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# ON THE DETERMINANTS OF HOUSING FINANCE DEVELOPMENT: Evidence from Sub Saharan Africa (SSA)

Christian-lambert Nguena
*University of Dschang*

Fulbert Tchana tchana
*World Bank*

Albert Zeufack
*World Bank*

## Abstract

Using a panel database of 48 SSA countries throughout the period 2000-2013, this paper analyses the structure of housing finance and its determinants. We find that stock market capitalization, urban growth and official development aid are key determinants of housing finance development while a post-conflict environment is conducive to greater development in housing finance. These results confirm that housing finance is not only driven by standard market forces of demand and supply, but also by development policies to frame urbanization, credit and development aid. Furthermore, we discover that the development of housing finance is not an issue of legal origin but is a question of developing the existing legal system and allowing it to become strong and trusted by borrowers and lenders. Market capitalization appears also to be correlated with a strong legal framework, a good credit information system and a stable macroeconomic environment. All these findings imply specific macroeconomic policies to boost housing finance development in SSA countries.

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**Contact:** Christian-lambert Nguena - clanguena@yahoo.fr, Fulbert Tchana tchana - tchana@worldbank.org, Albert Zeufack - zeufack@worldbank.org.

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## 1. Introduction

Investigating the housing finance system and its determinants is vital for both policymakers and academics. The development change of short-run risk into long-run resources, basic for long-run mortgage finance contracts, is additionally at the centre of financial intermediation theory, with numerous agency conflicts and market frictions indeed more obvious in housing finance than in other sections of the financial system. A mortgage loan is regularly the major risk of households in developed nations, with the house being the corresponding asset on the household balance sheet, and in this way a basic part of household welfare. The significance and structure of housing finance are additionally basic for transmission channels of monetary policy. Housing finance, however, has moreover been at the centre of numerous banking crises, most recently within the U.S., and later investigate has highlighted that banking crises connected to the housing boom and bust cycles are usually more profound than other crises (Claessens et al., 2011).

Africa has the highest rate of urbanization but the least developed housing finance system in the world (World Bank, 2014). 46 African cities have more than one million people and that every day for the next fifteen years; Africa's cities will have to accommodate an extra 40,000 people (UN-HABITAT, 2011). For the next 25 years, more and more people will be added to the number of urban dwellers in Africa. This makes the African case particular in the population of developing countries and thus makes it a very appropriate potential case study. This new issue of urban growth is emerging in a context of already widespread poverty and inequality in cities where many people live in slums without adequate basic services. Since developed financial systems can efficiently facilitate the mobilization of capital between surplus and deficit agents for housing investment, better housing finance systems are thus needed to meet the growing demand for housing faced by African countries.

However, the low capacity of the construction industry and the absence of a strong housing finance sector are likely to exacerbate the pressure on the housing market, rising rents, and further widening income inequality. Strong legal rights for borrowers and lenders (through collaterals and bankruptcy laws), deeper credit information systems, and more stable macroeconomic environments explain the strength of a housing finance system (Warnock and Warnock, 2008). According to these authors, these same factors also explain the variations in housing finance across emerging market economies. According to statistics on African countries, the legal rights of borrowers and the credit information systems are not very good while there is a relative instability of the macroeconomic environment. Despite its positive trend, the ratio of mortgage debt to GDP remains extremely low in Africa and stands at 3 per cent compared to 70 per cent in developed countries. Africa's mortgage markets are nascent and relatively small according to international comparisons. However, according to data from Badev et al. (2014), the average proportion of the population with the minimum income required for a prudent mortgage stands at 16 per cent in Africa.

So far, efforts of African governments, international partners, and financial institutions have barely reduced the gap between the high demand for housing and its insufficient supply in Africa's urban areas. As in other parts of the world, this gap is even more important for low- and middle-income households. Currently, most low and middle-income households in Africa only have access to the unregulated informal housing sector. Except for South Africa, formal sector housing programs (public or private) have mostly targeted middle and high-income households in Africa.

Housing finance issues can be classified into two main strands in economic literature. The first strand focuses on housing finance determinants (see Badev et al., 2014; Warnock and Warnock, 2008; Egert and Mihaljek 2007; Haibin Zhu, 2006; and Buckley and Madhusudhan, 1984); while the second focuses on the channels through which it affects inclusive growth and

shared prosperity (see Buckley, 1996; Hongyu et al., 2002; Gutierrez et al., 2007 and Dubel, 2007). This literature has addressed numerous questions of interest on housing finance determinants but has not focused on the specific characteristics of housing finance in SSA because of the low level of development of housing finance in this region among other reasons. The literature has yet to provide a comprehensive analysis of the factors of housing finance development, especially in Africa.

The theoretical literature has demonstrated the importance of macroeconomic stability and solid contractual and informational systems for financial deepening as they help relieve market frictions related to maturity change and information asymmetries. Cross-country comparisons have set up a solid empirical relationship between low inflation, solid and successful legal frameworks, comprehensive accounting and auditing benchmarks, and credit registries, on the one hand, and profound and steady financial systems, on the other hand (Levine et al., 2000; Boyd et al., 2001, Djankov, et al., 2007). Theory predicts that these components should be indeed more critical for mortgage finance given its long-run nature. In our empirical investigation, we intend to test these hypotheses by relating the depth and breadth of housing finance markets to these distinctive nation's factors. Building on the existing literature and to fill this gap, our study extends the growing literature on housing finance development with cross-country data seeking to answer the following question: What are the determinants of housing finance development in Africa?

