D = 14,139 n = 33

W2 = 18,151 S.D = 41,027 n = 50

G3 = 1,743 S.D = 2,796 n = 19

The average values of investment for the metalwork woodwork and GBS branches of the informal sector were shs161,687, shs18,151 and shs1,743. We test the null hypothesis that there is no significant difference between means in the sector. The difference between means for the metalwork and woodwork branches was not significant at 5% level of significance. Even the difference between means between metalwork and GBS means was not significant at 5% level, but was significant at 10% level. Investments were lowest in the GBS sector which we said was a labour intensive industry. The largest average was in woodwork. This tallies with the result in desired level of capital and savings, where woodwork had the highest of each values, Implying that the cost of capital to the woodwork informal branch was the highest of all.

4.5: Capital labour ratios in the informal manufacturing subsector:

Table 10: Frequency distribution of capital labour ratios for the informal manufacturing subsector.

Capital Labour Ratios	Percentages
0 - 5,000	64.9%
5,001 - 9,000	20.1%
9,001 - 35,000	12.0%
35,001- 55,000	2.0%
greater than 55,000	0.0%
Total	100.0%

M = 6,102.77 S.D =9,985.09 Max =63,180 Min =120

Capital-labour ratios in the informal sector were calculated by dividing the total value of capital in a firm by the number of casual and full-time labourers in the firm. 85% of firms in the informal manufacturing subsector had capital labour ratios of less than shs9,000 or k£450. This is much lower than those of the formal sector which reached a value of k£2,000 by 1964. Capital labour ratios have increased over the years. House (1978: pp.15) estimated capital labour ratios as k£134 for the manufacturing subsector in 1978. This can be estimated at about k£200 given present prices[5]. This is less than the present value of k£450. We noted in the last chapter that capital in the GBS sector was low whereas average labour quantities did not differ from those of the entire sector. It is for this reason that KLRs in the informal sector are quite low. 60% of the branchs firms have KLRs of less than 600 shs. 85% of entrepreneurs in the sector have KLRs of less than 9000shs.

[5] This value has been obtained by annually discounting House's value of K£134 by the inflation rate between the years 1978 to 1988. We have assumed an average inflation rate of 14% over the entire period.

Table 11: Frequency distribution for (klr's) capital labour ratios for the informal manufacturing subsector by branches.

Value of KLR's in shs	metalwork	woodwork	GBS
0 - 600	5.7%	14.9%	60.1%
601 - 3,500	34.3%	38.3%	24.9%
3,501 - 6,500	34.3%	27.7%	15.0%
6,500 - 9,500	17.1%	6.4%	0.0%
greater than 9,500	8.6%	12.8%	0.0%
Total	100.0%	100.1%	100.0%

M1 = 6844.15 S.D = 10672.5 Max = 63,180 Min = 164

W2 = 6096.94 S.D = 8249.73 Max = 50,000 Min = 50

G3 = 3740.36 S.D = 12,235.6 Max = 54,000 Min = 10

The most mechanized sector was the metalwork sector. 60% of entrepreneurs had capital stock greater than 4,000shs compared to 47% for woodwork. Relative to the formal sector, the branch is labour-intensive, The sector's capital labour ratios are much less than those of the formal sector. Average KLRs by branches were 6,844 shs worth of capital per labourer, 6,096 shs worth of capital per labourer, and 3,740 shs worth of capital per labourer for metalwork, woodwork, and GBS respectively. There was no significant difference between means between each of the branches at 5% level of significance. Differences were, however, significant at 10% level of significance. The GBS sector had the lowest capital labour ratios. Only one firm in this sector had a capital-labour ratio that exceeded 6,500shs, this was the maximum value of 45,000 shs. This particular firm was unique in that it combined both metalwork and GBS activities.

4.6: Output in the informal manufacturing subsector:

Table 12: **Frequency distribution for output for the manufacturing informal subsector.**

Value of Output in shs	percentage
0 - 100,000	15.0%
100,000 - 500,000	51.1%
500,001 - 900,000	17.9%
900,001 - 3,000,000	13.1%
Greater than 3,000,000	2.9%
Total	100.0%

M1 = 623,774.17 S.D = 815,587.24 Max = 4,848,000 Min = 9,200

Average output in the sector is estimated at about 623,774 shs in value. The highest output level is worth 4,848,000shs whereas the lowest is worth 9,200shs. This shows that the informal sector's total output can be much higher if individual firm output can be increased. It is, therefore, of importance to know why and how some of these firms have managed such high levels of output.

Table 13: **Frequency distribution for output for the manufacturing informal subsector by branches.**

Value of output in shs	metalwork	woodwork	GBS
0 - 50,000	3.3%	8.0%	10.5%
50,001 - 500,000	40.0%	62.0%	52.6%
500,001 - 1,000,000	36.7%	14.0%	26.3%
1,000,000 - 1,500,000	10.0%	4.0%	0.0%
1,500,001 - 3,000,000	6.7%	8.0%	10.5%
greater than 3,000,000	3.3%	4.0%	0.0%
Total	100.0%	100.0%	99.9%

M1 = 750,630shs s.d = 916,307 n = 33

W2 = 563,684shs s.d = 824,357 n = 50

G3 = 561,576shs s.d = 588,397 n = 19

The above table shows output per sector. 20% of the metalwork firms produced outputs of more than 1,000,000shs. This is more than woodwork

where 16% had an output of more than 1,000,000shs The percentage of GBS firms producing output of more than 1,000,000shs was only 11%. Most firms had outputs of between 5..00shs and 500,000shs. The average output in the metalwork sector was 750,630shs, woodwork 563,684shs and for GBS was 561,576shs. The differences between these means for mean KLRs between branches were not significant at 5% level between of significance

4.7: Employment in the informal manufacturing subsector

TABLE 14: Frequency distribution for full time employment for the informal manufacturing subsector.

Amount of labourers	Frequency
1	10.8%
2 or 3	36.3%
4 or 5	33.3%
6 or 7	8.8%
8 or 9	0.9%
10 or11	1.9%
11 to 15	2.9%
>15	1.9%
Total	99.8%

M =4.73 S.D =7.64 Max =76 Min =1

The average employment was approximately 5 persons per firm. Maximum employment reached 76 for a particular woodwork firm, whose owner was waiting to register his firm as a formal sector firm after starting as *jua-kali* in 1984. This implies that labour generation in the sector can be achieved both through vertical and horizontal. Horizontal expansion looks more attractive as a means of achieving increased employment. There was only one firm that had achieved high employment rates of up to 76 labourers. On the other hand, many firms had achieved employment of

between 5 and 10. Horizontal expansion seems mc e attractive as a policy tool. This could be misleading, we have to look into the sector's ability to expand horizontally before we actually conclude which of the two growth directions would achieve stable and consistent growth.

TABLE 15: Frequency distribution for full time employment in the informal manufacturing subsector by branches.

No of labourers	metalwork	woodwork	GBS
less than 2	18.2%	38.0%	22.2%
2 or 4	45.5%	44.0%	44.4%
5 or 6	4.2%	10.0%	16.7%
7 or 8	6.1%	0.0%	16.7%
9 or 10	0.0%	0.0%	0.0%
greater than 10	26.1%	8.0%	0.0%
Total	100.0%	100.0%	100.0%

M1 = 4.6 S.D = 3.08 Max = 15 Min = 1

W2 = 4.8 S.D = 10.5 Max = 76 Min = 1

G3 = 4.4 S.D = 2.57 Max = 10 Min = 1

The difference between means was not significant at 5% level. 70% of metalwork firms engaged either 5 or 6 labourers as compared to 60% of those in woodwork and only 50% in woodwork. The level of disparity in woodwork is notable, 8% of firms in woodwork employed more than 10 labourers with the maximum amount given as 76, at the same time over 80% employed fewer than 4 labourers. This shows the potential of this sector in employment creation. The causes for this differences should hold the answer to achieving the difference between employment generation potential of the sector and actual employment level.

Table 16: Frequency distribution of casual labourers in the informal manufacturing subsector by branches.

No of casual labourers	Frequency
0	58.8%
1 or 2	23.5%
3 or 4	8.8%
5 or 6	3.9%
7 or 8	1.9%
9 or 10	2.9%
TOTAL	99.9%

M =4.724 S.D =7.64 Max =76 Min =0

Only 4% of the firms in the sector employed family members. All these firms employed fewer than 5 family members. The average number of family members was 2 per firm. 60% of firms in the informal sector did not employ any casual labourers. Casual employees were taken only when work load exceeded actual labour in these firms. Casual labourer employment figures hence act as a proxy of positive increases in demand for output. Our casual labourer figures imply 40% of firms in the informal sector have higher demand of products than they can supply, hence the need to increase factors of production.

4.8: Year of starting business for the informal manufacturing subsector:

Table 17: Frequency distribution of year of starting business for the manufacturing informal subsector

Year of starting business	Percentage number of firms
before 1979	5.8%
1980-83	31.1%
1984-87	56.3%
1988-89	6.8%
TOTAL	99.9%

Mode = 1986 Max = 1989 Min = 1939 (note that the next minimum value after 1939 is 1978.)

Most firms in the manufacturing informal sector were begun between 1984 and 1987. 80% begun between 1980 and 1987. Less than 1% of firms in this sector begun before 1978. It is our belief that the manufacturing informal sector must have been in existence before 1978. McCormick (1988: pp.101) says that the age of firms range between 0.2 - 39 years. This implies that these firms were in existence before 1949. Either these firms could have withered out or moved over to the formal sector. The original is bound to be more realistic. If these firms had developed into formal sector firms, then not only would there be a lot of awareness of the sector's potentialities, but also entrepreneurs in the informal sector would be by far more aggressive of decisions to increase production so as to achieve what their predecessor had achieved. It is, therefore, possible that these firms stagnate and wither out after some period of time. It is this aspect that policymakers on the sector should attempt to confirm, analyse, and find adequate solutions.

4.9: Desired level of capital in the manufacturing informal subsector:

Table 18: Frequency distribution for the desired level of capital DCAP in the manufacturing informal subsector.

Value of desired level of capital in shs	Frequency
0	12.7%
1 - 20,000	46.1%
20,001 - 40,000	29.4%
40,001 - 60,000	5.9%
60,001 - 80,000	1.0%
Greater than 80,000	5.0%
Total	100.1%

M1 = 26,149 S.D = 52,962 Max = 500,000 Min = 0

The average desired level of capital was 26,149 shs. Earlier we stated that there were some entrepreneurs in the sector temporarily only eking out a living who did not fully reject wage labour. (Rempel:1974) These entrepreneurs are most probably some of the 13% percent who did not require any more capital. They are content with their income and output levels, and do not consider increasing investments so as to increase output hence incomes. They thus did not desire any investments. Such entrepreneurs exist mainly in the metalwork and the woodwork industries. They could also be in the GBS sector, but we cannot for sure say this from our tables. The table below shows the distribution of desired level of capital by sector.

Table 19: Frequency distribution for the desired level of capital DCAP for the informal manufacturing subsector by branches.

Value of DCAP in shs	metalwork	woodwork	GBS
0	9.1%	10.0%	26.3%
1 - 20,000	42.4%	50.0%	42.1%
20,001 - 40,000	36.4%	26.0%	26.3%
40,001 - 60,000	6.1%	6.0%	5.0%
Greater than 60,000	6.1%	8.0%	0.0%
Total	100.1%	100.0%	99.7%

M1 =32,481shs S.D =64,806 Max =370,000shs Min =0 t(stat) =2.9 n =33

W2 =34,271shs S.D =72,602 Max =500,000shs Min =0 t(stat) =3.3 n =50

G3 =15,094shs S.D =14,881 Max =55,000shs Min =0 t(stat) =4.42 n =19

The GBS sector had the largest number of entrepreneurs with zero desired level of capital. It was this very sector that had the lowest amounts of capital stock and investments. The average amount of capital stock was given as 4,505shs in value as compared to the average of shs 20,754 for the entire informal manufacturing subsector. The differences between means although insignificant at 5% level of significance, were significant at 10% level of significance. We, will, therefore talk about the means differences. The above mentioned aspect of some entrepreneurs in the manufacturing subsector not investing due to lack of motivation, need not apply for this sector. The high percentage of firms with zero level of

DCAP could be due to the low demand for capital in the sector.

4.10: Initial investments in the informal manufacturing subsector:

Table 20: **Frequency distribution for the amount of initial investments per entrepreneur in the manufacturing informal subsector.**

Value of Initial Investments	Frequency
0	27.5%
1 - 5,000	33.3%
5000 - 10,000	13.7%
10,000 - 15,000	15.7%
15,000 - 20,000	3.9%
greater than 20,000	5.9%
Total	100.0%

M =7,973 S.D =16,856.04 Max =143,000 Min =0

The data in the model represent the amount of initial investments individual entrepreneurs started their businesses with. If we assume the amounts of capital entrepreneurs in the sector started business with represents the initial amounts of capital entrepreneur require to enter business, we can say that initial capital requirements in the informal sector are low. 91% required less 15,000shs worth of capital. 84% required less than 10,000shs. This does not differ much from House's finding that initial capital requirements were less or equal to 10,000 shs worth of capital House (1978: pp.19). The table below shows amount of capital requirements by branches.

