The Relative Importance of Mortgage Pricing Determinants in Mortgage Affordability in Ghana: An Ex Post Attribution

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Abstract

Purpose: The purpose of this study is to explore the mortgage affordability problem in Ghana; an issue that has been associated inter alia with high mortgage rates, which results from the high cost of capital, an unstable macroeconomy and unfavourable borrowers' characteristics. Concurrent improvements in both the macroeconomy and borrowers' characteristics have rendered the identification of the most problematic mortgage pricing determinant difficult, consequently making the targeting of policy interventions problematic.

Methodology: This research sought to resolve this aforementioned difficulty by providing empirical evidence on the relative importance of mortgage pricing determinants. A dataset of mortgage rates of selected Ghanaian banking financial institutions from 2003 to 2013 was examined and analysed by applying Fisher's model of interest rates and an *ex post* analysis of the standard regression coefficients.

Findings: The risk premium factor emerged as the most important determinant in Ghana compared with the inflation premium and the real risk-free rate; although all are statistically significant and strongly correlated with mortgage rates.

Originality/ Value: This study provides insight on the relative importance of mortgage pricing determinates and subsequent macro-economic guidance to support policy interventions which could reduce mortgage rates/ enhance mortgage affordability. The paper specifically aims to engender wider debate as well as provide guidance to the Ghanaian Government and/ or private enterprises who seek to provide affordable mortgages. Further research is proposed which could explore ways of reducing mortgage rates as a means of engendering social equality and adopt innovative international best practice that has already been tried and tested in countries such as South Africa and the US.

Introduction

Ghana's mortgage market is woefully underdeveloped with little improvement since 1956 when the First Ghana Building Society commenced its mortgage lending activities (Boamah, 2010). The latest market entry was the Cal Bank[1] in 2012, which increased the source of mortgage finance but interest rates remain excessive and average about 30% per annum (Cal Bank, 2013). Other policy interventions have included: i) the Home Mortgage Finance Law, 2008 (ACT) which seeks to guarantee greater certainty and enforceability of foreclosures on defaulting mortgages (Boamah, 2011); and ii) the Land Administration Project (LAP) which seeks to stimulate economic development by creating a fair and transparent process for accessing and developing land (Ministry of Lands, Forestry and Mines, 2008). As a consequence of these initiatives, borrowers' characteristics (which have affected mortgage pricing) could improve and reduce default risk (*c.f.* Bomah, 2011b).

Traditionally, low levels of mortgage market participation and development have been caused by a toxic combination of: high capital costs; an unstable macro-economy; and unfavourable borrowers' characteristics resulting from high default risk (due to low income levels) and collateral risk. This adverse lending environment has prevented 90% of Ghanaians from taking a mortgage loan to purchase an affordable developer-built home (Ayitey, *et al.,* 2010). A turbulent macro-economy and its impact upon pricing of mortgages has also created problems for sustainable housing development albeit, its recent outlook was positive (Boamah, 2009; Akuffo, 2006; Asare and Whitehead, 2006; Boamah, 2003; Karley, 2002). According to the Bank of Ghana, the period between 2011 and 2012 experienced a single-digit inflation regime of 9% and 8.7% year-on-year respectively compared with the double-digit regime between 2003 and 2010; these statistics were hailed as a sign of relative stability. Accordingly, HFC Bank's mortgage rates reduced from 32% in 2010 to 30.67% in 2012 (Bank of Ghana, 2007). This is commensurate with relative reductions in the inflation rate over the same period from 16.3% (in 2003) to 10.6% in May 2013 (*ibid*). Therefore, Sandilands (2002) reiterated the relevance of a stable macro-economy to the development of

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[1] The CAL Bank was established in 1990 and currently registered by the Bank of Ghana as a universal bank since 2004. Introduced in 2011, the CAL Mortgage Scheme is a Retail Product tailored to middle income earners and high net worth individuals. Products under the scheme include complete mortgages, home completion, home improvement and equity release.

the mortgage market. The cause of high mortgage rates is difficult to determine because of improvements in the macroeconomy and borrowers' characteristics. This renders the targeting of appropriate intervention policies problematic and thus, the likelihood of choosing and implementing the wrong policy is further exacerbated. This paper therefore aims to prescribe measures to reduce the high mortgage rates in Ghana to improve housing affordability. The paper has four main objectives; these are to: i) examine and report upon the Ghanaian mortgage market; ii) identify and discuss the determinants of mortgage pricing; iii) assess the relative importance of mortgage pricing determinants for attributing mortgage rate performance; and iv) evaluate the implications of mortgage pricing determinants for mortgage market development.