Moreover, our paper is not only related to the contributions on which our theoretical argument is based, but also to other contributions to the large literature on the determinants of financial development (see Beck & Levine, 2005, for a survey). La Porta et al. (1998) show that legal origin is a good predictor of the efficiency of the legal system in protecting private property rights and enforcing contracts. They find that British common law countries are likely to have a better developed legal system that promotes financial development. Inspired by the work of Acemoglu et al. (2001) and Beck, Demirgu¨c-Kunt, and Levine (2003) find that differences in early settler mortality can explain cross-country variation in financial development among former colonies. The studies of Acemoglu and Johnson (2005) and Herger, Hodler, and Lobsiger (2008) suggest that colonial history mainly affects today's financial development through its effect on political institutions.

Furthermore, recent papers have shown systemic designs within the rise of distinctive sections of the financial system in the process of financial development (De la Torre et al., 2013). Mortgage finance frameworks can be financed both through bank-based channels such as retail financing, and more market-based channels like wholesale financing through securitization of mortgage loans. In any case, the development of mortgage finance systems might moreover depend on the scale and income level of its domestic economy. We are going to investigate the "income elasticity" of mortgage finance, the relative significance of diverse financing sources for the depth and penetration of mortgage finance across nations, and how the improvement of mortgage finance co-varies with the advancement of other portions of the financial system.

This analysis mainly carries out a dynamic panel data study, focusing on 48 SSA countries. It examines the determinants of housing finance development in a broader sense, using a different index of our main variable. The system Generalized Method of Moments estimator in dynamic panel data model proposed by Arellano and Bover (1995) and Blundell and Bond (1998) is the main method of this study and is compared with the Feasible Generalized Least Square estimator in a static panel data model. Before proceeding to the econometric analysis, this research provides some preliminary evidence with the presentation of some stylized facts adopting a comparative approach to study probably the evolution and the most important change in terms of housing finance development.

Although there is a large body of literature that investigates the specific determinants of housing finance in advanced countries, far less is known about this relationship in SSA developing countries. The objective related to this question provides an original contribution to the current debate in the field of housing because of the main four following points: firstly, from a political point of view it allows the implementation of a targeted policy through the identification of the levels of responsibility of the actors; secondly, from a scientific point of view, the new database partially constructed and used allow an analysis very close to reality; likewise, there is no study with such a problem applied to the specific case of Sub Saharan Africa.

Prior knowledge suggests that the housing finance sector in Africa is very weak. The ratio of mortgage debt to GDP is less than 10 per cent for almost all countries other than South Africa and Namibia. Housing penetration (the percentage of the adult population with an outstanding loan to purchase a home) is also very low, with no country having more than a 9 per cent penetration rate and three out of four countries having a rate lower than 5 per cent. Besides, in African countries, the mortgage rate, the legal system, and the country's GDP per capita are correlated with housing finance. Countries with a high GDP per capita and low mortgage interest rate enjoy greater access to housing finance.

Our econometric investigation provides important findings on each of our questions of interest. Stock market capitalization and the urban population growth rate are the strongest positive correlates of housing finance while recovery from conflict is another determinant albeit its effect is not as strong. Also, some factors seem to hamper the development of housing finance depending on the economic environment. These conditions are the ratio of credit to the economy to GDP which is a proxy of the development of the banking sector, official development aid and trade openness which may mask the low level of housing finance in oil-exporting countries.

While this approach yields broad quantitative results, caution is warranted in interpreting results because of uneven data quality. For instance, part of the recent increase in remittances might merely reflect improved data reporting as in the case of Ghana, Senegal, and Uganda. Also, the reported data most likely understate the full extent of intra-regional migration, and remittances. 4 Furthermore, remittances recorded against a country could reflect flows destined for neighbouring countries (e.g., Kenya serves as a hub for remittances flowing into Somalia, Tanzania, and Uganda). Notwithstanding these data weaknesses, this paper makes a first attempt at supplementing country studies on remittances in sub-Saharan Africa with an analysis at the aggregate level.

The remainder of this paper is organized as follows: Section 2 provides a literature review; Section 3 presents the characteristics of housing finance policy in Africa and investigates the link between housing finance and shared prosperity; section 4 does an econometric analysis using a panel dataset and draws some policy implications and section 5 concludes.

## 2. A brief empirical literature review of the determinants of housing finance

Comparatively to the literature on the determinant of mobile banking in SSA, the one related to housing finance determinants is growing (Nguena, 2018). The literature has been mostly empirical and focuses less on specific issues facing housing markets in SSA. This nascent literature mostly applied to other countries experience, highlights three main determinants: GDP per capita, as a proxy for the level of development; stock market development; and informal finance. Most importantly, the literature shows that government support or subsidy is not a determining factor.

Badev et al. (2014), using a new dataset on the depth and penetration of mortgage markets across countries in the world find that (a) mortgage markets seem to develop only at relatively high levels of GDP per capita; (b) policies associated with financial system development (such as

price stability or the efficiency of contractual and information frameworks) are also associated with mortgage market development, and (c) well-functioning insurance markets and better-capitalized stock markets are strongly associated with mortgage market development. Moreover, Buckley and Madhusudhan (1984) test a model of the relationship between housing investment and GDP, anticipated inflation, changes in inflation, and the extent of capital deepening across several developing and transition countries. They find that everything being equal, countries with deeper financial markets invest relatively more in housing.

Haibinand (2006) analyze the structure of housing finance markets and house prices in selected Asian countries and find evidence that in economies with more flexible housing finance markets, house prices are more responsive to overall changes in market conditions, particularly equity price movements. The main explanatory variables used are GDP, bank credit, equity prices, short-term rates, consumer price index, and the exchange rate.

Also, Besley et al. (1992) show that the Rotating Savings and Credit Associations (ROSCAs) achieve much higher allocative performance than other types of finance do indicate that informal finance matters in long-term finance. Their result highlights the need to verify whether ROSCAs can be used as a housing finance alternative in Africa where this type of financial institution is very common. The fact that the formal housing finance system is limited in SSA countries underscores the need to investigate the alternative of informal housing finance systems.