Table 21: Frequency distribution of initial investments per branch in the informal manufacturing subsector.

Value of Investment	Metalwork	Woodwork	GBS
0	18.0%	28.0%	42.1%
1 - 2000	3.0%	18.0%	36.8%
2001 - 4000	18.0%	14.0%	10.5%
4001 - 6000	6.1%	10.0%	0.0%
6001 - 8000	12.1%	6.0%	0.0%
8001 - 10,000	6.1%	8.0%	0.0%
greater than 10,000	36.4%	16.0%	10.5%
Total	99.8%	100.0%	99.8

M1 =9422shs S.D =10,581 Max =54,000shs Min =0 n =33

W2 =5440shs S.D =7,242 Max =39,640shs Min =0 n =50

G3 =2073shs S.D =4,624 Max =15,000shs Min =0 n =19

The average initial level of capital by branches was 9,422shs, 5,440shs and 2,073shs for metalwork woodwork and GBS respectively. The highest was metalwork. There was no significant difference between the mean initial investments in the sector. All in all capital barriers for entry into the sector are low, and potential entrepreneurs would not face any major entry problems.

4.11: Training in the informal manufacturing subsector:

To measure training, we used 6 levels of measurement explained in the previous chapter. 50% of entrepreneurs were trained in the informal sector itself. 90% percent were trained in the informal sector but had training either from formal training institutions and the formal industrial sector. 17% of these were trained in the formal industrial sector, 18% had attained trade test 1, 1% trade test 2, 6% trade test 3 and 4% higher levels of training. Just like the formal sector, the informal sector had inhouse training for labourers and entrepreneurs. Most entrepreneurs in the sector agreed that for one to be involved in day-to-day production, one needed informal sector training. Labourers and head of labourers stressed the inadequacy of formal sector training in day to day production.

Table 22: **Frequency distribution of entrepreneur training in the informal manufacturing subsector by branches.**

Level of Training	Metalwork	Woodwork	GBS	subsector
no training	0.0%	2.0%	0.0%	1.0%
informal training	51.4%	38.7%	100.0%	53.0%
formal training	14.3%	24.5%	0.0%	17.0%
Trade test 3	20.0%	20.4%	0.0%	18.0%
Trade test 2	0.0%	2.1%	0.0%	1.0%
Trade test 1	5.7%	10.2%	0.0%	6.0%
Higher training levels	8.5%	2.0%	0.0%	4.0%
Totals	99.9%	99.9%	100.0%	100.0%

One interesting aspect was most firms involved in production of goods requiring more technological input other than welding had more formal training than the others. For example those manufacturing machines such as metal cutters, melding machines, welding machines were more trained than those manufacturing fabrications such as windows. Very little formal training was notable in the GBS branch. We cannot test the

differences between distributions in the three branches using a test like chi square because it involves the division by probability of occurrence. Some proba ility of occurrence in our data is zero percent.

4.12: Ratio of formal sector prices to informal sector prices in the informal manufacturing subsector:

Table 23: Frequency distribution for the ratio of formal sector prices to informal sector prices PIFI for each subsector.

PIFI	metalwork	woodwork	GBS	subsector
0.3 - 1	6.8%	6.1%	11.5%	7.8%
1.01 - 1.2	24.1%	6.1%	17.8%	11.7%
1.201 - 1.4	33.4%	33.7%	18.8%	25.4%
1.401 - 1.6	17.6%	23.5%	35.5%	32.5%
1.601 - 1.8	10.6%	14.3%	6.3%	6.7%
1.801 - 2.0	5.8%	6.1%	6.3%	3.8%
>2	2.0%	10.3%	4.1%	12.7%
Total	100.3%	100.1%	100.3%	100.6^R

%

M1 = 1.43 S.D = 0.28 Max = 2 Min = 0.9 n = 33

W2 = 1.5 S.D = 0.35 Max = 2.8 Min = 0 n = 50

G3 = 1.4 S.D = 0.28 Max = 2.1 Min = 0.8 n = 19

M =1.432 s.d =0.301 Max =2.8 Min =0.8 n = 102

Only 8% of firms in the informal sector had prices equal to or greater than those of the formal sector. Generally formal sector produce were much more expensive than those of the informal sector. The average price ratio between branches is given as 1.43, 1.5 and 1.4 for metalwork, woodwork and GBS respectively. We test the null hypothesis there is no difference between PIFI between woodwork and metalwork. Our t calculated statistic is 0.228, we do not reject the null hypothesis implying there is no significant difference between the means. We then test the difference

between metalwork and the GBS sector. The t calculated statistic is 0.111. Once again we do not reject null hypothesis, the difference between means is not significant at 95% level.

The overall mean indicates that informal sector prices are definitely lower than formal sector prices. This could be the main economic explanation for success of informal sector products in the domestic market. GBS products were relatively expensive in comparison to other formal sector products. 13% of these firms sold there products at prices greater than or equal to formal sector prices. This branch's products have greatly infiltrated formal sector retail shops. It is maybe due to this fact that more informal sector entrepreneurs charge prices equal to those of the formal sector.

We did not tabulate credit, we however tried to explain their characteristics in the above text. Credit availability to the sector is limited. Only 11 entrepreneurs had received credit. 94% of entrepreneurs in the sector did agree they needed credit to expand their firms. Out of these eleven, only 3 were of the metal work sector, 2 from general blacksmith and 6 from woodwork. Most of these loans were either KCB Kenya Commercial Bank loans, K.I.E Kenya Industrial Estate loans or local informal sector loans.

CHAPTER 5

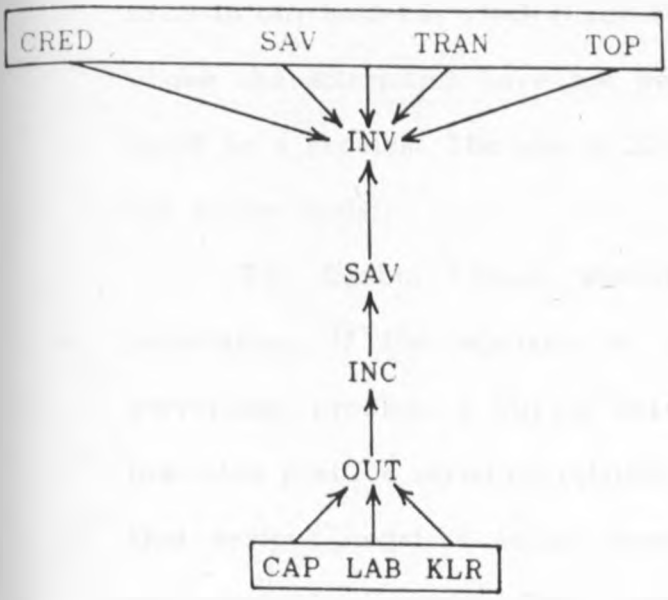
Analysis

In the analysis, we will describe, the econometric package used for our estimations, and review econometric parameters commonly used in the text such as the Durbin Watson statistic and the standard error of regression, and give the regression result.

5.1: The TSP Package and econometric method used

To analyze data collected, the TSP package, Systems analysis version was used to run our system of equations. One advantage of this method, compared to the manual method of analyzing systems of equations, is the ability of the systems method to regress all equations simultaneously. This enables us to capture the cross causal effects between the endogenous variables apart from solving the problem of correlation between our exogenous variables and our error terms. The choice of our instrumental variables is based on Fisher's structurally ordered instrumental variables. The causal effects embodied in our model can be summarized by the figure below.

Fig 6: Illustrations of structurally ordered instruments for our model.



CRED refers to credit, SAV refers to savings, TRAN refers to training, TOP refers to type of firm, CAP refers to capital, LAB refers to labour, KLR refers to capital labour ratios, OUT refers to output, INV refers to investments, INC refers to income. The first row shows those variables which have a direct effect on investments. We choose the exogenous variables that have the closest effects on investments. These are CRED, SAV, TRAN, and TOP. The next row of equations affect investments through output, output affects investments through income, and incomes affects output through savings. We hence bias our choice of instrumental variables to those variables that directly affect output. We could add KLR to ensure that our overidentified set of equations does not lack estimation power. One major problem we are likely to face in our estimation is the problem of specification. Different models are based on different real world situations. In 2SLS, the specification error in the subsidiary equations does not affect

the equation to be estimated or the parent equation. This is not to say that 2SLS does not suffer from specification errors, but that the amount of error caused by the specification error is not as large as in the other estimation techniques. Here underlies the superiority of 2SLS over other econometric estimations techniques. It is for this reason that the use of 2SLS in our model is vital. Given that we are studying the informal sector whose characteristics have not been fully presented, model specification could be a problem. The use of 2SLS reduces this specification problem in the entire model.

The Durbin Watson statistic (D.W) is a formal test for serial correlation. If the statistic is around 2, there is no serious serial correlation problem. A Durbin Watson statistic between 0 to 1.5 generally indicates positive serial correlation. A D.W statistic greater than 2.3 means that serious negative serial correlation exists. The figures in brackets represent the t values. The t statistic is the ratio of the statistic to its standard error. If the statistic exceeds 2 in magnitude then it at least 95% likely that the coefficient is not zero. The standard error of the regression is a measure of the magnitude of the residuals. Most of the residuals should lie between 2 and -2 of the standard errors. The F statistic tests the hypothesis that all the coefficients in the regression are zero. If the F statistic is above 2.7, then the probability is at least 95% that one or more of the coefficients is non zero. The R^2 statistic measures the success of the regression in predicting the values of the dependent variable in the regression.

5.2: The equations estimated and results

This section presents the results of all regressions undertaken in our study. It also attempts ω explain these results.

5.2.1: Estimations for the entire manufacturing subsector.

The section below gives the estimation results for the entire subsector. We have limited result presentation to the t statistic and the variable coefficient.

5.2.1.a: The General investment equation

Table 24: The t (statistic) and the coefficients of the general investment function.

EQUATION 1

Variable	Coefficient	t(stat)
CONST	-1288.02	(-0.14)
INC	-0.01	(-0.75)
OUT	0.014	(2.93)
CRED	0.14	(2.26)
SAV	-0.06	(0.53)
TRAN	5480.47	(2.78)
TOP	1385.60	(-0.37)

R^2 = 0.34627 D.W = 2.0987 S.E = 25279.7 F = 8.3867

The above table represents the coefficients of the investment function derived from heterogenous data collected from the manufacturing subsector. The F statistic is significant at 5% level implying that our model is well specified. Our D.W statistic of 2.09 indicates no serious serial correlation problem. Our standard error of regression is quite high but

with crossectional data, residual errors tend to be sparsed over wider ranges. Our units of measurement are also quite large but with an average of 14,453 shs worth of investments a s.e of regression of 25280 is acceptable.

The significant variables listed according to the level of significance were TRAN the level of training, OUT the level of output, and credit CRED. Neither savings (SAV) and income (INC) significant at 5% level of significance.

Credit or financial capital, has a direct relationship to investments. Credit improves the firms' cash balances, making it easier for a firm to acquire investments. The significance of investments as a function of credit conforms with general economic theory.

Output has two distinctive effects on investments. The first is the effect of output on investments through incomes. Increases in income through changes in output result in increased savings, thus increased saving financed investments. On the other hand, increased output of the firm in the short run increases an entrepreneur's desired level of capital, and ultimately investments, provided financial capital is sufficient. The marginal values of output and credit on investments is positive and less than one. This implies that the change in investments is less than the total change in credit and output. This is expected for output since the total value of output is shared between savings, entrepreneur disposable income and operating expenses. The value that goes to investments should therefore be less than the output itself. The implication of a less than one marginal change of investments given an unit increase in credit implies that informal sector entrepreneurs do not use the whole amount of credit

obtained on investments.

The effect of training on investment is due to adaptive factors. Because individuals trained in the formal sector and other formal sector institutions are trained with capital intensive technology, they vie to own such capital. This results in higher desired level of capital and hence increased demand for investments.

We have stated that the manufacturing informal subsector can be divided into three branches: general blacksmith, metal work, and woodwork. These three separate homogenous groups are quite different in characteristics. This fact could hold for investments as well. We introduced TOP so as to capture this. We should not take this discrepancy lightly, since the determinants of investments in each sector could differ seriously, rendering the possibility of finding a single investment function almost impossible. At 10% significance level, the marginal effect of type of firm on investments is 1,385shs worth of investments. There were three category measurement Top = 1, Top = 2, and Top = 3. The regression systems regressed the variable as an ascending variable. This means that total change between category 1 and 3 or the differences in investments between the metal work and general blacksmith branches is 2,770 shs on average. Definitely, therefore, the effect of TOP cannot be ignored. For this reason we regress the equations differently for each type of firm. This will also enable us to comment crudely on the stability of the general investment equation. Before we look at the results of the homogenous set of equations, we shall look at the general output and the income equations.

Savings were insignificant in the general model as a function of investments, The strange aspect about savings in this category is that the

marginal effect of savings on investments is negative. The theoretical effect of savings on investments is shown in the figure below. Increased savings imply increased investments which further increases output, incomes and eventually savings once again. The effect of savings on investments is therefore always expected to be positive.

