Master Thesis

The Housing Gap in Africa: How can financial markets promote real estate investments to support the housing industry?

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List of Abbreviations

ADF	Augmented-Dickey-Fuller
ANC	African National Congress
BHC	Bank for Housing and Construction
CAGR	Compound Annual Growth Rate
CMBS	Commercial Mortgage Backed Securities
CMO	Collateralized Mortgage Obligation
CRA	Credit Rating Agency
DSE	Dar es Salaam Stock Exchange
FDI	Foreign Direct Investment
FGBS	First Ghana Building Society
FMP	Fixed Mortgage Payment
GEAR	Growth Employment and Redistribution
GDP	Gross Domestic Product
GHL	Ghana Home Loans
GSE	Ghana Stock Exchange
GSE-CI	Ghana Stock Exchange Composite Index
HAMI	Housing Attractiveness and Maturity Index
HFP	Housing Finance Project
IPRI	International Property Rights Index
JLL	Jones Lang LaSalle
JSE	Johannesburg Stock Exchange
MPF	Mortgage Payment Factor
MPTS	Mortgage Pass-Through Security
NHC	National Housing Corporation
RMBS	Residential Mortgage Backed Securitas
SMBS	Stripped Mortgage Backed Securities
SPV	Special Purpose Vehicle

SSA	Sub-Saharan Africa
SSNIT	Social Security and National Investment Trust
TMRC	Tanzania Mortgage Refinance Company
UK	United Kingdom
USA	United States of America

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1. Introduction

"Development is about transforming the lives of people,

not just transforming economies."

Joseph E. Stiglitz

From South Africa up to Mali and from Tanzania west to Nigeria, demand for appropriate and affordable housing is voracious. With more and more households moving from rural areas to larger cities, urban growth outstrips the development of new housing units by far. The rapid growth of Sub-Saharan African countries, combined with slowly emerging wealth, leads to a gap of decent housing. Most African countries face these challenges and try to find appropriate solutions to solve them. When it comes to housing, most Africans tend to see it as a personal matter and do not make use of modern financial products. As times change and space gets an important value in urban areas, people can't finance their homes themselves. This thesis shall reveal solutions and try to find ways to make financial products accessible and affordable. Due to the upcoming demand in the future and the current lack of appropriate dwellings, it is getting difficult for respective governments to handle the challenges by themselves. Financial markets can help to reduce the gap and establish a working environment for affordable housing.

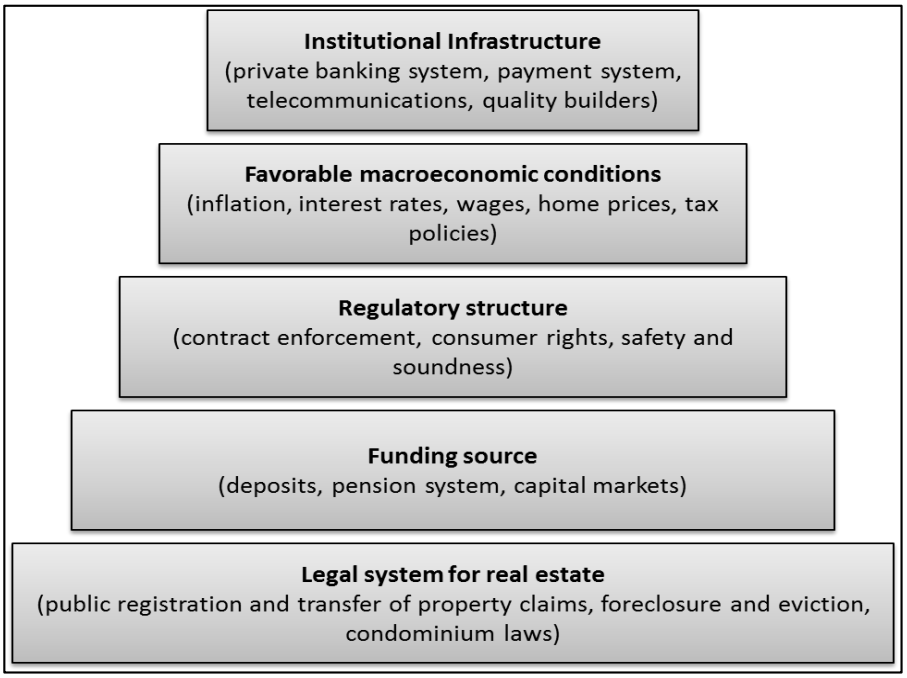
The first part of the following thesis will give a brief overview of the current economic environment and show fundamentals for a working housing market. Since a developed housing market relies on a well-functioning finance sector, the second part will focus on mortgages and securitization. The main products will be analyzed and explained. To see how these theoretical terms are used in a real environment, three different African mortgage markets will be characterized and compared to each other in an international context. Furthermore the dependence of general capital markets and mortgages markets

will be outlined. Finally, the Housing Attractiveness and Maturity Index is created to identify the most mature housing markets and compare respective countries to identify weaknesses and strengths.

2. Housing Supply in Sub-Saharan Africa

In most Sub-Saharan countries, housing was seen as a personal matter in which most households built their homes themselves. Due to the past economic growth and upcoming attractiveness of the continent, many new investors and developers see their chances to improve the housing situation and start to professionalize the housing finance and construction sector.[1] The following chapter shall reveal the general economic situation of Sub-Saharan Africa and give a brief overview of the key elements for working housing markets in selected countries. Tanzania will represent East Africa, Ghana will be the example for West Africa and South Africa is set as a general example as the most transparent market in Sub-Saharan Africa.

Figure 1 Key Elements of Working Housing Markets



Source: Own illustration, referring to: OPIC (2000).

[1] Cf. Centre for Affordable Housing Finance in Africa 2014, p. 1.

2.1 Fundamentals for working Housing Markets

There are several important steps to analyze housing industries and create suggestions for improvements in specific countries. Figure 1 shows five major key factors that affect the housing market. With these five topics, housing markets can be analyzed and can be seen as a way to make housing markets more comparable.

These factors base on the market itself, not on the attractiveness for investors or other institutions. It shall set key factors to analyze how efficient the housing market works and where improvements need to be accomplished.

The institutional infrastructure sets basic requirements for working markets. Private banking systems, telecommunications and the quality of builders are influential variables for a functioning institutional infrastructure.

Regulatory structures such as consumer rights, transparency and contract enforcements are other basic factors that contribute to the housing market and can be seen as goals to set up for an effective environment.

A further requirement is a decent legal structure for real estate. There have to be well-functioning processes of public real estate registration and transfer of property claims, as well as necessary condominium laws.

One major point is a stable and working macroeconomic environment. Stable and low interest rates, high wages, affordable home prices and a working tax system. All these factors are the basis also for a working housing market. The economy plays a very important role for housing markets in general.

Another aspect is the general funding system. How easy can a homebuyer manage to finance a new house? To answer this question, mortgages markets, securitization and the general capital markets have to be observed. This is the most important variable when it comes to housing and especially affordable housing.

By the use of these basic housing fundamentals, the Housing Markets of Tanzania, Ghana and South Africa will be outlined and compared.

2.2 Tanzania, Ghana and South Africa – A Housing Market Analysis

Africa as continent can be divided in five different regions. Northern Africa, Western Africa, Central Africa, Eastern Africa and Southern Africa. According to the United Nations, Sub-Saharan Africa consists of all African countries except North Africa including Sudan.[2] A total population of approximately one billion shows the economic importance of the region.[3] Every country has its own legal system and a different economic environment. By reason of this, it is hard to set up one basic line for all Sub-Saharan countries. To widen the range and applicability, Tanzania, Ghana and South-Africa will be further evaluated.

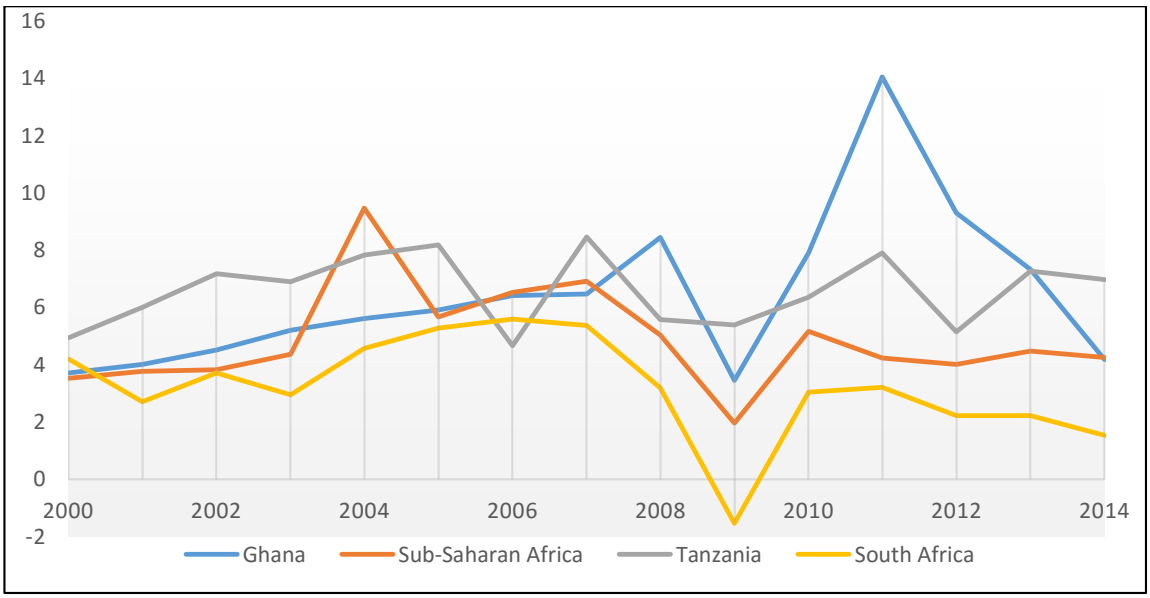
2.2.1 Macroeconomic Conditions

Except of the year 2009, all three countries showed positive GDP (Gross Domestic Product) growth rates for the last 15 years and longer in some extent. Taking all Sub-Saharan countries into consideration, there is a positive growth in all countries. This fact shows the high potential and progress in most of the Sub-Saharan countries. South Africa

[2] Cf. United Nations Statistics Division 2015.
[3] Cf. The World Bank 2015a.

has the smallest growth rate but can be seen as the most developed country and therefore it is normal to grow slower and steadily.

Figure 2 GDP Growth in selected Sub-Saharan Countries (in %)

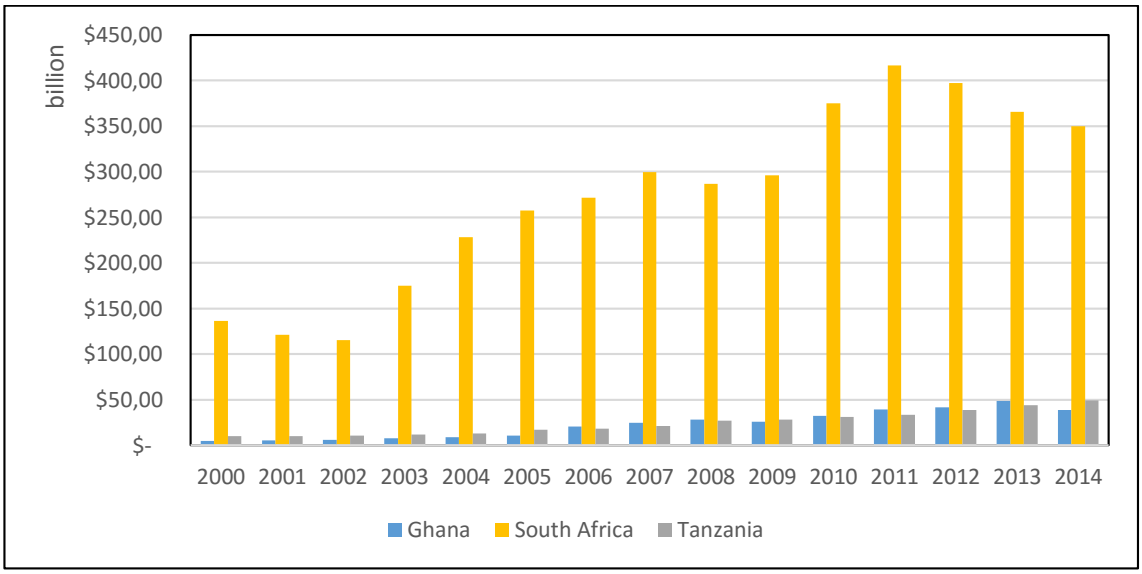


Source: Own illustration, referring to: Datastream.

In 2014 Ghana's growth rate was 4.18%. This is almost comparable to the average of 4.24% in Sub-Saharan Africa whereas Tanzania has a strong growth of 6.97%. As already mentioned before, South-Africa's growth rate is at a low level of 1.52%, but seen as normal compared to other developed countries such as Germany with 1.5%.[4].

[4] Cf. The World Bank 2015b.

Figure 3 GDP in current $ of selected Sub-Saharan Countries



Source: Own illustration, referring to: The World Bank (2015c).

The total GDP in Sub-Saharan countries is relatively small compared to fully industrialized countries. The Ghanaian GDP totals $39 billion. Tanzania's GDP is a bit higher than Ghana's with $49 billion. Figure 3 clearly shows that Tanzania and Ghana are not comparable to South-Africa. Its GDP was the highest GDP in Africa for a long time and now values $350 billion. Only Nigeria outruns South Africa and now is the largest economy in Africa with $568 billion. Thus this fact, South Africa is seven times bigger than the Ghanaian GDP and still one of the strongest economies on the continent. Its GDP is comparable to Denmark and Thailand. Besides this, all Sub-Saharan countries together have a total GDP of $1,728 billion. This is a ten times smaller GDP than the USA as the biggest economy with $17,419 billion.[5] Despite these numbers, the high

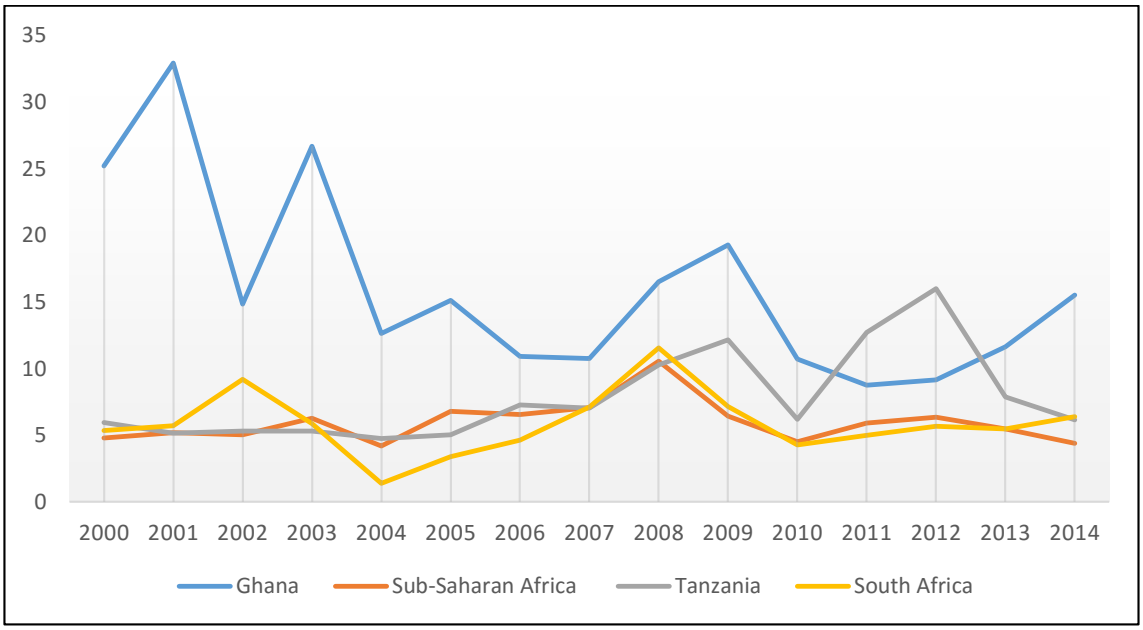
[5] Cf. The World Bank 2015c.

growth rates indicate that the Sub-Saharan countries have a high potential and are expected to grow even more in the future.

The inflation rate is an indicator for an efficient economy. It displays the change in costs over time for the average consumer of acquiring a defined basket of goods. Low and stable inflation rates are required for a balanced economy. Less changes in prices show the stability of each country. Another important indicator is that the inflation rate is linked to the development of the interest rates. Decreasing interest rates can attract investors borrowing money from the domestic market and invest there. This can cause the stimulation of the economic growth in each country. The positive development of the inflation rate has a significant impact on the financial development and consequently on the economic future. As figure 4 indicates, most Sub-Saharan countries show volatile developments of their inflation rates. Thus this has happened over a long period of time, the inflation rate has been quite stable over the last five years (around 5%). Taking a look at the observed countries, Ghana has the highest volatility and highest rates itself. In 2014 the inflation rate was 15.49%. In 2001 the inflation rate was even higher with 33%. Tanzania's inflation rate was 6.13% in 2014 and went down in the last two years from 16.00%. South Africa shows the lowest rates compared to the other two countries with 6.37%. Additionally, the interest rate was quite stable over the last five years.[6]

[6] Cf. The World Bank 2015d.

Figure 4 Inflation Rates of Selected Sub-Saharan Countries (in %)

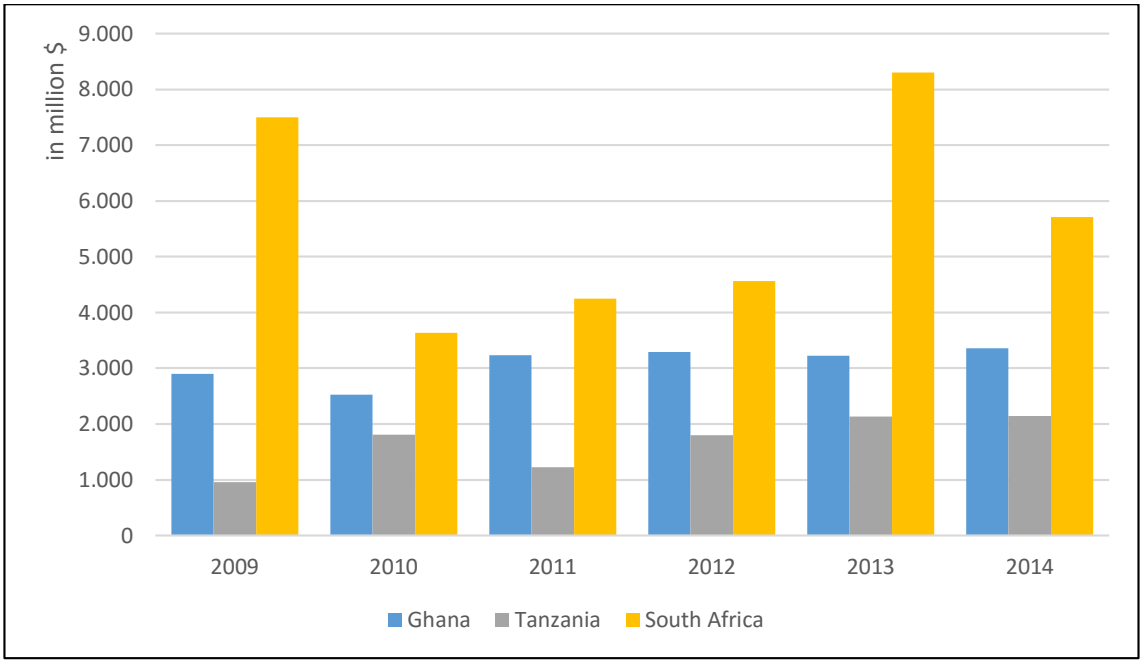


Source: Own illustration, referring to: The World Bank (2015d).