Analyzing the Malaysian housing finance market from a micro perspective, Ebekozien et al. (2019) found bad status of Central Credit Reference Information System, insufficient income, lack of creditworthiness, high default rate, fear of inability to recover the loan and operating costs from the auction, repayment incapability, lack of evidence of regular income, the absence of collateral, inability to make down payment among others as the root causes of the factors that contribute to the house-loan rejection. They concluded that the government should establish a special housing loan scheme to solve this issue.

Finally, many studies show that government involvement is not an absolute determinant of housing finance. For example, Badev et al. (2014) show that neither government subsidies, nor government support of housing financing through state banks dedicated to housing finance has been proven to spur the housing sector. Many developing countries have had such banks for many decades but their housing finance sector remains at an infant stage (Nguena, 2014ab). According to Jaffee and Renaud (1997), this conclusion should be relativized since there is still a need for government involvement for example to define and enforce property rights in the underlying asset, to enforce contracts, to set out appropriately balanced procedures for foreclosure when necessary, to follow macroeconomic policies that keep mortgage rates stable and many other roles we could list. A contribution to this literature with an empirical investigation of these hypotheses concerning the determinant of housing finance development in SSA is then pertinent.

## 3. Housing Finance in SSA: Stylized facts and benchmarking

### 3.1 Data

To develop our stylized facts and econometric analysis, we examine a sample of 54 African countries with data from African Development Indicators (ADI), the Financial Development and Structure Database (FDSD), and the Housing Finance Databases of the World Bank. The database summary and description are presented in the appendix. The analysis is limited to the 2000-2012 period to ensure more up-to-date results. The housing market and finance policy data are drawn from the newest housing finance databases of the World Bank. Tables A1, A2 and A3 describe the entire database.

### 3.2 Benchmarking the SSA housing market and finance policy: Typology and characteristics

Benchmarking the SSA housing market and finance policy along with a comparative approach is essential to have a clear picture of what has been done to date and what remains to be done. The following subsection presents a general perspective applicable to all SSA countries.

Overall, the banking sector in Africa has been growing since liberalization two decades ago when African governments adopted new legislation for financial institutions and institutionalised private banking systems, in some cases ending state monopolies in this sector (Nguena, 2020). SSA countries have financial systems which are growing rapidly and becoming increasingly integrated into the global financial system. At the core of the systems are banks, followed by pension funds. The regular Financial Sector Assessment Program implemented in these countries has generally confirmed that the banking system is well-capitalized, liquid, and profitable.

However, few commercial banks offer their customers housing loans in the form of mortgages. The majority of banks in Africa finance housing acquisitions, not via housing loans specifically, but as private investments or standard consumer loans. These latter products generally have high-interest rates with short repayment periods.

Some African countries have opted to establish specialized single-purpose non-bank mortgage lenders or "monoline" lenders. Most notable is Kenya, which has housing finance companies. Nigeria also has primary mortgage institutions, and South Africa has financial service providers specializing in mortgage lending. Typically, these institutions have a narrow banking license limiting their activities and restricting deposit collection. This means that they usually rely on wholesale funding on the liability side of their balance sheets. These institutions are particularly vulnerable during crisis periods because their funding costs rise to a much greater extent than those of lenders with a deposit base.

The banking and the financial system in most SSA countries remains underdeveloped compared to other developing regions. The ratio of private sector credit to GDP is less than 20 per cent for some countries and financial access is lower (there is only one branch per 100,000 adults in some countries). The small size of national markets, the low level of income, and the weak creditor rights and judicial enforcement mechanisms could explain this situation. Moreover, there is a need to improve the level of development of the financial sector, especially mortgage financing and the banking sector. However, prospects are good since gradual financial deepening is underway in most SSA countries (Montfort et al., 2013).

**Figure 3.1**: Comparative Mortgage Depth across SSA Countries (percentage of GDP for 2000-2010).

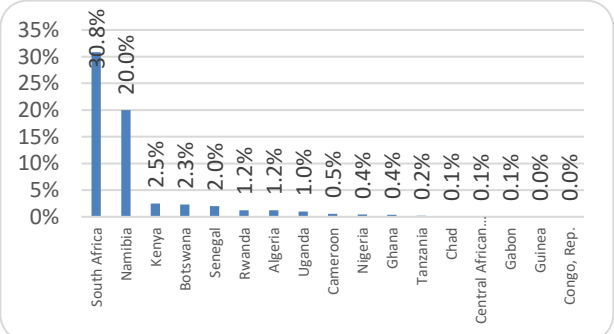
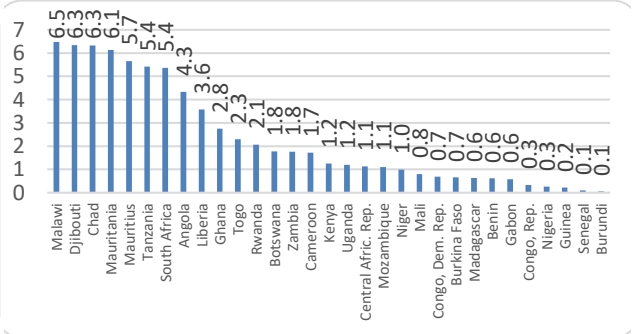



