Assessing the Interaction between the Macro Economy and the Mortgage Market: Evidence from Ghana

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Abstract

The mortgage market is crucial to the housing delivery system largely due to the huge financial requirement for housing production. Applying a multiple linear regression model on a monthly time series data for the period 2007 – 2015, this paper investigates the influences of the macroeconomic environment on the performance of the mortgage market. The findings of this study suggest that the macro-economic environment is crucial to the development of the mortgage market. The study results show that exchange rates have a negative and significant relationship with the growth of the mortgage market. Also the study finds significant influences of income and inflation rates on mortgage originations. This study suggests that a stable macroeconomic environment is crucial in any effort to develop a vibrant mortgage market. A healthy macro economy provides the anchor in attracting the needed long term finance for housing development. Indeed the growth of the housing industry is not indifferent to the baseline macroeconomic framework.

Keywords*:* Housing Finance, Mortgage, Macroeconomic Factors, Income Levels

1. Introduction

Housing is treated as an essential human need in every society all over the world. There are arguments to the effect that improved housing markets will not just serve direct consumption benefits but also will provide a number of positive externalities. For instance, the construction of a new housing unit through a production multipliercould increasethe aggregate output in an economy (BoG, 2007). Zhu Xiao (2001) asserts that housing generally accounts for a chunk of the wealth of a typical household's wealth and this is particularly so for 'low-income households'. In relatively high inflationary environments, investors have the tendency to shift their investments 'away from money markets to the goods market' as a hedge against the risk of negative real returns (Zhu Xiao, 2001). Also, housing serves as collateral for borrowing by homeowners. This implies that housing generates funds for other investments and provides further wealth creation avenues(Zhu Xiao, 2001). In addition to the economic benefits of housing, literature (for example, Rohe, Zandt, & McCarthy, 2001) documents that housing has a positive influence on the social well-being of the populace. For instance, Rohe, Zandt& McCarthy (2001) showthat the extent to which people are satisfied with their homes and neighbourhoodsdetermines the extent of their productivity at work.

Economic and finance literature until recently, appeared to have treated housing development and consumption as one of the several consumption/investment goods. Indeed the interactions of housing markets with the macro economy seems to be subtly ignored by mainstream economics and finance research with some of the theoretical and empirical research only including"macroeconomic variables as exogenous control variables" in the models to examine the dynamics in the housing markets. Howeverrecentresearches in finance appear to have had as a primary focus theinfluence of macroeconomic factors on the housing industry as "literature on consumptionbased asset pricing and studies on the equity premium puzzle" began to surface (BoG, 2007).

Boamah (2011) argues that the prevailing macroeconomic environment is crucial to the ability of nations to deepen the housing finance market and to realize the enormous benefitstherein such an effort.Thus, Sandilands (2002) noted that it is incumbent upon policy-makers to get the macroeconomic conditions right in the pursuit of an enhanced housing market. Any instability on the macroeconomic front affects negatively the housing market and housing finance (Richupan, 1999). Waigel (2000) assets that, factors such as national and international economic trends, interest rate, price stability, and exchange rate are all significant determinants of housing finance. These factors according to Gyamfi-Yeboah & Boamah, (2003) are very crucial for the attainment of a vibrant mortgage market. Generally countries that experience a more stable macroeconomic environment are associated with a deeper and well-groundedhousing finance system (Warnock & Warnock, 2008).

The debate on the dynamics of the interaction between the housing industry and the macro economy remains under explored. Again most of theprevious studies applied largely qualitative techniques in examining the effect of the macroeconomic environment on the development of the housing finance market (Boamah, 2011). This current study employs a quantitative approach and seeks to investigate the effect of macroeconomic factors on mortgage market activities using data from Ghana.Onibokun (1985) echoed the constraint of finance in housing development and

Fashakin (1998) as cited in Ayeniyo (2011) suggested the need to strengthen the co-operative housing system in an effort to ease the financial constraints in the housing delivery system. Levine (2007) hypothesized that the provision of housing cannot be successful if a nation does not have a well-developed mortgage market. Further, Kyereboah, Coleman, & Agyire-Tettey, (2010) held that one major strategy often advocated for improving access to housing in an economy is to facilitate the development of a vibrant and efficient mortgage market.

