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Public Policy and Firm Level Investment Behaviour in Ethiopia

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List of Acronyms

CSA   Central Statistical Authority of Ethiopia
FDI   Foreign Direct Investment
GCF   Gross Capital Formation
GDP   Gross Domestic Product
GDS   Gross Domestic Saving
GMM   Generalized Method of Moments estimation
ICA   Investment Climate Assessment
ISIC   International Standard of Industrial Classification
IVA   Industrial Value Added
MEDaC Ministry of Economic Development and Cooperation (Ethiopia)
OLS   Ordinary Least Squares
POLS   Pooled Ordinary Least Squares
SAP   Structural Adjustment Program
WB   World Bank
UNCTAD United Nations Conference for Trade and Development

Abstract

This paper addresses the effect of the bank foreclosure law on the investment behaviour of manufacturing firms in Ethiopia. The main premise of the paper is that this law has negatively affected private firm level investment in the study period. Using the Euler equation investment model, the two stage systems Generalized Method of Moments (GMM) estimation and an eight years survey panel data from the Ethiopian statistical Authority, the paper has tried to show, on average, a negative effect of the law on the investment rate of private firms. In addition all the Euler equation explanatory variables, augmented by variables which suit the context of developing countries, have the expected sign. More over, size and age of firms have also positive and negative effect on investment decision of Ethiopian firms, respectively. Further more, firms which have higher export to sale ratios are also more likely to invest than their non exporting counterparts.

Relevance to Development Studies

It is widely accepted that economic growth is one of the prime indicators of the development of nations. Countries which have diversified and strong economic base are more likely to succeed on meeting the social and economic needs of their societies. The development history of the developed world shows that the mystery of their economic strength mostly comes from their strong industrial base. Most of the development gap between the developing and developed nations widely lies on the success and failure of this sector.

Therefore, promoting industrial investment in Ethiopia is more than necessary to sustainably succeed in the development of this least developed nation. This can be achieved partly through formulating comprehensive industrial policy, improving the investment climate, and making sound policy interventions. This study focuses on the effect of past policy intervention on the investment behaviour of this sector. The result from this research can contribute to the endeavours of the country in the sphere of sound policy selection and evaluation of past interventions to promote manufacturing investment in Ethiopia.

Keywords

Chapter 1
Introduction

This paper will address the effect of the bank foreclosure law on the investment behaviour of manufacturing firms in Ethiopia. The main premise of the paper is that this law has negatively affected private firm level investment in the study period. Using econometric policy analysis technique, the paper has tried to show, on average, a negative effect of the law on the investment rate of private firms. In addition to the policy variable the other explanatory variables of the investment model which are expected to affect investment have also the expected sign. The next paragraphs explain the macroeconomic background of the economy and the idea and factors necessitated enactment of the bank foreclosure law in the country.

Since 1992 Ethiopia has undertaken economic reform(Ethiopian Investment Commission 2008), (Shiferaw 2007) with the objective to shift from the previous government's command to market economy and to progress the economy to the rigorous of international competition. This has provided the basis for a free participation of the private sector in the economy at large and in the manufacturing sector in particular. Among the measures(Ministry of Economic Development and Cooperation 1999), now onwards abbreviated as MEDaC, which had been under taken and expected to promote private sector participation were:

The lifting of the restrictions on private sector investment capital (ceiling) and number of business ventures, making easy licensing requirements and regulations, enactment of investment code which was accompanied by investment incentives like tax holidays & duty free importation of capital goods, reduction of tax and tariff rates, issuance of a new labour code which gave management autonomy to firms, and the devaluation of currency accompanied by conscious and gradual liberalization of the exchange rate are some of them worth mentioning.

In addition, to solve problems related to high demand for credit and low supply of funds from banks, the government wanted to improve the supply and ensure the repayment of loans. Due to delays in the legal system to give decisions on time regarding mortgaged assets, the government has implemented the bank foreclosure law since 19, February 1998. This law gives exclusive right to banks to auction mortgaged assets of defaulting debtors. The banks don't need to go in to lengthy judiciary processes, when the debtor fails to repay the loan as per the agreement, to get entitlement on the collaterals they secured from debtors in exchange for their disbursed loans.

As stated on the proclamation no.97/1998 (Government of Ethiopia 1998), the problem necessitated to amend the civil code concerning the sale of property mortgaged or pledged with banks are;.

> WHEREAS, it takes rather too long a time to obtain judgement, from courts of law, for sale of property mortgaged or pledged with banks and to subsequently have it executed; WHEREAS, consequently, banking business thriving on interest payments on loans it provides from public money received by way of saving deposits or acquired from other sources, has been adversely affected;

WHEREAS, in order to create a conducive environment to economic development by enabling banks to collect their debts from debtors efficiently and thereby promoting a good business culture,

Generally, since 1991 a series of structural adjustment and related policy measures were taken to improve the business environment for better participation of the private investor in the country.

It seems useful to see the general trend of the economy; from 1990-2004 in which major policy interventions were taken, by considering some aggregate economic variables which can partly explain the progress, as shown on figure 1. It shows that, as a percentage of gross domestic products (GDP), the gross capital formation (GCF) has an increasing trend until 2004. It is likely to be due to the higher public investment, especially investments in infrastructure, education, health, and real estate, in those years with the commitment from the government to improve the investment climate. Infrastructural investments in road, hydropower electricity generation, and telecommunication seem to have significant contribution to the higher gross capital formation.

Foreign direct investment (FDI) had been negligible part of GDP up to 1996 and started to rise in the later years. The most part of the increase in FDI seems to be due to visible participation of the private sector in the flower investment in the agricultural sector, real estate in the services sector, and partly in the industrial sector in the past ten years. The industrial value added (IVA) is on average almost stagnant at 10 % of GDP for a decade. But relative to the period before 1990 the sector has performed much better (Befekadu and Nega 1999/2000). Gross domestic saving (GDS) had been increasing after the reform and has tended to decline since 1998, even though; it showed some improvement in 2001.

FIGURE 1
Trends of some aggregate variables of the Ethiopian economy.

Macro Economic Indicators

Legend:
- Gross capital formation (% of GDP)
- Foreign direct investment, net inflows (% of GDP)
- Industry, value added (% of GDP)
- Gross domestic savings (% of GDP)
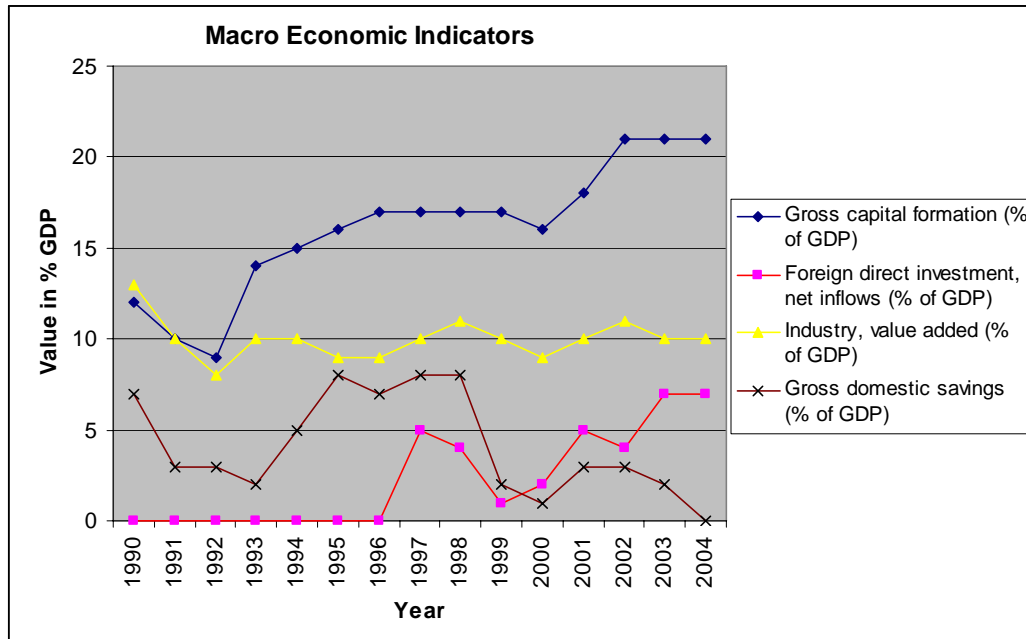
Source: Own computation using data from World Development Indicators 2006 (World Bank 2006).

FIGURE 2
Annual growth rates of some macro-economic indicators.

Macro economic indicators

Legend:
- GDP growth (annual %)
- Gross fixed capital formation (annual % growth)
- Manufacturing, value added (annual % growth)
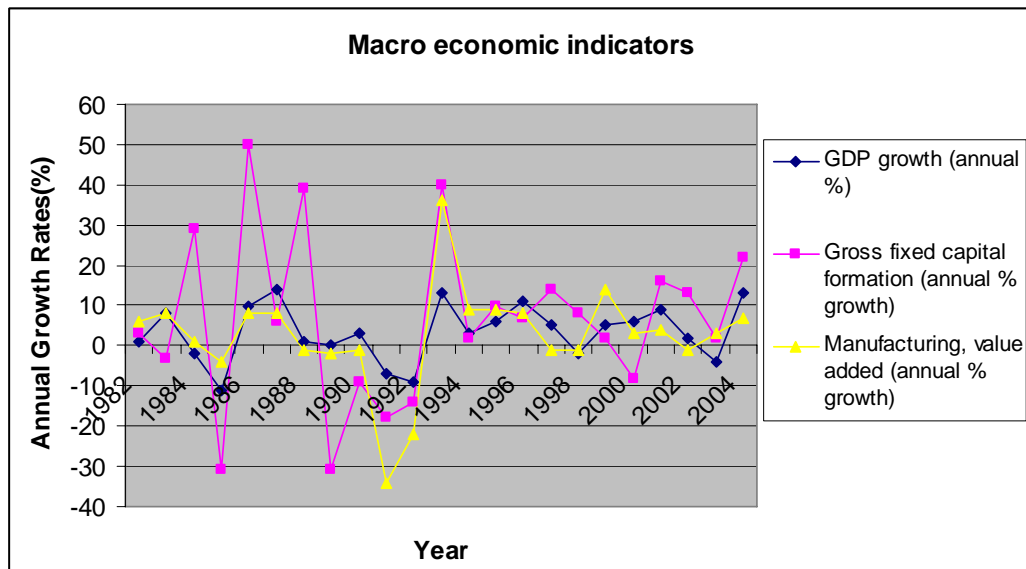
Source: Own computation using data from world development indicators 2006.

The above graph (Figure 2) shows the annual percentage growth rates for gross domestic product, gross fixed capital formation and manufacturing value added. The trend in the growth rates of the three indicators before the start of the structural adjustment programs in Ethiopia was negative and declining over time since 1988. But after the new federal government has implemented the reform program in 1991, the trend has seemed to improve to positive growth, even though, the indicators fluctuate together overtime.

1.1   Problem Statement

Even though the government of Ethiopia has undertaken several policy measures to encourage the participation of the private sector in the economy, the response of investment particularly in the manufacturing sector, has been not that much attractive and satisfactory (World Bank 2002). There have been some policy actions like bank fore closure law and political developments that might have undermined the incentive to invest. In relation to this, some literatures pointed out that apart from its benefit to the bankers, the bank fore closure law might have some contribution to hinder private investment from the investors side (Shiferaw 2006), since it gives excessive power to the banks. There fore, this has necessitated probing the issue further in detail to understand its contribution and draw conclusions on the basis of empirical evidence.

1.2   Relevance and Justification

It is widely accepted that investment is the primary source of economic growth. Especially, investment in the industrial sector has greater importance (Befekadu 2004) in diversifying production, increasing competitiveness in the world market through exploitation of economies of scale and for producing under increasing returns to scale. Moreover, its contribution in creating forward and back ward linkages in the economy is also much important. Promoting this sector needs to know and fix the main bottle necks of the sector and make sound policy interventions in addition to investing in infrastructures and promoting related actions.

So far the endeavours undertaken by the government of Ethiopia to improve the investment climate for increasing the participation of the private sector are significant, especially, in infrastructure development and policy intervention. But it happens some times that some policy measures could have unexpected side effects which might contribute to affect investment decisions negatively. There fore assessing the effect of a policy intervention is important to understand whether interventions which had been taken have the desired result or not. Learning from past policy interventions can be considered as one way of sound policy selection (learning by doing). Therefore, the research out put can have some contribution on understanding the response of firm level investment behaviour for a policy shock in the country under consideration and developing countries with similar socio economic background can make use of the lesson from the result to their economies as well. It may also contribute little input to the existing literatures on related topics.

1.3   Research objectives and research questions

The general objective of this research is to evaluate the effect of past policy intervention, enactment of bank foreclosure law, on private firm level investment decision in Ethiopia. The effect will be evaluated using statistical panel data policy analysis, differences in differences (DD), techniques by comparing private and public firms before and after the intervention.

The research questions which are going to be answered by the research are:

- What was the effect of the bank fore closure law on private firm level investment decision?
- Which firms are more likely to be affected? The Small, medium, or large ones? Which kind of industries?
- What is the effect over time?

1.4   Methodology

The methodology used to analyse the problem is econometric panel data policy analysis technique using the public firms as a control and private firms as a treatment group. This method compares the investment gap between the two groups of firms before and after the enactment of the bank foreclosure law in Ethiopia. The details on the methodology are explained on chapter four.

1.5   Scope and limitations

The scope of this research is limited, due to time and resource limitations, to a manufacturing census panel data set of the Ethiopian industrial sector for the years 1994-2001 taken from the Ethiopian Statistical authority. Due to lack of access and to make the analysis manageable at acceptable level, data sets for recent years are not included. The issue going to be addressed is also confined to only the effect of the bank foreclosure law on firm level investment behaviour in the specified years, no other investment categories are treated.

The other limitation is on the identification of the effect of the law. The methodology of estimation assumes that there were no other policies enacted in the same period to affect the treatment and control groups. There fore, it assumes that the private and public firms were not exposed to other different shock than the bank foreclosure law. Most of the structural adjustment programs were implemented since 1991, but this law has been put in to effect after 7 years in 1998. In addition, it has been assumed that both types of firms don't differ in unobservable variables which are correlated with the law and its effect. Since, the beginning of the structural adjustment program in Ethiopia, the public firms were exposed to market forces in the same way as the private firms and they have been denied of preferential treatment on subsidy, credit provision and labour supply. Further more, some of the private firms are also public establishments which were transferred to the private sector by privatization program. These and related treatments have

reduced the differences between the two group of firms in various attributes which support our decision to assume public firms as a control for the private firms. Therefore, the result from the analysis should be inferred by taking in to consideration the above assumptions in mind.