Another key element for working economies and sign for attractiveness can be the Foreign Direct Investment (FDI). FDI is a cross-border deal in which the investor is interested in a long-run investment that obtains significant influence in one economy. This can be reflected by significant ownership or voting power in a foreign company or public private partnerships. FDI is a key factor in international economic integration as it generates stable and continuing links between different markets. In figure 5 the FDI for Ghana, Tanzania and South Africa are pointed out. South Africa also leads according to the FDI compared to Tanzania and Ghana. The invested amount was $5.71 billion, whereas Ghana generated a FDI amount of $3.35 billion and Tanzania $2.14 billion. Ghana's and Tanzania's FDI where quite stable over the last five year with small but continuous growth. South Africa shows a higher FDI amount but also higher volatility and shifting growths and declines. Sub-Saharan Africa contributes $42.37 billion of the

$53.91 billion in whole Africa. That is a proportion of 79% and shows the attractiveness for foreign capital contributors to invest in Sub-Saharan Africa.[7]

Figure 5 FDI Inflows of Selected Sub-Saharan Countries



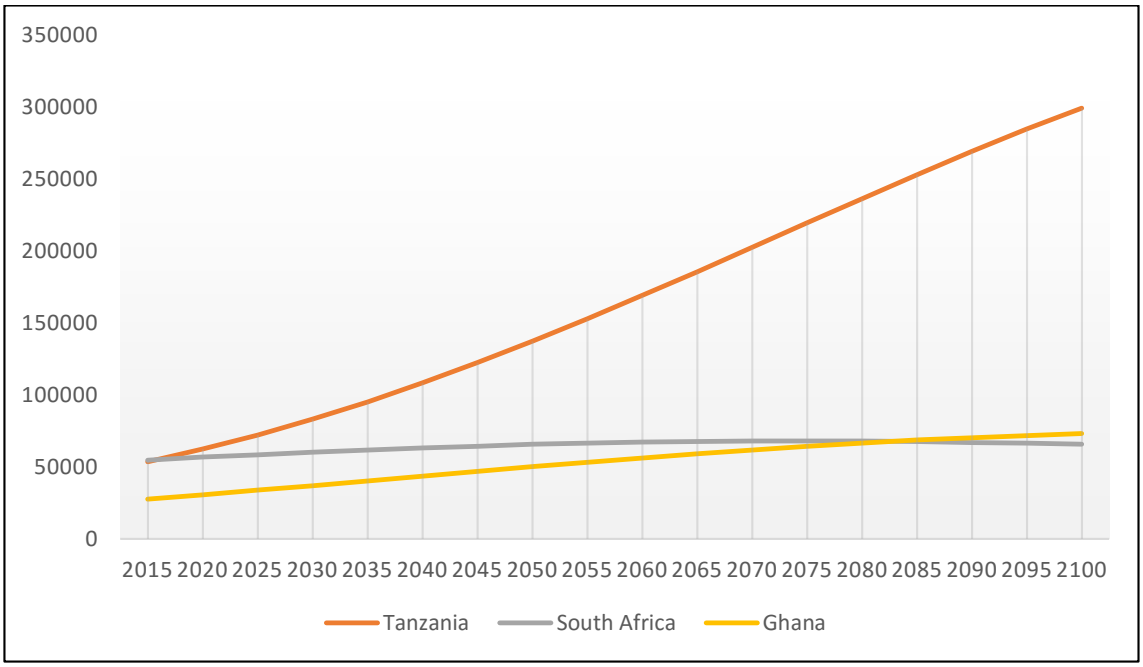
Source: Own illustration, referring to: United Nations Conference On Trade And Development (2015).

Another point that affects the housing markets is the demographic development and urbanization of one country. There is an easy and obvious link between housing demand and total population. The more people live in a country, the more housing units are needed. The same correlation can be found in the urbanization rate and housing units in cities. If more people want to move to cities and metropolitan areas, the more housing must be provided. In figure 6 the population forecasts are visualized. Obviously remarkable is the population development for Tanzania. The population in 2015 is 53.47

[7] Cf. United Nations Conference On Trade And Development 2015, pp. A3.

million and will rise to 137.16 million in 2050 and almost 300 million in 2100. This represents one of the highest growth rates in Sub-Saharan Africa and even worldwide. It outclasses Ghana and South Africa, despite that Ghana also shows steady growth rates. Its population accounts 27.4 million in 2015 and will rise to 50 million in 2050. It almost doubles the population in 50 years. Whereas Tanzania and Ghana show high growth rates, South Africa's population grows relatively slow over the years. Its population of 54.49 million in 2015 rises to 66 million in 2050. The total population of Sub-Saharan Africa growths from 962 million in 2015 to 2.1 billion in 2050.[8] These high numbers represent the importance of implementing a working housing market in respective countries.

Figure 6 Population Estimates for Selected Sub-Saharan Countries



Source: Own illustration, referring to: United Nations Population Division (2015).

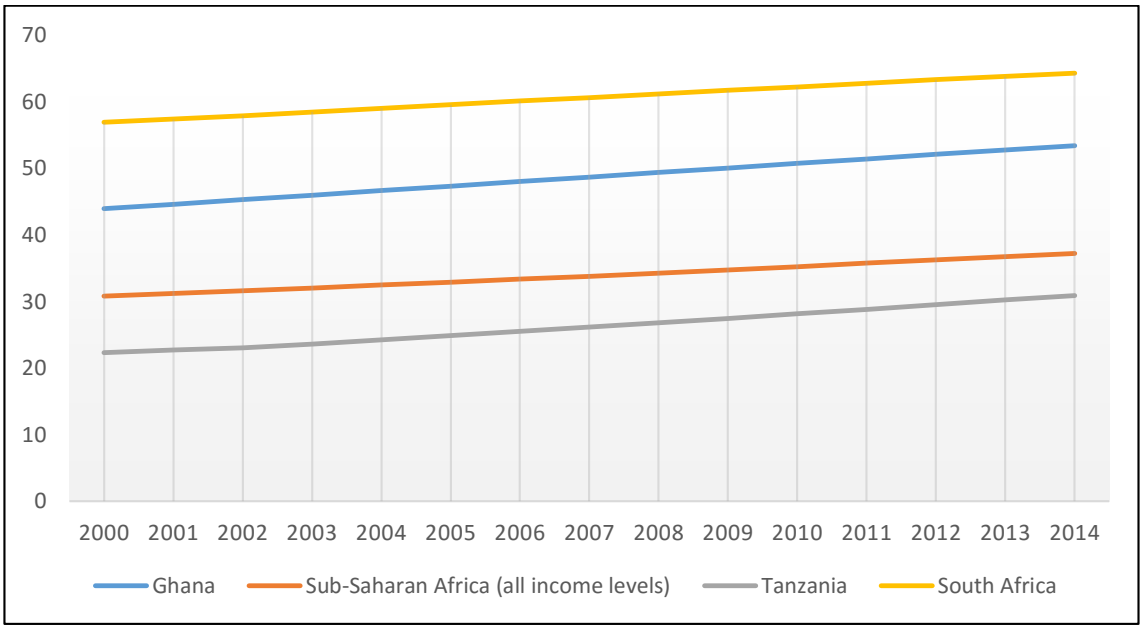
[8] Cf. United Nations Population Division 2015.

The rapid growth in population, especially in Tanzania, will be one of the major challenges for the national government.

Another central point in housing development is the urbanization rate. The upcoming middle class in many African countries are seeking the advantages of major cities and leave the rural areas to participate in the economic growth. This meets new challenges for the housing markets. Not only the growing total population but also the urbanization is a factor that has to be kept in mind. As figure 7 reveals, the urban population grew steadily during the past fifteen years in every observed country. South Africa has the highest urbanization rates with 64.29% in 2014. Tanzania's urbanization (30.90% in 2014) is even smaller than the Sub-Saharan average of 37.23% in 2014. Ghana's urbanization also grew constantly to 53.39% in 2014. These figures show the change in urban development during the past years in Africa.[9] South-Africa has the leading role when it comes to urbanization but the other Sub-Saharan countries still grow. Knowing these progresses from rural to urban areas, the housing industry has to face new challenges and even more in combination with the total population growth in respective countries.

[9] Cf. The World Bank 2015f.

Figure 7 Urban Population in % of total for Selected Sub-Saharan Countries



Source: Own illustration, referring to: The World Bank (2015f).

2.2.2 Capital Markets

The influence of capital markets to functioning house markets is immense. If there is no source for housing debt, almost no housing can be provided for the low and middle income class. Not only debt is important, also the equity markets can support the housing industry. If the capital markets provide worthwhile investment products, financiers will be attracted to invest in a country. This chapter shall give an overview of the existing capital markets in respective countries and focuses on the stock markets in general. Because there is a focus on the debt market in this thesis - especially mortgages and securitization - there will be a separate chapter explaining and analyzing these debt instruments. But as explained before, the housing industry also relies on the stock and bond markets, this is why there will be a short explanation of Tanzanian, Ghanaian and South-African bond and stock markets.

Table 1 Structure of Capital Markets

Capital Market	Public	Private
Equity Assets	○ Stocks ○ REITs ○ Mutual Funds	○ Real Properties ○ Private Equity ○ Hedge Funds
Debt Assets	○ Bonds ○ Mortgage Backed Securities ○ Money Instruments	○ Bank loans ○ Whole Mortgages ○ Venture debt

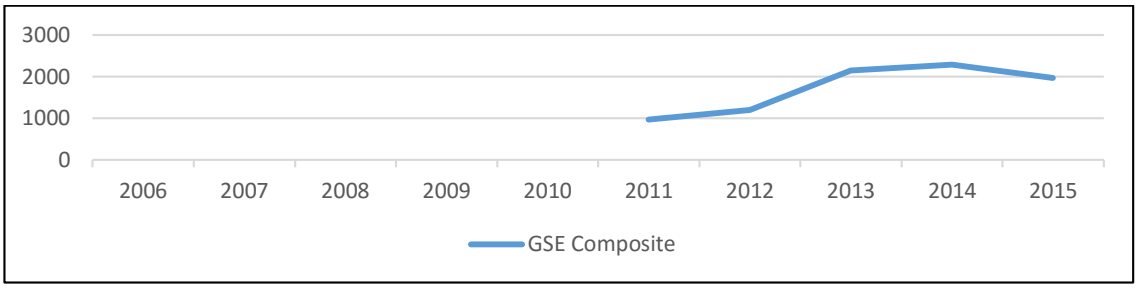
Source: Own illustration, referring to: Geltner (2007, p. 11).

In the following section the Ghana Stock Exchange (GSE), the Dar es Salaam Stock Exchange (DSE) and the Johannesburg Stock Exchange (JSE) are analyzed. There is no common Sub-Saharan Stock Index. Therefore, the single markets are compared by analyzing its particular price indices.

The GSE, incorporated in July 1989 as a private company limited by guarantee, is the principal stock exchange of Ghana situated in the capital Accra. The first trading activity was November 12, 1990. It changed into a public company limited by guarantee in April 1994. Since then, the GSE's performance has varied greatly. Included in the main stock index (the GSE Composite Index (GSE-CI)) are all ordinary shares with the exception of listed companies that have shares listed on other markets. The base value of this market capitalization weighted index was 1,000 on December 31, 2010. The Exchange is managed by a council with representatives from the registered companies, licensed trade members, insurance companies, and the general public. Currently there are 41 companies listed in the GSE-CI. The total market capitalization of the GSE is $15.03 billion.[10]

[10] Cf. Ghana Stock Exchange 2015.

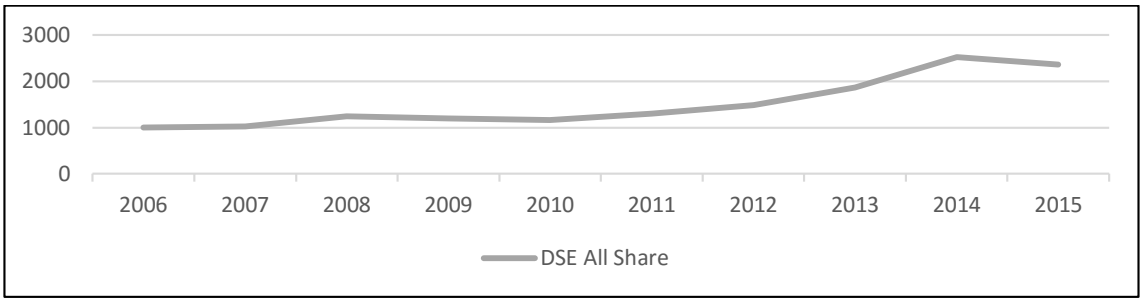
Figure 8 Ghana GSE Composite Index



Source: Own illustration, referring to: Datastream

22 companies are listed on the DSE in December 2015. The total market capitalization of the Tanzanian stock exchange is $9.58 billion. The stock exchange grew rapidly since the initial start in 1998.

Figure 9 Tanzania DSE All Share Index



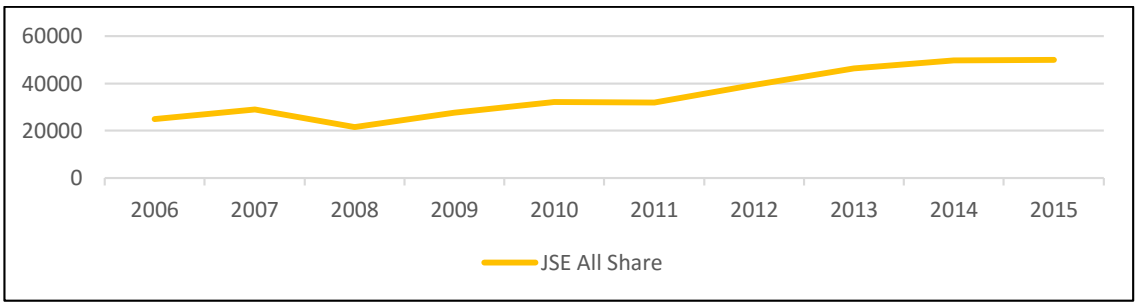
Source: Own illustration, referring to: Datastream

Speaking of market capitalization, the Johannesburg Stock Exchange (JSE) is the Sub-Saharan Africa´s center for financial services. More and more local and foreign investors, interested in gaining higher yields, entered the market and helped the JSE bit by bit to improve over the past years. The JSE was arranged in 1887 during the first South African gold rush. The JSE entered the World Federation of Exchanges in 1963 and advanced to an electronic trading system in the early 1990s. Today the JSE offers five financial

markets: equities and bonds in addition to financial, commodity and interest rate derivatives. As one of the world's 20 largest exchanges by market capitalization, the Johannesburg Stock Exchange offers primary and secondary capital markets across a varied range of instruments. Almost 400 companies are listed on the JSE.[11] Compared to the other Exchanges, South-Africa has the longest history and the strongest stock market. Ghana and Tanzania are still in the early stages and do not have the maturity yet, that South Africa has earned over the past years.

Analyzing Figure 8 to 10, stable growth in respective exchange markets are analyzed. The JSE Index almost doubled its value in the last ten years to almost 49,860 points in 2015. The GSE Composite Index also doubled its value from 967 points in 2006 to almost 2,000 in 2015. The same growth is seen in Tanzania. The DSE Index cam from 999 points in 2006 to 2,355 in 2015. These developments show the potential interest from investors in the observed countries. Due to the close link between the capital markets and the general development of one country's economy, it is also important for the housing markets to take a look at the future perspective.

Figure 10 South Africa JSE All Share Index



Source: Own illustration, referring to: Datastream

[11] Cf. Johannesburg Stock Exchange 2015.

3. Mortgage Loans and Securitization

A loan secured by an underlying real asset is called mortgage. In case of delinquency the property can be repossessed and is used as a security. Mortgage loans can be seen as the typical way of financing residential housing and are therefore one of the key factors to provide affordable housing to African countries. Many different kinds of mortgage loans exist on the market. They basically differ in their maturity, interest rate type and amortization type. This chapter will analyze these different mortgage loans and housing finance vehicles. The part will outline the possibilities and weaknesses these products entail.

3.1 Interest-Only Loan

This loan type is one of the simplest mortgage loan structures. During the life of the loan there is no amortization. Just the interest payment has to be transferred to the lender. At the loan's maturity date, the borrower has to pay back the whole loan amount at once. This is often used in commercial real estate where real estate developers use the loan amount to finance their development and pay off the loan amount when they sell the property. One of the reasons developers use it, is the low monthly payment comparing to other loans because of the repayment in a lump sum at the loan's maturity date. The interest-only loan is not suitable for financing owner occupied residential properties due to the high amortization payment at the end of the credit period.[12]

[12] Cf. Geltner 2007, p. 411.

3.2 Fixed-Rate Mortgage

A fixed-rate mortgage is a loan made by the mortgagee (a bank) to a single mortgagor (the debtor), for the acquisition of a property. The secured loan typically repays over a fixed time period, usually 15 to 30 years. The mortgagor makes fixed monthly payments, until the mortgage is fully payed back. A mortgage payment consist of two components: the interest component and the principal component. The following example shows how the payments are calculated, and then how the principal and interest components of each payment are calculated. Payments are made at the end of each month.[13]

$$Mortgage\ Payment\ Factor\ (MPF) = \frac{Interest\ Rate(1 + Interest\ Rate)^{Loan\ Term}}{(1 + Interest\ Rate)^{Loan\ Term} - 1}$$

$$Fixed\ Mortgage\ Payment\ (FMP) = Loan\ Amount\ \times MPF$$

As an example, following loan is considered:

Loan Amount of $200,000; Annual Interest of 8%, Loan Term of 15 years =180 months.