The Bank of Ghana, (2007) indicated that relative to most advanced countries, the housing industry in Ghana is at a rather fundamental stage. The housing industry has attained a critical developmental headache for policymakers as rapid urbanization as well as a fast evolving middle-class group has prompted high property prices in most urban communities. Policy makers are not just confronted with the issue of prices of houses but also how the required funds are sourced so as to satisfy the ever growing demand for housing in Ghana. The UN Habitat (2011) indicated that the housing deficit in Ghana is estimated at more than 1 million housing units, and growing by up to 70,000 units a year. The mortgage market in Ghana has achieved some moderate improvement since 2004 with the Bank of Ghana (2007) documenting that mortgage debt outstanding grew from 2.5 per cent in 2004 to 3.9 per cent in 2006. This is a significant improvement if compared particularly to the record of less than 0.1 per cent of GDP for Russia. Nevertheless it is streets apart from the range of 7-15 per cent recorded in most other middle-income countries (BoG, 2007).

A good number of the studies on the influence of the macroeconomic environment on the mortgage market have focused on inflation and exchange rate stability (Boamah, 2009; and Boleat, 2008). Aside inflation and exchange rate, this study includes other factors such as interest rates and income levels in the investigation of the relationship between the macro economy and the mortgage market.

The remainder of this paper is organized as follows: Section 2 surveys the literature and provides an overview of existing evidence on the effects of the macroeconomic environment on the growth of the mortgage market. In Section 3, the study discusses the methodology employed and the model specification. Section 4 provides a description of the data. Section 5 presents and discusses the main results. Summary of the study and some concluding remarks are made in Section 6.

2. Interactions of the Mortgage Market with the Macro Economy

Extant research addresses the interactions of housing market with the macro economy with particular emphasis on the implications of inflation and exchange rate risks on the growth of the macro economy.

2.1 Inflation, Interest Rates and the Mortgage Market

According to Boamah (2009), one requirement for a successful mortgage market is a macro-economic environment blessed with low inflation. He argues that inflation at low levels will ensure low and stable interest rates. In an environment with high inflation, lenders seek high interest rates as a buffer against inflation risk that has the potential to erode their purchasing power. In another study, Akinwunmi, (2009)posits that a lower frequency and severity of economic downturns make household income more stable and may contribute to a willingness to assume higher debt burdens and increased attractiveness of flexible mortgage rate.

Chiquier, Hassler, & Lea, (2004) identify interest rate risk as a major risk facing the development of mortgage markets. Lenders are exposed to interest rate risk if the offer long term fixed rate mortgages from usually short-term deposits. In other words lenders assume interest rate risk if they take on short term deposits and commit these funds to mortgages that are usually long dated. Lenders may seek to control this risk by using adjustable rate mortgages which transfers the risk to the borrowers. Butler, Kravova, & Safavian, (2009) posit that if inflation is volatile, lenders will incur high interest rate risk if they lend at a fixed rate. Lenders may therefore pass the risk to the borrowers through high interest. High rates of interest results in higher default rates and ultimately has the tendency to extinct the lenders' business.

