

What Drives the United States Housing Starts

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Abstract:

This paper examines the determinants of new housing starts within the United States. Using recent monthly data, this study will consider factors such as residential building permits, long and short-term mortgage rates, savings rates, and mortgage availability, to show how each of these variables influence the U.S housing market in the form of residential housing starts. Using a VAR model, this paper will show the impact that the vector variables have on each other, and especially, housing starts. By using a split set of data, this paper will also show the impact of the vector variables on housing starts during both a housing boom and a housing bust.

JEL Classification: E21, E22, E31, E43, R21, R31

Keywords: Housing starts, mortgage availability

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1.0 INTRODUCTION

This paper will look at the determinants of housing starts in the United States while ultimately trying to discover which variable(s) have the most profound effect on the construction of new residential properties. United States monthly data will be used from the year 2000 through the year 2008 for the various variables presented in the model. The regression will be run using a vector autoregression (VAR) model to show the influence that each variable has on the other variables within the model, as well as the total effect on the dependent variable, housing starts.

Through this study, a greater understanding will be reached about the economic conditions that impact one of the most important parts of the United States economy, the housing market. We will be able to understand the core factors which drive U.S housing starts and the conditions necessary to spur growth and sustainability within the housing market.

Analysis of the topic of housing starts is economically significant because the housing market is one of the largest and most influential markets in the economy. Negative or positive growth regarding housing starts can have an impact on the psyche of investors and the greater economy as a whole. It is for this reason that housing starts are considered a leading economic indicator in the U.S economy, and along with the other leading indicators, can predict which way the overall economy is headed in the future.

Through analysis of the effects of mortgage availability, mortgage rates, and interest rates, economists will have a better idea of the conditions within the housing market and how these conditions will ultimately effect the number of housing starts here in the U.S.

The recent recession has caused many people to reevaluate the housing market as a whole. A severe decline in home prices caused a domino effect which devastated the housing market, sub-prime mortgage market, and other companies dependent upon residential construction. The losses were severe, causing the government to have to step in and relieve many large companies of their toxic assets.

These toxic assets were mainly caused by defaults in the sub-prime mortgage markets. As home values dropped below the value of the mortgage taken out to pay for that home, homebuyers could no longer afford to pay their monthly mortgage payment. This led to a high default rate, leaving banks and other lending institutions with a dangerously high amount of debt that could not be accounted for. A report showed that as of December 2009, 9.1% of borrowers of Federal Housing Association (FHA) backed mortgages had missed at least three mortgage payments, up from 6.5% a year previous. The problems are rooted in the housing slump starting in 2007, where excessive loans were made to a ballooning market.

Many of these problems could have been avoided through more prudent spending policies and perhaps a statistical model that could help predict a slowdown in the housing market. Through research and developing an adequate model, we can make a connection between market factors and what drives the U.S housing market.

This paper discusses a few different variables not included in other papers about housing starts. Though there has been some scholarship showing a correlation between inflation and the residential housing market, no paper has addressed this topic by running a regression to show the relationship between the two. Also, no paper has included both mortgage availability and

