House price Dynamics in the USA: The Role of Monetary Policy, Current Account and Financial Innovation

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Abstract

The current financial crisis has been largely attributed to the boom and bust of the real estate market in the USA. A number of explanations have been put forward ranging from lax monetary policy, large capital flows to financial innovation. In this study, we try to identify the main determinants of house prices in the USA, paying particular attention to the aforementioned three factors. The assessment is carried out in well specified VAR and VEC models over the period 1973q1-2011q4. Our findings suggest that monetary policy shock has a significant positive effect on house prices. Financial innovation and capital inflows also play a role, albeit to lesser degree in house price variation. We finally suggest that these effects could be better identified and assessed if more appropriate and accurate indicators of financial innovation and capital inflows are developed and used.

I would like to thank my supervisor Dr.Tianxi Wang for his guidance, comments and editing suggestions on an earlier version of this paper. I would also to thank Nicolas Syrichas and the staff members of the Economics Department of the Central Bank of Cyprus for their insightful comments and suggestions. This paper is dedicated to my family.

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1. Introduction

A key feature of the period preceding the global financial crisis was a combination of low- both real and nominal- interest rates and rapid increases of house prices. This combination in conjunction with a fast credit expansion led many analysts to attribute the subsequent burst in the real estate sector to overly expansionary monetary policy for too long (Taylor 2009). Another school of thought provided an alternative explanation, the savings glut hypothesis, for the co-existence of low interest rates and house boom (Bernanke 2005, 2010, Ferrero 2012). This theory places the emphasis on excess savings and scarcity of financial assets in developing countries which led to capital inflows to developed countries, depressing interest rates.[1] Undeniably, over the boom period large fluctuations in international capital flows, real exchange rate and current accounts were registered. More importantly, it was identified that countries with high houses prices also experienced significant capital inflows and widening current account deficits (the increase in domestic borrowing must be financed from abroad)(Aizenman and Jinjarak 2009 and Ferrero 2012). As figure 1 shows during the boom countries such as Austria, Germany and China recorded large current account surpluses associated with slow house price growth and modest residential investment. Countries, such as Greece, Spain and the UK, which attracted lots of external capital, exhibited large rises in house prices and

[1] As explained above, the global savings glut hypothesis assumes that the surplus countries divert their savings to deficit countries. Laibson and Mollerstrom (2010) argued if this hypothesis were true then an investment boom should have taken place in the recipient countries. Instead what we observed in many instances such the USA was a consumption boom.

experienced significant residential investment booms. According to the table there is a negative correlation between current account balance and house prices. On average this correlation is equal to -0,64%.

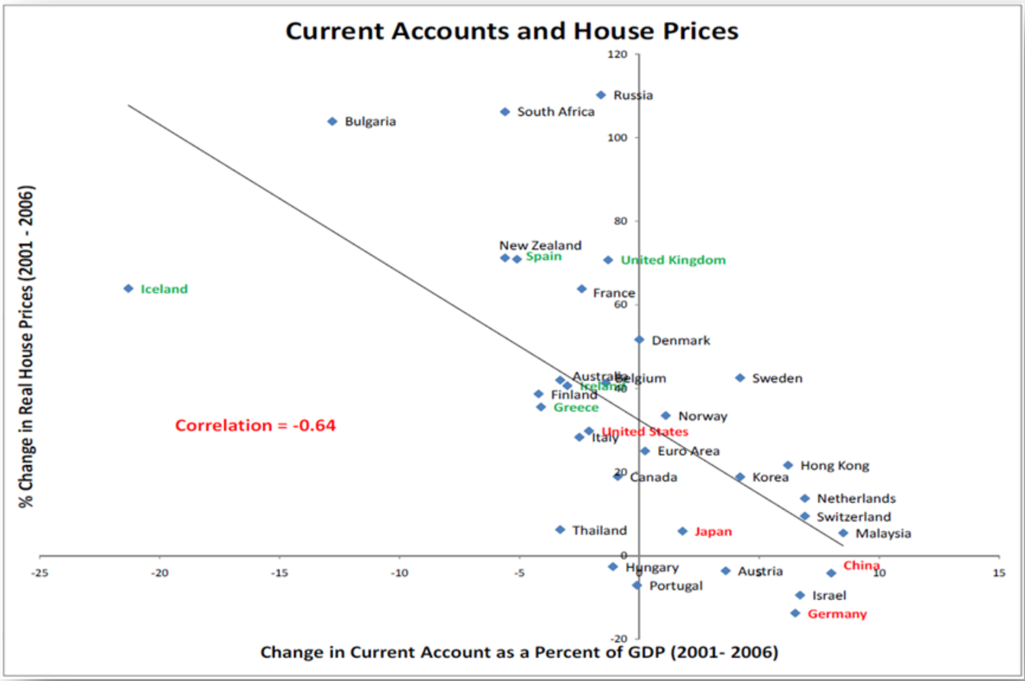


Figure 1: Current accounts and House prices in advanced and emerging countries. Source: Ferrero (2012)

A third strand in the literature stresses the relationship between financial innovation and property prices, and particularly how the easing of financial frictions affects the transmission of interest rates to house demand (Diamond and Rajan, 2009). According to this theory, the consumer in developed countries has easy access to credit and therefore higher leverage. Financial innovation reinforces this phenomenon and exacerbating the effect of variation of interest rates on property prices.

Though a large body of literature has dealt with each of the aforementioned factors separately, to the best of our understanding, only Sá et al. (2011)-, have tried to study simultaneously the effects of monetary policy, capital flows and financial innovation on property prices. Following Sá et al.(2011), the aim of this study is to shed light on the main determinants of house price dynamics in the USA, and in particular to evaluate the effects of capital inflows, as well as, financial innovation. Though Sá et al.'s(2011) panel data study has expanded explanatory power, since it takes into account data from many countries, this thesis by focusing only on the USA allows for an in-depth study of the idiosycrancy and the specific characteristics of one particular country. To this end, a Vector Autoregression (VAR) framework is utilized so as to allow to the assessment of the contribution of each factor to house price variation as well as the direction of causality. In addition, a number of misspecification tests are carried out to ensure the statistical adequacy of our model. The rest of the paper is organized as follows: Section 2 provides a relevant empirical literature review of the main drivers of house prices. Special attention is devoted to capital inflows and current account, monetary policy as well as financial innovation. Section 3 described the methodology followed. In section 4 the graphical analysis and statistical properties of the data are presented while in section 5 statistical adequacy tests are covered. Section 6 presents the empirical results of the VAR. The empirical results of the VEC framework are left for section 7. Finally, section 8 offers concluding remarks and ideas for further work.

2. Empirical Literature Review

On the empirical front there is a vast literature on the drivers of house price which, according to Galati et al. (2011) can broadly be summarized in three major categories: a) macroeconomic determinants, b) institutional and geographic factors and c) funding arrangements. In this study, our focus is on the macro drivers, monetary policy, capital inflows and financial innovation. We start with the empirical studies that try to uncover the relationship between house price and macroeconomic variables.

2.1 Macro determinants

The most widely cited macro driver is household income. [2] Various proxies for income were utilized with the majority of empirical studies using GDP, and real disposable income. Although rises in house prices are theoretically positively associated with income growth, empirically these connections are rather mixed. More specifically, in some studies Sutton 2002, Egert and Mihaljek 2007, GDP was found to be the most significant contributor of house price dynamics. Sutton (2002), for example, found that national income played the most important role of affecting house prices in a VAR study. Similarly, in a panel study of eight countries Egert and Mihaljek (2007) claimed that there is a positive relationship between GDP per capita and housing prices in OECD economies as well as in CEE economies.

In contrast, others studies attributed a minor role to income in determining house price movements. Tsatsaronis and Zhu (2004) confirmed the finding that income was

[2] Even though the equilibrium house price are determined by the interaction of the demand and supply, in most of the empirical studies focus of the demand side. The absent of the supply factors, land availability, cost of production is justified by the unavailability of reliable data on land and investment as well as the need to avoid the simultaneous bias problem (Ott 2007).

insignificant by using data for 17 industrials countries for the period 1970-2003. In addition, Annett (2005) showed that GDP was affecting house prices only in three countries- (Germany, Ireland and Finland) - out of a sample of 15 European countries.

The explanatory power of number of other macro variables was also examined. Tsatsaronis and Zhu (2004) singled out inflation as the most crucial component in determining house prices. They conducted Variance Decomposition analysis and showed that over 50 percent of the house price variation is explained by inflation variation while the remaining 50 percent was equally explained by the other three variables; interest rates, term spread and bank credit. Interest Rates were another important variable whose relationship with prices was examined in the literature. In Meen (2002) study, interest rates along with income and housing stock played significant role in explaining house prices in the UK. Interest rates featured also prominently in other property price studies (e.g. Sutton 2002). Even in some of them they were considered contributors to boom and bust cycle in the property market. Low interest rate boosted the demand for residential real estate while a reversal in their trend overburdened household budget and contributed in the bursting of the house bubble (Tsatsaronis and Zhu 2004, Galati 2011). Some support to the role of interest rates in boom-bust claim was provided by Egert et al. - (2007). They showed that for the period 1995-2001, Countries such as Czech Republic and Estonia faced double-digit annual growth in house prices regardless the imminent decrease in interest rates while from 2002 until 2006 this phenomenon had been observed in most CEE.

Apart from interest rates, another two monetary variables, money and credit are associated with the demand for housing. The overexpansion in credit was also considered, along with low interest rates, responsible for the recent house price hikes in many countries (Tsatsaronis and Zhu 2004). The same result was reached by other authors namely Collyns and Samlali (2002), Goodhart and Hofmann (2008), Iacovello and Minetti (2003).

But the effects of bank credit on house prices may go the other way as well and rising house prices may induce higher credit expansion. The empirical results on the direction of causality between credit and property prices seemed to be mixed. Some studies, inter alia Gerlash and Perg (2002), Hofmann (2004) and Davis Zhu (2009) advocated that credit is responsible for determining house prices while the reverse is not true. In contrast, Goodhart and Hofmann (2008) showed that the causality run in both directions.[3]

Lastly, unemployment is another important macro driver of house prices. Schnure (2005) investigated the impact of the unemployment on house prices for nine regions in Office of Federal Housing Enterprise Oversight's (OFHEO). He showed that 1 percentage point rise in the unemployment rate depresses housing prices by about 1 percent. Moreover, Abelson et al (2005) used Error Correction Method to explain the negative relationship between the unemployment rate and the house prices in Australia over the period 1970 and 2003. Their main finding was that short term changes in unemployment rate were not immediately dissipated in the long run equilibrium house prices. Mixed results were also produced in the study of Egert et al (2007). In particular they found that during 1995-2006 unemployment rate had a significant negative relationship with house prices in the OECD countries. However, this relationship was insignificant in case of CEE countries. Takas (2010) panel study identified as main drivers of real residential prices population and labour force. Labour force, however tend to be significant for OECD countries while for CEE countries turned out to be insignificant. Regional income growth and unemployment rates have statistically affect house prices.

[3] Money also exhibited the same bi-directional relationship (Greiber and Setzer 2007, Goodhard and Hofmann 2008).