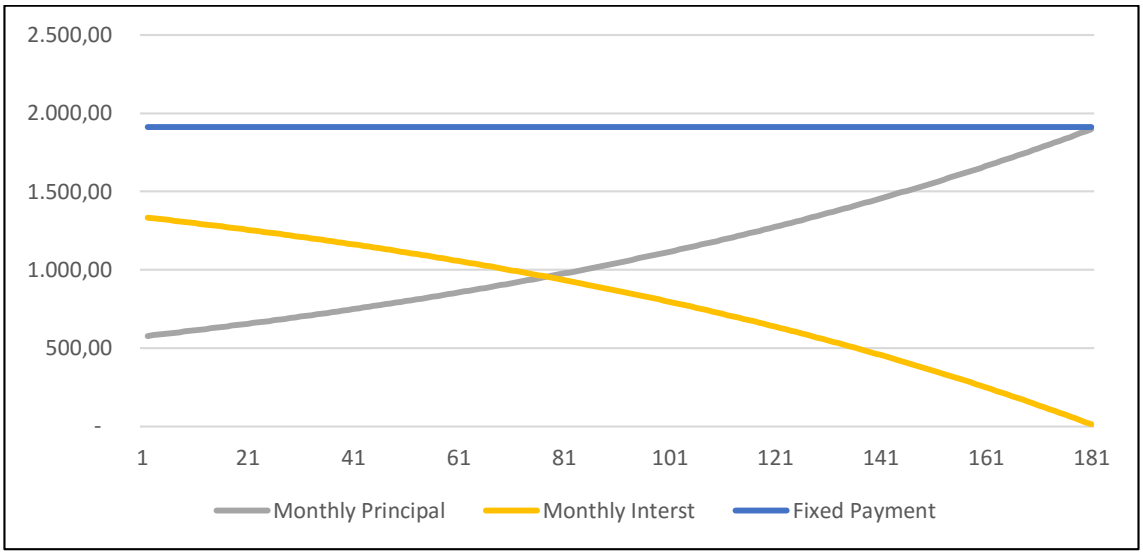
The fixed mortgage payment is as following:

$$FMP\ = \$200{,}000 \times \frac{0{,}08 \times (1{,}08)^{180}}{(1{,}08)^{180} - 1}$$

$$FMP\ = \$\,1{,}911.30$$

[13] Cf. Stone, Zissu 2012, pp. 28–30.

Figure 11 Fixed Rate Mortgage Payment Breakdowns



Source: Own illustration and calculation.

Therefore, the mortgagor will make 180 payments of $1,911.30 at the end of each month. The outstanding principal balance decreases over time because the mortgage amortizes over time. Considering that the balance at time zero corresponds to the present value of the fixed amount of scheduled payments, the balance at any time (t) is the present value of the remaining payments with interest rate r.[14]

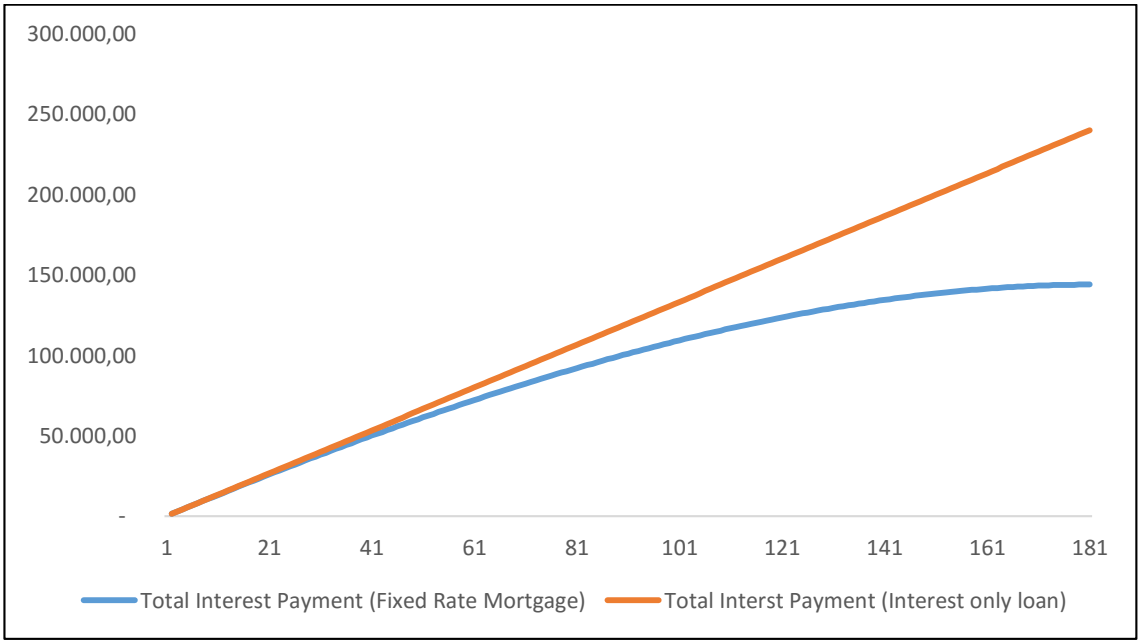
$$Outstanding\ Principal\ Balance\ (t) = FMP \times \left(\frac{1}{r} - \frac{1}{r \times (1+r)^{Loan\ Term-t}}\right)$$

As Figure 11 shows the monthly paid interest decreases over time as well as the monthly paid principal increases over time. This effect is based on the smaller outstanding mortgage balance and therefore lower interest. Due to this lower interest payments and fixed monthly mortgage payments, the monthly principal has to go up.[15]

[14] Cf. Fabozzi et al. 2011, pp. 11–13.
[15] Cf. Fabozzi et al. 2011, pp. 11–13.

The difference of cumulative interest expenses in fixed rate mortgages and interest only loans is stated in Figure 12. Given the example of a total loan amount of $200,000 with an interest of 8% and 15 year term, there is a big difference in the total interest payed. Due to the amortization over time, interest expenditures for fixed rate mortgages decline while the interest for interest only loans stays constant over time and leads to higher total interest expenses.

Figure 12 Comparison of Total Interest Payments



Source: Own illustration.

If the market rate of another mortgage is lower than in the current mortgage, the mortgagor has the option of refinancing the mortgage. For example, the mortgagor has a 15-year 8% mortgage rate contract. If interest rates increase to 10% in the market, the mortgage debtor will not use the refinancing option because of higher costs. The financing bank will suffer opportunity costs, due to the fixed 8% interest. If, on the other hand,

mortgage rates drop to 5%, the mortgage debtor may refinance the mortgage's outstanding balance at the new 5% to reduce the credit costs.[16]

3.3 Mortgage Loan Risks

There are four main risks mortgagees have to face: interest rate risk, prepayment risk, credit risk and liquidity risk. If the market interest rate for mortgages changes, the lender has different kinds of risk depending of a dropping or increasing interest rate. Considering an increasing interest rate, the negative effects for a mortgage lender mainly occur when he tries to sell the existing mortgages. This is because the gained yield is below the market rate yield. If the lender decides to sell the mortgages, there will be a discount. There are also negative effects for decreasing interest rates. Through this effect, it gets more interesting for the mortgagor to convert their debt and prepay the outstanding sum and refinance their home. So there leads to a higher prepayment risk. This prepayment results in lost cash-flows above the market rates and therefore lower possible earnings. Credit risk mainly refers to the risk of loss through default of the debtor of mortgage. An investment that cannot be bought or sold quickly enough due to the lack of liquidity to prevent or minimize a loss is said to be illiquid. This lack of marketability is the liquidity risk. If there is no resale market or the aversion of suffering a loss, the lender will be forced to hold the mortgage loan in its portfolio until the maturity date.[17]

[16] Cf. Stone, Zissu 2012, pp. 28–32.
[17] Cf. Myma Belo-Osagie et al. 2006, p. 161.

3.4 Residential Mortgage Backed Securities

Mortgage Backed Securities (MBS) can be defined as indirect debt instruments[18] and are divided into three main subtypes. Collateralized Mortgage Obligation (CMO), Mortgage Pass-Through Security (MPTS) and Stripped Mortgage-Backed Security (SMBS). There is also a difference in the underlying property. Moreover, Mortgage Backed Securities can be distinguished into Commercial Mortgage Backed Securities (CMBS) and Residential Mortgage Backed Securities (RMBS).[19] This type of securitization is one of the most common used refinancing vehicles in the mortgage market. The importance of a working refinancing system in the housing sector will be outlined in the following chapter.

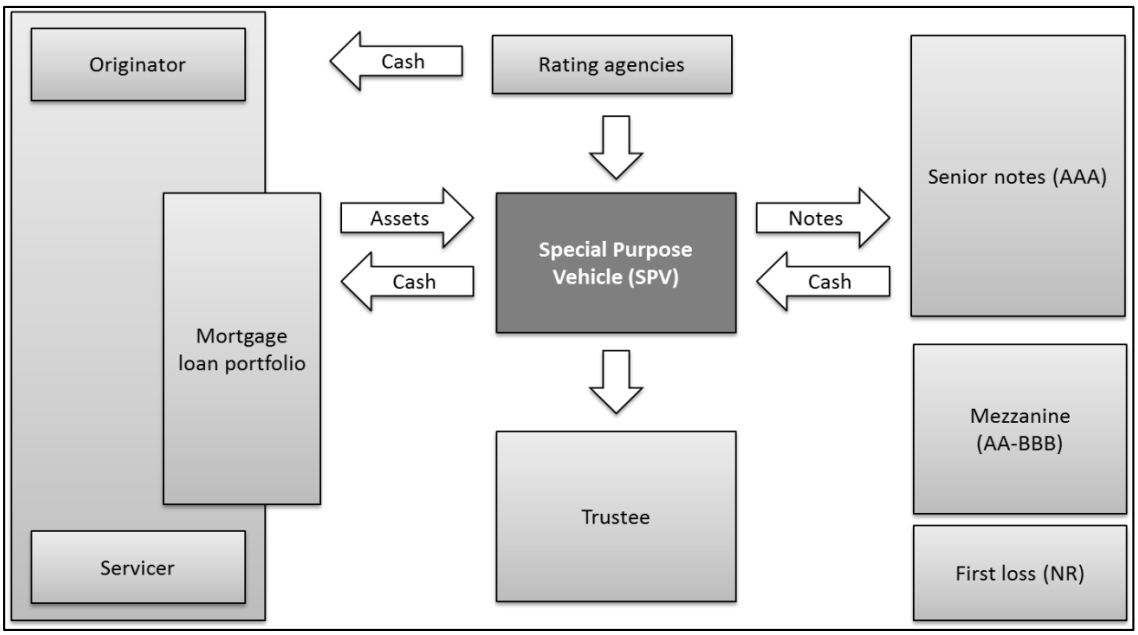
3.4.1 General Structure

Securities backed by a large pool of mortgage loans, which mainly finance residential property are called Residential Mortgage Backed Securities (RMBS). There are two major reasons banks are interested in using RMBS. The first one is to refinance their residential mortgage loans through capital markets. The second one is to transfer credit risk (default of the mortgagor) to the capital market.[20] Figure 13 shows a simplified RMBS transaction, in which the originator or mortgagee purchases a pool of comparable mortgage loans. The buyer is a special purpose vehicle (SPV). This vehicle is formed to issue mortgage-backed securities. The SPV offers notes in different tranches, depending of the mortgage loan characteristics. The mortgage loans are assigned to a trustee, who takes control of the mortgage loans and any extra credit enhancements supporting the

[18] Cf. Hoesli, MacGregor 2014, p. 242.
[19] Cf. Yuh-Dauh Lyuu 2008, p. 974.
[20] Cf. Rottke, Brämisch 2008, p. 256.

linked securities on behalf of the investors. This process is called securitization. The purchase and resale of mortgages takes place in secondary mortgage market, while the original mortgage takes place in the primary mortgage market. The secondary mortgage market serves the purpose of restocking the supply of resources available to grant further mortgages. Getting a credit rating for a RMBS meaningfully improves its liquidity along with its possible sales price. Those that secure investment grade ratings are the most commonly dealt and generate the greatest sum of sales profits. [21]

Figure 13 Simplified RMBS transaction structure



Source: Own illustration referring to: Rottke, Brämisch (2008, p. 258).

3.4.2 Rating and Tranches

One of the most important parts in a RMBS transaction is the building of tranches with different credit ratings. The main goal of the SPV is to qualify their bonds for the required

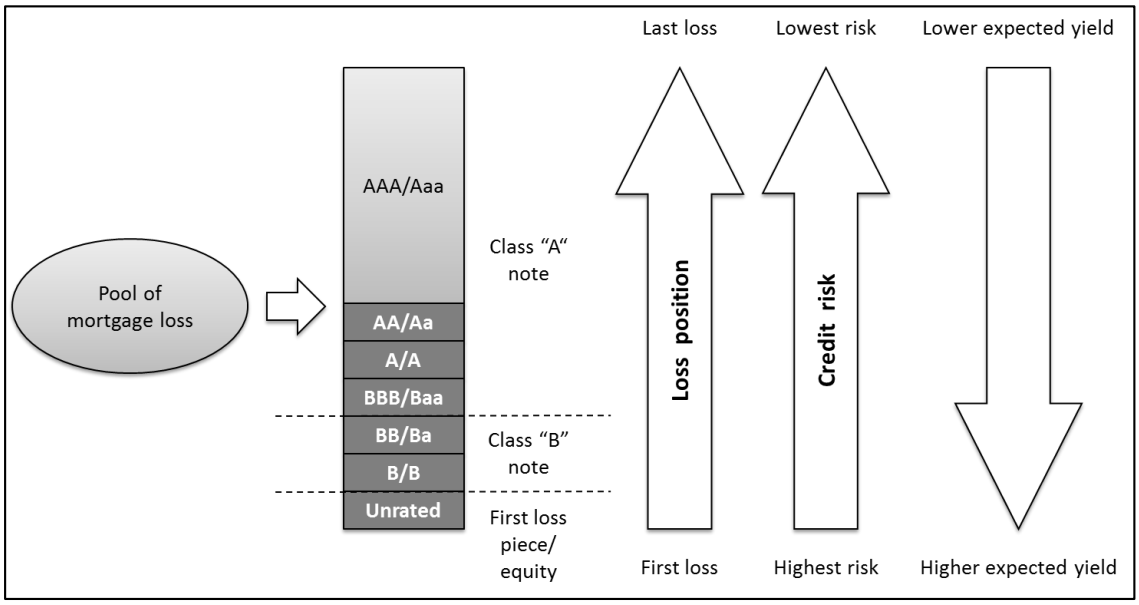
[21] Cf. Fabozzi 2006, p. 59.

ratings. Without these ratings, the offered bonds could not be placed on the market. Due to this fact, the structure of the RMBS transaction has to fulfill the rating agencies requirements.

A credit rating by a credit rating agency (CRA) is meant to reflect credit or default risk and represents an estimation of a debt obligor's solvency. The aim of credit ratings is to be comparable through time and across different types of fixed-income instruments. CRAs try to create ratings that represent an identical measure of credit quality worldwide and through all forms of debt instruments. In other words, a securitized issue and a bond with the same credit rating should express the same grade of credit quality.[22]. Regardless of these goals, the subprime crisis in 2007 has uncovered the difficulties and limits CRAs face during their rating process and sometimes lack of accuracy. Rating agencies differ about what exactly is assessed. Fitch and Standard & Poor's (S&P) measure a debtor's overall capability to satisfy the financial obligation and therefore estimates especially the likelihood of default. Moody's values the recovery in the event of loss and tries to include the expected loss.[23]

[22] Cf. Marco Pagano, Paolo F. Volpin 2009, p. 261.
[23] Cf. Adam Ashcraft et al. 2009, p. 10. Adam Ashcraft et al.2009.

Figure 14 Tranches of Mortgage Loans



Source: Own illustration referring to: Rottke, Brämisch (2008, p. 266).

Figure 14 shows the different tranches rating agencies define to value the different notes that the SPV issues. Higher default risk leads to higher yields but leads to a late compensation in case of loss.

3.4.3 Benefits to the Housing and Mortgage Market

There are several advantages for mortgagees in securitization. First of all, banks can refinance their loans and create even more mortgages through the free remaining funds they get through offering RMBS. Another important fact is that lenders can pass credit, interest and prepayment risks to the RMBS owners and create highly liquid instruments that were former illiquid mortgages.

Not only lenders can benefit from RMBS transactions, there is also a high value for homebuyers. The most important advantage for homebuyers is the increasing availability of mortgage loans. Through the implementation of the secondary market and the

elimination of credit risk, banks tend to offer lower interest rates due to the risk reduction in passing the risk forward through the sale of mortgages. This also leads to a higher affordability of mortgage loans for homebuyers. Even lower income sectors can benefit from RMBS. This is also caused by the risk transfer. Banks are now willing to give mortgage loans to the lower income sector because they can transfer the risk to the bond buyers of the RMBS transaction.[24]

[24] Cf. Myma Belo-Osagie et al. 2006, p. 162.

4. Analyzing the African Mortgage Market

As stated before, the key to a wide housing availability in countries goes along with the mortgage market. To establish a working mortgage market has to be strategic goal for the future. This chapter shall give a brief overview of international mortgage markets and focus on the Ghanaian, Tanzanian and South African mortgage markets.

4.1 The International Mortgage Market

The international residential mortgages market recovered from the economic crisis in 2009 and created low to medium growth until 2013. Until the end of 2018 the market is expected to continue to produce similar growth rates. The global residential mortgages market had total outstanding balances of $25,744 billion in 2013, which represents a compound annual growth rate (CAGR) between 2009 and 2013 of 2.7%. The performance of the market is estimated to accelerate, with an expected CAGR of 3.9% for the five-year period 2013-2018. By the end of 2018, this growth will drive the market to a value of estimated $31,097 billion.[25] These numbers and growth rates represent the importance of world's current mortgage market. Sub-Saharan Africa's mortgage market is yet to be further developed, as housing in many African countries is a personal matter. The existing markets are further analyzed in this chapter and weaknesses shall be outlined.