1.6   Organization of the Paper

The paper is organized in such a way that, the next part, chapter two, discuses about literatures related with firm level investment behaviour and the theoretical frame works which are used to explain investment in the manufacturing sector. The neoclassical, the Q-model, and the Euler equation investment models have been discussed and the reasons to use the later are also explained. Then chapter three elaborates the historical back ground and description of the Ethiopian manufacturing sector. The historical back ground states the emergence of industrial investment in Ethiopia and its progress in the past years. It also tries to hint the policy contributions and draw backs of the previous and current governments of the country on the performance of the sector. Chapter four describes the econometric methodology followed, the estimation techniques employed, and the kind of data used in the paper. The fifth chapter discuses and analyses the results from the panel version of the logistic regression, two stages GMM and other comparative estimation methods employed in the paper. It further points out the likely causes for the contribution of the bank foreclosure law. The last chapter concludes the findings of the paper and forwards the possible recommendations. References and Annexes are attached at the last part of the paper.

Chapter 2
Literature Review on Theories and Empirical Studies

This chapter will elaborate the theoretical back ground of firm level investment theories of the neoclassical, the Euler equation, and the Q investment models. Each of them has been discussed on the basis of how they can be used in different contexts of countries and what their strengths and limitations, on explaining firm level investment analysis, are in developing countries. It also briefs how related empirical literatures on firm level investment have approached to address related problems under the frame work of these theories and compares their results with the output from this research.

2.1 Theoretical Frame Work

Investment being one of the key factors that derive economic growth, it has been the concern of every nation. Its being volatile component of aggregate demand, main channel of technological transfer for developing countries, and it's partly or holly irreversible nature makes it an interesting topic for research.

Firm level investment in physical capital is a foreword looking decision which needs conscious actions. The basic neoclassical investment model (Jorgenson 1971) assumes that each firm has a desired stock of capital. There fore, investment is a response to change in the desired stock of capital that can be achieved instantaneously and free of cost. The firm equates marginal value product of capital with its marginal cost.

$$I_t = I_t^r + I_t^n = \delta K_{t-1} + \sum_{j=0}^{J} \alpha \beta_j \Delta(Y_{t-j} C_{t-j}^{-\sigma}) + U_t$$

The main critics on this model are first, its underlying theory is static while its empirical representation tended to be dynamic by ad hoc addition of delivery lags which are not part of the theoretical model. Second, since firms do not need to look in to the future, in this model, the fore ward looking nature of investment is missing. Third, the price and quantity factors may cause simultaneity problem in the model and the difficulty on the interpretation of the structural coefficients. Irreversibility of most investments also helps to explain the failure of this model (Dixit and Pindyck. 1994). Therefore, due to the reasons mentioned, this model seems not to suit the Ethiopian condition.

The other set of theoretical investment models are models with explicit dynamics(Chirinko 1993). Instead of ad hoc imposition of dynamics, these models try to provide direct analysis of the source of dynamics. They incorporate the sources of dynamics (adjustment costs and expectation of profits) in the firm's optimization problem. The idea here is firms face a non-zero adjustment cost when they change their capital stock, which is assumed to be convex according to Robert Eistner et al.(1993) as cited by(Abel and Janice 1994), due to its nature to increase at an increasing rate with the level of investment. The components of the adjustment cost include output foregone due to disruption of production, additional cost for installation of capital, and training of workers to use new machines.

The other source of dynamics, expectation of profits, includes production function, adjustment cost function, wage bill and purchase cost of new capital. The objective of the firm is maximizing expected profits. Unlike the basic neoclassical model, investment with explicit dynamics models does not depend on the desired stock of capital. The firm rather looks foreword to expected profits.

One of the explicit dynamic models is the Tobin's q-model which seems to be not appropriate for a developing country like Ethiopia due to its dependence on stock market values and the total or partial absence of these stock markets in developing countries.

$$q_t^A = V_t / p_t^I K_t$$

$$I_t / K_t = (1/\alpha)q_t + u_t, \text{ where } q_t = (q_t^A - 1)p_t^I$$

The other explicit dynamic model, relatively seems to perform better for developing countries, is the Euler model(Chirinko 1993). The objective of the firm in this model is to maximize its current profit and discounted future expected market value, looking forward in time. Its first order condition yields the ratio of investment to capital in the next period $(I/K)_{t+1}$ as a function of investment to capital ratio in the present period (in quadratic form-allowing for convexity of adjustment cost) and current profit to capital ratio $(\pi/K)_t$. If non-separability between investment and borrowing exists, current dept to capital ratio $(B/K)_t$ has to be included in the model. The out put to capital ratio $(Y/K)_t$ can be controlled if there is imperfect competition between industries in the market.

$$(I/K)_{t+1} = \beta_0 + \beta_1(I/K)_t - \beta_2(I/K)_t^2 - \beta_3(\pi/K)_t + \beta_4(Y/K)_t - \beta_5(B/K)_t$$

The theoretical explanation of the variables shows that currently highly indebted firms are less likely to invest in the next period. Since they face high loan burden the lenders may not be willing to give them additional loans as well as the firms may not also afford the collateral requirement to be an eligible client. The coefficient of the rate of out put can be interpreted as, the higher the rate of out put of firms in imperfect markets; it's most likely that they can invest more, because, expansion in out put can be taken as one strategy when a firm expects higher sales and profits in the current and future periods. The relation of future investment with the current is not linear and tends to be quadratic due to the increasing nature of their adjustment costs at an increasing rate for additional units of investment. The coefficient of rate of profits is expected to be positively related to future investment, but in the empirical model it turned out to be negative for unknown reasons and it is one of the critics on this model.

Since the objective of this paper is not to assess determinants of investment but response of private firms for a policy shock, our interest is on the coefficients of the interaction dummies, policy variable stated in the methodology part, of private firms and time after the implementation of the bank fore closure law in Ethiopia. If the law has positive contribution as expected by policy makers the expected coefficient would be positive. That means it has given confidence for private banks to supply loan for private investors and in turn private investors are satisfied with the availability of the loan and accepting the foreclosure when they fail to repay their loans, so that they are highly motivated to invest and their participation has increased after the intervention. But if the law has resulted in unexpected effect of reducing participation of private firms in investment due to its creation of uncertainty on loosing their equity with out the decision of the court of law (judicial body) in case of delays in repayment, the expected sign of the coefficient will turn out to be negative.

Therefore, the theoretical back ground for the enactment of the bank foreclosure law is that it improves the loan collection rate of banks, so that they can minimize their loan arrears and defaults, and reduce their excess liquidity by extending credit for the private investor, in confidence and with out any doubt for default, which can in turn boost investment for the economic growth of the country. In this context, if enacting the law successfully achieves the intended objectives by the policy makers it is expected to improve loan repayment for the banks and higher access to credit for the investors. But if the effect of the law is not as expected it might not have any contribution to improve firm level investment or it might hinder investment by reducing the access to credit through higher business uncertainties, high collateral requirements or providing unfair power for the banks relative to the investors and the like. This can also further be explained by its relation to the theory of uncertainty, irreversibility and the crowding out theory of investment.

Therefore, the effect of the policy intervention is explained for four years after the intervention how its trend has changed over time, the magnitude of the effect, and its level of significance depending on the direction of the effect under the context of the afore mentioned theoretical frame work.

2.2 Literature review

Most of the investment literatures in sub Saharan Africa usually focus on gross investments. There are limited literatures on sector specific investments, especially at firm or industry level. Some of those limited studies are also macroeconomic in nature and focusing on regressions across countries. While, with in country firm level investment studies are very few in number. More over, most of the studies also focus on issues like; the benefit from foreign direct investments (FDI), comparison of manufacturing investments in different countries, the impact of structural adjustment programmes on growth and investment, and determinants of investment and the like. But this paper tries to evaluate the effect of a policy intervention on firm level investment behaviour in the Ethiopian manufacturing sector which lacks such kind of studies so far.

One of the related investment literatures on firm level investment by (Begisten et al. 1997) investigates manufacturing investment in four African countries using firm level panel data set and employing the flexible accelerator specification. Focusing on factors that determine investment such as profitability, growth of value added, past firm borrowing, and the size and age of the firm, their paper, showed that profitability and out put have positive significant effect on investment in the manufacturing sector. Concerning the size of firms the author argued that large firms are more likely to invest in every year but in small amount, indicating that they are not constrained by credit. Where as, small firms have higher profit effect than the larger ones but don't undertake investment every year, indicating that they are mostly constrained by credit provision and wait until they accumulate retained earnings, even though, they expect higher profits in the future. Older firms also tend not to invest, which might be due to higher maintenance costs related to increased age and it has also an indication that the presence of other factors apart from capital cost affecting investment decisions.

The other study by (Athukorala and Sen 2002) showed the Indian economy case using a model of business investment derived from the Neoclassical standard theory of business investment with some modifications to reflect structural features in developing countries. The basic neoclassical theory relates investment as a function of lagged capital stock, change in output and the cost of capital. Then their model augments this by introducing credit availability, macro economic uncertainty, and the complementarities between public and private investment. Their estimation results showed that the level of capital stock, the level of domestic economic activity, rental cost of capital, and public investment are significant determinants of Indian business investments and these helped explain the behaviour of business investment in India following the structural adjustment reform in 1991. Even though, a large number of studies repeatedly showed a significant negative impact of structural adjustment programmes (SAPs) on private investment in the immediate post reform years, the situation in India didn't show the same result and investment has increased in the post reform period(ibid). Further, their result indicated that out put has positive effect and initial capital stock has negative effect on investment. Bank credit has a positive short run effect which has no relation in the long run, captured by the lagged credit variable, with investment and turned out to be insignificant on their regression result.

The study by (Ndikumana 2000) has investigated the effect of financial development on domestic investment using a sample of 30 sub Saharan African countries. The result from this study indicated a positive relation ship between domestic investment (total investment and private investment) and different indicators of financial development. I.e. higher financial development leads to higher future levels of investment. The paper by (Shiferaw 2002) also shows positive relation between credit to the private sector and investment. In Africa most of the factors which contribute to better investment climate are at lower level relative to the world average (Samuel 2007). Figure 3 below compares business surveys on key investment constraints between Africa and the world. Access to finance and cost of finance, infrastructure and business environment are indicated as at their lower levels. It seems reasonable to

expect these problems to be further pressing for sub Saharan Africa compared to the African average.

FIGURE 3
Barriers to firm growth: Africa and the rest of the World

Barriers to Firm Growth: Africa and Rest of World
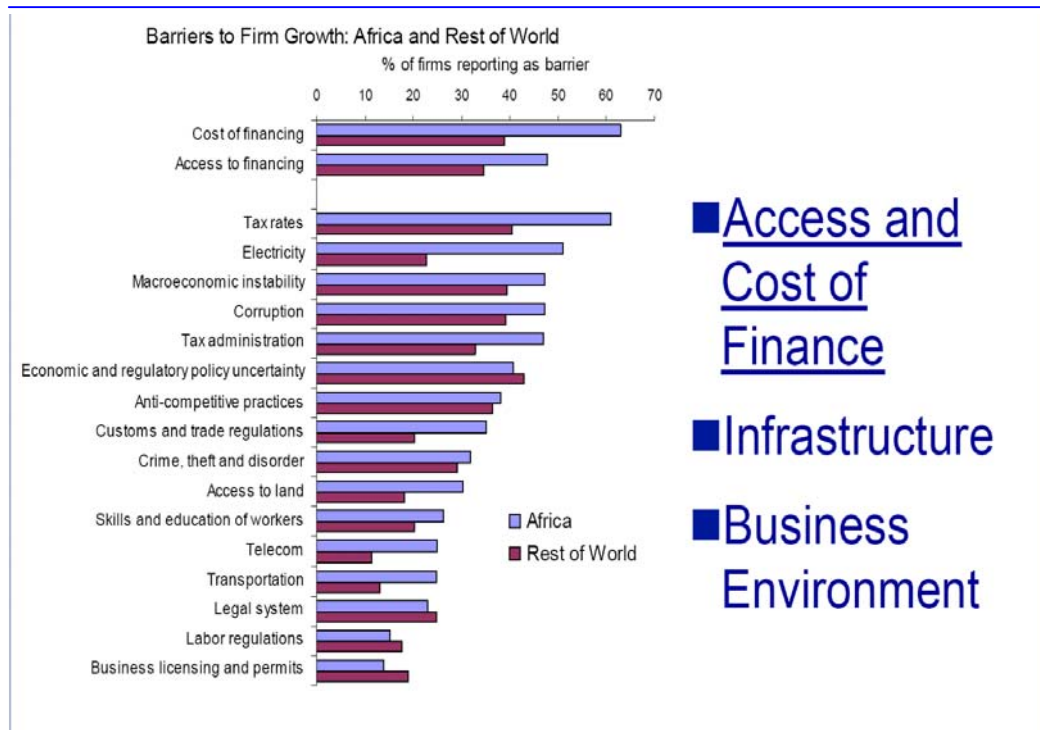
Source: Samuel Munzele Maimb, First Consult, from the WB website

2.3   Conclusion

The general conclusion that can be drawn from the above literature surveys is that firm level models of investment which are augmented by additional variables to suit the contexts of developing countries can better explain investment in those countries and the results would also be inline with known investment theories. Therefore, the Euler equation model, which is selected to analyse manufacturing investments in Ethiopia on this paper, can better explain the investment situation in the country. In addition the findings from previous surveys conducted by organizations and scholars can also provide useful information in explaining the investment situation and possible factors contributing to lower performance of the sector in the country in connection with the stated policy intervention.

Chapter 3
Back Ground and Descriptive Statistics

This section of the paper deals with the historical back ground of the manufacturing sector in Ethiopia from its start to the present time developments and challenges. It also shows the different indicators of the sector using tables from the data set in the study period using descriptive statistics.

3.1   Back Ground of the Ethiopian manufacturing sector

It has become evident and widely accepted that successful development of the industrial sector plays a key role in the development of nations. The development endeavours of this sector in Ethiopia had began in the 20th century. According to MEDaC (1999), political stability as a result of the emergence of a strong central government and the construction of the Ethio-Djibouti rail way in early 20th have contributed to the introduction of modern manufacturing in Ethiopia. The higher demand for imported manufactured goods and increasing cost of transporting goods from abroad has also contributed to domestic production of manufactured goods. The increased settlement of foreign citizens from Armenia, Greece, Italy and India also brought the entrepreneurial capacity to develop manufacturing industries locally (Befekadu et al. 2000/1).