Green & Wachter (2007) emphasise on the availability and cost of mortgages as crucial determinants of a well functioning housing markets across countries. They cited the decline in nominal prime interest rates from an average of 15 percent in 1980 to 4.4 percent in 2004 across several countries as a key factor in the development of the mortgage markets in these countries during these periods. The major outcome of the decline in nominal prime interest rates was improved access to mortgages, increase in demand for housing, and increase in house prices across most of the industrialized countries in the world. Green & Wachter (2007) conclude that the fall in interest rates is critical in inducing higher demand for mortgages. These views were largely corroborated by Huybens & Smith (1998) who argue in their study that an increase in the rate of inflation could have at first negative consequences on financial sector performance through credit market frictions which entail the rationing of credits leading to reduction in intermediary activities as well as capital formation. However, Arcelus & Meltzer (1973) state that even if market rates of interest rise, and the expectations of higher inflation in the long run keep interest rates at higher levels, it would not reduce housing demand permanently. This is because, wages and house prices would adjust to the higher anticipated inflation after a time lag.

Walley, Badev, Beck, & Vado, (2013) applied a regression analysis model and report that inflation is negatively and significantly associated with mortgage market development. Inflation volatility was negatively and significantly associated with mortgage depth. Inflation however relates positively and significantly with housing loan penetration, which may indicate the use of housing loans (and thus real estate more generally) as a hedge against inflation, where available. In another study, Warnock & Warnock, (2008) used a sample of 61 countries and found that deeper mortgage markets were associated with a stable macroeconomic climate of low and stable inflation.

2.2 Exchange Rate and the Mortgage Market

Boamah (2009) emphasise the repercussion of currency risk to mortgage financing and points out a stable currency is an essential ingredient for a successful mortgage market. Mortgages are long term loans and according to Boamah (2009), unstable exchange rates will not provide an attractive environment to long-term foreign capital. In another study, Boamah (2011) utilized a regression analysis model to determine the interaction between the mortgage originations in

Ghana and macroeconomic factors such as inflation, interest, and exchange rates. The study found exchange rate as the only significant macroeconomic factor influencing mortgage originations in Ghana. Boamah (2011) explained that the significant relationship between exchange rates and the mortgage market in Ghana was largely due the fact that mortgages in Ghana were denominated in foreign currencies (United States dollar) and that mortgagees focused on Ghanaianswhose incomes are indexed in foreign currencies. He noted further that the act of denominating mortgages in foreign currencies has resulted into resident Ghanaians being virtually priced out of the mortgage market. The situation is compounded by the rather volatile exchange rates in the country.

2.3 Income Levels and the Mortgage Market

Mortgage lenders are concerned with the prospective borrower's ability to pay so they require that the potential borrower should have not only sufficient but also consistent income (Mogaka, Mboya, & Kamau, 2015). The requirement to have a stable income is the very first criterion and other requirements like collateral become irrelevant if this is not met. Gelfand (1970) argues that lenders cannot provide mortgages only to have a foreclosure on their hands soon afterwards. De Soto (2000) documents that the requirement for consistent and stable income streams only restricts mortgage finance to households with adequate levels of income or savings and the poor are excluded automatically from mortgage financing. IDB (2005) however finds that home ownership among low income households is very high in Latin America and such households have very good quality housing. Thus, low income household may not be able to afford a mortgage but through self-build, they are able to have homes over time without borrowing from any financial institution. Therefore, a lender may perceive a high risk of non-payment due to the asymmetric character of information, even if the borrower has the ability to pay. The instability of the borrower's income however raises the risk of default on instalments while the loan is in effect, even when the borrower might have the ability to pay (IDB, 2005).

In a study of the mortgage market in Kampala, Uganda, Mugambe, (2009) observed that financiers would seek for proof of regular source of income preferably in permanent employment and would lend to those who can afford monthly repayments not exceeding 35% of the borrower's monthly income. These financiers could only finance up to 70% for urban areas housing and up to 60% for housing in other areas. Mugambe, (2009) argues that the low levels of income and presence of a large informal sector constrain the development of the mortgage market. The presence of a large informal sector often makes it difficult to estimate the potential borrower's income.