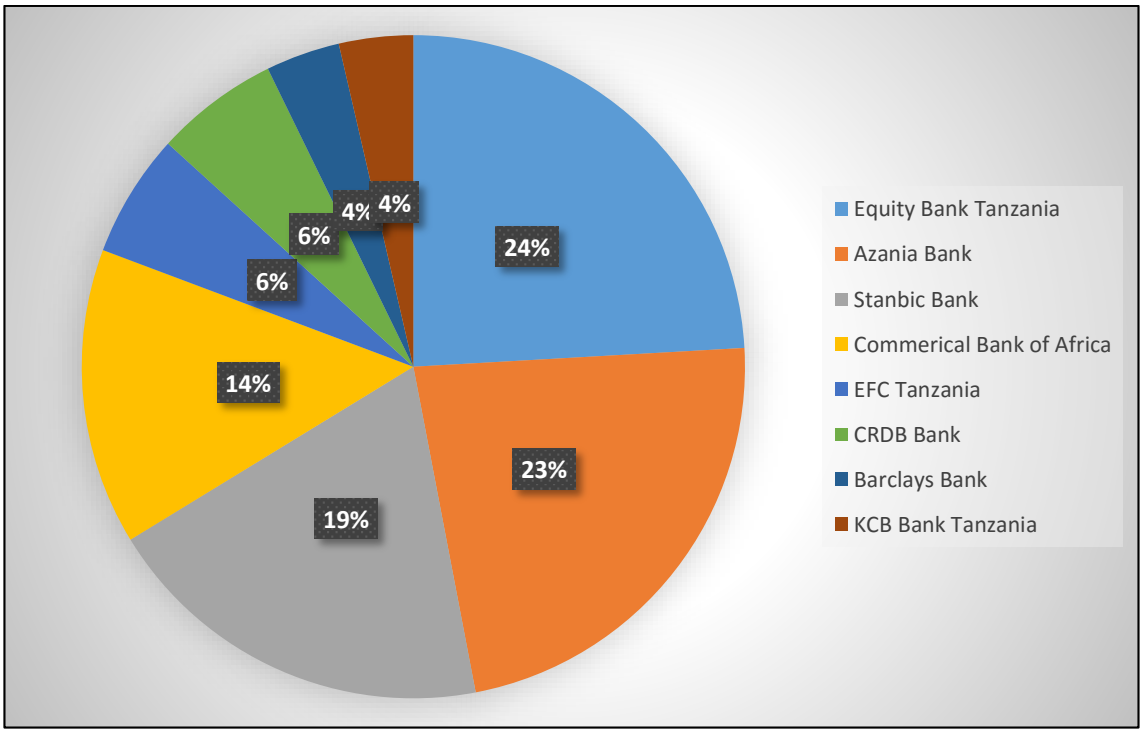
4.2 Tanzanian Mortgage Market

Current reports state that the Tanzanian mortgage market grew rapidly on a year to year basis from 2014 to 2015. 228% compared to last year's result. The new assigned

[25] Cf. Marketline 2014, p. 6.

mortgages grew from $21.38 million in December 2014 to $70.19 million in June 2015. The average debt size increased from $28,730.30 to $34,754.40, while this fast growth also more than doubled the mortgage outstanding debt to now $154.77 million. This outstanding debt increase was mainly because a boost on Equity Bank Tanzania's mortgage accounts from 20 in December 2014 to 66 in June 2015. This raised the bank's mortgage outstanding debt over 600% from $5.4 million to $38.21 million and market share from 7.51% to 24.7%. Figure 15 gives a brief overview of the active Tanzanian mortgage banks and their market share.

Figure 15 Market Share of Mortgage Loans in Tanzania



Source: Own illustration referring to: Tanzania Mortgage Refinance Company (2015, p. 3).

Considering average debt size, Equity Bank Tanzania contributed with the majority of the increase since during the period its average mortgage loan size grew from about

$280,000 to over $560,000. This is far higher the market's average debt size at around $46,339.20. According to Tanzania Mortgage Refinance Company (TMRC), due to intensifying competition in traditional bank products, further expansion is expected in the mortgage market with more banks introducing new mortgage loan products. Tanzania's National Housing Corporation (NHC), a state-run company to support housing supply in all income earners levels, will also boost the mortgage market through its Civil Servants Housing Scheme that plans to build 50,000 houses within the next five years. Tanzania's mortgage market increased from 0.36% of the country's GDP in December 2014 to 0.48% in June 2015.[26] High interest rates, currently 14.75%, and lack of affordable housing still remain the major constraints on market growth.[27]

The government owns and offers a large majority of the residential units. Therefore, there are less chances and opportunities for homeownership at present. This is why renting is the current real estate setting for residential properties. From a cultural perspective, as in many other African countries, Tanzanians would prefer to participate in homeownership. This lack in the real estate supply states a great chance for property developers. High demand and yields is a key factor for the residential market and sets great opportunities for investors. Furthermore, the rental and housing market is confronted with several challenges. There is an enormous discrepancy between the demand for urban housing and the recent supply. Since the demand for residential units is much higher than the current supply, rental prices for housing units have risen steeply. With the current growth in urbanization, developers are facing problems to keep up with the high demand.[28] This

[26] Cf. TanzaniaInvest 2015.
[27] Cf. Equity Bank Tanzania 2015.
[28] Cf. Lamudi 2015.

situation clearly shows the importance of setting up a working and stable mortgage market to provide loans to keep the real estate and construction industry at high levels.

The housing finance industry's main objective is to set up a mortgage finance system, in which it channels funds from savers to borrowers. The primary reason for this mortgage system is that real estate developers have the budget to build and owners have the credit to buy appropriate and affordable housing. As a consequence of the growth during the last 54 years, Tanzania has experienced fast population growth and urbanization, resulting in metropolitan areas, cities and towns with high variation in income levels and inequality in housing.

Typically, mortgage loans are set to repay over a period of time, ranging from 20 to 30 years. In Tanzania, mortgage regulations set a maximum term of 20 years. The Bank of Tanzania's Mortgage Market Update shows common interest rates between 18 to 21%, with some exceptions.[29] These high interest rates, together with a depreciating Tanzanian shilling, can lead to a shrinking demand for mortgage loans. As most mortgage markets, Tanzania's mortgage finance market depends on the strength of the general economy. Especially the effectiveness of the legal framework to support registration of land and law enforcements are essential.

The Ministry of Lands, Housing and Human Settlements, initiated the Housing Finance Project (HFP) with backing by the World Bank to support a dynamic mortgage finance market. Investments of $73.80 million for the development of the mortgage Market and $20.50 million for the development of housing microfinance have been made.[30]

[29] Cf. Tanzania Mortgage Refinance Company 2015, p. 1.
[30] Cf. The World Bank 2015e, pp. 1–2.

Moreover, the HFP is associated with the Tanzania Development Vision 2025. This vision underlines the meaning of affordable housing and capital market development. In 2010 Tanzania Mortgage Refinance Company (TMRC) was establishment to provide medium and long-term liquidity for Tanzanian banks and to extend mortgage loans to individuals.

Securitization in the form of mortgage-backed securities, which is one of the major funding source for mortgage lenders, has yet to be developed in Tanzania. The primary source of mortgage funding in Tanzania are currently mortgage liquidity facility, such as the TMRC. Due to the lack of accessible long-term funds, a liquidity facility can be a good option to refinance in short notice.

A low and stable inflation rate and general economic growth can help developing the mortgage finance market in Tanzania. A mature financial environment will help to encourage companies to focus also on long-term mortgage commitments. To secure a rapidly developing mortgage finance market a number of financial, legal and institutional regulations are required to withstand the challenges in Tanzania's mortgage market. Finally, Tanzania's focus should be on generating a sustainable primary mortgage market. Accompanied by this, a slow and monitored introduction of a secondary market should be considered and later implemented.

4.3 Ghanaian Mortgage Market

The first steps and beginning of the mortgage market in Ghana were made by the First Ghana Building Society (FGBS) in 1956. Several other acts and programs were starting from there on. The Building Society Ordinance in 1955 and the Mortgages Decree in 1972 are two examples. From there on the government took responsibility and established

the Bank for Housing and Construction (BHC) to provide housing finance and loans to homebuyers. By offering housing loans of only $994,075 to just 363 mortgagors in 14 years, the BHC failed to create an effective mortgage market. From there on other efforts have been made, the World Bank and the Social Security and National Investment Trust (SSNIT) gave $8.2 million and $16.2 million respectively as seed capital to set up a working market.[31]

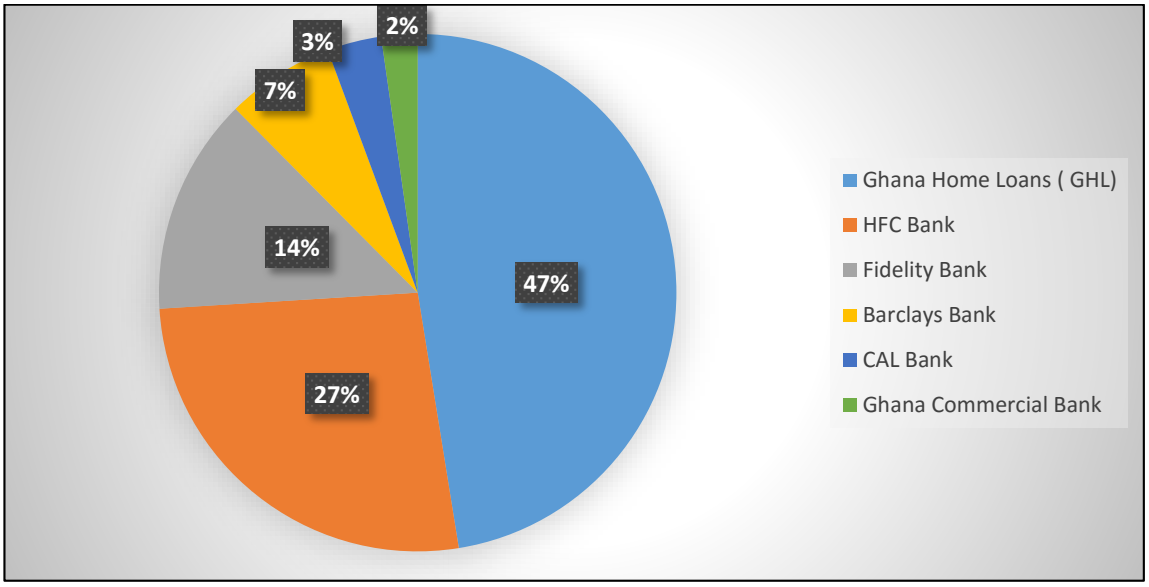
As of today, there are just five of 26 of Ghanaian banks formally offering mortgage loans as a product[32]. Additionally, Ghana Home Loans (GHL) functions as Ghana's single residential mortgage lender. Housing Finance is still a very small sector in the current banking system, with less than 3% of total loan origination. Most banks avoid the home loan market and focus on short-term lending and other products. This can be seen by the relatively small amount of total outstanding mortgages in Ghana of $200 million and under 6 000 borrowers.[33]

Currently, there are several mortgage loan products offered on the market. They can be divided into four main mortgage products. For purchasing new houses, the first and common product is the Home Purchase Mortgage. The bank lends 80% of the purchasing price, whereas the mortgagor has to make a minimum 20% down payment for acquisition costs of the property. Diverging from common mortgages, the loan term is 20 years and the interest payments are always variable for the mortgage loans in domestic currency Cedi. Among the several banks, the interest rate varies between 27% and 32%. For mortgages offered in US dollar, there are fixed interest rates varying between 12.5% and

[31] Cf. Modern Ghana 2013.
[32] HFC Bank, Fidelity Bank, CalBank, Stanbic Bank and UT Bank.
[33] Cf. Centre for Affordable Housing Finance in Africa 2015, p. 98.

14%. As the second product, Home Improvement Mortgages are offered. These Loans are offered for already existing buildings that need refurbishment. The usual term for these types of mortgages is five years. The Home Completion Mortgage is also an offered products. It is offered to homebuilders that need funding for buildings under construction. Finally, the Home Equity Mortgage is offered. Borrowers uses the equity of their homes as a collateral to receive another credit.[34]

Figure 16 Market Share of Mortgage Lenders in Ghana



Source: Own illustration referring to: Proparco (2013, p. 18).

As Figure 16 shows, GHL has a market share of almost 50% and is therefore the biggest mortgagee in Ghana. The small number of market participants is also noteworthy. This unbalanced market share is also an indicator for the immaturity of the mortgage market in Ghana. The average loan size GHL offered was $69,000 with a total amount of $115 million and 1,600 homebuyers and a robust asset quality with a ratio of non-performing

[34] Cf. Centre for Affordable Housing Finance in Africa 2015, p. 98.

loans of less than 3%. Admittedly, the offered products are mostly accessible to middle-income earners with earnings of $1,200 per month, which just qualifies 10% of Ghana's households[35]. In detail, only 5-8% of Ghanaians can afford a house from equity capital, whereas about 60% need financial assistance and 35% can't afford housing loans. Further about 60% of the market participants are Ghanaians living outside the country or resident non-Ghanaians.[36]

The mortgage loan market in Ghana faces many challenges. There is a lack of construction financing through the bank sector, as well as lack of data collection. Therefore, it is very difficult to get sufficient records of loan applicants due to the absence of required data. So it is problematic for banks to get reliable datasets. For example, there are delays in title registration of documents from the Land Title Registry. Another problem is the lack of a working address system, which is important to check the creditworthiness of potential mortgagors. There are also difficulties with land registration because of lacking documents. With this absence of traceability it is hard to use existing properties as collaterals.[37] Another aspect that has negatively affected the development of the Ghanaian mortgage market is the legal framework. As mentioned before, an efficient mortgage market needs a judicial system that ensures comprehensible and legal property transactions and foreclosures. Unfortunately, these uncertainties lead to insufficient market transparency and therefore to high risk in mortgage lending. The Bank of Ghana interviewed 22 members of the Ghana Real Estate Developers Association (GREDA) in 2007 about the reasons for increasing house prices. Table 2 shows the answers. The most frequently mentioned answer was the cost of raw materials and the

[35] Cf. Proparco 2013, p. 19.
[36] Cf. Modern Ghana 2013.
[37] Cf. Centre for Affordable Housing Finance in Africa 2015, p. 98.

high cost of land. Even one fifth state that high interest rates lead to higher prices. These results show that not only interest and mortgage payments effect the affordability of housing, the ease of getting raw materials and the affordability of general building costs have to be guaranteed.

Table 2 Causes of Increasing House prices in Ghana

Cost of raw materials	86,4%
High labor costs	27,3%
High cost of land	50%
High interest rates	18,2%
Unavailability of land	13,6%
Inefficient Technology	4,5%

Source: Own illustration referring to: Bank of Ghana (2007, p. 35).

4.4 South African Mortgage Market

The South African Mortgage Market is established since more than 100 years. The general financial system is well developed and functions as a role model for Africa. Due to wide-ranging legal environments, in terms of title and foreclosure, mortgage security can be seen as good as in the UK.[38] To understand the development and the link between capital and mortgage markets, a brief historic overview of the market background is given.

Occasional periods of strict regulations accompanied by a foremost market oriented financial system characterizes the South African financial system. The South African Reserve Bank, established in 1922, was the first attempt of South Africa's government to gain control over the financial markets. Due to war and troubles in the gold industry until

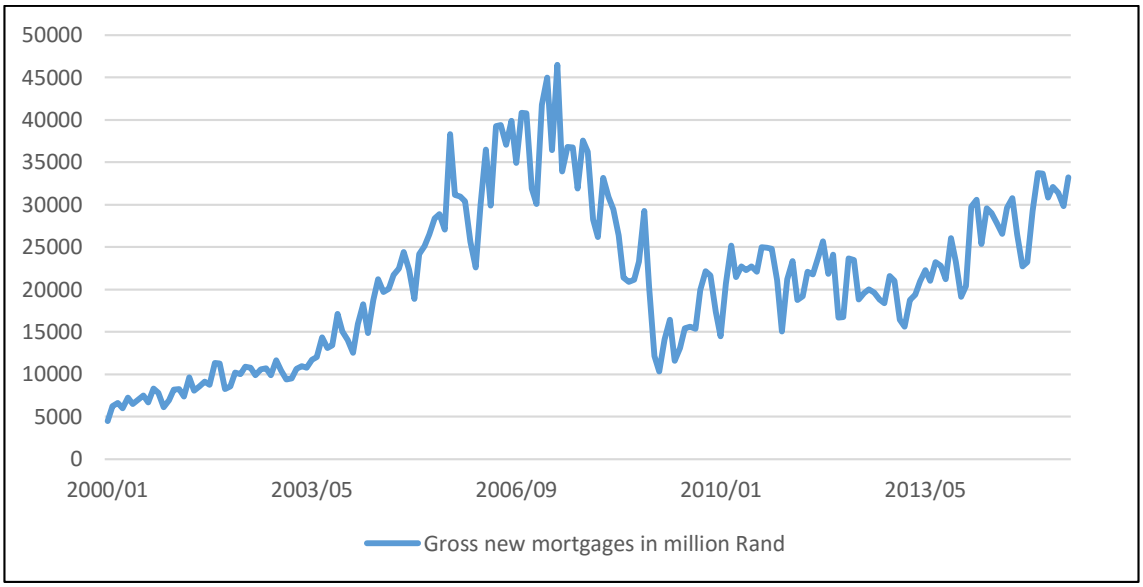
[38] Cf. Ben-Shahar 2008, p. 179.

the early 1960's, the interventions by the Reserve Bank were restricted. In the second half of the 1960's, South Africa's economy began to struggle due to the countries' exclusion from the international community of nations. With the governing apartheid regime and the beginning economic isolation, a period of instability began. South Africa's Reserve Bank reacted to these economic restraints and intervened to achieve direct control over the financial system. Exemplary, credit extensions and lending interest rates were controlled and administered from 1968 among other methods. From 1968 to 1980, these measures were kept in place. Beginning in 1980, a special commission were established to advance the prevailing financial system and focus on improving it. Through the de Kock Commission's market-oriented monetary system, the Central Bank began to deregulate the financial system. The previously mentioned interventions in interest rates and credit limits were formed back in the early 1980's. The political changes, especially the end of apartheid in 1993 led to a further development and implementation of a market-oriented system. The from then on governing African National Congress (ANC) developed this idea in an economic plan: Growth, Employment and Redistribution (GEAR).[39] Before the introduction of the secondary mortgage market in 2001, the market was limited to mortgage origination and servicing. Until 1999 the primary mortgage market was dominated by traditional banks with the typical mortgage product being a 20 to 30 year variable rate mortgage. The occurrence of non-bank mortgage originators from 1999 was a significant development in the mortgage industry. These new societies offered similar mortgage products as the traditional banks, but have been able to create a diversified market, through innovation and the use of securitization. This led to a market share of more than 50% of originated mortgages in South Africa. The development of a

[39] Cf. Frank Gyamfi-Yeboah, Alan J. Ziobrowski 2009, p. 341.

secondary mortgage market for conventional mortgages began in 2001. Since then, various financial institutions have used securitization as a tool for retrieving long-term and restocking capital.[40]

Figure 17 Development of New Mortgages in South Africa



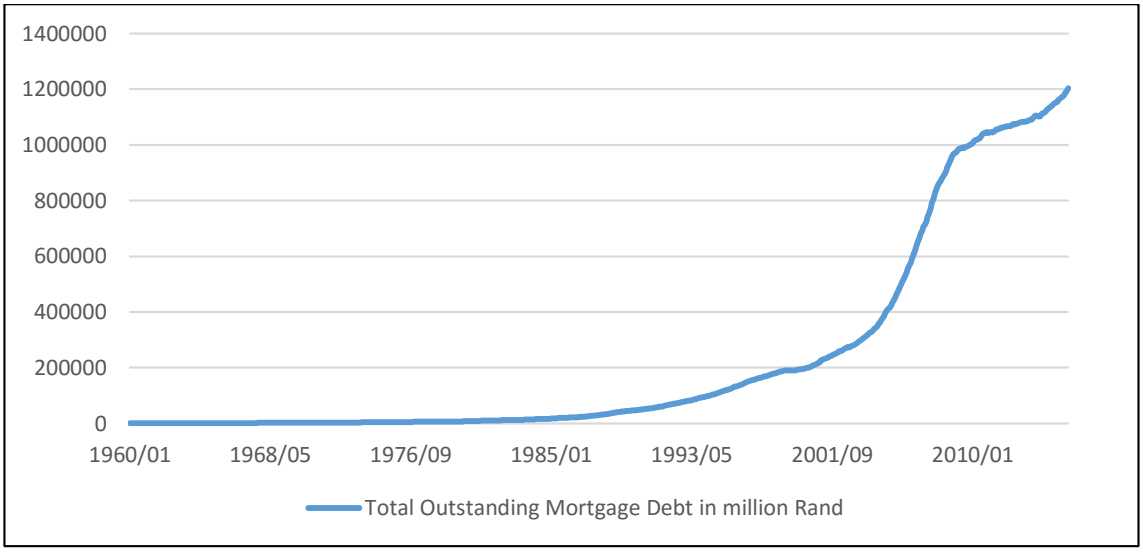
Source: Own illustration referring to: South African Reserve Bank (2015).