By 1925, there were 25 factories in the major urban centres. About 10 additional manufacturing industries were built during the period 1928 to 1941. A number of industries also came in to existence between 1941 and 1955 owing mainly to strong relations with the then governments of the United States of America and the United Kingdom. Nevertheless, industrial development gained strong momentum only after the Second World War when government began to take concerted effort towards the development of the sector, through tax incentives, tariff protection, and easy access to domestic credit (ibid).

Before the 1974 revolution there were 273 enterprises as a result of the expansion of import substituting manufacturing establishments by foreign nationals. Of which 37% (101) were fully owned by foreigners and the other 42 were shared ventures of more than 50% contributed by foreigners. The role of the government was relatively small with full ownership of only 13 manufacturing factories. More than 50% share in 5 and less than 50% share in 7 establishments. It can easily be understood that the majority of the manufacturing plants, especially the larger ones, were foreign owned and heavily protected from external competition. Moreover they were dependent on imported inputs which could be constrained by foreign exchange earning for full utilization of their internal capacity.

According to MEDaC (1999), after the 1974 revolution the military government came to power and nationalized all private large and medium scale manufacturing establishments owned by nationals and foreigners. This has completely discouraged private investment in the country. The then government's emphasis was on medium and large scale manufacturing

expansion owned by the state only. Even though some establishments were set, there had been no structural changes on the sector. It was dominated by light and consumer goods producing establishments.

During that time (Derg regime), policies had limited the ceiling on private sector investment capital up to 500,000 Birr and investors were not allowed to have licence for more than one kind(line) of business and also the investor should not have other job. There was also higher tax rate and discriminatory interest rate. The later was higher for the private investor relative to cooperatives and public establishments. The allocation of resources was also in favour of publicly owned large and medium institutions through the supply of foreign exchange, labour force and credit. These and related approaches reduced the role of the market and business incentives to invest which curtailed the development of private manufacturing in Ethiopia.

Since the establishment of the transitional government of Ethiopia in 1991, the government tried to rationalize its role in the economy by promoting the active participation of the private sector (Ethiopian Investment Commission 2008). Among the reform measures that had been undertaken are, the public enterprises reform program and price decontrol measures can be mentioned. The public enterprises reform program was implemented with the objective of improving efficiency, productivity and competitiveness in public enterprises through provision of managerial autonomy and responsibility. Given this autonomy, the government stopped subsidizing the enterprises and they were also denied of preferential treatment on supply of credit, labour and foreign exchange (MEDaC 1999).

3.2 Descriptive statistics

3.2.1 Number of establishments over time and by size.

In order to see the size and composition of the manufacturing firms in Ethiopia I classified them according to the total number of workers they employed. Establishments employing less than thirty workers are treated as small, employing equal to thirty or greater than thirty and less than hundred employees as medium and hiring hundred and more than hundred workers are treated as large manufacturing establishments. According to this classification, as shown on table 1, the number of small manufacturing establishments in 1994 was 259 and increased to 410 in 2001 at an average annual growth rate of 8.3%. While the medium establishments grown at 18.2% from 81 in 1994 to 184 in 2001. The large establishments have grown at an average annual rate of 3.4 from 138 in 1994 to 171 in 2001. Generally the total number of establishments increased from 478 to 765 by annual average rate of 8.6%. This shows that compared to their 1994 positions medium size establishments are growing at higher rate than the small and large establishments. The larger establishments have the least growth rate twice less than the smaller and four times less than the medium ones. But in general the small establishments dominate the manufacturing composition in 1994 as well as in 2001.

TABLE 1
The number of establishments by size and year.

Year	small	Medium	Large	Total
1994	259	81	138	478
1995	246	98	142	485
1996	371	102	150	623
1997	420	130	153	703
1998	452	130	143	725
1999	549	105	85	739
2000	407	168	161	736
2001	410	184	171	765
Total	3,113	998	1,143	5,254

Source: Author's computation based on CSA's Manufacturing Census

The composition of establishments by industrial group and size on table 2 indicates that 27.4% of the establishments are in the Food and Beverages industrial group which is the dominant among the industrial groups. The wood and furniture industrial group follows by 17.4% being the second populous and the non metal and the textile and apparel groups are the third and fourth constituting 14.4 and 9.3 %, respectively. According to size, the small enterprises are dominated by the food and beverages industrial group and followed by the wood and furniture, non metal, metal, leather and foot wear, paper and printing and textile and apparel in the same order. The food and beverages industrial group also dominates in the medium and large size establishments, the wood and furniture, non metal, leather and foot wear, and paper and printing industries are the next populous in the medium size firms in the same order . While, among the large enterprises, the textile and apparel, non metal, leather and foot wear, chemical and wood and furniture industries have high number of firms in the same order. Generally, the total number of small size, (firm year) observations over the 8 years is 3,113 (59.3%), 995(19%) for the medium firms, and 1140(21.7%) for the larger ones. This shows around two third of the manufacturing establishments can be classified as smaller firms.

From the same table below the average annual growth rate of firms in each industrial group can also easily be drawn. The average annual growth rate (between 1994 & 2001) in the food and beverages industrial group was 7.9% which was 146 in 1994 and increased to 227 in 2001. The highest annual growth relative to their 1994 position is registered for the simple machine industrial group (28.6%). The paper and printing, non metal, metal, wood and

furniture, chemical, and textile and apparel industries on average grown annually at 15.8%, 14%, 10.4%, 10.3%, 8.3% and 3.6%,respectively. Even though, the growth rate for the simple machine, paper and printing, and non metal industries is higher than the others, the economy is still dominated by food and beverages, wood and furniture, and non metal industrial groups. The least number of firms is registered in the tobacco industry, which is only one.

TABLE 2
Number of firms in each industry by year and size

No.	Industry	Year								Small	Medium	Large	Total
		1994	1995	1996	1997	1998	1999	2000	2001				
1	Food & Beverages	146	132	153	172	198	202	208	227	880	213	345	1,438
2	Tobacco	1	1	1	1	1	1	1	1	-	-	8	8
3	Textile & Apparel	51	48	62	66	65	70	64	64	167	87	236	490
4	Leather & Foot wear	52	50	63	61	57	49	49	54	229	110	96	435
5	Wood & Furniture	76	85	101	132	130	134	127	131	651	181	84	916
6	Paper & Printing	28	32	43	46	53	58	63	59	214	103	65	382
7	Chemical	24	27	35	41	41	43	41	38	146	54	90	290
8	Non - Metal	57	62	97	112	106	108	101	113	466	151	139	756
9	Metal	33	38	47	51	48	48	62	57	258	70	56	384
10	Machine(Simple)	7	7	21	21	26	26	20	21	102	26	21	149
Total		475	482	623	703	725	739	736	765	3,113	995	1140	5,248

Source: Author's computation based on CSA's Manufacturing Census

3.2.2 Ownership structure

Due to the different policies they used to implement, owner ship structure in Ethiopia seems to change with the change in regimes. There were some private firms in the regime of Emperor Haile Sellasie, but the participation of private firms has substantially reduced during the reign of the military government (Derg). The new federal government of Ethiopia, by undertaking a serious of reforms since 1991, has tried to change the situation by promoting the participation of private investors in the manufacturing sector. The privatization programme has also transferred some of publicly owned enterprises to the private sector. This has shifted the owner ship structure from public ownership dominated firms to better participation of the private sector.

As can be seen from table 3 below, in 1994 there were 257 private and 2 publicly owned small firms but in 2001 the number has increased to 406 private and 4 public firms. The number of privately owned medium sized firms was 58 in 1994 and increased to 163 in 2001, while the number of public firms reduced from 23 to 21. In addition the number of larger private firms has increased from 8 to 77, where as the number of large public firms has reduced from 130 to 94. The reason behind the reduction in publicly owned medium and large firms might be due to the privatization program implemented in the country as part of structural adjustment program and partly the better participation of the private sector in later years relative to the previous. There is also higher participation of the private sector in the investment of smaller firms. Since small firms are relatively easier to set up and not capital intensive, it seems the private investor has no barrier or difficulty for entrance to the sector.

The regional distribution of firms, as indicated on table 4 below, shows that most of the manufacturing firms, 64% of the total establishments, are situated in the capital city of the country, Addis Ababa (Region 14). The regions which have relatively better number of establishments next to Addis Ababa are Oromia(region 4), Southern Nations Nationalities and People's Regional State(region 7), Amhara (region 3), Tigrai(region 1), and Diredawa city council(region 15) constituting 14, 7, 6, 4,and 3.1%, respectively. The other regions have one or less percentage of manufacturing establishments from the total number of firms in the country. The owner ship structure also seems to follow the same pattern of distribution as the distribution of the total establishments among the regions.

The number of establishments of the various regions, in each year, is also mentioned on table 5. It indicates that the number and distribution of new establishments has still a tendency of regional bias to those regions which had a better number of establishments in 1994. This may indicate that the existence of large gaps in terms of infrastructural development and improved investment climate among the regions.

TABLE 3
Owner ship structure of firms by size and year.

No.	Size	ownership	year								total
			1994	1995	1996	1997	1998	1999	2000	2001	
1	Small	Private	257	241	370	412	443	523	403	406	3,055
		Public	2	4	1	8	9	26	4	4	58
2	Medium	Private	58	72	78	110	106	59	146	163	792
		Public	23	26	24	20	24	46	22	21	206
3	Large	Private	8	8	17	40	36	19	65	77	270
		Public	130	134	133	113	107	66	96	94	873

Source: Author's computation based on CSA's Manufacturing Census

TABLE 4
Owner ship structure by region

Ownership	Region										Total
	1	2	3	4	5	7	12	13	14	15	
Private	185	8	271	465	11	285	1	34	2,734	122	4,117
Public	8	10	71	266	0	80	14	24	624	40	1,137
Total	193	18	342	731	11	366	15	58	3,358	162	5,254
% from total	4	0.3	6	14	0.2	7	0.3	1.1	64	3.1	100

Source: Author's computation based on CSA's Manufacturing Census

TABLE 5
Regional distribution of firms by year (1994-2001)

Region	No of firms								
	1994	1995	1996	1997	1998	1999	2000	2001	Total
1	14	17	21	21	28	29	26	37	193
2	1	1	2	3	2	3	3	3	18
3	30	33	40	43	43	51	45	57	342
4	67	64	71	101	94	105	108	121	731
5	0	0	1	1	1	0	4	4	11
7	23	35	35	55	54	55	56	53	366
12	2	1	2	3	1	2	2	2	15
13	7	6	7	7	7	9	8	7	58
14	322	309	419	450	476	462	462	458	3,358
15	12	19	25	19	19	23	22	23	162
Total	478	485	623	703	725	739	736	765	5,254

Source: Author's computation based on CSA's Manufacturing Census

3.2.3 Export Performance

Since industrialization is believed to contribute enormously to the development of economies of nations through exporting diversified products of their comparative advantage to the world markets and increasing their hard currency earning capacity. The contribution of this sector to the export market in Ethiopia has been relatively very low. Table 6 below, shows the industry average values of exports and sales in thousand constant 2000 US $ in the first and second columns, respectively. The third column is the export to sale ratio. As shown on the third column, the industry average export relative to their sales is only 2%, indicating that most industries supply their produce to the local market. Among the industries, the leather and foot wear industrial group has the lions share in export performance. It exports 16.7% of its total sales. The textile and apparel and the food and beverages industrial groups have also the second and third best experience next to the leather and foot wear industrial groups. They have a 3.2 and 0.9 percentage share of exports from their respective total sales, respectively.

As shown on table 13 on the appendix, the export performance of the industrial sector has improved from 1.8% of export from total manufacturing sales to 2.38% in 2001, which is a 27.9% increase relative to their position in 1994. But on average it is around 2.07% of their sales. It shows that the sector has a long way to go and work hard to improve productivity and competitiveness to improve its contribution to the economy.

TABLE 6
Export performance by industry

No.	Industry	Sales('000)	Export('000)	Export/sales (%)
1	Food & Beverages	12700	375	0.90
2	Tobacco	227000	134.4	0.05
3	Textile & Apparel	12100	547.7	3.2
4	Leather & Foot wear	10400	6176.1	16.7
5	Wood & Furniture	1149.5	2.2	0.43
6	Paper & Printing	5540.8	0.573	0.27
7	Chemical	9301.8	0.104	0.0004
8	Non - Metal	7622	2.651	0.14
9	Metal	12900	38.76	0.20
10	Machine(Simple)	3544.6	4.86	0.37
	Total	9079.7	670.7	2.0

Source: Author's computation based on CSA's Manufacturing Census

3.2.4 Financing

There are a series of investment climate assessment reports by the government and international organizations like World Bank and (UNCTAD) United Nations Conference on Trade and Development which give the overview of industrial investment and access to finance. One of these literatures which generalizes findings from the World Bank 2006 investment climate assessment (ICA) by (Nebil 2007), a first consult PLC, elaborates that how access to credit in Ethiopia is a pressing issue for boosting investment. The assessment, on figure 4 below, indicates that access to finance has been considered as a major obstacle to firm operations and growth; 44% of the firms rated it as a 'major' or 'very severe' obstacle to investment.

FIGURE 4
Access to finance from a manufacturing ICA survey
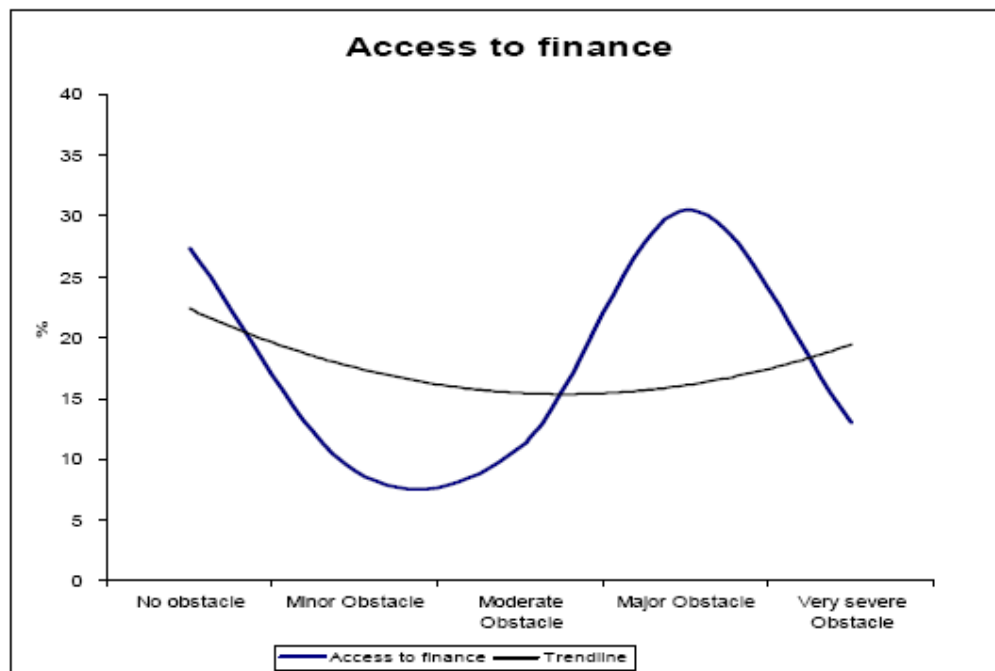
Source: First Consult PLC, findings from the world bank 2006 ICA

The lending to sectors also indicates that since 1994, relative to the services and the agricultural sector, the industrial sector has lower percentage shares as indicated on figure 5 below.