Mortgage Market Profiling: Evolution and Typology in Ghana

The Ghanaian mortgage market has often been described as: "... *a private club, opened only to a privileged few"* (*c.f.* De Soto, 2000). Its roots are traceable to the First Ghana Building Society (FGBS) in 1956 under the Building Society Ordinance, 1955 (Act 30) and the Mortgages Decree, 1972 (NRCD 96) (Boamah, 2010). This coincided with the pre-financial liberalization era (1957-1987) and the 1959-1964 housing policy, during which period mortgage lending by the FGBS was financed by short-term deposits and direct Government soft loans (*ibid*). In line with the state's new role as a facilitator and regulator under the 1970-1971 housing policy, the now defunct Bank for Housing and Construction (BHC) was established to provide concessionary construction finance and credit to homebuyers. This was in response to the global economic decline during the 1970s that was characterised by high inflation levels (Konadu-Agyemang, 2001). By granting housing loans of ¢224 million (US$995K) to only 363 mortgagors between 1974 and 1988, the BHC failed to make the expected impact (*ibid*). Other banks (including Ghana Commercial Bank, Barclays and Standard Chartered Banks) followed on this activity after the collapse of BHC but their mortgage lending activities were also short-lived.

The post-financial liberalization era after 1987 and the World Bank Urban II project witnessed the first failed attempt to establish a two-tier integrated housing finance system (*c.f.* Asare and Whitehead, 2006). The World Bank and the Social Security and National Insurance Trust (SSNIT) contributed US$8 million and US$16 million respectively to establish the Home Finance Company in 1990 - now HFC Bank. The bank initially operated as a secondary lender (refinancing mechanism) but became as primary lender (i.e.

originating, underwriting, funding and servicing mortgages) and monopolized the market over a decade (*ibid*). Macroeconomic volatility has distorted price signals and heightened the perceived risk of default and credit loss, resulting in high risk premiums (Agénor, *et al.,* 2000; Benita and Lauterbach, 2004; Adjasi, *et al*., 2008). This volatility is inextricably interlinked with the weak legal and regulatory environment, low income levels and the lack of refinancing opportunities and credit rating activities (Centre for Affordable Housing Finance in Africa, 2012; Tomlinson, 2007; De Soto, 2000). The present situation makes traditional bank mortgage lending unattractive and expensive for the majority of Ghanaians. The HFC Bank (2007) estimated that, only 5-8% of Ghanaians can afford a house from their own resource; about 60% needed financial assistance; and 35% are not capable of owning or building a house in their lifetime. For this reason, about 60% of market participants are resident non-Ghanaians and non-resident Ghanaians (Donkor-Hyiaman, 2011).

Mortgage market shares as at 2008 were mainly divided between four major participants, namely HFC Bank (30%), Ghana Home Loans (27%), Barclays Banks (25%) and Fidelity Bank (12%) (Akuffo, 2009). The mortgage portfolios of Ghana Home Loans and HFC Bank stood at US$65 million and US$ 8 million respectively, contributing to a mortgage-to-Gross Domestic Product (GDP) ratio of about 0.5% in 2011 (UN-Habitat, 2008; HFC Bank, 2011; Centre for Affordable Housing Finance in Africa, 2012). High financing costs and the lack, or inadequacy of long-term funds represent a major problem in the mortgage market (Boamah, 2011a; Karley, 2009; Debrah, *et al*., 2002). This may be attributed to unfavourable borrowers' lending criteria characteristics, namely: character, capacity, collateral, condition and capital – often referred to as the five Cs. Karley's (2003) South African study reveals very similar characteristics to borrowers in Ghana (Karley, 2002):

> *"[1] Capacity: that most have low and informal incomes, and in relation to price of dwelling it implies high default rate and insecurity for mortgage loan; [2] Capital: that there is general lack of savings to fulfil the initial deposit requirement; [3] Collateral: that prevalence of slums and backyard houses posed collateral risk; [4] Character: that many potential borrowers are unaccustomed to formal credit and financial obligations. Thus, they have no credit record for proper assessment; [5] Conditions: that macroeconomic volatility creates cash flow and inflation risk and limits*

> *long-term lending especially to low income borrowers and that the*
> *transaction cost of lending for low income is uneconomical".*

The foregoing raises a number of points of interest, including how housing finance systems should be conceptualized in the wider economy; how they should incorporate processes which improve housing affordability; as well as how they might be adapted innovatively to improve low- and middle-income access. State intervention could potentially relieve this dearth of affordable housing in Ghana if pension and insurance funds were released as a source of finance similar to existing practices in Southern Africa and Singapore (Ayitey, *et al*., 2013; Mwilima, *et al.,* 2011; Boamah, 2011a; Moodley-Isaacs, 2008; Tomlinson, 2007; Mahama and Antwi, 2006, Asare and Whitehead 2006; Chirchir, 2006). This is because pension, insurance and mortgage market funds have long-term investment horizons involving substantial assets and liabilities, which when matched properly could reduce liquidity risk and mortgage interest rates.