2.2 The Role of Monetary Policy, Current Account and Financial Innovation

Having examined the macro determinants in section 2.1 we now turn our attention to the role of external demand, capital flows and current accounts, monetary policy and financial innovation in driving property prices. The theoretical rationale behind the role of external demand in determining property prices is either that: a) higher domestic demand is the driving force behind both house prices and capital inflows or b) capital inflows drive interest rates to low level which in turn increases house prices.

On the empirical front, Punzi (2007) studied the effect of current account on house prices for ten OECD countries. She provided empirical support to her hypothesis that an increase in house price would give rise to the expected income of households and consumption and investment would be boosted, worsening the current account position. Ferrero (2012) took a different route and advocated that the relaxation of the collateral constraints lever up the demand for housing, thus result to higher house prices. As house prices go up, people are able to borrow more. Thus, part of the additional finance required, is secure from abroad generating a current account deficit. Matsuyama (1990) was the first to study the link between government spending and housing subsidies on residential investment and current account. He had showed that an increase in government spending resulted in reduction in house prices as well as in residential investment while its impact on current account was ambiguous. Sa and Wieladek (2010) compared the effects of monetary policy shocks and capital flows on property prices. They found that the variation of real house prices due to monetary policy shocks was just 5% while for capital flows 15%.

The depth of the financial sector rather than capital flows seem to play more important role in driving house prices in some studies. Favilukis et al. (2012) tested the common hypothesis that capital inflows are positively correlated with house prices. They found that capital flows play a small role in determining property prices. Instead, they argued that the dominant factor was the financial liberalization and its subsequent reversal. Punzi (2012) also maintained that financial liberalization had resulted in higher loan to value ratios, relax household borrowing constraints which in turn led to higher real estate prices and current account deficits. Aizenman and Jinkarak (2009) also found a robust and positive relationship between current account and house prices. More specifically, a standard deviation increase in the lagged current account deficit was associated with 10% appreciation in property prices. Noteworthy is the fact that even bigger impact is registered in case of higher financial depth while this effect is mitigated by the quality of institutions. The magnified effect of financial innovation is also documented - by Sa et al. - (2011). In a panel VAR study of 18 OECD countries they found that the positive effect of both monetary policy and capital inflows on house prices is greater in countries with a greater degree of financial innovation. Other panel VAR studies also examined how the degree of securitization of mortgage loans amplified the effects of monetary policy shocks on residential prices (Galza et al. 2009, Assenmacher-Wesche and Gerlach 2010).

3. Methodology

3.1 The VAR

3.1.1 Motivation

As it is evident from the literature review in section 2,despite the existence of a wide body of empirical research on house prices, assessing the quantitative implications of changes in key determinants on house prices remains an elusive task. Key fundamental indicators such as national income, interest rates and prices that, at least in theory, have prominent role in changes in house prices are not broadly supported by the existing empirical literature. The significance and the degree of contribution of each aggregate on house prices developments vary from country to country indicating strong geographical characteristics. Furthermore, the recent housing bubble in U.S makes it clear that some other determinants, such as financial innovation, which are systematically ignored in empirical studies, play an important role on house prices developments. Omitting such factors is likely to bias the results.

This dissertation attempts to quantitatively re-examine the dynamic interlinkages between house prices and key macroeconomic aggregates. Given the geographical dissimilarities, as well as the differences in financial deepening among countries this study focuses only in one country, namely USA. This approach allows flexibility to examine some other determinants of house prices that could be considered country specific, such as the degree of financial innovation and the state of the current account. As it has already been explained in the introduction, these factors contributed significantly in the house prices booming in the USA.

The simplest framework to examine dynamically the effects of macroeconomic developments on house prices is the supply and demand framework. Therefore, we could separate factors (and their lagged values) that determine house prices on two linear equations – Aggregate demand and Aggregate supply – and estimated them through OLS regression. However, this approach suffers from the simultaneous equation bias as well as from the unavailability of reliable data on the supply side.[4]

The alternative and most common approach to scrutinize the role of each factor in determining house prices is the Vector Autoregressive (VAR) framework that was first developed by Sims (1980). VAR has the advantage of treating all the variables as endogenous and allows both contemporaneous and dynamic relationships between all the variables included in the set. In addition, given that certain necessary assumptions hold, VAR can be estimated through a simple OLS regression. Nevertheless, in VAR typically we are not interested in the causal interpretation of estimated parameters but on the effect of exogenous shock of one variable of interest to the others.

3.1.2 The framework

Let X_t be a vector of variables of interest. In our case, X_t contains a house prices aggregate (h_t), money aggregate (m_t), credit (c_t), GDP (y_t), inflation (i_t), Federal funds rate (ffr), current account (ca_t) balance and financial innovation (f_t)[5]. Thus,

$$X_t = [h_t, m_t, c_t, y_t, i_t, ffr, ca_t, f_t]'$$

It is assumed that X_t is determined by a constant and its previous lagged values as well as unexpected disturbances (U_t) and can be described as

$$X_t = \delta + A_1 X_{t-1} + A_2 X_{t-2} + \dots A_p X_{t-p} + U_t$$

(1)

With the assumptions that $E[U_t] = 0$, $E[U_t U_t'] = \Sigma_{uu}$, and $E[U_t U_s] = 0$,

[4] One can argue that instrumental variables can be used but is very hard to find relevant instruments.

[5] Note that this section broadly follows the notation and mathematics of the book (Introduction to modern time series analysis by Kirchgassner and Wolters, 2007).

with the number of lags (p) determined at later subsection.

4. Data

4.1 Data Description

The empirical analysis of this project is based on time series quarterly data covering the period from the first quarter of 1973 to the fourth quarter of 2011. The country of interest is the United States of America. The set of variables used in the analysis include Gross Domestic Product (GDP), Consumer Price Index (CPI), Federal Funds Rate, Credit, Money (M1), House Prices, measure of capital flows, current account as well as financial innovation. GDP and CPI were collected from the Department of Commerce, Bureau of Economic Analysis (BEA) database, while Money, Credit and Federal Funds Rate from the St Louis, Federal Reserve database. Moreover, Current Account data were taken from the IMF International Financial Statistics (IFS), and House Prices (calculated in thousands of unit) were extracted from the US Department of Commerce: Census Bureau of Economic Analysis database. The analysis contains also a measure for financial innovation; the Frazer Index which was taken from the Frazer Institute publications (Gwartney et al 2003). This index is a measure of credit regulation and the degree of competition in the banking sector. This index consists of the following indicators: existence of interest rate controls, private sector credit, ownership and bank competition. Apart from Current Account all other variables are in logarithms in order to capture the non-linearities that are likely to exist.

4.2 Graphical Analysis

Casual visual inspection could reveal important characteristics of the data which need to be taken into account in constructing the appropriate models. We first plot the variables in levels over the period 1973Q1 to 2011Q4. As it is expected the graphs which can be found in Appendix 1 are not enlightening since almost all the variables follow an upward linear trend.[6] In order to have a more informative picture of aggregate changes in time the growth rates of the variables are displayed in Figure 2.

It is noticeable in figure 2 that the Current Account dramatically falls during the period 2000-2007. This was the period that the USA registered large current account deficits (domestic investment in USA exceeded savings) while from 2007 and onwards a correction started. Houses Prices after peaking in early 2006, begun to decline. This drop has been characterized as the largest fall in history by 34 per cent.(Case-Sheiller Price index on December 30,2008)[7] . It is worth mentioning that the financial regulation index exhibited similar path of that of house prices during the crisis.

[6] This happens because of the series exhibit unit-roots that is a common phenomenon in macroeconomic series. This finding is formally tested in the next subsection.

[7] Mantell, R.,.(2008) "Home prices off record 18% in past year, Case-Sheiller says". Available at: www.marketwatch.com. [Accessed 10 April 2013]