FIGURE 5
Lending to Sectors
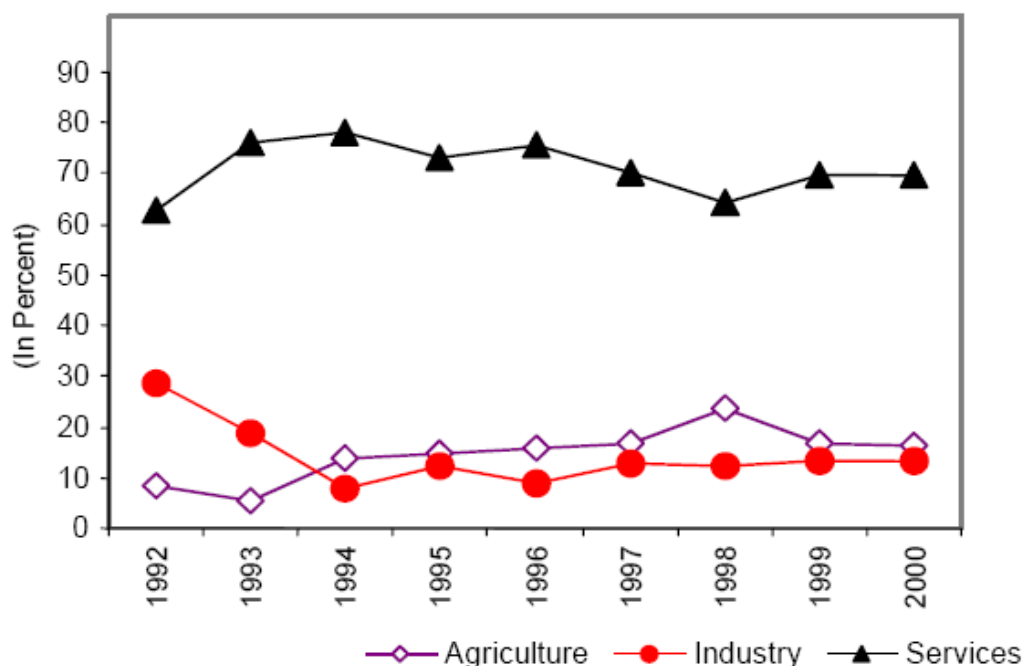
Source: National bank of Ethiopia (from first consult plc)

The other related major problem which makes financing Ethiopia's industrialization difficult includes (ibid) the lower amount of bank lending for long term assets. I.e. as indicated on figure 6 below, on average only 14% of the fund invested on long term assets comes from banks. And the other problem is the higher and strictest collateral requirements in lending. Especially, as indicated on figure 7 below, investment in the industrial sector has been hampered by the higher collateral requirement, around 194% of the loan.

3.3   Conclusion

The general conclusion which can be drawn form this chapter is that the Ethiopian manufacturing sector is dominated by small sized food and beverages, wood and furniture, and non metal industrial groups. Small and medium sized establishments are largely owned by the private sector; where as the public ownership dominates in the larger establishments. The export to sell ratio is very low for most of the firms. The leather and foot wear, the textile and apparel, and food and beverages industries have relatively better participation in export markets. Concerning financing industrial investment in the country there has been low access to credit especially for long term investments on fixed assets. In addition, relative to the other sectors the manufacturing sector gets the least amount of bank loan and faces the highest and strictest collateral requirement. There fore, it can easily be understood that financing in Ethiopia is one of the major factors affecting industrial investment.

FIGURE 6
Proportion of establishments' fixed asset finance source

Proportion of establishments' fixed asset finance source
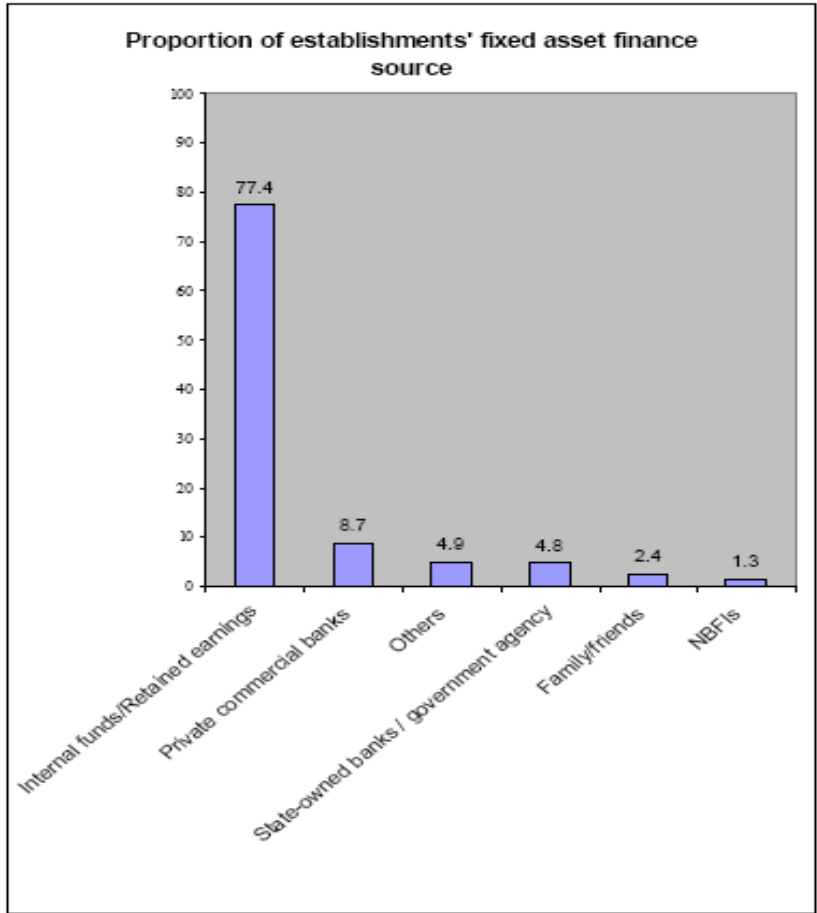
Source: First Consult PLC, findings from the world bank 2006 ICA

FIGURE 7
collateral requirements by sub-sector

Collateral requirements by sub-sector
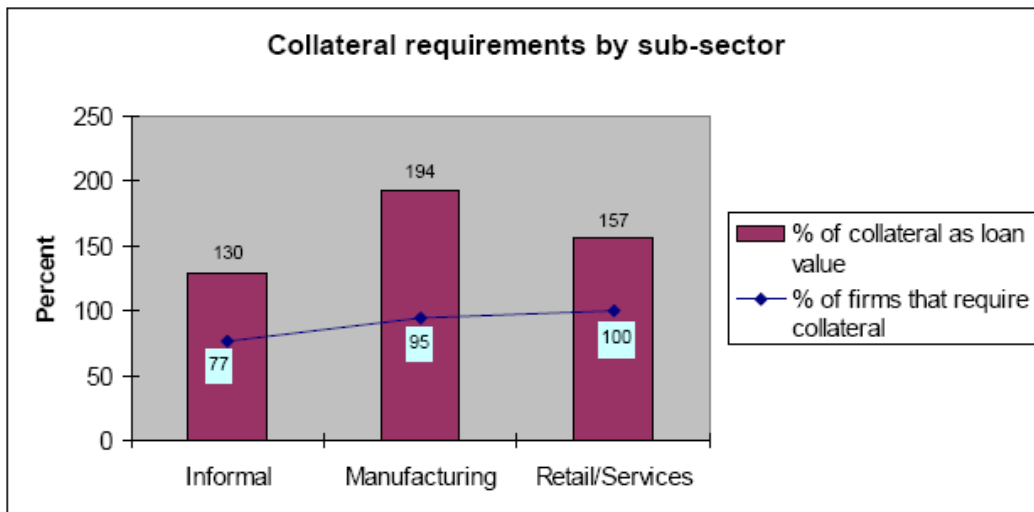
Source: First Consult PLC, findings from the world bank 2006 ICA

Chapter 4
Methodology, Estimation, and Data

This chapter tries to elaborate the methodologies followed to analyse the problem, the techniques used to estimate the selected investment models, and the kind of data employed in the paper to come up with the results of the analysis.

4.1   Methodology and Estimation

The methodology employed in the paper is econometric panel data policy analysis technique, differences in differences estimation. This method alternatively called as double differences which take, first, the differences between control and treatment groups and then the differences between pre and post intervention periods for the controlled variables. In policy evaluation technique this method usually uses some conditions to infer about the counterfactual. The treatment and control groups have to be selected randomly. It is obvious that private and public firms have visible differences and they seem not to be random controls for each other. But, since the interest here is to see the gap or the differences over time between the investment behaviour of the treatment and control groups, we assume that the private and public firms act in the same way through out the period as before in other attributes except this policy intervention. The Policy intervention, the bank foreclosure law, is the only policy implemented on the treatment group in that year and other policy measures which might have been undertaken in the period 1998- 2001 are assumed to affect both the treatment and the control group in common. I.e. no policy which affects only one of the two groups has been implemented in the period. The other differences between the firms and over time are captured by their respective dummies for fixed effects and the time dummies for each year, respectively.

The model, specified below, including the two set of industries (treatment and control groups) will be fitted before and after the implementation of the law. The coefficient of the private dummy variable (β_1) captures pre intervention difference between private and public firms and its sum with the coefficient of the interaction (policy) term shows differences in investment rate between the two set of firms after intervention. The coefficient of the interaction term between private and time dummies (δ_1) captures effect of the policy over time on the treated private firms.

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \beta_1 P_{it} + \alpha_i X_{it} + \delta_1 d_{2t} * P_{it} + a_i + u_{it} \ , \text{-------------- where}$$

y_{it} =rate of investment of firm i at time t (y/k).

$\quad P_{it}$ = Dummy for the treated firms (ownership) =1 for private firms

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ =0 for public firms

$\quad u_{it}$ = error term, a_i = fixed effects (unobserved firm fixed effects which are constant over time), d_{2t} = time dummy =1 after intervention

$\qquad\qquad\qquad\qquad\qquad$ =0 before intervention

Since the panel data has more than two years of observations and controlling the fixed effects increases the variation in the variables the fixed effects specification has

been used as a variant for the analysis in addition to the GMM estimation for reasons of comparison.

To avoid omitted variables bias and to improve the explanatory power of the model, matrix of other factors (X_{it}) which determine investment (from the Euler equation model and some additional variables) have been controlled in the above equation. The sensitivity of the result for different specifications and variables has been checked.

Since the Euler equation makes use of lagged dependent variables as one of its explanatory variables, the fixed effects specification seems to fail to estimate such models correctly. This problem can be tackled by using the systems generalized methods of moment's estimation as indicated by (M. Arellano and Bover 1995). This method treats variables other than strongly exogenous variables as endogenous and solves the equations simultaneously. It also uses lagged differences as instruments for the levels equation and the lagged level variables as instruments for differenced equations (Manuel Arellano 2003) to solve the endogeneity, omitted variables problems and measurement errors. The other advantage of this method is that since it makes use of the levels and differenced equations at the same time to estimate the parameters it doesn't loose variation in variables and makes use of the information in levels and differenced equations. Therefore, the two stages systems generalized method of moments (GMM_2st) estimation technique has been selected to undertake the analysis in the paper.

In addition, to show the general feature and the structural changes over time of the manufacturing sector in the study period in Ethiopia descriptive statistics has been used.

4.2   The Data & Description of Variables

The data that has been employed in this paper is industrial panel data from surveys by Ethiopian Statistical Authority, which undertakes annual survey of manufacturing enterprises that employ at least 10 persons and use power driven machinery in the country. The paper has made use of surveys for the years 1994-2001. The panel has been created by appending data sets using independent surveys of these 8 years. Before appending the data sets together every data set has been inspected and checked for matches in firm id's and variable coincidences. For different firms which have the same firm id, new firm id is created by multiplying their respective firm ids with regional codes and ISCI numbers. In addition, variables like the capital stalk which have consistency problems were adjusted using theoretical backgrounds and their respective empirical specifications. I.e. the capital stalk has been generated by subtracting the depreciated part of the year beginning capital from the beginning capital stalk and adding investment in the same year. Annual depreciation rate of 10% has been used.

The bank foreclosure law was enacted on 19, February 1998. Since the data set has four years surveys before the law had been put in to effect and additional four years after the implementation of the law, the years (1994-97) are before intervention and (1998-2001) are after the intervention. The data contains 478 observations in 1994 and 765 in 2001. The total number of observations over the 8 years makes it an unbalanced panel of 5254 firm year observations. All the necessary information for firm level investment analysis is included in the data set except the loan variable which is treated by the interest payment as proxy in the analysis.

The balanced panel- The data has also been estimated for the balanced part of the panel. This category includes those firms only continuously existed through out the whole study period making a balanced panel data of 1568 firm-year observations. The number of these firms is 194. A separate regression for this set of firms has been estimated in addition to the estimation for the whole observations of the unbalanced panel to check the robustness of the study.

Size -The size of establishments whether they are small, medium or large may have effect on their investment decision. There fore size is used as one of the explanatory variables in the multiple regression analysis. Size is usually measured on the basis of the capital stalk or the size of the labour force employed in the establishment. Countries which have capital intensive industries at large use the capital stalk measure, while countries whose industries are labour intensive, developing countries like Ethiopia, by their very nature use the labour force as a measure. The Ethiopian statistical authority classifies the size of establishments in the country based on the number of workers employed in the establishments. On this paper the same classification, based on total employment in each firm, has been used.