Mortgage Pricing Determinants: Conceptual Price Setting in Theory

Mortgage pricing involves a dynamic trade-off between supply and demand for new home purchases, and the price of a mortgage depends upon how much is borrowed (Geltner, *et al*., 2007; Geltner and Miller, 2001). Unlike government securities which are considered risk-free (Reilly, 1994), an individual however may default on mortgage repayments. A risk premium charge is therefore incorporated into the nominal risk free rate price to cover the extra risk taken (Daniels and VanHoose, 2005; and Chrisholm, 2002). Therefore, the mortgage price is a function of macroeconomic performance and borrower risk which are also referred to as systematic and specific risk respectively. While the former risk affects all investments, the latter is idiosyncratic to borrowers.

The role of Government in mortgage pricing is reflected in three determinants of the mortgage rate – i) *real risk-free rate* ii) *expected inflation* (inflation premium) and the iii) *risk premium* (Donkor-Hyiaman, 2011).

- *Real risk-free rate*

  The real risk-free rate represents the pure short-term time value of money irrespective of risk - that is, the price charged for the exchange between current goods and future goods (Reilly, 1994; Brueggeman and Fisher, 2011). According to Bates and Parkinson

(1968), the cost of capital is the first approximation to pricing and the most vital influence on the mortgage price (Meidan and Chin, 1995). The real risk-free rate therefore varies with short-term capital supply and demand (Geltner and Miller, 2001). This is further influenced by the size of the lender's fund reservoir, cost of money to the lender, loan servicing costs and available investment alternatives (Dasso, *et al.,* 1995). The availability of investment alternatives and investors' time preference for consumption of income are the two factors influencing the supply of capital in the economy (Reilly, 1994). Therefore, there is a positive relationship between real growth rate in the economy and the real risk-free rate (*ibid*). Hence, the high economic growth of 14.4% recorded in 2011 by the Ghanaian economy (Centre for Affordable Housing Finance in Africa, 2012) amidst the scarcity of long-term funds meant that suppliers of capital demanded a high return. This explains the popular concern by lenders about the high cost of capital in the economy.

- *Expected inflation*

  The real risk-free rate is affected by purchasing power losses due to the expected rate of inflation in the short-term economy, hence, requiring a premium as compensation – inflation premium (Bruggeman and Fisher, 2011). A high inflationary regime results in borrowers being charged high interest rates which are beyond the means of some individuals (Thornton, 2009). Conversely, too low an interest rate charged presents a significant risk to a lender, especially in a highly volatile inflationary economy (Brueggeman and Fisher, 2011). This has ramifications for the term structure of interest rates and the yield curve; where the latter is considered as the difference in market yields of otherwise identical investments of different maturities (Geltner and Miller, 2001). High-anticipated inflation in the long-term may restrict lending in the short-term or attract high inflationary premiums on short-term lending. A common alternative is to allow the mortgage rate to vary in respect of the: i) rate of inflation; ii) the prime rate (Dasso, *et al.,* 1995); or iii) the yield on Government securities (Kolbe and Greer, 2009). Effectively, the size of these three designated market indices are attributable to the Government and represent major determinants of cost, availability and affordability of mortgage funds.

The high and volatile inflation regime in Ghana therefore has implications for liquidity preference and risk which could explain the '*long-term capital scarcity'* in the

mortgage market (Daniels and VanHoose, 2005). Short-term liquidity preference renders the mortgage market illiquid in the long-run; requiring a term (liquidity) premium to compensate lenders for putting their money into relatively uncertain illiquid mortgage assets (*ibid*). Alternatively, funding long-term mortgages with short-term deposits structurally creates liquidity risk and a maturity gap such that banks may not have sufficient cash to meet deposit withdrawals (Angbazo, 1997). Banks are therefore forced to borrow emergency funds at a potentially higher cost which is borne by the borrower to compensate for the expected cost of a liquidity shortage (Prisman, *et al*., 1986). Liquidity risk depends on the ease with which an investment can be converted into cash (Boamah, 2009). This is affected by the availability of refinancing mechanisms, which creates a market for the resale of mortgage loans to secondary lenders (*c.f. ibid*). A distinct lack of refinancing mechanisms (e.g. securitization) via the secondary mortgage market could account for the persistence of liquidity risk in Ghana (*ibid*). Securitization removes risk from mortgage lenders' balance sheet by matching assets with liabilities – this augments loan supply and reduces mortgage rates (Liu, *et al.,* 2009; European Central Bank, 2007; Sorensen and Lichtenberger, 2007).

- *Risk premium*

  Borrowers' risk is a composite of borrowers' ability to afford a mortgage and collateral (property) risk (Titman, *et al*., 2005). Unforeseen risks include a fall in the property's value below the loan balance or a fall in borrower's income – either of which might cause mortgagors to default (Wong, *et al*., 2004). Default risk is determined by borrowers' credit worthiness and is contingent upon the past fiscal responsibility as evidence of the intent to repay the loan. Nevertheless, according to Kau (2005), it is the house versus the mortgage value *vis-à-vis* personal characteristics (such as the home borrower's liquidity) that explains default. Therefore, diverging degrees of default risk and distinctive levels of liquidity subject the amount and timing of expected return to uncertainty and degradation; both of which accounts for risk premiums (Daniels and VanHoose, 2005). Yield degradation is the consequence of an expectation of bad debt upon default (Geltner, *et al*., 2007; Geltner and Miller, 2001). The general low income levels coupled with high house prices and mortgage rates in Ghana creates an affordability problem and increases the expectation of default (Karley, 2009; Asamoah, 2010; and Agblobi, 2010).