Figure 2- Graphs in First Difference

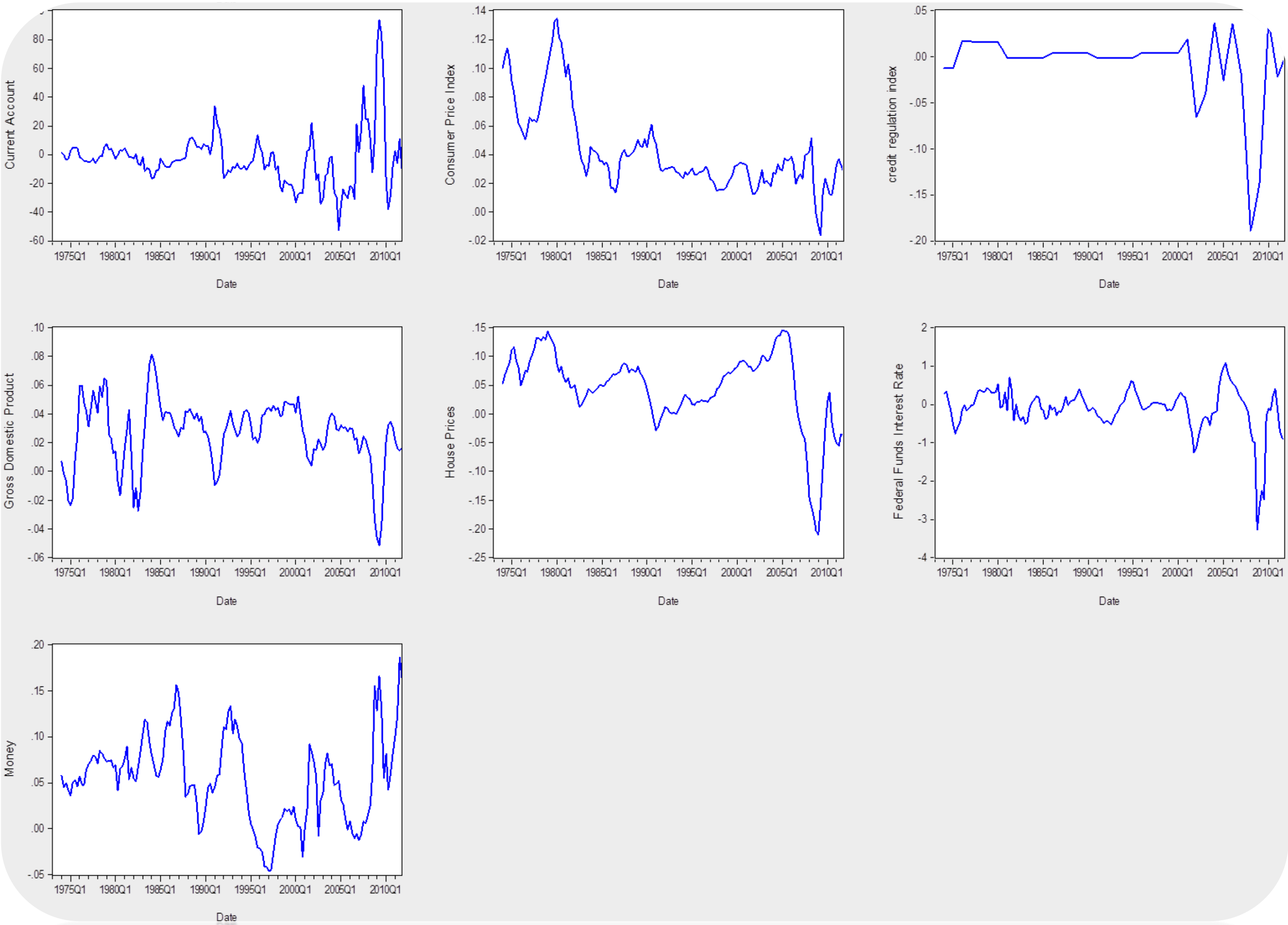


Figure 3 - House prices and Current Account

Figure 4 - House prices and Financial Innovation

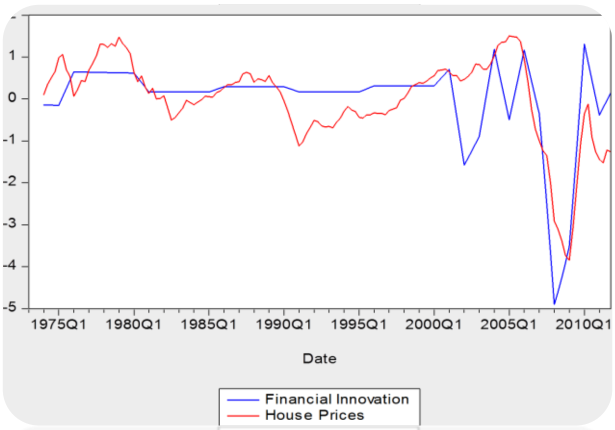
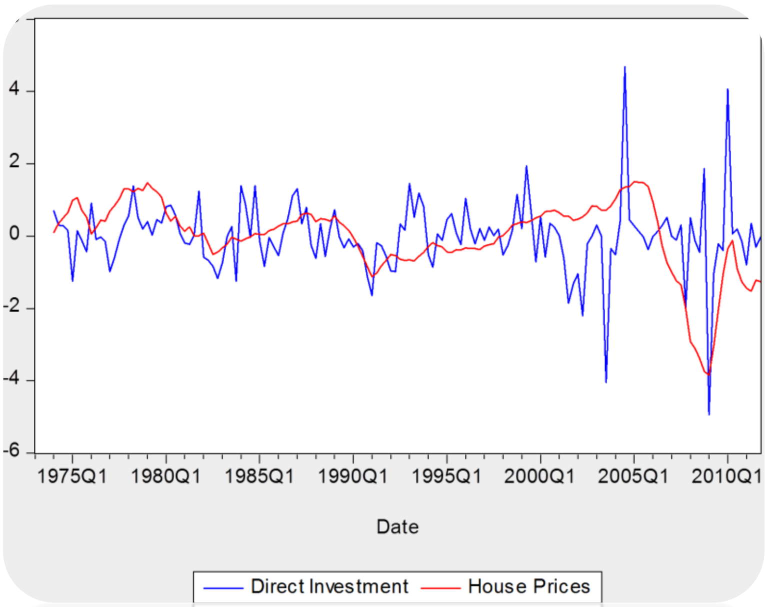


Figure 5 House Prices and Direct Investment



The graphical inspection of the relationship between the growth in house prices and the external account, as captured either by the current account or foreign direct investment in the USA, shows that there is some co movement that becomes more pronounced during the crisis. This relationship seems to be stronger in the case of house prices and the current account rather than with foreign direct investment (Figure 3 and Figure 5). For the financial innovation variable (Figure 3) there seems to be little relationship between variations in house prices and the index before the crisis period. The substantial drop in both variables can be explained by the credit tightening that happened during the collapse of house prices. What is not clear from the visual inspection is the direction of causality, a matter formally examined in later sections.

5. Statistical Adequacy Tests

5.1 Unit root test

Before proceeding with the estimation analysis of our model, it is necessary to carry out some tests to ensure that our model is correctly specified. We start with the most common problem in time-series econometrics analysis, namely unit root. The existence of trend in the series has profound implications for regression analysis. Formally times series is stationary if its mean, persistency and variance are constant over time and if the covariance does not depend on the observation time of the two variables but on the separation time length between the two values of the variables. (Hill et al, 2012). An examination of whether a series is stationary or not is essential for three reasons. Firstly, the use of non-stationary data leads to a spurious regression model. Secondly, in a time series regression the existence of a trend does not allow the assumptions of asymptotic analysis to be satisfied. Thirdly, R- squared, confidence interval, T-tests and F-tests are not valid since none of the tests are normally distributed under non-stationary data[8].

First of all, we should formally check whether our series are stationary or not – and if they are whether exhibiting a deterministic or stochastic trend. In the case of a deterministic trend, the problem can be easily solved by adding an appropriate time variable capturing the time trend. On the other hand, if our data exhibit the common serious problem of stochastic trend (unit root), then a more careful treatment of the data and a more thorough analysis must be carried out.Two standard procedures for testing for a unit root, the Augmented Dickey-Fuller (ADF) and the more powerful Dickey – Fuller (DF) – GLS test proposed by Elliott et al. (1996) are employed in this study. These tests are based on the examination of the autoregression process of order one AR (1) for our time series:

More formally

$$\mathrm{Y}_t = \beta_0 + \rho \mathrm{Y}_{t-1} + \varepsilon_t \qquad (2)$$

Where β_0 is a constant, and ρ is an unknown coefficient to be estimated and ε_t is a white noise process.

If ρ is equal to one implies that the series is non-stationary, it has a unit root. If ρ is different from one then the series is stationary and no further action is required.

Subtracting Y_{t-1} to be subtracted from both sides of the equation to get,

$$\Delta \mathrm{Y}_t = \beta_0 + \gamma \mathrm{Y}_{t-1} + \varepsilon_t \qquad (3)$$

Where $\gamma = \rho - 1$ and $\Delta \mathrm{Y}_t = \mathrm{Y}_t - \mathrm{Y}_{t-1}$

[8] Brooks (2008) and Kemp, EC352 lecture notes, Essex University

The basic objective of the test is to examine the null and alternative hypothesis:

$H_0: \quad \gamma = 0$ or $\rho = 1$ Series contains a unit root, non-stationary

$H_1: \quad \gamma < 0$ or $\rho < 1$ Series is stationary

Table 1 summarizes the results of the ADF and DF-GLS tests for the variables of interest with a trend and without a trend. The number of lags included is eight in order to be sufficiently long to remove any serial correlations in the residuals. It can be clearly seen that the values of all the variables in ADF and DF-GLS t-statistics, both with time trend and without, are higher than the critical values at a 5% significance level. Therefore, the null hypothesis cannot be rejected and the variables are considered non-stationary. Since our variables violate the assumption of stationarity we cannot include them in levels in a simple OLS regression analysis because our potential estimators will be biased and inconsistent. A common approach to solve the unit root problem widely adopted in the literature is to take the first difference of the series. Therefore we first differentiate he data once and then we test again for unit root. First difference equation: $\Delta \mathrm{Y}_t = \mathrm{Y}_t - \mathrm{Y}_{t-1}$

Table 2 presents the above examined variables in first difference and test again for stationary using ADF and DF-GLS tests as before. In this case, it can be clearly seen that the test statistics for all the variables are lower than the critical value at a 5% significance level. Hence, the null hypothesis is convincingly rejected. Therefore, by differentiating once the non- stationary series became stationary. Thus, we conclude that the sequence is of order one $\mathrm{I}(1)$.

Table 1: ADF and DF-GLS with intercept

Variable	**Lags**	**ADF Test statistic**		**5% critical value**		**DF-GLS Test statistic**		**5% critical value**	
Variables are in logs (except current account)		**No Trend**	**Trend**	**No trend**	**Trend**	**No trend**	**Trend**	**No Trend**	**Trend**
House prices	8	-2.01	-1.82	**-2.88**	**-3.44**	0.22	-1.49	**-1.94**	**-2.98**
CPI	8	-2.87	-2.38	**-2.88**	**-3.44**	0.87	-0.69	**-1.94**	**-2.98**
Credit	8	-1.33	-2.25	**-2.88**	**-3.44**	3.66	-1.42	**-1.94**	**-2.98**
Money M1	8	-0.65	-1.70	**-2.88**	**-3.44**	2.11	-1.41	**-1.94**	**-2.98**
Federal Funds Rate	8	0.87	-0.71	**-2.88**	**-3.44**	1.14	-1.81	**-1.94**	**-2.98**
GDP	8	-0.81	-1.53	**-2.88**	**-3.44**	1.92	-1.71	**-1.94**	**-2.98**
Current Account	8	-1.30	-2.89	**-2.88**	**-3.44**	-0.67	-2.54	**-1.94**	**-2.98**
Credit Regulation	8	-1.25	-1.84	**-2.88**	**-3.44**	-1.37	-1.76	**-1.94**	**-2.98**

Table 2: First Difference using AFD and DF-GLS tests with intercept

Variable	**Lags**	**ADF Test statistic**		**5% critical value**		**DF-GLS Test statistic**		**5% critical value**	
Variables are in logs (except current account)		**No Trend**	**Trend**	**No trend**	**Trend**	**No trend**	**Trend**	**No Trend**	**Trend**
House prices	8	-3.06	-3.48	**-2.88**	**-3.44**	-2.88	-3.05	**-1.94**	**-2.98**
CPI	8	-2.97	-3.67	**-2.88**	**-3.44**	-1.86	-3.70	**-1.94**	**-2.98**
Credit	8	-11.88	-11.88	**-2.88**	**-3.44**	-2.74	-10.76	**-1.94**	**-2.98**
Money M1	8	-4.68	-4.65	**-2.88**	**-3.44**	-4.50	-4.68	**-1.94**	**-2.98**
Federal Funds Rate	8	-5.10	-5.26	**-2.88**	**-3.44**	-3.43	-4.94	**-1.94**	**-2.98**
GDP	8	-8.25	-8.26	**-2.88**	**-3.44**	-7.31	-8.14	**-1.94**	**-2.98**
Current Account	8	-2.93	-2.92	**-2.88**	**-3.44**	-2.81	-2.82	**-1.94**	**-2.98**
Credit Regulation	8	-3.85	-3.09	**-2.88**	**-3.44**	-3.84	-3.92	**-1.94**	**-2.98**

An additional test is the Phillips-Perron test which, unlike the Dickey-Fuller tests, does not rely on the assumption of independently and identically disturbances (IID). (Seddighi (2012). In Appendix 2, we display the Phillips-Perron test under which the variables are in logs (except the current account) and are first differentiated. It can be easily pointed out that all the variables are stationary with a trend and with no a trend, since their critical values are lower than the T-test. Additional evidence of stationarity is provided by the KPSS test. Kwiatkowski et al., (1992) claim that under the KPSS test the null and alternative hypothesis are in the diverse direction. In this special case, the null hypothesis implies that the series does not contain a unit root. As can be seen from the appendix 2 table, all the first differentiated series are stationary at a 5% significance level.

5.2 Misspecification Tests

In the previous subsection we formally test and conclude that the series used are non-stationary. A common way to get around the problem of spurious regression and to induce stationarity in the series is by differentiation. Yet, additional assumptions must be satisfied before making plausible inferences about the quality of our results. These assumptions are standard in time series estimation and are summarized as:

1) Exogeneity,
2) Non-collinearity,
3) No serial correlation
4) VAR system stability

If one or more of these assumptions do not hold, then we say that our model is not correctly specified and hence the estimation of parameters and statistical innovations are not qualitatively and quantitatively (bias and inconsistent estimators) correct. The exogeneity assumption cannot be easily tested but we assume that we eradicate the most common source of it; namely omitted variable bias by including as many variables as possible in the VAR equation. The second assumption is also satisfied since we do not have any linear relationships among the variables included in the VAR equation. To ensure the statistical adequacy of the models the appropriate tests for serial correlation and stability are carried out. Additionally, a test for heteroskedasticity is implemented.