3. Methodology

This study took into considerations the findings of Boamah (2011) for Ghana on the influence of inflation and exchange rates on the mortgage market. In terms of macroeconomic variables, this study follows Mogaka, Mboya, & Kamau, (2015) to include income levels and interest rates as other factors affecting growth of the mortgage market. Also, unlike Boamah (2011), this study utilised monthly, rather than annual data for the most recent period, spanning 2007 to 2015. The expanded time series should allow for a deeper insight into the issue by studying the extent to which the macroeconomic environment provides a satisfactory explanation of the performance of the mortgage market.

In this study, secondary data in the form of time series was used. The data for this study were obtained from secondary sources at Ghana Home Loans.Officials at Ghana Home Loans that were capable of furnishing the required information by virtue of their ranks and files were relied on to provide any other information necessary to achieve the objectives of this study. Also data onmacro economic factors were collected from statistical bulletins and other reports published by the Central Bank of Ghana and the Ghana Statistical Services. Ghana Home Loans is a major mortgage lender in Ghana. The data used were monthly data and covered the period 2007to 2015. The data comprises of approved mortgage loans, Cedi / Dollar exchange rates, interest rates, inflation rates and incomes of potential borrowers.

Multiple linear regressions have been the methodological approach employed by previous studies to examine the effects of macroeconomic variables on mortgage originations. Thus the relationship between the macroeconomic factors and the mortgage market is estimated in the following regression model.

$$MORG_t = \beta_0 + \beta_1 ER_t + \beta_2 INT_t + \beta_3 INF_t + \beta_4 INCOME_t + \varepsilon_t$$

Where

- $MORG_t$ represents mortgage financing at time *t*;
- β_0 is the intercept
- ER_t is the exchange rate at time *t*.
- INT_t is the interest rate at time *t*.
- INF_t is the inflation rate at time *t*
- $INCOME_t$ represents income at time *t*
- $\beta_i$is the parameter of independent variables to be estimated
- ε is the error term

4. Descriptive Analysis

A summary descriptive statistics of all the variables are presented in Table 1 as follows.

Table 1 Descriptive Analysis

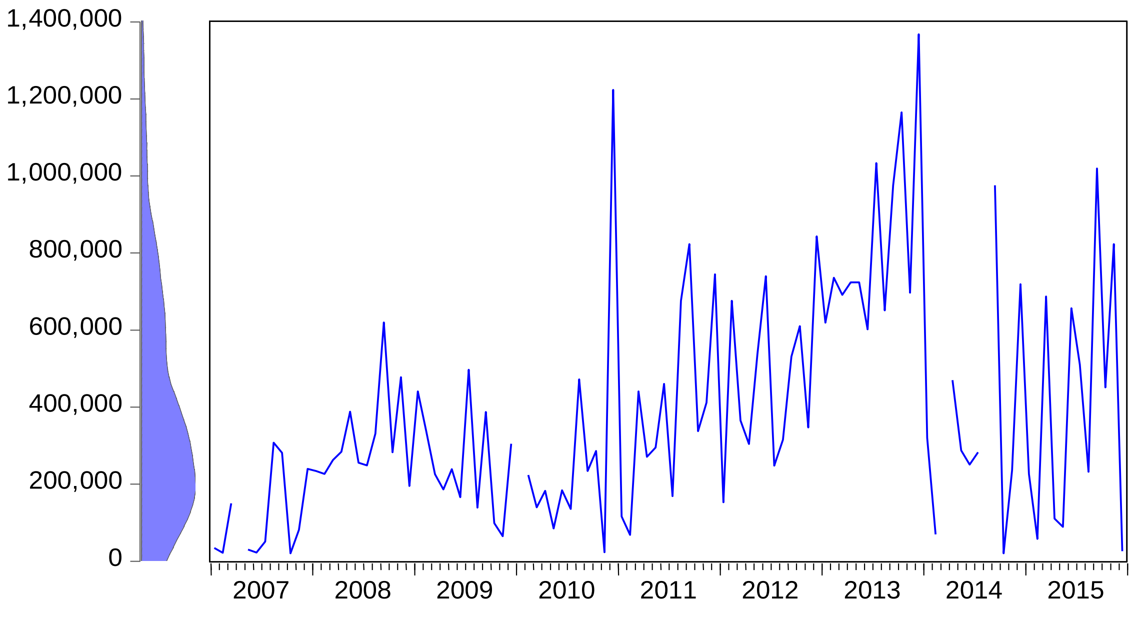
	APPROVED LOAN	ER	INF	INT	INCOME
Mean	387,648.00	1.83	13.24	18.72	39,428.76
Median	291,299.00	1.51	12.70	22.34	23,479.97
Maximum	1,367,945.00	4.19	20.70	27.80	225,289.60
Minimum	20,162.00	0.91	8.39	9.13	563.80