FIG 7: **Figure showing relation between savings and investments.**

SAV———————— INV————————OUT

OUT————————INC———————— SAV———— INV

The implication of our findings is that though savings were not significant as a determinant of investments in the manufacturing subsector, for some of the investments financed by savings, higher savings resulted in lower investments, and greater investments in reduced savings. The rate at which investments increase as savings decrease is less than the decrease in savings. This paradox can be explained by looking at the levels of savings and investments critically. Those entrepreneurs with high level of capital stock are the very ones with high savings. (See table 4 below) If this holds, we would be right to say that there exists a level of investment where the entrepreneur cannot finance investments from savings acquired in the short run, and therefore does not invest. For this reason as savings increase, marginal changes in investments decline. This further explains why the savings co-efficient is quite low. At lower levels of savings, investments increase as savings increase, but as savings

increases past S_c[6] or the critical level of savings, investments financed from savings begin to fall. This marginal fall in investments overshadows the rise in investments caused by lower saving levels, hence the low negative coefficient of savings on investments. (see the case for metal work below.)

TABLE 25: **Table showing relation between annual savings and investments for the metalwork industry of the manufacturing subsector**

Level Of Savings in shs	Average Amount of Investments
0 - 10,000	8,500shs
10,001-20,000	14,015shs
20,000-30,000	29,465shs
30,000-40,000	19,471shs
>40,000	15,800shs

Source: The figures above have been calculated from raw data collected by the questionnaire used in this study.

In the principle above underlies the basic problem of firm stagnation mentioned in chapter 4 and suggests that credit should be availed to informal sector firms. We shall, however, not conclude until we analyse the individual sectoral savings and investment behavior. The investment function for the manufacturing subsector is more of a function of output, credit, and level of training. Individual branch's investment

[6] The critical level of savings is that level of savings where investments financed by savings reach a maximum, and any increase in savings is not be used to increase investments. capital stock has reached a maximum.

functions have to be analyzed, the above function does not incorporate the heterogeneity of branches within the informal sector.

5.2.1.b: The General Income Equation

The significant variable in this set of equation is only output (OUT). Investments are not significant as determinants of investments.

TABLE 26: **The coefficients and the t statistic for the general income equation.**

EQUATION 26[7]

Variable	coefficient	t(stat)
CONST	24536.9	(0.967)
OUT	0.2546	(8.98)
INV	6.31	(0.007)

R^2 = .51 D.W = 2.26 S.E = 201753 F = 53.56

Our R^2 of 0.51 implies high explanatory power of our model. The F statistic, is significant at 5% significance level. Theoretically the F statistic tests how the variables in the equation explain the model. Our Durbin Watson statistic implies no serious serial correlation problem. Output was the only significant variable. The marginal effects of a change in output on income is given 0.2546, The effect of the marginal change is less than the marginal change itself. Income is always less than the value of output. Total value of output is paid to labour, households and firms providing raw materials

[7]* The format of each of the following tables are the same. The first column represents the variable, the second column represents the coefficients of the variables, and the last column shows the t statistic.

and other firm inputs. The value of the coefficient is hence justified.

Investment was not significant at 5% level of significance. Investments affects income through output. Investment effects on output can be divided into two. It acts as an injection in technology, hence resulting in direct increases in output capacity of the firm, it changes the production functions hence output. Capital stock affects the costs of operations, particularly if the capital requires constant change of spares and has high maintenance costs. On the other hand capital stock determines the production function resulting in changes in capital labour ratios which determine output. Our general model does not capture these relationship. This could be a result of the differences of the importance of investments between firms. We, therefore, need to regress three different sets of equations on each section of the sector.

5.2.1.c: The output equation.

TABLE 27: **The coefficients and t statistic for the general output equation**

Variables	Coefficient	t (stat)
CONST	380,276	(3.39)
INV	13.144	(4.417)
KLR	8.77	(0.527)

R^2 = 0.224 D.W =1.88 S.E = 725692 F = 14.2862

The F statistic shows that our model specification is significant at 5% level of significance. The explanatory power of the model is appropriate for crossectional data. The D.W statistic implies no serious serial correlation problem. In the output equation we have used KLR i.e the capital labour ratios. In the general equation, modelling of the output equation proved

a major problem. Attempts to reduce the standard error of the regression by respecifying the equation worsened the explanatory power of the model.

The heterogenous nature of our data, causes divergence of the systems of equation solutions, and our coefficient matrix tends towards the singular matrix. The above explanation hopes to shed some light on the reasons as to why our output model is not widely accumulative in variables. By regressing three different equations on the different sub divisions of the sector, to eliminate some of these difficulties. The most interesting finding of the output equations is that investments are a major determinant of OUT, output. We noted previously that output also does affect investments. The result is a two-way process, output acts like a proxy for demand for firm produce, since production in the informal sector occurs on demand. Firms increase investments so as to increase output to meet product demand. Investments act as technological progress, resulting in increases in output capacity.

5.2.2: Equations on Metalwork branch:

The section below presents analysis and findings for the metalwork branch only. Once more we have limited our table presentation to the t statistic and variable coefficient.

5.2.2.a: The investment equation for metalwork.

The table below presents equation results for the metalwork branch.

TABLE 28: **The Investment Equation Results for the metalwork branch.**

Variable	Coefficient	t(stat)
INC	0.026	(-1.59)
OUT	0.01	(2.60)
CRED	-0.08	(-0.82)
SAV	0.47	(2.01)
TRAN	2770.9	(1.91)
R^2 =0.25	S.E = 13100	F = 2.3195

The investment function in the metalwork industry differs little from the general investment function. The variables that are significant in this equation are output, savings and training. Credit was not significant in the homogenous model for metal work alone. This could be because out of 11 individuals who had acquired credit in the sector, only 3 were from the metalwork sector. The level of investments in these three firms, though high, was not necessarily higher than the rest of the well-to-do entrepreneurs in the sector. This by implication could mean the metal work sector does not need credit. This might not be the case, we have to look into the level of business and investments before these few entrepreneurs had acquired credit. Their level of investments and capital stock could have been very low. It is that credit, therefore, that expanded business. This, however, does explain why the credit coefficient is negative. The coefficient means that given a marginal increase in credit, investment levels fall. The nature of credit given to informal sector entrepreneurs is cash

credit. The use of credit is, therefore, at the entrepreneur's discretion. The levels of capital and investment for each entrepreneur who received credit in the informal sector is shown below.

Table 29: **Credit use for the metalwork branch.**

credit available	level of investments	capital stock	operation expenses	unaccounted value of credit
300,000	1,470	16,470	N.A	282,060
30,000	8000	11,700	8,000	2,300
50,000	39,420	56,720	50,000	3,860

Source: From raw data collected from our questionnaire.

From the table above we note that choice on whether to use credit for firm development depends very much on individual entrepreneurs. It follows, therefore, that we cannot directly say that the results from our system of equations are conclusive about informal sector need for credit. The first individual definitely did not use credit availed to him in any form for investments. His capital resources total about 16,470. It is possible that he used these funds for firm operations. It is this personal discretion in the use of capital that explains why the credit coefficient is negative.

Training was significant in the present investment equation. The marginal effects of training are quite large and positive. This can be attributed to the fact that personnel trained in either the formal sector or in formal sector institutions are trained with capital intensive equipment. They hence strive to acquire such capital to improve their product quality. These trained entrepreneurs are at their best when using capital they were trained with. This is not to say that production in the non trained entrepreneur firms are of any poorer quality. We are only stressing the importance of adaptive effects of formal training.

The gen ral model does include output as a determinant of investments. Output affects investments through desired level of capital. Production in the informal sector occurs on order. Output is hence a reflection of demand for products. Increased demand can be met by increases in both labour and capital, to avoid diminishing marginal productivity caused by expansion of single factors of production. In the short run, labour is increased by hiring casual labourers, whereas capital is increased by increasing capital stock. General theory also states output affects investments through incomes and savings. The savings coefficient is positive and significant at 5% level of significance. Savings are hence a major determinant of investments in the informal manufacturing subsector. The explanatory power of the equation is quite high as compared to the general equation model. The F statistic is significant at 0.01%.

For all the equation above and those below, the constant term and the D.W statistic does not appear. In order that the TSP package be able to pick data values for the metal work alone we used a selection variable top1. Top=1 ensures that only the variables with top=1 be chosen. For blacksmith and wood work we used top=3 or top3 and top=2 or top2 respectively. This package does, therefore, not give the value of the constant term since the constant term is the choice variable at the same time the constant variable. The D.W statistic is also not given by this selection method.

5.2.2.b: The income equation for the metalwork branch:

TABLE 30: **The income equation for metal work.**

Variable	Coefficient	T(stat)
OUT	-0.119	(2.15)
INV	6.57	(2.01)

R^2 = 0.124 S.E = 871042 F = 4.4122

Both variables output and investments are significant. Output was significant at 0.01% confidence interval. The coefficients of output remain positive. The marginal relationship is, like the general equation, negative. Investment remains a determinant of income at 5% level of significance. The income equation differs, from the general income equation in this aspect. Investments affect income through output. Implying that investments have a positive effect on output since the sign of the investment coefficient is positive. The F statistic implies at least one or two of the variables in the equations explain the independent variables. The explanatory power of our model is very low. We have to contend with this low value due to the crossectional nature of our data. We shall now look at the metal work output results.

5.2.2.c: The Output results for metalwork:

TABLE 31: **The Output Equation For The Metal Work Branch**

Variable	Coefficient	t(stat)
INV	74.38	(5.04)
klr	-55.582	(-2.43)

R^2=0.124 S.E = 871042 F = 4.4122

In the metal work output equation all variables included were significant at 5% level of significance. The independent variables effectively explain the endogenous variable at 5% level of significance as shown by the F statistics.

Marginal changes in investments result in positive changes in output, whereas capital labour ratios negatively affect output. This could be of particular interest to us, since this is a sub-sector that seems to invest a lot in capital goods. The negative coefficient means that if capital is increased faster than labour, or capital is increased and labour is a constant, then output declines. This implies that increases in capital result in diminishing marginal productivity. On the other hand, increased labour without an increase in capital or with a less than proportional change in capital results in an increase in output. This conforms with normal micro theory. The t statistic is hence a one tail test to the left. This implies we are testing the probability of an increase in labour with constant capital, or increases in labour with a less than a proportionate change in capital will result in increase in output as capital-labour ratios fall. Our t statistic is -2.43, implying that at a certain low level of capital labour ratios, output will not increase. Here again the marginal productivity of labour shall become negative. Output can, therefore, be increased by increasing capital in the short run, only if this increase in capital is accompanied by a more than proportionate change in labour. Increasing labour alone will increase output upto a certain level above which any changes in labour will reduce output. Indiscriminate increases in capital will result in diminishing output. This can be explained through maintenance costs and diminishing marginal

productivity. We therefore take note of this observation.

5.2.3: Equations For Woodwork

5.2.3.a: The investment function for woodwork.

TABLE 32: Results for the Woodwork Investment Function

Variables	Coefficient	t(stat)
INC	-0.14	(-0.49)
OUT	0.07	(6.25)
CRED	0.21	(2.59)
SAV	0.21	(1.33)
TRAN	533.94	(0.288)

R^2 = 0.63 S.E = 25978 F = 19.303

The wood work investment function differs from the general investment function and the metal work investment function. The significant variables is output and credit.

Output was significant in both the general function and in the metal work equation. The strong significance of the relation between output and investments is expected. Output affects investments by determining desired level of capital and incomes, hence increasing savings through which investments are financed.

Savings in this model, although not significant at 5%, were significant at 10% level of significance. This could be attributed to the high prices of machines required in the sector. We did not collect data on prices of capital goods in this sector, but did attempt to collect data on DCAP, the desired level of capital. Unlike machines in the other sub divisions of our study, the investments in this sector were fairly expensive (see table 22).

The desired level of capital reflects the price of machines required in the sector. The average desired level of capital was higher for the woodwork industry than in the other branches in the informal sector. The maximum level of DCAP valued at present year prices was 500,000shs. Entrepreneurs either had the small amount of capital just necessary to undertake business, or they had acquired large amounts of investments over time hence they had large capital stocks (see table 9). It is the latter group of individuals who invested using savings and credit or savings alone. Only a few entrepreneurs could afford the costs of investments. As savings increased, investments increased only to certain level, that is to the level of investments where savings could no longer finance the cost of investment goods. This is supported by the positive savings coefficient. Above this point, savings are no longer a determinant of investments. It is this effect that makes savings insignificant. The wide diversity between the two lumps of data is reflected in the capital variable (See table 9). The high costs of capital in this sector justifies the importance of credit, which was significant in our model. This result is not due to model mispecification, as our F value is significant at 95% level. The explanatory power of our model is totally acceptable, particularly given that it is crossectional data.

5.2.3.b: The Income Equation for Woodwork.

TABLE 33: The Income Equation For The Woodwork Branch.

Variable	coefficient	t(statistic)
OUT	0.53	(13.21)
INV	-5.63	(5.05)
R^2 = 0.76	S.E = 161,171.9	F = 156.75

The significant variables in this model includes investments and output. All variables included are significant at 95% level of significance. Output was significant in the woodwork output equation and in the general output equation.