5.2.1 Serial Correlation

The Breush- Godfrey (1978) test is used for serial correlation which can be expressed formally as follows:

$Y_t = \beta_0 + \beta_1 X_t + u_t$

$U_t = \rho_1 u_{t-1} + e_t$

where e_t is identically and independently distributed of X_t, with mean zero and variance σ^2 so that the disturbance u_t follow an AR(1) process.

The null and alternative hypotheses are:

H_0: $\rho_1 = 0$ no serial correlation

H_1: $\rho_1 \neq 0$ serial correlation

The tables below show the Breusch- Godfrey test for House prices, Current Account, Financial Innovation, Gross Domestic Product, Federal Funds Rate, and Consumer Price Index. All the variables are in log (except current account) and are first differentiated. The lags used in the VAR model are six.

Table 3.A

Lags	LM-Stat	Prob
1	42.82046	**0.2017**
2	38.10104	**0.3740**
3	58.09279	**0.0113**
4	68.30722	**0.0009**
5	23.37179	**0.9483**
6	39.05220	**0.3343**
7	46.44018	**0.1141**
Probs from chi-square with 36 df.		

1973Q1-2006Q4

Table 3.B

Lags	LM-Stat	Prob
1	43.44561	**0.1839**
2	42.74162	**0.2041**
3	56.70221	**0.0154**
4	77.97627	**0.0001**
5	35.72324	**0.4816**
6	61.74640	**0.0048**
7	43.32637	**0.1872**
Probs from chi-square with 36 df.		

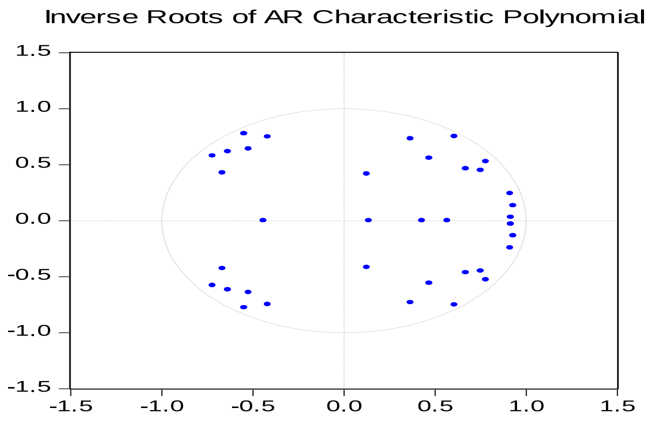
1973Q1-2011Q4

For five out of the seven lags, for both periods the null hypothesis cannot be rejected at a 5% significance level and so there is no serial correlation between the residuals.

5.2.2 Stability Test

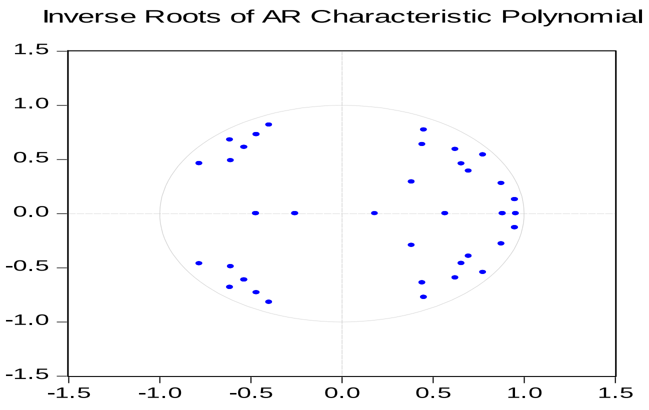
In a VAR framework testing for stability entails that in absolute terms the inverse roots of the AR characteristic Polynomial must be lower than one.

Figure 6.A



1973Q1-2006Q4

Figure 6.B



1973Q1-2011Q4

It can been easily seen from the above figures that all the roots of the polynomial for the two models lie inside the unit root cycle for both horizons, indicating that the VAR models are stable.

5.2.3 Heteroskedasticity- white test

To test for heteroskedasticity the White test is used. Following Wooldridge (2009), for a three variable regression the White test checks the significance of x:

$$U^2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \delta_3 x_3 + \delta_4 x^2_1 + \delta_5 x^2_2 + \delta_6 x^2_3 + \delta_7 x_1 x_2 + \delta_8 x_1 x_3 + \delta_9 x_2 x_3 + \text{error}$$

With the null and alternative hypothesis being:

H_o: $\delta_1=\delta_2=\ldots\ldots\delta_9=0$ Homoskedasticity

H_1: $\delta_1\neq\delta_2\neq\ldots\ldots\delta_9\neq0$ Heteroskedasticity

The null hypothesis cannot be rejected if all the regressors are equal to zero, and hence the model is homoscedastic.[9] The probabilities in both periods are higher than a 5% significance level.Thus, the model is considered as homoscedastic.

Table 4.A

Chi-sq	df	Prob
2303.865	2268	0.2947

1973Q1-2011Q4

Table 4.B

Chi-sq	df	Prob
2297.828	2268	0.3260

1973Q1-2006Q4

[9] Lags of nine are used for this test. The presence of heteroskedasticity in the series does not prevent us for estimating VAR equation through OLS since it does not causing bias and consistency in the estimated parameters. However, our estimators are not efficient in essence that calculation of standard errors and confidence intervals are larger than normal.

5.3. Granger Causality Test

In a VAR model we are interested in finding out if changes in one variable *cause* changes in another variable. The most applied test is the Granger- Causality test, firstly introduced by Granger (1969) and Sims (1972). According to Brooks (2008, p.298) '''*causality' has the meaning of a correlation between the current value of one variable and the past values of others and not that the movements of one variable cause movements of another''.* If just one variable 'causes' the other and not vice versa then there is a unidirectional causality from the former variable to the latter. Moreover, there will be a bi-directional causality, if both variables influence one another. At the same time, if none of the two variables cause each other, the variables are assumed to be independent.

H_o: implies no granger causality among the variables

H_1: implies granger causality among the variables.

Table 5 summarizes the results of the Granger- Causality test containing all the variables in logs (except the current account) and first differences. The number of lags included is six.

Table 5: Granger Causality Test

1973Q1-2011Q4

Dependent variable: House Price			
Excluded	**Chi-sq**	**Df**	**Prob.**
CA	13.05343	6	0.0422
CPI	11.14703	6	0.0839
Credit Regulation	20.03184	6	0.0027
GDP	20.34910	6	0.0024
Funds Rate	28.34813	6	0.0001

1973Q1-2006Q4

Independent variable: House Price			
Depended	**Chi-sq**	**Df**	**Prob.**
CA	7.921676	6	0.2439
CPI	22.45235	6	0.0010
Credit Regulation	15.28366	6	0.0182
GDP	12.76317	6	0.0470
Funds Rate	19.92311	6	0.0029

The left hand side table summarizes the results of the Granger- Causality test for the period 1973Q1-2011Q4. The number of lags included is six. All the variables show causality on house prices at a 10% significance level. In particular, CPI seems to be significant on house prices only at a 10% level, while the rest of the variables have a significant effect on house prices at a 5% level. In reverse direction house prices have a bi-directional causality on all variables, apart from current account even at a 10% significance level. Performing the same test over the shorter period that excludes the crisis years the previous findings are maintained but those for the external factors and the financial innovation index. This is not a surprising result but something that has been suggested in the graphical analysis.

6. Empirical Results

Having established that we have a well specified model we proceed to perform Impulse Response and Variance Decomposition Analysis. Such an analysis will assist us to obtain further insights of the dynamics among the variables.

6.1 Impulse Response

Impulse Response analysis is used to understand the implied dynamics of a VAR model. Specifically, the use of Impulse Response allows us to analyze the dynamic behavior of a variable due to a random shock of another variable. A standard practice in VAR estimation is to orthogonalise the residuals for impulse response analysis using the Choleski decomposition. The Choleski decomposition ordering implies that the innovation of the first variable is allowed to affect all the other variables. In our study based on the assumption that financial variables react more quickly to shocks we start with the ordering: Current Account, Financial Innovation, Inflation, GDP, House Prices and Federal Funds Rate[10]. However, to ensure the robustness of our results a number of different orderings are tried.

1973-2011

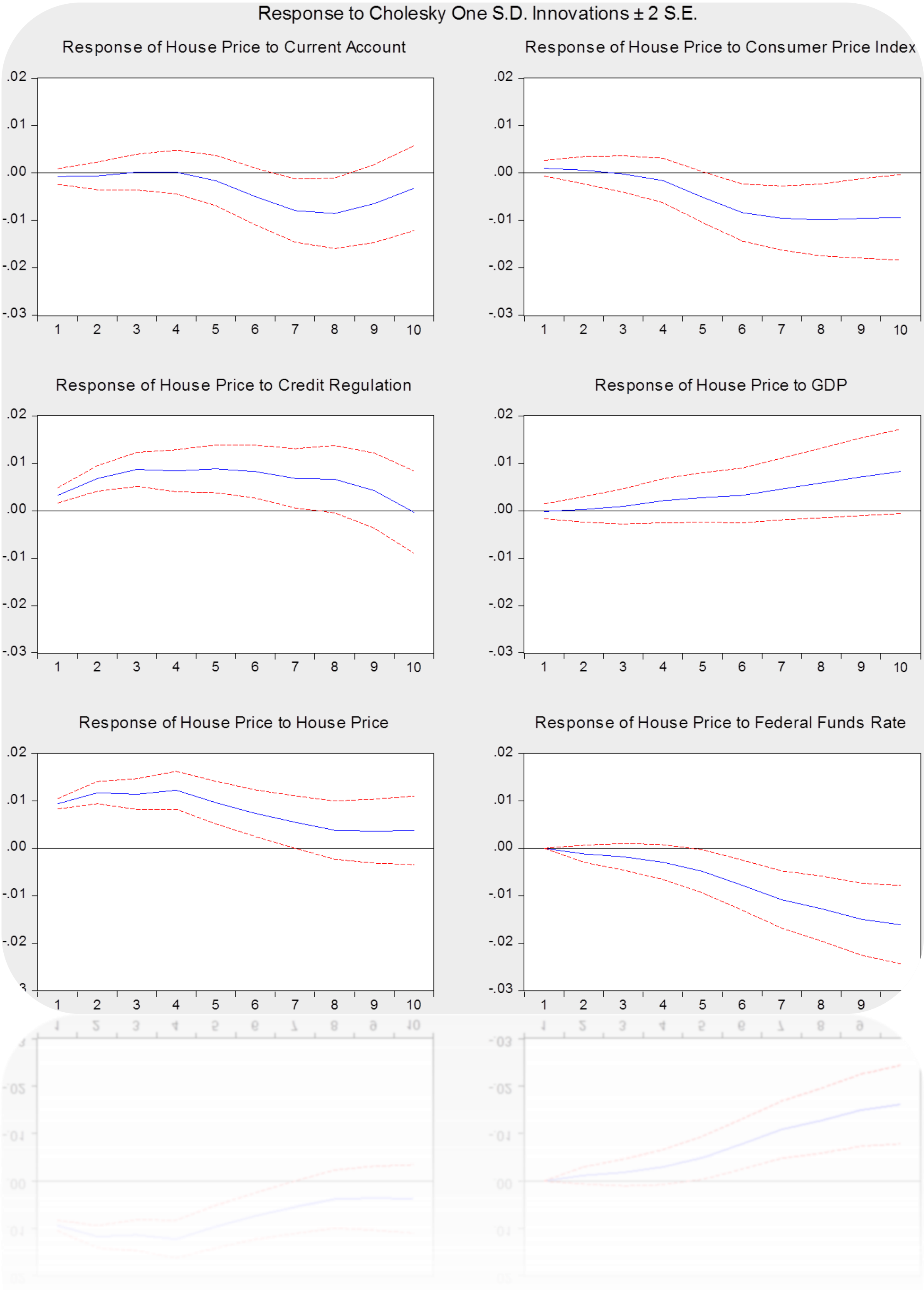
Figure 7 depicts the impulse responses (IRFs) of the variables referred above, where the variables are in logs and first differences covering the period 19731Q1 to 2011Q4. The figure shows the IRFs over 40 quarters for one standard deviation shock. The responses of house prices to the different shocks are quite large and significant. Inflation and monetary policy seem to have the larger, negative and positive effect, respectively[11]. Financial Innovation also has a positive impact, i.e. the higher the innovation the bigger the impact on house prices. Moreover, the response of House Prices to GDP is an upward straight line, implying that GDP affects house prices positively.[12] The other variable of interest the external channel as captured by the CA deficit seems to have a rather strong negative effect on house prices. If the foreign direct investment is used instead of the current account the impact on house prices is even lower.

