ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

THE IMPACT OF COMPETITION ON MOBILE PENETRATION IN SUB-SAHARAN AFRICA

By

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Approved by: Signature

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Acronyms

FGLS:- Feasible Generalized Least Square

FPEN :- Fixed Line Penetration

HHI:- Herfindahl-Hirschman Index

GDP:- Gross Domestic Product

ICT:- Information Communication Technology

ITU:- International Telecommunications Union

MPEN:- Mobile Penetration

MPR:- Mobile 3 Minute Peak Hour Local Call Price

OLS:- Ordinary List Square

PCSE:- Panel Corrected Standard Error

PPP:- Purchasing Power Parity

SSA:- Sub-Saharan Africa

TSCS:- Time Series Cross-sectional

WDI:- World Development Indicators

Abstract

Relying mainly on a recently published data of the International Telecommunication Union (ITU), World Telecommunications/ICT Indicators (2008) and on a global database of mobile market information-Wireless Intelligence, we investigate the impact of competition on mobile penetration in 35 Sub Saharan African countries for the period 2000-2006. This study examines not only the impact of introduction of competition but also the role of intensity of competition on mobile penetration in the region. To this effect, we use different equations with different measures of competition that reflect either the introduction or intensity of competition on the sector. Thereafter, controlling various sector characteristics and macro economic indicators, we apply panel data regression analysis with fixed effects. Besides, we test potential endogeneity problems and use appropriate estimation technique as necessary. For the most part, the results of this study come out consistent with the existing literature. That is, estimation results confirm that introduction of competition in the mobile market is strongly and positively associated with mobile penetration. Furthermore, the results of this study indicate that promoting effective competition plays a significant role in increasing mobile penetration.

1. Introduction

Until the early 1980s, there was a strong argument in the academic circles that most communications and transportation industries including telecommunications are subjected to strong production economies of scale and should therefore be taken as natural monopolies Shy (2001). The policy implication of such an argument easily led to policies that favoured strong government interference. The interference varied from a direct ownership to strong regulation. These views, however, did not last long after the 1980s. Problems with public enterprises, technological progress, and globalization stimulated many nations to introduce reforms on such industries.

One of the technological developments in the telecommunications industry in that period was the introduction of mobile cellular telecommunications in the mid 1980s. An introduction of cellular technology is recognized as significantly affecting how people live and it is one of a tremendous success stories of the industry. According to a very recent estimates of International Telecommunication Union (ITU), cellular connection worldwide is about to reach 4 billion growing at an average rate of 24% between 2000 and 2008. Currently, mobile subscribership surpasses fixed telephone lines in many parts of the world.

Since its introduction coincided with the privatization and introduction of competition in telecommunications sector, unlike the fixed line, the mobile market has been subject to competition as of its infancy. Currently, although there are slight number of countries that do not allow mobile competition, almost all countries opened up their mobile sector to competition.

The African mobile market, which has also been recording an impressive growth rate, is not an exception to this. Though some countries in the region still maintain a monopoly in mobile service provider, many African countries have been permitting competition in the past decade following the international trend. Though the extent varies form country to country, a 2007 data set form ITU indicates that 89.4 percent of the economies have achieved some form of competition.

Albeit mobile penetration (MPEN) is still very low - 28.3 subscribers per 100 inhabitants[1], the African mobile market achieved an impressive growth rate in the past few years. For instance the mobile subscriber grew by 49.1% between 2002 and 2007[2]. MPEN have begun to exceed those of fixed networks in a growing number of African countries. As a result, mobile has also become more attractive than fixed line for improving access to telecommunications in the eyes of both policy makers and regulators. Among other reasons, like the introduction of prepaid services and cheaper network deployment costs that have contributed to the African mobile boom, some evidences suggest that competition may also played a significant role.

It is in light of this that we will investigate whether competition in the mobile sector has played a significant role in increasing MPEN in the Sub Saharan Africa- a region which has recorded the largest number of new subscribers in the past decade. In addition, we will also identify the impact of other sector characteristics and socio economic variables on MPEN.

Though there are a number of studies on the impact of competition on telecommunications sector performance (in terms of employment, investment, output, service pricing, network expansion, labor productivity and total factor productivity both in the developed and developing countries), the key contribution of this paper can be seen in two dimensions. First, it extends the previous literatures specifically for case of Sub Saharan Africa (SSA), where significant mobile telephone growth is being achieved in the past decade. Second, it tries to study not only the impact of a mere ***existence*** of competition but also ***intensity*** of competition on MPEN. For the latter case, the paper uses Herfindahl-Hirschman Index (HHI)[3], which considers the market share of all carriers in the mobile market, as a measure of intensity of competition.

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[1] While Asia had 37.5, the Americas 72.4, Oceania 79.2 and Europe 109.6 penetration level

[2] Summarized form ITU ICT Indicators Database (2007)

[3] HHI is the sum of the square of market shares of operators within a defined market segment. Consequently a monopoly market segment has a HHI of 1 and an atomistic market tends to a HHI of 0.

2. Review of Literature

Competition in the telecommunications sector is now a global trend. Mobile and internet services are leading the sector in terms of being the most competitive markets. For instance, 88 % and 92% of countries in the world have either partial or full competition in the mobile and internet services respectively. However, in many countries the provision of fixed services is still a monopoly. Yet, between 62 and 65 % of the countries have allowed competition in the provision of international, domestic long distance and local call services (ITU Regulatory Database).

Following this trend, there are several cross-country studies examining the effect of competition and other reforms on the telecommunications sector. Except few, most of these studies analyze both the effect of competition and privatization on telecommunications performance. The findings of these researches largely indicate that competition has led to significant efficiency and performance improvements. For instance, the paper by Wallsten (2001) examines the effects of privatization, competition and regulation using a panel dataset for 30 African and Latin American countries from 1984-1997. The study found that competition generally has a positive effect on telecommunications sector by increasing level of fixed line penetration and decreasing the price of local call. The results of impact of privatization, however, are mixed.

On the other hand, Li and Xu (2004) using a cross country panel data set covering the period from 1990 to 2001, studied the impact of privatization and competition in the telecommunications sector around the world. They found that countries that allow competition and full privatization, both in fixed line and mobile sectors, experienced significantly more performance gains than countries that haven't made such reforms. In the study they indicated that 'an increase in competition index by one (for example, a move from a monopoly market structure to competition in either fixed line or mobile market segment) would raise telecom investment per capita by about 30 percent'. At the same time, their econometric result indicates that there is complementarity between privatization and competition. Particularly, they find that in countries where the services are privatized, competition significantly decreases the cost of local phone calls.

Other cross country studies like McNary (2001), and Fink et al (2002) also showed that competition significantly increases fixed line penetration and boost labour productivity. McNary (2001) estimated that 'every sixteen months of mobile competition increases penetration by population by approximately one line per hundred people'.

A study by Boylaud and Nicoletti (2000) which investigates the effect of entry liberalisation and privatization on productivity, prices and quality of service in both long distance and mobile telephony markets, in 23 OECD countries in the period 1991-1997, come up with a similar conclusion. Controlling for technology developments and differences in economic structure, the study found that prospective competition (proxied by the number of years to liberalization) and effective competition (proxied by the number of competitors) bring about productivity, quality improvements as well as reduction in the prices of all telecommunications services.

A wide range of literature, including those indicated above, shows that competition is the more significant element in driving penetration, telecommunications investment, labor productivity and efficiency than privatization. However there are also studies that came up with different conclusions. For instance, Ros (1999) examines the effects of privatization and competition on network expansion and efficiency on the basis of data from 110 countries from 1986-1995. He found that by contrast, competition in at least one fixed line market segment (local, long distance, or international) did not significantly affect fixed line penetration, but impacted positively on efficiency. This was strengthened by Bortolotti et al. (2002) who suggested that a more competitive environment may crowd out investment by the incumbents, as they will have to share some of the benefits from these investments with their competitors.

Almost all of these earlier empirical works, except Boylaud & Nicoletti (2000), focuses primarily on the impact of competition on the performance of fixed line telecommunications service. To our knowledge, the only study that tries to analyze the impact of telecommunications reforms on the mobile sector performance is a very recent study by Li (2008). This study examines the impacts of reforms, privatization, new entry and independent regulatory authority on mobile network penetration in 29 OECD countries and including China for the period 1991-2006. The result of the study shows

that introducing new entry in general, is positively correlated with mobile network penetration and expansion. In addition, it is also highlighted that independent regulation, is positively correlated with penetration and its role is particularly crucial in privatized mobile markets.

But there are also some other empirical works whose primary objective is to find the determinants of demand for mobile networks including competition as one of the explanatory variables. For instance, Gruber (2000) tries to identify determinates of the diffusion of mobile telecommunications in 10 Central and Eastern Europe for the period 1990-1997. The results of his study signify that competition, as measured by both simultaneous entry of firms and number of firms, considerably affects mobile diffusion in the region. His econometric results also indicate that waiting list for a fixed line connection (as a proxy for measure of efficiency of fixed line operator) and number of fixed telecommunications lines per head (as a measure of the size of fixed network) has a positive significant effect on mobile diffusion. Similarly, Chakraarty (2005) who investigates the diffusion of mobile and the role of competition and regulation in 29 countries in Asia, indicated that competition and independent regulation played a major role in increasing the diffusion of mobile service. In addition, the paper finds that income per capita and the size of fixed network positively affect the diffusion.

3. Econometric Model

In this study we employ panel data model to measure the impact of competition on MPEN in 35 SSA countries between 2000 and 2006.

Basically there are two approaches in estimating panel data models; the fixed effects and random effects approach. The fixed effect approach allows intercepts to vary by county at a point of time. On the other hand, estimation by random effects approach considers country variation to be randomly distributed and uncorrelated with explanatory variables. What it essentially saying is the countries included in a sample are drawings from a much larger universe of such countries and that they have a common mean value and individual difference of the intercept values of each country are reflected in the error term (see Gujarati (2004) and Baltagi (2005)). Accordingly, the selection between these two

approaches depends on their assumptions explained above and the characteristics of data we have.

In this study, we try to measure the impact of competition on network penetration rates in 35 countries out of 48 SSA countries (the rest 13 countries are excluded because of insufficient data). Given this nature of the data, therefore, form the outset we can not describe the observations as being a random sample from a much larger population. As a result we are compelled to use fixed effect approach which controls for (unobserved) country related effects by fitting country related constants in addition to a common regression constant to estimate our panel data model. But we also undertook a formal test – Hausman Specification Test- in order to statistically confirm that fixed effect is justifiable[4]. The test results in all specification of different measures of competition are in favor of the panel fixed effects estimation[5]. Hence the panel data model is specified as follows

$$\ln MPEN_{it} = \partial_i + B_1 \ln Y_{it} + B_{12} \ln UR_{it} + B_{13} comp_{it} + B_{14} \ln MPR_{it} + B_{15} \ln FPEN_{it} + B_{16} IR_{it} + \varepsilon_{it} \quad (1)$$

where i *(1, 2,...,M)* is the subscript for the cross-sectional dimension (country) and t*(1, 2,...,T)* is the subscript for the time-series dimension (year).

The variables used in this model are;-

$MPEN_{it}$ representing mobile penetration (MPEN) - number of mobile telephone lines per hundred inhabitants. Y_{it} and UR_{it} represents GDP per capita and percentage of urban population respectively; MPR_{it} represents three minute mobile peak hour local call price, while $FPEN_{it}$ represents fixed line penetration (FPEN)- number of fixed telephone lines per hundred inhabitants. $Comp_{it}$ represents four different measures of competition, alternatively (dummy for existence of two or more mobile operators, number of years

[4] The Hausman test checks a more efficient model (random effects) against a less efficient but consistent model (fixed effects) to make sure that the more efficient model also gives consistent results. The Hausman test tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If they are (insignificant P-value, Prob>chi2 larger than .05) then it is safe to use random effects. If we get a significant P-value, however, we should use fixed effects

[5] Hausman Specification Test Result, are $\chi^2(6)= 161.94$, $\chi^2(6)= 44.05$, $\chi^2(6)= 111.82$, $\chi^2(6)= 124.41$, when $Comp_{it}$ represents dummy for existence of two or more mobile operators, number of years passed with two or more mobile operators, total number of mobile network operators, and HHI respectively (with p-value .0000)

passed with two or more mobile operators, total number of mobile network operators, and HHI), and finally IR_{it} represent a dummy variable which indicates whether the country has an independent telecommunications regulatory authority or not and ε_{it} is an error term.

Finally, in order to look at more detailed impact of each number of entrants into the market, based on equation 1, we constructed two equations[6]. In the first equation, we include all control variables and a set of entry dummies; monopoly is used as base dummy, and *dumentry2* equals one if there is two mobile network operators in the market, and equals zero, otherwise; *dumentry3* equals one if there is three mobile network operators in the market, and equals zero, otherwise; and so on. In the second equation we replace a set of entry dummies with the quadratic form of number of mobile operators to see the impact of competition (measured by number of mobile operators) in general. The equations are presented as follows;

$$\ln MPEN_{it} = \partial_i + B_1 \ln Y_{it} + B_2 \ln UR_{it} + B3\ DumEntry2_{it} + B_4\ DumEntry3_{it} + B_5\ DumEntry4_{it} + B_6\ DumEntry5_{it} + B_7 \ln MPR_{it} + B_8 \ln FPEN_{it} + B_9\ IR_{it} + \varepsilon_{it} \quad (2)$$

$$\ln MPEN_{it} = \partial_i + B_1 \ln Y_{it} + B_{12} \ln UR_{it} + B_{13} opno + B_{14}\ sqopno + B_{15} \ln MPR_{it} + B_{16} \ln FPEN_{it} + B_{17} IR_{it} + \varepsilon_{it} \quad (3)$$

3.1 Hypothesis

Building on theoretical and empirical literatures, we put forward the following hypothesis regarding the plausible relationship between the effect of the explanatory variables included in the model and the dependent variable (i.e. MPEN).

Economic theory proposes that competition increases rivalry of firms in a market and hence induces firms to become efficient and offer greater quantity and variety (choice) of products or services at a lower price. Though some empirical researches on the telecommunications sector could not find results that support this presumption (Ros (1999) and Bortolotti et al. (2002)), most confirm that competition is positively and significantly related with penetration of telecommunications services (see Boylaud &

[6] Using a similar approach adopted by Li (2008)

Nicoletti (2000), Gruber (2000), Wallsten (2001), McNary (2001), Fink et al (2002) Li and Xu (2004), Chakraarty (2005), and Li (2008)).

Accordingly our major hypothesis which is subjected to test given the countries and time period under investigation can be stated as follows;

Both the introduction and the intensity of competition in the mobile sector will increase MPEN. Therefore the coefficient of $Comp_{it}$ *is expected to have a positive sign when it represents dummy for the existence of mobile competition, or year with mobile competition, or total number of mobile operators, but negative sign when it represents HHI.*

In addition to the above major hypothesis, the expected impact of other explanatory variables; GDP per capita, percentage of urban population, independent regulation, FPEN, MPR are put with the following rational.

Theoretically since GDP per capita indicates affordability and greater prosperity, it is expected to lead towards enhanced demand for mobile telecommunications services. Such positive impact of GDP per capita on telecommunications penetration in general and MPEN in particular seems to have a general consensus on empirical studies (see Ross 1999, Ahna and Leeb (1999), Wallesten (2001), Fink et al (2002), Madden et al (2004), Chakravarty (2005), Garbacz & Thompson (2007))[7]. Therefore we expect GDP per capita to positively affect MPEN. On the other hand, two hypotheses are possible for percentage of urban population. First, urbanization results in increased business transaction and communication therefore urban dwellers would have higher demand for a mobile phone, hence positive correlation with MPEN is expected. Second, mobile telephone is good alternative for increasing access to telecommunication to rural areas; hence percentage of urban population might be negatively associated with MPEN. This is mainly because rural areas are very costly and therefore more difficult to be connected with fixed line network, mobile networks can be installed more rapidly than fixed line

[7] Here it is important to note that some studies including Gruber and Verboven (2001) and McNary (2001) couldn't find support for this hypothesis

networks, mobile services has become widely available with prepaid cards. Therefore this would be subject to the investigation for the period and countries under consideration.

It seems obvious that, from law of demand, the relationship between price and quantity demand is negative. Accordingly, most of the studies came up with results consistent and widely accepted theoretical background. However, some studies on the telecommunications sector particularly on FPEN in developing countries came up with a contradictory result. They explain the issue that in many developing countries low penetration are not due to insufficient demand at current prices, but rather due to insufficient supply (Ros 1999). Therefore, this would also be subject to investigation for the period and countries under consideration.

In the case of regulatory intervention in mobile market, some argues for minimal level of regulatory control as compared to fixed line service sector. According to them, mobile service is a value-added service and hence should fall outside the regulatory scope of basic voice telephony in regulatory agencies. In addition they argue that existence of an 'intense' competition in mobile sector is strong enough to make mobile operators efficient. However these views are highly criticized not only because of the prevalent imperfect competition in the mobile sector and intensive use of mobile telephony for universal service, but also because of the necessity of interconnection, fixed mobile termination, and mobile number portability issues. Therefore we expect that existence of independent regulatory agency to be positively correlated with a MPEN.

The relationship between FPEN and MPEN is also a matter of debate. Some cross country studies indicate that mobile service is a substitute for fixed line services Gruber and Verboon (2001), Madden Coble-Neal (2004), Waverman et al (2005), while others indicate that the two services are complementary Ahna and Leeb (1999), Garbacz and Tompson (2005), Chakravarty (2005)). A study by Garbacz and Thompson (2007)) shows that there is lack of asymmetric relationship between the demand of two services. According to this finding, although fixed line service is a substitute in the mobile market, mobile phones are complements in the fixed line market. Given the variability of the empirical outcomes (depending on countries, periods and the methodology used), the

expected impact of FPEN on MPEN is also subject to investigation. Complementarity between these two services indicates positive network externalities, i.e. an increased incentive to acquire a mobile phone when there is additional fixed line user. But for anyone consumer, the substitutability indicates a reduced incentive to acquire a mobile telephone when he has a fixed line. The net effect, therefore, depends on the relative strength of these two effects.

3.2 Endogeneity , Autocorrelation and Hetroscedasticity

Before estimating a simple equation (1) using fixed effect regression, it would be intuitively sound to suspect that three variables affecting MPEN may be endogenous. These variables are MPR, FPEN and GDP per capita (income).

First is MPR, as it may also depend on the level of MPEN. That is though people may/may not afford telecommunications services because of low/high prices, existing high or low prices may, on the other hand, might be attributable to the current smaller or larger MPEN. This is a typical demand-and-supply two-way causality issue, or endogeneity problem. Second is a FPEN, as FPEN could in turn depends on MPEN. That is either mobile & fixed line services might be substitutes so that FPEN could affect MPEN positively, or they may happen to be complementary to end up with an opposite outcome.

Thirdly, the relationship between income (GDP per capita) and MPEN is also bidirectional. On the one hand income, which indicates affordability, is one of the most important determinants of demand for mobile phones. While, on the other hand, expansion of telecommunications infrastructure generates and speed up economic development as the spread of telecommunications services reduces costs of interaction, expands market boundaries, and facilitates information flows both in urban and rural areas (Waverman et al 2005).

Consequently, in the presence of the above endogeneity problems, one of the most important OLS assumptions- error term is uncorrelated with the dependent variables- would be violated and OLS can produce biased and inconsistent parameter estimates.

Unfortunately, however, these endogeneity problems are not properly handled by previous studies on the impact of regulatory reforms including competition. For instance, Ross (1999) though includes price in his penetration model as exogenous variable and does not treat the possibility of endogeneity problem in the equation. But others like Wallesten (2001), Fink et al (2002), Li and Xu (2004), like McNary (2001) preferred to exclude price as independent variable in the penetration equation. Chakraarty (2005) on the other hand neglected the possibility of fixed-mobile two way causality issue though it includes FPEN as independent variable in the MPEN equation. Fink et al (2002) corrected this problem by two stage estimation procedure, though it excludes price in the penetration model.

Except a recent study by Maiorano & Stern (2007), which tries to identify the relationship between regulation and performance in the mobile telecommunications sector, as to our knowledge, there is no other study on the impact of telecommunications reforms that explicitly take into account the two way causality issue between income and penetration.

Therefore it would be an interesting extension to this study to investigate all the above potential endogeneity problems and use appropriate estimation technique, whenever necessary.

Accordingly, the following instrumental variables are considered for testing endogeneity in the three potential endogenous variables. For the income (GDP per capita) we used capital stock and labour force as instrumental variables. This is based on Aggregate Production Function (APF), which is one of the basic ways used to determine the impact of some socio-economic factors (such as telecommunications) on economic growth. For mobile service price we used population density (DEN_{it}) as instrumental variable since it can be considered as a proxy for a per subscriber cost of setting up a network. In addition one year lagged mobile 3 minutes peak hour price (MPL_{it}) is also used as instrumental variable. Finally, for FPEN, we used a dummy variable for fixed competition (DUMFC) and a dummy variable for privatization ($DUMPRV_{it}$) are added on in the FPEN equation to be used as instrumental variables.

the World Bank[9]. We also consulted ITU Regulatory Data base (http://www.itu.int/ITU-D/ICTEYE/Regulators/Regulators.aspx), World Bank Privatization Database (http://rru.worldbank.org/privatization), and ITU publications – Trends in Telecommunications reform (2000-2006) to get data on regulatory privatization information. Based on the availability of data, therefore, 35 SSA countries are included in the study.