The total outstanding South African home mortgage loans of September 2015 stood at $82.93 billion with a mortgage rate of 9.50%.[41] Figure 17 shows the development of the gross new mortgages in million Rand for every single month since 2000. An enormous growth until early 2007 can be seen. Due to the financial crisis until 2009 there is a decline in new mortgages loans. The recovery of the economy led to another growth and achieved a new height since than in 2015. In Figure 18 the outstanding mortgage debt in million

[40] Cf. Frank Gyamfi-Yeboah, Alan J. Ziobrowski 2009, p. 342.
[41] Cf. South African Reserve Bank 2015.

Rand is depicted. The mortgage debt grew slowly from 1990. From 2001 with the start of the securitization of mortgages the outstanding mortgage debt grew rapidly until now.

Figure 18 Outstanding Mortgages in South Africa



Source: Own illustration referring to: South African Reserve Bank (2015).

Generally speaking, South Africa has the biggest and most developed mortgage market in Sub-Saharan Africa. The country has achieved a high professionalization and therefore also an interesting market for foreign and domestic investor and developers.

To see if there is a relation in capital and mortgage markets and the start of deregulation and the introduction of Mortgage Backed Securities, the next part approaches the integration of South African mortgage and capital markets.

4.5 Integration of South African Mortgage and Capital Markets

Previous Studies showed the importance of the integration between mortgage and capital markets in emerging countries to gain further economic progress. Using time series data

from South Africa, the following part shall reveal the importance of liberalization of capital markets and the development of a secondary mortgage market.

4.5.1 Time Series and Data

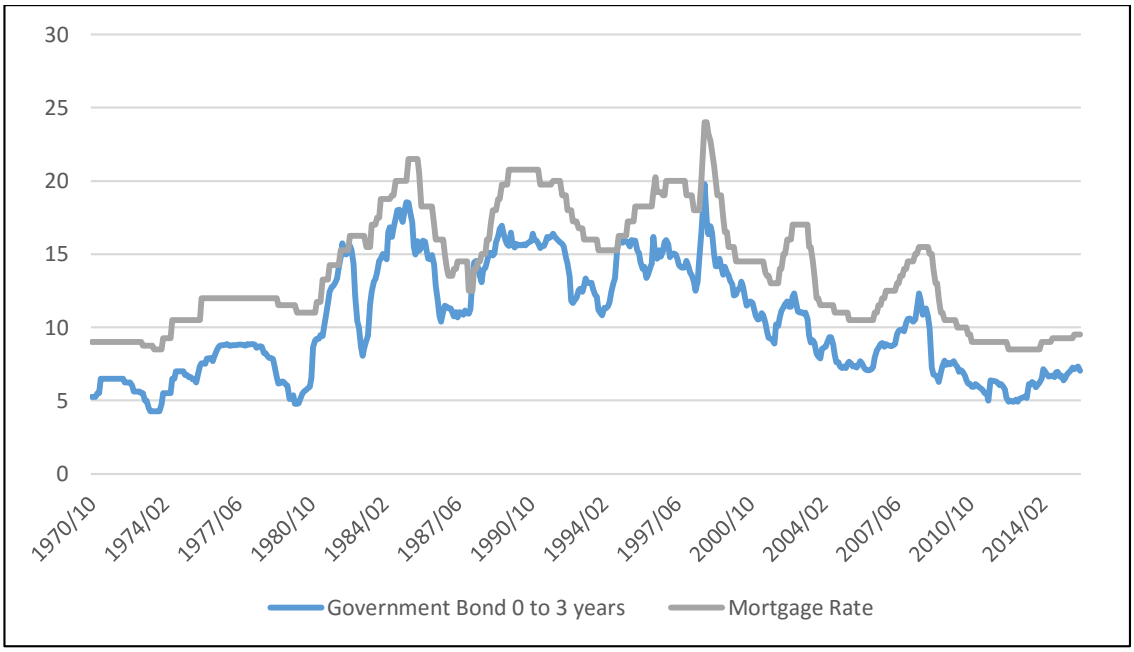
To investigate the relationship between the mortgage and the capital markets, suitable data is needed to analyses these two markets. South Africa is one of the few Sub-Saharan countries that deliver a various range of mortgage and capital market data. The South Africa Reserve Bank collects the data and makes it accessible to the public. In this analysis data from 1970 to 2015 is used to observe the change over time. The mortgage rate on a monthly basis is taken into consideration to analyze the mortgage market. For the capital market, monthly data of South African government bond yields are used. Because most of the mortgage loans are adjustable rate mortgages, this study uses short term (0 to3 years) government bonds, to regard the varying mortgage rates. Figure 19 illustrates the mortgage and bond rate from 1970 to 2015. Two main impacts occurred during that period. As mentioned before, South Africa deregulated the capital markets from 1980 on and opened the barriers. Another aspect is the introduction of mortgage backed securities and therefore first steps to securitization. To consider these impacts, the data is spitted into timeframes. The first period from 1970-1979, the second period from 1980 to 1989, the third period from 1990 to 1999 and the fourth period from 2000 to 2015.

Prior to the deregulation, the highest mortgage rate was 12%, averaging 10.53%. The bond yield averaged 6.85% with a highest value of 8.86%. From then on, the average mortgage rate was 14.83% with the highest rate of 24% in 1998 and lowest rate of 8.5%

in 2012. The bond yield varied from 4.76% in 1980 to 19.79% in 1998, averaging 11.32%.[42]

Figure 19 also points out, that there is a lag between mortgage rates and bond yields. Nevertheless the two datasets seem to be highly correlated.

Figure 19 South African Mortgage Rate and 0 to 3 Year Bond Rate



Source: Own illustration referring to: South African Reserve Bank (2015).

4.5.2 Cointegration and Unit Root Tests

Before the test for cointegration of mortgage and capital markets can be done, the available time series has to be tested for stationarity. If variables show the same dependence structure for different time settings, they are called stationary[43]. To identify

[42] Cf. South African Reserve Bank 2015.
[43] Cf. Hackl 2008, p. 217.

the non-stationarity of the interest rate series the Dickey and Fuller unit root test is used to estimate the following equation:

$$\Delta y_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2\ \ldots\ldots} + e_t\,, t = 1, 2, \ldots,$$

Where $y_t = interest\ series$

And $\Delta y_t = y_t - y_{t-1}$

The null hypothesis H_0: $\alpha_1 = 0$ is tested to indicate the series is not stationary.[44]

The Augmented Dickey Fuller (ADF) statistics is used to test the results for significance.

Table 3 ADF test for mortgage and treasury rates for South Africa

	1970-1979	1980-1989	1990-1999	2000-2015
Variables	t-Statistics			
Mortgage Rate	-1.31	-1.13	-2.01	-3.42
Bond Yield	-0.50	-2.59	-2.87	-2.77

Source: Own illustration referring to: Eviews 9 (See Appendix for complete Eviews Output).

The ADF statistic is the t-value for the joint estimate of γ with the lag term. The mortgage and capital markets are expected not to be integrated, if the ADF statistic is less than the critical values of the ADF in absolute terms. In Table 3 and 4 the critical values and results of the unit root test are summarized. The different critical values for the 2000-2015 time period vary due to a longer time period and therefore more observations. The results demonstrate that all the series are non-stationary and are integrated of order one.[45] These results show evidence that the capital and mortgage markets may be cointegrated. To

[44] Cf. Frank Gyamfi-Yeboah, Alan J. Ziobrowski 2009, p. 4.
[45] Cf. Frank Gyamfi-Yeboah, Alan J. Ziobrowski 2009, p. 5.

show that the two markets are cointegrated or not, the Engle and Granger test for cointegration is used.

Table 4 Critical Values for ADF Test

Critical Values			
	1%	5%	10%
1970-1999	-4.04	-3.45	-3.15
2000-2015	-4.00	-3.43	-3.14

Source: Own illustration referring to: Eviews 9 (See Appendix for complete Eviews Output).

To see if there is a long-term equilibrium relationship between mortgage interest rates and bond yields, following equations have to be estimated:

$$r_{mr} = \beta_0 + \beta_1 r_{br} + e_t$$

$$r_{br} = \beta_0 + \beta_1 r_{mr} + e_t$$

With: $r_{mr} = mortgage\ rate$

And: $r_{br} = 0\ to\ 3\ year\ bond\ rate$[46]

The Engle and Granger test proposes seven test statistics in which

$$H_0 = Series\ are\ note\ integrated$$

And an alternative $H_1 = Series\ are\ integrated$, can be tested.[47]

[46] Cf. Frank Gyamfi-Yeboah, Alan J. Ziobrowski 2009, p. 5.
[47] Cf. Hackl 2008, p. 321.

The results of the cointegration tests are presented in Table 5. To see if the data is cointegrated, the respective t-values have to be higher than the critical values in absolute terms. In Table 5 and 6 the critical values and the t-statistics of the Engle and Granger test are presented. The results show that in the 1970-1979 term, there is no integration between the bond and mortgage rate. Since then, an integration of the mortgage and bond rate occurred.

Table 5 Engle and Granger Test Results

	1970-1979	1980-1989	1990-1999	2000-2015
	t-Statistics			
Mortgage Rate	-0.35	-3.94	-2.99	-4.45
Bond Yield	-0.47	-3.17	-2.46	-3.17

Source: Own illustration referring to: Eviews 9 (See Appendix for complete Eviews Output).

Table 6 Engle and Granger Test Critical Values

	Critical Values		
	1%	5%	10%
1970-2015	3.73	3.29	2.91

Source: Own illustration referring to: Robert F. Engle, Byung Sam Yoo (1987, p. 158).

4.5.3 Interpretation

As previously mentioned, deregulation of the financial markets in South Africa began in 1980. The results indicate that before this deregulation, the capital and mortgage markets were not integrated. For all three periods from 1980-1989, 1990 to 1999 and 2000-2015, the ADF statistics are greater than the critical value. Thus, these series seem to be integrated. Taking the introduction of the secondary mortgage market in 2000 into consideration, slightly higher t-values can be observed since the integration. As a general result of the Engle and Granger cointegration test, deregulation of financial markets in

emerging countries can lead to an integration of capital and mortgage markets. Therefore, it is very important to have strong and independent capital markets to have a working and efficient mortgage market.

4.6 Comparison and Perspectives

The mortgage market in Ghana and Tanzania are still in infancy levels. As mentioned before, with a total outstanding mortgage debt of $180 million and $150 million, they are far less developed than the market in South Africa, showing an outstanding debt of $90 billion. The difference in these numbers is due to multiple reasons in the finance and economic sector.

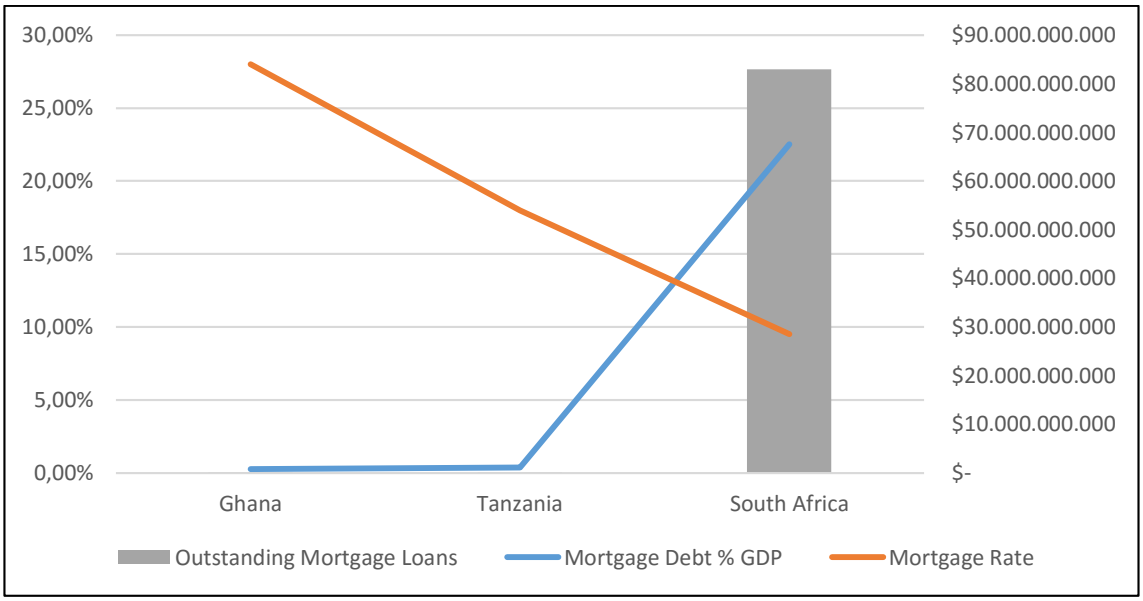
In Tanzania and Ghana, the supply of marketable financial housing products is very low compared to South Africa. The other advantage of South Africa is the introduction of the secondary mortgage market. Since then, the amount of mortgage debt increased significantly. Tanzania started the refinancing of mortgage loans and has made various efforts to improve their second mortgage market. Ghana still lacks a good working securitization for mortgages. Another fact is the extensive real-estate broker network in South Africa, which makes it easier for mortgage providers to achieve scale quickly. The South African non-bank sector has grown fast and has been enhanced by its mortgage switching facility.[48]

In Figure 20 Ghana, Tanzania and South Africa are compared to each other with the most important mortgage key figures. Mortgage Debt to GDP in %, current mortgage rate and the total value of outstanding mortgage debt. Obviously, there is an enormous difference.

[48] Proparco 2013, p. 20.

With a declining mortgage rate the amount of mortgage debt and total debt to GDP is growing. Another aspect that shows the importance of a low and steady mortgage rate. It is striking that South Africa outnumbers the results of the other two countries.

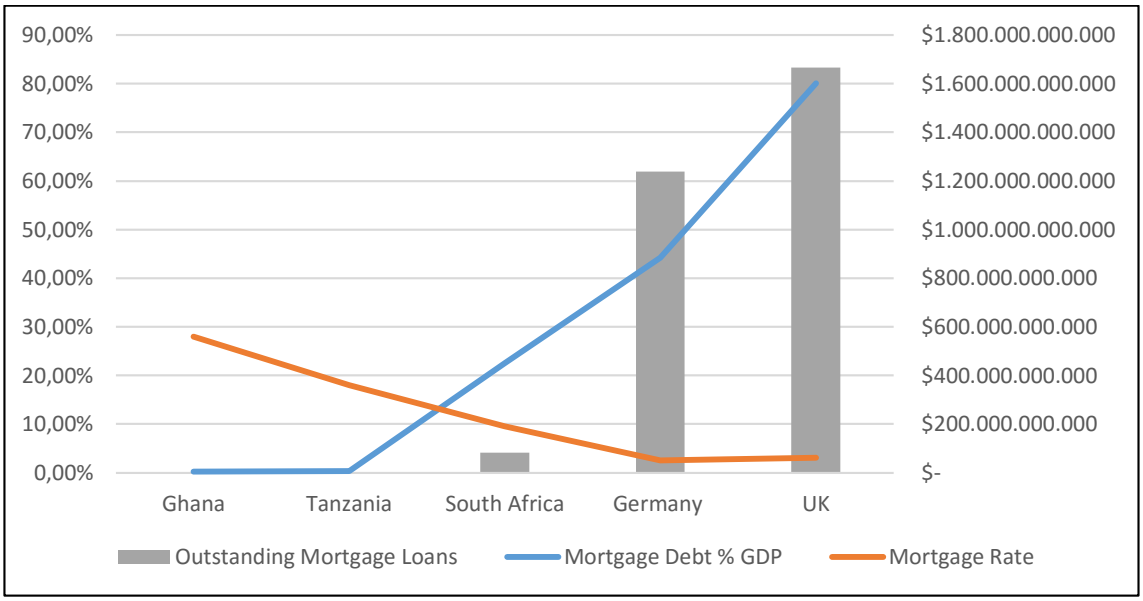
Figure 20 Comparison of African Mortgage Markets



Source: Own illustration referring to: Various different data sources.[49]

[49] Centre for Affordable Housing Finance in Africa 2015; Bank of Ghana 2007; Proparco 2013; South African Reserve Bank 2015.