[10] Sa et al. (2011) have adopted the following variable ordering : DGP,CPI,federal funds rate, House prices, current account, and lastly the credit regulation index.

[11] In VAR analysis is standard to use movements in short term rates to identify monetary policy shock (Christiano et al 1999)

[12] Moreover, house prices seem to affect GDP more than in the reverse direction, a result also found by Goodhart and Hofmann (2008) in the UK.

Figure 7. : Impulse Responses for the period 1973-2011

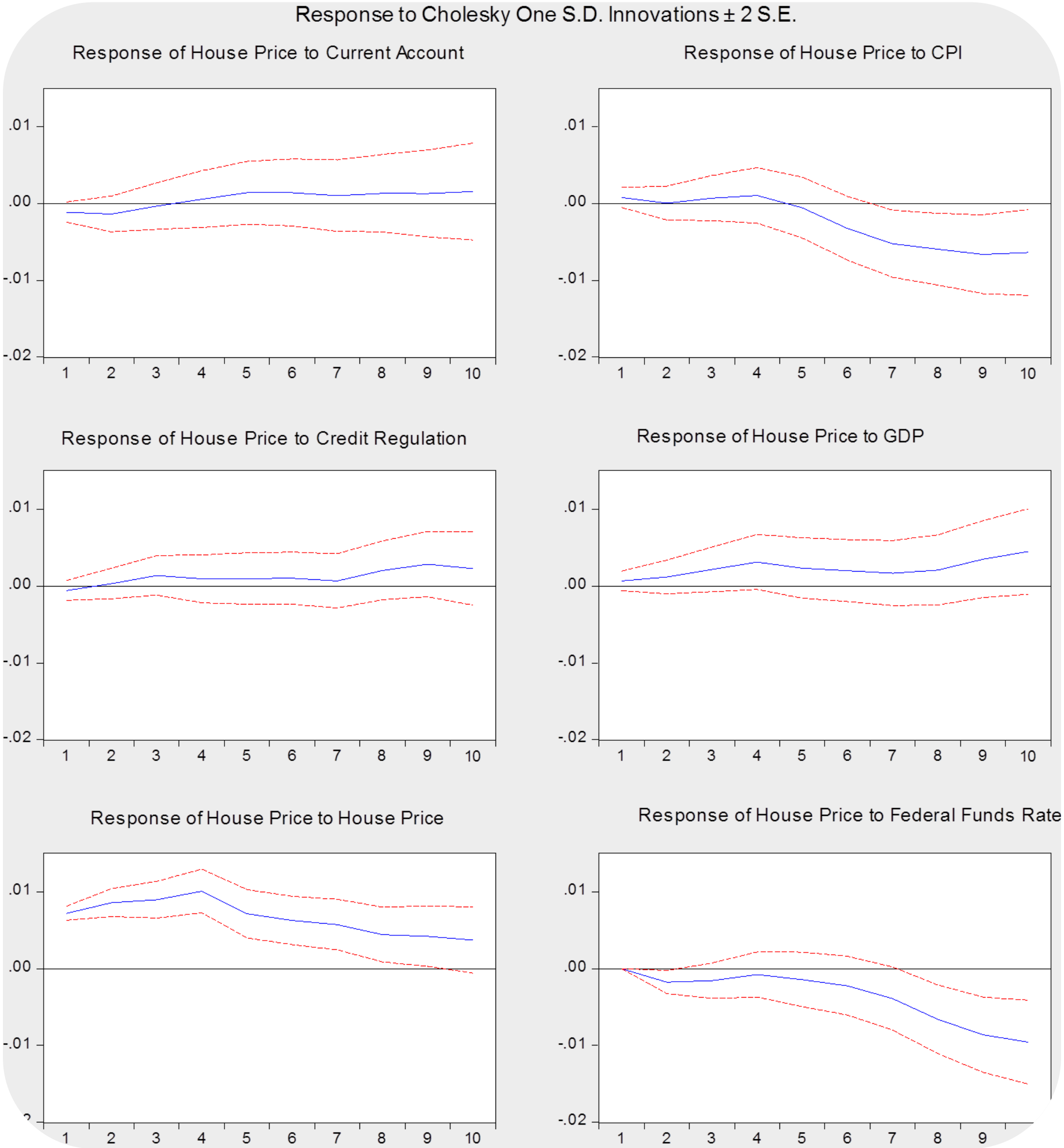


1973-2006

The analysis below is replicated for a shorter period which the latter crisis years. The aim is to see whether the previous relationships have been affected by the crisis and if yes to what extent.

Figure 8 shows the impulse responses for the period 1973Q1 to 2006Q4, excluding the financial crisis that started in 2007. The general result is that impact of all the variables on house price is weaker over the shorter period compared to the findings over the longer period. This is most evident for the credit regulation and the external variables, the current account and the foreign direct investment which both exhibit a very small impact on house prices. This result confirms the previous findings of the Granger causality tests.

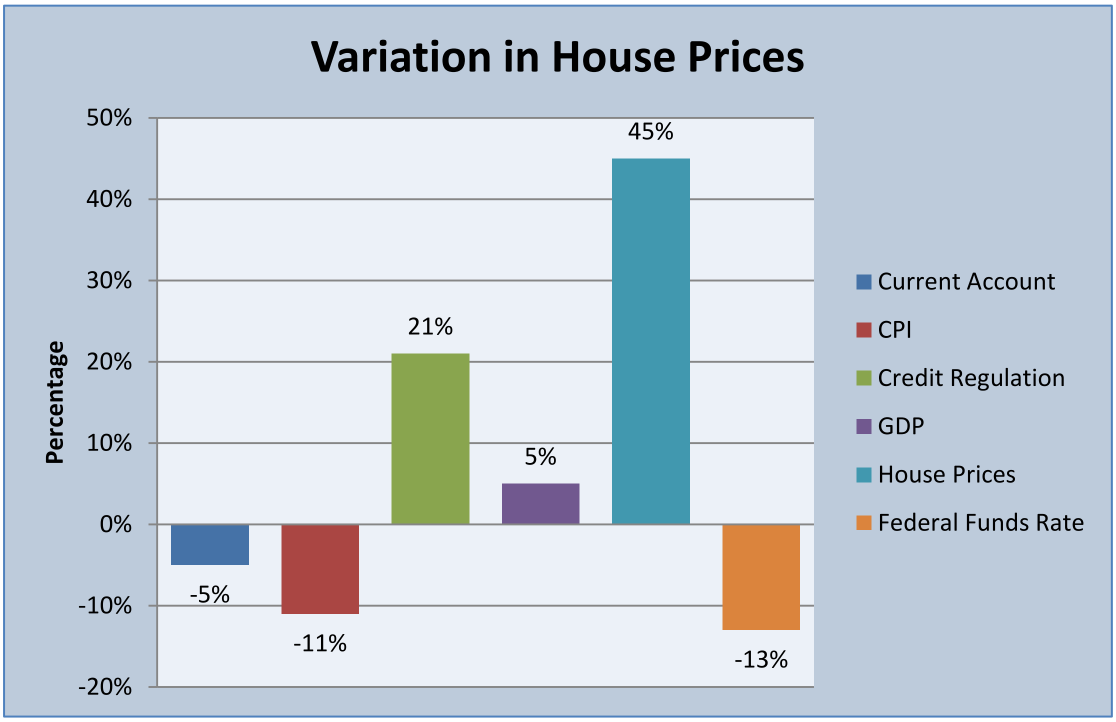
Figure 8: Impulse Responses, for the period 1973-2006



6.2 Variance Decomposition

The Variance Decomposition displays and signifies the amount of information provided by every variable assigned to the rest variables in the autoregression. It identifies for each variable separately, the proportion of the forecast error variance that can be enlightened by exogenous shocks to the other variables.The ordering of the variables is the same one used for the impulse response analysis. Figure 9 illustrates the VDCs for the period 1973Q1-2011Q4.

Figure 9: Variance Decomposition 1973Q1-2011Q4



Other than its own shock credit regulation index is the highest contributor accounting for 21% of house price variation. Monetary policy proxy, the federal fund rate is second with 13% closely followed by CPI with 11%. Current account provides a small explanation of real estate price variation of about 5%. About the same magnitude is the impact on GDP. Interestingly enough the direction of causality which seems to run from house price to GDP and the estimated effect is around 9%.