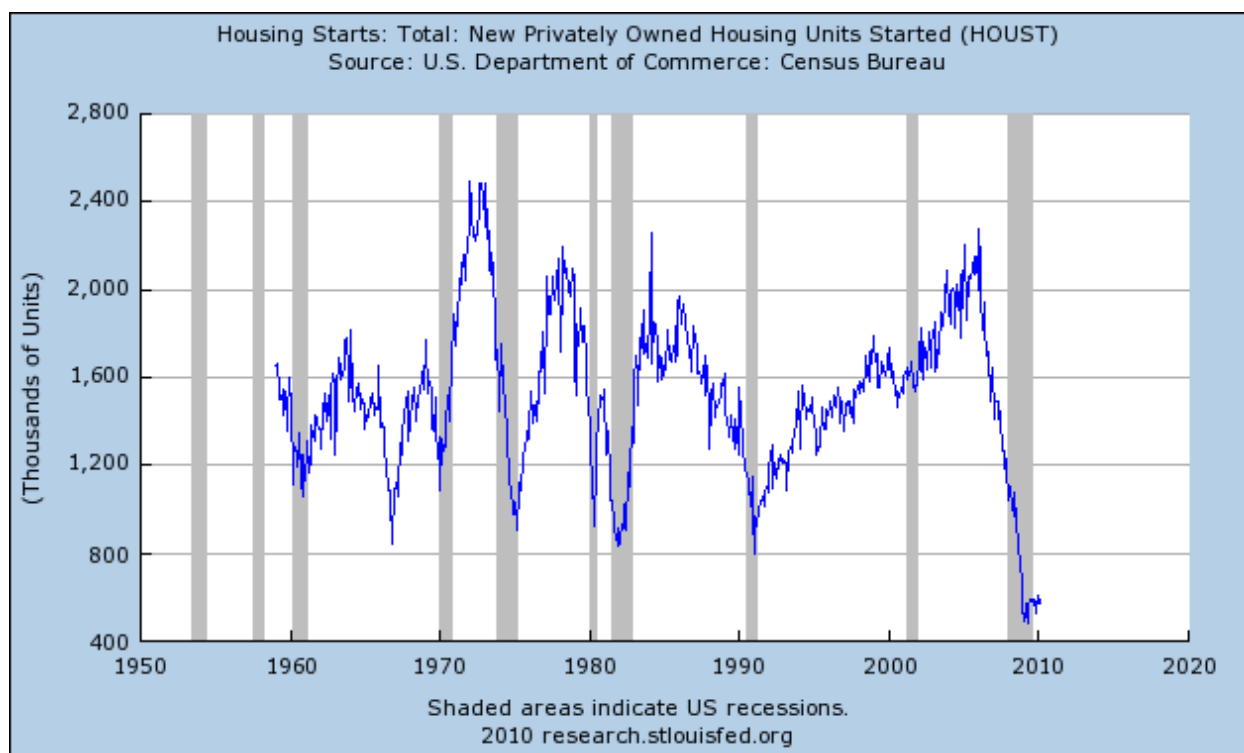
inflation in the same model. I will also include a number of other variables to attempt to find trends in the number of housing starts.

The most important and innovative aspect of this paper will be analyzing a split data set. I have split the data to be representative of the economy during a housing boom and housing bust. The data from 2000 to 2005 represents a healthy, booming housing market. The data from 2006 to 2008 represents a struggling, weak housing market. The data will be analyzed to find any possible differences in the reactions of housing starts to the vector variables during each time period.

2.0 TRENDS

The amount of national housing starts has been an important topic in economics because of the potential impact a poor housing market can have on the economy. Because of its strong correlation with the direction of the U.S economy, housing starts are used as a leading indicator along with a basket of other leading indicators.

In the early 1960's and 1970's, housing starts were very volatile and had a cyclical component that lasted, from peak to trough, in anywhere from a few quarters to a few years. More recently, starting in the early 1990's, housing starts have become less volatile and have shown more sustainable growth. Many believe this is because of more educated and focused monetary policy aimed at stabilization in the housing market. The graph shows that the housing market has been in steady decline since 2006. The last few months have shown a small rebound in the number of housing starts, showing some potential for positive growth.