In summary, the interest rate is the chief instrument of monetary policy (Rochon and Vernengo, 2001) and the primary mechanism that clears the market; moving up to purge excess demand for mortgage funds and down to eliminate excess supply. Therefore, the size of the mortgage rate is attributable to the macro-economy (Government) and borrower risk.

Methodology

This empirical study was based upon secondary data gathered from the Bank of Ghana and included historical macroeconomic independent variables such as actual inflation rates, Treasury bill rates (were obtained from the Bank of Ghana) and mortgage rates. Mortgage rates obtained from the HFC Bank over the period 2003 to 2013 were used because the HFC Bank is the major mortgage lender in Ghana (Boamah, 2009) and data was available for only this period. Mortgage pricing determinants (predictor variables) were obtained by decomposing HFC Bank's mortgage rates from 2003 to 2013 based on the Fisher equation of interest rates. The Fisher equation is commonly used within financial mathematics and economics to estimate the relationship between nominal and real interest rates under inflation. The Treasury bill rates for the corresponding years were used as the nominal risk-free rates; these were then deducted from the mortgage rates to arrive at the risk premium. The nominal risk-free rates were deflated by deducting actual (*ex post*) inflation rates to obtain the real risk-free rates.

The standardized regression coefficients method was adopted to estimate the relative importance of the determinants of HFC Bank's mortgage rate via multiple regression (Darlington, 1990; and Courville and Thompson, 2001). This was done by first testing the hypothesis that HFC Bank's mortgage rates are not influenced by: i) the real risk-free rate, ii) expected inflation; and iii) the risk premium. The magnitude of the estimated regression coefficients for the three predictors determines their relative importance in mortgage pricing. The usefulness of each predictor is defined as the proportionate contribution they make to the R^2 by their inclusion in the model (Darlington, 1968). This type of index is often desired when the explanatory aspects of regression analysis are of interest (Johnson and Lebreton, 2004).

The research hypothesis was:

H_o: $\beta = 0$ (HFC Bank's mortgage rates are not influenced by the real risk-free rate, expected inflation and the risk premium)

H$_A$: β ≠ 0 (HFC Bank's mortgage rates are influenced by at least the real risk-free

rate or expected inflation or the risk premium)

The significance level, α = 0.01

The multiple regression model estimated was: $i_t = \beta_0 + \beta_1 r_{t+1} + \beta_2(\pi_{t+1} + r_{t+1}\pi_{t+1}) + \beta_3 Rp_{t+1} + \varepsilon$; where: i_t = HFC Bank's historical mortgage interest rates from 2003 to 2013 (dependent variable); β_0, β_1, β_2 and β_3 = standard regression coefficients; r_{t+1} = real risk-free rate; π_{t+1} = actual (ex-post) inflation; $r_{t+1}\pi_{t+1}$ = cross product of the real risk-free rate and actual inflation; and Rp_{t+1} = risk premium; and ε, the noise term.

Results, Analysis and Discussion

At 0.01 significance level, the P-values for the real risk-free rate, inflation premium and the risk premium are all zero (0.00), and lower than the significance level; this underpins the overall significance of the model. Moreover, the estimated t-statistics 24.13 (*real risk-free rate*), 26.91 (*inflation premium*) and 28.61 (*risk premium*) are higher than the critical-t of 5.84 at 99% confidence interval - indicating that the individual determinants are significant. Hence, we reject the null hypothesis that, HFC Bank's mortgage rates are not influenced by the real risk-free rate, expected inflation and the risk premium. In other words, there is a linear relationship between HFC Bank's mortgage rates and the real risk-free rates, inflation premiums and the risk premiums.

The standard regression coefficients of 0.990 (risk premium), 0.986 (inflation premium) and 0.873 (real risk-free rate) are positively correlated with the mortgage rate. The latter is more sensitive to the risk premium than the inflation premium and the real risk-free rate. This is confirmed by the reduction in the coefficient of multiple determination (R^2) from 0.99% to 0.16%, when the risk premium was excluded. On the contrary, the R^2 was 26.41% when the inflation premium was excluded. This suggests statistically that on a relative importance basis, the risk premium is more significant in explaining changes in the mortgage interest rate than the inflation premium (refer to Table 1 below).