Figure 10: Variance Decomposition 1973Q1-2006Q4

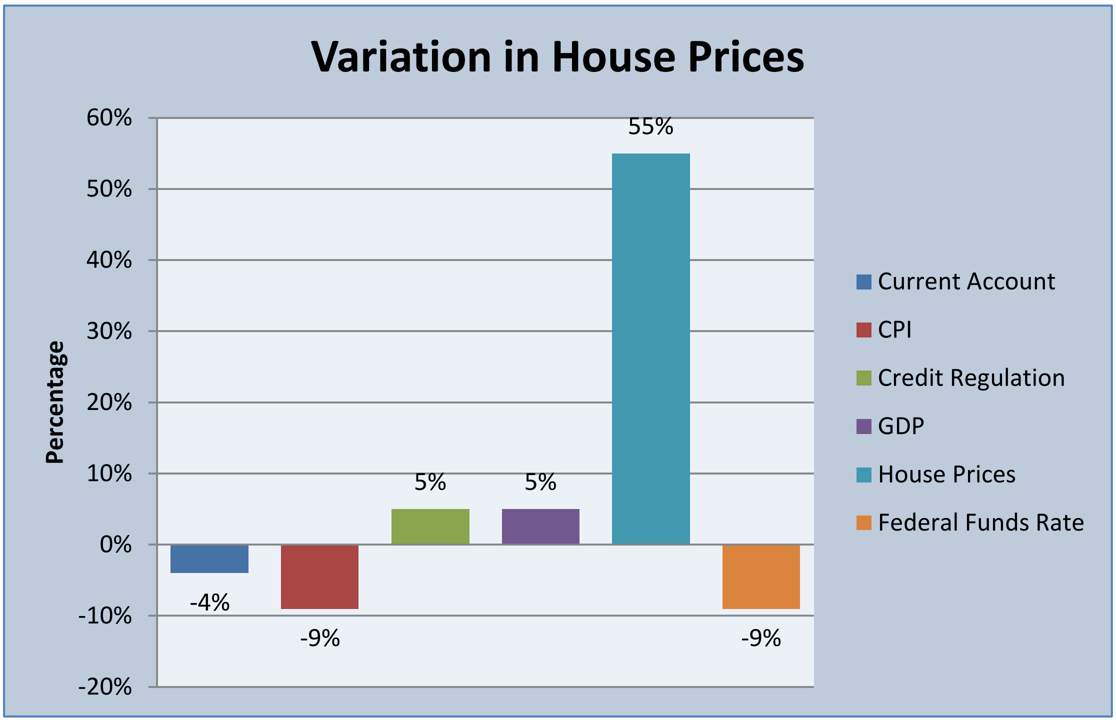


Figure 10 summarizes the VDCs of the same variables as before but it covers a shorter period 1973Q1- 2006Q4, i.e. excluding the recent financial crisis. The effects of house prices are very similar to the longer period results except for the current account and financial innovation index. It can be clearly seen that the variation of credit regulation to house prices has decreased to 5% for the period of 1973-2006. Similarly, current account variation to house prices has declined to 4%. GDP's effect seems too unaltered and is about 5%.

7. Extension: Vector Error Correction (VEC)

The Vector Error Correction Model (VEC) is applied in order to capture the long run relationships among the variables. The analysis of the Vector Error Correction model can be consider as a VAR approach, in which there are cointegrated relations among the non-stationary time series. (Sims, 1980, McDonald and Kearny, 1987). The existence of cointegrated relations implies the variables are converging to their long run equilibrium. In addition, it also allows for the short-run adjustment dynamics. Testing for cointegration is only meaningful in the case of non-stationary series, integrated of the same order. As we have checked in section 5.1, all the variables in the analysis are non-stationary and integrated of order one. Below we test for cointegration using Johansen test, and confirmed the existence of one cointegrated equation at 5% level in trace table and maximum eigenvalue table. These imply that our cointegrated variables may be influenced by the error correction mechanism (ECM) causing fluctuations in the Granger Causality Tests. Therefore, inclusion of an error correction term in the VEC model should be used in order to draw correct inferences from causality tests (Granger 1988, Toda and Phillips 1993).

7.1 Cointegration

As have already been discussed the use of non-stationary variables lead to spurious regression. However, this is not always true. In the special case of having two non-stationary variables I(1), Y_t and X_t ,in a simple model $Y_t = \alpha + \beta X_t + u_t$, and the residual $u_t = Y_t - \alpha - \beta X_t$ found to be a stationary process I(0) then we could assume that the two variables are cointegrated. (Hill et al., 2012) The presence of cointegration allows for the regression to run in levels.

In order to test for cointegration, we should simply test for stationarity of the residuals. There are two approaches to test for cointegration; the Engle and Granger test and the Johansen procedure. The Engle- Granger approach captures just a single cointegrated relationship, while the Johansen Maximum Likelihood (ML) being a VAR procedure procedure could result in more than one cointegrated relatioships.

'*'The Johansen procedure can be seen as multivariate generalization of the Dickey-Fuller test''* (Enders 2010, p.386) and represented by the following equation:

$\Delta Y_t = \Pi Y_{t-1} + u_t$

where:

$\Pi = (A - I)$

A is an square matrix of parameters and I is the Identity Matrix.

The matrix Π can be expressed as the product of two matrices: α and β' [13]. The rank of Π equals the number of cointegrating vectors. If Π is zero, implies that the variables are not cointegrated as the rank of the matrix will be zero. The Johansen procedure tests if the restrictions indirect by the matrix Π can be rejected.

The null and alternative hypotheses in the test of cointegration are:

H_0: the series are not cointegrated

$H_{1:}$ the series are cointegrated

[13] The β is matrix of long-run coefficients of the cointegrating vectors,and the α is the matrix of the adjustment parameter and it is similar to an error correction term.

Table 6: Johansesn Cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.319818	117.6667	95.75366	0.0007
At most 1	0.171235	60.24288	69.81889	0.2280
At most 2	0.103933	32.25799	47.85613	0.5979
At most 3	0.062477	15.90664	29.79707	0.7188
At most 4	0.041254	6.294001	15.49471	0.6608
At most 5	0.000113	0.016808	3.841466	0.8967

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.319818	57.42385	40.07757	0.0002
At most 1	0.171235	27.98489	33.87687	0.2142
At most 2	0.103933	16.35135	27.58434	0.6358
At most 3	0.062477	9.612637	21.13162	0.7801
At most 4	0.041254	6.277193	14.26460	0.5779
At most 5	0.000113	0.016808	3.841466	0.8967

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

From table 6 it is clear that there exists only one cointegrated vector. Based on this result we proceed to estimate the VEC model.

7.2 VEC estimates

To estimate a VEC test all the variables are in levels and are transformed into logarithms. As before we use the Choleski identification procedure and experiment with different variable ordering to ensure the robustness and comparability of our results with the unrestricted VAR. The Akaike Information Criterio is used to determine the lag-length which is found to be six. As was the case with the VAR, in order to ensure a well specified model we carried out a misspecification testing and Granger causality tests.[14] Having done this we move to perform IRFs and VDCs.

7.2.1 Granger Causality Test

Table 7a summarizes the Granger Causality test under a VEC model for the period 1973-2011, while table 7.b summarizes the granger causality for the shorter period (1973-2006) in a six lags base. A slightly different picture of what was found with the unrestricted VAR model delivers the Granger Causality test for the longer period.Recall that under the VAR model all the variables[15] Granger cause house prices but the GDP is the only variable that does not cause house prices in the VEC model. Moreover, evidence of bi-directional causality can be traced with house prices and with most of the variables, except from the current account and federal Funds Rate at 5%. Over the short period, the results are very different. In the VEC model the Credit regulation, GDP, and Federal Funds Rate do not affect house prices while Current Account and Consumer Price Index have a significant effect at a 10% level. On the reverse direction, house prices are only granger cause GDP at 5% significance level.

[14] For the sake of brevity the results of misspecification tests are not reported here.(see appendix 3)
[15] At the 5% significance level.

Table 7a: period 1973-2011

Dependent variable: House Price			
Excluded	**Chi-sq**	**Df**	**Prob.**
CA	29.99092	6	0.0000
CPI	14.78522	6	0.0220
Credit Regulation	25.87846	6	0.0002
GDP	5.978932	6	0.4256
Funds Rate	22.09165	6	0.0012
All	**114.4572**	**30**	**0.0000**

Independent variable: House Price			
Depended	**Chi-sq**	**Df**	**Prob.**
CA	6.685180	6	0.3509
CPI	21.33631	6	0.0016
Credit Regulation	23.31635	6	0.0007
GDP	14.85653	6	0.0214
Funds Rate	7.676885	6	0.2627

Table 7b, period 1973-2006

Dependent variable: House Price			
Excluded	**Chi-sq**	**Df**	**Prob.**
CA	17.36345	6	0.0080
CPI	11.29276	6	0.0797
Credit Regulation	9.172032	6	0.1641
GDP	3.526852	6	0.7404
Funds Rate	5.422912	6	0.4908
All	**53.81783**	**30**	**0.0048**

Independent variable: House Price			
Depended	**Chi-sq**	**Df**	**Prob.**
CA	8.863817	6	0.1814
CPI	10.39209	6	0.1091
Credit Regulation	7.424185	6	0.2834
GDP	19.98402	6	0.0028
Funds Rate	2.747353	6	0.8398

7.2.2 Impulse response and Variance Decomposition in a VEC model,1973Q1-2011Q4

Figure 11 displays the impulse response analysis for the period 1973Q1-2011Q4. In general, the Impulse Response analysis of the VEC delivers a picture that is broadly consistent with the picture of the unrestricted VAR. Specifically, according to the

VEC specification Credit Regulation affect current house prices positively, while Consumer Price Index and Federal Funds Rate do so negatively. However, there are some differences. The major determinant of house prices in both models for the period of 1973-2011 is their own past house prices, while in the second position is the Federal Funds Rate. Federal funds rate explains about 11% of real estate variation while CPI about 3%. Moreover, the GDP has lower than 5% explanatory power for both models in the same period. This result is associated with the findings of Tsatsaronis and Zhu, 2004, Gallin, 2003, Annet, 2005 studies   Specifically, GDP has very little impact on house prices in the VEC model. Another important result is that Current Account and Credit Regulation have a smaller effect on house prices in the VEC specification compared to the VAR model. This result can be verified by the variance decomposition analysis of figure 12. Past house prices explain about 55%, Credit Regulation 4%, while the Federal Funds rate and Consumer Price Index 11% and 3%, respectively. Current account explains only 3% of the variation in house prices.