Investments affect income through output. We shall see in the next equation the effect of investments on output. The marginal effects of investments on income is negative from our results. Gross income is divided into savings and entrepreneur disposable income. Investments can, therefore, have a negative effect on savings through this concept. This implies the effect of investments on income through savings is greater than the effect of investments on income through output. Savings are used to finance investments as noted in the above investment model.

The total value of output is divided into savings, entrepreneur disposable income, and operation expenses. Savings and disposable income are conflicting uses of the total value of output. Operating expenses cannot be considered competitive of total value of output its not to the entrepreneurs choice to whether to keep aside finance for operations as in the case for savings and disposable income.

This competitive use between savings and entrepreneur disposable income causes the negative marginal effect of investment on income. The analysis above does not in any way contradict the savings coefficient obtained in our woodwork investment model. Since the value of output is not a constant. The variations in the value of output result in high variations in income. Large amounts of income mean higher disposable income, thus savings and income cease to become competitive uses. At very low incomes, savings are almost nonexistent, and investments can only be financed by credit if available. The causality between investments and savings has not captured these two situations, i.e. at high levels of incomes and at very low income levels. The income savings relation, on the other hand, does capture this relation. At low levels of income, savings are hence low; at higher levels of income, savings are much higher in absolute terms.

The most significant variable is output. This argument holds both in theory and practice. The marginal effect of a change in output on income, is given as 0.530. That means that a marginal change in output causes less than a unitary change in incomes. Value of output as we have already stated is divided into operating expenses, savings and income. Hence a change in output should result in less change in income than the change in output.

The explanatory power of the equation shown by R^2 is quite high, about 80%. At 5% significant level the explanatory variables effectively explain the independent variable.

5.2.3.c: The Output Equation for Woodwork.

TABLE 34: The Woodwork Output Equation.

Variable	Coefficient	t(stat)
INV	18.99	(5.826)
KLR	-48.99	(-1.89)

R^2 = 0.22 S.E = 711073 F = 6.817

The woodwork output equation differs from the general output equations. In the general output equation, only investment was significant. In the woodwork and metalwork equations, both investment and capital labour ratios were significant. Investment was significant in all the three equations. Both variables were significant at 5% level for the woodwork section. The F statistic is significant at 95% level of significance given proper model specification. The explanatory power of our model was about 0.22, i.e relatively low but given that it is crossectional data we should be content with this. At 5% level of significance the explanatory variables effectively explain output.

Investments affect output by either changing the the firms production functions or by acting as technological injection. On the other hand klr's also affects output. As labour increases given that capital is held constant, or capital is increased at a lesser rate than the increase in labour in the firm, results in increases in output. This only applies up to a certain level of labour increases. Any increases in labour above this point result in diminishing marginal productivity of labour until labour begins to decrease instead of increasing.

5.2.4: Equations for General Blacksmith

The section below gives the equation results for the GBS sector. The set of three equations in the model are presented seperately.

5.2.4.a: The investment equation results for the GBS branch.

TABLE 35: **Investment equations for general blacksmith.**

Variable	Coefficient	T(stat)
INC	0.007	(0.772)
OUT	0.0001	(-0.73)
CRED	0.446	(0.855)
SAV	-0.0310	(-0.87)
TRAN	2018.5	(2.019)

R^2 = 0.224 S.E = 741073 F = 6.816

The significant variable in the general blacksmith model is only training. The average amount of investments in this branch was approximately 1,743shs in value, whereas those for metal work and woodwork are 16,168shs and 18,151shs respectively. This explains the low level marginal effect of other variables such as savings, credit, and output accepted in general theory as determinants of investments.

The significance of labour is acceptable, considering the branch's characteristics. The sector is labour-intensive and, as we have mentioned, uses very little capital. In essence, therefore, the amount of capital used per labourer plays a significant role in the investment function. The training coefficient is 2,018shs. Theoretically this value should represent marginal change in investments given a unit change in training. This is explained by the adaptive factor caused by training. We have already

explained this. The other variables were not significant at 5% level. We shall proceed and look at incomes in the general black smith section of the manufacturing sub-sector. The explanatory power of our model was low, at 22%. There were trade offs between the model's explanatory power, and our model specification. Trying to improve the explanatory power of our model worsens the specification of our model. At 5% level at the two variables effectively explain our model.

5.2.4.b: The Income Results for the GBS Branch.

TABLE 36: The Incomes Equations For The General Blacksmith Branch.

Variables	Coefficients	t(stat)
OUT	0.147	(4.379)
INV	12.914	(1.05)

R^2 = 0.30 S.E = 104885 F = 7.336

Only output was significant 5% level of significance. The marginal effect of output on incomes in the general blacksmith section is positive but less than one. This is expected as we mentioned previously, that incomes is a part of total value of output. Hence a marginal change in output results in a less than one change in income. This should be the only variable that affects income in this model, considering the little we have reviewed of the sector. The explanatory power of our equation suffices, as shown by the value of R^2. Our model specification also holds, the F statistic is significant at 95% level.

5.2.4.c: The Output Results for the General blacksmith Branch.

TABLE 37: **The Output equation for the general blacksmith branch.**

Variable	Coefficient	t(stat)
INV	-47.499	(-0.59)
PIFI	344791	(2.675)
KLR	40.91	(3.767)

R^2 = 0.35 S.E = 503995 F = 4.267

The significant variables in the output model include capital labour ratios, and the ratio of formal sector prices to informal sector prices at 5% level of significance. The explanatory power of the model is low at about 35%. This is acceptable as we have denoted in the earlier sections in this text. The variables do explain the independent variable at 5% significance level as shown by our F statistic of 4.267.

One interesting characteristics of the above equation is that in spite of low capital stock, (KLR) capital-labour ratios are still significant and the coefficient of regression is positive, unlike in the metal work and woodwork branches. Positive changes in capital-labour ratios result in increases in output. In this sector, therefore, it is impossible to increase labour in the short run. Capital stock has to be increased for output to be increased. This could be true, what we should look at is the cost and type of capital equipment required for these firms. Not only is the equipment highly capital intensive, but it is also very expensive. Hence though incomes in the sector could be high they might not be high enough to meet the cost of such equipment. Entrepreneurs, therefore, need to find other sources of funding. Since incomes in the sector are high, employment in this sector

is relatively high and products cheaper than the formal sector it is up to policy makers to decide on the beneficiaries of encouraging increased investments.

The ratio of formal sector prices to informal sector prices was significant at 95% level. It is, therefore, important that these prices do not rise above those of the formal sector as this would reduce profitability and output in the sector. Ease of entry and exit would automatically ensure low profits in the sector. Ease of entry and exit into the informal sector has been accepted by economists as part of the sectors characteristics and constitutes part of the definition of the sector.

5.2.5: Effects of Investments on Labour

To capture the effects of investments on labour we have to first regress the labour equation and analyse the causal effects.

TABLE 38: **Results for the labour General model.**

Variable	Coefficient	T(stat)
CONST	0.939	(1.895)
INV	0.0002	(5.8511)
OUT	$1.6*10^{-6}$	(3.063)
CAP	$-1.2*10^{-5}$	(-1.841)

R^2 = 0.76 D.W = 1.88 S.E =3.72 F (stat) = 109.3

Investment is significant at 5% level as a variable affecting labour in the entire manufacturing subsector, but the marginal effect of investments on labour is quite low. The above model analyzes the entire manufacturing subsector. We noted in the previous chapters that the general blacksmith had little need for capital stock. It is this branch's

results that dampens the effect of investments and capital on labour. All the other variables were significant in the investment function. We mentioned that output acts as a proxy for demand for investments It hence follows that as demand for firm output increases, entrepreneurs increase labour intake in the firms. To increase output there is need to increase demand for informal sector output. We have to look at individual branches in the manufacturing sector to conclude effectively on investment effects on labour.

5.2.5.a: Effect of investments on labour for the metalwork branch.

Table 39: Labour Equation Results for the Metalwork Branch.

Variables	Coefficient	T(stat)
INV	$-6.18*10^{-5}$	(-1.94)
OUT	$3.2*10^{-6}$	(8.64)
CAP	$6.92*10^{-5}$	(3.38)

R^2= 0.68 S.E =1.79 F(stat) = 32.56

All variables were significant at 5% level of significance. The low coefficients imply, for any increments in labour in individual firms to occur, large changes in investments output and capital stock have to occur. To make a metal work firm employ one more person, output has to be increased by 312,500shs by value. To achieve this level of output investments have to be increased 16,181shs. This value does not differ from the required change in capital stock. The implication of these results is that in the short run it is only through horizontal expansion that the sector can increase employment in the metalwork sector. Our model specification is acceptable given the value of our F statistic. The

explanatory power of our model is quite high, a level of about 68%. The Durbin Watson statistic implies no serious serial correlation problem.

5.5 5.b: Effects of Investments on Labour for the Woodwork Branch.

Table 40: Labour Equation Results for the Woodwork Sector:

Variables	Coefficient	T(stat)
INV	0.0003	(4.19)
OUT	$1.3*10^{-7}$	(0.15)
CAP	-7.2*10-5	(-1.02)
R2 = 0.85	S.E = 4.15	F(stat) = 135.07

Only investments was significant at 5% level of significance. Labour in the woodwork sector was a function of investments. This implies that investments in the woodwork sector constituted labour intensive embodied capital. It hence follows that employment in the woodwork sector of the informal sector can be increased through vertical expansion in the sector. We cannot however disqualify horizontal expansion of the woodwork sector as a means of increasing employment in the woodwork sector. The output coefficient is positive and for one extra person to be employed in the sector there is need for output to be increased by about seven million shillings. Since output, however, not significant at 5% level of significance, we will not rely on the output as a variable affecting labour in the woodwork branch. The implication of the negative capital coefficient is we cannot increase capital through investments beyond a certain level and hope to continue increasing employment in the sector. Employment can only be increased using vertical expansion in the short run. Increasing labour through horizontal expansion of the woodwork sector depends on

the amount of initial capital required to join the sector.

5.2.5.c: Effects of Investments on Labour for the GBS Branch.

Table 41: **Labour Equation Results for the GBS Sector.**

Variable	Coefficient	T(stat)
INV	0.0003	(1.209)
OUT	2.37	(0.0002)
CAP	-0.0001	(-0.509)

R^2 = 0.17 S.E = 2.48 F (stat) = 1.64

Only output was significant for the general blacksmith sector. Investments were not significant at 5% level of significance. Two deviations from our mean covers 95% of our data on labour in the sector that has an average of 5 labourers per firm. The standard error value of 2.48 is acceptable. The variables in the equation effectively explain labour generation in the sector. This is shown by the F statistic which is significant at 5% level of significance. The explanatory power of our model is low compared with the other branches. We shall, however, contend with this value and associate this to the characteristics of the GBS sector. The significance of output as the most significant variable in this model implies two facts. The first is the demand for labour in this sector solely depends on demand for firm output. Employment of the sector can only be achieved through increases in demand for informal sector produce. The second implication is vertical expansion through investments will have little or no effect on output as shown in the output equations for GBS hence no effect on labour. If investments were to increase above a certain point, then labour will have to be reduced as factor substitution occurs. Vertical

expansion to increase labour should therefore occur through, policies to increase output and not policies to increase investments. Horizontal expansion in this sector as a means of labour potentialities will reduce the average number of labourers per firm. Unless output in the sector as a whole is increased, through increasee in demand for output, total labour generated per firm would reduce if more firms enter the industry. The basic requirement for labour creation is increase in demand for output.

CHAPTER 6

Conclusions and policy recommendations

In this section, we will summarize the factors determining investments in the informal manufacturing subsector, then give the effect of investments on output, incomes, and labour in the subsector. Lastly, we will give various policy recommendations for the sector.

6.1: The investment function

We estimated three different set of equations for each section of the manufacturing subsector. Our investment functions for each section differed.

TABLE 42[5] : **Comparison of significant variables per branch in the informal manufacturing subsector.**

EQUATION	SIGNIFICANT VARIABLES AT 5% LEVEL				
	Tran	cred	out	inc	sav
1) General	*	*	*		
2) Metal Work	*		*	*	*
3) Wood Work		*	*	*	
4) G BlackSmith	*				

Output was the only variable that was significant in each of the investment equations with the exception of the GBS branch. There was no variable that appeared in any one of the equations without appearing in the other equation with the exception of the GBS branch. The change in the investment function over the entire set of equation with the exception of the GBS branch was minimal. From this crude method of deductions, we can say that the investment function is fairly stable. We can, therefore, hope to make valid conclusions from our analysis. Though the investment

[5] tran: represents training, cred: represents credit, out: represents output, inc: represents income, sav: represents savings and lab: represents labour.

function shows element of stability we state categorically that no one investment function holds for the entire manufacturing subsector. For each branch in the manufacturing subsector we have to estimate a separate investment function.

6.2: Effects of investments on macro-economic variables

This section, summarizes the effect of investments on output incomes and labour in the manufacturing informal subsector.