**Figure 3.2:** Comparative Mortgage Penetration across SSA Countries (housing loan penetration)



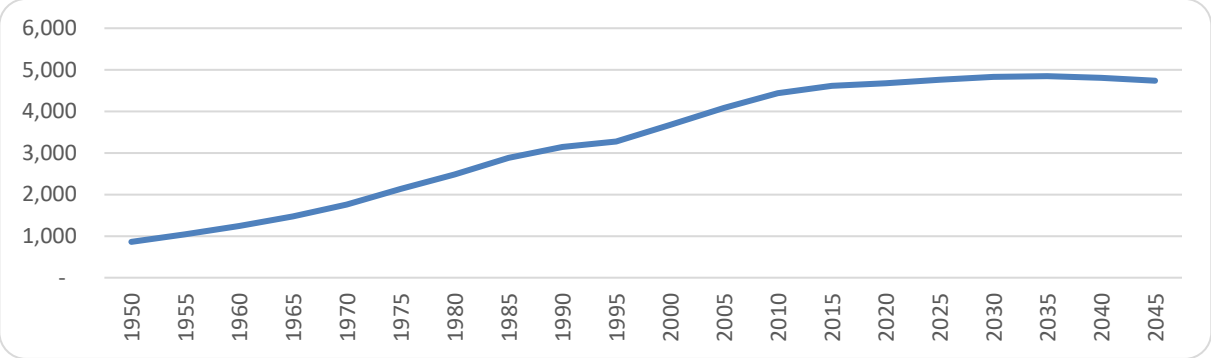

*Source*: Authors' calculation using the Badev et al. (2014) World Bank database on housing finance and the Global Financial Inclusion database (FINDEX). *Note*: Percentage of the adult population with an outstanding loan to purchase a home. Unlike the mortgage depth indicator, the penetration index refers to any provider of housing loans, including regulated financial institutions, microfinance institutions, and other formal sources.

Although the mortgage market in Africa is still small by international standards, the sector is growing gradually and is attracting attention from policymakers. Positive growth is now observed in some markets such as Kenya, Uganda, and others. For example, Kenya's mortgage market grew by 37 per cent in 2012, resulting in a total of 19,700 mortgages. Uganda showed signs of growth at the end of December 2012, representing about 0.98 per cent of GDP. According to figure 3.1 above, South Africa and Namibia remain the market leaders in SSA in terms of depth. Figure 3.2 highlights practically the same classification with a GDP value of close to zero and minimal differences among several countries (Malawi, Djibouti, Chad, Mauritania, Mauritius, Tanzania) with higher levels of mortgage penetration. The highest mortgage penetration rate in SSA is 6.48 per cent in Malawi, still significantly less than many countries in the world, such as Sweden which are almost at 60 per cent.

Sub-Saharan Africa is the region in the world where housing finance is the least developed. In fact, in SSA, many countries have less than 1 per cent mortgage depth or do not have a mortgage market. Moreover, the most advanced countries in mortgage market development such as South Africa (30.8 per cent) and Namibia (20.0 per cent), are far behind many countries in the world with a deeper mortgage market like Denmark with 109.8 per cent. Figure 3.3 below shows that annual housing demand is increasing. This could be explained by an increasing urbanization rate. Even if the demand for housing is projected to be constant after 2015, it is still increasing at a low rate.

Many initiatives have been taken in Africa to support the development of the mortgage market. For example, the recent creation of national and regional mortgage refinancing institutions in Nigeria (2013), Tanzania (2011), and the WAEMU (West African Economic and Monetary Union) sub-region (2010) will improve mortgage loan granting. There potentially may be a way to improve household access to long-term liquidity through developing mortgage markets at a reasonable cost. Unfortunately, interest rates are too high in almost all African countries, which undermines mortgage market accessibility.

**Figure 3.3:** Annual Housing Demand Evolution in SSA, 1965-2050 (projection)




*Source*: Authors' calculation using the World Bank database on housing finance launched by Badev et al., 2014: "Housing finance across countries: New data and analysis," WPS6756.
NB: SSA annual housing data is the result of the division between additional total population size (difference between the current year and the previous year) and household population size; data for one year is the sum of total housing needs per country; Annual housing demand projection is based on the fact that by 2050, Africa's urban population is projected to reach 1.2 billion, with an increasing urbanization rate moving from 45 per cent (2025) to 59 per cent (2050) (UN-HABITAT 2014).

The description mainly highlights the fact that in SSA, the formal housing finance system is not well developed and is bank-based—it cannot, therefore, respond to the demand of economic agents. We are therefore not surprised to see that the housing supply is not sufficiently abundant or affordable to meet the population's housing needs**.**

## 4. Empirical investigation and result analysis

### 4.1 Regression model specification

The article aims to distinguish the most important determinants of housing finance development in SSA. To answer the three questions of interest, three regression models are used. The first model assesses housing finance determinants. It is given by

$$HFIN_{it} = \alpha + \beta_1 MACAP_{it} + \beta_2 Upop_{it} + \beta_3 GDPPC_{it} + \beta_4 GDPgrowth_{it} + BX_{it} + \varepsilon_{it} \quad (1)$$

Where *HFIN* is a housing finance indicator, *MACAP* is a financial market indicator, Upop the ratio of urban population to the total population, *GDPPC* is GDP per capita which is an indicator of the level of development of the country, GDP growth; and *X* is a set of control variables (see the appendix for more detail). $\alpha$, $\beta$, are parameters, *B* a matrix of parameters, $\varepsilon_{it}$ the disturbance term; the other variables are defined in the appendix.

This regression model is based on the theoretical background of determinants of financial product development, such as housing finance products which have been developed in the literature review. The set of control variables that accounts for all other relevant factors of housing finance is consistent with the existing theoretical and empirical literature. It mainly captures financial attitude, trade, education, and governance among others. It also accounts for key findings highlighted in section 3.

### 4.2 Estimation strategy and preliminary tests

The choice of panel data analysis gives us the advantage of having a reasonable size of time series data for analysis which could not have been performed on each of the individual countries. The double dimension of panel data allows us to simultaneously take into account their dynamic behaviour and their possible heterogeneity across countries, which is not possible with either time-series or cross-sectional data.