Std. Dev.	296,760.70	0.80	3.92	6.48	43,505.69

The average approved mortgage loan in a month is USD 387,648.00. Total approved mortgage loan in a month ranges from USD 20,162.00 to USD 2,087,045.00 within the period 2007 – 2015. The Ghana cedi remained relatively unstable against the US dollar over the period. On the average the Cedi was exchanged at GH¢1.83 to the US dollar within the period 2007 – 2015. Within the period 2007 – 2013, the Cedi traded as high as GH¢4.19 versus the US dollar. Inflation was relatively high within the period, averaging 13.24 percent and picking at 20.70 percent. Consumer inflation trended into the single digits, recording a minimum of 8.39 percent. Interest rates were relatively high as well, accelerating to 27.8 percent while recording a minimum value of 9.13 percent. On the average, interest rates within the period 2007 - 2015 pitched at 18.72 percent. Income levels were wide apart, ranging from GH¢563.80 to GH¢225,289.60.

The study presents in Fig. 4.1 as follows the trends in the monthly approved mortgage loans.

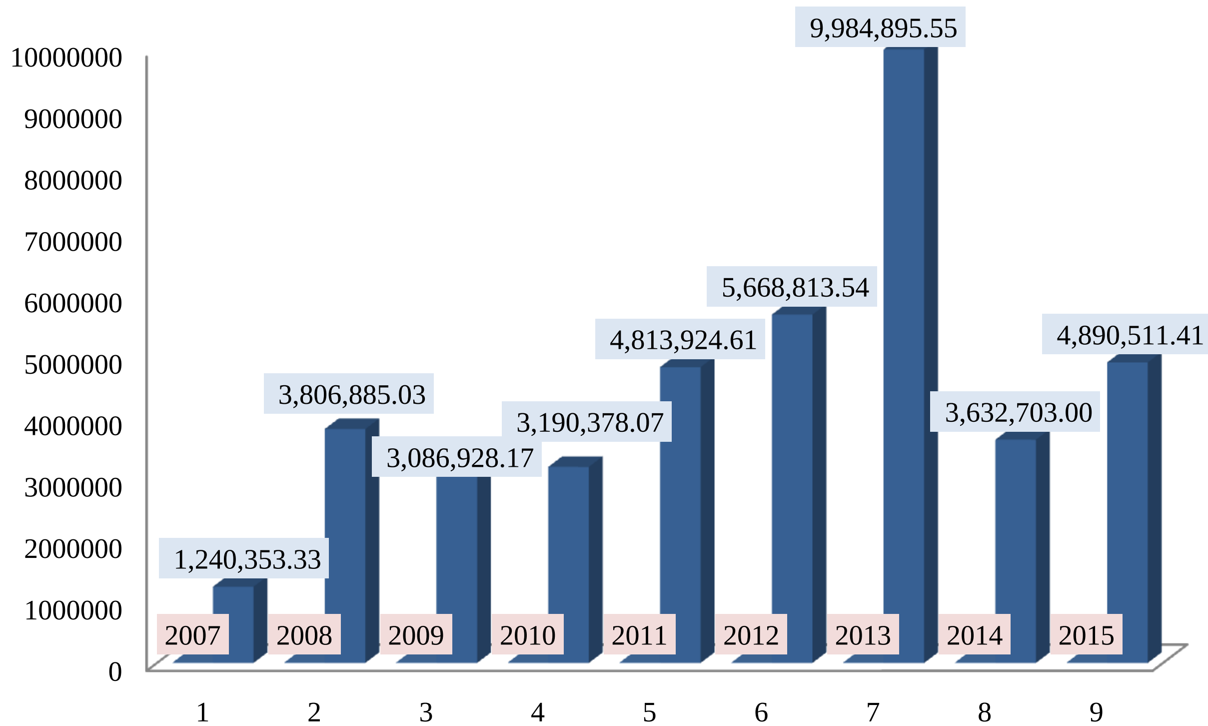
Fig. 1 Trends in Monthly Approved Mortgage Loans