The main interest variable of this study is a measure of competition. Earlier studies define and measure competition in different ways in their attempt to find a more appropriate definition and measurement. Ross (1999) defined fixed line competition as 'a government approval of competition in fixed line services' while Li and Xu (2004) as 'the existence of more than one fixed/wireless telecom operator' but both of them measure competition as a dummy variable in their econometric model. On the other hand, Wallsten (2001) defines and measures fixed line competition by 'the number of wireless operators in the country not owned by the incumbent', while McNary (2001) defines mobile competition as 'the existence of more than one interconnected carrier with greater than one-percent market share' and measures it by the years of competition in the mobile services market.

Unlike those in the existing literatures, we examine the impact of competition on MPEN from two distinct perspectives. Firstly, we examine the impact of introduction (mere existence) of competition on MPEN. Hence we use two variables alternatively; a dummy variable (which shows whether or not two or more mobile network operators exists in the market) and a variable that shows the number of years with two or more mobile operators. Secondly, we examine the impact of intensity of competition, measuring it by number of mobile subscribers and Herfindahl-Hirschman Index (HHI), alternatively. The use of a more informative as well as continuous measure of intensity (extent) of competition- Herfindahl-Hirschman Index (HHI) can be considered as a significant

[9] We also used WDI database for data on labour force, which is used as instrumental variables for income (GDP per capita). But capital stock data requires estimation for the specified period and countries, as it is unavailable from different sources including WDI database. Therefore we construct capital stock series based on annual investment from WDI database and initial capital stocks from Miketa (2004), and is calculated using the perpetual inventory method.

departure of this paper from the existing literatures on the effect of competition on telecommunications performance.

McNary (2001) attempted to measure the intensity of competition defining mobile competition as 'the existence of more than one interconnected carrier with greater than one-percent market share'. However, he himself admitted the shortcoming of this definition as it is been widely observed that in a number of countries that introduce competition, the previously state-owned monopoly remains a virtual monopoly with a huge market share while other operators remain with insignificant market share. This is one of the main reasons why this paper looks directly on the market share of each individual firm and calculated HHI values for each country and period under investigation. HHI takes into account the relative size and distribution of the firms in a market and approaches zero when a market consists of a large number of firms of relatively equal size. Therefore it decreases both as the number of firms in the market increases and as the disparity in size between those firms decreases, which in both cases shows increase in the intensity of competition.

Even if HHI is by far better measure of intensity of competition than those that are used in the previous literatures, caution has to be taken as it also can not be considered as a full fledged measure of intensity of competition. This is mainly because it doesn't give a signal on contestability of a market. In which case, existence of barriers to entry (structural, strategic and policy/regulatory barriers) and other anti-competitive conduct of firms (vertical and horizontal restraints) need to be assessed to understand the degree to which the behavior of incumbents is affected by the threat of potential entrants.

In summary, to measure the impact of introduction of competition on MPEN, we alternatively use a dummy variable ('1', if there is two or more mobile operators in the market, '0' otherwise), and number of years with a mobile competition. On the other hand to measure the intensity of competition we use number of mobile operators and HHI alternatively.

In addition to a variable of interest – measures of competition- other control variables used in this study can be grouped into two categories. The first group includes socio

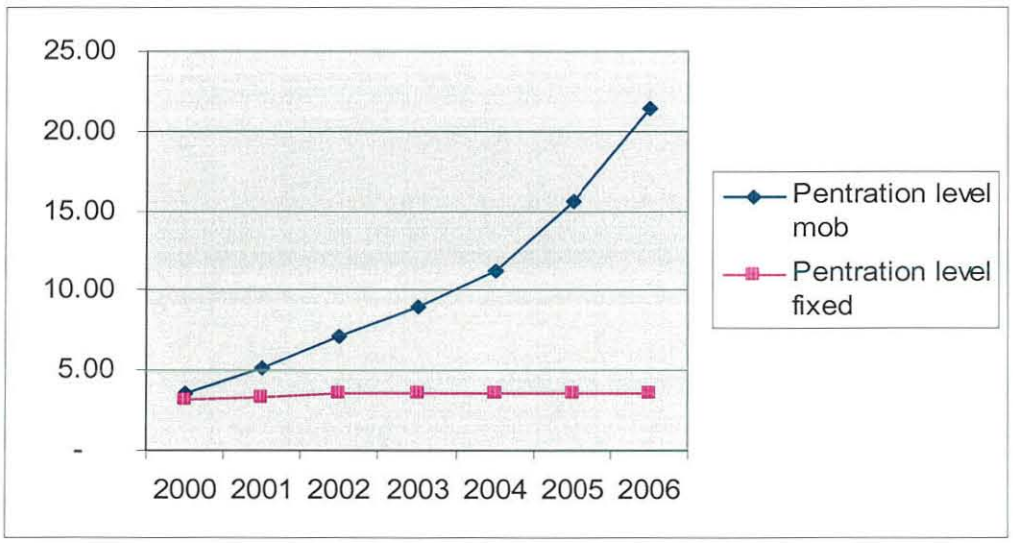
economic indicators such as GDP per capita and degree of urbanization (percentage share of urban population) while the second comprises telecommunications performance indicators such as yearly measurements of MPEN, FPEN, MPR and existence of independent telecommunications regulator.

5. Data Analysis

5.1 Descriptive Analysis

Figure one bellow indicates the trend of MPEN and FPEN in SSA over the period 2000-2006. As the figure demonstrates, MPEN surpassed FPEN in the year 2000. In the following years, MPEN increases very fast at annual average growth rate of 35.30 %, while FPEN is steadily increasing by 1.90% only. Consequently in 2006 MPEN reached around 21.48 per 100 inhabitants which is around six fold of FPEN. Despite this remarkable growth, MPEN is still very low, even as compared to the rest of the world's average which is 66.16 in the year 2006. That is one of the reasons that makes many mobile industry observers to come into consensus that there is still a wide room for mobile expansion in the SSA in the coming decade.

Figure 1:- Trend of MPEN and FPEN in SSA over the period 2000-2006 (calculated mean across 35 countries by year)



Data Source:- ITU Telecommunication/ICT Indicators (2008)

Behind this fast growth trend, however, there is a considerable variation across countries which tends to increase in each year under investigation. For instance, the variation of level of MPEN increases form 49.31 in 2000 to 356.29 in 2006. Table 1 below shows that both in the year 2000 and 2006 the highest MPEN was recorded is Seychelles, South Africa, Gabon, Mauritius and Botswana. On the other hand, Ethiopia, Central Africa Republic and Niger are among countries that recorded the lowest level of MPEN in both years.

Examining the growth of MPEN, we can spot that the highest growth in the study period is recorded in Nigeria (from 0.03 in year 2000 to 24.05 in year 2006), Niger (from 0.02 to 3.35 people per 100 inhabitants), Sudan (from 0.07 to 11.59 people per 100 inhabitants) respectively. On the other hand the lowest is recorded in Seychelles (from 33.63 to 82.52), Zimbabwe (2.34 to 6.49) and Botswana (13.52 to 46.78)

Table: 1 - The lowest and highest level of MPEN in descending and ascending orders respectively (for year 2000 and 2006, 10 countries)

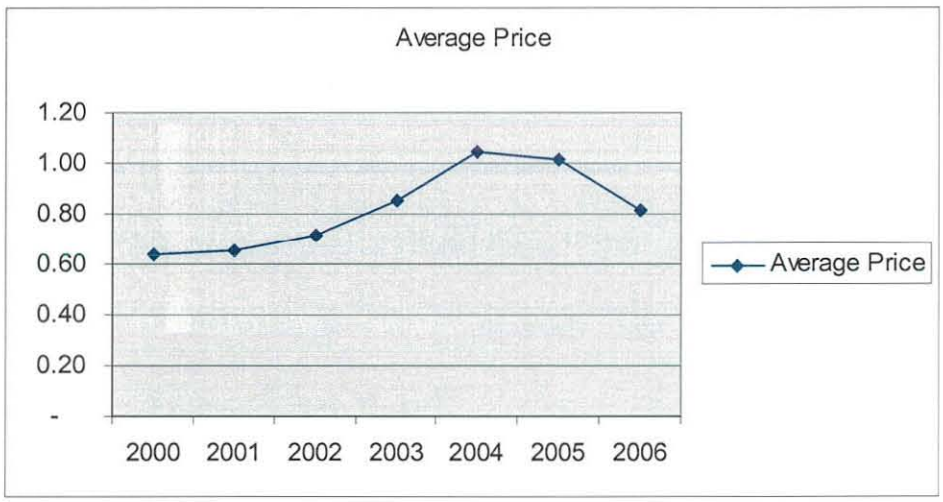
Year 2000				**Year 2006**			
Lowest MPEN		**Highest MPEN**		**Lowest MPEN**		**Highest MPEN**	
Country	***MPEN***	***Country***	***MPEN***	***Country***	***MPEN***	***Country***	***MPEN***
Niger	0.02	Seychelles	33.63	Ethiopia	1.09	Seychelles	86.52
Nigeria	0.03	South Africa	18.28	Eritrea	1.36	South Africa	83.33
Ethiopia	0.03	Mauritius	15.08	Burundi	2.55	Gabon	63.86
Sudan	0.07	Botswana	13.52	Central African Rep.	2.69	Mauritius	61.50
Mali	0.10	Gabon	9.79	Niger	3.35	Botswana	46.78
Central African Rep.	0.14	Namibia	4.61	Rwanda	3.40	Mauritania	33.57
Angola	0.20	Cape Verde	4.54	Malawi	4.71	Namibia	29.67
Burkina Faso	0.22	Swaziland	3.27	Madagascar	5.47	Senegal	24.99
Burundi	0.24	Cote d'Ivoire	3.20	Zimbabwe	6.49	Swaziland	24.29
Mozambique	0.30	Senegal	2.63	Uganda	6.73	Nigeria	24.05

Data Source:- ITU Telecommunications/ICT Indicators (2008)

Similarly, figure two indicates the trend in the price of mobile service in SSA for the same period and countries under investigation. It is interesting to see that average MPR was increasing for the period in which MPEN was increasing at a very fast rate. Eventhough it is not strong per se, we can observe that there is a positive correlation between MPEN and MPR especially in the latter years of the investigation. For instance,

the correlation coefficient of average MPR and MPEN for the period 2000-2006 was 0.58. We can also see from the figure below that the price of mobile service was increasing and reached its peak in the year 2005 and started to fall thereafter. On the average, the annual growth rate of MPR was 5.2 % for the period 2000-2006. Alike with the MPEN trend there is a huge disparity in prices among countries throughout the study period. We can see that the highest per minute price in 2006 was recorded in Cote d'Ivoire (2.26$), Seychelles (1.63$) and South Africa (1.42$) respectively while the lowest in both years were recorded in Mauritius (0.11$) Botswana (0.20$) and Ethiopia (0.29$). (See annex 2)

Figure 2 :- Trend of MPR in SSA over the period 2000-2006 (calculated mean across 35 countries by year)

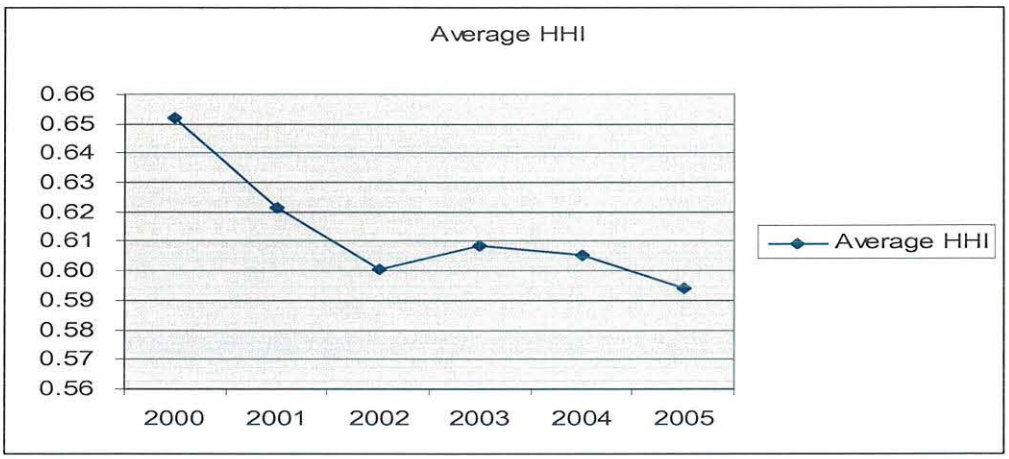


Data Source:- ITU Telecommunications/ICT Indicators (2008)

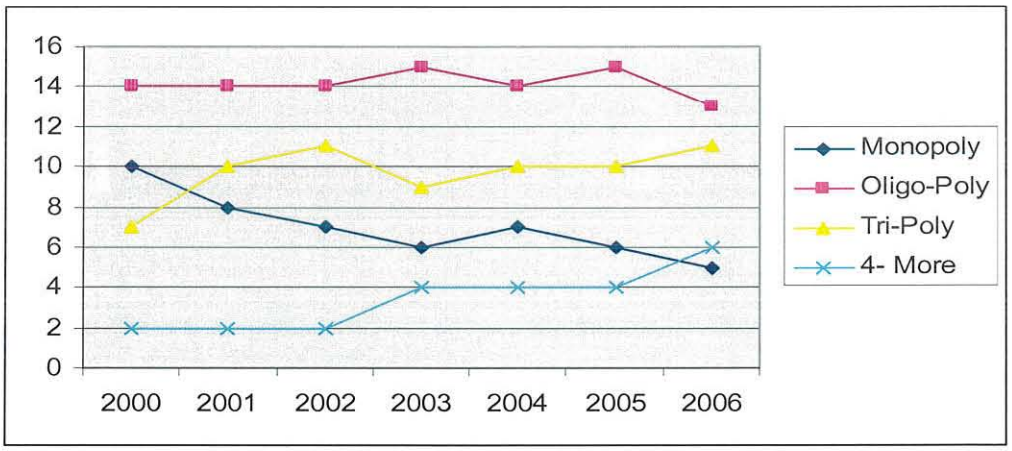
On the other hand, as shown in figures 3 a & b, market structure has been significantly changed in the period under investigation. Competition among mobile operators appears to have increased. Countries with a monopoly mobile operator has been decreasing yearly and reached five (Eritrea, Ethiopia, Namibia Rwanda and Swaziland) in 2006, from ten in 2002. Eventhough oligopoly market structure largely dominates the region's mobile industry, it can be observed that the number of countries that have 3 and 4 or more operators have also increased in the years under investigation.

Figure 3:- Mobile Market Structure; HHI and number of operators ((i.e. calculated means across 35 countries by year)

(a)



(b)



Correspondingly, as indicated in graph 3a the intensity of competition (which is measured by HHI) in the mobile market has also been decreasing. On average, HHI decreased 1.7% per annum in the period 2000-2006. In 2006, the lowest HHI is recorded in Nigeria (0.29), Benin (0.30) and Tanzania (0.38). A negative correlation between HHI and MPEN has been observed for all the period under consideration. For instance, the correlation coefficient between average MPEN and average HHI for the period 2000-2006 was -0.71. In this regard, it is interesting to note that Nigeria which has recorded the highest MPEN growth for the period 2000-2006 has also showed a remarkable shift form a monopoly

mobile operator in 2000 to situation where five mobile operators were operating in a market with a lowest HHI in 2006.

Finally the following table presents a summary of descriptive statistics (for all countries in the sample.

Table 2:- Summary statistics (mean, standard deviation and correlation) of major variables under investigation

Variable	2000	2001	2002	2003	2004	2005	2006	C.C*
Mobile Penetration	3.54 (7.02)	5.21 (9.68)	7.15 (12.03)	9.00 (13.53)	11.30 (15.23)	15.56 (18.88)	21.48 (22.27)	
Per capita GDP	1,004.71 (1,594.02)	981.82 (1,560.72)	1,036.18 (1,638.58)	1,199.78 (1,835.11)	1,361.86 (2,008.75)	1,488.98 (2,150.71)	1,652.57 (2,277.09)	0.98
Urban Population (%)	34.13 (15.71)	34.57 (15.82)	35.01 (15.93)	35.46 (16.05)	35.90 (16.17)	36.35 (16.29)	36.82 (16.38)	0.97
Measure of Competition								
HHI	0.63 (0.28)	0.60 (0.25)	0.58 (0.24)	0.59 (0.24)	0.61 (0.22)	0.59 (0.21)	0.57 (0.21)	(0.71)
Mobil Operator Number	1.91 (0.98)	2.14 (1.00)	2.20 (0.99)	2.29 (1.05)	2.34 (1.00)	2.37 (0.97)	2.54 (1.01)	0.92
NO. of Years with Mobile Competition	1.43 (1.65)	2.11 (1.97)	2.83 (2.31)	3.60 (2.61)	4.40 (2.91)	5.23 (3.19)	6.11 (3.39)	0.98
Dummy Competition	0.66 (0.48)	0.74 (0.44)	0.77 (0.43)	0.80 (0.41)	0.80 (0.41)	0.83 (0.38)	0.86 (0.36)	0.88
MPR (3 minute peak hour price)	0.64 (0.30)	0.65 (0.31)	0.72 (0.37)	0.83 (0.55)	1.05 (1.57)	1.02 (1.24)	0.82 (0.47)	0.58
Fixed Line Penetration	3.10 (5.95)	3.26 (6.23)	3.45 (6.58)	3.51 (6.71)	3.61 (6.83)	3.62 (6.81)	3.56 (6.79)	0.76
Dummy Regulation	0.46 (0.51)	0.51 (0.51)	0.60 (0.50)	0.60 (0.50)	0.60 (0.50)	0.60 (0.50)	0.66 (0.48)	0.82

* Correlation Coefficient (C.C) with MPEN

Data Source:- World Development Indicators Database (2008), Telecommunications/ICT indicators (2008), ITU Regulatory Data base (http://www.itu.int/ITU-D/ICTEYE/Regulators/Regulators.aspx), Wireless Intelligence (www.wirelessintelegence.com)

5.2 Econometric Analysis and Results

As mentioned earlier, before estimating the simple equation 1, we undertake Durbin-Wu-Hausman test to test the presence of endogeneity. The test results show that neither MPR nor FPEN correlation with the error term is strong enough to result in substantially biased estimates for all measures of competition. However, we find that GDP per capita may pose endogeneity problem in the case where year of mobile competition is used as a measure of competition. Therefore only in this case that we use the two stage least squares (2SLS) instrumental variables method as an estimation technique.

In addition, Likelihood Ratio Test for hetroscedasticity and Woldrige (2002) test for autocorrelation indicate that our data is suffered from both autocorrelation and hetroscedasticity[10]. Even though, the reason behind the presence of hetroscedasticy is not quite clear, we believe that the following possible causes discussed in Fink et al (2002) for the case of fixed lines can be adapted for mobile services as well. That is, it could be because of different government initiatives on mobile expansion under different regimes, so that countries with a more volatile political environment (or unstable and frequently changing governments) have a higher variance in the level of mainlines per capita than others arising from differing government initiatives on mobile expansion. Another hypothesis is that the relatively richer developing countries can more easily overcome natural and geographical obstacles (for example terrain) than relatively poorer countries.

Consequently, in models with these features, OLS is not optimal as it does not make an efficient use of the data. Instead, Feasible Generalized Least Squares or FGLS (Parks,1967) and Panel Corrected Standard Errors or PCSE (Beck & Katz, 1995) can find consistent and efficient estimators. Nevertheless, as Beck and Katz (1995) critizes FGLS, as it only works if time period (T) is greater than cross-sectional units (N). Even then, it

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[10] When $Comp_{it}$ represents dummy for existence of two or more mobile operators, number of years passed with two or more mobile operators, total number of mobile network operators, and HHI respectively;

A likelihood ratio test for hetroscedasticity are $\chi^2(34)= 99.32$, $\chi^2(34)= 146.96$, $\chi^2(34)= 115.13$, $\chi^2(34)= 109.14$, (with p-value .0000.). These therefore strongly rejects the null hypothesis of no group-wise heteroscedasticity

Wooldridge (2002) test for autocorrelation with significant test statistics are 82.94, 115.63, 37.02, and 101.11 (with p-value .0000), indicating the presence of serial correlation.

exhibits an extreme overconfidence of the standard errors, leading to inaccurate confidence intervals. However PCSE outperforms FGLS, and it is at least as good as OLS and more efficient even when T is less than N. Therefore, for the same reason above and the nature of data we have (T<N), we prefer to estimate our econometric model using PCSE approach assuming hetroscedasticity and AR(1) autocorrelation of errors within panels. Accordingly, estimation results will be discussed follows;

5.2.1 Competition Effects

Table I (of annex 1) presents the estimation results of our investigation on both the impact of introduction and intensity of competition. Our hypothesis that MPEN could be affected by both introduction and intensity of competition is strongly confirmed in all our specifications. Mobile competition positively and significantly affects MPEN. The coefficients of the different measures of competition are all positively significant at 1% level of significance. This result is consistent with most of the findings of existing empirical literatures.

Looking at the impact of the existence of competition in the mobile sector, it is observed that a move from a single to one or more mobile operators results in 1.20 additional lines per 100 inhabitants. Similarly one year of mobile competition results in approximately 0.19 additional lines per hundred inhabitants. On the other hand, looking at the impact of intensity of competition, we observe that each mobile competitor is associated with an increase of almost 0.57 additional lines per hundred inhabitants. Similarly a 1% decrease in HHI is associated with 1.48% increase in the MPEN level (see Annex 1).