Figure 21 International Comparison of Mortgage Markets



Source: Own illustration referring to: Various different data sources.[50]

Other important factors for the stability and affordability of mortgages are the inflation and exchange rates. Tanzania's and especially Ghana's inflation rates are extremely volatile and vast. Trying to stabilize the inflation and exchange rates has to be one goal of the policies. Figure 21 shows the African mortgage market in relation to Germany's and the UK's. A significant distinction is not only the amount of outstanding debt (Can be higher in developed countries due to greater value) but particularly the mortgage debt to GDP ratio. In the UK and Germany, 80% respectively 60% of the total GDP is mortgage debt. An enormous amount compared to other African nations. It clearly shows the opportunities and challenges the Sub-Saharan countries have to face. Nevertheless, South Africa can be used as a role model to gain further success in creating an affordable and easy accessible mortgage market.

[50] South African Reserve Bank 2015; Hypostat 2015; Federal Reserve Bank 2015; Centre for Affordable Housing Finance in Africa 2015; Federal Reserve Bank 2015.

To stabilize the mortgage and housing markets and to close up on the developed markets, following steps can be taken into consideration:

- Creating a strong legal and regulatory environment for the real estate and housing sector. Modernize current land administration systems, procedures, and all sector participators and provide the framework for a market-based housing sector in African countries.[51]
- Generating a stable capital markets system. Lower and stable interest rates are needed.
- Stabilizing the Economy. Growing economies attract the interest of foreign investors and can generate
- Opening up cement markets and other construction materials. Promotes competition and lowers prices.
- Using natural resources to gain independence of expensive. (E.g. high potentials in green buildings with bamboo).
- Simplifying property registrations.
- Strengthening the mortgage sector in creating new mortgage products. Open the market for securitization and keep low and stable mortgage lending rates
- Attracting investors. Tax savings and simplified transactions to open the market and raise the attractiveness.
- Strengthening Public Private Partnerships (PPP). Establish housing companies, owned by private entities and the government

[51] Cf. Proparco 2013, p. 20.

These are just a few suggestions to open the market and try to raise awareness to attract investors.

The following chapter shall explain and developed strategies, to quantify the maturity and attractiveness respective housing markets in African countries can achieve.

5. The Housing Attractiveness and Maturity Index (HAMI) for Africa

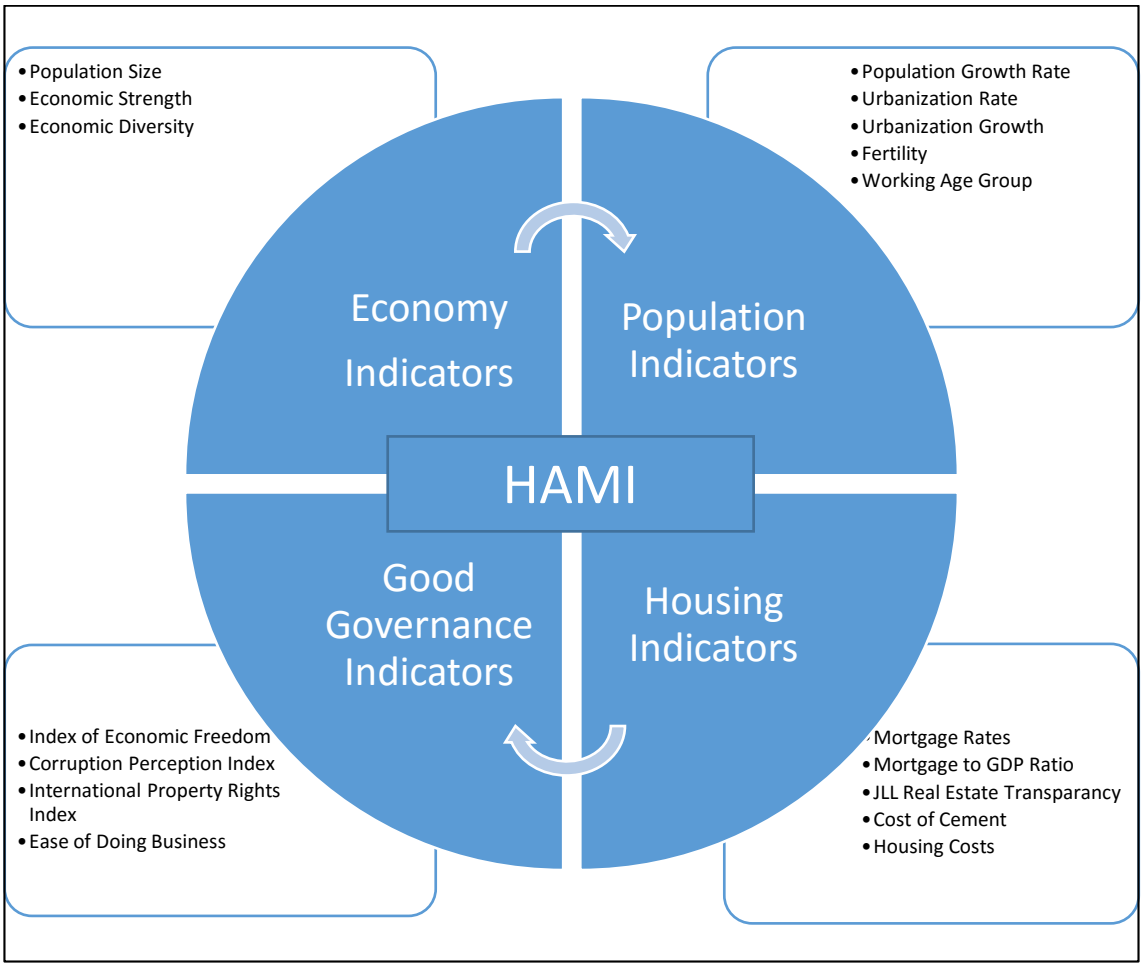
Sub-Sharan Africa consists of many different nations, cultures and religions. Every single country has to deal with different challenges and problems. For the housing industry, especially developers and construction companies, these numerous distinctions set high standards for developers to meet new challenges. To measure the difficulties and opportunities, this chapter tries to develop a single measurement to identify the maturity and attractiveness of the housing and residential sector in respective countries. Investors and developers can read off values and set their own weighting. The Index is based on the previously discussed housing and mortgage influencing variables.

5.1 Calculation and Approach

The basic approach of the Housing Attractiveness and Maturity Index is to combine several important measurements and form one single index. The HAMI combines economic factors (e.g. GDP), population factors (e.g. population growth rate), good governance factors (e.g. Property Rights Index) and housing indicators (mortgage rates).

Every indicator relies on specific sources. These sources are getting analyzed and create a specific rating for each indicator. Combining these four ratings, the HAMI score should express the attractiveness for developers to start investing in housing developments.

Figure 22 Approach of the Housing Attractiveness and Maturity Index



Source: Own illustration.

5.1.1 Economic Indicators

The first step is to analyze the general economic situation. To identify and value the general economic situation in respective countries, five variables are selected. They represent the economic strength, diversity and population size.

Population size

Population size per se is not a negative influencing factor. But from the point of view of a real estate developer, small countries are unlikely to support developments with several

hundreds of housing units. But the amount is a key factor for every developer and investor. Large developments generate more economies of scale and therefore lower the costs. So small countries are not the favorable address to invest first. It is assumed that in larger economies, higher economies of scales can be achieved.

To classify the population size of each country, the sizes are divided in five quintiles and deliver a point score. 20% of the highest values get five points, countries that represent values between 60% and 80% get 4 points, between 40% and 60% 3 points, 20% and 40% 2 points and the lowest 20% get 1 point. This approach is also used for the other variables to identify the general economy.

Economic Strength

To examine the economic strength, two variables are used to identify the current economic situation. The current GDP and the GDP growth rate in each country. To value the attractiveness for developers and investors, the general economic strength is very important. The current GDP states the general situation compared to other nations and reports the economic power. For the GDP growth rates, a geometric mean for the last 15 years is calculated to see the development over the past years and give a trend for the upcoming years. Developers would prefer countries with higher and stable growth rates during the last years due to its fast development and continuously growing environment.

Both, the current GDP and GDP growth rate for all Sub-Saharan countries are consulted and then divided in five quintiles. The higher the values, the more points they get on the point score.

Economic Diversity

Developers who look for investments into large buildings with many housing units, it is appropriate to invest in countries with a diversified economy. Countries that still rely on agriculture are not as attractive as countries with a strong industry and service percentage. Therefore the percentages of industry to GDP and services to GDP are analyzed.

Again, a point score is used to identify the highest and lowest scoring countries. The countries with the highest reliance on industry and services sector are seen as the most attractive ones and consequently get the highest score.

Results

To get a consistent overview of the general economy in respective countries, all five variables are shown in Table 7. The variables are shown in their point score and ranked to their average score they get in combining all five variables. Nigeria (4.6), Zambia (4.4), Dem. Rep. of the Congo (4.2), Ghana (4.2) and South Africa (4.2) built the top five countries, according to the general economic situation.

Table 7 General Economy Index for all Sub-Saharan Countries

Country	Population	GDP	GDP Growth 99-14	Services to GDP %	Industry to GDP %	Index
Nigeria	5	5	5	5	3	4.60
Zambia	4	4	5	4	5	4.40
Congo,DemRep	5	5	3	3	5	4.20
Ghana	5	5	4	3	4	4.20
South Africa	5	5	2	5	4	4.20

Uganda	5	4	5	4	3	4.20
Angola	4	5	5	1	5	4.00
Botswana	2	4	4	5	5	4.00
Tanzania	5	5	4	2	4	4.00
Mozambique	5	4	5	3	3	4.00
Sudan	5	5	4	3	3	4.00
Kenya	5	5	3	3	3	3.80
Ethiopia	5	5	5	2	2	3.80
Namibia	2	3	3	5	5	3.60
Burkina Faso	4	3	4	3	4	3.60
Senegal	3	4	3	4	4	3.60
Cameroon	4	4	2	3	4	3.40
Cote d'Ivoire	4	5	1	4	3	3.40
Madagascar	4	3	4	4	2	3.40
Mauritius	1	3	3	5	4	3.20
Mali	4	3	4	2	3	3.20
Rwanda	3	2	5	4	2	3.20
Congo, Rep.	2	4	3	1	5	3.00
Gabon	1	4	1	4	5	3.00
Mauritania	2	2	4	2	5	3.00
Zimbabwe	3	3	1	4	4	3.00
Lesotho	2	1	2	5	4	2.80
Niger	4	2	3	2	3	2.80
Malawi	4	2	3	3	2	2.80

Chad	3	3	5	1	2	2.80
Benin	3	3	3	3	2	2.80
Guinea	3	2	1	2	5	2.60
Eritrea	2	2	1	5	3	2.60
Cabo Verde	1	1	4	5	2	2.60
Swaziland	1	2	1	3	5	2.40
Sao Tome Pri.	1	1	3	5	2	2.40
Equat. Guinea	1	4	5	1	1	2.40
Burundi	3	1	2	2	3	2.20
Togo	3	2	2	2	2	2.20
Sierra Leone	2	2	5	1	1	2.20
Seychelles	1	1	2	5	1	2.00
Comoros	1	1	2	4	1	1.80
South Sudan	3	3	1	1	1	1.80
Liberia	2	1	2	1	1	1.40
Somalia	3	1	1	1	1	1.40
Guinea-Bissau	1	1	1	2	1	1.20
Cen.Afr.Repub.	2	1	1	1	1	1.20
Gambia	1	1	2	1	1	1.20

Source: Own illustration and calculation referring to: The World Bank (2015a).

5.1.2 Population Indicators

After analyzing the general economy of each country, some population variables are set to examine. Larger countries and countries with a high urbanization rate have the potential

for further projects in several locations. This can generate greater efficiency considering the approval procedure, legal structures, moneylenders, and construction workers.

Another five different variables for the population are identified and analyzed to give an overview and classify their potential.

Population Growth Rate

Population growth creates demand for housing, and therefore is a good indicator for the future demand. Nonetheless, very high growth rates can create market pressures that cannot be managed easily in emerging economies. Therefore, the point score rewards countries with stable and not very high population growth rates.

To simplify the calculation, only 20 countries with the highest economic index are taken into further consideration.

The point scoring rewards countries that are growing at a modest rate. Countries expected to grow less than 1.5% per annum collect five points; those rising 1.5% to 2.25% per year get four points. Those increasing 2.25 to 2.75% per year receive three points, countries with growth rates from 2.75% to 3.00% get two points and countries over 3.00% get just one point.

Urbanization Rate

The urbanization rate represents the percentage of each nation's total population that are living in urban areas. As rural residents settle to cities not only for economic opportunity, the demand for housing in African cities continues to grow rapidly. By 2020, the UN projects that 40.7% of sub-Saharan residents will live in urban areas. That increase will

represent over 117 million people.[52] Most of the demand for housing units is in the moderate and middle income families, living in urban cities. In most countries, these growing urbanization leads to a development of unappropriated slum housing. Therefore there is a high demand for affordable housing. Investors and developers seek that opportunity to invest in building new homes. Consequently, the higher the urbanization rate, the higher the demand for housing.

The point scoring is divided into five parts. Countries with more than 60% of urban population get five points, between 50% and 60% four points, between 40% and 50% three points, between 30% and 40% two points and under 30% just one point.

Urbanization Growth Rate

As mentioned before, rapid urbanization worsens housing characteristics and can mean a high demand for appropriate housing. Even if the current urbanization rate is low, the growth rate can be high and can be seen as an indicator for future demand. The average growth rate in the last 10 years is the underlying variable for the study.

Nations with an average increase of 4.0% receive five points, between 3.0% and 4.0% four points, between 2.0% and 3.0% three points, between 1.0% and 2.0% two points and lower than 1.0% just one point.

Fertility Rate

The fertility rate is the average number of births per women. Lower fertility rates go a long with stronger economic potential. There are less challenges economies have to face. More children attend school and more resources for consumption are available for

[52] Cf. Lachman Associates LLC 2013, p. 12.

example. Total fertility in Africa is expected to decline in the next years, shrinking from 4.68 children per woman in 2010-2015 to 4.39 in 2020.[53]

The observations are classified into five groups. Nations with a fertility rate below 2.8 get five points. Countries with a rate between 2.8 and 3.5 get four points, between 3.5 and 4.0 get three points, between 4.0 and 4.5 get two points and countries above 4.5 get one point.

Working-Age Adults (% of Total Population)

Countries with more people in the segment from 15-64 years are more likely to need more housing. They theoretically have also more income to spend on housing. This is why developers and investors should prefer countries with more people in the target group.

The countries are divided in five groups. The point scoring differs with increasing target population. Countries with a percentage of more than 65% get five points. In addition, countries between 60% and 65% get four points, between 55% and 60% three points, between 50% and 55% two points and below 50% one point.

Results

The results of the population indicators for respective countries are shown in Table 8. It is evident, that South Africa (4.5) shows the highest scores for the population variables. It is almost in every category in the top group and therefore a top housing investment location according to population matters. Other countries that also rank in the top five group are Namibia, Botswana, Cote d'Ivore and Ghana. The lowest rating shows Uganda (2).

[53] Cf. Lachman Associates LLC 2013, p. 13.

Table 8 Rating of the Population Indicators for the HAMI

Country	Urbanization Rate	Urbanization Rate Increase	Fertility Rate	Population Growth	Working-Age Adults	Population Index
South Africa	5	3	5	5	5	4.5
Namibia	3	5	4	4	3	4
Botswana	4	3	4	4	4	3.75
Cote d'Ivoire	4	4	1	4	2	3.25
Ghana	4	4	2	3	3	3.25
Mauritius	2	1	5	5	5	3.25
Cameroon	4	4	1	3	2	3
Nigeria	3	5	1	3	2	3
Zambia	3	5	1	2	2	2.75
Angola	3	5	1	1	1	2.5
Congo, Dem. Rep.	3	5	1	1	2	2.5
Ethiopia	1	5	1	3	2	2.5
Kenya	1	5	1	3	3	2.5
Madagascar	2	5	1	2	3	2.5
Senegal	3	4	1	2	2	2.5
Mozambique	2	4	1	2	2	2.25
Sudan	2	3	1	3	3	2.25
Tanzania	2	5	1	1	2	2.25
Burkina Faso	1	5	1	1	2	2
Uganda	1	5	1	1	1	2

Source: Own illustration and calculation referring to: The World Bank (2015a).

5.1.3 Good Governance Indicators

To identify the legal framework and economic stability of each country, four existing indicators are taken into one. This shall give an overview of the general reliability of a countries government and legal surroundings.

Ease of Doing Business

The ease of doing business indicator unites 10 different sets and gives an overview of the general possibilities in starting a business in 189 different countries. It is not only a well know indicator and handles different topics, it also measures the complexity and cost of regulatory processes as well as the strength of legal institutions. Therefore it is used to compare African Nations in their general attractiveness.[54]

The countries are divided in five groups again. The easier doing business is possible, the more points a country can get. The top 50 countries in the "Doing Business Report 2015" get five points, the top 100 countries get four points, the top 125 countries get 3 points, the top 150 countries get 2 points and the other countries get 1 point.

Corruption Perception Index (CPI)

Another major factor in good governance is corruption. To incorporate the importance of corruption in good governance, the Corruption Perception Index is used to identify the risks of a corrupt economic environment. A total of 174 countries are observed in this index.

[54] Cf. World Bank Group 2015, p. 17.

The results of the CPI are grouped into five clusters. Countries that rank higher than 50 receive five points, countries between 50 and 100 receive four points, between 100 and 125 receive three points, between 125 and 150 receive two points and the rest 1 point.

International Property Rights Index (IPRI)

Property rights are directly linked to principles of individual liberty. They promote prosperity and set the framework for a working legal environment. The IPRI is a yearly study that goals to measure the strength of property rights and to rank countries to make them comparable. The IPRI uses ten diverse factors and contains 129 different countries.[55]

Again, countries are valued according to their rank. Countries that rank 50 or below get 5 points, between 50 and 80 get four points, between 80 and 95 get three points, between 95 and 110 get two points and the rest gets one point. (If there is no score, countries also receive one point)

Index of Economic Freedom

The Index of Economic Freedom consists of ten different values to value the economic freedom (Property Rights, Freedom from Corruption, Fiscal Freedom, Government Spending. Business Freedom, Labor Freedom, Monetary Freedom, Trade Freedom, Investment Freedom and Financial Freedom). It is a good indicator for human progress and greater prosperity and consists of 175 countries. Hence not only real estate developers rely on such indicator.[56]

[55] Cf. Property Rights Alliance 2015, p. 3.
[56] Cf. The Heritage Foundation 2015, p. 20.

In the calculation for the rankings in this chapter, the results of the Economic Freedom Index are weighted and divided into five groups. Countries ranking better than 50 get five points, better than 80 get four points, better than 110 get three points, better than 140 get two points and the other countries get one point.

Results

Table 8 shows the results for all the good governance indicators. Striking is the high range of values. Mauritius ranks number one with a value of 5.0, whereas Angola, Congo and Sudan rank last with just 1.0. These are clear indicators of the current political situation in these countries. There are many challenges in these countries for the housing industry because of the political instability.