Figure 11: Impulse response for 1973-2011

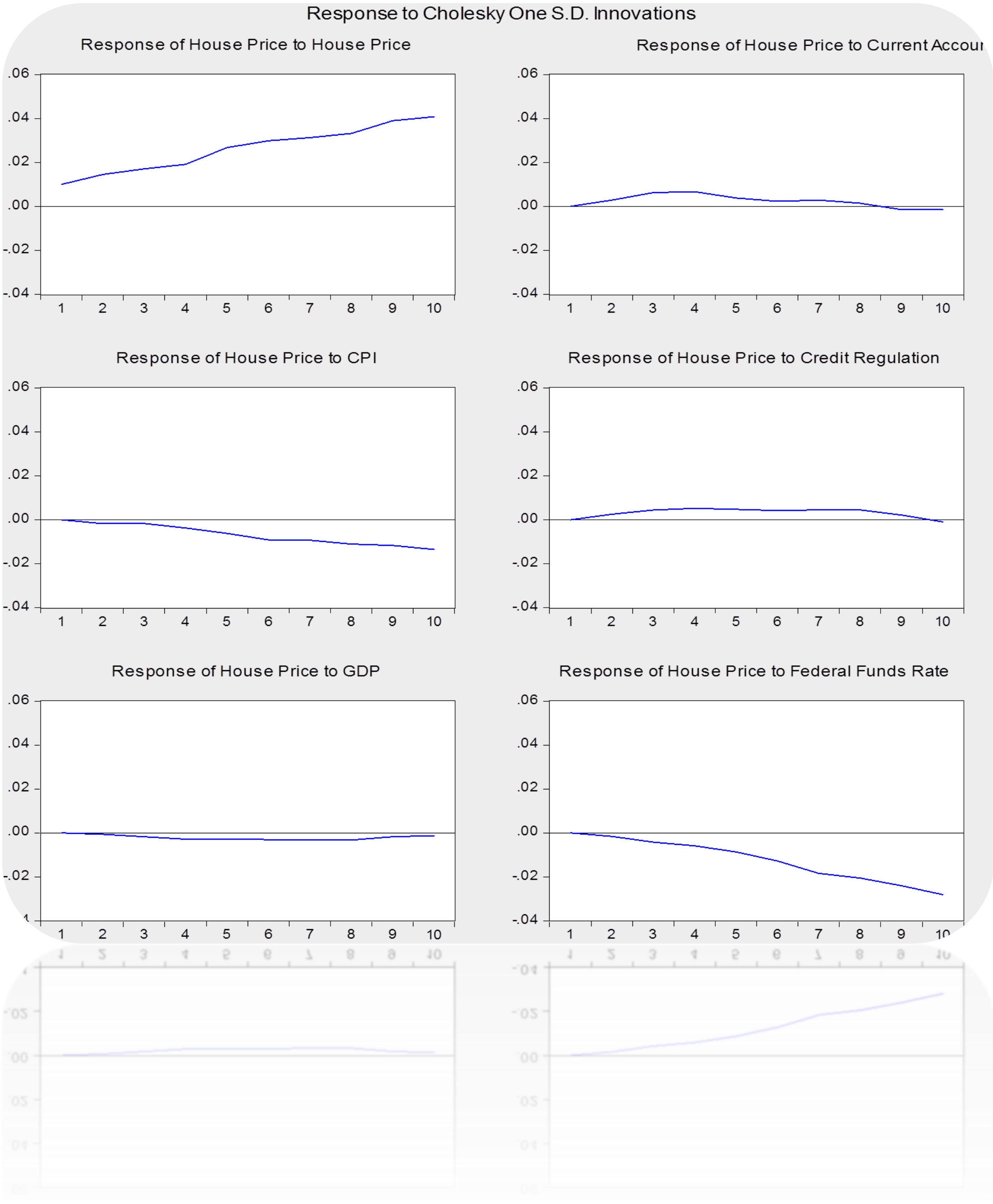
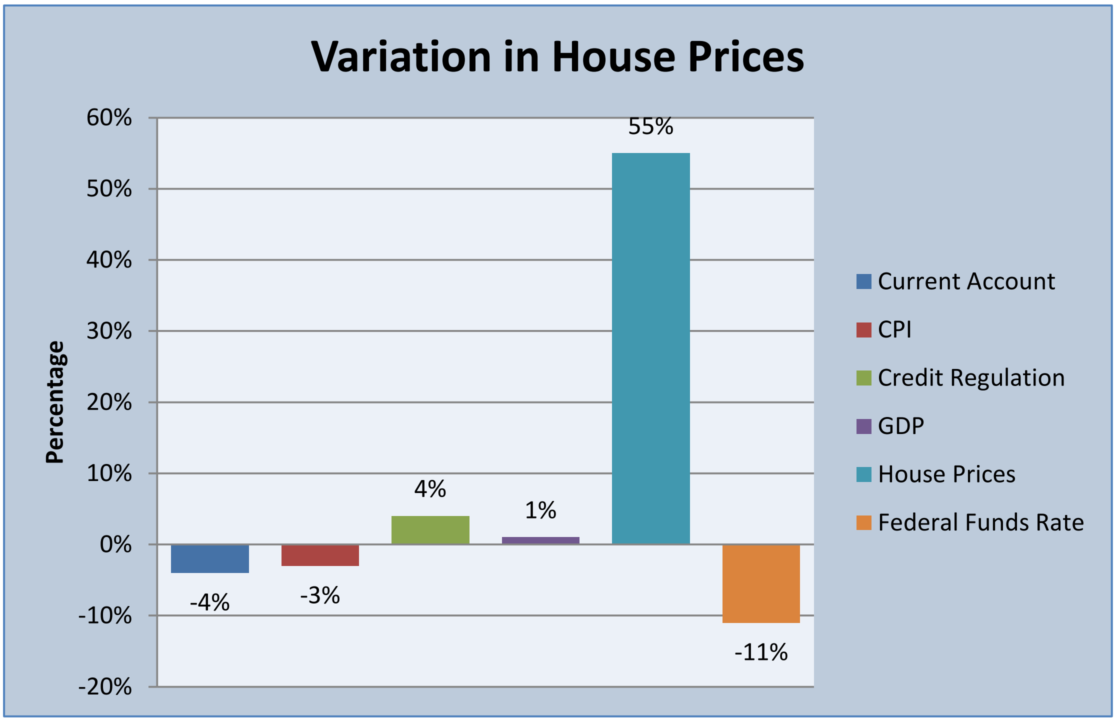


Figure 12



7.2.3 Impulse response and Variance Decomposition in a VEC model,1973Q1-2006Q4

The same analysis over the shorter period was performed and the results are reported in figure 12 and 13 below. The broad conclusion that can be drawn is that more or less the picture portrayed over the longer period is maintained but now the effects are much reduced. For example, the contribution of the Federal funds rate is more than halved compared with its contribution over the longer period. The same result also holds for financial innovation while for the contribution of the remaining variables register small decreases.

Figure 12

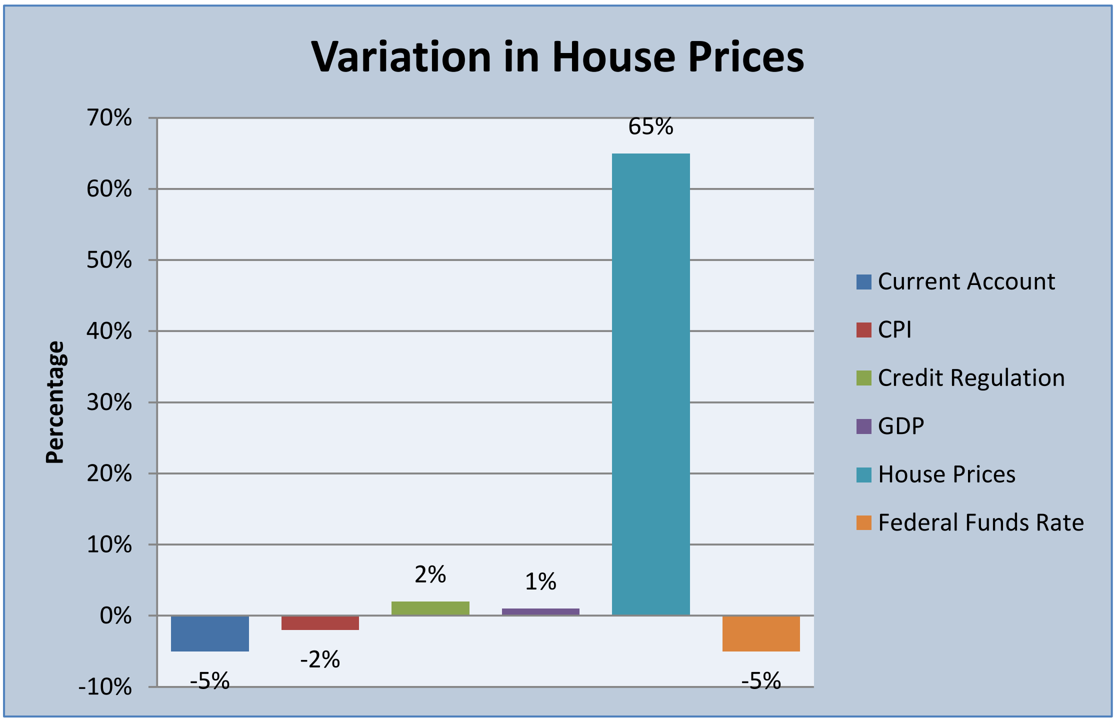
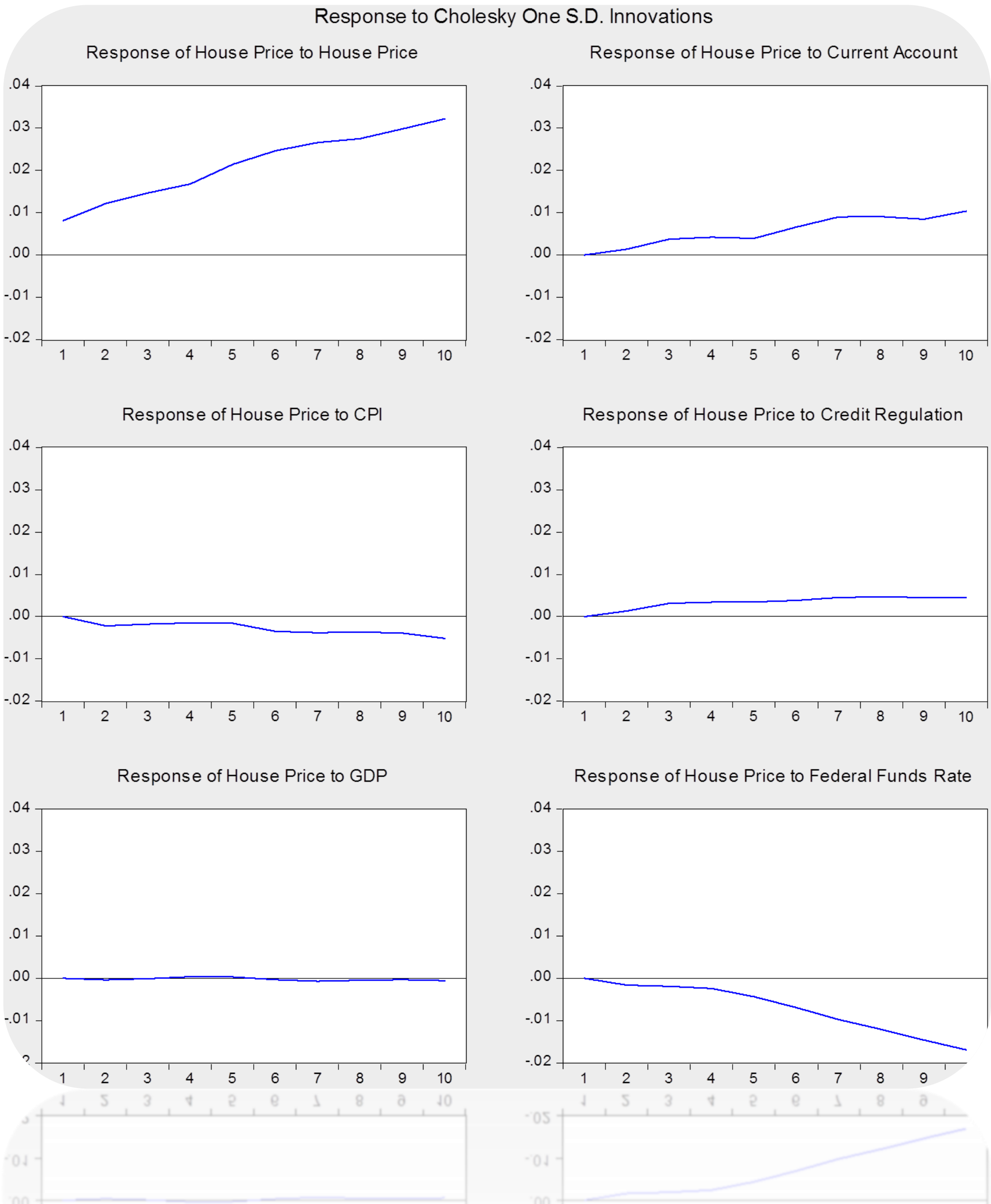


Figure 13



8. Conclusion

In this study, we empirically examine the key macrodeterminants of house price variation in the USA. The empirical investigation is conducted within well specified Vector Autoregressive (VAR) and Vector Error Correction (VEC) frameworks over the period 1973Q1-2011Q4. This approach allows us to study simultaneously the effects of a number of macro variables on house prices with special attention to monetary policy, current account and capital inflows as well as financial innovation.