In table II (of Annex 1), we present the regression result of two equations that are constructed to have a closer look on the impact of different number of mobile operators in the market. Accordingly, results in first column shows that each entry of an operator in the mobile market is associated with a significant positive effect on MPEN. On the other hand, when we look at the results of estimation in column 2, we can see that the linear term of the number of operators is associated with a positive coefficient and its squared term is associated with the negative coefficient. This indicates that, in general, early

entries into the mobile market have considerable effect on MPEN, but the impact progressively decreases with further market entries. This result is consistent with Li (2008) where he found that the entry effect of mobile competition follow an inverted U Shape.

5.2.2 Effects of other Telecommunications Performance Indicators

In all the above equations (equation 1, 2 and 3), we included three telecommunications performance indicators (MPR, FPEN, and dummy for the independency of regulatory authority) that are expected to affect the rate of MPEN. Therefore in this subsection we discuss the estimation results of each indicator.

In the estimation results, we can observe that MPR is positively and significantly associated with the level of MPEN[11]. Though it seems contrary to intuition and many other empirical literatures, there could be a couple of plausible explanations of this result. The first explanation is that limited MPEN observed in many developing countries (including SSA countries) could be the result of supply side rather than demand side constraints[12]. That is MPEN is low for the period not due to insufficient demand at the current prices but rather due to insufficient supply. Therefore, even though prices are increasing with new operators entering the market, more subscribers may join the network as the incumbent operators might not have sufficient network capacity to accommodate the available demand in the market. The other possible explanation is the limitation of a price variable to incorporate quality of service differences in different countries and/or periods under consideration. This problem is critical in the telecommunications sector, where quality of service plays a significant role in the expansion of a particular service. That is, higher price may be associated with higher quality of service and vice versa. In this case, therefore, even though MPEN seems to increase with an increase in the absolute amount of MPR, it might be negatively associated with a real price level adjusted to quality of service.

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[11] In all equations (1,2, and 3) we found similar result using MPR adjusted for PPP in place of MPR with current exchange rate.

[12] Similar explanation is given by Ross (1999) who found that higher residential price are positively associated with higher main lines per 100 inhabitants in case of countries with 100 inhabitants.

FPEN on the other hand, is positively and significantly associated with MPEN. This, therefore, implies a positive network externality in which fixed line is a complement rather than a substitute for mobile service. In other words there is an increased incentive to acquire a mobile phone when there is additional fixed line user. This result is consistent with Ahn and Lee (1999), Garbacz and Tompson (2005), Chakravarty (2005), but contrary to studies by Gruber and Verboon (2001), Madden Coble-Neal (2004), Waverman et.al (2005).

Finally, we can observe that, the impact of independent regulator per se, is significantly correlated with MPEN. As indicated in our hypothesis, this might be because of intensive use of mobile telephony for universal service, the necessity of interconnection, fixed mobile termination, and mobile number portability issues. This result is consistent with Maiorano & Stern (2007) and Li (2008).

5.2.3 Effects of Socio Economic Variables

Our empirical estimates suggest that per capita income is significantly and positively associated with MPEN. This is consistent with a theoretical presumption that per capita income indicates greater affordability and hence it results to enhanced demand for mobile telecommunications services. A number of empirical researches have also come up with results congruent with this presumption. Percentage of urban population is negatively associated with MPEN indicating that mobile is a good alternative for rural areas coverage.

6. Conclusion

Sub Saharan African mobile telephony market has achieved a substantial growth in the past decade. Looking at countries and the period under investigation in this particular study, we can see that MPEN increased from 3.54 to 21.48 people per 100 inhabitants. However, not only the MPEN level is very low as compared to the world average, which is 66.16 in 2006, but also there is a considerable variation across countries, and this variability vividly increases in each year under investigation.

Using econometric approach, this study therefore attempts to explore the impact of competition on MPEN in 35 Sub-Saharan African countries over the period 2000-2006. Likewise, we tired to identify the impact of other telecommunications performance indicators and socio economic variables on MPEN.

Unlike other studies, the paper tried to look at both the impact of existence and intensity of competition using different measures of competition. To measure the impact of a mere introduction (existence) of competition we use two variables alternatively; a dummy variable (that shows whether the market is under a single mobile operator or not), and number of years with mobile competition. On the other hand to measure the intensity of competition we used number of operators and a measure of HHI of the mobile market alternatively. Furthermore, the paper tries to have a more detailed look on the impact of the existence of different number of mobile operators (two, three or more operators) in the market using a set dummy variable for each entry in the market.

For the most part, the econometric evidences presented in this study are consistent with the existing literature. It unanimously shows that both existence and intensity of competition has a positive and significant effect on MPEN. MPEN seems to be higher in countries that allow competition; a move from one year of mobile competition results in 1.20 additional lines while one year of mobile competition results approximately 0.19 additional lines per hundred inhabitants. In addition to allowing competition in the sector, the results of this study indicate that fostering effective competition also plays an important role in improving in MPEN. We can observe that each mobile competitor is

associated with an increase of almost 0.57 additional lines per hundred inhabitants. While a 1% decrease in HHI is associated with 1.48% increase in the MPEN level.

With a closer investigation of the impact of different number of operators, we can observe that each mobile entry significantly and positively associated with MPEN. However it is also observed that initial entries have greater impact on MPEN than further market entries.

Similarly, the study also shows that MPEN is positively affected by FPEN, per capita income. However, unlike the theoretical and empirical literatures, the study shows that MPR tends to positively associate with MPEN. This is either an indication of supply rather than demand side problems as a cause of limited MPEN in the SSA countries, or result of increase of MPR with increase in quality of service.

Finally, based on the findings of this study, we recommend countries in the region not only to allow competition but also foster effective competition in the mobile sector in order to expand mobile services and leverage the economic benefits of information connectivity. In view of this, it is very important to identify and address any anti-competitive arrangements and practices in both the private and public spheres.

Bibliography

Ahna, Hyungtaik, Leeb, Myeong-Ho (1999) 'An econometric analysis of the demand for access to mobile telephone networks' Elsevier Science B.V., Information Economics and Policy 11 (1999) pp. 297–305

Baltagi, Badi H (2005) 'Analysis of Panel Data', 3rd ed., John Wiley & Sons Ltd, West Sussex, England

Becker, G. (1997) 'There's nothing natural about "natural" monopolies', Business Week, October 6, 1997.

Birkenes, Turid, Brynjar Moerkved, Halvor Nafstad, Jan-Petter Saether (2001) 'The regulator's dilemma: Competition versus monopoly?' Norwegian Post and Telecommunications Authority, PT.

Bortolotti, Bernard and Juliet D'Souza, Marcella Fantini, William L. Megginson (2002) 'Privatization and the sources of performance improvement in the global telecommunications industry' Telecommunications Policy, Vol. 26 pp.243-68

Boylaud, Olivier and Nicolett, Giuseppe (2000) 'Regulation, Market Structure and Performance in Telecommunications, Organization for Economic Co-operation and Development', Economics Department Working Papers No. 237

Chakravarty, Sujoy (2005) 'Determinants of Cellular Competition in Asia', IIMA Working Papers 2005-06-01, Indian Institute of Management Ahmedabad, Research and Publication Department

Fink,Carsten; Mattoo Aaditya, and Rathindran, Randeep (2002) 'An Assessment of Telecommunications Reform in Developing Countries' Policy Research Working Paper Series 2909, The World Bank

Garbacz, Christopher and Thompson, Herbert (2007) 'Demand for telecommunication services in developing countries', Elsevier Science B.V, Telecommunications Policy 31 (2007) pp. 276–289

Gruber, Harald (2000) 'Competition and innovation: The diffusion of mobile telecommunications in Central and Eastern Europe', European Investment Bank

Gujarati, Damodar (2004) N 'Basic Econometrics', 4th ed., McGraw-Hill, New York, USA

Haucap, Justus (2003) 'The Economics of Mobile Telephone Regulation' Department of Economics,University of the Federal Armed Forces Hamburg, Discussion Paper No.4

Hausman, Jerry A. (2002). "Mobile Telephone" Massachusetts Institute of Technology Handbook of Telecommunications Economics, Volume I, Edited by M.E. Cave et al (2002): pp. 563-604.

International Telecommunication Union. (2007) ICT Indicator Database, http://www.itu.int/ITU-D/ict/statistics/index.html

International Telecommunication Union. (2007). Regulatory Database, http://www.itu.int/ITU-D/icteye/Default.aspx

Katz, Diane (2004) 'A Telecommunications Policy Primer: 20 Comprehensive Answers to 20 Basic Questions', The Mackinac Center for Public Policy, Midland, Michigan

Li, Wei and Lixin Colin Xu (2004) 'The Impact of Privatization and Competition in the Telecommunications Center around the World', Journal of Law and Economics, vol. 47, University of Chicago

Li, Yan (2008) 'Econometric Evidence on the Impacts of Privatization, New Entry, and Independent Industry Regulator on Mobile Network Penetration and Expansion', ESRC Centre for Competition Policy, University of East Anglia, CCP Working Paper 08-35

Madden, Gary G and Coble-Neal, Grant (2004) 'Economic determinants of global mobile telephony growth' MPRA Paper No. 10828

Maiorano, Federica & Stern, Jon (2007). 'Institutions and Infrastructure Investment in Low and Middle-Income Countries: The Case of Mobile Communications', City University Economics Discussion Papers 07/06, Department of Economics, City University, London.

McNary, Robert (2001) "The Network Penetration Effects of Telecommunications Privatization and Competition" Honors thesis, Stanford University, USA

Mureithi, Muriuki (2005) 'Evolution of telecommunications policy reforms in East Africa: Setting new policy strategies to anchor benefits of policy reforms' Summit Strategies Ltd. Nairobi, Kenya.

Noll, Roger. (1999) 'Telecommunications Reform in Developing Countries.' SIEPR Policy Paper: Stanford.

Petrazzini, Ben (1995) 'The Political Economy of Telecommunications Reform in Developing Countries: Privatization and Liberalization in Perspective', Praeger, Westport, Connecticut and London.

Ros, Agustin J. (1999). 'Does Ownership or Competition Matter? The Effects of Telecommunications Reform on Network Expansion and Efficiency.' Journal of Regulatory Economics, 15:1, pp. 65-92.

Ros, Agustin J., Aniruddha Banerjee (2000) 'Telecommunications privatization and tariff rebalancing: evidence from Latin America', National Economic Research Associates.

Shy, Oz. (2001) 'The Economics of Network Industries', Cambridge University Press

Sherer, F.M. (1980) 'Industrial Market Structure and Economic Performance', Chicago: Rand McNally.

Torero, Maximo, Chowdhury, Shyamal and Arjun S. Bedi (2002) 'Telecommunications Infrastructure and Economic Growth: A Cross-CountryAnalysis' Information and Communication Technology for Development and Poverty Reduction, pp.21-63 Washington DC: Johns Hopkins University Press

Wallsten, Scott (1999) 'An Empirical Analysis of Competition, Privatization, and Regulation in Africa and Latin America' Working Paper, Stanford University and The World Bank. url: http://econ.worldbank.org/docs/553.pdf

Wallsten, Scott J. (2001) 'An Econometric Analysis of Telecom Competition, Privatization, and Regulation in Africa and Latin America', Journal of Industrial Economics, Volume XLIX March 2001 No. 1

Wallsten, Scott (2002) 'Does sequencing matter? regulation and privatization in telecommunications reforms', Technical report, Development Research Group, The World Bank.

Wallsten, Scott (2003) 'Telecommunications Privatization in developing Countries: The Real Effects of Exclusivity Periods' Working Paper and AEI-Brookings Joint Center for Regulatory Studies, url: http://aeibrookings.org/admin/pdffiles/phpq5.pdf

Waverman, Leonard, Meschi, Meloria and Fuss, Melvyn (2005) 'The Impact of Telecoms on Economic Growth in Developing Countries. Africa: The Impact of Mobile Phones.' The Vodafone Public Policy Paper Series No. 2: 10-23

Wooldridge, J. M. (2002) 'Econometric Analysis of Cross Section and Panel Data' Cambridge, MA: MIT Press.

Annex 1:- Estimation Results

Table I: - Fixed Effect Estimation Results of Equations with Different Measures of Mobile Competition

Dependent Variable: - ln mobile penetration

	Measuring the impact of introduction (existence) competition		*Measuring the intensity of competition*	
	Equation 1 (dummy variable for existence of two or more mobile operators)	**Equation 2** *(Number of Years with two or more mobile operators)*	**Equation 3** (number of operators)	**Equation 4** (HHI)
ln per capita GDP	1.105*** (0.196)	2.078*** (0.379)	1.284*** (0.189)	1.203*** (0.210)
ln Percentage of urban population	-0.362 (0.312)	6.189*** (1.762)	-0.563** (0.267)	-0.494** (0.236)
mobile competition	1.195*** (0.141)	0.189*** (0.039)	0.566*** (0.095)	-1.483*** (0.168)
ln mobile price	0.299*** (0.068)	0.043 (0.098)	0.194** (0.091)	0.237*** (0.077)
ln fixed line penetration	0.290*** (0.091)	0.884*** (0.269)	0.316*** (0.109)	0.248* (0.130)
Dummy Independent Regulator	0.314** (0.142)	-0.324 (0.229)	0.134 (0.112)	0.283** (0.112)
R^2	.74	.76 (within)	.66	.65
Countries	35	33	35	35
Observations	222	209	222	221

***significant at 1%; **significant at 5%; *significant at 10%

-All the above equations are similar except that they include different measure of mobile competition; dummy variable for existence of two or more mobile operators, Number of Years with two or more mobile operators, number of operators and HHI, for equation 1 to 4 respectively.

- Except Equation 2, which is estimated using 2 Stage Least Square IV method, all the above equations are estimated using Panel Corrected Standard Error (PCSE) Approach.

-Though the total data set has 35 countries, the data analyzed in Equation 2 include only 33 countries as we are forced to drop Guinea and Seychelles because of lack of data when we apply instrumental variables in the estimation of the model; number of observations has also decreased for the same reason.

Table II: - Estimation Results of Equations Measuring the Impact of Different Number of Mobile Operators in the Mobile Market

Dependent Variable:- ln mobile penetration

	Equation 1	Equation 2
ln per capita GDP	1.217*** (0.179)	1.239*** (0.216)
ln Percentage of urban population	-0.676** (0.289)	-0.543** (0.253)
number of operators	- 	1.181*** (0.303)
squared number of operators	- 	-0.120** (0.060)
Entry2Dummy	1.028*** (0.153)	-
Entry3Dummy	1.268*** (0.169)	-
Entry4Dummy	2.119*** (0.274)	-
Entry5Dummy	2.039*** (0.463)	-
ln mobile price	0.256*** (0.070)	0.190*** (0.066)
ln fixed line penetration	0.297*** (0.091)	0.279** (0.112)
Dummy Independent Regulator	0.173 (0.127)	0.249** (0.124)
R^2(Adjusted)	.75	.71
Countries	35	35
Observations	222	222

***significant at 1%; **significant at 5%; *significant at 10%
- Equations are estimated using Panel Corrected Standard Error (PCSE) Approach.

Annex 2. The Highest & Lowest level of MPR in Descending & Ascending Orders Respectively (for years 2000 and 2006, 10 countries)*

1. MPR with Current Exchange Rate

Mobile Price in Year 2000 (in USD)				*Mobile Price in Year 2006 ((in USD)*			
Lowest Price		*Highest Price*		*Lowest Price*		*Highest Price*	
Country	Price 2000	Country	Price 2000	Country	Price 2006	Country	Price 2006
Mauritius	0.11	Mali	1.26	Mauritius	0.11	Cote d'Ivoire	2.26
Sudan	0.14	Burundi	1.11	Botswana	0.20	Seychelles	1.63
Niger	0.23	Benin	1.01	Ethiopia	0.29	South Africa	1.42
Angola	0.24	Malawi	0.94	Sudan	0.31	Swaziland	1.33
Guinea	0.26	Ghana	0.88	Eritrea	0.33	Cameroon	1.32
Ethiopia	0.26	Mozambique	0.88	Mozambique	0.40	Namibia	1.23
Uganda	0.36	Tanzania	0.85	Madagascar	0.45	Cape Verde	1.22
Seychelles	0.50	Cape Verde	0.83	Ghana	0.45	Kenya	1.17
Zimbabwe	0.50	Swaziland	0.80	Mauritania	0.50	Gabon	1.03
Senegal	0.56	Madagascar	0.78	Senegal	0.57	Burkina Faso	1.03

2. MPR Adjusted to PPP

MPR in Year 2000 (in USD)				*MPR in Year 2006 (in USD)*			
Lowest Price		*Highest Price*		*Lowest Price*		*Highest Price*	
Country	Price 2000	Country	Price 2000	Country	Price 2006	Country	Price 2006
Mauritius	0.19	Madagascar	10.11	Mozambique	0.00	Cote d'Ivoire	3.65
Sudan	0.37	Mali	3.08	Mauritius	0.19	Swaziland	2.37
Angola	0.56	Benin	2.65	Botswana	0.31	Kenya	2.33
Niger	0.62	Ghana	2.36	Sudan	0.53	Cameroon	2.30
Uganda	0.87	Burundi	2.31	Ethiopia	0.82	Burkina Faso	2.24
Ethiopia	0.88	Burkina Faso	2.24	Ghana	0.87	South Africa	2.07
Cape Verde	1.17	Togo	1.89	Angola	0.94	Tanzania	1.87
South Africa	1.19	Swaziland	1.81	Nigeria	0.96	Niger	1.85
Senegal	1.27	Mozambique	1.79	Senegal	1.02	Benin	1.81
Central African Rep.	1.44	Kenya	1.77	Mauritania	1.04	Rwanda	1.77

* This is based on the available data on for specified period and amoung selected 35 countries

Annex 3:- Summary of Existing Literatures

Study	Objective	Econometric Model	Data Source Time period, Countries Covered	Results
Ross (1999)	Examine the effect of telecom reform on network expansion & efficiency	Fixed Effect Model; Use IV technique to control privatization & competition endogenity	ITU, World Bank, 1986-1995 Both Developed and Developing Countries (110 countries)	-Privatization positively affect network expansion -Competition doesn't affect network expansion & positively affect efficiency -GDP Per capita lagged one year positively affect network expansion -Prices positively affect network expansion
Ahan & Leeb (1999)	Analyse the demand for access to mobile telephone networks	Estimating probabilities of access using both Estimates under Normal Transformation (NT) & Density Weighted Average Estimator (DWAE)	ITU 1998 206 countries	-All prices negatively affect subscription -GDP positively affect subscription -number of fixed lines per person positively affect subscription
Gruber (2000)	Unravel the determinants of the diffusion of mobile telecom. in central & eastern Europe	Using S- Shaped Diffusion Model with econometric Specification	ITU, World Bank 1990-1997 10 Central and East European countries	-GDP per captia, urbanization and transition to market economy doesn't affect mobile diffusion -fixed line waiting list, fixed penetration, number of mobile operators and entry mode positively affect mobile penetration
Boylaud & Nicoletti (2000)	Investigate the effect of entry liberalisation & privatization on productivity, prices & quality of service in long-distance & mobile telephony markets	use Both random & fixed effect analysis Estimated for each service and for all services pooled Fixed Effect Regression	OECD Commission Outlook & OECD International Regulation Database 1991-1997 23 OECD Countries	-controlling for technology developments & differences in economic structure, prospective competition (proxied by the number of years to liberalization) & effective competition (proxied by the number of competitors) bring about productivity & quality improvements & reduce the prices of all telecom. services No clear evidence could be found on the effect of privatization (actual/prospective) on productivity, prices and quality
Wallesten (2001)	Explore the effect of privatization competition and regulation on telecommunication performance (fixed line)		ITU, Worldbank SIMA Database 1984-1997 30 African and Latin American Countries	-Competition positively affect number of mainlines per capita, payphones and connection capacity and negatively affect local prices. -Privatization negatively correlated with connection capacity while it doesn't significantly affect other performance indicators. However privatization combined with independent regulator positively correlated with telecom performance measures -GDP per Capita is positively correlated with mainlines per

				capita, while population & % of urban population is negatively correlated.
McNary (2001)	Investigate the effect of privatization & competition on network penetration	Fixed Effect Analysis & use IV method to solve Privatization and Competition endogenity problem	ITU, World Development indicator 1987- 1998 200 countries	-local fixed competition and cellular competition are both found to have significant positive effects on penetration -privatization is shown to have a significant negative effect on penetration
Fink et al (2002)	Investigate whether privatization, competition & regulation (their sequences & compeleme-ntarity) affect telecom performance	Fixed Effect Analysis & correct endogenity between mobile and fixed penetration Control for problems of serial correlation & panel-level hetroscedasticity	World Bank 1985-1999 86 developing countries (Africa Asia, Middle East, Latin America and Caribbean)	-both privatization & competition, coupled with independent regulation significantly increase mainline penetration, labour productivity - GDP per capita, & mobile penetration rate is a positive significant determinant of mainline penetration -sequencing of competition and privatization matter, introducing competition after privatization negatively affect mainline penetration -Autonomous factors such as technological progress have strong influence on telecom. performance
Madden et al (2004)	Examine the growth of global telephony and the economic factors that affect its growth	Using utility optimization/Maximization behaviour of an economic agent & then use Fixed Effect Estimation both for All countries & high income countries Test homoscadasitsity (but rejected by fixed effect) and use Two stage IV technique is used to control endogenity Construct impulse response function	ITU 1995 – 2000 56 countries (8 low, 11 lower middle, 9 upper middle, 28 high Africa Asia Europe Middle eat and Western Hemisphere)	-GDP and network externality positively affect network growth -Low income countries are more income-elastic, but network effects are inelastic -Both income and network effects exhibit signs of non linearity, the effect appears to decrease with an increasing income and subscriber base (income and network effect for high income countries is very low) -Price is shown to have negative effect on penetration and uniform across both models and -Impulse response function showed that increase in income will yield a larger cumulative subscription effect than the equivalent change in price
Li & Xu (2004)	Investigate the impact of privatization & competition in telecommunication	Fixed effect analysis Used 2 stage list squares to avoid endogenity between reform variables and telecom performance Use Dynamic Specification by inclusion of Leads and Lags of Reform Variables, & Undertake analysis on Low income vs Middle & High income countries	ITU, Wold Bank-Stanford Telecomm Project 1990-2001 117 countries	Full privatization substantially improved the allocation of labour & capital, expand service output and network penetration, improving labour and total factor productivities. But partial privatization has no significant impact -Countries that implemented more aggressive programs of reforms (full privatization and competition) in both fixed line and mobile sectors experienced significantly more performance gains in multiple dimensions -there if complementarily between privatization and competition in that competition restrained service pricing in countries that privatize fully