Age- The age of each establishment has also been expected to affect the investment decision of firms. It is taken based on their entry year. First the average year of establishment, 1983, is identified. Firms established before this average year are treated as old and the age dummy takes a value of one for this group of firms. The other set of firms established after 1983 are treated as younger firms and the age dummy takes a value zero for this group of firms.

In the model there are three set of additional dummies. The one captures those firms which are treated versus which are not. $P_{it} = 1$ for treated (private firms) and $P_{it} = 0$ for non treated (public) firms. The private enterprises are the treatment groups on which the law has been applied. The public enterprises are the control groups which are not part of the treatment. Since, both banks and public industries are owned by the government they can't be foreclosed in failure to payback their debt, or if public enterprises take loan from private banks and fail to repay back, government may repay from other sources instead of letting public enterprises being foreclosed by private banks.

The other dummy, d_{2t}, captures time before and after the intervention. $d_{2t} = 1$ after the intervention and $d_{2t} = 0$ before the intervention. Or alternatively a dummy has been generated for each year, and 'before' and 'after' could be identified on the basis of years before and after the intervention. The third set of dummies is industry dummies indicating different groups of industries and their time invariant fixed effects. Group of firms doing related activities constitute an industry. There are ten different industries categorized according to these attributes. Differences between these industries are captured by their respective industrial dummies.

Euler equation variables- table 14 on the appendix describes the industry average values of the dependent and Euler equation explanatory variables. The average value for the dependent variable, investment to capital ratio on the third column, indicates that the chemical industrial group has the highest value among the industries. It invests on average 14% of its capital annually. The paper and printing, metal, leather and foot wear and tobacco industrial groups have also the next best ratio in the same order. The least

investing industrial groups compared to their capital stock are the simple machine, food and beverages, and the textile and apparel industrial groups. Compared to their capital stock, the wood and furniture and food and beverages industrial groups have the highest out put value, indicating that they are relatively labour intensive. But the chemical industry has lower out put to capital ratio, indicating relative to other industries it is capital intensive. The profit rate is higher for the food and beverages and the wood and furniture industrial groups, indicating that compared to their capital stalk they have higher profits than others. They need low capital to set up but produce more out puts using higher labour inputs.

Chapter 5
Results and Discussion

This chapter will display the results from the analysis using the dataset, methodologies and estimation techniques mentioned in the previous chapter. The results will further be discussed under each sub section. The first section deals with how firms decide to invest. The second, on how much do firms want to invest. It will further be discussed for various industrial and size groups of firms. In each section the effect of the policy and other factors determining firm investment behaviour will be discussed.

5.1   The decision to invest

It is important to see investment from the sides of both the decision to invest and the amount invested. This section tries to show the behaviour of firms on how they decide to invest or what explains their decisions to invest and the next will deal on how much the firms want to invest once they decide to invest. Since large amount of firms don't undertake positive investment or don't invest annually at all, it is better to probe what explains the probability of firms to undertake positive annual investments. As indicated on table 7 below, it shows the pooled and panel versions of the probit and logit estimates of the decision to invest. The dependent variable is a dummy which takes one if a firm invests and zero otherwise. The first column is the marginal effects after probit, the second is the marginal effects after logit, the third column is the panel version of random effects probit specification, and the last column shows the fixed effects estimates of the panel logit specification.

The main specification selected here, to interpret the results for the decision to invest, is the fixed effects panel logit specification. Since the data set is a panel and controlling the fixed effects takes care of correlations between the explanatory variables and time invariant fixed effects, omitted variables and measurement error problems the result from this specification seems robust relative to the others. The results from the other specifications are also put in columns 1-3 for comparison and simulation purposes.

Most of the coefficients on the first three columns have the same sign and nearly similar magnitude and significance levels. If understanding the general issues across industries are very important, the results from these columns, which estimate by pooling the panel data observations, can be interpreted. But when we are more interested on the policy variable and the other explanatory variables the result from the last column tends to be more reliable, since it makes use of variation across panels and controls for firm fixed effects to avoid some estimation biases.

The general conclusions which can be drown from this table are; first, the private and post intervention interaction term (policy variable) has negative sign in all of the specifications, indicating that the probability of investing has declined over time for private firms after the intervention. The coefficient is significant in only one of the specifications and it can be explained as the chance to invest has declined by 30% in the post period for the private firms compared to the pre intervention period. Second, all the Euler equation explanatory variables have the required sign in the fourth specification and they are statistically significant at conventional levels, except the profit coefficient which has its own draw back as stated on the theoretical frame work. Third, size, represented by number of employees, has positive significant effect on the decision to invest for firms in all of the specifications, indicating that a unit increase in size, on average, increases the probability of investing by 0.045 percentage points. Similar result has been achieved by (Gunning and Remco 2002)using the flexible accelerator model and

the fixed effects logit estimation for the Zimbabwean industries. The fourth point is that, exporting firms are more likely to invest than firms which do not export but it is not statistically significant. The last main point worth mentioning is that in general fifty percent of the total firms in the Ethiopian manufacturing sector have zero annual investment, on average, as mentioned on the row indicating the probability.

The general conclusion which can be drawn from this analysis of the decision to invest is that the policy tended to affect negatively the decision to invest of private firms over time. Size, output to capital, and export to sale ratios have a positive contribution on the probability of investing of firms. Where as, age and higher debt to capital ratios of firms have negative effect on their decisions to invest.

TABLE 7
probability of investing or the decision to invest
(The dependent variable is a dummy which takes one if a firm invests and zero if not)

VARIABLES	(1) probit	(2) logit	(3) Xtprobit,re	(4) Xtlogit,fe
Lag(investment/capital)	0.959***	1.543***	0.561***	-0.204
Lag (profit/capital)	-0.000*	-0.000	-0.000	-0.000*
Lag(output/capital)	-0.000***	-0.000***	-0.000*	0.000**
Lag (Debt/capital)	0.000*	0.000**	0.000*	-0.000
private	-0.717***	-0.967***	-0.684***	0.938**
Post intervention period	0.133	0.263	0.239**	0.036
Policy variable	-0.121	-0.256	-0.308**	-0.422
age	0.204***	0.346***	0.201**	-0.233
employ_tot (Size)	0.000***	0.002***	0.001***	0.000
Export to sale ratio	0.803***	1.299***	0.935***	0.491
ind2	-0.246	-0.839	-0.255	
ind3	-0.303***	-0.592***	-0.257*	
ind4	0.160*	0.240	0.250	
ind5	-0.013	0.003	0.007	
ind6	0.351***	0.557***	0.460***	
ind7	0.290***	0.464***	0.394**	
ind8	0.084	0.136	0.175	

ind9	0.274***	0.441***	0.316*
ind10	0.172	0.280	0.113
Constant	0.117	-0.037	0.055
probability	0.51	0.52	
Observations	3419	3419	3419	1829
Number of firms			1009	394

Note - Standard errors are in brackets

*** indicates statistical significance at 1% (p<0.01), ** at 5% (p<0.05),and * at 10% (p<0.1)

Source: Author's computation based on CSA's Manufacturing Census

5.2   OLS, Fixed Effects, and GMM Estimations of 'how much to invest?'

This section of the estimation makes use of the same model as the decision to invest, except the dependent variable which is investment to capital ratio in this case. It was a dummy variable which only takes one or zero in the previous part. The OLS, fixed effects, and GMM estimation methods are explained and the results from these estimations are displayed on tables and discussed in the following sub sections.

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \beta_1 P_{it} + \alpha_i X_{it} + \delta_1 d_{2t} * P_{it} + a_i + u_{it}$$

5.2.1 OLS and Fixed effects estimations

The paper bases its interpretation on the results from two stage generalized method of moment's estimation. But for reasons of comparison using different specification and to check the robustness of the whole result the pooled OLS and fixed effects estimation results are explained in this section. The result from the regression analysis, on table 16 of the appendix, indicates the regression results of firm level investment behaviour using the pooled ordinary least squares and fixed effects version of panel data estimation. It has been tried to simulate the estimation by controlling different variables. The dependent variable in all the specifications is investment to capital ratio. The first column uses ordinary least squares regression by controlling time dummy for post intervention years 1998-2001, dummy for private firms, and the interaction between private dummy and post period dummy which is the policy variable. The only significant coefficient, at 5% level of significance in this specification, is the post intervention period dummy. While the coefficient for the policy term and private dummy are positive and negative, respectively, but they are not significant at conventional significance levels.

Since OLS usually suffers from omitted variables, measurement error, and simultaneity biases, the results are presented for reasons of comparison as mentioned above. There fore, to avoid the omitted variables problems the specific time invariant attributes of the firms and other variables affecting investment rate are controlled in the latter columns of the table. The second column of the table contains the result after controlling the same variables on column one but using the fixed effects estimation which controls time invariant unobservable firm fixed effects. This has improved the magnitude of post period dummy from 2.5 to 3.18 percentage points and the significance

level to 1%. The coefficient of private dummy has changed its sign from negative to positive and significant at 1%. The coefficient of the policy variable has also changed its sign from positive to negative, but not significant at conventional significance levels.

The third and fourth columns controlled additional five variables expected to affect investment rate. The third column, OLS specification, shows that all the additional variables significantly affect investment rate but the policy variable is still insignificant. All the coefficients of the additional variables have the expected sign but the coefficients of output, profit, and loan rate are very small in magnitude. The fixed effects specification of the same variables on column 4 gives significantly higher values for post intervention and private dummies and from the additional variables lagged investment, lagged output and lagged profit rate are significant at conventional levels.

The fifth and sixth columns additionally controlled for total number of employment as proxy for size of firms, age and sales variables which are expected to affect investment decisions and improve the explanatory power of the model. The OLS result in column 5 indicates that firm age has significant negative effect on investment rate. I.e. older firms are less likely to invest than younger once. This might be due to the need by new firms to expand their production capacity which had already been achieved by older ones or the higher maintenance costs needed by older firms which hinders them to undertake new investments.

In addition, the sales variable has also significant positive effect on investment but close to zero in magnitude, indicating that the higher the income from sales of produce the higher the investment rate would be expected from the firm. Controlling the additional variables in the analysis, still, doesn't improve the significance level of the interaction term. The fixed effects specification on the sixth column indicates that from the additional variables controlled; only the lagged investment, output and profit rates have significant effect on investment.

The general conclusion which can be drawn from this table seems that in all the specifications the bank fore closure law has consistently negative but not significant effect on investment decisions of private firms. It also shows that the existence of significant difference between the investment behaviour of private and public firms and investment rate in pre and post intervention periods on average.

5.2.2 The Generalized Method of Moments (GMM) Estimations

The results from the table explained in the above section might be corrected for measurement errors and omitted variables biases in the last column (fixed effects), but the endogeneity problem might not be solved because of the inclusion of the lagged dependent variable in the model. By construction, the unobserved panel- level effects are correlated with the lagged dependent variables, making standard estimators inconsistent. In such cases (M. Arellano and Bond 1991) derived a consistent Generalized Methods - of- Moments (GMM) estimator for the parameters of this model to solve the stated problems. One of the requirements is that there be no autocorrelation in the error terms (Arellano's tests for autocorrelation, AR2 are displayed on table 8). GMM has two versions: the first is Arellano & Bond's first step GMM, which has been mentioned above and some times called 'difference GMM' and the second is the two stages systems GMM, which is an augmented version outlined by Arellano and Bover (1995) and fully developed by (M. Arellano and Bond 1998) Which solves equations containing endogenous variables simultaneously. It is called 'system GMM'.

The result on table 8 below indicates regression outputs using the one and two step generalized method of moment's estimation using the same variables on the table we used on the explanation of the above section. The first stage GMM estimation results are included to check the robustness of our two stage GMM estimation results and for comparison purposes. The first stage GMM estimators of the coefficients of these variables, as indicated on the table, show that lagged investment and lagged out put are highly significant (at 1%). Even though, the coefficient of the policy term is negative, it is not statistically significant at conventional levels.

TABLE 8
GMM estimation of the impact of bank foreclosure law on firm investment behaviour
(Investment to capital ratio is the dependent variable)

VARIABLES	(1) GMM_1St	(2) GMM_2St	(3) GMM_1St	(4) GMM_2St
Lag(investment/capital)	0.287***	0.252***	0.284***	0.255***
	[0.075]	[0.067]	[0.075]	[0.067]
Lag(investment/capital)^2	-0.288***	-0.239***	-0.284***	-0.244***
	[0.089]	[0.079]	[0.088]	[0.079]
Lag (profit/capital)	-0.000	-0.000*	-0.000	-0.000*
	[0.000]	[0.000]	[0.000]	[0.000]
Lag(output/capital)	0.000***	0.000	0.000***	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Lag (Debt/capital)	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Lag(export/sales)	-0.141*	-0.119*	-0.137	-0.117*
	[0.084]	[0.065]	[0.084]	[0.067]
Post intervention period	-0.027	-0.015	-0.017	-0.012
	[0.019]	[0.011]	[0.021]	[0.011]
private	0.102	0.022	0.085	0.038**
	[0.083]	[0.014]	[0.087]	[0.015]
Policy variable	-0.022	-0.028*	-0.026	-0.030*
	[0.026]	[0.015]	[0.027]	[0.016]
age			0.031	-0.012
			[0.042]	[0.008]

employ_tot (Size)			0.000	0.000*
			[0.000]	[0.000]
Constant		0.086***		0.075***
		[0.011]		[0.014]
Observations	2411	3452	2388	3428
Number of firms	711	1013	711	1010
Test ARB_AUT	0.49	0.63	0.40	0.58
Test SH_OIR	0.00	0.47	0.00	0.55

Note: *** indicates p<0.01(significant at one percent), ** p<0.05(significant at 5 percent), and * p<0.1(significant at ten percent)

Standard errors are in brackets, ARB_AUT indicates the p-value for the Arellano and Bond's AR2 test for serial autocorrelation, and SH_OIR indicates the p-value for Hansen Test for Over identifying Restrictions for exogeneity of instruments for the GMM_2st and Sargan Test for GMM_1st.

Source: Author's computation based on CSA's Manufacturing Census

The second column on the same table contains the two stage GMM estimates. Unlike the first stage GMM, here the lagged profit coefficient and the private dummy are significant at 10% and the policy variable at 5%. This indicates that, after the implementation of the bank foreclosure law, investment rate for private firms tended to decline by 3.1 percentage points over time due to the intervention. But, relative to public firms investment rate by private firms was 2.6% points higher before the intervention.