<Insert Table 1 Here>

The relative importance of risk premium could be explained by its higher standard deviation (0.19%) (thus, higher variance and greater volatility) when compared with inflation

premiums (0.11%). For example, the range of risk premiums is 2,080 basis points[2], while that of inflation premium is approximately 1,199 basis points for the same period. This confirms that the risk premium increases with increasing risk and decreases when risk reduces hence, corroborating the theoretical securities market line[3] (SML). The behaviour of risk premiums over the period 2003-2013 could be attributed to two main causes: i) unstable macro-economy; and ii) unfavourable borrowers' characteristics. The latter results in high default risk owing to the general low income levels in Ghana, which subsequently culminates in poor credit ratings. For instance, default rates peaked at 95% in 1999, declining to 11% by May 2009 (Asamoah, 2010). This substantial reduction in default rates may be attributed to improvements in incomes which increased from GH¢0.55 to GH¢2.60 per day, representing a 17% compound annual growth rate over the period from 1999 to 2009. Improvements in income enhances borrowers' ability to service repayments, reduces default risk and consequently reduces the degradation of the *ex-ante* yield which may result from the effect of bad debt.

Collateral risk has been a major bottleneck for housing capital development in Ghana and has become synonymous with weak land administration and mortgage regulatory regimes. Land administration in Ghana suffers with a high incidence of imperfect land titling and incomplete registration of property ownership, which constrains the use of pledging property as collateral for housing credit. By elongating the process of converting collaterals into cash upon borrowers' default, liquidity and foreclosure risks increased which limited the supply of loanable funds in the mortgage market. This is because most banks in Ghana have become portfolio lenders who lend when mortgages fit well into their portfolios (Karley, 2002). Aside these regulatory hindrances, the absence of formal and large refinancing mechanisms also accounts for the high liquidity risk in the market which heightens interest rate risk. Housing finance systems are interdependently linked to property right, macroeconomic considerations and policy transmission mechanisms that should reflect both improvements and deterioration in related variables (Pugh, 1994). Related variables include mortgage rates and supply and demand of mortgages. Hence, improvement in these variables should have a positive impact on mortgage pricing to borrowers' advantage.

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[2] Basis Point (Bps) is a unit that is equal to 1/100th of 1%, and is used to denote the change in a financial instrument. The basis point is commonly used for calculating changes in interest rates, equity indexes and the yield of a fixed-income security.

[3] Security Market Line (SML) is the representation of the capital asset pricing model. It displays the expected rate of return of an individual security as a function of systematic, non-diversifiable risk (Reilly, 1994).

However, reduction in the mortgage rate remained below expectation as Ghana cedi-denominated mortgage rates were circa 30 per cent during 2012 to 2013. This could be attributed to the relative stability of the inflation regime over the last one year and not necessarily a reduction in the risk premium caused by the improved regulatory and property rights system. Moreover, the period under observation experienced high inflation risk; which also explains the high volatility of the risk premium. If the expected inflation in 2003 was 16.3%, it increased to 22.4% just a year after and reduced to 19.86% in 2009. An investment made in 2003 and maturing in 2004 or 2009 suffers 6.1% and 3.56% in real return losses respectively. For instance, the real risk-free returns from 2004 to 2007 were negative; that is -5.3%, -0.2%, -5.2% and -0.3% respectively. Figure 1 presents a time series graph of the real risk-free returns during the period of 2003 to 2013. This supports the assertion of Chambers, et a*l.* (2008) and Sandilands (2002) that high and volatile inflation regimes results in real return losses on investments.

<Insert Figure 1 Here>

High and volatile inflation rates were instrumental in putting the brakes on long-term lending, especially mortgage financing during most of the periods before the millennium. This finding concurs with previous studies that attributed the dollarization (as a hedge against inflation risk) of the property market to high and volatile inflation (Asare and Whitehead, 2006; Boamah, 2011). Similarly, this could be the reason for most banks avoiding the mortgage market because high inflation volatility has expanded lenders credit, interest rate, and liquidity risks (Renaud, 2004). High inflation volatility has subsequently contributed to the high risk premiums charged borrowers. Risk premiums in 2003 and 2006 were 15.4% and 21%; that is about 1,540 and 2,100 basis points respectively. It plummeted to 0.3% in 2008, during which period, mortgage rates hovered around 25% while Treasury bill rates were about 24.7%. This coincides with the period of high investor confidence. Figure 2 presents a time series of mortgage risk premiums during the period of 2003 to 2013; the combined performance of real risk-free rates and risk premiums for the same period are presented in Figure 3.

<Insert Figures 2 and 3 Here>

The substantial real risk-free rates (cost of capital) also results from the high real growth recorded in 2012 (Reilly, 1994). Corroborating Bruggeman and Fisher (2011), the real risk-

free rates were highly affected by purchasing power losses due to inflation risk. This suggests that mortgages originated at those rates were inadequately priced; which strengthens the proposition that a stable macroeconomy and favourable borrowers' qualities are vital in pricing competitively and plays a crucial role in supplying long-term mortgage funds. This evidence disputes the assertion that the cost of capital (real risk-free rate) is the most vital influence on mortgage pricing (Median and Chin, 1995). The above analysis is graphically represented in Figure 4 below.