Chakravarty (2005)	Investigate the diffusion of mobile and the role of competition, regulation in Asia	Fixed effect analysis	ITU 1993-2002 29 Asian Countries	Competition and presence of independent regulator, GDP per capita, the capacity of fixed telephone exchanges, number of payphones positively and significantly affect mobile penetration rat
Garbacz & Thompson (2007)	Determine price and income elasticity and study impact of privatization and competition	Fixed effect use IV Estimation to control Price endoginity Two Separte equations for Residential and Mobile service	ITU, World Bank 1996-2003 53 developing countries	-Privatization and mobile competition has no significant effect on both residential and mobile price -Residential competition and independent regulation has significant negative and positive impact on residential price respectively. On the other hand revenue and GDP per capita has significant positive impact on both residential and mobile prices -Demand for mobile is positively affected by residential price, GDP per capita, average year of schooling, while it is negatively affected by own price & mobile competition. -Demand for fixed line is negatively affected by mobile price, mobile competition & its own price (while it is positively affected by GDP per capita & average year of schooling -Mobile demand become both price & income elastic while the contrary is true for fixed line -Although fixed line phone are substitute are substitutes in the mobile market, mobile phone are not substitute in fixed line market (there is lack of symmetry)
Maiorano & Stern (2007)	Identify the relationship between regulation and performance in mobile telecommunication sector	Use both random & fixed effects; Treat endogeneity of 2 variables; GDP per capita, regulation Estimate Dynamic Single Equation Method using Arellano & Bond (1991) Estimator	ITU, World Bank 1990-2004 30 low and middle income countries	-Existence of Autonomous industry regulator increases penetration rates for mobile telecommunication but estimate vary depending on specification. -there is a sizeable and strongly significant impact of mobile telecoms infrastructure on per Captia GDP
Li (2008)	Examine the impacts of reforms, privatization, new entry & independent regulatory authority on mobile penetration	Fixed Effect Estimation (on econometric model based on Logistic Growth Model:- S shaped function Dynamic estimation using Arellano-Bond Dynamic Estimator & use IV to control endoginity of mobile price & labour productivity	ITU 1991-2006 29 OECD countries & China	-New entry effects on mobile penetration follow an inverted U-Shape (3-5 entries are jointly associated with highest penetration, but decline after 5th penetration) -Privatization alone yields few benefits to mobile penetration -Independent regulation per se, is positively correlated with mobile penetration & its role is particularly crucial in privatized mobile markets -Mobile service price & labour productivity partially mediate effects of regulatory reforms, especially new entry & an independent regulator

Annex 4 Countries Included in the Study (with Mobile 3 Minute Peak Hour Local Call Price)

Country Name	Year						
	2000	2001	2002	2003	2004	2005	2006
Angola	$0.24	..	$0.21	$0.12	..	$0.74	$0.90
Benin	$1.01	$0.98	$1.03	$1.24	$0.97	$0.85	$0.96
Botswana	..	$0.67	$0.62	$0.79	$1.15	$1.06	$0.20
Burkina Faso	$0.75	$0.72	$0.86	$1.03	$0.77	$0.77	$1.03
Burundi	$1.11	$1.07	$0.93	$0.80	$0.78	$0.50	$0.58
Cameroon	..	$0.86	$1.08	$1.29	$1.31	$1.31	$1.32
Cape Verde	$0.83	$0.61	$0.90	$1.07	$1.18	$1.18	$1.22
Central African Re	$0.63	$0.61	$0.43	$0.52	$0.57	$0.57	$0.57
Cote d'Ivoire	$0.70	$0.68	$1.94	$2.32	$1.25	$1.25	$2.26
Eritrea	..	..	..	..	$0.37	$0.33	$0.33
Ethiopia	$0.26	$0.26	$0.25	$0.25	$0.25	$0.25	$0.29
Gabon	..	$0.61	$0.65	$0.77	$0.56	$0.56	$1.03
Ghana	$0.88	$0.67	$0.95	$0.86	$0.60	$0.60	$0.45
Guinea	$0.26	$0.23	$0.61	$0.60	$0.54	..	..
Kenya	$0.59	$0.57	$0.57	$1.28	$1.16	$1.13	$1.17
Madagascar	$0.78	$0.86	$0.53	$0.58	$0.65	$0.48	$0.45
Malawi	$0.94	$0.78	$0.86	$0.62	$0.55	$0.94	$0.60
Mali	$1.26	$1.23	..	$1.05	$1.16	$1.16	$0.85
Mauritania	..	..	..	$0.51	$0.52	$0.51	$0.50
Mauritius	$0.11	$0.10	$0.10	$0.11	$0.13	$0.12	$0.11
Mozambique	$0.88	$1.15	$1.00	$0.42	$0.31	$0.38	$0.40
Namibia	$0.70	$0.40	$0.64	$0.89	$1.16	$1.18	$1.23
Niger	$0.23	$0.23	$0.24	..	$1.11	$0.91	$0.92
Nigeria	..	$1.08	$0.97	$0.39	$0.27	$0.89	$0.61
Rwanda	..	$1.33	$1.24	$0.49	$0.50	$0.79	$0.80
Senegal	$0.56	$0.54	$0.57	$0.73	$0.85	$0.85	$0.57
Seychelles	$0.50	$0.49	..	$2.22	$2.30	$1.63	$1.63
South Africa	$0.69	$0.56	$0.48	$1.13	$1.25	$1.27	$1.42
Sudan	$0.14	$0.14	$0.25	$0.25	$0.26	$0.26	$0.31
Swaziland	$0.80	$0.64	$0.49	$0.75	$1.21	$1.23	$1.33
Tanzania	$0.85	$0.82	$0.54	$0.23	$0.30	$0.69	$0.74
Togo	$0.75	$0.72	$0.71	$0.72	$0.80	$0.94	$0.72
Uganda	$0.36	$0.29	$0.61	$0.52	$0.56	$0.67	$0.62
Zambia	$0.68	$0.58	$0.90	$0.57	$0.62	..	..
Zimbabwe	0.50	0.40	1.16	2.17	.	.	..

Declaration

The project is my original work, it has not been presented for a degree in any other university and that all sources of material used for the project have been duly acknowledged.

Written by: Signature

Confirmed by: Signature

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

The Probability of Banking Crisis in Ethiopia: With Special Emphasis to the Real Estate Sector

BY

Seblewengel Mulugeta Germamo

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial fulfilment of the Requirement for the Degree of Master of Science in Economic Policy Analysis

October, 2009

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List of Acronyms

ADLI	Agricultural Development Lead Industrialization
CBB	Construction and Business Bank
CBE	Commercial Bank of Ethiopia
CDC	Construction in Developing Countries
CSA	Central Statistical Authority
DBE	Development Bank of Ethiopia
EBDS	Ethiopian Business Development Service
EEA	Ethiopian Economic association
EIA	Ethiopian Investment Agency
EWS	Early Warning System
FDI	Foreign Direct Investment
FSIs	Financial Soundness Indicators
GDP	Gross Domestic Product
GMP	Exchange Rate Market Pressure
GVPC	Gross Value of Production
ICCIDC	International Conference on
IMF	International Monetary Fund
ISHOPA	Imperial Savings and Home Ownership Public Association
ISIC	International Standards Industrial Classification
ISO	International Standards Organization
NBER	National Bureau of Economic Research
NGO	Non Government Organization
SMCE	Saving and Mortgage Corporation of Ethiopia
SUR	Seemingly Unrelated Regression
UN	United Nation
US	United States

Abstract

This paper examines the robustness of banking system in relation to financing the real estate sector. It also discusses the probability of banking crisis in Ethiopia in relation to real estate sector. In the past four to five years there was large expansion in the real estate sector. This paper gives review of the real estate sector in Ethiopia. The sector took 11%, 13% and 25% of total capital investment during the year 2005, 2006 and 2007 respectively. Commercial Bank of Ethiopia, Construction Bank of Ethiopia and Development Bank of Ethiopia are the main banks that supply credit to the real estate developers in descending order. Five monthly indicators and one yearly indicators of banking crisis are used for the discussion on probability of banking crisis.

Except the appreciation of real exchange from 1991/92 to 2004/05 the trend of the monthly indicators, the rise in M_2 money multiplier, a decline in real output and a fall ***in exports*** *implies that the probability of banking crisis is very low. The same is true for the annual indicator, decline in real out put. But the large credit expansion and the bubble in real estate price needs serious attention, since they are among the causes for banking crisis. The real estate market is very fragile and highly scattered, making data compilation very difficult. Initiating a standard market structure for the real estate sector is very essential.*

Chapter One

Introduction

1.1. Background of the Study

Ethiopia is one of the poorest countries in Sub-Saharan-Africa. Its economy is agrarian and the current economic policy is Agricultural Development Lead Industrialization (ADLI). This policy came into act after the current government took power in 1991. Though there are different problems, both internal and external, one can't deny that there is visible progress in different sectors. Construction sector is one of them.

The boom in the construction sector is very visible across the country and one can guess that it has already created thousands of new jobs. The recent aggressive move towards public and private housing investment and revision of governing rules could have multi-dimensional impacts on the economy, to mention few: Opening the market for foreign investors (like Chinese) and private investors, particularly the Diaspora. During 1996/97 – 2006/07 the share of Foreign Direct Investment (FDI) in total construction Gross Value of Production (GVPC) averaged about birr 224.4 million. i.e. 1.7 percent. The highest share was recorded in 1998/99 which is 4 percent. In recent years the flow has increased to some extent. In the period 2002/03 – 2006/07 the annual foreign direct investment (FDI) flow was Birr 289.8 million which 1.9 percent. There are diverse type and size of projects in this sector. There are both public and private construction businesses (EEA, 2006/07).

According to Ethiopian Investment Agency (EIA) there are about 1,375 licensed real estate businesses in Ethiopia. Of these 2438(91.6%) were domestic investors and 204(78.4 %) were foreign companies. However, only 62 projects, i.e., 4.5 percent of the licensed real estate developers were operational during 1992/93-/2006/07, with capital of 1,783.5 million.

This report indicates construction in Ethiopian generally is financed by government budgets and private equity capital, NGOs and banks. Government budget finances public infrastructures and other public constructions such as schools, clinics, etc and the private sector finances buildings for residential and business purpose. Remittances too are significant sources o f finance in the real estate sector. But collecting data to support this observation is very difficult. Foreign aid and grants are also the other sources for public construction of residential buildings.

This paper is concerned with investigating the level of real estate financing in Ethiopia, challenges thereof and commercial bank's participation. The problems associated with real estate financing have been increasing through time, even though government puts its effort to reduce the problems. Hence the paper assesses the existing state of real estate development and its finance.

1.2. Research Problem

Construction sector is characterized by an intensive use of labour both in on site construction and in the production and distribution of building materials. The role of construction sector in the broader economy is the starting point for understanding the dynamics of the industry (Altman and Mayer, 2003: 4). However, information on the construction sector is quite

scattered at different levels. In Ethiopia it is very visible that construction sector is flourishing and creating huge job opportunities, especially in capital cities of regions. Real estate can be listed as one of the main category in this sector. The boom in the real estate sector is predicted to be financed mainly by huge credit from banks. Off course there are also remittances and direct investment by the Ethiopian Diasporas in this sector. But it is difficult to capture the contribution of remittances and Diaspora's investment in the real estate sector in Ethiopia. This paper will deal with the financial impact of this expansion in the real estate sector in relation to the banking sector.

As released by Ethiopian Business Development Service Network (EBDS), a report by US embassy-Addis Ababa (2009) indicates that the two main problems in the construction sector are: (1) Contractors lack financial management skill, and (2) most contractors want to use their machinery as collateral for loan purpose. And this findings are in conformity with that of EEA. On the other hand banks have problem in identifying the true owner of the machinery. As part of the construction sector the real estate sector shares this problem. Moreover banks are suspicious that contracting firms are awarded projects that are beyond their capacity so they may not finish on time. While these and other problems are there, still there is a huge supply of credit for this sector. The economic reason behind this credit supply and its potential impact will be the issues to be discussed in this paper.

1.3 Objectives of the Study

- Examining the robustness of banking system in relation to financing the real estate sector.
- Discussing the probability of banking crisis in Ethiopia in relation to real estate sector.

1.4. Hypothesis of the study

- Banks are highly exposed to the real estate sector and the sector may not be a sustainable business.
- The probability that banking crisis will occur is very low.

1.5. Data Source and Methodology

The study used secondary data. The data were taken from different reports of Central Statistical Authority (CSA), Commercial Bank of Ethiopia (CBE), Construction and Business Bank of Ethiopia (CBB) and National Bank of Ethiopia (NBE). Analytical method is employed to deal with probability of banking crisis. The top five indicators for banking and currency crisis in developing countries, identified by Kaminisky et al (2000), were used to discuss the probability of banking crisis in Ethiopia.

Since analysis of financial sector vulnerability cannot rely on quantitative indicators alone, qualitative information on institutional circumstances, combined with informed judgment, is also essential (IMF, 2000) and is used. Thus, a discussion was conducted with the concerned bodies from Construction, Commercial and Development Banks of Ethiopia.

1.6. **Significances of the Study**

Started during imperial regime, the real estate business showed a significant progress. There is a huge flow of capital to construction of buildings, both for sale and rental purpose. This paper is expected to investigate where this capital is coming from. The result will be useful for all who need to know the financial aspect of the sector. It will also provide information regarding healthiness of banking system in relation to expansion in investment in the sector. These will, for both the real estate and financial (banking) sector, help policy makers to come up with appropriate policy. There are studies dealing with probability of banking crisis in relation to the real estate sector. But they are very few for developing countries case. When we come to the case of Ethiopia there is no study done on the probability of banking crisis. Then the study fills this research gap.

1.7.Limitation of The study

- There are very few literatures done on the financial impact of Real estate sector in developing countries.
- Private banks are not willing to give data
- It would have been better if primary data were colleted. But secondary data is used due to financial limitation.

1.8. Organization of the Paper

This paper has a total of five chapters. It starts with introductory chapter. The second chapter deals with review of both theoretical and

empirical literature on the issue. The third chapter gives overview of the real estate sector and banking in Ethiopia and is followed by discussion on the probability of banking crisis. Conclusion and policy recommendation are given in the last chapter.

Chapter Two

Literature Review

2.1. Theoretical review

2.1.1. Nature and Description of Real Estate Business

As cited in EEA, volume VI (2006/07), according to UN (1996) International Standards Industrial Classification (ISIC), Rev. 3, Construction is defined generally as an economic activity directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature, and other such engineering constructions as roads, bridges, dams, etc

According to ISO definition, real estate refers to real property such as land, land improvements, and building held for business use in the production of income. Construction of buildings, both for residential and business purposes, constitutes a considerable share in the construction industry. One may get small medium and large scale enterprises in this sector too.

Unger and Karvel (1979) described the real estate or real property as:

> Land and the improvements made to land, and the rights to use them. Land is not only the surface of the earth. It starts at the centre of the earth, passes through the earth's surface and continues on in to space. Given a particular parcel of land, it is possible for the owner to own rights to use its drill or dig bellow its surface (subsurface rights), and own rights to use the air space above it (air rights).

According to Unger and Karvel (1979), anything attached to land with the aim of being permanent is considered to be part of the land and therefore the real estate. Thus houses, schools, factories, roads, and land escaping are real estates. As a group, these are referred to as improvements because they improve or develop land. There is also the same description in Harwood and Jacobus, 1993.

According to Unger and Karvel (1979) description it is also possible to identify real property from personal property[1] by considering at the way the item is adapted to the building. If the item is specifically adapted to part of that building then they are automatically included in the purchase or rental of the building. For example, the key to a house spends most of its useful life in a pocket or purse; it is nonetheless quite specifically adapted to the house and therefore a part of it. When it is not clear that an item is real or personal property, the use of written agreement can avoid a subsequent controversy.

2.1.2. Financing the Real Estate Business

Harwood and Jacobus (1993) identified various mortgage lenders, i.e.The primary market. They also described the secondary market, where

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[1] *Items that are not part of the land, such as tables, chairs, beds desks, automobiles farm machinery, and the like are classified as personal property. Generally, personal property is everything that is not real property. When an object, which was personal property, is attached to the land the building and become a real estate, it is called a fixture. Actually it depends on the manner of attachment. Whether a property is real estate or fixture should be clear, for property tax concern. If the property is attached to land by means of cement, nails, bolts, etc, it becomes a fixture.*

mortgage lenders get much of their money, and explained mortgage loan instruments and financing instrument.

The primary market (also called the primary mortgage market) is where lenders originate loans, i.e. where lenders make funds available to borrowers. Examples are saving and loans, commercial banks, mutual savings banks, and mortgage companies. From the borrower point of view this market is source of mortgage loan money. It is the institution with which the borrower has direct personal contact. It is the place where the loan application is taken, the place where the loan check comes from, and the place to which loan payments are sent by the borrower. One of the example of primary market is Savings and Loan Associations. In the same book cooperatives are raised as the origin of saving and loan associations. And the savers were at the time borrowers. Through time this associations became a primary source of residential real estate loans. (Harwood and Jacobus, 1993)

The other source of fund for real estate companies is a **mortgage company**[2]. A mortgage company is a company, which makes mortgage loan and then sells to a long-term investor. The company starts the process with locating borrowers, qualifying them, preparing the necessary loan papers, and finally making the loans. Once the loan made, it is sold for cash on the secondary market .The mortgage company will continue to service the loan, i.e. collect the monthly payments and handle such matters

[2] Some times they are known as mortgage banking or mortgage dealers in residential, commercial, apartment, condominium, mobile home, and special purpose property mortgages.(Edimster, 1980)

as insurance and property tax impounds, delinquencies, early payoffs, and mortgage release. (Harwood and Jacobus, 1993)

There are also **mortgage brokers** who facilitate the availability of loan. Unlike bankers they specialize in bringing together borrowers and lenders. Just like real estate brokers bring together the buyers and sellers. The mortgage broker doesn't lend money, and doesn't service loan. The borrower pays their fee and it is expressed interims of points. Municipal bonds i.e. public bonds are one way of making home ownership affordable. They provide a source of mortgage money for home buyer. In this program borrowers have advantage. Because these bonds are free of tax. (Harwood and Jacobus, 1993)

Secondary market, which is also called secondary mortgage market, provides a way for the lender to sell a loan. It plays an important role in getting money from those who want to lend to those who want to borrow. Traditional system is where local institutions like saving and loan societies and banks collect from depositors and lend it to borrowers. Each lender employs a standard way of collecting deposits and making loans. But there are three main possible problems. The first is that institutions with imbalance in depositors and borrowers. The second happens when the depositor want to withdraw their money and put it in another source. In this case the institutions have to increase interest rate to attract depositors. This results in increasing loan rate. The third problem is timing. Lenders must borrow short from their deposit relation ship and lend long. (Harwood and Jacobus, 1993)

Secondary market can solve these problems. The institutions have to find a market to sell their loans to investors who will pay cash for the loan long

term for its guaranteed rate of return. So the primary lenders (Banks and saving and Credit Societies) continue to make loans, Gambling that they will find another investor in the secondary market to buy the loan for long term. Effectively primary lenders can make loans from secondary market rather than their deposits. (Harwood and Jacobus, 1993)

Availability and Price of Mortgage Money

We noted above about money pipelines between lenders and borrowers. These sources are savings generated by individuals and businesses as a result of their spending less than they earn (real savings) and also government created money called fiat money or "printing press money." This second sources competes for available goods and services alongside the savings of individuals and businesses. (Harwood and Jacobus, 1993)

In the pitch of money and capital real estate borrowers must compete with the needs of government, business and consumers, Government compete the hardest when they borrow to finance a deficit. Strong competition also comes from business and consumer credit sectors. In the face of such strong competition for loan funds, home buyers must either pay higher interest or be out bid. (Harwood and Jacobus, 1993)

One solution to this problem is for government to create more money, thus making completion for funds easier and interest rates lower. Unfortunately the net result is often "too much money chasing too few goods," and prices are pulled upward by the demand caused by the newly created money. This is followed by rising interest rats as saver demand higher

returns to compensate for losses in purchasing power(Harwood and Jacobus, 1993)

They also add as alternative solution that from the standpoint of residential loans, increasing real savings or decrease demands for available money.