The third and the fourth columns control additional variables for- age and size. On the third column the first stage GMM result indicates that the inclusion of these variables doesn't improve the result and they all are also insignificant. But on the fourth column using the two stages GMM the proxy for firm size-total employment by firm- is significant at 10%, indicating that the size of the firm determines its investment decision. That is, larger firms invest higher than the smaller ones, which is inline with the finding by (Begisten et al. 1997) .

The age of the firm is negatively correlated with investment, indicating that older firms are less likely to invest, but the coefficient is not statistically significant. The investment literature has mixed evidence on the effect of age on investment. Some argue that since older firms have accumulated knowledge, experience, market share, and exposure to the export market over time, they are more likely to invest than their younger counterparts. The other argument is that, since younger firms are more aggressive and energetic to improve their economies of scale they tend to invest better. While, older firms are believed to have already achieved their highest economies of scale and not active participants, and they tend to invest less.

The other important points on this column are that, first; the coefficient of the private dummy has improved its magnitude and efficiency. Private firms were investing on average 4.1percentage points higher than their public counterparts in the pre-intervention period. The second point is that the negative effect of the law has increased in magnitude and efficiency. This indicates that on average private investment rate seems

to decline, over time, by 3.3 percentage points as a result of the implementation of the law, at a 5% significance level. The last and interesting point is that the coefficient of the export to sale ratio consistently gives a negative significant coefficient in most of the specifications, indicating that firms which have higher export to sale ratio tend to invest less compared to those which have less or zero ratios. I.e. a unit percentage points increase in the ratio of exports to sale of a firm is on average related to 11.6 percentage points decline in the amount it invests.

We have seen on the decision to invest part in the previous section 5.1 that exporting firms are more likely to invest than the others, but the result here shows that, they invest only part of their export sales. That means their investment is not increasing at a given proportional rate as their earnings from exports. Their probability of investing or decision to invest is higher but investing in fewer amounts, indicating that they are using their large part of export earnings in non investment options, which might be expenditure on imported inputs or accumulation of the profit to invest in large amount in the future periods. While firms which are not exporting or export fewer are less likely to invest compared to exporting firms, but they invest in large quantities once they decide to invest.

The general conclusion from this section seems to be, the bank foreclosure law has negative contribution on private firm level investment, age and export to sale ratio have the same negative effect, and out put and firm size have positive effects on investment.

5.2.3 GMM estimation from the balanced panel of the data

It seems reasonable to relay on the result from the unbalanced panel data analysis than the balanced one, since it is likely to better represent the existing real situation in the manufacturing sector of Ethiopia. It is difficult to say that firms continuously existed and surveyed through out the study period, which only constitute part of the whole establishments, are representative of the whole manufacturing sector. Firms which joined the sector in later periods and left the sector before the last round survey are also expected to contribute better to show the real situation in the sector. But to check the robustness of our result and to see the effect of the intervention only on firms which continuously persisted or surveyed through out the study period, it is better to see the result from regressions on the balanced panel as well.

The description of those firms which existed through out the period as indicated on table 19 of the appendix; they have a total firm-year observation of 1,568. Out of which 819 are private and 749 are public. Their composition across industries and description of the dependent and explanatory variables are also displayed on the table. The decision to invest on table 20 of the appendix indicated a similar result in terms of significance and direction of the effect as shown on the unbalanced panel analysis in the previous section.

Table 21 of the appendix shows the GMM estimates on the balanced panel. The third and the fourth columns control for industry fixed effects in addition to the variable on the table. As the two stages GMM estimates on column 1 and 3 indicate the policy variable is negative and significant at acceptable levels. The magnitude of the effect is comparable with the result from the unbalanced panel and even a bit higher for this group of firms. The size and age of firms have also the same positive and negative result as on the unbalanced one, respectively, but the results are not statistically significant here.

Generally the similarity of the findings on most of the measures on the analysis from the unbalanced and balanced panel data sets indicates the robustness of the findings.

5.3   Which industrial groups are more affected by the intervention?

The effect of a policy intervention may not equally or in the same way affect all industrial groups in the economy. It might have positive, negative, or no effect on investment rate of industrial groups depending on the different attributes each industrial group has. Table 9 below shows the two stage GMM estimates of investment to capital ratio. It contains explanatory variables from the Euler equation model, variables for size and age, and dummies for post intervention period and the policy variable. The first column shows the result for food and beverages industrial group. Firms (private and public) in this industrial group have encountered, relative to the pre-program period, increased investment rate in the post intervention period. The private firms in this industrial group had a higher investment rate than the public firms in the pre intervention period. The partial effect of the intervention on the private firms over time shows a negative 5.7% effect on their rate of investment, and which is significant at 5%. But all the other results for this industrial group except for out put and debt variables are not statistically significant at conventional significance levels. Lagged out put and debt positively affect the investment rate for this industrial group.

The second column contains results for the firms in the textile and apparel industrial group. The rate of investment for the private firms in this group was greater relative to the public in pre-intervention period. The ratio of investment to capital has increased in the post relative to the pre intervention period, but it is not statistically significant. The older firms in this group are more likely to invest than the new entrants and investment tends to increase when the size of the firm is relatively bigger. The effect of the law on this and the paper and printing industrial group is exceptionally positive and close to zero, but not statistically significant. The effect for the rest of the industrial groups is negative, but the only statistically significant coefficients, at 5%, are the simple machinery and the food and beverages industrial groups. Since, the observations for the tobacco, metal, and leather and foot wear industrial groups don't fit the models properly they are dropped and not included in the table.

The coefficient of the export to sale ratio for all of the industrial groups is consistently negative. But it is only significant for the simple machines industrial group.

TABLE 9
GMM estimation for each Industrial group
(Investment to capital ratio is the dependent variable)

VARIABLES	(1) Fd&Bev	(2) Text&Aparel	(3) Wood&fr	(4) Paper&Prt	(5) Chemical	(6) Non-Metal	(7) Machine
Lag(investment/capital)	0.182	0.398	0.105	-0.077	0.226	0.171	-0.199
	[0.133]	[2820]	[0.341]	[76.175]	[0.224]	[0.808]	[0.367]
Lag(investment/capital)^2	-0.226	-0.296	-0.162	0.000	-0.243	-0.162	0.192
	[0.145]	[1928]	[0.345]	[0.000]	[0.262]	[0.850]	[0.605]
Lag (profit/capital)	-0.0000003	0.0000037	-0.0000001	-0.0000168	0.0192118***	-0.0000017	-0.002
	[0.000]	[0.286]	[0.000]	[0.002]	[0.006]	[0.000]	[0.004]
Lag(output/capital)	0.000**	-0.000	0.000	0.000	-0.001	0.000	0.002
	[0.000]	[0.067]	[0.000]	[0.001]	[0.001]	[0.000]	[0.003]
Lag (Debt/capital)	0.000***	0.015	-0.000**	-0.013	0.051	0.110	0.011
	[0.000]	[180]	[0.000]	[57.8]	[0.067]	[0.191]	[0.052]
Lag(export/sale)	-0.030	-0.306	-0.142	-109.25	-208.13	-0.063	-0.116**
	[0.037]	[53577]	[5.651]	[28648]	[146.1]	[141.0]	[0.049]

Post intervention period	0.016	0.018	-0.045	-0.186	0.026	-0.014	0.009
	[0.018]	[884.9]	[0.148]	[2234]	[0.042]	[23.09]	[0.025]
private	0.038	0.098	0.068	0.264	0.168***	0.113	0.129
	[0.115]	[14277]	[0.417]	[272.3]	[0.054]	[0.118]	[0.079]
Policy variable	-0.057**	0.000	-0.001	0.000	-0.077	-0.015	-0.146**
	[0.028]	[0.000]	[0.199]	[0.000]	[0.062]	[23.36]	[0.067]
age	0.007	0.229	-0.006	1.807	-0.023	-0.036	0.045
	[0.015]	[11425]	[0.154]	[16924]	[0.035]	[0.121]	[0.033]
employ_tot (Size)	0.000	0.000	0.000	0.000	0.000**	0.000	-0.000
	[0.000]	[0.276]	[0.000]	[1.013]	[0.000]	[0.002]	[0.000]
Constant	0.041	0.000	0.037	0.000	-0.014	0.000	0.029
	[0.116]	[0.000]	[0.361]	[0.000]	[0.054]	[0.000]	[0.045]
Observations	925	352	563	272	218	490	89
Number of firms	288	81	197	66	54	130	31

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

Even though, almost for all industrial groups, relative to the public, private firms have positive investment rates in the pre-intervention period, the coefficients are significant only for the chemical industrial group. The magnitude is 16.79% points higher at significance level of 1%. Size is also a significant determinant of investment rate for the chemical industrial group. That is, the higher the size the higher the investment rate. The others have also positive but insignificant coefficients for size, except the simple machine industrial group which has a negative insignificant coefficient. This might indicate that firms in the simple industrial group limit their economies of scale to some determined level, even though; they might have the ability to invest.

TABLE 10
GMM & fixed effects estimations controlling for industry and time dummies
(Investment to capital ratio is the dependent variable)

VARIABLES	(1) GMM_2St	(2) GMM_1st	(3) fixed eff
Lag(investment/capital)	0.261***	0.251***	-0.148***
Lag(investment/capital)^2	-0.246***	-0.236***	0.081
Lag (profit/capital)	-0.000*	-0.000*	-0.000*
Lag(output/capital)	0.000	0.000	0.000***
Lag (Debt/capital)	0.000	0.000	-0.000
Year 2 (1995)	0.011	0.013	0.000
Year 3 (1996)	0.007	0.008	0.000
Year 4 (1997)	0.001	0.002	-0.007
Year 5 (1998)	0.007	0.008	-0.014
Year 6 (1999)	-0.029*	-0.021	-0.061***
Year 7 (2000)	-0.019	-0.018	-0.049**
ind2 (Tobacco)	0.421	0.441	
ind3 (Textile & Apparel)	0.002	-0.002	
ind4 (Leather & Footwear)	0.032**	0.029	
ind5 (Wood & Furniture)	-0.001	0.003	
ind6 (Paper & Printing)	0.035**	0.039*	
ind7 (Chemical)	0.028*	0.023	
ind8 (Non-Metal)	0.022**	0.020	

ind9 (Metal)	0.003	0.003	
ind10 (Simple Machine)	-0.001	-0.002	
age	-0.012	0.025	0.007
employ_tot (Size)	0.000	0.000	-0.000
Prvt (private)	0.038**	0.029	0.108***
prvtyr5 (policy 1998)	-0.047**	-0.049*	-0.037*
prvtyr6 (policy 1999)	-0.003	-0.012	0.008
prvtyr7 (policy 2000)	-0.007	-0.011	-0.005
prvtyr8 (policy 2001)	-0.044**	-0.048	-0.037*
Year 8(2001)			-0.035*
Constant	0.050***	0.036	0.049**
Observations	3446	3446	3449
Number of firms	1014	1014	1017

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

The other specification which helps to see the effect of the law and the behaviour of other determinants of investment by industries is controlling all the year and industry dummies in the model. Table 10 above shows the first and two stage GMM estimations on the second and first column, respectively and the fixed effects estimation on the third column.

As can be seen from the first column of table 10, all the Euler equation explanatory variables have the expected sign except the debt variable. The profit coefficient has also contrary result to the theory as stated in the theoretical frame work which is the general weakness of the model. Its interpretation some times relates to credit constraints and others take it as expected profits. To see the time effect and the effect of the policy in each year, the dummy for the first year (1994) is the omitted category and the coefficients of the other years' dummies are interpreted relative to this base year. The policy intervention has taken place starting from year 5. There fore in the pre intervention years (1995-97) investment had been greater (positive) relative to the base year (1994). But in the post intervention years especially in 1999 and 2000(year 6&7) investment ratio on average has declined at 2.9 & 1.8 percentage points, respectively. Especially in 1999 it has a significant effect at 10%. While both coefficients are not significant in the first stage GMM, on column two, the coefficients for both years are similarly negatively related.

Further more, the coefficients of the same years, after the fixed effects estimation on column three, show the same negative relation with strong significance levels at 1 and 5 percents. This seems to give evidence of declining investment rates in the post intervention years relative to the base year, 1994. The dummy for year 2001 has been dropped due to multi-collinearity problems in the two stages GMM estimation, but it shows a consistently negative significant coefficient on the fixed effects specification on the last column.

Concerning the industrial groups, the food and beverages industrial group has been treated as the reference group and the coefficients of other industrial dummies are interpreted relative to this base category. As it can be seen starting from the 12th to 20th rows on the table, relative to the food and beverages industrial group, investment rate is lower for industry 5(wood & furniture) and 10(simple machine). Where as, the rest of the industries have greater investment rate compared to the base category, which is significantly negatively affected by the intervention. The coefficients are statistically significant at five percent significance level for leather and footwear, paper and printing and non metal industrial groups. They invest on average 3.2, 3.5, & 2.2 percentage points higher than the food and beverage industrial group. The coefficient of chemicals industrial group is significant at ten percent and its investment rate is 2.8 percentage points higher than that of the base category.

By taking the mean entry year of establishments as a bench mark to differentiate younger and older firms, age of a firm is negatively correlated with investment rate, indicating that firms established before 1983 have lesser investment rates than the younger ones. But the size of a firm measured by the number of employment created is positively related with the rate of investment, indicating that a unit percentage points increase in the employment of workers on average is likely to increase the investment rate. Even though, this relation seems to exist, the coefficients are not statistically significant at conventional levels in both cases.

The coefficients of the private dummy and its interaction with post period year dummies (policy variable for years 1998-2001) indicate that before the intervention the private firms had investment rate 3.8 percentage points higher than that of their counterpart public firms. But overtime due to the policy intervention the investment rate of private firms tended to decline by 4.7 and 4.3 percentage points in the years 1998 and 2001, respectively. The effect is also significant at 5% significance levels for both years. On the years 1999 and 2000 there seems to have a similar negative effect but not statistically significant at an acceptable level. A similar result has been achieved using the fixed effects estimation too, except the decline on the significance level to 10%.

The general conclusion that can be drawn from this section is that the bank fore closure law has tended to affect negatively private investment in most of the industries except the textile and apparel and the paper and printing industrial groups. The negative effect is significant for the food and beverages and simple machines industrial groups. Investment rate for the private firms in the pre-intervention period was higher for all industrial groups relative to the post intervention period. Age of a firm negatively affects investment in the wood and furniture, the chemical and non metal industrial groups. But, it is positive for the others. Size affects investment in all industries positively. Especially, it is significant for the chemical industrial group. Profit rate also positively and significantly affects investment in this industrial group.