\<Insert Figure 4 Here\>

Mortgage returns were therefore delivered by inflation and risk premiums, which per the empirical evidence are critical in determining mortgage prices in Ghana. By comparison, risk premiums have been the major mortgage pricing determinants, which affirm the unfavourable borrowers' characteristics. This is underscored by high illiquidity and low levels of income which increases default risk. Essentially, borrowers' adverse characteristics and the Government's macroeconomic management inefficiencies underpinned by the high and volatile inflation regime are the major determinants of the high mortgage rates in Ghana.

Implications for Mortgage Financing
Improvements in incomes suggests that factors including inflation, interest rate, collateral and liquidity risks may have accounted for the high risk premiums incurred by mortgage borrowers. By comparison to developed markets in the US and the UK, the nascent capital market in Ghana lacks essential financial infrastructure such as derivatives. Thus, lenders are unable to diversify away specific risk from their loan portfolios. This problem contributes towards persistent high mortgage rates as lenders price away risk rather than mitigate it. Gwin (1986) raised the concept of 'benefits pricing' and the mortgage pricing risk management activities of banks. Gwin (*ibid*) concluded that the size of risk premiums is directly related to the level of development of the capital markets and the level of innovation in terms of risk management in the market. The lack of risk management innovation also relates to product risk which is directly dependent on the kinds of mortgage products on the market, and for that matter, product design. Most mortgage lenders in Ghana have resorted to the traditional constant payment mortgage (CPM) with the exception of the HFC Bank that offers alternatives like the graduated mortgage payments and negative amortization models. The disadvantage with CPM is that it leads to the front-loading of repayment as incomes

increase; which may present most borrowers as cost burdened and highly probable to default especially in the early years of mortgage servicing. For this reason, borrowers are charged high risk premiums and this brings into question the role of mortgage lenders in market development. The highly inefficient mortgage market in Ghana requires mortgages lenders to be proactively innovative. Further, the Ghanaian Government has persistently been inefficient and unable to manage macroeconomic variables properly; for which reason, there is a constant production of high systematic risk - evident by high and volatile inflation regimes in the economy. This in the context of public policy, is a negative externality created by Government and fully transferred to borrowers by mortgage lenders in the pricing process.

Systematic risk directly limits the supply of loanable funds. Underpinned by high inflation, it inverts the remunerative structure of the investment market in favour of short-term investments such that the existence of a source of finance may not be accessible except at a high cost. In effect, both the demand and supply sides of the mortgage market are constrained by specific risk. Hence, any attempt to concentrate on either the demand or supply side in isolation may not be enough to stimulate development in the mortgage market.

Conclusion

The Ghanaian mortgage market is underdeveloped and reflective of unfavourable prevailing macroeconomic market conditions and governmental policies; both of which have contributed to a high and volatile inflation regime. In turn, a narrow range of mortgages available have become unaffordable for the vast majority of Ghanaians who either struggle to obtain a mortgage or default on subsequent repayment. Given the inextricably linked array of complex economic and political interralationships that underpin this problem, prescribing a panacea will require the development of an efficient mortgage market that incapsulates both the supply and demand side of affordable housing. For example, while adequate incomes are a prerequisite to enhance the prospects of mortgage market participation, the need for greater sources of finance cannot be over-emphasized and hence, alternative international finance practices require far greater consideration and application. Financial availability *per se* in the absence of a conducive macroeconomic environment and approprate risk management instruments, will not however necessarily make such funding affordable.

The analysis conducted in this research revealed that the risk premium factor was the most important mortgage pricing determinant in Ghana compared with the inflation premium and

the real risk-free rate; although all are statistically significant and strongly correlated with mortgage rates. Furthermore, and unsurpisingly, a volatile inflation regime accounts for a higher proportion of the mortgage rate. In-turn, investors' expectation of high inflation constricts long-term investments and long-term mortgage funds in the Ghanaian mortgage market. In essence, a shortage of long-term funds has increased competition for limited funds available which has consequently raised the cost of capital to lenders. This recurrent trend looks set to continue in the absence of a transformational intervention by government to introduce: i) more innovative fiscal policies into the Ghanaian economy; and ii) partner with financial (and other funding institutions) to develop alternative sources of affordable mortage finance. Hence in conclusion, although this research has identified the relative importance of mortgage pricing determinants, it has also identified new avenues of research enquiry and sought to engender further academic/ industrial debate on the use of innovative international best practice within the Ghanaian mortgage market. It is hoped that ultimately this work will act as a catalyst for engendering social, political and economic change for the betterment of Ghanaian citizens.