Equity sharing: in addition to interest rate on the loan here the lender wants to share in some of the benefits normally reserved for the equity holder, in return for providing financing. The equity holder would agree to this either to get a lower rate of interest or to get financing when financing was scarce, or where the equity holder was not big enough to handle the deal alone. (Harwood and Jacobus, 1993)

One of the variations in equity sharing is **Rich uncle financing** (Harwood and Jacobus, 1993). Here the investor may be a parent helping a son or daughter buy a home or a son or daughter buying a parent's present home while giving the right to occupy it. The other variation is for an investor to provide most of the down payment for a home buyer, collect rent from the home buyer, pay the mortgage payments and property taxes, and claim depreciation, each party has a right to a portion of any appreciation and the right to buy out the other.

Normally real estate mortgage loans are thought as being secured solely by real estate; however it is possible to include items classed as personal property in a real estate mortgage so that to create a package mortgage. In residential loans, such item as refrigerator, clothes washer, and dryer can be guaranteed along with the house and lend in a single mortgage .The

purpose is to raise the value to the collateral in order to raise the amount the lender is willing to loan. For the borrower, it offers the opportunity of financing major appliances at the same rate of interest as the real estate itself. This rate is lower than if the borrower finances the appliances separately. Once an item of personal property is included in a package mortgage, selling it with out the prior consent of the lender is a violation of the mortgage. (Harwood and Jacobus, 1993)

There are also what we call **blanket mortgage and reverse mortgage** (Harwood and Jacobus, 1993). The former is a mortgage secured by two or more properties and the later is mortgage where the lender makes a lump sum payment to the borrower, who in return repays it through monthly payments to the lender.

Construction Loan, which is also called interim loan money, is advanced as construction takes place .The lender doesn't advance the entire loan at once because the value to the collateral is insufficient to warrant that among. Until the house is finished rather the lender will pay out the loan as the building is being constructed always holding a portion until the property is ready for occupancy. In some cases until it actually is occupied. (Harwood and Jacobus, 1993)

Self- helps housing finance in developing countries

Self-help financing was regarded, as housing that was affordable relative to the size and stability of existing income over the short term and the household life –cycle. (Datta and Jones, 1998). Datta and Jones (1998) start their work by highlighting on housing and finance in developing countries. According to them from the lessons of NGO and micro- finance practices one can see that housing and finance in developing countries explores the linkages between formal and informal housing finance. The failure by formal institutions to filter down bellow middle income class has led to NGOs and community groups to create and adopt creative finance program such as informal savings banks and credit rotating schemes.

As cited on Datta and Jones (1998), Turner (1967) revealed that one of the key observations made of self – help housing is that it allows households to build in stages in order to synchronize investment in buildings and community facilities with the rhythm of social and economic change.

2.2. Empirical Review

2.2.1 Real Estate and Banking Industry

2.1.3. What Makes Real Estate Markets So Special?

Real estate markets are characterized by heterogeneity. No two properties are identical and information on market transactions is often limited and not generally available. Also, real estate markets are typically characterised by infrequent trades, a negotiated pricing process, large transaction costs and rigid supply .In contrast to stock markets and other financial markets, there is no clear market price. (Cummings, 1996)

The price of property should in principle equal the discounted present value of the expected stream of future income (rents), which depends on expected growth in income anticipated real interest rate, taxes and other structural factors in a well functioning market price should equilibrate demand and supply in other words the fundamental equilibrium price can be thought of as the price at which the stock of existing real estate equals replacement cost. If the replacement cost is above price of the real estate no new construction will take place, and if it is lower new construction will equilibrate the market. Real estate cycles for well functioning markets will then be driven by economic cycles and depend on changes in, for instance, expected growth in income, real interest rate, taxes and future demographic profile. (Hilbers et al, 2001)

Hilbers et al (2001) also mentioned that the real estate market is characterized by several market imperfections that distort the adjustment towards equilibrium. First the market suffers from imperfect information about future demand, second, supply is rigid in the sense that new construction may take several years to be completed, and in many markets

the supply of land is a binding constraint. Also, in markets where collateralized lending is widespread, real estate prices affect the availability of resources to finance real estate, which may again affect the price of real estate. Finally, changes in the structure of the financial sector may foster credit booms and increase the amount of available resources for financing. Some of these market imperfections can lead to cycles that differ from the economics cycle or bubbles. (Hilbers et al, 2001)

Such market imperfections will create stress on the financial sector. For instance, if lending is collateral based, rather than demand for and supply of new construction market price will depend on the availability of resources to finance real estate, which may again affect the price of real estate. Credit booms, created due to change in structure of financial sector, too have their own pressure on the banking sector.

Stresses in the banking system are difficult to quantify. The data necessary for making an assessment are generally not available and as a result dating of banking crisis must rely on events such as the closure of banks and official (or government takeover of) financial institutions. Generally banking sector weaknesses emerge because of deterioration in asset quality. Reliable and timely data on non-performing asset is not always available and even indirect evaluations of asset quality require information on bankruptcies, exposures of financial intermediaries to different sectors, and movements in real estate and other asset prices. But these are information that is not generally available in many developing and transition economies. (IMF, 1998)

The timing of events in the economic arena is notoriously difficult to analyze. Economic theory, while relatively good at characterizing equilibrium situations, tends to be less informative about the dynamics

that could lead from one equilibrium to another (IMF, 1998). To predict the timing of rare events such as financial crisis, which may critically depend on factors that are hard to capture such as structural features of the economy, institutional developments, changes in political landscape, and expectations of domestic and foreign players in various markets, is likely to be even more demanding (IMF, 1998). The process of policy making and policy responses themselves have crucial bearing on weather a situation of stress degenerates in to crisis and typically this can't be taken in to account in modelling exercises. Hence, it is not surprising that models based on quantifiable factors that don't endogenize policy responses have not met with much success (IMF, 1998).

In the same paper, IMF (1998), it was concluded that although predicting the crisis correctly is not attainable, the very success of such models in predicting crisis would eliminate the phenomenon they were trying to predict if policy makers take appropriate action in response to early warning indicators.

The relationship between real estate and banking industry is justifiably the topic of much attention in the real estate literature, but the perspective of that attention largely appears to be focused on how the banking industry shapes and influences real estate market activity. (Allen et al, 1995). Studies that consider this perspective includes Hilbers et al (2001) and Sirmans and Benjamin (1991), each examine how the reduced credit availability negatively impacts the real estate sector. Also as cited in Allen et al (1995), Fergus and Goodman (1991) are among examples of studies based on the above perspective.

Allen et al (1995) examined commercial banks exposure and sensitivity to real estate market by applying seemingly unrelated regression (SUR) model to bank portfolios. They tested for the relation between bank values and real estate market proxy after controlling for general market and interest rate conditions. Allen et al (1995) found positive relationship between monthly bank returns and the real estate index. The sensitivity of bank values to the real estate market has increased over time and bank specific sensitivity coefficients positively related to banks balance sheet exposure to real estate sector. (Allen et al 1995)

2.2.2 Causes of financial crisis

2.2.2.1 Asset bubbles

Definition

According to wikipedia, the free encyclopaedia an economic bubble, which some times referred to as a speculative bubble, a market bubble, a price bubble or a financial bubble, is trade in a products or assets with inflated values. And the Investor Glossary explains it as: in markets, a bubble is an extended period of extreme overvaluation. It occurs in stock markets, real estate, commodities and precious metals. Bubbles are formed when excessive speculation enters a market. Instead of viewing the intrinsic value of an asset, speculators in a bubble market focus on the resale value of the asset. This is some times referred to as the greater fool theory of investing. In a bubble, it doesn't seem to matter that a price is irrationally high – it only matters that it can be sold for an even more irrational price at a latter date. Bubbles often end with steep declines, where most of the speculators gains are quickly wiped out. Such drop in

price is known as a crash or a bubble burst. Prices in an economic bubble can fluctuate erratically, and become impossible to predict from supply and demand alone. (Sheen S. and Edward, 2007)

Impact of Economic Bubble

Economic bubbles are generally considered to have a negative impact on the economy, because they tend to cause misallocation of resources into non-optimal uses. In addition, the crash, which usually follows an economic bubble, can destroy a large amount of wealth and cause continuing economic malaise. (Investor Glossary)

Another impact of economic bubbles is their impact on spending habits. Market participants with overvalued assets tend to spend more because they "feel" richer (the wealth effect). When the bubble inevitably bursts those who hold on these overvalued assets usually experience a feeling of poorness and tend to cut discretionary spending at the same time, hindering economic growth or, worse, exacerbating economic slowdown. In an economy with a central bank, the bank may therefore attempt to keep an eye on asset price appreciation and take measures to curb high levels of speculative activity in financial assets. This is usually done by increasing the interest rate (That is the cost of borrowing money) (Historically this is not the only approach taken by central banks. It has been argued that they should stay out of it and let the bubble, it is one, take its course. (Investor Glossary)

Possible Causes of Economic Bubble

One possible cause of bubble is excessive monetary liquidity in the financial system, including careless or inappropriate lending standards by

banks, which asset markets are then caused to be vulnerable to volatile hyperinflation caused by short term, leveraged speculation (Mark, 2008). Mark (2008) forwarded the known economic theory that, excessive monetary liquidity (easy credit, large disposable incomes) potentially occurs while fractional reserve banks are implementing expansionary monetary policy (i.e. lowering of interest rates and flushing the financial system with money supply). When interest rates are going down, investors tend to avoid putting their capital in to savings accounts. Instead, investors tend to leverage their capital by borrowing from banks and invest the leveraged capital in financial asset such as equities and real estate.

Social Psychology factor

Greater Fool Theory

This theory is popular among laymen but not fully confirmed by empirical research, Greater fool theory portrays bubbles as driven by the behaviour of permanently optimistic market participants (the fools) who buy overvalued assets in anticipation of selling to other speculators (the greater fools) at a much higher price. (Sheen and Edward J., 2007)

According to this unsupported explanation, the bubbles continue as long as the fools can find greater fools to pay up for the overvalued asset. The bubbles will end only when the greater fool become the greatest fool who pays the top price for the overvalued asset and can no longer find another buyer for it at a higher price.

Many countries experienced asset bubble in the late twentieth century. Asset bubbles occurred in Norway, Finland, and Sweden in the 1880s.Real estate and stock prices rose meteorically in Japan in the 1980s, only to collapse precipitously in the 1990s(Pomerleano, 1999). In mid 1997, real

estate bubbles occurred in Malaysia and Thailand, and an equity market bubble occurred in Malaysia (Pomerleano, 1999). Financial crisis often follow what appear to be bubbles in asset prices (Allen and Gale, 2000). Allen and Gale raised the case of Japan in 1980's as a recent example. There was a rise in real estate and stock prices and subsequently collapses in 1990.Norway, Finland and Sweden had similar experience. In emerging economies financial crisis of this type have been particularly prevalence since 1980; examples include Argentina, Chile, Indonesia, Mexico, and most recently the South East Asian economies of Malaysia, Indonesia, Thailand and South Korea. (Allen and Gale, 2000)

Literatures consider bubbles in asset prices as having three distinct phases. Kaminisky et al (2000) and Allen and Gale (2000) can be listed as reference. The first phase starts with financial liberalisation or a conscious decision by the central bank to increase lending or some other similar event. The resulting expansion in credit is accompanied by and increases in price for assets such as real estate and stocks. This rise in prices continues for some time, possibly several years, as the bubble inflates. During The second phase the bubble bursts and asset price collapse often in a short period of time such as few days, or months but some times over a long period .The third phase is characterised by default of many firms and other agents that have borrowed to buy assets at an inflated price. Banking and/ or foreign exchange crisis may follow this wave of defaults and banking and foreign exchange crisis often causes problems in the real sector of the economy that can last for a number of years.

As cited in Allen and Gale (2000) **Kaminisky and Reinhart** (1996; 1999) study a wide range of crisis in 20 countries including 5 industrial and 15 emerging ones. According to their study financial liberalization and

significant credit expansion were common original causes for most of the crisis considered. And these were followed an average rise in price of stocks of about 40% per year above that occurring in normal times the price of real estate and other assets increased significantly. At some point the bubble burst and the stock and real estate markets collapse. In most cases banks and other intermediaries were over exposed to the equity and real estate markets and a banking crisis result about a year latter on average. This is often accompanied by an exchange rate crisis as governments choose between lowering interest rates to defend the currency crisis or raising interest rates to defend the currency. Finally, a significant fall in out put occurs and the recession lasts for an average of about a year and half.

2.2.2.2 Lack of professional financial services skills

Pomerleano (1999) puts lack of professional financial services skills and limited availability of market based instruments for managing real estate and corporate restructuring as a cause of asset bubble. As cited in Pomerleano (1999), Eschweler (1999a) found that In Japan and Thailand the lack of expert appraisers hinders rapid valuation and transparent market transactions. In the absence of credible valuations that reflect market values, rents and real estate prices have dropped slowly despite high vacancies and further increase in supply (Pomerleano, 1999). The study emphasizes the view that luck of skills and of market based financial instruments that price risk and value asset leads to wrong price signalling. Countries that have capable professionals such as appraisers, analysts and insolvency experts have recognized and responded more swiftly to asset

bubbles than countries with a limited base of financial sector skill. (Pomerleano, 1999)

2.2.3 Methodological issues on financial crisis

The empirical literature on financial crises (Currency, bank and debt crises) can be categorized according to three methodological approaches. Namely, Case studies, event studies and signal approach/early warning system. Case studies and event studies concentrate on specific crises episodes (Sachs et al, 1996; Glick and Rose, 1998; and Blanco and Garber, 1986). The main thinking behind signal or Early Warning System (EWS) approach is that an economy behaves differently on the eve of the financial crises than during times of normalcy.

Kaminisky et al (2000) analyzed and provided empirical test of early warning indicators of banking and currency crises in emerging economies. They identified key empirical regularities in the run-up to banking and currency crises that would enable officials and private market participants to recognize vulnerability to financial crises at an earlier stage.

According to Kaminisky et al (2000), there have been more than 65 developing country episodes during 1980-95, when the banking system's capital was completely or nearly exhausted; the public sector bailout costs of resolving banking crises in developing countries during this period have been estimated at around $250 billion. Using several simple measures of vulnerability to currency crises over the period June 1996-97.The top five indicators of banking sector crises are **real exchange rate, stock prices, M2 multiplier, out put, exports, and real interest rate on bank deposit**. One of their main finding is that banking and currency crises in

developing countries don not typically arrive with out any warning. There are recurring patterns of behaviour period leading up to banking and currency crises. They also identified that the best (in descending order) of the 15 monthly indicators (considered in their study) were **appreciation of real exchange rate, a decline in stock prices, a rise in the (M2) money multiplier, a decline in real out put, a fall in exports, and a rise in real interest rate**. Among eight annual indicators tested the best of the pack were a **high ratio of short-term capital to GDP and large current account deficit relative to investment.**

The research by Tornell et al (2001/2002) indicates that banking crises don't spread across countries, typically are preceded by a real exchange rate appreciation and lending boom, along with debts denominated in foreign currency. When the crisis hits, a real depreciation takes places. Since many agents, including those in non-tradable sectors, had denominated their debts in foreign currency during the boom years, the real depreciation implies dramatic balance sheet effects. Many agents see the value of their debt mushroom, while their revenues remain flat. This results in a reduction in their ability to service debt as well as in plummeting net worth. (Tornell, 2001/02)

2.2.3.1 Macro prudential Analysis

IMF together with World Bank setup a program in 1999 to assess the financial system of member countries (IMF, 2001). The so-called Financial Sector Assessment program is voluntary in nature. Hilbers et al (2001) mentioned that "so far about 60 Countries have participated in the program, including many systematically important ones (such as Canada,

Germany, Japan, Korea, the United Kingdome), and 30 more have indicated their willingness to do so in the near future".

The program has two components: assessments of compliance with international standards and codes and a macro prudential analysis of soundness of financial system. For the latter component financial soundness indicators are developed. (Hilbers and et al, 2001)

Macro prudential surveillance is defined as monitoring of conjectural and structural trends in financial markets so as to give warning of the approach and potential impact of financial instability. (IMF, 2009)

Macro prudential analysis is the assessment and monitoring of the strength and vulnerabilities of financial system. This encompasses quantitative information from both FSI and Indicators that provide a broader picture of economic and financial circumstances, such as GDP growth and inflation, along with information on the institutional and regulatory framework – particularly through assessments of compliance with international financial sector standards and codes, and the outcome of stress tests (IMF, 2009)

Financial soundness indicators (FSIs) are indicators compiled to monitor the health and soundness of financial institutions and markets, and of their corporate and household counterparts. FSIs include both aggregated information on financial institutions and indicators that are representative of markets in which financial institutions operate. Macro prudential indicators include both FSIs and other indicators that support the assessment and monitoring of the strength and vulnerabilities of financial systems, notably macroeconomic indicators. (ibid)

As quoted by Daly and Akhter (2009) Sundararajan et al (2000) defined Financial Soundness indicators as: "Financial Soundness Indicators (FSIs) are indicators compiled to monitor the health and soundness of financial institutions and markets, and of their corporate and household counterparts". FSIs include both aggregated information on financial institutions and indicators that are representative of markets in which financial institutions operate. Macro prudential indicators include both FSIs and other indicators that support the assessment and monitoring of the strength and vulnerabilities of financial systems, notably macroeconomic indicators.

According to Chul (2006), debt accumulation and asset Price booms, innovation in financial markets, risk concentration and lower capital adequacy for banks are data required for analysing risks to financial stability. And they are derived from stylized patterns of actual crises.

As was mentioned above IMF took the initiative to compile banking sector indicators. V. Sundararajan, Charles Enoch, Armida San Jose, Paul Hilbers,Russell Krueger,Marina Moretti, and Graham Slack are the contributors for the occasional paper on Financial Soundness Indicators: Analytical Aspects and Country Practices(2009).The following are list of both core and encouraged sets

	Core sets
Deposit taking institutions	Regulatory capital to risk-weighted assets
	Regulatory tier -1 capital to risk-weighted assets
Capital adequacy	Non performing loans to total loans
	Non-performing loans net of provisions to capital
	Sectoral distribution of loans
	Large exposure of capital
Earnings and profitability	return on assets
	Return on equity
	Interest margin to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio)
Sensitivity to market risk	Duration of assets
	Duration of liabilities
	Net open position in foreign exchange to capital

Encouraged Set

Deposit-taking institutions

Capital to assets

Geographical distribution of loans to total loans.

Gross Asset position in financial derivatives to capital

Gross liability position in financial derivatives to capital.

Trading income to total income

Personnel expenses to non interest expenses.

Spread between reference lending and deposits rates

Spread between highest and lowest inter bank rate.

Customer deposits to total (non-inter bank) loans

Foreign currency denominated loans to total loans

Foreign currency denominated liabilities to total Liabilities.

	Net open position in equities to capital large
	Large exposure to capital.
Other financial corporations assets.	Assets to total financial system
	Assets to GDP.
Non financial corporate sector	Total debt to equity
	Return on equity
	Earnings to interest and principal expenses
	Net foreign exchange exposure to equity.
	Number of applications for protection from creditors.
Market liquidity	Average bid-ask spread in the securities market
	Average daily turnover ratio in the securities market.

Households	House holds debt to GDP
	Household debt service and principal payments to income.
Real estate markets	Real estate prices
	Residential real estate loans to total loans
	Commercial real estate loans to total loans

Most current analysis of FSIs is judgmental, in conjunction with other tools of financial assessment. (IMF, 2004)

The fallout this time (in America) was mentioned to be worse for three key reasons:

- Commercial real estate is a heavyweight sector
- Commercial real estate is closely tied to employment
- Collapse in the commercial real estate sector could wreck any improvements the

American banking sector has seen since 2007, 47 lenders have failed, of which one quarter had an exceptionally high exposure to commercial real estate loans. Until recently the U.S banking sector has been an economic "black-hole," whose unending appetite for capital left nothing for actual economic stimulus efforts. (Money map report, 2009).

As cited in the money map report "any bank that has sizable book of commercial real estate loans could have serious problems in 2009," Jamie peters, a bank analyst at Morningstar Inc.

2.2.3.2 A Probit logit approach

Hilbers, et al (2001) used a probity logit approach to explore the potential contribution of price movements in the property market to the observed financial sector distress. The function:

$t = \prod_{t=1}^{T} F(X_t'\beta)^{y_t} [1-F(X_t'\beta)]^{(1-y_t)}$ represents the likely hood function of T observations in a simple probit logit model.

The dependent variable in their paper is $y_{t,\ which}$ is a dummy variable measuring financial sector stress. There are four explanatory variables:

1. The real interest rate
2. M_2 multiplier (The ratio of M_2 to base money)
3. The residential property price index
4. Dummy variable measuring the down turn in the residential property market.

The study revealed that there is a close link between developments in the real estate sector and financial sector. This relation ship become apparent, when real estate prices are seen in relation to credit growth (Hilbers et al, 2001:13).