Source: Economic Research, Federal Reserve Bank of St. Louis

3.0 LITERATURE REVIEW

The importance of the housing market is reflected by the amount of scholarship dedicated to the subject matter. Multitudes of studies have tried to dissect the housing market in an attempt at figuring out what truly drives the market. A few theories tend to recur across many of the studies addressing the housing market and housing starts. Some economists believe demographic factors and the introduction of new securities called money-market certificates (MMCs) can explain some of the cyclical anomalies found in the housing market (Jaffee et al., 1979). Others believe that inflation causes distortions in the housing market (Kearl, 1979),

Though they credit mortgage availability as a key factor in the housing market, Jaffee et al. (1979) discuss the impact that new securities issued in the late 1970's and certain

demographic information had on housing starts. They argue that MMCs and secondary market activity caused an unusual increase in credit availability during that time period, causing a lengthening in the historically short housing cycle. Another factor that contributed to housing starts, they claim, were the baby boomers generation coming into home buying age, as well as the idea that purchasing a home was a solid investment. The baby boomers generation created a larger market for houses, while the view that a house was an investment caused greater interest in the market and therefore a greater amount of housing starts.

Despite a large amount of evidence for the idea of mortgage availability as the main driver of the housing market, Kearn (1979) studied the impact that inflation can have on the housing market. Through his paper, Kearn showed that inflation can cause a distortion in the housing market that can lead to a considerable loss in the housing stock. According to his research, expected inflation, even if correctly anticipated, can cause a considerable drop in the demand for housing, and therefore a drop in housing starts. Kearn explains that inflation only may affect the ability to pay in the future, yet has a huge impact on the current payments. This causes a real increase in housing capital which reduces demand for housing.

Some economists take a larger, macroeconomic approach when diagnosing the housing market. Ewing and Wang (2005) suggest that the macro economy has a larger impact on housing starts than inflation or mortgage availability alone. Others suggest that it is government policy, not the macro economy, which plays the largest role. Taylor (2007) says that a longer, less volatile housing cycle is due to more responsible and knowledgeable government policy. Government policy has accomplished this, Taylor explains, through managing the volatility of interest rates to minimize violent swings which cause a reduction in housing starts.

4.0 DATA AND EMPIRICAL METHODOLOGY

4.1 Definition of Variables

$$\Delta HSST_t = \alpha_1 + \gamma_t + \sum \beta_1 \Delta AVL_t + \sum \beta_2 \Delta MR30_t + \sum \beta_3 \Delta MR15_t + \sum \beta_4 \Delta INFL_t + \sum \beta_5 \Delta SVRT_t + \varepsilon_t$$

The dependent variable of this model is housing starts, represented here as HSST. Housing starts represent the number of residential building construction projects started in a specific time period. Since we are using monthly data, HSST represents the residential construction starts in a given month. One-unit housing starts make up the majority of monthly housing starts, though two, three, four, and five or more unit housing starts are also included in the data. Data was retrieved from the U.S Census Bureau, and therefore the definition of housing starts in this paper is consistent with the U.S Census Bureau's definition.

Independent variables consist of five different variables obtained through six different data categories. First, AVL_t represents the level of mortgage availability in the U.S economy. Mortgage availability is defined as the amount of deposit stock into U.S banking institutions during a certain time period divided by the average price of a new house in that same time period. This variable is used to measure the availability of credit in the economy, and represents the possible supply of mortgages provided by U.S banking institutions. Second, $MR30_t$ represents the market mortgage rate on a 30-year mortgage at time t . This variable is significant because it represents mortgage market conditions and is a strong factor in whether or not potential homebuyers purchase a home. Third, $INFL_t$ represents inflation at time t , which measures the general price level of goods and is influential in effecting other market interest rates. Fourth, $MR15_t$ represents the market mortgage rate for a 15-year mortgage at time t . This rate is generally lower than the 30-year mortgage rate and represents shorter-term mortgage

loans to the consumer market. The fifth and final independent variable is the savings rate at time t , represented as $SVRT_t$. Savings rate is used to show the affect that the level of household savings has on the ability to purchase a home. Appendix A and B provide additional information including data source, acronyms, and expected signs for each of the variables.

4.2 Data

The study uses monthly data from 2000 to 2008. The data was split into two sections. The 2000 to 2005 data represents a housing boom. The 2006-2008 data represents the housing crash. The rest of this study will be devoted to interpreting the results of separate VARs for the split data sets. Data was mostly attained from the Federal Reserve website and various Federal Reserve Bulletin releases. Additional sources of information are shown in Appendix A and B. Table 1 shows the summary of the data collected.