Volume of approved mortgage loans increased over time, spiking in the last month of 2010 after recording low volumes in the months preceding December, 2010. Total volume of approved mortgage loans relapsed in January 2011 immediately after picking in the previous month. Total approved housing loans however remained relatively stable and high throughout 2011 to 2013. The years 2011 to 2013 witnessed low and stable inflation and interest rates while GDP growth rates remained relatively high, up-surging to reach 15 percent in 2011.

This study also considers the trend in the total volume of annual approved mortgage loans and presents the results in Fig. 2 as follows.

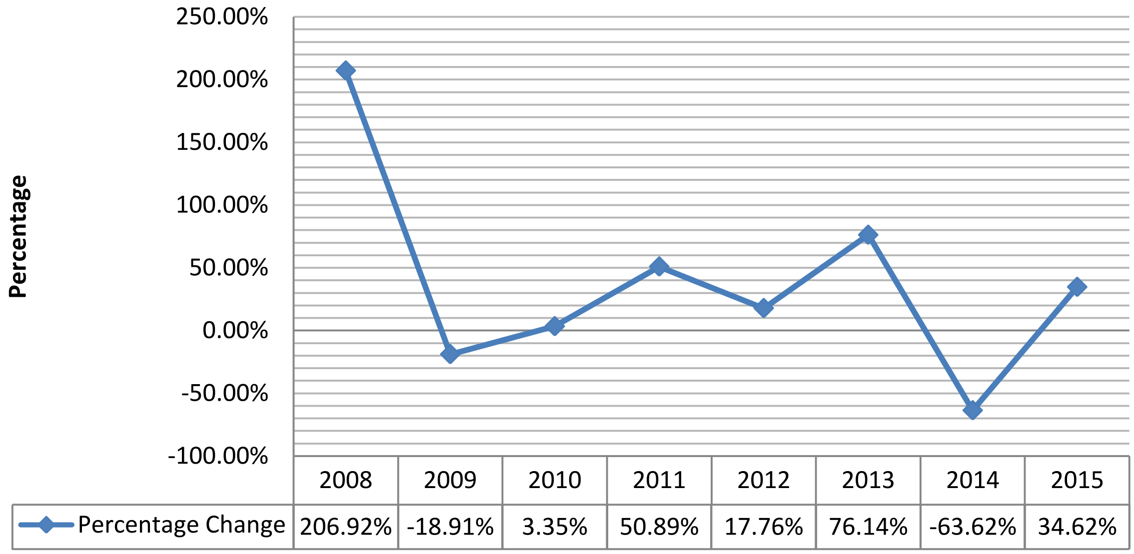
Fig. 2 **Total Volume of Annual Approved Mortgage Loan**