5.4   Effect of the policy on investment of firms, categorised by size.

As we have seen the two stages GMM estimates on table 8, size is a significant determinant of the investment rate of firms. There fore, it is important to see the effect on the basis of the three size categories based on the total number of workers they employed. Firms are categorized as 'small' if the number of their employees is less than 30, 'medium' if the number is greater or equal to 30 and less than hundred, and 'large' if they have employed more than and equal to 100 workers. A separate two stages system GMM estimation is conducted for each of the three groups. Table 11 below shows the result of this estimation. The first column is for small, the second for medium, and the third for larger firms. Since the number of public firms in the smaller size group of firms is by far lower than the number of private firms, it is difficult to base our conclusion on the estimated coefficients of this group for variables which need inference about the treatment group relative to the control. They are interpreted for comparative purposes, but the reader should implicitly understand that it should be excluded. But we can do valuable inferences about the medium and larger group of firms and some of the variables in the smaller group which don't relate one to the other.

   The result indicates that compared to the pre intervention period, investment in the post intervention period has declined for small and larger firms, but increased for the medium groups. The coefficients are not significant even at 10% significance levels. Private firms have significantly higher investment rate in the pre intervention period for all the three groups. The significance level is 10% for the medium firms and at 1% for larger and smaller ones. Relative to the public the magnitude of investment rate for private firms is higher for the large (18.39%), smaller (8.5%), and medium (7%) firms in the same order. But the coefficient of the policy term indicates that there seems a negative significant effect of the law on investment rate for small and large firms. There is 11.3 percentage points' effect of the intervention on the larger firms. The effect on the medium groups is also in the same direction but not statistically significant.

   Firm age has a negative (3.4%) significant effect on investment rate for larger firms, insignificant negative effect on medium, and positive and insignificant effect on the smaller groups. The other important point on this table is that the Euler equation explanatory variables for the rate of investment have the expected sign and significant coefficients for the smaller firms, except the lagged debt and profit terms which are not significant at conventional levels. The same holds true for the larger firms, except the change in sign for the profit and out put coefficients and all of them being insignificant. The positive sign for the profit coefficient of larger firms indicates that they tend to invest when they earn higher profit. The other alternative argument can be they seem to be credit constrained, due to their dependence on profits for undertaking investments. This is the case for smaller firms in most of the investment literatures.

   The export to sale ratio for all of the three groups negatively affects investment rate. But the only significant coefficient is for the smaller group of firms.

TABLE 11
GMM estimation for small, medium, & large establishments
(Investment to capital ratio is the dependent variable)

VARIABLES	Small	Medium	Large
Lag(investment/capital)	0.233**	-0.021	0.236
	[0.094]	[0.138]	[0.148]
Lag(investment/capital)^2	-0.275***	0.101	-0.124
	[0.104]	[0.193]	[0.215]
Lag (profit/capital)	-0.000	-0.000	0.000
	[0.000]	[0.000]	[0.000]
Lag(output/capital)	0.000**	0.000	-0.000
	[0.000]	[0.000]	[0.000]
Lag (Debt/capital)	0.000	0.001	0.000
	[0.000]	[0.001]	[0.002]
Lag(export/sales)	-0.186**	-0.013	-0.064
	[0.093]	[0.042]	[0.068]
Post intervention period	-0.011	0.014	-0.016
	[0.009]	[0.028]	[0.012]
private	0.086***	0.071*	0.184***
	[0.012]	[0.036]	[0.049]
Policy variable	-0.036**	-0.011	-0.113**
	[0.014]	[0.043]	[0.045]
age	0.002	-0.032	-0.034**
	[0.010]	[0.023]	[0.015]
Constant	0.003	0.055**	0.106***
	[0.009]	[0.024]	[0.016]
Observations	1820	725	883
Number of firms	742	320	209

Note - Standard errors are in brackets

*** indicates statistical significance at 1% (p<0.01), ** at 5% (p<0.05),and * at 10% (p<0.1)

Source: Author's computation based on CSA's Manufacturing Census

Table 12 below controls for industry dummy variables in addition to the explanatory variables included on table 11. There seems to be no significant change on the result here too for the variables controlled on the previous table, except the profit term whose coefficient become significant at 5%, indicating that the higher the profit firms gain the higher they tend to investment. The coefficients of the industrial dummies would be interpreted relative to the omitted category, food and beverages industrial group. It is also possible to see a similar analysis, on table 15 of the appendix, controlling for the export to sale ratio as one of the explanatory variables.

TABLE 12
GMM estimation by size controlling for industry dummies
(Investment to capital ratio is the dependent variable)

VARIABLES	(1) Small	(2) Medium	(3) Large
Lag(investment/capital)	0.264***	-0.032	0.198
	[0.098]	(0.141)	(0.151)
Lag(investment/capital)^2	-0.303***	0.109	-0.075
	[0.106]	(0.194)	(0.213)
Lag (profit/capital)	-0.000	-0.000	0.000**
	[0.000]	(0.000)	(0.000)
Lag(output/capital)	0.000***	0.000	-0.000
	[0.000]	(0.000)	(0.000)
Lag (Debt/capital)	0.000	0.001	0.001
	[0.000]	(0.000)	(0.001)
Post intervention period	-0.013	0.016	-0.018
	[0.009]	(0.028)	(0.012)
private	0.084***	0.054*	0.173***
	[0.012]	(0.031)	(0.052)
Policy variable	-0.034**	-0.003	-0.105**
	[0.015]	(0.043)	(0.046)
ind2 (Tobacco)			-0.029

ind3 (Textile & Apparel)	0.033*	0.022	-0.031
	[0.018]	(0.032)	(0.019)
ind4 (Leather & Foot wear)	0.037*	-0.025	0.007
	[0.020]	(0.081)	(0.025)
ind5 (Wood & Furniture)	0.022**	0.007	-0.006
	[0.011]	(0.024)	(0.037)
ind6 (Paper & Printing)	0.044**	0.064**	0.075**
	[0.019]	(0.025)	(0.035)
ind7 (Chemical)	0.022	0.113**	0.020
	[0.015]	(0.047)	(0.023)
ind8 (Non Metal)	0.019	0.044*	0.039
	[0.013]	(0.025)	(0.027)
ind9 (Metal)	0.005	0.061	0.062*
	[0.014]	(0.037)	(0.034)
ind10 (Simple Machine)	0.011	-0.026	-0.019
age	0.000	-0.035*	-0.039**
Constant	-0.017	0.032	0.098***
Observations	1825	732	889
Number of firms	746	321	208

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

The result for the smaller firms in the first column of table 12 shows that, relative to the omitted category all firms have higher investment rate. Especially the coefficients for textile and apparel, leather and foot wear, wood and furniture, and paper and printing industries have significant coefficients. The paper and printing firms in all of the three groups have significant investment relative to the base category. The chemical and non metal firms in the medium firm category have also significant investment rates. The larger firms in the metal industrial group have a significant rate of investment compared to the base category, too. Where as the coefficient for larger firms in the textile and apparel, wood and furniture, and simple machine industrial groups are less and insignificant compared to the food and beverages industrial group. The same is true for medium firms in the leather and foot wear and the simple machine industrial groups.

5.5 What is the likely cause for the negative effect of the law?

Since it can be as a result of various factors, it is difficult to draw what exactly causes the negative effect of the law on investment. But as mentioned in the country's background section of the paper it is possible to point out what most likely tends to cause it. The main cause seems to be the higher amount of collateral needed to get investment loan. This gives unequal ground for the banks and the investor in that, when the investor fails to pay back his debt the law forces him to loose his high valued collateral relative to the low valued loan he took from the bank. Therefore, the investor becomes reluctant to take investment credit to undertake further investment decisions, which contributes to the decline in the level of investment after the implementation of the law. In addition in a country where the investment climate is not highly attractive, financial institutions are not well developed, productivity and competitiveness is at its lower level, and institutions are not strong enough, the enactment of such a law indirectly reduces investment in that;

First, when the investment climate is less attractive there will be high uncertainty of success on most of the investments. The high rate of uncertainty increases the probability of loosing the borrowed capital due to failure of the investment project. The failure on the investment calls for the loss of high valued collateral through the enforcement of this law which in turn reduces the ability and the motive to invest in the next periods. As shown on figure 3, there is a large gap between Africa and the rest of the world in various indicators of the business environment. It seems reasonable to expect a wider gap (James 2000) in sub Saharan Africa and Ethiopia in those measures relative to the world average. The World Bank ranks Ethiopia the 11th out of 46 sub- Saharan African countries in ease of doing business in the year 2008. Even though, there has been some improvement in the index relative to previous years, the country has to go a long distance to improve the investment climate to reduce uncertainties.

The second indirect cause can be the general low development of the financial sector, which manifests itself by high cost of capital, high rate of collateral requirement, and low access to investment credit as indicated in figures 4, 5, 6, & 7. The amount of fund allocated to fixed capital investment particularly for the manufacturing sector is relatively very low. The lower access to finance accompanied by high collateral requirement and high cost of capital reduces the profitability of investment projects (Hildegard 1983). When the profitability is very low investors tend to be less motivated to take investment credit at high collateral and interest rates, since it reduces their probability of loan repayment and increases the chance of loosing their high valued collaterals. Moreover, inability to get the required amount of collateral, to be eligible debtor, also deprives most of the potential investors from undertaking significant investment decisions.

The third is the lack of the rule of law and competent institutions. When legal, trade and other important institutions function less efficiently and ineffectively, it increases the uncertainty on the investor and reduces the probability of success in investment achievements. Therefore the investor doesn't want to take high cost credit in the existence of such inefficient and less effective institutions, to avoid loss of his fixed capital pledged as collateral with banks.

The fourth is the lower productivity and competitiveness of the sector which can be explained by low export levels, lower educational and skill level of the labour force, and low technological innovation and imitation capacity. These problems, especially, affect the local potential investors which have less entrepreneurial capacity and exposure to the world market. The low level in these indicators reduces profitability and the confidence to work using costly credits in uncertain environment, provided the enforcement of the law in cases of failure to repay debts.

Generally in a country where the business environment is relatively uncertain, the financial institutions are not well developed, and the level of industrial competitiveness in terms of market share, availability of skilled labour force, and entrepreneurial capacity of local investors is relatively at lower level, it is more likely that an intervention which gives unequal ground for financial institutions and potential investors is expected to affect the favoured (the banks) positively and the other party(the investor) negatively.

Chapter 6 Conclusions and Recommendation

6.1   Conclusions

This paper has aimed to probe the effect of the bank fore closure law on private firm level investment behaviour of the Ethiopian manufacturing sector. It has made use of a panel data set and fixed effects version of panel logit estimation to deal with the probability of investing and GMM estimation method for the amount invested, to come up with the following conclusions. The main conclusion of the analysis is that in both the decision to invest and the amount invested cases on average the bank for closure law has negative effect on manufacturing investment in Ethiopia. The same result has also been achieved using the balanced panel data set. Further findings from the analysis are explained as follows;

First, the panel logit results for the decision to invest indicated that the age of a firm has a negative effect on the decision to invest. Where as out put to capital ratio, Size of firms, measured in number of employees, and the ratio of exports to sales have positive effects on the probability of investing.

Second, the GMM estimates for the amount to invest indicated that the private firms on average had greater investment rate in the pre-intervention period compared to the public. The investment situation of all the firms has declined in the post intervention period relative to the period before the intervention. The negative effect of the law is significant and higher on the larger group of firms (10.5%). The effect for the smaller group of firms has also tended to be significantly negative, but due to the less amount of control groups in this category it has become difficult to infer the most likely effect on this group. Among the industrial groups the food and beverages and the simple machinery industrial groups are significantly affected and the magnitude is higher for the simple industrial group. The other group of industries have also encountered a negative effect but statistically insignificant, except the textile and apparel and the paper and printing industries.

Almost all of the industrial groups have positive investment compared to the base category, food and beverages industrial group. Which indicates that the food and industrial group is relatively the most affected than others. In the small industrial group the textile and apparel, the leather and foot wear, wood and furniture, and paper and printing industrial groups have positive significant investment compared to the base category. But in the medium group the paper and printing, the chemical and non metal industries have the highest significant result. In the large industrial group the metal and paper and printing industries have the same positive significant investment compared to the food and beverages industrial group in the study period.

The result for the other variables which have been expected to affect the rate of investment (the amount to invest) indicates that size has positive effect, indicating that bigger firms invest higher than smaller ones. Age of a firm and export to sale ratio are negatively related. Older firms tend to invest less; especially this is significantly true for larger and medium groups. Firms which have higher exports per sale also tend to invest less. But the probabilities of investing are higher for exporting firms, and invest in small amount if they decide to invest. This might be due to the relatively few number of exporting firms in the economy or the exporting firms tend to accumulate their profits till they invest in large quantities in the future. Or else they use their export earnings for expenditures other than investment on the same business.

6.2   Recommendations

The likely negative result achieved on this analysis for the bank for closure law on private firm level investment behaviour doesn't show that the law is not important. But it indicates that the way it is implemented has the unintended effect to affect the motive to invest. Even though, there is no hard and fast rule to recommend the right policy option, as it has been tried to elaborate in the literature review, back ground, and possible causes part in 2.2, 3.2.4 & 5.5, the issues like the business environment, access to credit, high collateral rates, and the general investment climates are by far less in Africa (James 2000) , especially in sub-Saharan Africa. Ethiopia also shares similar problems. But the government of Ethiopia has been trying to improve the investment climate as much as possible (Gelb et al. 2007). Since this law gives relatively better advantage for financial institutions compared to the investor on the basis of the issues mentioned above, it tended to contribute negatively.

There fore, to better benefit from the implementation of the law, as expected by the policy makers, the financial system needs to get the necessary reforms in order to charge reasonable amount of collaterals, accept the different kind of collaterals which are used in other successful countries, and free competition in the financial sector needs to be promoted. The other thing which needs the government's attention is that the general investment climate should further be improved to reduce uncertainties and the risk of failure of investment projects, different policy measures to improve the productivity and export performance of firms through educating or training the labour force, reforming the legal system to efficiently implement the rule of law, and promoting export through market incentives and creating conducive macroeconomic environment is very important and will help to achieve the required objectives. Especially, if improvements in the financial sector and the rule of law are in place the need for the bank foreclosure law as a policy measure will be very low and banks and investors will equally be treated.