To estimate the static model specification, we carry out specification and robustness checks including stationarity and cointegration tests; based on the result, we apply the Feasible Generalized Least Square (FGLS) in case of the presence of heteroscedasticity. To estimate the model, we use the System Generalized Method of Moment (GMM) estimator developed by Blundell and Bond (1998). The estimator combines two sets of equations. The first set includes first-difference equations where the right-hand side variables are instrumented by the levels of the series lagged one period or more. The second set consists of the equations in levels with the right-hand side variables being instrumented by lagged first or higher-order differences.

This estimator has several advantages[1] such as taking into account country-specific effects while enabling us to address issues associated with endogeneity, measurement errors, and omitted variables. By exploiting internal instruments, the System GMM estimator avoids the difficult task of identifying valid external instruments consisting of variables that are correlated with the endogenous explanatory variable, but not with the error term of the equation.

The validity of these internal instruments (lagged variables in level and first differences) is not rejected. As suggested by Arellano and Bond (1991), and Blundell and Bond (1998), a Sargan-Hansen test of over-identifying restrictions and a serial correlation test are carried out. In both instances, the null hypothesis is not rejected—the instrumental variables are not correlated with the residual, and the errors exhibit no second-order serial correlation.

We have tested, in a view to correct when necessary, the potential spatial correlation amongst explanatory variables using Pesaran (2005) approach. The test result confirmed the absence of spatial autocorrelation. Moreover, to limit the risk of over-instrumentation, we keep the number of instruments to the minimum by using as instruments only the first valid lagged value of the

[1] Bond, Hoeffler, and Temple (2001) offer a good overview on GMM estimation of empirical growth models.

right-hand side variables. We assume that financial variables are endogenous and are therefore are instrumented by their second lag value while the other variables, treated as predetermined, are instrumented by their first lag value.

### 4.3 Housing finance determinants: results discussion of baseline and augmented model

Table I below presents results on housing finance determinants. It shows that stock market capitalization, official development aid, the growth rate of the urban population, and the dummy variable of lagged conflict are key determinants of housing finance in SSA. Stock market capitalization, official development aid and the growth rate of the urban population are the strongest positive determinants while recovery from conflict is not significant for some specifications. Besides, some variables seem to hamper the development of housing finance depending on the economic environment. These variables are the credit to the private sector (a proxy of the development of the banking sector), and trade openness which may mask the low level of housing finance in oil-exporting countries.

**Table I:** Housing finance determinants (housing finance depth)

| | **Model A1: Housing finance determinants (housing finance depth)** | | | | |
|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| **Stock market capitalization** | **0.001*** ** | **0.001*** ** | **0.001*** ** | **0.001*** ** | **0.001*** ** |
| | **(0.00005)** | **(0.00005)** | **(0.00005)** | **(0.00006)** | **(0.00005)** |
| **Urban population** | **0.0001*** | **0.0002** ** | **0.0001*** | **0.0001*** | **0.0002** ** |
| | **(0.00006)** | **(0.0001)** | **(0.00006)** | **(0.00006)** | **(0.0001)** |
| Conflict dummy t-1 | **0.007** ** | **0.008*** ** | **0.007** ** | **0.004** ** | **0.009*** ** |
| | **(0.003)** | **(0.003)** | **(0.003)** | **(0.002)** | **(0.003)** |
| Investment stock | -0.0001 | 0.0005 | -0.0001 | 0.0006 | -0.002 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| GDP per capita growth | 0.0002 | 0.0001 | 0.0002 | 0.0002 | 0.0003 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Voice accountability | -0.00003 | -0.00006 | -0.00004 | 0.00004 | 0.00001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.00008) | (0.0001) |
| Domestic credit to private sector | -0.0002 | -0.0001 | -0.0002 | **0.0002** ** | -0.0002 |
| | (0.00001) | (0.00001) | (0.00001) | **(0.0001)** | (0.00001) |
| Trade openness | -0.00004 | -0.00004 | -0.00003 | -0.00003 | -0.00003 |
| | (0.00003) | (0.00003) | (0.00003) | (0.00002) | (0.00003) |
| Inflation | 0.00005 | 0.0001 | 0.00005 | 0.0001 | -0.00001 |
| | (0.0002) | (0.0002) | (0.0002) | (0.0001) | (0.0002) |
| Interest rate | 0.0001 | **0.0002** ** | 0.0001 | **0.00003*** ** | **0.0001** ** |
| | (0.0001) | **(0.0001)** | (0.0001) | **(0.0001)** | **(0.0001)** |
| Transfers | 8.95e-20 | 1.03e-19 | 8.9e-20 | 8.9e-21 | 4.9e-20 |
| | (1.15e-19) | (1.1e-19) | (1.1e-19) | (9.3e-20) | (1.1e-19) |
| Official development aid | **0,122*** ** | **0,0630** ** | **0,174*** ** | **0,122*** ** | **0,0630*** |
| | **(0,0326)** | **(0,0281)** | **(0,0193)** | **(0,0245)** | **(0,0333)** |
| Kaolegal | --- | **-0.007*** ** | --- | --- | **---** |
| | | **(0.002)** | | | |
| Kaosahel | --- | --- | -0.001 | --- | --- |
| | | | (0.005) | | |
| Kaomac | --- | --- | --- | **-0.0004*** ** | --- |
| | | | | **(0.00004)** | |
| Kaofcbf | --- | --- | --- | --- | **0.003*** ** |
| | | | | | **(0.0009)** |
| Constant | -0.004 | -0.02 | -0.005 | -0.027 | 0.04 |
| | (0.063) | (0.061) | (0.062) | (0.05) | (0.062) |
| Countries | 45 | 45 | 45 | 45 | 45 |
| Observations | 223 | 223 | 233 | 223 | 223 |

*Source*: Authors estimates

*Note* Kaolegal (Financial openness*Legal-*dummy*: Legal-based decomposition-); Kaosahel (Financial openness*Sahel-*dummy*: Sahel-based decomposition-); Kaowealth (Financial openness*Wealth-*dummy*: wealth-based decomposition-); Kaotrop (Financial openness*Trade openness); Kaomac (Financial openness*Market capitalization); Kaofbcf (Financial openness*Investment stock). *,**,**: significance levels of 10%, 5% and 1% respectively. Values in the bracket are standard errors.