6.2.1: Effects of Investments on output

TABLE 43: **The coeffients and t(statistic) of investments (INV) on output in each branch in the informal manufacturing subsector.**

Equations	Coefficients of the Inv Variable	t(statistic)
General	13.14	(4.41)
MetalWork	74.38	(5.04)
WoodWork	18.99	(5.83)
G BlackSmith	-47.49	(-0.59)

The investment variable is a major determinant of the output function. The marginal effects of investments on output are positive. It is hence compatible that investments have a positive effect on output, with the exception of the GBS branch of the economy. Required level of investments in the GBS branch of the economy is very low. Output here was more of a function of capital-labour ratios (KLR) and the ratio of formal sector prices to those of the informal sector (PIFI). In this branch KLRs are very low, and production functions are tend to Leontiff functions. PIFI determines demand for output in this sector. Lower prices in the

informal sector imply larger demand for products in the sector.

6.2.2: Effects of investments on income

TABLE 44: **The coefficients ands t(statistic) of investments (INV) on incomes for each branch for the manufacturing subsector.**

Equations	Coefficient of the Inv Variable	T(statistic)
General	0.005	(0.007)
MetalWork	6.57	(2.00)
WoodWork	-5.63	(-5.25)
G BlackSmith	12.91	(1.05)

Investment at 5% level of significance is not significant as a determinant of income in the general equation. Entrepreneur incomes in the woodwork industry are significant, but negatively related to investments. Increase in investments increases the value of output, which increases gross incomes in the sector. Investments on the other hand also reduces net disposable income, through increases in amount of income kept as savings. The negative sign of investments implies that in the woodwork sector the amount of disposable income kept as savings exceeds the increase in income caused by increases in output. Investments in the woodwork sector increases gross incomes but the marginal values accruing to maintenance of capital, labour, operating costs and savings are higher than those accruing to net disposable incomes. Though investments were not significant in the general equations, the marginal effects on investments were positive. The same applies for the metal work branch. It is only in the woodwork industry that net disposable income fell with investments. in the GBS branch the effect of investments on income was

not significant.

6.2.3: Effects of investments on labour

Table 45yy: The coefficients and t (statistic) for investments in the labour equations for each branch in the manufacturing subsector.

Equation	investment coefficient	t(statistic)
General	0.0002	(5.85)
Metalwork	$-6.18*10^{-5}$	(1.94)
Woodwork	0.0003	(4.19)
GBS	0.0003	(1.209)

Investments were a significant determinant of labour in each of the branches with the exception of the GBS branch. The effect of investments on labour though significant were very low. Large amounts of investments are required to cause substantial increases in labour. On average to create an extra unit of employment in the sector, 5,375shs worth of investments is required.

6.3: Policy Recommendations

The manufacturing subsector activities are the most visible activities in the informal sector. There are several macro and micro economic variables that affect the informal manufacturing subsector. Policy makers can manipulate only some of these variables, through fiscal, monetary and structural policies.

Our study concentrated on investments in the informal sector. To achieve increased output and consequently increased GDP, investments in the manufacturing subsector have to be increased. Our research findings stressed the importance of investments on output for each of the sections in the sector with the exception of the general blacksmith sector(GBS).

Due to the GBS branch's unique characteristics, we shall first look at its need for investments and give necessary recommendations before we analyse general policy for the manufacturing subsector. Though investment in this branch were low, output, labour potential and entrepreneur incomes were not any lower than those of the other sectors. The amounts of desired capital, which reflects entrepreneur investment needs, were estimated at 88,833shs compared with that of the metal work and woodwork desired level of capital 27,724shs and 20,365shs respectively. Investment in the sector were non the less low and consequently total capital stock. The high desired level of capital in the GBS section is because the capital stock requirements to manufacture these products are large, high-cost capital-intensive equipment. Entrepreneurs in the sector, hoping to own such equipment, require large finances, to buy such capital. Profits and output in the sector were no lower than those of metal work and woodwork

branches. Average incomes and average output in the section were 112,166shs and 561,576shs respectively, whereas the average incomes and output of the entire sector were 183,480shs and 623,774shs respectively. There was no significant difference in the mean output and incomes of this sector compared to the other sectors. This makes us question the importance of investments in this sector. One interesting characteristic of this branch were its production functions. The production functions of products produced by GBS firms are close to Leontiff production functions. They can be produced by either mostly labour and very little capital or mostly capital and very little labour. Presently the firms are labour-intensive. The nature of this production functions makes it difficult to assess the importance of investments in this section of the economy.

The choice of whether investments in the GBS branch should be encouraged depends on the effects of investments on quality of produce, labour generation effects, and location of these firms vis a vis the type of capital that the investments in the branch would generate. There is very little we can say in this paper about the quality of produce in the sector. For us to talk about the quality of GBS products an entire study with adequate measures of relative quality performance needs to be undertaken. We can, however, discuss quality of products versus relative pricing between the informal and formal sectors. Generally the prices of the GBS products are lower than those of its counterpart in the formal sector. It is important to note that the very same products produced in the informal sector were sold to formal sector retail business who then sold them to the public. This is particularly true for the GBS branch. On quality of informal sector GBS produce, the term becomes very subjective

especially when the products in question are not original products of the informal sector. If quality of produce refers to beauty or appearance of product, then the formal sector definitely has an upper hand. If quality, on the other hand, refers to durability of product, then a consumer survey will have to be undertaken. If quality refers to input of technology into product, then the formal sector has a definite edge over the GBS branch. To illustrate the last aspect, consider a water tank built in the GBS branch compared with one in the formal sector. The formal sector water tank might have a thermal insensitive layer within, in the form of an asbestos lining, which the informal product does not have. This aspect constitutes technological input into product.

Improvement of product quality in the GBS branch can be achieved either through increased investments, or by training entrepreneurs on nontechnical product diversification. If technical training is provided the entrepreneurs trained shall be biased towards acquiring investments emboding capital intensive methods of production. We advocate for non technichal training for reasons we will look into in the coming text. Non technical training implies that, entrepreneurs and their labourers will acquire technological innovation independent of high production costs presently prevailing in the formal sector. The products will also have higher local content in production.

On labour generation effects of investments in the GBS sector, we have already specified that the branch's production functions caused by the current technology in the section tends towards Leontiff production functions with biases towards labour intensive production. Firms producing the very same products in the formal sector are capital intensive in

nature. If, therefore, the GBS branch increases investments it is definite that the sector shall have to substitute labour for capital. The average nummber of labourers in the GBS branch is approximately 5 per firm. This is relatively high considering the scale of operations. We stated in the analysis of effects of investments on labour that this branch's ability to increase employment depended greatly on demand for its output. Investments in the sector would reduce the ratio of prices of the competing formal sector firms to this branches prices. The advantages of lower prices will hence be erased. Mass investments in this sector can increase prices only if large increases in the demand for output occurs, otherwise some firms will collapse and total employment in the sector does not increase.

The last factor we have to consider for us to decide whether investments in the GBS sector should be encouraged is the effect of investments on structure of the sector. We begin by analysing the location of these firms. The location of these GBS firms does not differ from the location of the other informal sector activities. They, however, cluster more around the eastern side of the city outskirts. A few are found in the outskirts of the city such as Dagoretti and Githurai. They do not flow into residential areas as the other informal sector firms. This could be partly due to the amount of noise pollution caused by the firms. The firms located in the outskirts of the city concentrate in the market centers, and not in the residential areas. For GBS firms, location is not random. Increased investment in the sector could mean changes in location of these firms due to increased air and noise pollution. This we would understand if we actually look into the kind of machines available as investment goods in the

sector. These machines are big automated machines requiring huge power and water installations. The firms would be faced with higher adjustment costs, resulting in some of these firms pulling out of the industry unless a lot is done by the government to ensure smooth changes in location over a long period of time. This, though realistic, would be very expensive due to, the need to subsidize adjustment costs and high costs of administering subsidies and ensuring smooth transition. There would be a lot of loopholes in this strategy, thereby encouraging corruption. The beneficiaries of this operation might eventually not be the informal sector. The firms involved might eventually be forced to pay for this out of their own resources. This paper urges no interference with the GBS section of the manufacturing subsector. The firms should grow at their own natural rate of growth. Any firm that grows too large for its location and technical combinations of labour and capital should be able to move by itself to the formal sector. Output in GBS section of the manufacturing sector is not determined by investments.

The above characteristics do not apply for the metal work and the woodwork sections. Investments had significant effects on output in these two sections. Most investments in the woodwork section were achieved by savings. The role of credit was not very high for the metalwork section of the sector. There were only three individuals in the woodwork section who had received loans for their businesses. This small number could be the cause of the inability of our regression equations to capture the need for investments in our model. Field experience showed that the success of the wood work industry depended very much on the quality of a firm's

products. Most entrepreneurs recognised this fact. Quality of produce depended greatly on the machines types available to the entrepreneur. Some of the entrepreneurs hired machinery such as lathe machines, plane cutters, curving equipment, at high costs. This increased the prices of their products, hence reducing the ratio of their prices and the prices of the formal sector (PIFI). The above finding underscores the importance of investments to the woodwork section of the economy. The issue is how to finance these investments. In the metal work section, the role of investments on output was very high. Though some investments were financed by savings the role of credit was emphasized by the model. The importance of investments to increase output in the woodwork and metal work branches is unquestionable.

How these investments can be financed remains an unsolved issue. Policy makers can recommend investments in the sector to be financed through personnal savings or credit. There are two types of savings, forced savings and voluntary savings that can be applied. Policy makers can only encourage voluntary savings through special packages and or use of extension workers to encourage entrepreneurs to increase savings. Though incomes in the sector can be estimated, receipts of payment are received sporadically. The special packages on savings to be provided by the sector need to incorporate this concept. Cooperative like banks with special emphasis on *jua-kali* should be established. Credit is the other means of financing investments. Presently there are a few institutions considering providing loans to the informal sector. These include the Ministry of Economic Planning and Development. Those that presently provide credit Include Kenya Industrial Estates (KIE), Small Enterprises

Finance Company (SEFCO), International Labour Office/ United Nations ILO/UNHCR Joint Loan Board JLB and KCB Kenya Commercial Bank. A major problem faced by informal sector firms is the inability to obtain collateral security. So far only KCB has provided collateral-free loans to the sector. The others have elaborate guarantee programmes not conducive to informal sector entrepreneurs. Others have attempted to simplify their loan schemes with limited success. If the system of loan provision remains unchanged, then it goes without saying that financial assistance to the informal sector will remain a hue and cry. Informal sector entrepreneurs have formed regional co-operatives, which solicit funds and provide loans to their members. These organizations are accepted within the sector, and provides loans without collateral security. Policy makers could use these bodies already created in the informal sector as saving mobilization and credit provision institutions. These organisation's structures and liquidity could be improved to cater for the financial demands of the informal sector. A triple strategy could be incorporated between advisory provision, supply of finance, and the mobilization of savings through these strengthened institutions. The Makadara *jua kali* Co-operative is an example of one of them which has started providing loans to its members. Other areas have formed such bodies but have not begun releasing loans to their members. Studies should be undertaken to analyse the possibilities of encouraging the development of these co-operatives into stronger institutions. Another factor to be considered with loan provision is the nature of credit provision. Credit should take the form of physical capital rather than financial capital. This is important due to the lack of seriousness of some informal sector entrepreneurs. Some of them use this credit for other uses

other than firm uses.

Firms in the manufacturing sector employ an average of five people per firm. The mean number of labourers for each of the individual sections is: four for GBS, five for metal work, and four for the woodwork section. Increasing employment in the woodwork and metalwork branches requires increases in both labour and capital, assuming that there are no limitations to demand of firm output. Because this is not the case, there is need for a two sided policy, incorporating both increases in demand for output and at the same time encouraging continued use of labour-intensive methods of production. Increasing domestic demand for output can be achieved through large-scale advertisement at the macro level since individual firms will not be able afford these costs. Investments and the use of labour-intensive methods are not necessarily contradictory approaches. Firms can be made to invest in capital embodying labour-intensive production techniques. An example is a wood cutter and a saw. A saw requires more human hours of work input, at the same time engages an individual at a time. The plane cutter requires fewer man hours at the same time engages one worker at a time. The plane, therefore, does not reduce labour per se but, on the contrary, increases worker productivity and induces excess capacity in firms operating in full capacity. Factor substitution occurs more effectively where labour specialisation exists. Production specialisation in the informal sector is minimal in individual firms. It is unlikely, therefore, that firms in the sector would effectively implement factor substitution. Factor substitution would only be effective if investments in the sector are geared towards automated goods, that undertake all stages of production in the firm with much less labour. Investments in the sector should be

geared towards labour intensive capital. A good example of labour intensive embodied capital versus capital intensive embodied capital is a smaller steel rolling plant versus brick built iron blast furnace. Shifting investments from capital intensive embodied goods to labour intensive embodied goods can be done through pricing policies. The policymakers should, therefore, identify informal sector capital goods that embody the use of more labour than others, and recommend subsidies for these products. Such a policy will not only have effects on labour, but will improve individual entrepreneur ability to increase investments financed by savings. This policy shall have the added advantage of increasing marginal productivity of labour as labourer employment per firm increases and saving of foreign currency at the macro level as firm depend less on imported capital goods.