For the eleven samples country cases in their paper, there is a strong correlation between real estate price developments and credit growth. This

supports the notion that financial resource is one of the driving forces for continuous rise in price in this market. On the other hand falling real estate prices and rising vacancies are signals to banks to reduce lending. They also revealed that a high exposure of banks to a real estate sector was a significant cause for banking crisis for all of the sample countries. Therefore Price bubbles in the real estate sector and excessive credit expansion were among the causes for bank crisis.

Komulainen and Lukkarila (2003) studied the causes of financial crises in 31 emerging countries during 1980-2001.They estimated a probit model using 23 macroeconomic and financial sector variables. The result of this study shows that traditional variables such as unemployment and inflation, as well as several indicators of indebtedness such as private sector liabilities of banks explain currency crises well and it appears currency crises occur in tandem with banking crises. And in emerging market countries, the vulnerability to crises is exacerbated by situations involving large liabilities that permit sudden capital out flow and domestic financial sector.

Komulainen and Lukkarila (2003) used a panel regression model to their variables.Finaly they come up with the main reasons for financial crises in emerging markets. Given the indicators, the model estimates the probability of crises .The form of the estimated model was: Prob. $(Y_{it} = 1/X_t , \beta_t = F(X_t^{'} , \beta_t).$

Where X_t corresponds to the set of indicators and β_t a vector of unknown parameters. The observed variable Y_{it} receives a value of 0 or 1 depending on weather a crisis occurred or not. With a probit or logit model, the right hand side of the model is constrained between 0 and 1, and is compared to

the observed value Y_{it}. The probit model assumes thate the probability distribution (Y_{it} conditional on X_{it}) corresponds to normal distribution.

Since in a currency crisis situation a successful attack leads to sharp currency depreciation and substantial reserve losses, both the signal approach and limited dependent model traditionally define currency crisis as discrete event. One common technique is to construct an index of exchange market pressure as a weighted average of exchange rate changes and reserve changes (as well as interest rates in some cases). The crisis is said to occur when the index exceeds country specific threshold level.

We calculate an exchange market pressure index (EMP) for each country. The index includes exchange rate depreciation and loss of reserves, which are weighted to contribute equally. The exchange market pressure, takes the form.

$$EMP = \Delta e - (\delta_e / \delta_r) * \Delta r,$$

Where Δe denotes the change in exchange rate and Δr in international reserves, δ_e and δr denote the standard deviation of exchange rate alteration and reserves, respectively.We determine the values of the EMP index more than two standard deviation above the mean as crisis.

Since macro economic variables often worsen prior to the actual crisis, they define as crisis not only the crisis month but also the eleven-month before. In other words they use a one-year window for their variables.

Chapter Three

Overview of Real Estate Sector and Banking in Ethiopia

3.1 Historical Background

Most houses in Ethiopia are built of mud or mortar and have thatch or tin roofs. In rural areas, the traditional thatched hut is still the most common dwelling. As of the mid 1980s, over two third of all housing units were constructed of wood and mud, and only lesser number of them were built of wood and thatch. (Zerayehu and Kagnew, 2009). Housing shortages and overcrowding are still a major concerns. According to CSA report, it has estimated that 89% of the population is living in substandard housing.

In the past four decades government have attempted to alleviate the problems, but no one has comprehensive housing policy at federal and city level. Each of them has enacted urban and land management laws consistent with its respective economic policy objectives as well as institutional targets, indicating that there was inconsistent housing policy.

Since the onset of market oriented economy, the serving government allotted finance to construction expenditure, in general, accounted averagely 8.7% of the total economic service outlays in the period 1992 to 2004, relatively higher than the average record, 5% in the socialist regime with which the commercial banks are engaged in housing and construction loan balance of Br. 658.6 million in 1993 and Br.3,206.9 million in 2006, indicating the boom in construction sector, mainly due to increased investment by the private sector. (Zerayehu and Kagnew, 2009)

Recently housing development and finance become the joint responsibility of ministry of Housing and Urban Development, private investors and banks. Many private investors have engaged in housing investment at large. The government has also established the Ethiopian Housing Cooperative Agency to encourage the Diasporas. In effect, the growth rate and share of real estate development have been increasing, indicating booms in the real estate development.

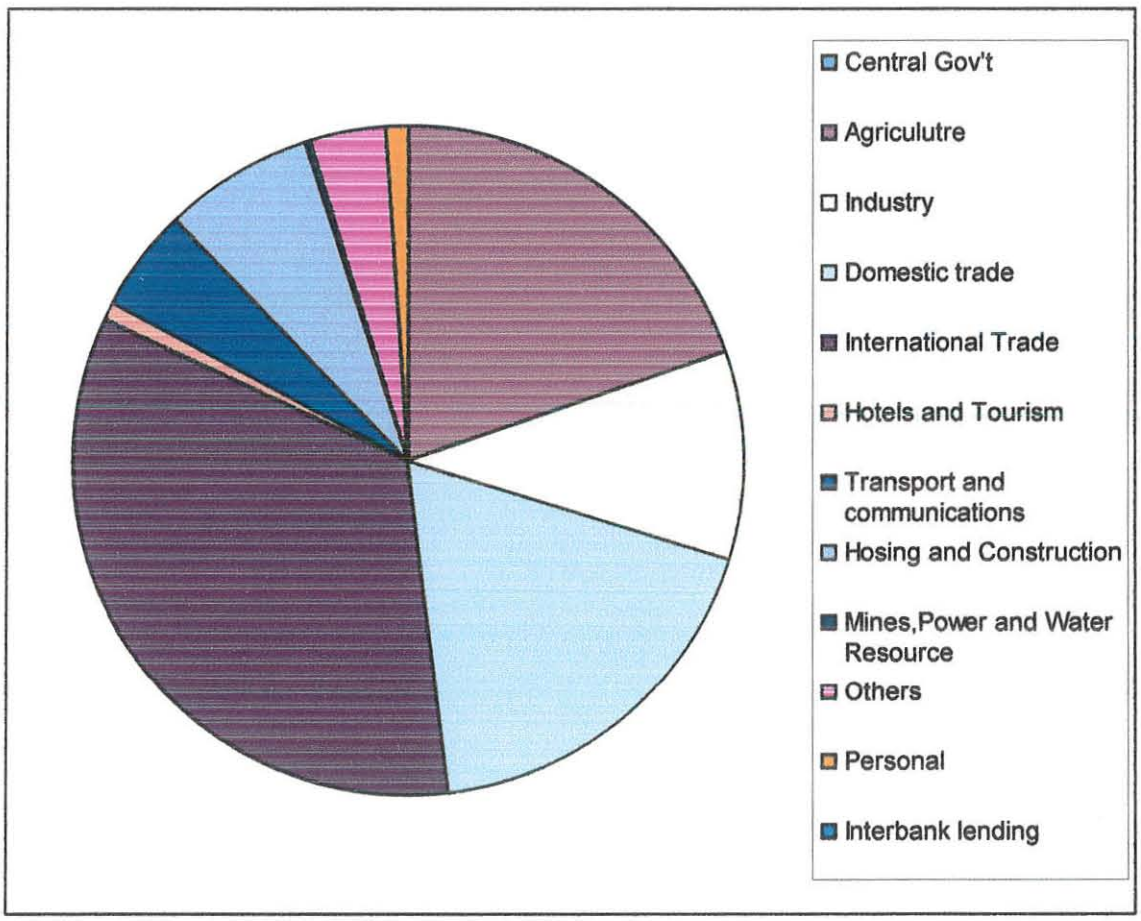
3.2. Construction sector

As we mentioned in the introduction part expansion of the construction sector is very visible in the country. Construction is an important component of the domestic gross capital formation. The share of construction Gross Value Production (GVP) in the gross domestic capital formation (GDCF), which was 59.6 percent in 1996/97, has increased to 74.2 percent in 2002/03, though it marginally declined in recent years to about 68.4 percent for the whole period. (EEA, 2006/07)

Road construction, real estate development and construction of condominium houses are major construction sub sectors. (EEA, 2006/07) Road construction is the major sub sector, which takes the lion's share on the construction industry. The share road sector expenditure in the total government construction expenditure was 49.5%, 44.5%, and 44.5% in 2003/04, 2004/05, and 2005/06 respectively. It accounts nearly half of the expenditure of government expenditure on construction. This was due to the high priority given to road construction in the country. (EEA, 2006/07)

Percentage Share of Loans by Economic Sector

Fig. 3.1



Source: drew based on data from National Bank of Ethiopia.

3.3. Real Estate Development

In this paper construction of condominium houses are included in real estate sector. There is very large investment in the real estate development. As of February 18, 2009, though the number of licensed

investors is very large, those that became operational are very low. Only 65 projects, i.e. 2.7 percent of the total licensed real estate developers were operational with a corresponding capital of Birr 1,783 million. There is also huge public investment on the residential housing. The country's five –year development plan know as Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) aims at reducing slum areas in the main towns by 50 percent through the construction of 400,000 new residential houses by 2009/10. As per the national integrated housing development program, the Ministry of Works and Urban Development and Urban Development and Regional Development Offices envisage to build of 396,000 condominium houses during 2006/07- 2009/10. (NBE. 2007/08)

In 2006/07 and 2007/08 more than 112,000 condominium houses were constructed. In 2007/08 alone, the number of planned blocks and housing units reached 3076, respectively. Out of the 3076 blocks 1,590 were under construction in 59 regional towns including Addis Ababa and Dire Dawa. (NBE. 2007/08)

Loans disbursed by banks for housing and construction purpose reached Birr 195.2millionin 2007/08 in contrast to just Birr 16.2 million last year. These loans accounted for 11.2 percent of the total loan disbursed by the banks during 2007/08. (NBE, 2007/08).

Loans as of 2007/08

Table 3.1

Construction Sector	**Loans in Millions of Birr**	**Percentage Share**
Housing and Construction	2,017.0	56
Hotels and Tourism	243.6	6.8
Transport and communications	1,337	37.2
Total	3,598.30	100

Source: National Bank of Ethiopia

Hosing construction, construction of hotels and telecommunications construction are all under the construction industry but data for this construction sub sectors is compiled separately. Half of the loan goes to the construction sector goes to housing and construction.

Number of Private Projects Approved in the Real Estate Sector

Table 3.2

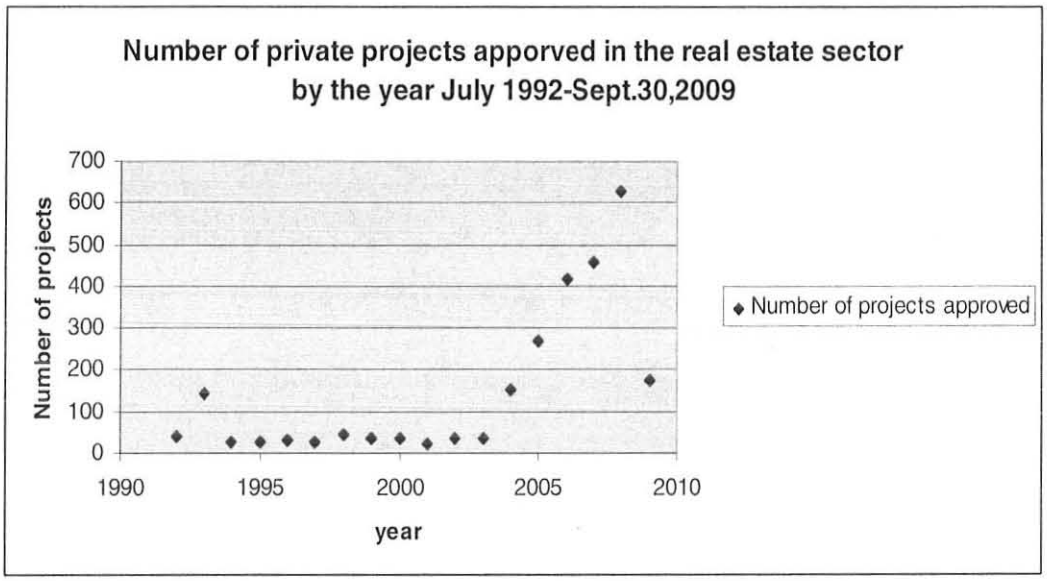
year	Number of Projects	year	Number of Projects
1992	41	2001	23
1993	144	2002	34
1994	29	2003	38
1995	25	2004	154
1996	33	2005	267
1997	27	2006	418
1998	45	2007	457
1999	35	2008	626
2000	35	2009	174

Source: Ethiopian Investment Agency

As can be seen form table--- the participation of private sector improved slowly form 1992 to 2003. From 2003 to 2004 there is a jump from38 to 154. The reason might be the decision of banks to surge huge supply of credit to the sector. According to Ethiopian

Investment Agency (EIA), if we don't include construction of condominium hoses currently almost all of the projects in the sector are privately owned

Fig.3.2



Source: drew based on data from National Bank of Ethiopia

Construction, hotel and restaurant, real estate: renting and business activities and transport, storage and communication together generated 2254 and 5476 permanent and temporary Jobs respectively which are 32.5 percent and 47.5percent out of total permanent and temporary employment created in the country. (NBE, 2007/08) 33.8 percent of the permanent and 60.9 percent of the temporary jobs are created by the real estate development, renting and business activity.

Number and Capital of Investment projects Approved by the Real Estate sector (Capital in Millions of Birr)

Table-3.3

Particulars	Fiscal year as at June 30						
	2001	2002	2003	2004	2005	2006	2007
Total Investment							
No. of project	679	801	1,217	2,225	2,872	5,859	6,471
Investment Capital	8,523	9,190	13,438	21,220	36,467	80,036	96,540
Real estate							
No. of project	24	23	45	100	167	2345	2568
Investment Capital	1,209	114	365	947	4,126	10,633	24,517
Growth in real estate capital	-91%	221%	160%	335%	158%	130%	130%
Share of real estate capital	14%	1%	3%	4%	11%	13%	25%

Source: Ethiopian Investment Agency, quoted in NBE Annual Report

3.3.1 Real Estate Investment

3.3.1.1. Public Sector Investment:

During the Derg regime, the public sector, as in other economic sectors was dominant in real estate investment too. The government had direct involvement in the supply side and created the cooperative housing delivery system on subsidy basis. Since 1991, in the current regime, the public sector's investment is somehow stagnant or declining except for few low cost housing projects undertaken by regional states. Since 2006, the government has given focus on building condominium housing projects for the benefit of low and moderate-income group households. Condominium houses have been constructed with total cost of Birr 1.3 billion in seven towns across the country, including the capital city.

The Ministry of Work and Urban Development has planned for budget year 2007 to construct 400,000 houses in 30 towns with a budget of Birr 24 billion, intended for medium and low-income earners. As per the Ethiopian economic association report (2006/07), Addis Ababa city administration had planned to build a total of 150,000 houses which is 50,000 condominium housing units per year starting from 2004/05. But only 12,000 housing units (8%) were build and transferred to urban dwellers. Some of the factors for this discouraging performance were escalating construction materials prices and ambitious plan disregarding the reality on the ground in terms of availability of raw material, production capacity of domestic industry and skilled manpower availability. (EEA, 2006/07) According to the Addis Ababa housing project office, in 2006/07 Addis Ababa city administration has planned to build 33,000 new houses in addition to the completion of the 32,000 homes whose building began in the preceding fiscal year (2005/06).

3.3.1.2 Private Sector Investment

The current government has returned houses, those being nationalized, to their former owners'. Following the adoption of market –led economic policy, the participation of the private sector in the economy, including that of the real estate development, has been immensely increased from year to year. These institutions [3] generate significant income from building rent.

3.3.1.3 Foreign Investment

According to the Ethiopian Investment Agency's report (EIA), in 2007/08, real estate investment projects owned by foreigners worth of over Birr 22 billion were registered, while investment projects owned by domestic investors amounted to Birr 30 billion. Of which 6 projects worth Birr 0.4 billion are operational. For the period of 1992-2008, the total number of real estate developers licensed by EIA reached 2,438 with a total capital of Birr 52.5 billion, of which, 92.7% is under pre-implementation, indicating that how far it is behind the country's expectation and there would have many obstacles and inherent problems that bogged down the real development. Only 2.7% is operational the rest is under implementation period.

[3] Some of the real estate developers are Ayat Rreal Estate, Ropack International, Gift Real Estate, Zenebwork Real Estate and Ethiopian Red Cross Society Patriots Association, Women's Affairs Office, Confederation of Trade Union, and Ethiopian Orthodox Church.

3.3.2. Current Situation of the Real Estate Sector

Status of Real Estate Projects (1992-2007) – Licensed Projects in Billions of Ethiopian Birr

Table-3.4

Domestic and foreign	1992-2007			July 1992 - February 18,2009		
	Licensed projects	Percentage share	No. of projects	Licensed projects	Percentage share	No. of projects
Operational	1.7	5.38%	80	1.8	3.4	65
Implementation	2.3	7%	112	2.3	4.4	111
Pre-implementation	27.9	87.66%	1400	48.3	92.2	2262
Total	31.9	100%	1,592	52.4	100	2,438

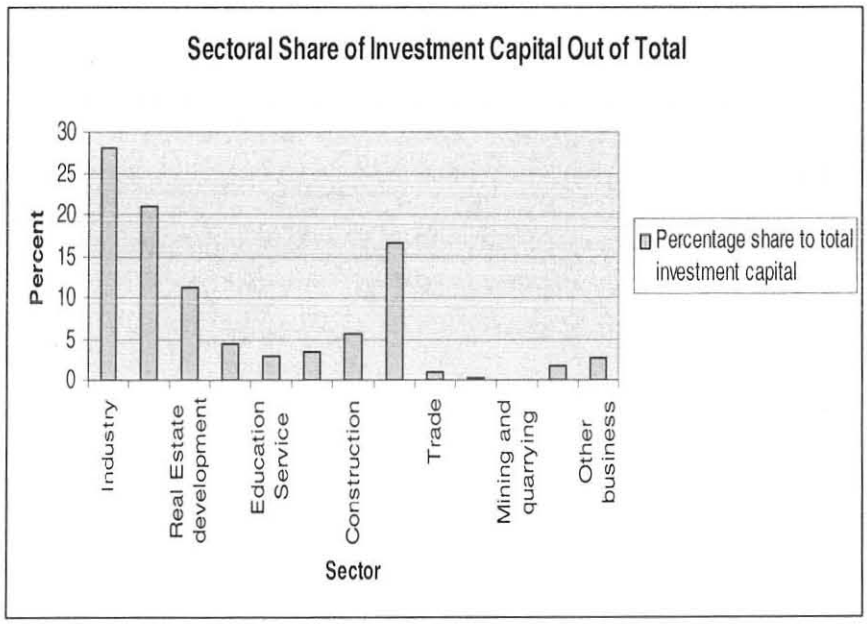
Source: Ethiopian Investment Agency

The number of projects being registered in the real estate sector is increasing each time. As can be seen from Table 3.3 with in one year 846 investors registered. But only few projects are operational. For instance during 1992-2007 only projects worth Birr 1.7 billion are operational among 1,592 projects worth Birr31 billion. This implies that there are some obstacles to implement the project. Though we can't support it with data there investors who fulfil the formalities to register, but the

implementation of the project will depend on the loan that will get from banks. Generally it is because all registered investors don't have the capacity to invest.

Sectoral Share of Investment Capital

Fig-3.3



Source: Drew based on data from National Bank of Ethiopia

The figure shows that investment capital going to construction sector is significant. It takes the fifth rank according to investment capital absorbed by sectors.

3.3.2.1. The Public Real Estate Sector:

Housing loan and the poor

The ministry of Housing and Urban Development has designed various policies and facilities. Many private investors have engaged in housing investment at large. In addition government paid due emphasis on public housing investment in particular condominium buildings to address the poorest part of the society. As cited in Zerayehu and Kagnew (2009) according to the report by ministry of work and urban development, an agreement has been reached between regional governments and the commercial bank of Ethiopia, to invest Br.9.3 billion for building condominium houses.

Real estate development requires huge financial capacity and liquid assets to contain the inherent maturity mismatch between assets and liability. Otherwise, it turns out the inherent problem to the liquidity problems depending on the amount and the pace of loan disbursement. This indicates that it is not easy task to enable the population house owners.

There are at least three major reasons that disable loan accesses to the poor. The absence of good collateral, informality and instability of income, and lack o f information on the borrowers. In this regard, long maturity of bank loans leads to vary in high risk potentially when a sizable portion is tied up in the long-term portfolio. The risk of default is closely linked to the fact that housing loans are relatively large sums in comparison to the income of the borrower. Commercial banks have traditionally shunned mortgage lending due to liquidity and interest rate risks. Large portion of loan able fund is tied up for the long term; the lending institutions might face liquidity problems aggravated by the

assets- liability mismatch. Much of the risks are also emanated from the characteristics of land and real estate as well as the level of development of the economy as depicted bellow.