Stock market capitalization is a key determinant of housing finance in SSA. It is significant in all specifications of our empirical model. Warnock and Warnock (2008) show that countries with strong legal and credit information systems and a stable macroeconomic environment have a deeper housing finance system; we can add to these factors market capitalization since it contributes to improving legal and credit information systems. Furthermore, this result is coherent with the theoretical predictions and the empirical findings of Badev et al. (2014) at a global level. Financial and stock markets are less developed in almost all African countries. A study by Beck et al. (2011) shows that more banking and fewer stock markets are the key features of the financial structure. This could be the reason why SSA has a weak housing finance market since its financial structure is more bank-based than market-based.

We can see that this financial structure has failed to improve housing finance depth in SSA. This can be explained by the fact that the banking sector usually does not offer specific and acceptable housing loans which are generally long-term loans. For almost all these countries, there are several governments and private banks but the mortgage depth remains low, stable, and sometimes tends to decrease.

Therefore, policymakers who wish to boost housing finance in SSA countries should consider strengthening the development of stock markets. Moreover, credit to the private sector is non-significant and negatively correlated to housing finance in some countries while it is significant and positively correlated to housing finance in others. This ambiguous empirical result might mean that the assumption that banking development is a catalyst of housing finance should be reconsidered since it seems to be detrimental. In Africa, the banking sector is more developed than the financial sector—however, the region still has a low depth of housing finance. Developing mortgage markets is imperative and should be encouraged through a clear state policy.

Besides, the growth rate of the urban population is instrumental in housing market development in SSA. In table 4.1, the growth rate of the urban population is a positive determinant of housing finance in all empirical model specifications except one. This variable drives the demand for marketable housing in any country and specifically in SSA countries. This result confirms the finding of Badev et al. (2014) at a global level in the African context.

Furthermore, reconstruction after years of conflict that has devastated infrastructure is also a key determinant of housing finance. In many empirical specifications, the dummy of lagged conflict is positively and significantly correlated to greater housing finance in SSA. There are two main rationales behind this finding: (a) after conflicts where housing has been widely destroyed, there is a need to reconstruct; and (b) at the end of a financially draining conflict, the people do not have enough money saved to build a house without financing, so rebuilding will require credit.

In the same way, official development aid appears to positively impact the development of housing finance in SSA. Indeed, from a theoretical point of view, it can contribute to the housing finance development process through the following two main channels: by boosting direct investments in the sector on one hand, and/or indirect contributions through the improvement of individual financial conditions on the other hand.

The inflation rate, interest rate, transfers from abroad, and the GDP per capita rate are positively associated with housing finance but these are not significant relationships. Thus, these four variables are weak determinants of financial deepening. These findings are in line with those of Egert and Mihaljek (2007) and Haibin (2006). However, trade openness, domestic credit, and investment stock greatly impede the development of housing finance.

In addition to the basic model and subsequent regressions, we add one composite variable at a time. The idea is to check the compounded effect of our previous context differentiation. We find that financial openness combined with the legal_*dummy*, investment stock, and market capitalization has a significant effect while its combination with the Sahel_*dummy* is not-significant. On one hand, the combination of the legal_*dummy* and market capitalization reduces housing finance depth and on the other, the combination with investment stocks has a positive effect. This result shows that legal origin is not the problem when it comes to questioning the housing finance development state; according to Warnock and Warnock (2008), it is more a question of developing an existing legal system and allowing it to become strong and trusted by borrowers and lenders.

### 4.4 Robustness check

To make sure that our results are robust, we make additional estimations: replacing some variables by their proxy, changing the specification, and changing the estimation method. By changing the specification, we were guided by the maximization of the number of observations relative to the main estimations. Practically, we either add control variables that might affect the dependent variable or remove other control variables to maximize the number of observations. As shown in Table A3 in the appendix, our results are conclusive since we have the same sign and significant variables as in the principal results discussed.

By replacing some variables with their proxy, we were able to verify whether we obtain the same result even when we use different measures for the same variable. By changing the estimation method from FGLS to GMM, we verify the robustness of our main results.

Table A.3 shows the results of our robustness check. The overall results are conclusive. However, by comparing table A.3 in the appendix to table I, the interpretation of the impact of conflict_*dummy* is either positive or negative and significant depending on how we change the housing finance index. So, the previous results of a positive impact of conflict_*dummy* are plausible only for housing finance depth and not housing finance penetration. Also, our combined variables become positively and significantly related to housing finance when the proxy is housing finance penetration.

We can therefore confirm that there is a little relative difference depending on the variable we use to index housing finance even if results remain mostly similar. The rest of the variables remain the same sign and significance independent of the change of the proxy of housing finance development and the estimation method.

## 5. Conclusion

This paper uses a new database on mortgage depth and penetration across countries and panel data econometric techniques to investigate housing finance determinants in SSA countries. It begins by using a benchmarking exercise with a decomposition approach to describe and present the typology of housing finance systems in Africa.

The statistical analysis mainly reveals that housing finance performance varies significantly based on the decomposition of country characteristics. Also, our analysis reveals that housing finance systems in Africa are generally nascent and based more on banks than on markets.

The paper's econometric analysis leads to the following key findings: stock market capitalization, urban growth and official development aid are the main determinants of housing finance development in Africa. Specifically, stock market capitalization is one of the main determinants of housing finance development in Africa; in addition and from a theoretical point of view, official development aid which is designed to promote the economic development and welfare of developing countries can contribute to housing finance development process through the following two main channels: by boosting direct funding in the sector in one hand, and/or

indirect contributions through the improvement of individual financial conditions on the other hand. While credit to the private sector is non-significant and negatively correlated to housing finance in some countries but it is significant and positively correlated to housing finance in others. Hence, the hypothesis that banking development is a catalyst of housing finance should be relativised.