One finding of the GBS branch is its inability to increase firm employment levels without increasing capital. We mentioned that the production functions of this sector presently tends towards Leontiff production functions. This was because the capital available to the sector is either highly capital intensive or labour intensive implements. Examples of capital available to these firms include capital used in the production of car bodies. These are large firm lines, which are automated at most levels. Or the manufacture of buckets in large scale are greatly automated systems which increase speed of production. On the other hand informal sector firms have very little capital. Such capital includes implements such as pliers, a rail bar, manual metal cutters, and hammers. Increasing employment given the nature of these firms can only be achieved if output can be increased. Otherwise labour will have to be substituted for capital.

So far we have only looked at possibilities of increasing informal

sector employment through vertical expansion. There is need for policies to increase labour using the sector's horizontal potential. This can be realised by encouraging increased entrepreneur incomes, since entrepreneur motivation in most instances is profits. On the other hand, entrepreneurs should be encouraged to diversify production. A good example is venturing into porcelain products. It is possible to produce such products in the informal sector due to low technological and capital requirements. This would ensure faster horizontal expansion of the sector partly because the market for this produce is fully in the hands of the formal sector, and market for informal sector produce assuming they will produce at low prices will be guaranteed. Limited competition within the informal sector firms in this sector would give these entrepreneurs higher incomes which will result in increased entry into the sector.

Labourer incomes average 1200shs per month these incomes are not much different from the formal sector's unskilled labourer incomes. They are, however, low for skilled labourers in the formal sector. Labourer incomes in the sector remain low for the same reasons as those of the formal sector. Entrepreneur incomes, on the other hand, are adequate to ensure entry into the sector. Introduction of taxation, on entrepreneur incomes, will reduce the attractiveness of the sector to entrepreneurs. The high unemployment rate coupled by few formal training institutions ensures a large source of manpower for the informal sector. This has a repressive effect on labour wages in the sector. Entrepreneur incomes average 13,000shs monthly for the combined informal manufacturing subsector. Average entrepreneur incomes for sections of the manufacturing subsector are 16,000shs, 11,000shs and 12,000shs for metal work, woodwork and GBS

respectively. These values are net of lumpsum council and government taxes in the form of licencing. These incomes are satisfactory enough to ensure entry into the sector. It is for this reason that the present state of affairs as per tax collection should prevail. Tax enforcement would act as a disincentive to the expansion of the informal sector. It is true that successful informal sector entrepreneurs move to the formal sector. This is done first by registering the firm, then by changing location preferably to areas where the informal sector is non existent. It is at this level that these firms should be taxed. This aspect of firm maturity to warrant taxation could be considered a protectionist policy to informal sector firms still operating in the sector and should be legalized.

From the field it was noted that several entrepreneurs in the sector are individuals originally in formal sector employment or employees in the informal sector itself. Their previous incomes were definitely lower than there present incomes. The character of entrepreneurs entering the sector is unlikely to change, with more ambitious entrepreneurs directly joining the formal sector.

Successful entrepreneurs in the informal sector formally register their firms, shift location and join the formal sector. What should worry policy makers is hence not informal sector incomes but the stagnation possibilities of the firms in the sector. A study by Jobs And Skills in Africa (JASPA) showed that most informal sector firms grow to a certain level after which growth ceases.(See also the text after Table 19) The average life expectancy of firms was estimated at 79 months. The firms then die of or operate in that low form without any aggressiveness in production for the rest of the time period. It is this stagnation noted in

these firms that should be of concern to policy makers. Stagnation in these firms could be due to inability to increase or and improve quality of output through investments and lack of aggressive marketing and managerial skills. We have already looked at the importance of investments in the sector, and analysed how best investments can be financed. We shall therefore concentrate on marketing.

Informal sector marketing procedures are limited to outdoor display of products. Most formal marketing procedures are not conducive to individual informal sector firms. What is required is an appropriate means of marketing informal sector produce. Individual firms in the informal sector cannot undertake marketing procedures such as advertising and salesmanship due to the high costs involved. Sales promotion such as competitive pricing is currently used by informal sector entrepreneurs. Informal sector prices are significantly lower than the same products sold in the formal sector. The ratio of formal-sector prices to informal-sector prices averages at 1.43. This price advantage could be eroded if middleman-ship encroaches on the sector. Policy makers should stress the use of publicity as a marketing tool. This, combined with national sponsored exhibitions, would go a long way towards improving the marketing of informal sector produce. Exhibitions would: encourage improved product quality within the sector, act as a media to display improved and new products, and might increase the export potential of their sector.

We should look at the export potential of this sector more closely as export promotion is currently part of national development policy Exportable produce include welding machines, wooden lathe machines, metal cutters, and unique GBS products such as jikos. Some of these products could require improvement in packaging and design. This could be performed by a specialized institution if quick results are to be attained. The institution should not be a profit making institution since the profit motive would either result in appreciation of low informal sector good prices to the external market and retail domestic prices, and repression of domestic producer selling prices. The monopsony nature of this institution if left to be a profit making institution would be the cause of the latter effect. If quick results is not necessarily our objective, then through seminars policymakers should encourage entrepreneurs to venture into exportation. This can be supported by participation of Kenyan informal sector entrepreneurs in external trade fairs and appropriate tax and bureaucracy exemptions. Entrepreneurs in the informal sector could be termed as bureaucracy shy. Even when dealing with city council officials, they are quick to tempers and other non business healthy attitudes. It would be a disincentive, therefore, to subject them to the long official requirements for exportation. Exemptions from such bureaucracy is, therefore, required.

Within the informal sector there are several innovations and reproduction of formal sector products. This is particularly true for the metal and general blacksmith sections of the industry. New products presently manufactured in the sector include welding machines, lathe machines for wooden products, metal and wood cutters. Technocrats in the sector argue that they can produce most components of capital goods used in the sector. A grinder is used to shape off uneven coagulations caused by welding or cutting metal bars. Most technocrats in metal and wood work interviewed in this study agreed that they could manufacture all components of the grinder with the exception of the amateur. The amateur requires equal loading of metal on the entire surface area. This aspect of equiloading can only be done by a balance machine, the only balancing machine in the country is found in the Kenya airways workshop. These are some factors that inhibit innovativeness in the sector. There is hence need for institutional support to identify new products that the sector can produce and provide this type of capital either to be used en mass by the informal sector at a price or to produce these particular component and sell it to the informal sector entrepreneurs for assembling with the rest of components they produce. Optionally they could buy the components produced by the sector and sell the entire product. These very institutions should engage in product research and development.

Another major requirement of these firms is provision of training to informal sector entrepreneurs involved in production. Training of informal sector personnel is not costly. Labourers are trained in the sector itself at a fee negotiated between the trainee and the firm's entrepreneur. Others are trained free of any charges, but work during the training

period without pay. There is need for formal training for both labourers and entrepreneurs. This is particularly so since most of entrepreneurs involved in innovations have at least some formal training particularly in the electrical field. The kind of training to required by informal sector firms is not specialized but a combination of mechanical and electrical classes combined and managerial and accounting seminars. This would increase the innovative potential of the sector, and, on the other hand, ensure better trained firm owners and entrepreneurs. Labourer training institutions should be provided by the government. Sponsoring of labourer to these institutions is done either by individual firms or by the individual labourers themselves. Labourer training should take the form of technical training alone. The importance of labourer training must be stressed, since it is these very labourers who become firm owners or entrepreneurs.

The present Kenyan law structure makes the informal sector illegal and discourages the sector's growth. The Trade Licencing Act, Factories Act and the Local Government Act encourage the persecution of the sector. There are two ways in which the informal sector and the law can be made to compromise. Either the informal sector should operate under the existing laws or the current laws be changed to suite the growth of the informal sector within reasonable limits. Currently the former situation holds. The importance of law recognition is it allows for risk taking and development as it provides security to the entrepreneur. More emphasis should be laid in using the law as a regulatory and a protective tool towards the sector. There is, therefore, need to critically reexamine current by-laws, particularly local government laws, to avoid the destruction of the informal sector.

Lastly there is need for a coordinating body to check the feasibility of any policies and to ensure that policies applied to the sector at all levels are not contradictory. All in all, the need to establish the informal sector in Kenya is unquestionable. All efforts should be taken to ensure growth and stabilisation in the sector.

6.4: Conclusions

The above mentioned policy recommendations can be summarised as: a) non interference with the general blacksmith section of the informal sector, b) The provision of credit to finance much needed investments in the sector, c) solicitation of savings through extension services and special packages to the sector, d) improved institutions initiated by the informal sector itself such as jua kali cooperatives to increase savings , provide credit and train personnel. e) improved marketing of informal sector produce through increased publicity and government aided trade exhibitions, f) review of Local Government Laws, Factories Act and other laws that affect the sector to change the role of law from being destructive to being more regulatory and protective, and the need for a coordinative body. Such policies should expand the sector's output potential, and labour generation capacity, and widen the local technological shelf by identifying and safeguarding informal sector innovations. Training in the sector will result in improved entrepreneurship in the economy, whereas development of the sector results in exploiting entrepreneurial potential in the economy. The benefits of increased entrepreneurship will be spread to other sectors of the economy. Informal sector development will result in the widening our local industrial base, hence reducing reliance

on the agricultural sector. Lastly is the increased manufacturing of capital goods and consumer durables from induced innovations in the sector. This increases consumer sovereignty in the economy, and has the overall effect of improvement in standard of living for consumers in the economy by charging lower prices for their produce. On the other hand, the lower prices charged for capital goods has the effect of increasing investments in the informal sector, and in the formal sector as the informal sector gains more recognition.

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APPENDIX 1

Survey Questionnaire

Nairobi's Informal Manufacturing Sub-sector

Greetings , Introduce yourself to the particular individual, and explain purpose of visit. Care should be taken to explain non association to the income tax department otherwise the entrepreneur shall not be co-operative. Its wise to show your student or relevant identity card to erase of unnecessary fears. Only the entrepreneur should be interviewed. Please note where questions are in the form of yes/no mark the relevant answer.

SITE: to be answered by observation.

PERMANENT STRUCTURE yes/no

SHED OF SEMI PERMANENT STRUCTURE WITH PARTIAL ROOFING yes/no

JUA KALI yes/no

1.) OUTPUT AND INCOMES

PRODUCTS:

1.1 Which products do youproduce?_____

_____

_____

_____

_____

_____

The questions below are to be used to fill table one below, We shall attempt to estimate present year level of output.

1.2 What amount of each product do you produce /weekly /monthly /annually

1.3 What price does each product go for ?

TABLE 1

TOTAL REVENUE TABLE FOR PRESENT YEAR

NAME OF PRODUCT AVAILABLE	QUANTITY PRODUCED ANNUAL OR 3 MONTH ESTIMATE	PRESENT YEAR PRICE	FORMAL SECTOR PRICE OF PRODUCT

The formal sector price of product is obtained by observation in the formal sector shops.

The questions below are for table 2.

2.1 Which raw materials do you use for the manufacture of each product?

2.2 What quantities of each raw material are used in the manufacture of each product ?

2.3 What was the price of raw material per unit ?

2.4 Is the raw material from the formal or informal sector ?

TABLE 3

Cost Of Raw Material Table;

Product name and Size	Raw Material Used and Quantity	price Per Unit	From Formal or Informal Sector
1			
2			
3			

The Questions Below Are For Table 4 below.

3.0 How many full time workers do you employ ?

3.1 How much do you pay each individual full time worker ?

3.2 How many casual workers do you employ /annually/ every 3 months /weekly .

3.3 How much do you pay each casual labourer weekly / monthly or daily ?

3.4 How many trainees have you engaged this year ? Does this significantly differ from the past year? If yes then how many trainees did you employ last year?_____

3.5 How much do you pay them weekly/monthly ?

3.6 Are there any family members employed in your firm ? if yes move to 3.7 if not move to 4.0.

3.7 How many do you employ? How much do you pay them weekly/monthly?

TABLE 3
The Employment Table

TYPE OF LABOURERS	NUMBER	AMOUNT PAID TO WORKERS
FULL TIME PRODUCTION WORKERS		
PART TIME WORKERS		
TRAINEES		
FAMILY MEMBERS		

4.0 Do you use electricity in your work premises ? yes/no If yes then move to 4.1, if not then move to 5.0.

4.1 What is the average cost of electricity monthly ?_____5.0 Does your business have access to piped water ? yes/no If yes then move to 5.1 if not move to 6.0.

5.1 How much on average do you pay for water annually /monthly ?

6.0 Does your business have a license ? yes/no, If yes then move to the next, question i.e 6.1 if not then move to 7.0.

6.1 How much do you pay for your license monthly/annually ? kshs_____

6.2 Have you been harassed by any government representative ? Yes/No

If yes explain, if no move to 7.0. _____

7.0 For the questions below mark either yes or no

Do you own, rent or just use the space where you are located? _____

If own then move to 7.1 if not move to 8.0

7.1 What amount are you charged (annually/monthly Kshs_____

8.0 Do you incur any transport cost through any of the following below, such as transportation of raw material: Yes/No,

transportation of finished product to consumer: yes/no

transportation of labourers yes/no if no move to 9.0 if yes move to 8.1.

8.1 Do you own your own transport or do you hire? hire/own If hire how much on average do you pay monthly/annually to the hiring service? Kshs._____ monthly /annually If you own then how much approximately do you spend on transport monthly or annually Kshs._____The questions below are to be used in filling table 4 below on investments.