Table 1: Summary Statistics

Variable	Mean	Min	Max	Standard Deviation
HSST	141.0519	41.2	211.9	35.8319
AVL	24629885.4	21711297.5700	40427440.83	4405564.1990
MR30	6.43212963	5.23	8.52	0.73308
INFL	2.896296	0.1	5.6	1.010869
MR15	5.9768287	4.63	7.8	0.811071721
SVRT	2.676852	0.8	5.8	1.007691

5.0 EMPIRICAL RESULTS

The split data series allows for a dynamic study of the U.S housing starts under two different sets of market conditions. The first set of data was taken for the five independent variables discussed earlier from 2000 to 2005. This represents the U.S housing market while it was experiencing a boom. The second set of data, taken from 2006 to 2008, represents the U.S housing market while it is experiencing an historic downturn. During the housing boom, housing prices increased from an average of \$161,715 to \$259,782, an increase of 61%. During the housing downturn, housing prices dropped from around \$260,000 to just below \$180,000. To run a VAR for the entire period would produce unreliable results, as the VAR would be diluted by the subsequent boom and bust. By splitting the data we can make healthy conclusions about what drives U.S housing starts during a housing boom or bust.

For a few of the independent variables, the results are predictable under both data sets. The impulse response functions for both sets of market conditions shown in tables three and five illustrate that mortgage rates and housing starts have a negative relationship no matter how well or poorly the housing market is performing. An increase in either the short or long-term mortgage rate will always negatively impact housing starts because potential home-buyers are unwilling or unable to accept a loan requiring them to pay a high amount of interest. A positive shock to either MR15 or MR30 will reduce the number of housing starts.

The results for the impact of inflation are mixed. The rate of inflation affects other market rates, but according to Kearn (1979) it also affects the real cost of owning a home through a multiplier effect. The results of the separate VARs both show that inflation has almost no

meaningful effect on the number of housing starts. There are a few possible reasons for this. Inflation was generally controlled at acceptable levels throughout the data set, usually fluctuating from two to five percent. The lack of a spike in inflation and a general perception that inflation rates would remain stable may have guarded against a market reaction to changes in inflation. The impulse response functions for the 2000 to 2005 data show a slight negative reaction in housing starts to inflation, while the 2006-2008 data reveal mostly the same, though a slightly less stable, result.

The most meaningful results come from the analysis of mortgage availability. It is the most controversial variable included in the set and also the most crucial. The results of the impulse response functions show that mortgage availability will have a different impact on housing starts depending on how the housing market is performing. During the housing boom from 2000 to 2005, availability showed a slight, positive impact on housing starts for the first two periods after the increase in mortgage availability. This coincides with conclusions made by Thom (1985) on the impact of mortgage availability. However, mortgage availability has a very different impact when analyzed during an economic downturn. The impulse response functions for the 2006 to 2008 data reveal a consistently negative response of housing starts to a shock in mortgage availability over numerous periods following the shock. From the data, we can see that mortgage availability consistently grew during the economic downturn as housing prices decreased, yet housing starts continued to fall. From this we can conclude that attempts to increase mortgage availability by solving problems of illiquidity are not immediately successful when attempting to spur housing starts during a poor economy. Impulse response function graphs are included in tables three and five, while the unit root test to make the data stationary are included in tables two and four.