Recommendations

Similar to the United States (in the 1970s) and South Africa, both supply and demand-oriented mortgage support-programs should be introduced by the Ghanaian Government to facilitate the efficient operation of the mortgage market. A typical example is the Tandem Plan of the US Government National Mortgage Association (GNMA); this allows the GNMA to buy Federal Housing Association and Veteran Association (FHA-VA) mortgages at higher than market prices, thereby reducing the effective mortgage interest rate for homeowners. This will enable the Government to counter inefficiencies within a persistent unstable macroeconomy hence, ensuring greater fairness to borrowers.

Two lessons from South Africa can also be learnt. First, implementation of a subsidy scheme increases borrowers' equity contribution towards mortgaging (Kolbe and Greer, 2009). A subsidy will reduce financial leverage and repayments accordingly in relation to incomes as the size of the loan reduces. Associated reductions in default risk would subsequently lower risk premiums and mortgage rates accordingly. Second, a mortgage indemnity fund could also be established as a recompense facility to indemnify mortgage lenders who sustain losses due to borrowers defaulting on mortgage repayments. This default guarantee scheme could reduce risk premiums substantially and resolve a perrenial problem. However, a full

indemnity would be costly to the state, hence, risk sharing between the state and borrowers/ lenders would be more equitable and transparent (cf. Attakora-Amaniampong, 2006). Notwithstanding, these proposals to enhance the borrowing capacity of borrowers and reducing the risks to lenders, the Government must tackle the economy with renewed vigour and vitality, and reduce inflationary pressure within the economy. Low levels of inflation could attract long-term investments and subsequently long-term funds for mortgage lending.

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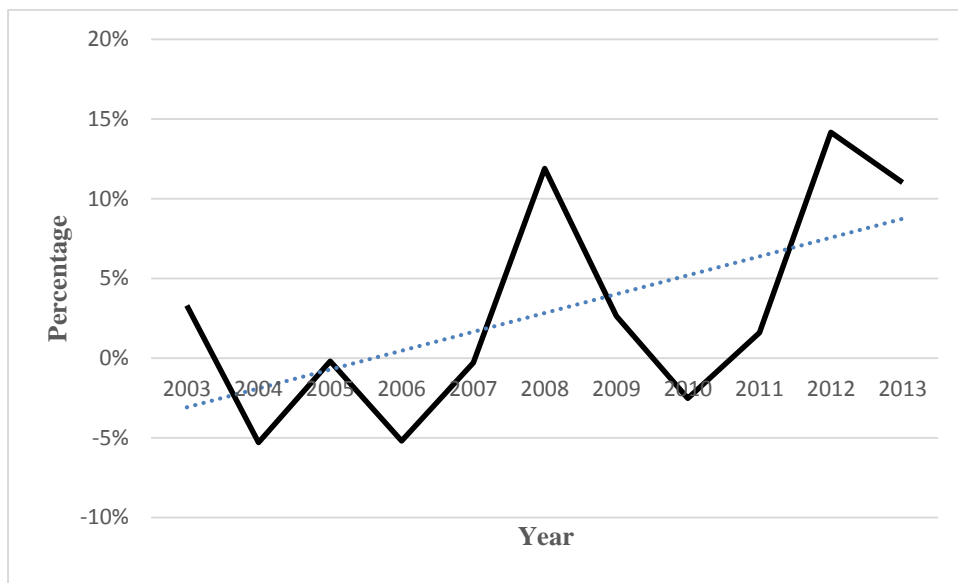
Table 1: Results of Multiple Regression

Fisher's Equation: $i_t = \beta_0 + \beta_1 r_{t+1} + \beta_2(\pi_{t+1} + r_{t+1}\pi_{t+1}) + \beta_3 Rp_{t+1} + \varepsilon$

Dependent Variable	Regressors (Ex-post)	Regression Coefficients	t-statistic	p-value .
Ex-post	Real Risk-Free Rate	0.873	24.132	0.00
Mortgage	Inflation Premium	0.986	26.906	0.00
Rate	Risk Premium	0.990	28.614	0.00