9.0 Which machines assist you in production ?

9.1 When did you buy each machine?

9.2 What is the present estimated cost of machinery ?

9.3 Is the machine manufactured in the informal sector ?

9.4 When did you begin your business ?

TABLE 4

INVESTMENT TABLE 4

MACHINE TYPE	YEAR OF BUYING MACHINE	ESTIMATED PRICE OF MACHINE	WHERE DID YOU BUY MACHINE ? FROM FORMAL OR INFORMAL

10.0 Do you need any more machines? yes/no , If yes What are the estimated price of machine?

MACHINES NEEDED	ESTIMATED PRICE OF MACHINE

11.0 Have you at any time applied for any loan for this business yes/no .If no then explain why not _____

_____then move to 12.0 if he has received a loan then move to 11.1 below .

11.1 Why do you want the loan ?

to buy new equipment: yes/no,

to employ more workers: yes/no,

to replace worn out equipment: yes/no.

11.2 Did you receive the loan ? Yes/No ,If no move to 12.0, if yes move to 11.3.

11.3 What type of loan was it? cash loan or physical capital loan?

11.4 What was the amount of loan Kshs._____

11.5 How did you use the loan ?

___all applied to business

___ some applied to business, what amount Kshs._____

all applied to other uses___. If all was applied to other uses then move to 12.0. Otherwise move to 11.6.

11.6 Have you started paying back the loan ? Yes/No If yes how much do you pay annually ? kshs_____

12.0 On average how much did you save last year? Kshs._____

12.1 How much did you replough into business? Kshs._____

12.3 Is this amount typically different from other years ? Yes/No if yes what is your average level of savings ? kshs _____

13.0 Are you trained in this field ? yes/no if yes move to 13.1.

For the question below tick the appropriate answer

13.1 Where did you undertake your training ?

____ On the job training (informal sector)

____On the job training (formal sector) village polytechnic and other training institutions;

____certificate trade test I

____level of certificate trade test II

____ level of certificate trade test III

____ Higher level of training.

14.0 What do you estimate you annual/monthly income as from business as Kshs._____

Do you pay yourself a salary ,yes/no . if yes how much Kshs._____

END INTERVIEW AND THANK RESPONDENT

APPENDIX 2

Data

The data variables are represented, in short form. This section explains the variable codes used in this appendix.

1.) INV represents Investments.

2.) OUT represents Output.

3.) INC represents Income.

4.) CAP represents Capital.

5.) INVP represents Initial level of investments.

6.) KLRs represents Capital labour ratios

7.) DCAP represents Desired level of capital.

8.) TOP represents Type of firm

9.) SAV represents Savings

10.) PIFI represents Ratio of formal sector prices, to informal sector prices.

11.) CRED represents Credit

12.) TRAN represents Training

13.) LAB represents Labour

bs	INV	OUT	INC	CAP	INVP	KLR
1	1983.000	2569200.	1188600.	1983.000	0.000000	992.0000
2	1631.000	138160.0	36532.00	1630.000	0.000000	543.0000
3	33000.00	1612800.	189390.0	55000.00	15000.00	5500.000
4	2000.000	132000.0	10500.00	2755.000	755.0000	918.0000
5	14550.00	4076400.	1723612.	59550.00	15000.00	4253.000
6	9020.000	286000.0	113000.0	17320.00	8300.000	3320.000
7	5500.000	864000.0	111000.0	21500.00	16000.00	5500.000
8	7585.000	165600.0	16200.00	7585.000	0.000000	3792.000
9	16900.00	14400.00	1900.000	16900.00	0.000000	8150.000
10	92000.00	969600.0	111200.0	99000.00	7000.000	19800.00
11	5500.000	543600.0	183200.0	9000.000	3000.000	2250.000
12	10000.00	690000.0	214000.0	13000.00	3000.000	2000.000
13	0.000000	600000.0	18200.00	1480.000	1480.000	161.0000
14	53300.00	900000.0	109030.0	54445.00	1145.000	13611.00
15	5000.000	33180.00	70400.00	14910.00	9910.000	1970.000
16	7000.000	57600.00	25100.00	9925.000	2925.000	1962.000
17	10000.00	484000.0	155500.0	13500.00	3100.000	3275.000
18	12200.00	2569200.	1188600.	20250.00	8050.000	1350.000
19	6200.000	135520.0	52200.00	10200.00	4000.000	1700.000
20	6000.000	410200.0	141840.0	6400.000	400.0000	1280.000
21	9200.000	291000.0	31000.00	9200.000	0.000000	1151.000
22	22500.00	1586800.	899290.0	30000.00	2500.000	5000.000
23	600.0000	128400.0	125000.0	600.0000	0.000000	100.0000
24	1.000000	2097600.	100000.0	15000.00	15000.00	51000.00
25	0.000000	2149375.	120000.0	15000.00	15000.00	3000.000
26	59530.00	2176800.	1309200.	66430.00	6500.000	63180.00
27	1470.000	1230000.	383100.0	16470.00	15000.00	1117.526
28	8000.000	344800.0	122810.0	15320.00	7320.000	3830.000
29	30345.00	441600.0	187140.0	45000.00	15000.00	22500.00
30	13000.00	112800.0	81200.00	13000.00	0.000000	3000.000
31	18500.00	505000.0	179100.0	100000.0	51000.00	11285.00
32	23500.00	111200.0	155100.0	33800.00	15300.00	11000.00
33	3830.000	268800.0	66000.00	3830.000	0.000000	1000.000
34	370.0000	137520.0	19200.00	370.0000	0.000000	185.0000
35	955.0000	312750.0	68700.00	955.0000	0.000000	238.0000
36	558.0000	312000.0	17800.00	558.0000	0.000000	186.0000
37	1900.000	804000.0	251100.0	19200.00	11300.00	1800.000
38	6000.000	472000.0	73600.00	19780.00	13780.00	1919.000
39	15400.00	324000.0	107200.0	15400.00	0.000000	5100.000
40	0.000000	194000.0	41200.00	100.0000	100.0000	200.0000
41	2450.000	384000.0	30600.00	1150.000	200.0000	210.0000
42	200.0000	630900.0	35010.00	3250.000	3000.000	106.0000
43	0.000000	190800.0	236120.0	1240.000	1240.000	250.0000
44	0.000000	267600.0	26000.00	120.0000	120.0000	0.000000
45	1000.000	10800.00	26000.00	2175.000	1175.000	2175.000
46	6000.000	385000.0	130560.0	21000.00	17000.00	5700.000
47	8000.000	480000.0	196000.0	11700.00	3700.000	5350.000
48	275.00.0	2130000.	670000.0	275000.0	0.000000	2618.000

obs	INV	OUT	INC	CAP	INVP	KLR
49	1200.000	834000.0	376560.0	1200.000	0.000000	600.0000
50	26200.00	512640.0	48000.00	40200.00	14000.00	20000.00
51	22000.00	211000.0	19600.00	22500.00	0.000000	5620.000
52	9780.000	489600.0	23300.00	9780.000	0.000000	3260.000
53	11550.00	272000.0	149400.0	11550.00	0.000000	3850.000
54	4000.000	153000.0	48000.00	565.0000	0.000000	565.0000
55	640.0000	226800.0	80800.00	640.0000	0.000000	210.0000
56	8000.000	161600.0	51600.00	8850.000	1500.000	2000.000
57	44600.00	438500.0	27890.00	72300.00	27700.00	11460.00
58	26000.00	681600.0	147100.0	40800.00	4800.000	8160.000
59	8500.000	1059000.	318000.0	20300.00	11800.00	3388.000
60	12000.00	582000.0	127000.0	26800.00	14800.00	6700.000
61	16300.00	600000.0	267400.0	16300.00	0.000000	5400.000
62	16100.00	1080000.	544360.0	16100.00	0.000000	3220.000
63	3000.000	176000.0	31200.00	595.0000	0.000000	3000.000
64	14330.00	156000.0	103400.0	14330.00	0.000000	7000.000
65	200.0000	237720.0	654000.0	200.0000	0.000000	200.0000
66	39420.00	4848000.	142000.0	56720.00	17300.00	1666.000
67	6000.000	57600.00	32000.00	15000.00	9000.000	7500.000
68	6000.000	280000.0	133800.0	15000.00	9000.000	0.000000
69	605.0000	93600.00	28000.00	2605.000	2000.000	1300.000
70	20000.00	1440000.	149400.0	29000.00	9000.000	5000.000
71	15000.00	652000.0	102600.0	22000.00	7000.000	7000.000
72	7000.000	116800.0	50000.00	11500.00	3600.000	3600.000
73	15000.00	231200.0	55200.00	15000.00	5000.000	5000.000
74	500.0000	224200.0	24000.00	500.0000	120.0000	120.0000
75	0.000000	320000.0	76000.00	1940.000	485.0000	485.0000
76	7000.000	72000.00	75600.00	11000.00	3000.000	3000.000
77	7000.000	540000.0	47000.00	8000.000	2000.000	2000.000
78	8000.000	400000.0	68000.00	13615.00	3200.000	3200.000
79	52000.00	1734000.	403000.0	52180.00	15000.00	10436.00
80	12000.00	349800.0	74800.00	12000.00	1.000000	6000.000
81	0.000000	34600.00	4600.000	6000.000	6000.000	6000.000
82	0.000000	86400.00	19200.00	1390.000	1390.000	1390.000
83	37350.00	1106800.	389400.0	76990.00	39640.00	6999.000
84	0.000000	9200.000	7200.000	6340.000	6340.000	6340.000
85	6000.000	55200.00	13080.00	12000.00	6000.000	12000.00
86	7000.000	37800.00	12100.00	14000.00	7000.000	50000.00
87	520.0000	30800.00	8800.000	520.0000	0.000000	520.0000
88	0.000000	26400.00	7200.000	12566.00	12566.00	12566.00
89	18000.00	684000.0	56200.00	4000.000	0.000000	1333.000
90	0.000000	220000.0	60000.00	1740.000	1740.000	870.0000
91	12000.00	280800.0	48400.00	15000.00	3000.000	7500.000
92	1110.000	380000.0	117200.0	1810.000	700.0000	500.0000
93	2000.000	308000.0	99000.00	2400.000	400.0000	800.0000
94	13000.00	648000.0	61000.00	36000.00	13000.00	5000.000
95	10000.00	444000.0	232900.0	30020.00	20020.00	7505.000
96	12000.00	57700.00	36368.00	27000.00	15000.00	13500.00

obs	INV	OUT	INC	CAP	INVP	KLR
97	795.0000	480800.0	75100.00	12000.00	11205.00	3000.000
98	3200.000	93200.00	38400.00	10500.00	7300.000	2600.000
99	52000.00	372000.0	130000.0	67000.00	15000.00	23000.00
100	12000.00	640000.0	87000.00	18000.00	6000.000	3600.000
101	26700.00	364000.0	86400.00	19190.00	2490.000	5393.000
102	0.000000	278000.0	60500.00	500.0000	500.0000	166.0000

obs	DCAP	TOP	SAV	PIFI	CRED	TRAN
1	2750.000	2.000000	0.000000	1.400000	0.000000	2.000000
2	15500.00	2.000000	0.000000	1.600000	0.000000	3.000000
3	500000.0	2.000000	22000.00	1.100000	80000.00	5.000000
4	15000.00	2.000000	0.000000	1.600000	0.000000	1.000000
5	80000.00	2.000000	40000.00	2.800000	10000.00	2.000000
6	45000.00	2.000000	2000.000	1.800000	0.000000	1.000000
7	13000.00	1.000000	2000.000	1.400000	0.000000	3.000000
8	9000.000	1.000000	0.000000	1.500000	0.000000	1.000000
9	13000.00	1.000000	0.000000	1.500000	0.000000	5.000000
10	60000.00	2.000000	60000.00	1.400000	33000.00	6.000000
11	15000.00	1.000000	5000.000	1.200000	0.000000	1.000000
12	7000.000	1.000000	12000.00	1.200000	0.000000	1.000000
13	0.000000	1.000000	20000.00	2.000000	0.000000	3.000000
14	10500.00	2.000000	100000.0	1.300000	0.000000	1.000000
15	45000.00	2.000000	0.000000	1.500000	0.000000	1.000000
16	8000.000	2.000000	0.000000	1.700000	0.000000	3.000000
17	20000.00	2.000000	36000.00	1.400000	0.000000	2.000000
18	31000.00	1.000000	30000.00	1.300000	0.000000	5.000000
19	1400.000	1.000000	2000.000	1.100000	0.000000	1.000000
20	9200.000	3.000000	3000.000	1.200000	5000.000	1.000000
21	3600.000	3.000000	2600.000	1.400000	0.000000	1.000000
22	5000.000	2.000000	40940.00	2.100000	300000.0	5.000000
23	3000.000	3.000000	36000.00	0.800000	0.000000	1.000000
24	32000.00	3.000000	24000.00	1.300000	5000.000	1.000000
25	32000.00	3.000000	60000.00	1.600000	0.000000	1.000000
26	12600.00	1.000000	160000.0	1.800000	300000.0	6.000000
27	85000.00	2.000000	100000.0	1.800000	0.000000	2.000000
28	36000.00	1.000000	2832.000	1.800000	0.000000	1.000000
29	53000.00	2.000000	43440.00	1.700000	0.000000	3.000000
30	14000.00	2.000000	0.000000	1.300000	0.000000	1.000000
31	72500.00	1.000000	24000.00	1.200000	0.000000	1.000000
32	27000.00	1.000000	11400.00	1.700000	0.000000	6.000000
33	540.0000	2.000000	0.000000	1.500000	0.000000	1.000000
34	0.000000	3.000000	0.000000	1.700000	0.000000	1.000000
35	20000.00	3.000000	12000.00	1.500000	0.000000	1.000000
36	0.000000	3.000000	0.000000	1.500000	0.000000	1.000000
37	15000.00	3.000000	30000.00	1.300000	0.000000	1.000000
38	21000.00	1.000000	0.000000	1.500000	0.000000	2.000000
39	16000.00	2.000000	12000.00	1.500000	0.000000	3.000000
40	19000.00	3.000000	0.000000	2.100000	0.000000	1.000000
41	16000.00	2.000000	0.000000	1.500000	0.000000	3.000000
42	0.000000	3.000000	27000.00	1.500000	0.000000	1.000000
43	0.000000	3.000000	96000.00	1.400000	0.000000	1.000000
44	3000.000	3.000000	0.000000	1.400000	0.000000	1.000000
45	16000.00	3.000000	1000.000	1.600000	0.000000	1.000000
46	0.000000	1.000000	28560.00	1.700000	0.000000	1.000000
47	6000.000	1.000000	36000.00	1.300000	30000.00	2.000000
48	150000.0	2.000000	0.000000	1.400000	150000.0	5.000000