Overall, to develop SSA housing finance markets, this study suggests that governments should focus on market capitalization, mortgage markets development and official development aid. Within the market, rather than deep government subsidies and special circuits dedicated to housing finance which have not been effective (Diamond, 1999; Lea and Renaud, 1995), government involvement is still needed and can be focused for example to defining and enforcing property rights in the underlying asset; to enforce contracts; to set out appropriately balanced procedures for foreclosure when necessary; to follow macroeconomic policies that keep mortgage rates stable; amongst other.

## 6. Appendix

**Table A1:** Variable Definition and Data Source

| Variables | Signs | Variable Definitions | Sources |
|---|---|---|---|
| Housing finance policy | HFINP | Mortgage rate | Housing finance database, World Bank |
| Mortgage depth | HFIND | Mortgage debt to GDP / Credit to GDP | Housing finance database, World Bank |
| Housing finance penetration | HFINPE | Percentage of the adult population with an outstanding loan to purchase a home. | Financial inclusion database, World Bank |
| Housing cost | HFINC | Cheapest house price | Housing finance in Africa |
| Housing finance access | HFINA | the proportion of the population who can access mortgage rate | Housing finance in Africa |
| Housing construction price | HFINCP | Cost of a standard 50kg bag of cement in US$ | Housing finance in Africa |
| Housing demand | HFINDM | Annual housing demand | Housing finance database, World Bank |
| Urban population | UPOP | Urban population (% of total) | World Bank (WDI) |
| Public spending | PSPEND | Public spending on education, total (% of GDP) | World Bank (WDI) |
| Interest rate | TXINT | Real interest rate (annual %) | World Bank (WDI) |
| Financial openness | KAOPEN | economy capital account degree of openness | Chin & Ito (2006) |
| Domestic credit | BCRED | Domestic credit to the private sector by banks (% of GDP) | World Bank (WDI) |
| Transfers | TRANS | Net current transfers from abroad (constant LCU) | World Bank (WDI) |
| Investment stock | IS | Lagged value of gross fixed capital formation | World Bank (WDI) |
| Trade openness | TROPEN | Imports plus Exports in commodities (% of GDP) | World Bank (WDI) |
| Public Investment | PUBIV | Gross Public Investment (% of GDP) | World Bank (WDI) |
| Stock market capitalization to GDP (%) | MACAP | The total value of all listed shares in a stock market as a percentage of GDP. (Standard & Poor's, Global Stock Markets Factbook and supplemental S&P data) | Global Stock Markets Factbook and supplemental S&P data |
| Inflation | INFL | Consumer Price Index (annual %) | World Bank (WDI) |
| Economic Prosperity 1 | GDPG | GDP Growth (annual %) | World Bank (WDI) |
| Economic prosperity 2 | GDPPC | GDP per capita growth (annual %) | World Bank (WDI) |
| Human Capital | SE_SEC | Secondary school enrollment (% gross) | World Bank (WDI) |
| Gender education | SE_ENR_PRSC_FIN | The ratio of girls to boys in primary and secondary education (%) | World Bank (WDI) |
| Population | POP | Population ages 15-64 (% of total) | World Bank (WDI) |
| Governance 1 | VA_PER | Voice and accountability | World Bank (WGI) |
| Governance 2 | PS_PER | Political stability | World Bank (WGI) |
| Infrastructure 1 | IS_ROD | Roads paved (% of total roads) | World Bank (WDI) |
| Infrastructure 2 | EG_ELC | Electricity production from hydroelectric (% of total) | World Bank (WDI) |
| Official development aid | ODA | Net official development assistance/aid received | World Bank (WDI) |
| Wealth_*dummuy* | WEALTH | Dummy variable based on the decomposition of (lower=0, lower middle=1, upper=2) wealth level | Author compute |

| | | | |
|---|---|---|---|
| Conflict_*dummy* | CONFLICT | Dummy variable based on the decomposition of (Conflict=1 versus absence of conflict=0) countries | Author compute |
| Sahel_*dummy* | SAHEL | Dummy variable based on the decomposition of (Sahel=0 versus Forest=1) countries | Author compute |
| Legal_*dummy* | LEGAL | Dummy variable based on the decomposition of (French law=0 versus Common law=1) countries | Author compute |

WDI: World Development Indicators. WGI: World Governance Indicators. FDSD: Financial Development and Structure.

*Source*: Authors' construction.

**Table A.2:** Housing Loan Penetration by Country (2011)

| Country | % | Country | % | Country | % |
|---|---|---|---|---|---|
| **Angola** | 4.3 | Rwanda | 2.1 | Kenya | 1.2 |
| **Burundi** | 0.1 | Sudan | 6.4 | Liberia | 3.6 |
| **Benin** | 0.6 | Senegal | 0.1 | Lesotho | 0.8 |
| **Burkina Faso** | 0.7 | Sierra Leone | 0.5 | Madagascar | 0.6 |
| **Botswana** | 1.8 | Somalia | 6.9 | Mali | 0.8 |
| **Central African Republic** | 1.1 | Chad | 6.3 | Mozambique | 1.1 |
| **Cameroon** | 1.7 | Togo | 2.3 | Mauritania | 6.1 |
| **Congo, Rep.** | 0.3 | Tanzania | 5.4 | Mauritius | 5.7 |
| **Comoros** | 0.7 | Uganda | 1.2 | Malawi | 6.5 |
| **Djibouti** | 6.3 | South Africa | 5.4 | Niger | 1.0 |
| **Gabon** | 0.6 | Congo, Dem. Rep. | 0.7 | Nigeria | 0.3 |
| **Ghana** | 2.8 | Zambia | 1.8 | | |
| **Guinea** | 0.2 | Zimbabwe | 1.3 | | |

*Source*: Authors' construction based on Badev et al. (2014) database on housing finance.