Ghana experienced in recent years a dramatic growth in the volume of housing loans. As shown in Fig. 2, the volume of approved mortgage loans in the years to 2013 witnessed cumulative growth, though volume of housing loans recorded some dips in 2009 and 2010. It is the opinion of this study that the relative growth in the mortgage market can be attributed to stable macro-economic environment experienced in these years. Inflation was subdued and recorded single digit values in the last half of 2010 through to 2012. Interest rates were relatively low, recording single digit values in the last half of 2011 while GDP growth averaged 8 percent, picking at 15 percent in 2011. Total volume of housing loans however shrank heavily in 2014 after outperforming in a year earlier. The year 2014 witnessed general economic downturn in Ghana as debt to GDP ratios up-ticked at the same time as prices of commodities back pedalled while inflationary pressures remained elevated. In the year 2014, the Ghana cedis recorded huge tumbles in the currency market. The local currency performed woefully against its major trading partners, trading so low to exchange at GH¢4.00 to the US Dollar in the first half of 2015.

Growth in mortgage loans was generally positive between 2007 and 2015 with negative growth recorded in only 2009 and 2014. Linear trend lines as depicted in Fig. 3 shows a positive outlook after growth in housing loans tumbled in 2014.

Fig. 3 Annual Percentage Growth in the Volume of Approved Mortgage Loan



The sharp decline in housing loans in 2014 coincided with generally bearish consumer and investor sentiments. These bearish sentiments were at the backdrop of exacerbated fiscal crises that has led the country to sign a three-year aid deal with the IMF in April 2015. The bitter pill from the fiscal imbalances was compounded by a protracted energy crises and lower commodity prices that ignited Government's austerity measures with depressing implications for economic growth. Indeed GDP growth rates decelerated from 9.3 percent in 2012 to 7.3 percent in 2013 and 4.0 percent in 2014.

5. Empirical Results

The study engaged a regression model to investigate the influence of macroeconomic factors on the mortgage market. The study followed the ordinary least square regression options which are mostly used in literature. The study examined the correlations among the independent variables in order to ascertain if there were any serial correlations. The results are shown in Table 2. There were a number of independent variables that were highly correlated with each other (correlation coefficients of over 0.5) which suggested the presence of serial correlations.A collinearity diagnostics (as shown in Table 3) was performed and low VIFs were found to be associated with the independent variables. They are all less than 10 and the mean VIF is only 2.22. Hence, the key independent variables in the analysis may not be harmful for our research and should not bring serious noise to the results.

Table 2 Correlation Matrix

	Approved Loan	INT	ER	INF	Income
Approved Loan	1.0000				
INT	0.2174**	1.0000			
ER	0.2263**	0.6088***	1.0000		

INF	-0.1044	0.7092***	0.3046***	1.0000	
Income	0.8607***	0.3755***	0.4893***	0.0290	1.0000

Note: *** indicates significance at 1% and ** indicates significance at 5%

Table 3 Collinearity Statistics

Variable	VIF	Tolerance
INT	3.28	0.30
INF	2.32	0.43
ER	1.80	0.55
INCOME	1.47	0.68
Mean VIF	2.22	

Stationarity of the explanatory variables and dependent variable for the research model was tested using Augmented Dickey-Fuller (ADF) test. The results presented in Table 4 indicate the rejection of the unit root null hypothesis of the stationary of the research variables at the first level. Thus the variables were not differenced in the analysis.

Table 4 Results of the Unit Root Test

Variable	ADF Statistic	P-value	Order of Integration
Approved Loan	-13.8499	0.0001	l(1)
ER	-11.1546	0.0000	l(1)
INF	-5.3857	0.0000	l(1)
INT	-5.4806	0.0000	l(1)
Income	-16.2677	0.0001	1(1)

The results of the regression analysis are presented in Table 5. The F-statistic shows that the overall regression model is statistically significant and is useful in prediction purposes at 1% level of significance. Thus the independent variables used are statistically significant in predicting the performance of the mortgage market. The results from the regression model denote that the independent variables explain about 80 percent of the variation in the growth of the mortgage market.