obs	DCAP	TOP	SAV	PIFI	CRED	TRAN
49	55000.00	3.000000	12000.00	1.300000	0.000000	1.000000
50	0.000000	2.000000	6000.000	1.700000	0.000000	4.000000
51	28500.00	2.000000	0.000000	1.200000	0.000000	5.000000
52	25000.00	2.000000	0.000000	1.600000	0.000000	2.000000
53	16000.00	2.000000	80000.00	0.800000	0.000000	3.000000
54	4000.000	1.000000	0.000000	1.000000	0.000000	1.000000
55	6000.000	3.000000	15000.00	1.000000	0.000000	1.000000
56	6000.000	2.000000	0.000000	1.300000	0.000000	2.000000
57	15000.00	1.000000	7000.000	1.300000	0.000000	1.000000
58	36000.00	1.000000	2000.000	1.050000	0.000000	2.000000
59	0.000000	1.000000	5000.000	1.300000	0.000000	1.000000
60	14500.00	1.000000	3000.000	1.300000	0.000000	1.000000
61	14000.00	1.000000	24000.00	1.500000	0.000000	2.000000
62	0.000000	1.000000	0.000000	0.900000	0.000000	3.000000
63	3000.000	2.000000	14400.00	1.800000	0.000000	1.000000
64	114000.0	1.000000	9000.000	2.000000	0.000000	3.000000
65	3000.000	2.000000	70000.00	1.400000	0.000000	1.000000
66	25000.00	1.000000	0.000000	1.600000	150000.0	2.000000
67	24000.00	2.000000	1800.000	1.400000	0.000000	2.000000
68	25000.00	2.000000	0.000000	1.500000	0.000000	1.000000
69	2600.000	2.000000	28000.00	1.400000	0.000000	1.000000
70	25000.00	1.000000	0.000000	1.200000	0.000000	3.000000
71	32000.00	1.000000	0.000000	1.200000	0.000000	1.000000
72	22000.00	1.000000	0.000000	1.500000	0.000000	1.000000
73	13000.00	2.000000	0.000000	1.100000	0.000000	3.000000
74	25000.00	3.000000	0.000000	1.100000	0.000000	1.000000
75	30000.00	2.000000	0.000000	1.300000	0.000000	1.000000
76	6000.000	2.000000	3000.000	2.000000	0.000000	2.000000
77	18000.00	3.000000	0.000000	1.300000	0.000000	1.000000
78	30000.00	2.000000	40000.00	1.400000	0.000000	3.000000
79	28000.00	2.000000	2000.000	1.500000	0.000000	6.000000
80	35000.00	2.000000	0.000000	1.400000	0.000000	1.000000
81	0.000000	2.000000	0.000000	2.500000	0.000000	1.000000
82	3200.000	2.000000	0.000000	1.500000	0.000000	1.000000
83	0.000000	2.000000	0.000000	1.000000	150000.0	0.000000
84	0.000000	2.000000	0.000000	1.400000	0.000000	2.000000
85	37000.00	2.000000	0.000000	1.300000	0.000000	2.000000
86	14000.00	2.000000	0.000000	1.300000	0.000000	5.000000
87	17000.00	2.000000	0.000000	1.600000	0.000000	1.000000
88	0.000000	2.000000	2400.000	1.400000	0.000000	1.000000
89	18000.00	2.000000	0.000000	1.000000	0.000000	2.000000
90	25000.00	2.000000	0.000000	1.900000	0.000000	1.000000
91	29000.00	2.000000	0.000000	1.400000	0.000000	1.000000
92	19000.00	2.000000	8400.000	1.600000	0.000000	2.000000
93	22000.00	2.000000	0.000000	1.300000	0.000000	3.000000
94	56000.00	1.000000	2000.000	1.200000	0.000000	1.000000
95	37000.00	1.000000	16896.00	1.500000	0.000000	1.000000
96	21000.00	2.000000	0.000000	1.700000	0.000000	1.000000

obs	DCAP	TOP	SAV	PIFI	CRED	TRAN
97	20000.00	2.000000	8500.000	1.100000	0.000000	3.000000
98	27000.00	1.000000	0.000000	1.300000	0.000000	3.000000
99	14100.00	1.000000	21996.00	1.700000	0.000000	1.000000
100	8800.000	1.000000	3000.000	2.000000	0.000000	3.000000
101	30000.00	1.000000	0.000000	1.500000	0.000000	1.000000
102	30000.00	3.000000	0.000000	1.600000	0.000000	1.000000

obs	LAB				
1	2.000000	3.000000	10.00000	3.000000	14.00000
6	5.000000	3.000000	2.000000	2.000000	5.000000
11	4.000000	6.000000	2.000000	4.000000	3.000000
16	2.000000	4.000000	15.00000	6.000000	5.000000
21	8.000000	6.000000	6.000000	10.00000	3.000000
26	6.000000	4.000000	4.000000	2.000000	4.000000
31	7.000000	3.000000	3.000000	2.000000	4.000000
36	3.000000	4.000000	4.000000	3.000000	2.000000
41	6.000000	8.000000	5.000000	8.000000	0.000000
46	4.000000	2.000000	76.00000	2.000000	2.000000
51	4.000000	3.000000	3.000000	1.000000	3.000000
56	4.000000	5.000000	5.000000	6.000000	4.000000
61	3.000000	5.000000	1.000000	2.000000	1.000000
66	15.00000	2.000000	4.000000	2.000000	6.000000
71	3.000000	3.000000	3.000000	4.000000	4.000000
76	3.000000	4.000000	4.000000	5.000000	2.000000
81	1.000000	1.000000	11.00000	1.000000	1.000000
86	1.000000	1.000000	2.000000	3.000000	2.000000
91	2.000000	3.000000	3.000000	7.000000	4.000000
96	2.000000	4.000000	4.000000	3.000000	5.000000
101	3.000000	3.000000			

APPENDIX 3

Covariance Matrices

The tables below show the covariance matrices for the equations estimated in our model.

Table 1a: **Covariance Matrix for the General Investment Equation.**

C(1),C(1)	80,211,654	C(1),C(2)	0.92
C(1),C(3)	-6.062	C(1),C(4)	81.91
C(1),C(5)	0.717	C(1),C(6)	-9406587
C(1),C(7)	-28,236,311	C(2),C(2)	0.00021
C(2),C(3)	-4.30D-05	C(2),C(4)	-6.83D-05
C(2),C(5)	-0.000686	C(2),C(6)	-3.275
C(2),C(7)	2.736	C(3),C(3)	2.18D-05
C(3),C(4)	-7.43D-05	C(3),C(5)	-0.0001
C(3),C(6)	-0.1197	C(3),C(7)	-0.0284
C(4),C(4)	0.00404	C(4),C(5)	-0.0014
C(4),C(6)	-28.545	C(4),C(7)	3.404
C(5),C(5)	0.013	C(5),C(6)	-7.04
C(5),C(7)	-50.68	C(6),C(6)	3,886,751
C(6),C(7)	1,496,361	C(7),C(7)	13,669,383

C(1) represents the constant term in each of the investment equations below.

C(2) represents the coefficient of income.

C(3) represents the coefficient of output.

C(4) represents the coefficient of credit.

C(5) represents the coefficient of credit.

C(6) represents the coefficient of training.

C(7) represents the coefficient of Type of firm.

The above coeffient tags holds for each of the investment functions below.

Table 1b: Covariance Matrix for the General Income Equation.

C(20),C(20)	6.43D+08	C(20),C(21)	-338.54
C(20),C(22)	-2244.05	C(21),C(21)	0.000803
C(21),C(22)	-0.01124	C(22),C(22)	0.640399

C(20) represents the constant term in all the icome equations.

C(21) represents the output coefficient.

C(22) represents the investment coefficient.

The above symbols hold for each income equation estimated.

Table 1c: Covariance Matrix for the General Output Equation.

C(30),C(30)	1.26D+10	C(30),C(31)	-1,296,946
C(30),C(32)	35621.84	C(31),C(32)	276.0005
C(31),C(32)	-26.804	C(32),C(32)	8.853

C(30) represents the constantr term in each of the output equations estimated.

c(31) represents investment coefficient in each output equation. C(32) represents the capital labour ratios coefficient in each output equation. The above coefficient symbols holds for each output equation.

Table 2a: Covariance Matrix for the Metalwork Investment Equation.

C(2),C(2)	0.00086	C(2),C(3)	-0.000303
C(2),C(4)	-0.000307	C(2),C(5)	-0.002
C(2),C(6)	18.232	C(3),C(3)	0.00014
C(3),C(4)	-3.85D-05	C(3),C(5)	0.00054
C(3),C(6)	-10.753	C(4),C(4)	0.00652
C(4),C(5)	0.00128	C(4),C(6)	-25.198
C(5),C(5)	3,683,732	C(5),C(6)	-109.905

Table 2b: Covariance Matrix for Metalwork Income Equation.

C(21),C(21)	0.00161	C(21),C(22)	-0.0353
C(22),C(22)	1.1485		

Table 2c: Covariance Matrix for Metalwork Output Equation.

C(31),C(31)	10.63	C(31),C(32)	-11.03
C(31),C(33)	-84,575.09	C(32),C(32)	670.48
C(32),C(33)	-2479848	C(33),C(33)	1.55D+10

Table 3a: Covariance Matrix for the Woodwork Investment Equation.

C(2),C(2)	7.35D-05	C(2),C(3)	-7.86D-06
C(2),C(4)	0.000974	C(2),C(5)	-0.000136
C(2),C(6)	-2.067	C(3),C(3)	3.17D-06
C(3),C(4)	-0.000483	C(3),C(5)	-1.10D-05
C(3),C(6)	-0.458772	C(4),C(4)	0.272
C(4),C(5)	0.0029	C(4),C(6)	-29.842
C(5),C(5)	0.0013	C(5),C(6)	-1.877
C(6),C(6)	999,727		

Table 3b: Covariance Matrix for the Woodwork Income Equation.

C(31),C(31)	6428.12	C(31),C(32)	-7,[illegible]
C(31),C(33)	31.57	C(32),C(32)	1.66D+10
C(32),C(33)	-340429	C(33),C(33)	117.9213

Table 3c: Covariance Matrix for the Woodwork Output Equation.

C(31),C(31)	6428.418	C(31),C(32)	-7,635,596
C(31),C(33)	31.57	C(32),C(32)	1.66D+10
C(32),C(33)	-340,429	C(33),C(33)	117.9213

Table 4a: Covariance Matrix for the GBS Investment Equation.

C(2),C(2)	7.53D-05	C(2),C(3)	-7.86D-06
C(2),C(4)	0.00097	C(2),C(5)	-0.00014
C(2),C(6)	-2.0668	C(3),C(3)	0.000974
C(3),C(4)	-0.000483	C(3),C(5)	-1.10D-05
C(3),C(6)	-0.459	C(4),C(4)	0.272
C(4),C(5)	0.0029	C(4),C(6)	-29.84
C(5),C(5)	0.0013	C(5),C(6)	-1.877
C(6),C(6)	999,728		

Table 4b: Covariance Matrix for the GBS Income Equation.

C(21),C(21)	0.00113	C(21),C(22)	-0.187
C(22),C(22)	151.076		

Table 4c: Covariance Matrix for the GBS Output Equation.

C(31),C(31)	6428.42	C(31),C(32)	-7,635,596
C(31),C(33)	31.57	C(32),C(32)	1.66D+10
C(32),C(33)	-340,429	C(33),C(33)	117.9213