**Table A.3:** Housing Finance Determinants (Sensitivity and Robustness Check)

| **Model A2: Housing finance determinants (Sensitivity and robustness check)** | | | | | | |
|---|---|---|---|---|---|---|
| | | **FGLS** | | | **GMM** | |
| | **HFD** | **HFP** | **HFP** | **HFP** | **HFP** | **HFD** |
| Mortgage depth L1 | --- | --- | --- | --- | **1.02*** ** | 0.131 |
| | | | | | **(0.045)** | (0.086) |
| **Stock market capitalization** | **0.001*** ** | **0.03** ** | **0.03*** ** | 0.02 | **0.001*** ** | **0.001*** ** |
| | **(0.00003)** | **(0.012)** | **(0.013)** | (0.12) | **(0.00005)** | **(0.0001)** |
| **Urban population** | **0.008*** ** | **-0.06*** ** | **0.06*** ** | -0.03 | **0.0002** ** | 0.001 |
| | **(0.0005)** | **(0.022)** | **(0.023)** | (0.022) | **(0.00008)** | (0.002) |
| Conflict dummy t-1 | **0.004** ** | **-2.28** ** | **-3.42*** ** | **-2.2** ** | --- | --- |
| | **(0.002)** | **(1.12)** | **(1.23)** | **(1.15)** | | |
| Investment stock | 0.00009 | **1.22** ** | 0.59 | **1.11** ** | -0.002 | -0.00003 |
| | (0.001) | **(0.479)** | (0.53) | **(0.504)** | (0.002) | (0.01) |
| GDP per capita growth | **-1.0003*** ** | **-1.58*** ** | **-2.1*** ** | **-2.3*** ** | 0.0003 | 0.0002 |
| | **(0.002)** | **(0.482)** | **(0.51)** | **(0.512)** | (0.002) | (0.002) |
| GDP growth | **2.15*** ** | **2.37*** ** | **2.18*** ** | **2.5*** ** | 0.0001 | 0.0001 |
| | **(0.002)** | **(0.459)** | **(0.485)** | **(0.487)** | (0.002) | (0.002) |
| Political stability | **0.08*** ** | **0.1*** ** | **0.1** ** | **0.1*** ** | 0.00001 | -0.0001 |
| | **(0.023)** | **(0.025)** | **(0.026)** | **(0.026)** | (0.0001) | (0.0004) |
| Domestic credit to private sector | --- | -0.035 | **-0.06** ** | -0.035 | -0.0002 | 0.0001 |
| | | (0.028) | **(0.029)** | (0.028) | (0.0001) | (0.0006) |
| Trade openness | --- | -0.006 | -0.01 | -0.006 | -0.00003 | -0.00004 |
| | | (0.01) | (0.01) | (0.01) | (0.00003) | (0.0001) |
| Inflation | --- | **0.19*** ** | **0.16*** ** | **0.18*** ** | -0.00001 | 0.0001 |
| | | **(0.06)** | **(0.06)** | **(0.063)** | (0.0002) | (0.0003) |
| Interest rate | --- | **0.28*** ** | **0.267*** ** | **0.28*** ** | 0.0001 | 0.0001 |
| | | **(0.04)** | **(0.04)** | **(0.04)** | (0.0001) | (0.0003) |
| Transfers | 9.1e-20 | 3.02e-17 | 2.14e-17 | 3e-17 | 4.9e-20 | -5.4e-21 |
| | (9.8e-20) | (3.4e-17) | (3.33e-17) | (3.4e-17) | (1.1e-19) | (1.3e-19) |
| Official development aid | **0,174*** ** | 0,251 | 0,138 | **0,290*** ** | **0,196** ** | **0,158** * |
| | **(0,0115)** | (0,152) | (0,094) | **(0,049)** | **(0,077)** | **(0,082)** |
| Kaolegal | --- | **0.86*** ** | --- | --- | **---** | --- |
| | | **(0.33)** | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Kaosahel | --- | --- | **0.962*** (0.292)** | --- | --- | --- |
| Kaowealth | --- | --- | --- | 0.16 (0.266) | --- | --- |
| Constant | -0.105*** (0.04) | -28.4* (14.9) | -0.913 (16.84) | -26.15* (15.41) | --- | --- |
| Auto | na | Na | Na | Na | -1.06 (0.255) | -1.089 (0.276) |
| Sargan OIR | na | Na | Na | Na | 2.052 (10.307) | 1.682 (10.794) |
| Wald | na | Na | Na | Na | **12.48* (0.067)** | **70.374*** (0.000)** |
| Countries | 45 | 45 | 45 | 45 | 45 | 45 |
| Observations | 401 | 252 | 252 | 252 | 223 | 206 |

*Source*: Estimation result observation by the authors.

*Source*: Estimation result observation by the authors.

*Note*: HFD (Housing finance depth); HFP (Housing finance penetration); Kaolegal (Financial openness*Legal-*dummy*: Legal based decomposition-); Kaosahel (Financial openness*Sahel-*dummy*: Sahel based decomposition-); Kaowealth (Financial openness*Wealth-*dummy*: wealth-based decomposition-); Kaotrop (Financial openness*Trade openness-); Kaomac (Financial openness*Market capitalization); Kaofbcf (Financial openness*Investment stock). *,**,**: significance levels of 10%, 5% and 1% respectively. Values in the bracket are standard errors. Auto: Autocorrelation test. OIR: Overidentifying Restrictions test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of a) no autocorrelation in the Autotests and; b) the validity of the instruments in the Sargan OIR test. P-values in brackets. AR(1): First Order Autoregression. AR(2): Second-Order Autoregression. Autoregression is on the Return variables.

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