Table 2: Unit Root Test for 2000 to 2005 Data

Method	Statistic	Prob.**	Cross- sections	Obs
<hr/> Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.62801	0.0000	6	394
<hr/> Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-14.2926	0.0000	6	394
ADF - Fisher Chi-square	165.568	0.0000	6	394
PP - Fisher Chi-square	144.845	0.0000	6	420

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 3: Unit Root Test for 2006 to 2008 Data

Method	Statistic	Prob.**	Cross- sections	Obs
<hr/> Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.15285	0.0157	6	186
<hr/> Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.40603	0.0000	6	186
ADF - Fisher Chi-square	67.3659	0.0000	6	186
PP - Fisher Chi-square	125.321	0.0000	6	204

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 4: Impulse Response Functions – 2000 to 2005 Data

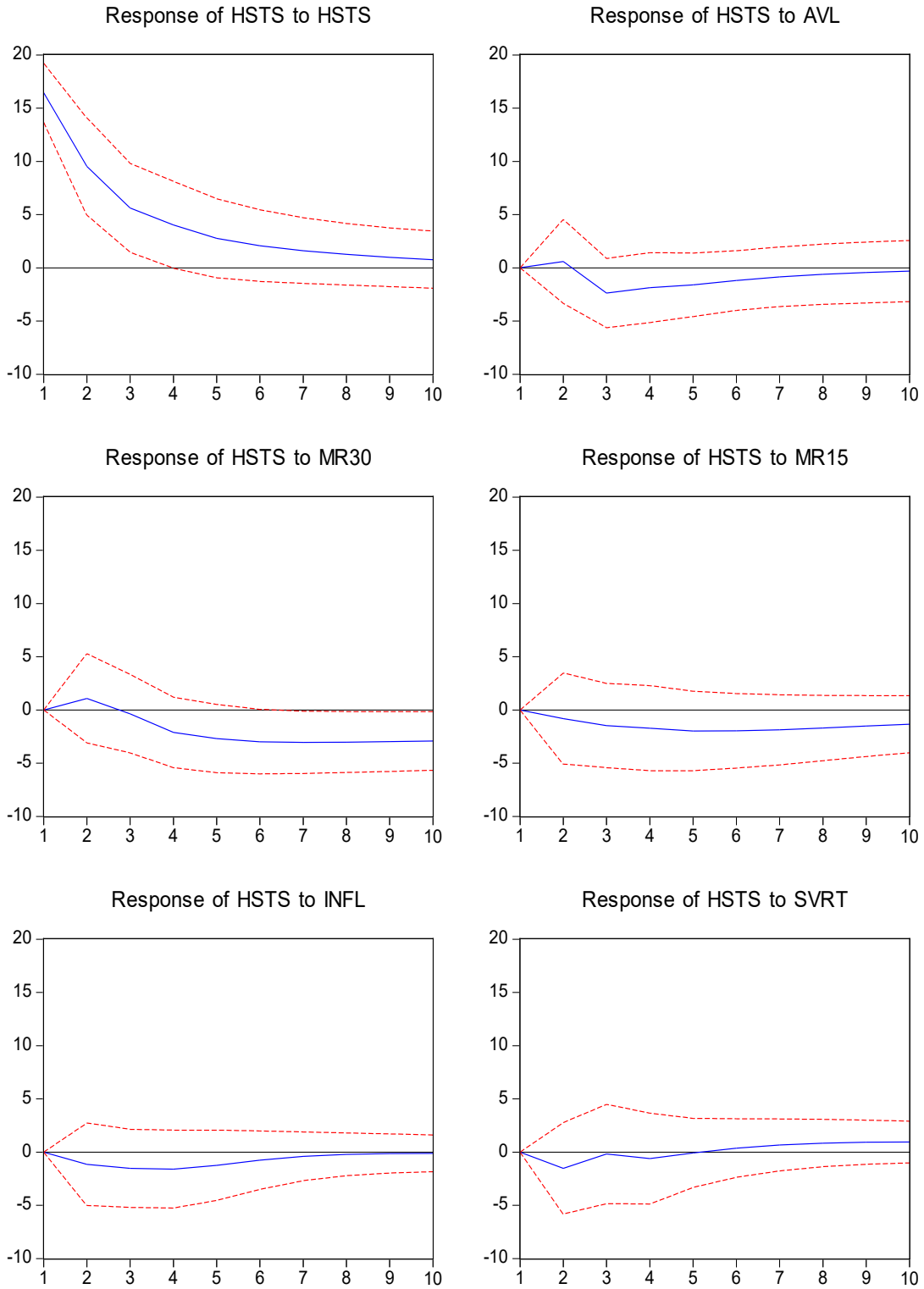
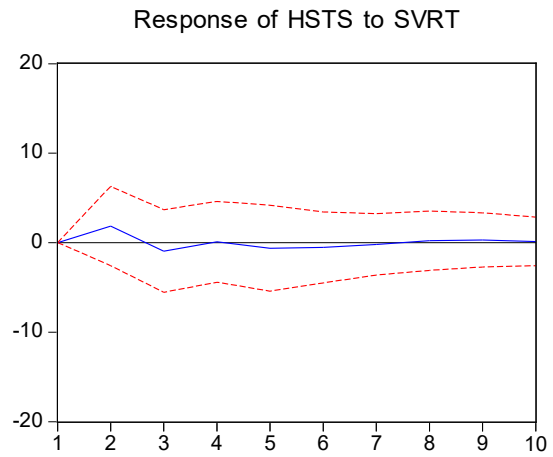
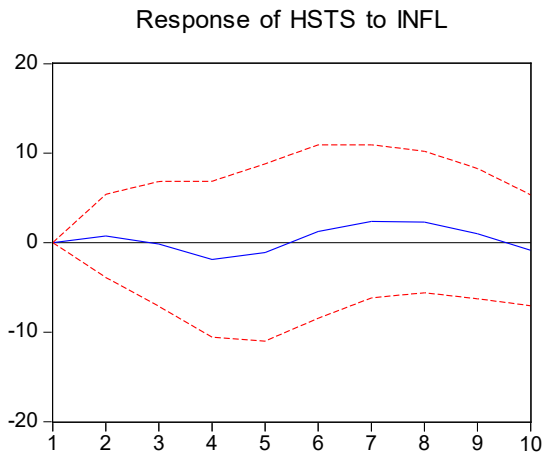
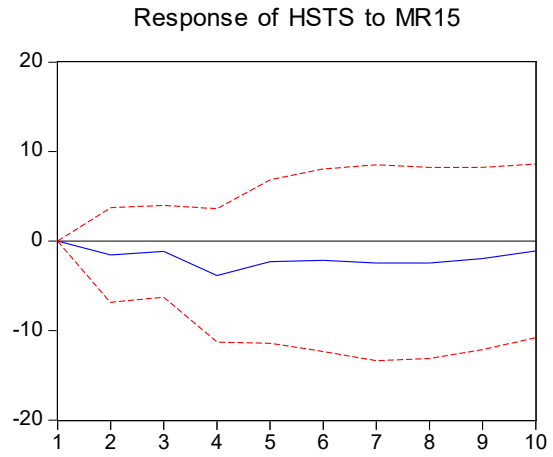
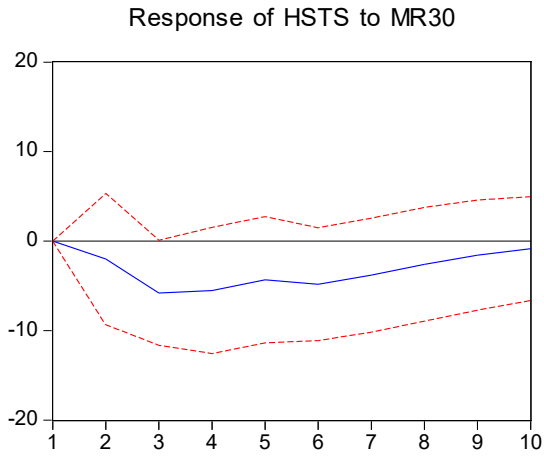
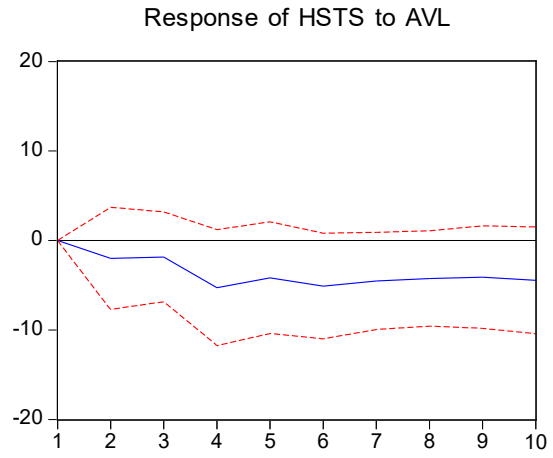
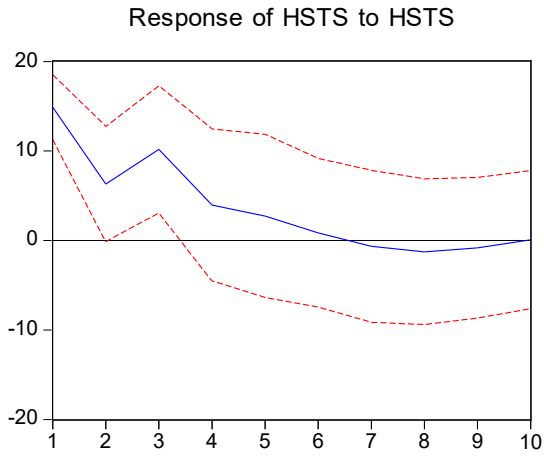