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Appendix

TABLE 13
Export and sales performance over years

year	Sales(000)	Exports(000)	Export/sale (%)
1994	7657.3	592.5	1.86
1995	9600.3	811.9	1.88
1996	8808.9	648	1.6
1997	8172.2	639.9	2
1998	8437.9	753.3	2
1999	9471.7	436.8	2.16
2000	10100	460.5	2.31
2001	10500	1018.4	2.38
Total	9152.2	669.9	2.07

Source: Author's computation based on CSA's Manufacturing Census

Table 14
Description of the industry averages of the dependent and explanatory variables.

No.	Industry	Investment/Capital	Output/capital	Loan/capital	Profit/capital	employment
1	Food & Beverages	.07500	20703.84	491.2	2336.78	113.24
2	Tobacco	.1117	46.98	.0032	13.98	920.33
3	Textile & Apparel	.078	2174.28	.223	-243.5	512.4
4	Leather & Footwear	.121	8986.89	77.06	-71.06	122.88
5	Wood & Furniture	.0915	31327.69	25.95	9117.78	39.95
6	Paper & Printing	.1319	819.46	.126	2.29	102.3
7	Chemical	.141	18.4	.360	.97	85.9
8	Non Metal	.101	4081.69	.0322	726.2	83.1
9	Metal	.129	1511.8	10.36	177.16	57.9
10	Simple Machine	.0669	1512.87	.142	829.7	61.13

Source: Author's computation based on CSA's Manufacturing Census

TABLE 15

GMM estimates by size (controlling industry fixed effects)

VARIABLES	(1) Small	(2) Medium	(3) Large
Lag(investment/capital)	0.226**	0.005	0.207
Lag(investment/capital)^2	-0.267**	0.061	-0.096
Lag (profit/capital)	-0.000	-0.000	0.000
Lag(output/capital)	0.000***	0.000	-0.000
Lag (Debt/capital)	0.000	0.001	0.001
Lag(export/sales)	-0.179*	-0.059	-0.054
Post intervention period	-0.012	0.001	-0.019
private	0.086***	0.079	0.177
Policy variable	-0.034**	0.016	-0.105**
ind2 (Tobacco)	0.000	-0.047	-0.034
ind3 (Textile & Apparel)			-0.025
ind4 (Leather & Foot wear)	0.036*	0.441*	-0.028
ind5 (Wood & Furniture)	0.038*	0.001	0.018
ind6 (Paper & Printing)	0.024**	-0.133	-0.012
ind7 (Chemical)	0.045**	-0.089	0.064
ind8 (Non Metal)	0.023	0.202	0.015
ind9 (Metal)	0.021	-0.299**	0.030
ind10 (Simple Machine)	0.007	0.224	0.057
age	0.016	-0.058	-0.030
Constant	-0.018	0.056	0.103
Observations	1820	723	882
Number of firms	742	318	208

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

TABLE 16

Impact of bank foreclosure law on firm investment behaviour (Investment to capital ratio as a dependent variable)

VARIABLES	(1) POLS	(2) fixed eff	(3) POLS	(4) fixed eff	(5) POLS	(6) fixed eff
Post intervention period	-0.025**	-0.032***	-0.019*	-0.032***	-0.021*	-0.035***
	[0.012]	[0.012]	[0.011]	[0.012]	[0.012]	[0.012]
private	-0.009	0.087***	0.016	0.108***	0.035***	0.102***
	[0.009]	[0.024]	[0.011]	[0.025]	[0.012]	[0.025]
Policy variable	0.007	-0.016	-0.022	-0.0218	-0.018	-0.0182
	[0.013]	[0.014]	[0.013]	[0.015]	[0.014]	[0.015]
Lag(investment/capital)			0.467***	-0.145***	0.428***	-0.144***
			[0.039]	[0.050]	[0.040]	[0.050]
Lag(investment/capital)^2			-0.430***	0.082	-0.388***	0.0780
			[0.050]	[0.063]	[0.051]	[0.063]
Lag(output/capital)			0.000***	0.000***	0.000***	0.000***
			[0.000]	[0.000]	[0.000]	[0.000]
Lag (Debt/capital)			0.000***	-0.000	0.000***	-0.000
			[0.000]	[0.000]	[0.000]	[0.000]

	(1)	(2)	(3)	(4)	(5)	(6)
Lag (profit/capital)			-0.000***	-0.000*	-0.000**	-0.000*
			[0.000]	[0.000]	[0.000]	[0.000]
sales					0.000***	0.000
					[0.000]	[0.000]
employ_tot (Size)					0.000	-0.000
					[0.000]	[0.000]
age					-0.017***	0.008
					[0.006]	[0.016]
Constant	0.116***	0.055***	0.075***	0.044**	0.065***	0.045**
	[0.008]	[0.019]	[0.009]	[0.018]	[0.010]	[0.019]
Observations	5140	5140	3474	3474	3441	3441
Number of firms		1562		1021		1015
R-squared	0.003	0.013	0.069	0.062	0.079	0.063

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

TABLE 17

Description of number of firms in industries by size and over years

No.	Industry	Size	Year								Total
			1994	1995	1996	1997	1998	1999	2000	2001	
1.	Food and beverages	small	84	70	89	107	128	147	121	134	880
		medium	14	15	18	21	27	34	40	44	213
		large	48	47	46	44	43	21	47	49	345
		subtotal	146	132	153	172	198	202	208	227	1,438
2.	Tobacco	small	-	-	-	-	-	-	-	-	-
		medium	-	-	-	-	-	-	-	-	-
		large	1	1	1	1	1	1	1	1	8
		subtotal	1	1	1	1	1	1	1	1	8
3.	Textile and apparel	small	12	10	23	23	27	37	20	15	167
		medium	10	7	9	13	11	8	13	16	87
		large	29	31	30	30	27	25	31	33	236
		Sub-total	51	48	62	66	65	70	64	64	490
4.	Leather & Footwear	small	30	29	39	35	29	30	20	17	229
		medium	11	12	10	12	15	10	16	24	110

		large	11	9	14	14	13	9	13	13	96
		subtotal	52	50	63	61	57	49	49	54	435
5.	Wood & Furniture	small	44	49	63	94	100	115	93	93	651
		medium	20	25	28	27	19	17	22	23	181
		large	12	11	10	11	11	2	12	15	84
		Sub-total	76	85	101	132	130	134	127	131	916
6.	Paper & Printing	small	16	13	23	25	29	44	35	29	214
		medium	6	12	12	13	15	8	18	19	103
		large	6	7	8	8	9	6	10	11	65
		Sub-total	28	32	43	46	53	58	63	59	382
7.	Chemical	small	14	13	21	20	19	29	16	14	146
		medium	3	5	3	7	9	9	10	8	54
		large	7	9	11	14	13	5	15	16	90
		Sub-total	24	27	35	41	41	43	41	38	290
8.	Non - Metal	small	32	30	64	69	67	88	52	64	466
		medium	11	15	13	22	23	9	30	28	151
		large	14	17	20	21	16	11	19	21	139

		Sub-total	57	62	97	112	106	108	101	113	756
9.	Metal	small	24	28	34	34	33	37	37	31	258
		medium	4	4	6	10	8	7	15	16	70
		large	5	6	7	7	7	4	10	10	56
		Sub-total	33	38	47	51	48	48	62	57	384
10.	Machine(Simple)	small	3	3	15	13	20	22	13	13	102
		medium	1	1	3	5	3	3	4	6	26
		large	3	3	3	3	3	1	3	2	21
		Sub-total	7	7	21	21	26	26	20	21	149
Total(by size of firms)		small	259	245	371	420	452	549	407	410	3,113
		medium	80	96	102	130	130	105	168	184	995
		large	136	141	150	153	143	85	161	171	1,140
Grand total(firm*year observations)			475	482	623	703	725	739	736	765	5,248

Source: Author's computation based on CSA's Manufacturing Census

TABLE 18

GMM estimates excluding the export to sale variable for various industrial groups.

VARIABLES	(1) F&B	(2) Tx&Ap	(3) Wd&Fr	(4) P&Pr	(5) Chem	(6) Non_M	(7) Simp_Ma
Lag(investment/capital)	0.185	-0.022	0.100	-0.071	0.209	0.175	-0.118
	[0.305]	(47.54)	(0.136)	(1.476)	(0.224)	(0.851)	(0.433)
Lag(investment/capital)^2	-0.232	0.157	-0.154	0.000	-0.225	-0.166	0.059
	[0.303]	(46.058)	(0.160)	(0.000)	(0.261)	(0.900)	(0.688)
Lag (profit/capital)	-0.000	0.000	-0.000	-0.000	0.019***	-0.000	-0.003
	[0.000]	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.004)
Lag(output/capital)	0.000**	-0.000	0.000	0.000	-0.001	0.000	0.002
	[0.000]	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.002)
Lag (Debt/capital)	0.000***	0.015	-0.000***	-0.019	0.049	0.110	0.008
	[0.000]	(0.090)	(0.000)	(8.021)	(0.074)	(0.147)	(0.038)
Post intervention period	0.018	-0.003	-0.045	0.043	0.027	-0.026	0.008
	[0.154]	(0.338)	(0.043)	(1484.65)	(0.040)	(2.69)	(0.022)

private	0.039	0.000	0.067	0.098	0.162***	0.113*	0.128
	[0.310]	(0.000)	(0.080)	(207.226)	(0.051)	(0.063)	(0.079)
Policy variable	-0.060	0.030	0.000	-0.132	-0.078	-0.003	-0.143**
	[0.158]	(4.30)	(0.059)	(1484.68)	(0.059)	(2.664)	(0.066)
age	0.007	-0.099	-0.005	0.846	-0.022	-0.035	0.052
	[0.015]	(3.26)	(0.019)	(1391.2)	(0.028)	(0.081)	(0.030)
employ_tot (Size)	0.000	0.000	0.000	0.000	0.000**	0.000	-0.000
	[0.000]	(0.000)	(0.000)	(0.067)	(0.000)	(0.001)	(0.000)
Constant	0.039	0.059	0.035	0.143	-0.008	0.000	0.021
	[0.311]	(0.376)	(0.072)	(991.00)	(0.051)	(0.000)	(0.044)
Observations	927	357	564	272	220	490	90
Number of firms	288	81	198	66	54	130	32

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

Table 19
Description of the balanced panel data

No.	Industry	frequency	percentage	cumulative	private	public	I/K	Y/K	D/K	Pr/K
1	Food & Beverages	440	28.06	28.06	221	219	.083	14050.6	139.8	1482.1
2	Tobacco	8	0.51	28.57	1	7	.111	46.98	.003	13.9
3	Textile & Apparel	256	16.33	44.90	72	184	.089	22.94	.397	-1.105
4	Leather & Footwear	144	9.18	54.08	88	56	.136	10607.9	.087	-1714.2
5	Wood & Furniture	136	8.67	62.76	88	48	.111	2142.8	.440	106.2
6	Paper & Printing	176	11.22	73.98	112	64	.169	1764.7	.188	4.70
7	Chemical	104	6.63	80.61	58	46	.205	44.36	.832	2.99
8	Non Metal	208	13.27	93.88	136	72	.115	14279.7	.041	2370.4
9	Metal	72	4.59	98.47	33	39	.144	7.92	.259	1.05
10	Simple Machine	24	1.53	100.00	10	14	.104	3.23	.042	.706
	Total	1,568	100		819	749	.117	7169.4	38.6	576.3

Source: Author's computation based on CSA's Manufacturing Census

Table 20
The decision to invest on balanced panel

VARIABLES	(1) probit	(2) logit	(3) Xtprobit	(4) Xtlogit
Lag profit to K	-0.000	-0.000	-0.000	-0.000
Lag output to K	-0.000***	-0.000***	-0.000	-0.000
Lag Debt to K	0.000**	0.000**	0.000*	0.000*
post	0.501***	0.813***	0.399***	0.710***
Policy variable	-0.757***	-1.146***	-0.541***	-0.952***
age	0.026	0.080	0.022	0.008
employ_tot (Size)	0.001***	0.002***	0.001***	0.002***
Export to sale ratio	0.894***	1.470***	0.885*	1.516
ind2	-0.145	-0.506	-0.111	0.027
ind3	-0.358***	-0.693***	-0.366	-0.687
ind4	0.075	0.099	0.101	0.193
ind5	-0.142	-0.180	-0.320	-0.548
ind6	0.510***	0.847***	0.689*	1.186*
ind7	0.425***	0.703***	0.574	1.001
ind8	0.138	0.240	0.120	0.213
ind9	0.761***	1.296***	1.230**	2.116**
ind10			9.057	23.580
Constant	-0.025	-0.206	0.073	0.116
	[0.093]	[0.158]	[0.212]	[0.367]
Observations	1292	1292	1311	1311
Number of firms			194	194

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p < 0.01$), ** at 5% ($p < 0.05$),and * at 10% ($p < 0.1$)

Source: Author's computation based on CSA's Manufacturing Census

Table 21
GMM estimates for balanced panel (3&4 control industry)

VARIABLES	GMM_2St	GMM_1St	GMM_2St	GMM_1St
Lag(investment/capital)	0.286***	0.284***	0.278***	0.239**
	[0.091]	[0.104]	[0.093]	[0.100]
Lag(investment/capital)^2	-0.266**	-0.276**	-0.258**	-0.242**
	[0.117]	[0.125]	[0.118]	[0.122]
Lag (profit/capital)	-0.000	-0.000***	-0.000	-0.000***
	[0.000]	[0.000]	[0.000]	[0.000]
Lag(output/capital)	0.000	0.000***	0.000	0.000***
	[0.000]	[0.000]	[0.000]	[0.000]
Lag (Debt/capital)	0.000***	0.000	0.000***	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Post intervention period	-0.005	-0.020	-0.000	-0.042*
	[0.011]	[0.024]	[0.012]	[0.023]
private	0.067***	0.127	0.057***	0.217**
	[0.022]	[0.108]	[0.021]	[0.091]
Policy variable	-0.047**	-0.026	-0.051**	-0.021
	[0.024]	[0.034]	[0.023]	[0.033]
age	-0.015	0.117**	-0.011	0.085*
	[0.013]	[0.051]	[0.013]	[0.048]
employ_tot (Size)	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	0.067***		0.048***	
	[0.014]		[0.015]	
Observations	1322	1121	1322	1121
Number of firms	194	194	194	194

Note - Standard errors are in brackets

*** indicates statistical significance at 1% ($p<0.01$), ** at 5% ($p<0.05$),and * at 10% ($p<0.1$)

Source: Author's computation based on CSA's Manufacturing Census

Notes