- Due to their fixed location nature, real estate developers and lenders would expose to have various risks when the government unexpectedly changes land-use regulations, property right policies, and city standards.
- Because of heterogeneity nature of land and real estate that may bring asymmetric information; there is no clear market price as it is rigid supply.
- Due to the required amount of huge capital and mismanagement real estate development will lead to financial turmoil.
- Because of its backward and forward linkages with the product and service markets, any distortion in the land and housing markets may entail ripple effects in economy.
- Fluctuations in land and real estate prices also disturb the borrowers' affordability, the banks' profitability, the macroeconomic stability and borrowers' effective demand.
- As a result of the construction lags, it distorts the feasibility study which the lending institutions undertake to grant loans, and entails additional cost escalation through time.
- Where there is more favourable macroeconomic growth and stability, the absorptive capacity of the economy is enhanced. If not, the household's borrowing and repaying capacities will be put in trouble

3.4. Financial Institutions

3.4.1. Historical Background

Before 1974, there were two financial institutions namely, the savings and Mortgage Corporation of Ethiopia (SMCE) and the Imperial Savings and Home Ownership Public Association (ISHOPA) that were engaged in housing development finance .The Institutions were operating in Addis Ababa and Asmara Only. However, the accessibility of these institutions for credit was mainly open to the middle and upper income groups. (CBB's company profile)

Subsequent to the urban Land and Extra Houses Proclamation, the Housing and Savings Bank (HSB) was established under proclamation No. 60/1975 by the merger of the two financial institutions mentioned above and with redefined objectives. (CBB's company profile)

The main reason for the establishment of Housing and Savings Bank was the need to encourage and further accelerate the rate of housing construction for the improvement of the living standards and conditions of Ethiopians. HSB went on fulfilling its objectives until the introduction of free market economy. HSB was given a broader responsibility to undertake other commercial, foreign, and local banking services and, thus, re-established under proclamation No. 203/94 with this broader mission to the society and was renamed as Construction and Business Bank(CBB) since September 22,1987.

One of the main purpose for which the bank is established is: to provide loans for the construction, repair, modification and acquisition of dwelling houses and buildings, for construction sector activities, and for the development of Hotels and tourism. Off course it grants loans for business

and personal needs (Consumer loans). But the largest sum (more than half) goes to Buildings and construction sector. This sector consist residential housing construction and business construction. (CBB's company profile)

3.4.2. Exposure of Banks to the Real Estate Sector

For bank values to be significantly related to real estate market, two conditions are necessary: (1) Banks must hold significant amounts of real estate (2) The real estate holdings must be significantly influenced by general changes in the market value of the real estate. The first condition can be verified by review of bank annual reports. (Allen et al, 1995)

The Share of loan granted to Housing and construction sector Out of total loan disbursed by each bank

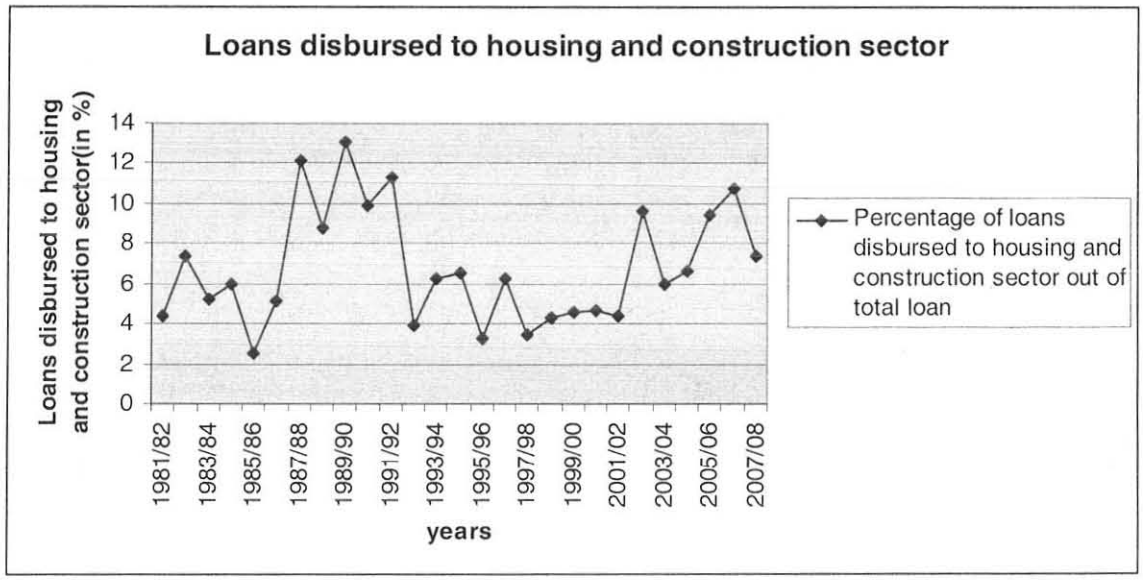
Table -3.5

Banks	**Loans granted to housing and construction sector (in %)**		
	2005/2006	**2006/2007**	**2007/2008**
Construction and Business Bank (CBB)	81.44	79.04	83.43
Commercial Bank of Ethiopia(CBE)	1.06	5.48	4.62
Development Bank of Ethiopia(DBE)	0.33	0.09	0.1

Source: Computed based on data from National Bank

As can be seen from the Table-3.3 Construction Business Bank of Ethiopia is highly exposed to this sector as compared to Commercial and Development Bank of Ethiopia. Commercial and Development Bank of Ethiopia take the second and third rank.

Fig-3.4



Source: Computed based on data from National Bank

The share of each bank in the total loan disbursed to housing and construction sector by banks

Table -3.6

Banks	**Share of the bank out of total loan granted for housing and construction sector (in %)**		
	2005/2006	**2006/2007**	**2007/2008**
Construction and Business Bank (CBB)	**30.04**	**16.54**	**9.67**
Commercial Bank of Ethiopia(CBE)	**3.73**	**17.11**	**33.09**
Development Bank of Ethiopia(DBE)	**0.16**	**0.04**	**0.04**

Source: Computed based on data from National Bank

Compared to total loan granted by commercial bank of Ethiopia to different sectors, the loan to housing and construction sector is very small. But this doesn't mean that the bank has smaller contribution to housing and construction sector. It is rather CBE grants huge amount of loan for different sectors. This is revealed in the above table (Table-3.4). During the year 2005/2006, out of Birr 1,167 million, 30% of the loan to housing and construction sector was supplied by construction and business bank. While only 3.73% came from commercial bank of Ethiopia. In 2006/2007

both banks have almost equal share in the total loan of Birr 1,674.9 million disbursed to housing and construction sector. But in 2007/2008 out of total of Birr 2,017 million 33.1% came from commercial bank of Ethiopia and only 9.6% from construction bank of Ethiopia. Development bank of Ethiopia grants insignificant amount to housing and construction sector. But its grant was higher in 1980's. Currently the development bank of Ethiopia is almost ceasing granting loan to housing and construction sector. It has only collections from this sector for the previously supplied loans. For example, during the years 2004, 2005, 2006, 2007, and 2008 the bank had disbursement only in one month while it has collection in all months. (Refer appendix I)

CHAPTER FOUR

The probability of Banking Crisis in Ethiopia

As it was discussed in the literature review part, price bubble and significant credit expansion are among the common original causes for most banking crises. And there are also other indicators raised for developing countries case. Namely, real exchange rate, stock prices, the (M2) money multiplier, real out put, exports and real interest rate. The trend of those indicator variables and the implication thereof will be discussed in this part of the paper.

4.1 Real Estate Price

Since there is no separate index for real estate price, in this paper house rent index is taken as a proxy for real estate price. The old weight of house rent in the country level price index was 15.44%. Currently it is 20.56%. It includes construction materials, water, and fuel and power. This index is a highly significant one in the consumers' price index. Next to food and non food index, house rent takes the largest share in the price index. So it can be said that movement in the price of construction materials contributes significantly to movement in the general price level.

House rent index

Table-4.1

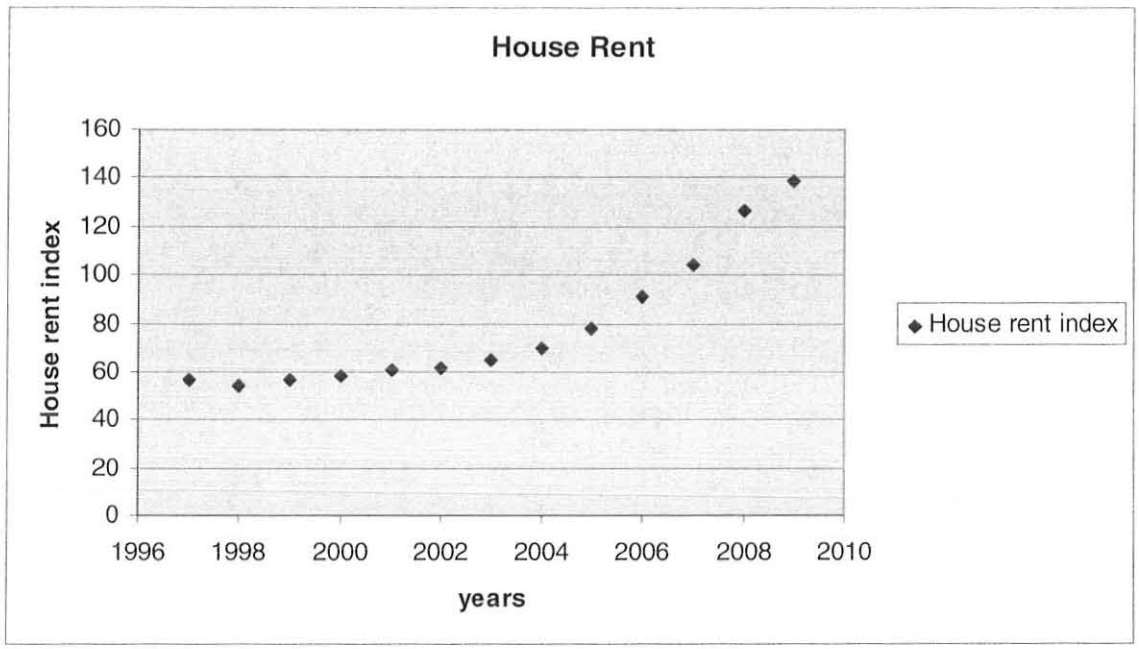
Years	Average	Percentage change
1997-2000	56.13	
2000-2003	61.13	9.23
2003-2006	74.3	21.54
2006-2009	115.1	55

Source: Computed Based on data from National Bank of Ethiopia.

The average for the year 1997-2007 was 56.13. It increased by 9.23 percent and reached 61.13 during the year 2000-2003.During the year 2003-2006, it increased by 21.54 percent. From1997 to 2009 there is no time where the index was declining, except a small decline from 1997 to 1998. But it started to shoot up significantly only after the year 2004.

The maximum was registered in June 2009.Which was 133.2.But average for the years 2006-2009 is 115.1.It showed a 55 percent increment. Fig.-1 supports this fact.

Fig-4.1



Source: National Bank of Ethiopia

4.2 Credit Supply to Housing and Construction Sector

According to NBE, broad money supply reached birr 40.2 billion in 2004/05, indicating 19.6% growth rate over the preceding year. This was attributed to 29.5 percent and 6.7 percent growth rate in domestic credit and net foreign assets respectively. As end of the year 2006/07, broad money supply reached Birr 61.8 billion, indicating a growth rate of 22.2 percent compared with the same period of last year. Both domestic credit and net foreign asset showed a growth rate of 25.5 percent and 10.2 percent respectively. Of the components of credit, credit to the central government increased by 20 percent and reached Birr 30.3 billion as end of June, 2007. Similarly, credit to the non government sector rose by 31.1

percent and reached 31.5 billion from Birr 24.0 billion a year ago, largely reflecting the policy of the government to encourage private investment.

4.3 Domestic Credit

Table 4.2

Particulars	Year ended June 30						
	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Domestic Credit(in millions of Birr)	28,202.3	31,138.8	40,305.8	49,296	61,844.2	79,969.3	89,555.33
Percentage change	2.4%	10.4%	29.4%	22.3%	25.5%	29.3%	12%

Source: National Bank of Ethiopia

As can be seen from Table 4.2, domestic credit was increasing from 2002/03 to 2007/ 08. As of end of July 2009 domestic credit reached Birr 90,912.5 million. Before 2004/05 the growth rate was low. It increased very significantly during the year 2004/05. As discussed above (in the hose rent section) house rent index showed significant increase after the year 2004/05. This supports the notion that financial resource is one of the driving forces for continuous rise in price in the real estate market.

Business Bank of Ethiopia, currently the vacancy rate for commercial buildings is increasing. Some of the real estate developers already started accumulating arrears. Banks have surveyed the real estate market (Market for both commercial and residential buildings). For example Commercial Bank of Ethiopia surveyed the market at different places of Addis Ababa by randomly checking different buildings so that to know their rent. The survey warned them that the market is not as attractive as it was before. That is why developers are failing to repay their loan as per the previous rate and are.

Most of residential real estate developers target the upper income group and the Diaspora, because they are very expensive (EEA, 2006/2007). But this group takes a very small proportion of the entire population. In the view of the large expansion in this expensive residential real estate it can easily be predicted that the demand might saturate in the near future (EEA, 2006/07). And this will obviously create loan repayment problem. Banks have already started to suffer from accumulation of arrears from loans granted to real estate developers. But they don't want to disclose the exact numbers. They say it is confidential either for the bank or the real estate developer.

Commercial Bank of Ethiopia takes a significant share out of total loan granted for housing and construction sector. But the share of loan disbursed to this sector is very low compared to total disbursement by the bank for all sector. And the loan is collateral base. I had had some discussion with representative from the portfolio management department (Head office) and research and development department. As to the information I got from them, there is no extreme situation regarding the

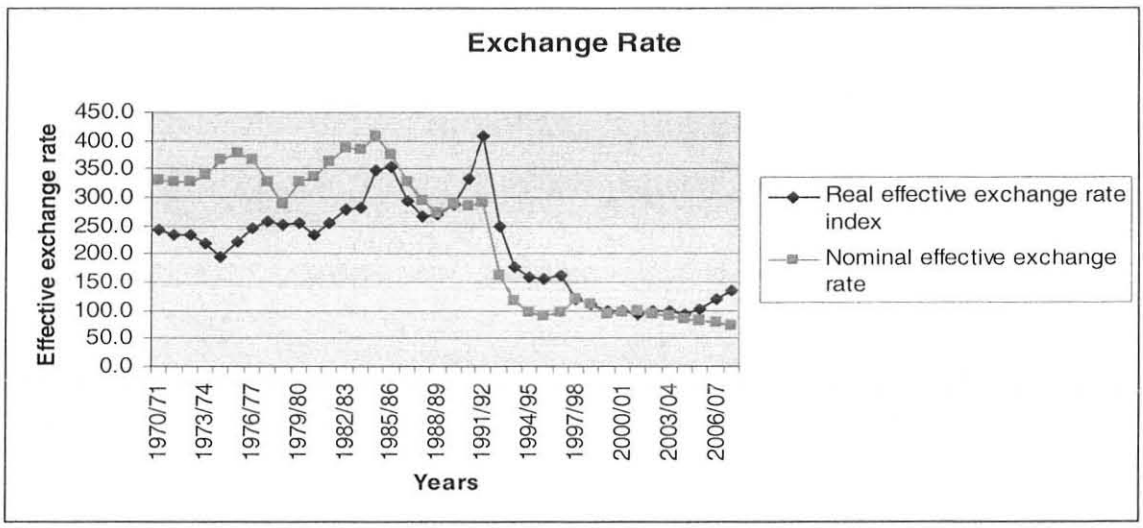
real estate business that will worry the bank. Since the bank's lending is collateral based. Even if the extreme case happens, and for instance if developers fail to come up with any repayment the bank can have the collateral at hand. Also the share of loan disbursed to housing and construction sector is very small out of the total disbursement by commercial Bank. (Table-3.3)

4.4 Banking Crisis Indicators

4.4.1 Real Exchange Rate

National Bank of Ethiopia publishes only quarterly and yearly data for real effective exchange rate. When we look at the yearly data, real effective exchange rate was appreciating constantly during 1991/92 to 2004/05. It can be seen from fig. - 4.3 that it started to increase after the year 2004/05

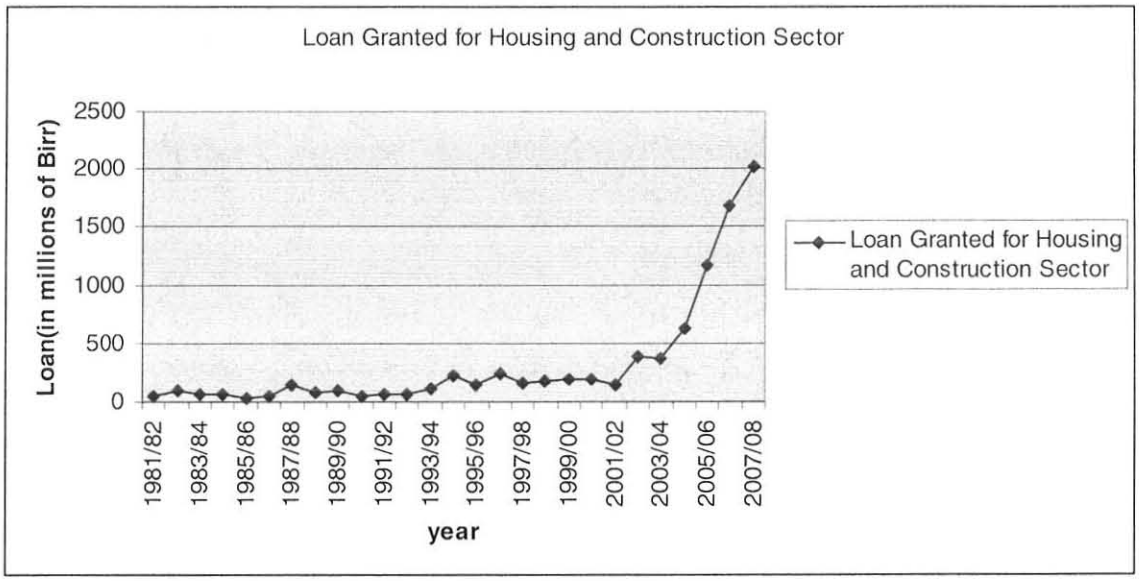
Fig-4.3



Source: National Bank of Ethiopia

Loan disbursement for housing and construction sector shows the same trend. As the steeper part of the graph (fig-4.2) implies that there is change in all years but not like the years after 2003/04. After the year 2003/04 it increased at an alarming rate. From the year 2003/04 to 2004/05 it increased by 68.2 percent and reached Birr 626.454 millions. From 2004/05 to 2005/06 it increased by 86.3 percent and reached Birr 1166.954 millions. Also its hare out of total loans disbursed was increasing from 2003/04 to 2005/06.But from 2006/07 to 2007/08 it decreased. Because of banks decision to cease their credit supply to the real estate sector. Commercial bank can be sited as an example;

Fig-4.2



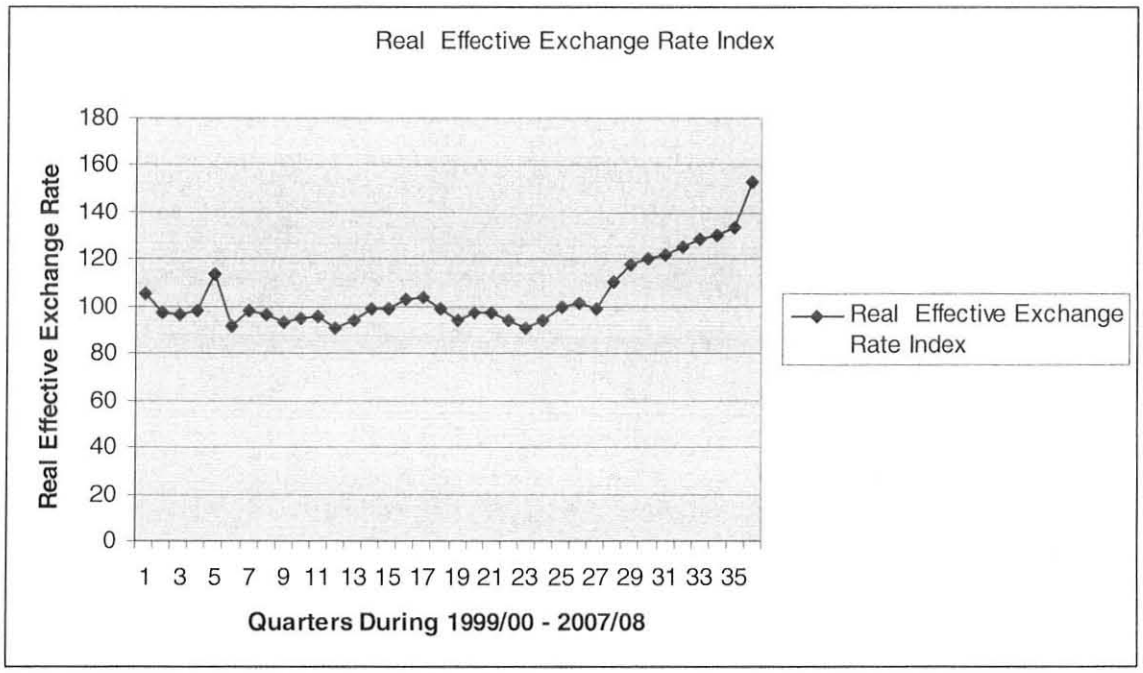
Source: National Bank of Ethiopia

Though I failed to support it with strong data, as I understood from my discussion with representatives from Commercial and Construction and

When we look at quarterly data during 1999/00 – 2007/08, it started depreciating starting from quarter two of year 2004/05. Figure 4.4 show that there are ups and downs in the movement of real effective exchange rate. But there is not time that it stayed depreciating. This is true only until 2004/05. After 2004/05 that real effective exchange rate kept on increasing.