Table 5: Impulse Response Functions – 2006 to 2008 Data



6.0 CONCLUSION

In summary, both short-term and long-term mortgage rates show predictable results in regards to their impact on housing starts in both sets of the split data. A positive shock in either the 30 or 15-year mortgage rate will result in a negative reaction in the residential housing market. The model shows a very weak result regarding the impact of savings rate and housing starts. This result can be partially explained by the recent trend for America's willingness to accept ever higher levels of debt without the savings to back that debt. The issuance of sub-prime mortgages to families without proper savings to obtain a prime rate mortgage was one of the downfalls of banks and savings and loan institutions during the recent recession. These sub-prime mortgages were most likely the cause of the savings rate having little impact on housing starts, since families were not required to save funds before purchasing a home.

The most intriguing result was the impact of mortgage availability and housing starts. Through this study we can conclude that during a housing boom, mortgage availability may have a slightly positive impact on the amount of residential housing starts. However, the 2006 to 2008 data yields a different, negative result. From this we can conclude that during a housing bust, attempts to increase the level of credit liquidity in U.S banks to make mortgages available to consumers will not be effective in increasing the number of residential housing starts. This conclusion is consistent with Kearn and Mishkin (1977) who also found evidence that mortgage availability was not effective at increasing housing production.

Appendix A: Variable Description and Data Source

Acronym	Description	Data Source
HSST	The number of residential construction housing starts in the United States	U.S census bureau
AVL	The deposit stock into U.S banks divided by the average price of a new home	Federal Reserve Bulletin: Various Issues National Association of Realtors
MR30	Monthly rate for a 30-year fixed-rate mortgage	Freddie Mac
MR15	Monthly rate for a 15-year fixed rate mortgage	Freddie Mac
INFL	U.S inflation rate	InflationData.com
SVRT	U.S savings rate	Federal Reserve: St. Louis Fed

Appendix B: Variables and Expected Signs

Acronym	Variable Description	What it captures	Expected Sign
AVL	Deposit stock divided by average price of house	Credit Availability	+
MR15	15-year fixed mortgage rate	Short-term mortgage loan rate	-
MR30	30-year fixed mortgage rate	Long-term mortgage loan rate	-
INFL	Inflation rate	General market rate movements; Real cost of purchasing a home	-
SVRT	Savings Rate	Household savings	+

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