Table 9 Good Governance Indicators for selected Sub-Saharan Countries

Country	Ease of Doing Business	Corruption Index	Property Rights Index	Index of Economic Freedom	Good Governance Index
Mauritius	5	5	5	5	5
Botswana	4	5	5	5	4.75
South Africa	4	4	5	4	4.25
Ghana	3	4	5	4	4
Zambia	4	4	4	3	3.75
Tanzania	2	3	4	3	3
Burkina Faso	2	4	2	3	2.75
Namibia	3	4	1	3	2.75
Senegal	1	4	3	3	2.75

Uganda	3	2	3	3	2.75
Cote d'Ivoire	2	3	2	3	2.5
Kenya	3	2	3	2	2.5
Madagascar	1	2	2	4	2.25
Mozambique	2	3	2	2	2.25
Ethiopia	2	3	2	1	2
Nigeria	1	2	1	2	1.5
Cameroon	1	2	1	1	1.25
Angola	1	1	1	1	1
Congo, Dem. Rep.	1	1	1	1	1
Sudan	1	1	1	1	1

Source: Own illustration and calculation referring to: Several Sources.[57]

5.1.4 Housing Indicators

In the past chapters, the good governance, population and economic situation in respective countries were analyzed using different indicators. To get the final HAMI score, real estate and housing indicators are needed.

Real Estate Transparency Index

The Real Estate Transparency Index published by Jones Lang LaSalle (JLL) is a specialized index focusing on real estate issues. Therefore it is a good indicator for decision-making of developers and investors. JLL's Global Real Estate Transparency Index quantifies real estate market transparency across 102 countries. The Index aims to

[57] Calculations based on: The Heritage Foundation 2015; Property Rights Alliance 2015; World Bank Group 2015; Transparency International 2014.

help real estate investors understand important differences when transacting, owning and operating in other markets.[58]

To estimate the HAMI score, the JLL index is divided into five different groups. The lower the JLL index, the more points a country gets. The original data is separated into quintiles to define the score. From a JLL index score of 1.0 to 2.1, countries get 5 points. From 2.1 to 2.9 they get four points. From 2.9 to 3.4 they get three points. From 3.4 to 3.9 they get two points and from 3.9 on, they get one point. A country with no data gets 1 point.

Mortgage Rates

Mortgage rates are one of the key drivers for a working housing industry. Consequently, mortgage rates have to be considered creating a housing index.

Using data from the Centre for Affordable Housing Yearbook 2015, the higher the mortgage rates, the more expansive financing a house gets. Therefore, lower mortgage rates are ranked higher in the HAMI score.

Mortgage to GDP Ratio

As mentioned before, the mortgage to GDP ratio identifies the maturity of a housing finance system. Higher mortgage to GDP ratios indicate the importance of the housing finance sector and the attractiveness for lenders. In the HAMI index, the countries with higher mortgage to GDP ratios get higher scores.

[58] Cf. Jones Lang LaSalle 2014, p. 6.

House Prices

High house prices are usually good for developers and investors. But considering an emerging market, where capital and financial markets are not well established, the affordability of houses is an important factor. Low house prices further indicate low construction costs. In the HAMI index, the countries with lower house prices get a higher score. The prices refer to the cheapest unit built by a formal developer.

Cost of Cement

The price of 50kg cement can be seen as an indicator for construction costs. For the HAMI calculation, countries with lower cement prices get a higher score.

Results

The results of the housing indices scoring can be seen in Table 10. South Africa ranks number one followed by Mauritius and Botswana. Zambia, Mozambique and Sudan are the weakest countries according to housing needs and transparency.

Table 10 Housing Indicator Scoring for Selected South African Countries

Country	Mortgage Rate	Mortgage to GDP ratio	JLL Transparency	House Prices in $	50kg cement in $	Housing Index
South Africa	4	5	5	3	5	4.40
Mauritius	4	4	3	2	4	3.40
Botswana	4	2	3	1	5	3.00
Namibia	3	4	1	4	3	3.00
Kenya	2	2	3	4	3	2.80

Burkina Faso	5	1	1	5	2	2.80
Senegal	3	1	1	3	5	2.60
Cote d'Ivoire	4	1	1	5	2	2.60
Ethiopia	3	1	1	2	5	2.40
Ghana	1	1	2	5	2	2.20
Uganda	1	1	2	5	2	2.20
Congo, Dem. Rep.	2	4	1	3	1	2.20
Tanzania	2	1	1	3	3	2.00
Angola	3	1	1	1	4	2.00
Cameroon	3	1	1	2	3	2.00
Madagascar	3	1	1	1	4	2.00
Nigeria	1	1	1	4	2	1.80
Zambia	2	1	2	1	3	1.80
Mozambique	2	1	1	1	4	1.80
Sudan						

Source: Own illustration and calculation referring to: Jones Lang LaSalle (2014); Centre for Affordable Housing Finance in Africa (2015).

5.1.5 Forming the Housing Attractiveness and Maturity Index (HAMI)

To finally form the Housing and Attractiveness and Maturity Index, all the previously calculated results run together. General economy indicator, population indicator, good governance indicator and the housing indicator form the HAMI, by calculating the

arithmetic mean. The top five countries according to housing maturity and attractiveness are:

- 1. South Africa: 4.34
- 2. Botswana: 3.88
- 3. Mauritius: 3.71
- 4. Ghana: 3.41
- 5. Namibia: 3.34

The most developed country in Sub-Saharan Africa (South Africa) also leads according to HAMI.

Table 11 Final HAMI Scorings

Country	Economy Indicator	Population Indicator	Good Governance Indicator	Housing Indicator	HAMI
South Africa	4.20	4.5	4.25	4.4	4.34
Botswana	4.00	3.75	4.75	3	3.88
Mauritius	3.20	3.25	5	3.4	3.71
Ghana	4.20	3.25	4	2.2	3.41
Namibia	3.60	4	2.75	3	3.34
Zambia	4.40	2.75	3.75	1.8	3.18
Cote d'Ivoire	3.40	3.25	2.5	2.6	2.94
Kenya	3.80	2.5	2.5	2.8	2.90
Senegal	3.60	2.5	2.75	2.6	2.86
Tanzania	4.00	2.25	3	2	2.81

Burkina Faso	3.60	2	2.75	2.8	2.79
Uganda	4.20	2	2.75	2.2	2.79
Nigeria	4.60	3	1.5	1.8	2.73
Ethiopia	3.80	2.5	2	2.4	2.68
Mozambique	4.00	2.25	2.25	1.8	2.58
Madagascar	3.40	2.5	2.25	2	2.54
Congo, DR	4.20	2.5	1	2.2	2.48
Cameroon	3.40	3	1.25	2	2.41
Angola	4.00	2.5	1	2	2.38
Sudan	4.00	2.25	1	1	2.06

Source: Own illustration and calculation.

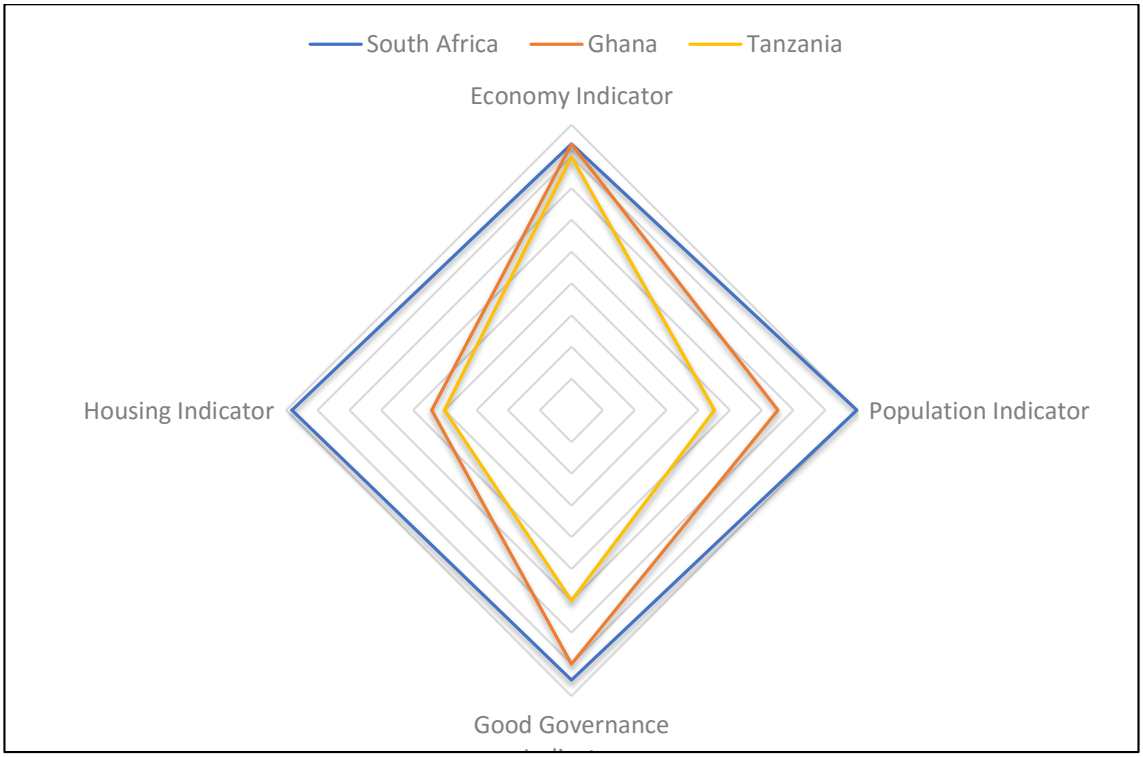
5.1.6 Detailed Comparison

Because the study focuses on Tanzania, Ghana and South Africa, Table 12 displays the different results of the HAMI components. It is obvious that South Africa gets the highest scores in every category. Noticeable is the economy indicator. South Africa, Tanzania and Ghana show strong results in their general economic environment. Ghana also shows higher scores than Tanzania in the population and good governance indicator. This leads to the conclusion that Tanzania has to improve in their administration structure and still has a high number of rural inhabitants. Both Ghana and Tanzania show weak results in the general housing indicator. Both markets lack a working housing finance sector, especially regarding mortgage finance.

The HAMI calculates a first score for the comparability of housing markets. There is still not every single influencing variable included. But it is meant to give a brief overview of

the important key factors to compare countries and show strength and weaknesses to see where improvement is necessary or not.

Table 12 HAMI Component Comparison



Source: Own illustration and calculation.

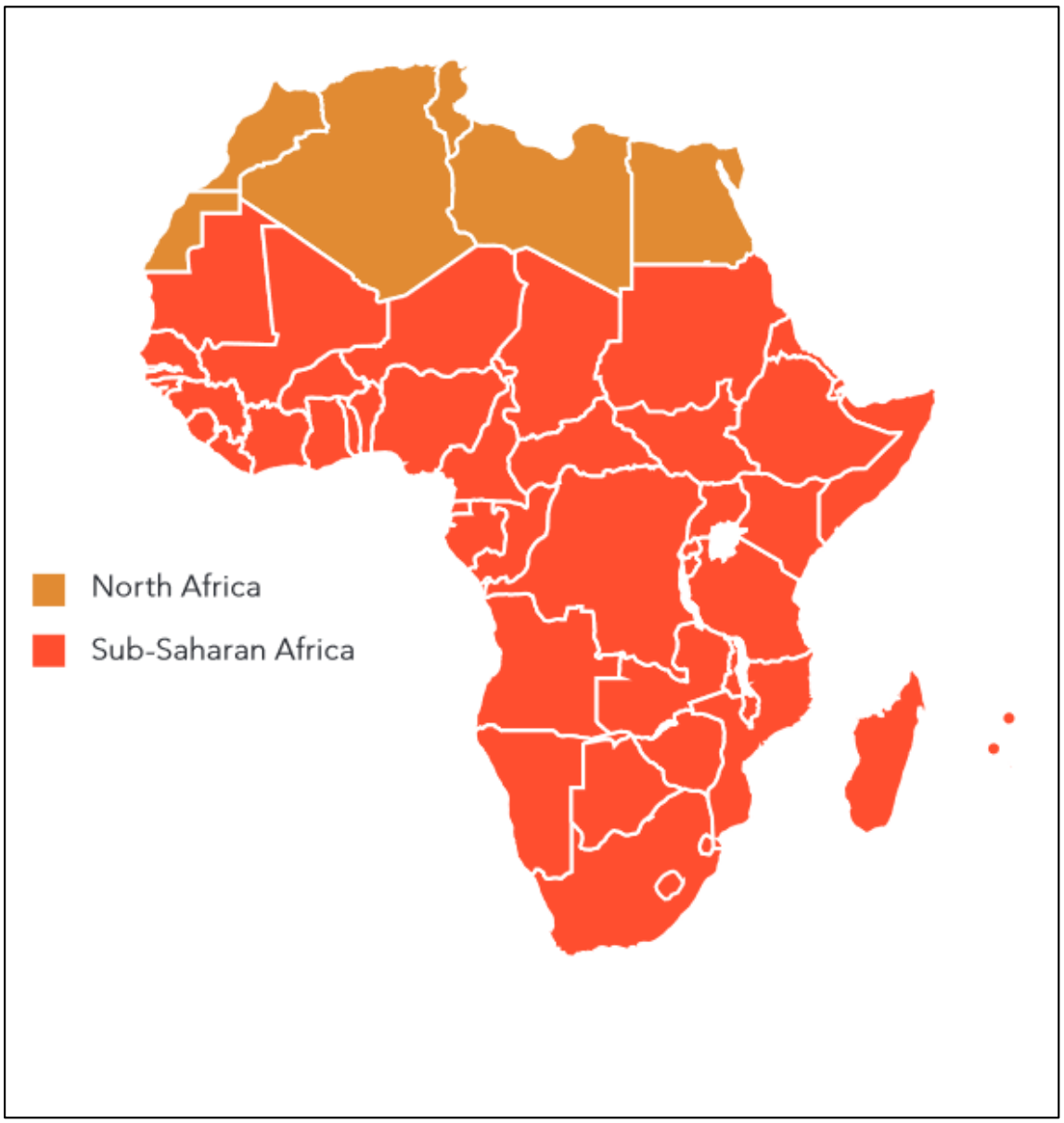
6. Conclusion

Sub-Saharan Africa's diversity is immense. Therefore the requirements for a reliable housing finance system vary from country to country. This thesis has shown that efficient housing finance markets can generate a sustainable improvement in the supply of housing. The comparison of current mortgage markets in African countries has crystalized the differences in respective countries. South Africa outnumbers the other countries by far. Ghana and Tanzania are still in the early stages of a working mortgage market, mentioning that the securitization of mortgage loans has just started or is yet to come. The analysis of the integration of mortgage and capital markets showed significant evidence of mutual influences. The deregulation of the financial markets in South Africa led to an improvement and integration of capital and mortgage markets. The introduction of Mortgage Backed Securities indicated just a small influence on the integration. Nevertheless, an introduction of RMBS can promote the refinancing options of domestic banks and financial institutions. Still, a working financial market leads to a higher availability of mortgages and therefore to a shrinking gap in housing supply.

The final assessment of housing maturity in African countries can deliver important information to improve the housing sector. The Housing Attractiveness and Maturity Index evaluation can depict weaknesses and strength of each housing market. It is also an indicator for foreign and domestic investors and developers to value the possibilities of an investment or construction. Generally speaking, Sub-Saharan Africa shows great evidence of high potential housing markets. By initializing housing finance reforms in order to gain attractiveness from foreign investors combined with establishing stable and reliable mortgage markets can help closing the current gap in housing supply and create affordable housing.

Appendix: Figures and Tables

Figure 23 Overview of Sub-Saharan Africa



Source: ACCA (2014, p. 10).

Table 13 ADF Test Mortgage Rate 70-79

Null Hypothesis: MORTGAGERATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.319357	0.8779
Test critical values:	1% level	-4.043609	
	5% level	-3.451184	
	10% level	-3.150986	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MORTGAGERATE)
Method: Least Squares
Date: 12/11/15 Time: 20:01
Sample (adjusted): 1970M11 1979M12
Included observations: 110 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MORTGAGERATE(-1)	-0.040486	0.030686	-1.319357	0.1899
C	0.377272	0.260039	1.450828	0.1498
@TREND("1970M10")	0.001286	0.001340	0.959574	0.3394

R-squared	0.017825	Mean dependent var	0.022727
Adjusted R-squared	-0.000534	S.D. dependent var	0.207501
S.E. of regression	0.207556	Akaike info criterion	-0.279932
Sum squared resid	4.609528	Schwarz criterion	-0.206283
Log likelihood	18.39628	Hannan-Quinn criter.	-0.250060
F-statistic	0.970920	Durbin-Watson stat	1.979180
Prob(F-statistic)	0.382046		

Source: Own calculation referring to: Eviews.

Table 14 ADF Test Bond Rate 70-79

Null Hypothesis: BONDRATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.503090	0.9821
Test critical values:	1% level	-4.044415	
	5% level	-3.451568	
	10% level	-3.151211	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BONDRATE)
Method: Least Squares
Date: 12/11/15 Time: 20:09
Sample (adjusted): 1970M12 1979M12
Included observations: 109 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BONDRATE(-1)	-0.011319	0.022498	-0.503090	0.6160
D(BONDRATE(-1))	0.226313	0.099398	2.276831	0.0248
C	0.130918	0.131216	0.997729	0.3207
@TREND("1970M10")	-0.000927	0.001006	-0.921390	0.3590

R-squared	0.081484	Mean dependent var	0.000917
Adjusted R-squared	0.055240	S.D. dependent var	0.265559
S.E. of regression	0.258120	Akaike info criterion	0.165220
Sum squared resid	6.995702	Schwarz criterion	0.263985
Log likelihood	-5.004474	Hannan-Quinn criter.	0.205273
F-statistic	3.104935	Durbin-Watson stat	2.047071
Prob(F-statistic)	0.029739		

Source: Own calculation referring to: Eviews.

Table 15 ADF Test Bond Rate 80-89

Null Hypothesis: BONDRATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.596504	0.2828
Test critical values:	1% level	-4.037668	
	5% level	-3.448348	
	10% level	-3.149326	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BONDRATE)
Method: Least Squares
Date: 12/11/15 Time: 20:19
Sample (adjusted): 1980M03 1989M12
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BONDRATE(-1)	-0.050083	0.019289	-2.596504	0.0107
D(BONDRATE(-1))	0.468616	0.081595	5.743199	0.0000
C	0.642910	0.226187	2.842380	0.0053
@TREND("1980M01")	0.000886	0.001899	0.466475	0.6418

R-squared	0.260938	Mean dependent var	0.092458
Adjusted R-squared	0.241489	S.D. dependent var	0.701534
S.E. of regression	0.610984	Akaike info criterion	1.885818
Sum squared resid	42.55636	Schwarz criterion	1.979740
Log likelihood	-107.2633	Hannan-Quinn criter.	1.923953
F-statistic	13.41653	Durbin-Watson stat	1.913634
Prob(F-statistic)	0.000000		

Source: Own calculation referring to: Eviews.