Table 5 Results of the Effects of Exchange Rate on the Mortgage Market

Dependent Variable: APPROVED LOAN

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	348417.0	50333.46	6.9222	0.0000
ER	-100073.6	22514.61	-4.4448	0.0000

INCOME	6.501562	0.373667	17.3993	0.0000
INF	-10105.13	5191.078	-1.9466	0.0544
INT	5266.836	3746.215	1.4059	0.1629

R-squared	0.7984
Adjusted R-squared	0.7902
S.E. of regression	135912.4
Sum squared resid	1.83E+12
Log likelihood	-1374.263
F-statistic	98.0142
Prob(F-statistic)	0.0000

The results show that the macro-economic environment significantly influences the performance of the mortgage market. Indeed, exchange rates, inflation and income levels all have significant effects on mortgage originations in Ghana. The study results show that exchange rates have a negative and significant relationship with the total approved mortgage loans. This finding is particularly not surprising given that mortgages in Ghana are denominated in foreign currencies (mostly in the United States (US) dollars) and a dip in the local currency against the US dollar has a dire implications for the demand for mortgage loans. This may suggest that the exchange rate is a major factor that influences the offer of mortgage loans. This result is consistent with Konadu-Agyeman (2001), Akuffo (2006) and Boamah (2011). The implication of this result is that mortgages in Ghana are probably focused on Ghanaian living abroad or Ghanaians with foreign denominated income. This result lays credence to the contention by Asare & Whitehead (2004) that resident Ghanaians have been priced out of the mortgage market by high exchange rates.

Even though Boamah (2011) reports that inflation is insignificant in explaining mortgage originations in Ghana, this study finds significant influences of inflation rates on mortgage originations. The study results show that inflation is negatively and significantly associated with the performance of the mortgage market. This implies that a stable macroeconomic environment of low and stable inflation is necessary for deeper mortgage markets. This result is consistent with earlier findings by Warnock & Warnock (2008) and Walley et al., (2013).

The results of this study show that interest rates have a positive relationship with the mortgage market performance. It must rather be indicated that this variable is statistically insignificant. Boamah (2011) also examined the relationship between interest rates and mortgage originations and report insignificant results. This result may suggest that a rise in the rates of interest is associated with higher volume of mortgage loans. This is however contradictory to arguments by Green & Wachter (200&) that a fall in interest rates is critical in inducing higher demand for mortgages.

The results from the regression model also reveal a significantly positive relationship between income levels and mortgage originations. This implies that a prospective borrowers' ability to pay is of utmost concern to mortgage lenders. Thus, borrowers with sufficient incomes are more likely to secure mortgage loans. This result provides support for the findings of Mugambe (2009) and Mogaka et al. (2015).

6. Conclusions

Despite its recognised economic and social importance, housing finance often remains under-developed in developing countries mainly due to the lack of macroeconomic stability. This study evaluated the influence of the macroeconomic environment on the development of the mortgage market using a monthly time series data for the period 2007 – 2015.

The trend analysis shows that Ghana has experienced dramatic growth in the volume of housing loans in recent years and that total volume of approved mortgage loans increased over time from 2007 to 2014.Linear trends show a positive outlook.The study's results show that the macro-economic environment is crucial to the development of the mortgage market. Exchange rates have a negative and significant relationship with the growth of the mortgage market. The effect of interest rates on the performance of the mortgage market is positive and insignificant. Inflation rates have a negative and significant effect on the performance of the mortgage market. Also the study finds positive and significant influences of income on mortgage originations. Thus, a macroeconomic environment with stable and relatively low inflation, interest and exchange rates is crucial to the growth of the mortgage market. The seeming requirement for consistent income streams may only restrict mortgage finance to individuals with adequate income levels. Obviously a stable macro-economic environment is fundamental in attractingexternal funds and availability of long-term finance which is crucial to the development of the mortgage market.

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