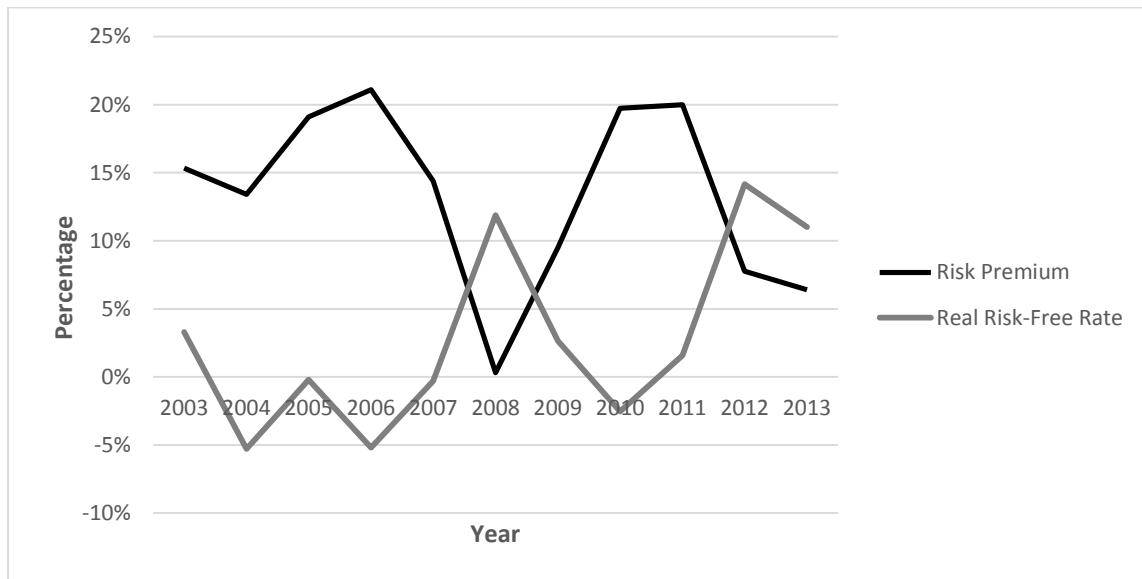$R^2 = 99.29$

Figure 1: Time Series of Real Risk-Free Rate (2003 – 2013)
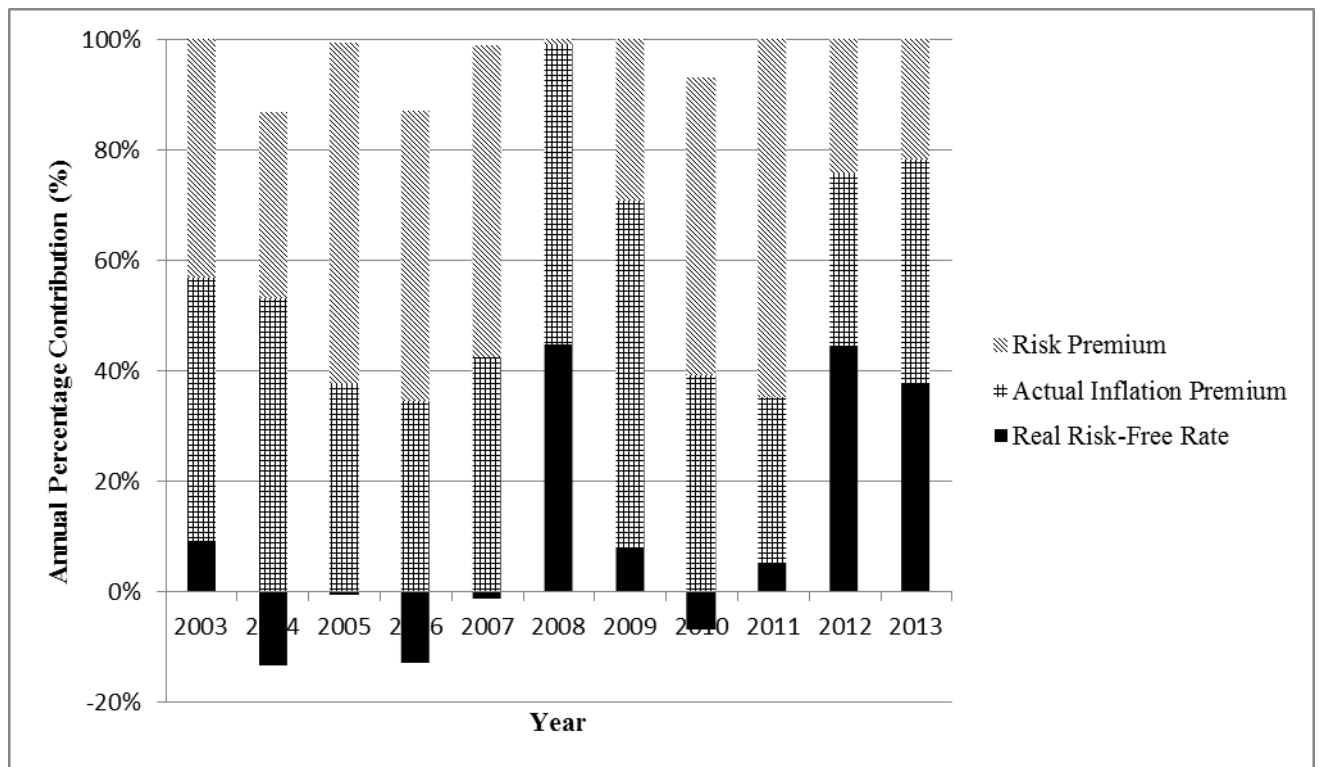
Figure 2: Time Series of Mortgage Risk Premiums (2003 – 2013)

Figure 3: Performance of Real Risk-Free Rates and Risk Premiums (2003 -2013)

Figure 4: Performance of HFC Bank's Mortgage Rate Determinants (2003 – 2013)