Table 16 ADF Test Mortgage Rate 80-89

Null Hypothesis: MORTGAGERATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.126996	0.9194
Test critical values:	1% level	-4.036983	
	5% level	-3.448021	
	10% level	-3.149135	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MORTGAGERATE)
Method: Least Squares
Date: 12/11/15 Time: 20:21
Sample (adjusted): 1980M02 1989M12
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MORTGAGERATE(-1)	-0.021812	0.019354	-1.126996	0.2621
C	0.376217	0.285537	1.317578	0.1902
@TREND("1980M01")	0.000863	0.001673	0.515760	0.6070

R-squared	0.010833	Mean dependent var	0.077731
Adjusted R-squared	-0.006222	S.D. dependent var	0.559725
S.E. of regression	0.561464	Akaike info criterion	1.708348
Sum squared resid	36.56802	Schwarz criterion	1.778410
Log likelihood	-98.64669	Hannan-Quinn criter.	1.736798
F-statistic	0.635179	Durbin-Watson stat	1.688893
Prob(F-statistic)	0.531673		

Source: Own calculation referring to: Eviews.

Table 17 ADF Test Bond Rate 90-99

Null Hypothesis: BONDRATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.871056	0.1757
Test critical values:	1% level	-4.037668	
	5% level	-3.448348	
	10% level	-3.149326	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BONDRATE)
Method: Least Squares
Date: 12/11/15 Time: 20:26
Sample (adjusted): 1990M03 1999M12
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BONDRATE(-1)	-0.099246	0.034568	-2.871056	0.0049
D(BONDRATE(-1))	0.325832	0.088715	3.672781	0.0004
C	1.440334	0.517546	2.783005	0.0063
@TREND("1990M01")	-0.000219	0.001616	-0.135446	0.8925

R-squared	0.138134	Mean dependent var	-0.023729
Adjusted R-squared	0.115453	S.D. dependent var	0.635795
S.E. of regression	0.597968	Akaike info criterion	1.842750
Sum squared resid	40.76245	Schwarz criterion	1.936672
Log likelihood	-104.7223	Hannan-Quinn criter.	1.880885
F-statistic	6.090366	Durbin-Watson stat	2.000914
Prob(F-statistic)	0.000700		

Source: Own calculation referring to: Eviews.

Table 18 ADF Test Mortgage Rate 90-99

Null Hypothesis: MORTGAGERATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.013603	0.5876
Test critical values:	1% level	-4.037668	
	5% level	-3.448348	
	10% level	-3.149326	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MORTGAGERATE)
Method: Least Squares
Date: 12/11/15 Time: 20:27
Sample (adjusted): 1990M03 1999M12
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MORTGAGERATE(-1)	-0.045805	0.022748	-2.013603	0.0464
D(MORTGAGERATE(-1))	0.396423	0.086488	4.583540	0.0000
C	0.831719	0.431048	1.929531	0.0562
@TREND("1990M01")	-0.000138	0.001357	-0.101888	0.9190

R-squared	0.167097	Mean dependent var	-0.044492
Adjusted R-squared	0.145178	S.D. dependent var	0.542658
S.E. of regression	0.501723	Akaike info criterion	1.491774
Sum squared resid	28.69678	Schwarz criterion	1.585696
Log likelihood	-84.01467	Hannan-Quinn criter.	1.529909
F-statistic	7.623545	Durbin-Watson stat	2.034770
Prob(F-statistic)	0.000109		

Source: Own calculation referring to: Eviews.

Table 19 ADF Test Bond Rate 00-15

Null Hypothesis: BONDRATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.772605	0.2094
Test critical values:	1% level	-4.007613	
	5% level	-3.433906	
	10% level	-3.140847	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BONDRATE)
Method: Least Squares
Date: 12/11/15 Time: 20:30
Sample (adjusted): 2000M03 2015M10
Included observations: 188 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BONDRATE(-1)	-0.058015	0.020924	-2.772605	0.0061
D(BONDRATE(-1))	0.316612	0.070234	4.507991	0.0000
C	0.595238	0.240312	2.476943	0.0142
@TREND("2000M01")	-0.001427	0.000818	-1.744282	0.0828

R-squared	0.121631	Mean dependent var	-0.027660
Adjusted R-squared	0.107309	S.D. dependent var	0.405311
S.E. of regression	0.382947	Akaike info criterion	0.939207
Sum squared resid	26.98331	Schwarz criterion	1.008067
Log likelihood	-84.28542	Hannan-Quinn criter.	0.967106
F-statistic	8.493024	Durbin-Watson stat	1.984855
Prob(F-statistic)	0.000026		

Source: Own calculation referring to: Eviews.

Table 20 ADF Test Mortgage Rate 00-15

Null Hypothesis: MORTGAGERATE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.417993	0.0521
Test critical values:	1% level	-4.008154	
	5% level	-3.434167	
	10% level	-3.141001	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MORTGAGERATE)
Method: Least Squares
Date: 12/11/15 Time: 20:31
Sample (adjusted): 2000M05 2015M10
Included observations: 186 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MORTGAGERATE(-1)	-0.042819	0.012528	-3.417993	0.0008
D(MORTGAGERATE(-1))	0.035198	0.070505	0.499224	0.6182
D(MORTGAGERATE(-2))	0.451189	0.064220	7.025718	0.0000
D(MORTGAGERATE(-3))	0.230806	0.070340	3.281273	0.0012
C	0.640436	0.195181	3.281243	0.0012
@TREND("2000M01")	-0.001534	0.000594	-2.580357	0.0107

R-squared	0.314225	Mean dependent var	-0.026882
Adjusted R-squared	0.295176	S.D. dependent var	0.331790
S.E. of regression	0.278550	Akaike info criterion	0.313288
Sum squared resid	13.96622	Schwarz criterion	0.417344
Log likelihood	-23.13576	Hannan-Quinn criter.	0.355455
F-statistic	16.49534	Durbin-Watson stat	2.061011
Prob(F-statistic)	0.000000		

Source: Own calculation referring to: Eviews.

Table 21 Engle and Granger Test 70-79

Date: 12/11/15 Time: 21:04
Series: MORTGAGERATE BONDRATE
Sample: 1970M10 1979M12
Included observations: 111
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=12)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
MORTGAGERATE	-0.354567	0.9726	-1.146208	0.9634
BONDRATE	-0.470878	0.9649	-1.637825	0.9466

*MacKinnon (1996) p-values.

Intermediate Results:

	MORTGAG...	BONDRATE
Rho - 1	-0.010420	-0.014889
Rho S.E.	0.029388	0.031620
Residual variance	0.056154	0.064989
Long-run residual variance	0.056154	0.064989
Number of lags	0	0
Number of observations	110	110
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution

Source: Own calculation referring to: Eviews.

Table 22 Engle and Granger Test 80-89

Date: 12/11/15 Time: 21:09
Series: BONDRATE MORTGAGERATE
Sample: 1980M01 1989M12
Included observations: 120
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=12)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
BONDRATE	-3.948298	0.0114	-33.99502	0.0014
MORTGAGERATE	-3.171742	0.0823	-24.94921	0.0143

*MacKinnon (1996) p-values.

Intermediate Results:

	BONDRATE	MORTGAGERATE
Rho - 1	-0.159097	-0.128352
Rho S.E.	0.040295	0.040467
Residual variance	0.571562	0.450982
Long-run residual variance	1.906338	1.244794
Number of lags	2	2
Number of observations	117	117
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution

Source: Own calculation referring to: Eviews.

Table 23 Engle and Granger Test 90-99

Date: 12/11/15 Time: 21:19
Series: BONDRATE MORTGAGERATE
Sample: 1990M01 1999M12
Included observations: 120
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=12)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
BONDRATE	-2.994689	0.1193	-16.76445	0.0928
MORTGAGERATE	-2.463726	0.3013	-11.77663	0.2528

*MacKinnon (1996) p-values.

Intermediate Results:

	BONDRATE	MORTGAGERATE
Rho - 1	-0.140878	-0.098963
Rho S.E.	0.047043	0.040168
Residual variance	0.316897	0.371737
Long-run residual variance	0.316897	0.371737
Number of lags	0	0
Number of observations	119	119
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution

Source: Own calculation referring to: Eviews.

Table 24 Engle and Granger Test 00-15

Date: 12/11/15 Time: 21:20
Series: BONDRATE MORTGAGERATE
Sample: 2000M01 2015M10
Included observations: 190
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=14)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
BONDRATE	-3.452416	0.0406	-21.93188	0.0324
MORTGAGERATE	-3.173041	0.0793	-19.40909	0.0563

*MacKinnon (1996) p-values.

Intermediate Results:

	BONDRATE	MORTGAGERATE
Rho - 1	-0.116042	-0.102694
Rho S.E.	0.033612	0.032364
Residual variance	0.155913	0.211431
Long-run residual variance	0.155913	0.211431
Number of lags	0	0
Number of observations	189	189
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution

Source: Own calculation referring to: Eviews.

Table 25 Critical Values Engle and Granger Test

Critical values for a higher-order system (33).

Number of var's *N*	Sample size *T*	Significance level 1%	5%	10%
2	50	4.12	3.29	2.90
	100	3.73	3.17	2.91
	200	3.78	3.25	2.98
3	50	4.45	3.75	3.36
	100	4.22	3.62	3.32
	200	4.34	3.78	3.51
4	50	4.61	3.98	3.67
	100	4.61	4.02	3.71
	200	4.72	4.13	3.83
5	50	4.80	4.15	3.85
	100	4.98	4.36	4.06
	200	4.97	4.43	4.14

Source: Own calculation referring to: Robert F. Engle, Byung Sam Yoo (1987, p. 158).

Table 26 General Economy Comparison of all Sub-Saharan countries for HAMI

Country	Population in Million	Current GDP in $	GDP Growth in Geometric Mean % 10 years	% Services to GDP	% Industry to GDP
Angola	24227524	131400635026.06	8.64%	30.37%	60.19%
Benin	10598482	8746992733.50	4.31%	50.30%	13.85%
Botswana	2219937	15813371063.16	4.81%	59.69%	37.94%
Burkina Faso	17589198	12542969275.20	5.95%	51.60%	26.01%
Burundi	10816860	3093647293.48	3.04%	42.43%	18.31%
Cabo Verde	513906	1871187333.50	5.72%	75.89%	16.48%
Cameroon	22773014	32548591285.86	3.84%	46.64%	30.63%
Central African Republic	4804316	1782927902.67	-0.72%	29.85%	11.95%
Chad	13587053	13922224560.79	7.87%	32.30%	15.08%
Comoros	769991	647720102.47	2.75%	54.53%	10.94%
Congo, Dem. Rep.	74877030	32962261155.68	4.11%	45.66%	33.19%
Congo, Rep.	4504962	14135462555.84	4.27%	25.78%	69.37%
Cote d'Ivoire	22157107	34253611098.32	2.12%	56.54%	21.10%
Equatorial Guinea	820885	14308094224.69	11.65%	0.00%	0.00%
Eritrea	5110444	3857821138.21	1.49%	63.03%	22.44%
Ethiopia	96958732	54797679657.55	8.61%	42.25%	15.43%
Gabon	1687673	17228443336.36	1.49%	53.50%	42.87%
Gambia, The	1928201	807069488.19	3.50%	0.00%	0.00%
Ghana	26786598	38648154100.37	6.27%	49.77%	29.51%
Guinea	12275527	6624068015.50	2.64%	42.34%	37.55%
Guinea-Bissau	1800513	1022371991.53	2.55%	42.52%	13.56%
Kenya	44863583	60936509777.96	4.23%	50.37%	19.36%
Lesotho	2109197	2088021624.11	2.80%	64.63%	29.77%
Liberia	4396554	2027000000.00	3.84%	0.00%	0.00%
Madagascar	23571713	10593147526.94	5.29%	57.48%	16.15%
Malawi	16695253	4258033615.30	4.14%	49.65%	17.04%
Mali	17086022	12074473001.81	5.07%	35.01%	22.73%
Mauritania	3969625	5061180371.05	4.88%	41.63%	35.56%
Mauritius	1260934	12616421088.38	3.94%	73.77%	23.22%
Mozambique	27216276	16385584919.00	7.17%	50.20%	21.17%
Namibia	2402858	13429503284.90	4.62%	59.07%	34.87%
Niger	19113728	8168695869.87	4.30%	43.80%	19.50%
Nigeria	177475986	568508262377.80	7.19%	59.10%	20.67%
Rwanda	11341544	7890190336.75	7.67%	52.51%	14.36%
Sao Tome and Principe	186342	334902362.06	4.17%	64.29%	15.93%
Senegal	14672557	15578916865.39	3.97%	58.78%	23.98%
Seychelles	91526	1405764157.88	2.91%	70.45%	12.48%
Sierra Leone	6315627	4892363979.23	7.22%	32.16%	6.26%
Somalia	10517569		0.00%	0.00%	0.00%
South Africa	54001953	349817096206.47	3.15%	68.05%	29.47%
South Sudan	11911184	13069991258.27	-0.81%	0.00%	0.00%
Sudan	39350274	73815376184.62	4.92%	50.39%	20.38%
Swaziland	1269112	3400422936.23	2.30%	44.83%	47.69%
Tanzania	51822621	49183884817.49	6.46%	43.54%	24.99%
Togo	7115163	4518443907.45	2.79%	41.14%	17.15%
Uganda	37782971	26312399301.41	6.66%	51.94%	19.94%
Zambia	15721343	27066230009.10	6.79%	56.50%	33.85%
Zimbabwe	15245855	13663314279.67	-1.46%	56.78%	29.59%

Source: Own illustration referring to: The World Bank (2015a).

Table 27 Comparison of Population Data of selected Sub-Saharan Countries

Country	Urbanization Rate	Urbanization Rate Increase	Fertility Rate	Population Growth	Working-Age Adults
Angola	43.27%	5.41%	6.3406	3.37%	49.84%
Botswana	57.19%	2.26%	2.8396	1.89%	64.27%
Burkina Faso	29.02%	6.38%	5.9848	3.00%	51.80%
Cameroon	53.82%	3.71%	5.1161	2.54%	54.02%
Congo, Dem. Rep.	41.98%	4.47%	6.3906	3.21%	50.87%
Cote d'Ivoire	53.48%	3.61%	4.9343	2.18%	54.24%
Ethiopia	19.03%	4.61%	5.1504	2.63%	54.48%
Ghana	53.39%	3.88%	4.1551	2.51%	57.66%
Kenya	25.20%	4.32%	4.7028	2.64%	55.12%
Madagascar	34.47%	4.74%	4.775	2.83%	55.14%
Mauritius	39.81%	0.00%	1.667	0.30%	71.02%
Mozambique	31.93%	3.51%	5.4796	2.82%	51.15%
Namibia	45.68%	4.24%	3.3426	1.77%	59.58%
Nigeria	46.94%	4.73%	6.0134	2.66%	53.18%
Senegal	43.39%	3.45%	5.1004	2.91%	53.25%
South Africa	64.30%	2.30%	2.5345	1.44%	65.45%
Sudan	33.62%	2.62%	4.7607	2.32%	55.85%
Tanzania	30.90%	5.54%	5.4811	3.12%	51.57%
Uganda	15.77%	5.44%	6.28	3.32%	49.18%
Zambia	40.47%	4.02%	5.8502	2.93%	50.99%

Source: Own illustration referring to: The World Bank (2015a).

Table 28 Good Governance Indicator of selected Sub-Saharan Countries

Country	Ease of Doing Buisness	Corruption Index	Property Rights Index	Index of Economic
Angola	181	161	127	158
Botswana	72	31	39	36
Burkina Faso	143	85	101	102
Cameroon	172	136	111	146
Congo, Dem. Rep.	184	152		168
Cote d'Ivoire	142	115	98	103
Ethiopia	146	110	106	149
Ghana	114	61	50	71
Kenya	108	145	83	122
Madagascar	164	133	112	79
Mauritius	32	47	34	10
Mozambique	133	119	99	125
Namibia	101	55		93
Nigeria	169	136	120	120
Senegal	153	69	80	106
South Africa	73	67	29	72
Sudan	159	173		
Tanzania	139	119	78	109
Uganda	122	142	91	92
Zambia	97	85	76	100

Source: Own illustration referring to: The Heritage Foundation 2015; Property Rights Alliance 2015; World Bank Group 2015; Transparency International 2014.

Table 29 Real Estate and Housing Indicators for Selected Sub-Saharan Countries

Country	Mortgage Rate	Mortgage Debt to	JLL Transparency	House Prices in $	50kg cement in $
Angola	15.00%		4.36	200000	7.00
Botswana	6.50%	6.59%	3.09	70519	5.40
Burkina Faso	5.00%			8429	10.12
Cameroon	14.00%	0.50%		42163	8.50
Congo, Dem. Rep.	16.00%	15.00%		25000	23.40
Cote d'Ivoire	5.50%			8429	9.27
Ethiopia	11.70%		4.46	34515	5.41
Ghana	28.00%	0.25%	3.98	8429	9.27
Kenya	16.00%	3.53%	3.29	17000	7.60
Madagascar	12.00%			138000	6.95
Mauritius	8.50%	12.99%	3.14	31000	6.40
Mozambique	19.00%	0.14%	4.20		6.00
Namibia	10.50%	18.21%		18563	8.04
Nigeria	20.00%	0.58%	4.03	16400	11.00
Senegal	11.00%	0.07%	4.52	21915	5.06
South Africa	9.50%	22.54%	2.09	26763	5.35
Sudan					
Tanzania	18.00%	0.36%		20992	7.04
Uganda	22.00%	0.90%	3.97	13600	11.00
Zambia	17.00%	1.29%	3.49	65000	7.50

Source: Own illustration referring to: Jones Lang LaSalle (2014); Centre for Affordable Housing Finance in Africa (2014).

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Statutory Declaration

I declare that I have developed and written the enclosed Master Thesis completely by myself, and have not used sources or means without declaration in the text. Any thoughts from others or literal quotations are clearly marked. The Master Thesis was not used in the same or in a similar version to achieve an academic grading or is being published elsewhere.

Nurnberg, 14th of December

Location, Date (Signature)