Real Effective Exchange Rate during the Year 1999/00-2007/08

Fig 4.4



Source: Drew based on quarterly data from National Bank of Ethiopia

4.4.2 Broad Money Multiplier (M2)

Table-4.3

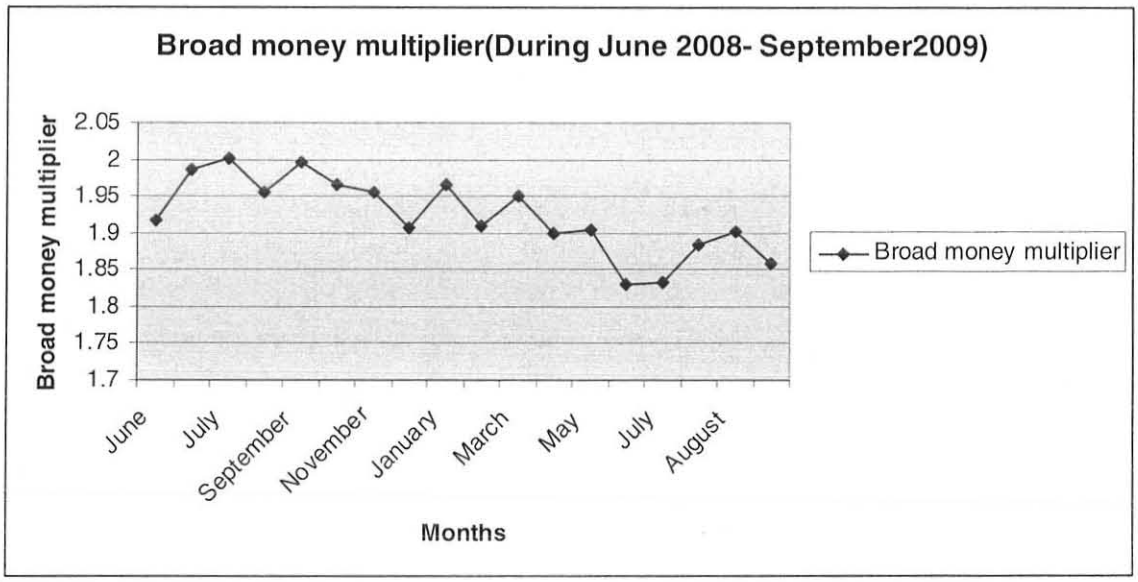
	2002/03	2003/04	2004/05	2005/06	2006/07
Narrow money to reserve money ratio	1.4	1.3	0.9	1.1	1.1
Broad money to reserve ratio	2.6	2.5	1.7	2.2	2.1

Source: National Bank of Ethiopia

The ratio of broad money (M2) to international reserves or broad money multiplier was declining from 2002/03 to 2004/05. As indicated in table 4.3 from the year 2002/03 to 2006/07 the lowest was registered in 2004/05. As it was discussed in the literature review (page 20) it is the high ratio of broad money multiplier that will give warning for banking crisis together with other indictors. It can't be said that the M2 multiplier was very high. For instance the near past from the table was 2006/07. The M2 multiplier during this year, 2.1, is not very high compared to the previous values.

Figure 4.5 is drawn based on monthly data, from June 2008- September 2009. It shows that the broad money multiplier has got a declining trend.

Fig4.5

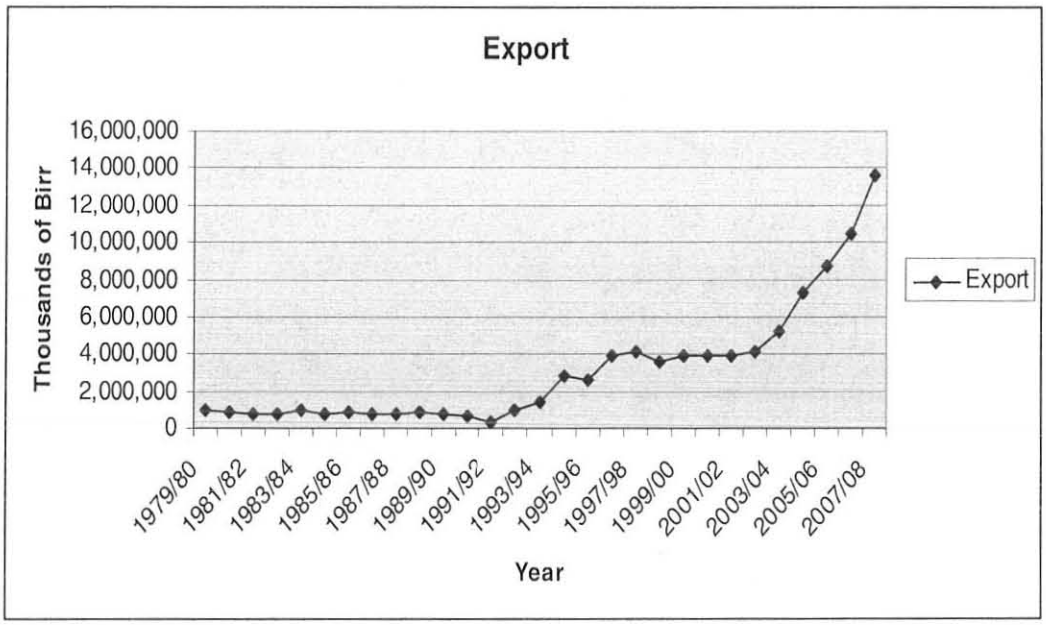


Source: Drew based on monthly data from National Bank of Ethiopia.

4.4.3 Export

Export showed an increasing trend after the year 1993/04, except slight decline in 1995/96 and 1998/99. It didn't showed significant change with in the year 1998/99 and 2002/03. The growth of export has slowed down during 2005/06 (EEA, 2006/07). Total export grew by 18.5 compared to 36% and 41.62% and 24.5% during the 2004/05 and2005/06 respectively.

Fig-4.6

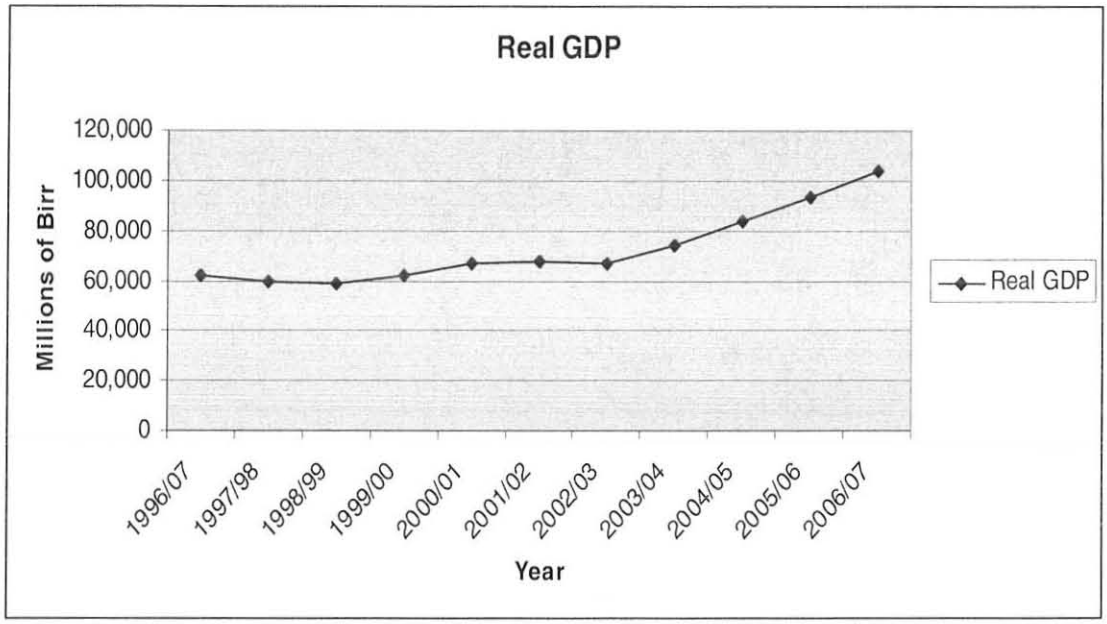


Source: National Bank of Ethiopia.

4.4.4 GDP and Deficit Including Grant Relative to Investment

It is decline in out put and high level of deficit relative to investment that implies or indicates probability of banking crises together with the other indicators.

Fig. -4.7

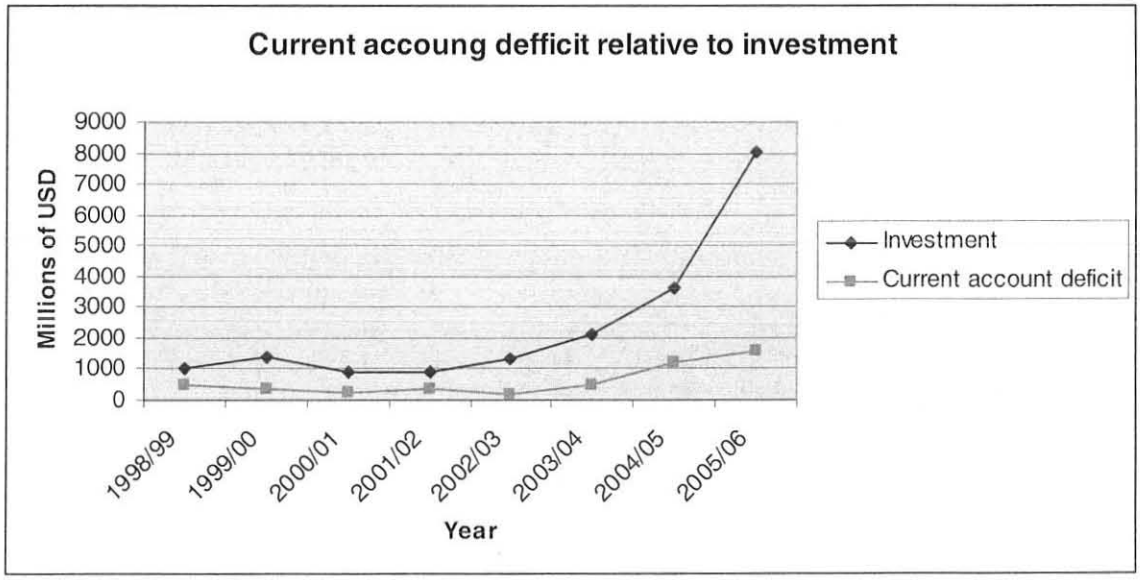


There is no time where out put declined and persisted there. As shown in fig.-4.5 investment is well above current account deficit. There is a great variation in the level of current account deficit and investment, especially after year 2002/03.

Some of the variables, which are identified as the best indicator of banking crisis, were discussed in this chapter. Kaminisky et al (2000) found that banking and currency crises in developing countries don not typically arrive with out any warning. There is period where some kind of behaviour persistently occurs. For banking crisis those behaviours are appreciation of real exchange rate, a decline in stock prices, a rise in the

(M2) money multiplier, a decline in real out put, a fall in exports, and a rise in real interest rate. And those are monthly indicators. While large current account deficit relative to investment is annual indicators.

Fig.-4.6



Source: Drew based on data from National Bank of Ethiopia

For our case there is no variable, which showed those behaviours persistently, except, real effective exchange rate. Implying that probability of banking crisis is very low in Ethiopia at least in the near future. But the large credit expansion in and the bubble in real estate price needs serious attention. Because this two are among the causes for banking crises.

CHAPTER FIVE

Conclusion and Recommendation

5.1 Conclusion

This paper tried to give over view of the real estate sector in Ethiopia, discussed finance in the sector and healthiness of banks in relation to it. Real estate sector is a sector where significant share of capital investment goes to. The share of real estate capital in total capital was 11%, 13% and 25% during the year 2005, 2006, and 2007 respectively

There is positive relationship between credit growth and real estate price. Real estate price started to increase at an increasing rate in the same year (2004/05) where credit growth showed a very significant change. Supporting the notion that financial resources is one of the driving forces for continuous rise in price of real estate market .The contribution of this paper in studies of real estate development in Ethiopia is , this paper gives highlight of the finance in real estate sector, banks exposure to the sector. Though the banking crisis indicators imply low probability banking crisis in relation to real estate, there is a red light from the expansion in credit and continuous developments of real estate prices.

The banking crisis indicators discussed are, appreciation of real exchange rate, a rise in the M_2 money multiplier, a decline in real output, and a fall in exports. Real exchange rate was appreciating constantly from 1991/92 to2004/05.Aftere 2004/05 it started to depreciate slowly. The M_2 money multiplier was declining from 2002/03 to 2004/05. After that it didn't

move up as compared to previous years. There is no period where out put declined and stayed long there. And there was great variation in the level of current account deficit and investment. Investment was well above current account deficit especially after the year 2002/03.

5.2 Recommendations

- Expansions in real estate developments are very visible in Ethiopia. But the real estate market is at its infant stage. The real estate market is very fragile and scattered. For instance if one needs to get data on real estate price, there is nowhere price is followed up and registered centrally. Organized way of market should be initiated in the near future. This will ease data compilation, sectoral performance assessment, studying the linkage of the sector with other sectors and following up the working of the market.
- There is a big data problem in the real estate sector. Even the available data's are not compiled in a standard way. So data's should be compiled in a standard way for the real estate.

Reference:

Akinwunmi, Adeboye, Gameson,Rod,Hammond,Felix and Olomolaiye, Paul (2008), **<The Effect of Macroeconomic Policies on Project Finance (Housing) in Emerging Economies>,** First International Conference in Developing Countries, ICCIDC-I, pp. 22-32

Altman, M. and Mayer M. J. (2003). Sector Strategies for Employment **Creation,Construction, Social Services and Food,** Employment and Economic Policy Research Unit. Human Sciences Research Council.

Bruce M., Harwood and Charles J., Jacobus, D.R.E.I. (1993). **Real Estate Principles.** Six Editions. Regents/Prentice Hall, Englewood Cliffs, New Jersey 07632.

Buchanan, Mark(2008). **"Why Economic Theory is Out of Whack".** New Scientist. Retrieved 15 December 2008.

CSIR (2001). **Agenda 21 for Sustainable Construction in Developing Countries**. First Discussion Document: Version 2.

E. Philip, Davis (2004). **Macro prudential Analysis and Financial Soundness Indicators.** Western London: Brunel University.

Ethiopian Economic Association (2006/07). **Report on the Ethiopian Economy**,

Ethiopian Investment Agency (2007). **Annual Report.**

Fernando, Ferreira, Joseph, Gyourko, Joseph, Tracy (2008).**Housing Busts and Household Mobility.** National Bureau of Economic Research (NBER), Working Paper serious, 1050 Massachusetts Avenue. Cambridge, MA02138.

Graciela L, kaminisky, Morris, Goldstein and Carmen, M.Reinhart (2000). **Assessing Financial Vulnerability: An Early Warning System for Emerging Markets.** Institute for International Economics

IMF (2000). **Macro Prudential Indicators of Financial System Soundness.**

IMF (2009). **Financial Soundness Indicators.** Occasional Paper (4/23/2009).

Investor Glossary. **www.dogsofthedow.com.**

Jack Cummings (1996). **Real Estate Finance and Investment Manual.** Prentice Hall

James Kolari and Seppo pynnonen (1990), **<Event study Methodology: Correction in Standard Abnormal Return Tests>.**

Jan P.A., Jacobs, Gerard H., Kuper, and Lestano (2007). **Currency Crises in Asia: A Multivariate Logit approach.** Department of Economics, University of Groningen.

Kami S.p. Rwegasira (1991). **Financial analysis and institutional Lending operations Management in a Developing Country: A Critical Perspective of Tanzania Banks and DFIs**

Kavita Datta and Gareth A. Jones (1998). **Housing and Finance in Developing Countries.** Routledge Studies in Development and Society.

Krugman Poul (1998), **<What Happened to Asia>** , URL: http://webt.mit.edu.

Levine, Sheen S., Zajac, Edward J. (2007.). **The Instructional Nature of Price Bubbles**

Lu You-Jie and Paul W. Fox (2001). **The Construction Sector in China: It's Image, Employment Prospects and Skill Requirements.** Sectoral Activities Programme Working paper(180).Geneva: International Labor Office.

Marcus T., Jeff, Madura and Kenneth J., Wiat (1995) < **Commercial Bank Exposure and Sensitivity to the Real Estate Market** >. The Journal of Real Estate Research. Vol. 10, No. 2: 129-140

Maurice A., Unger and George R., Karvel (1979). **Real Estate Principles and Practices.** Six Editions. South-Western Publishing Co.

Michael, Pomerleano (1999) <Critical Financial Sector Professions Required in The Aftermath of an Asset Bubble>. World Bank.

Money Morning / The Money Map Report (Thursday, 02 April 2009)

National Bank of Ethiopia (2006/07). **Annual Report.**

National Bank of Ethiopia (2007/08). **Annual Report.**

Park Yung Chul (2006). **A Macro Prudential Approach to Financial Supervision and Regulation: conceptual and operational Issues**. IMF

Paul, Hilbers, Qin, Lei and Lisbeth, Zacho (2001), **<Real Estate Market Development and Financial Sector Soundness>** Working Paper, W.P/01/129).

Raufdeen, Rameezdeen, Nisa, Zainudeen and Thanuja, Ramachandra (2003). **Study of Linkages between Construction Sector and Other Sectors of the Sri Lankan Economy.** Department of Building Economics, University of Moratuwa, Sri Lanka.

Raza, Ali Khan (2008). **Role of Construction Sector in Economic Growth: Empirical Evidence from Pakistan Economy**. First International Conference on Construction in Developing Countries (ICCIDC - I).

Rijkers B., Laderchi C. R., Teal F. (2008). **Who Benefit from Promoting Small and Medium Scale Enterprises? : Some Empirical Evidence from Ethiopia**. Policy Research Working Paper, WPS4629 **The Current State of the Construction Industry**. Volume VI.

Robert O.Edimister (Ph.D.) (1980). **Financial Institutions. Markets and Management.** University of Maryland: McGraw-Hill Book Company.

Tuomes, Komulainen and Johanna, Lukkarila (2003). **What Drives Financial Crises In Emerging Markets?** Bank of Finland, and University of Helsinki. US Embassy ,2009, the construction sector in Ethiopia. Ethiopian busyness development service network. URL: www.bdsethiopia.net.

Wikipedia, the free encyclopedia.**http://en.wikepedia.org**

Zerayehu, Sime and Kagnew, Wolde (2009). Unpublished work on **"Challenges and prospects of Real Estate Financing in Addis Ababa"**

Loan Disbursed by Development Bank of Ethiopia for Housing and Construction Sector

Appendix I

'000 of Birr

Year	2004			2005			2006			2007			2008		
Month	App Roval	Disbur sement	Colle ction	App roval	Disbur sement	Colle ction	App roval	Disbur Sement	Colle ction	App roval	Disbur sement	Colle ction	App roval	Disbur sement	Colle ction
July	-	-	847	-	-	461		1,903	1,203	-		1,376			100
August	-	-	1989	-	-	1,989			-	-		_			8,260
Sept.	-	-	93	-	-	93			466	-		1000			-
Oct.	-	-		-	-	543			542	638		198			-
Nov.	-	-	-	-	-	-			20	-		8,416			-
Dec.	-	-	612	-	-	79			42	-		17,360			-
Jan.	-		3,042	-	1,903	1,203				-		2,620			2,620

Feb.	-		-	-		386			1,168	-		400			_
March	-		-	-		175			1,625	-		590			400
April	-		-	-		257				-		_			200
May	-		-	-		905			232	-		502		800	1,776
June	-	957	-	-		461			1,093	-		_			100
Total						6091									

Source: Development Bank O Ethiopia

Appendix II

Investment Capital by Sector

(In millions of birr)

Sector	2002/03						%age share to total	
	No. of projects	Investment Capital	No. of projects	Investment Capital	No. of projects	Investment Capital	No. of projects	Investment Capital
Industry	361	3525.96	822	8507	919	10520.01	32	28
Agriculture	96	1401.9	254	4142.39	463	7657.15	16.12	21.00
Real Estate development	45	364.89	100	947.47	167	4125.83	5.81	11.31
Hotel and Tourism	24	120.51	134	800.68	269	1593.84	9.37	4.37
Education	114	1519.92	182	862.60	175	1,076.56	6.09	2.95

Service								
Health Service	34	1264.48	60	483.67	46	1,277.79	1.60	3.50
Construction	129	1087	138	1379.10	150	2084.08	5.22	5.72
Construction Machinery leasing	360	2601.32	384	2320.79	512	6060.93	17.83	16.62
Trade	9	33.73	41	400.40	68	377.30	2.37	1.03
Transport and Storage	3	566.43	7	23.86	20	48.04	0.70	0.13
Mining and quarrying	6	27.94	9	71.73	1	38.59	0.03	0.11
Electricity generation	7	822.48	7	881.51	10	633.26	0.35	1.74
Other	29	101.33	87	398.51	72	972.67	2.51	2.67

business								
Grand total	1217	13437.89	2,225	21219.71	2872	36,466.66	100.00	100.00

Source: Ethiopian Investment Agency.

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of materials used for the thesis have been duly acknowledged.

The examiners' comments have been dully incorporated.

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Date: 17-11-2009

Place and date of submission:

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