The Federal funds rate turn out to be one of the most consistent and important predictor of house prices across different model formulation and time spans. Specifically, monetary policy shock accounts for 5%-13% of house price variation Inflation also plays a significant role in explaining house price variation but to a lesser degree, with contribution of 2%-11% compared to interest rate. We find also some evidence that financial innovation has a significant explanatory power, around 21%, at least in the unrestricted VAR over the whole period while its impact is small, 2%-4% when the crisis is excluded. Small but significant effect on house prices is also exerted by the current account and capital inflows,of 4%-5%, with the effect being stronger when the crisis is taken into account in the estimation. In accordance with other studies, GDP explanation is either small or insignificant.

In a nutshell, our study suggests that monetary policy, capital inflows and financial innovations play a role in determining house prices in the USA. Nevertheless, the robustness of our results as well as a better understanding of the interactions of these variables with house prices could be further enhanced if more work is devoted in developing better and more accurate indicators of the latter two variables. Specifically, for financial innovation an indicator that captures more adequately mortgage securitization would most probably have rendered it a higher explanatory power. The same can be said for capital inflows; instead of using either the broader concepts of current account or foreign direct investment, we can narrow them down to a more relevant component, namely foreign investment directed in real estate in the USA.

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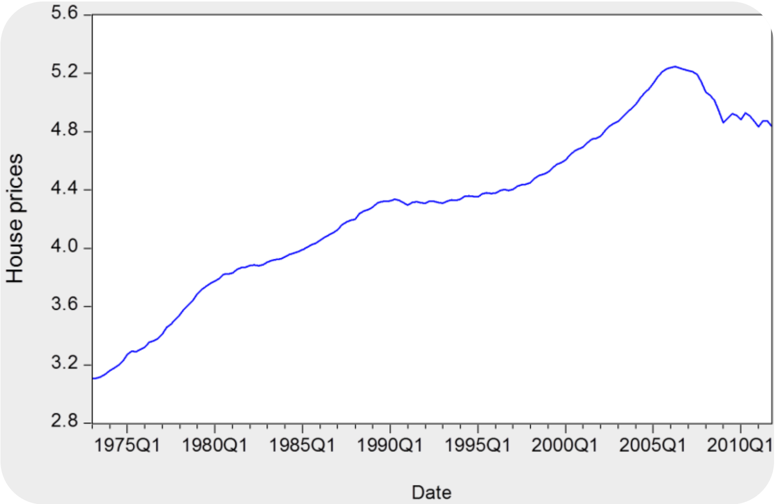
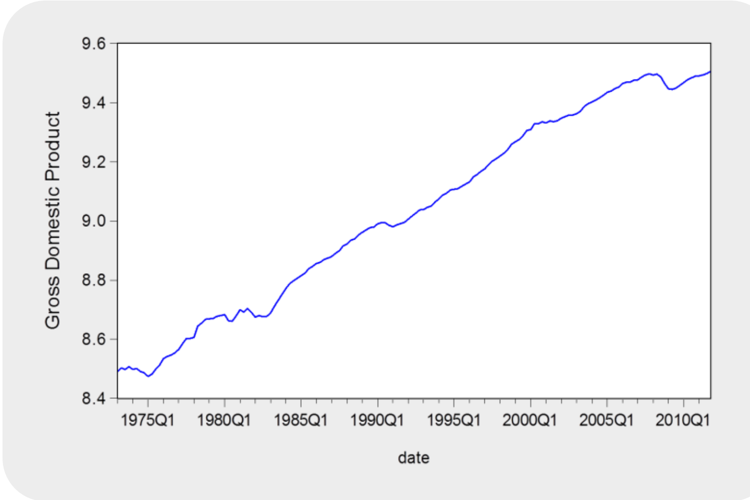
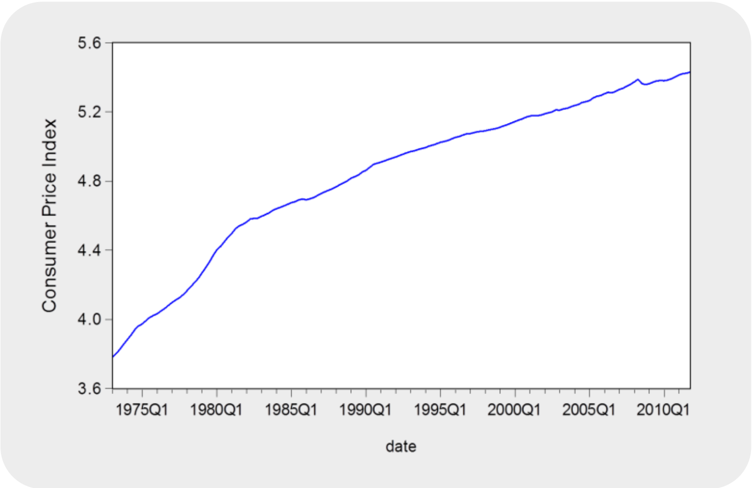
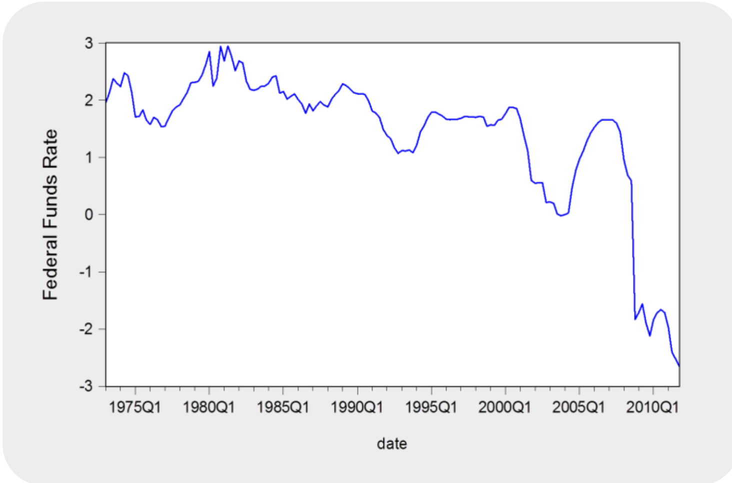
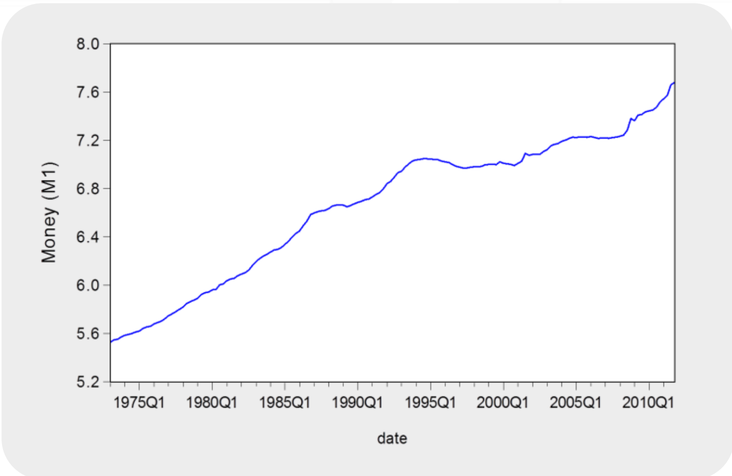
APPENDIX 1

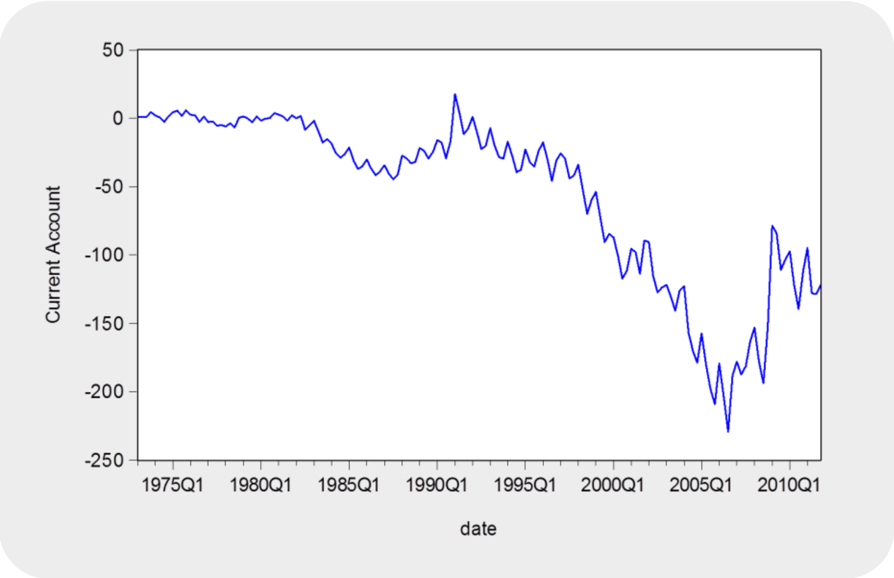

House prices
5.6
5.2
4.8
4.4
4.0
3.6
3.2
2.8
1975Q1 1980Q1 1985Q1 1990Q1 1995Q1 2000Q1 2005Q1 2010Q1
Date

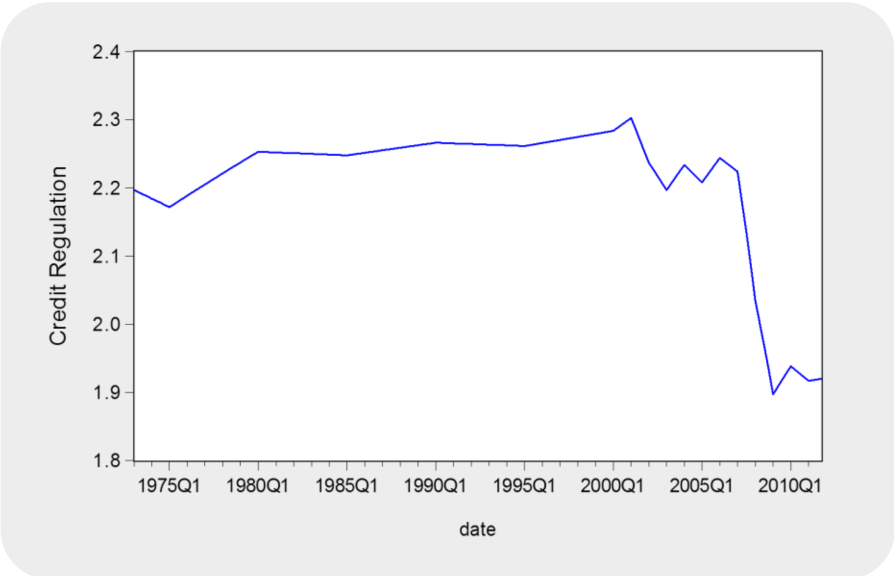

Gross Domestic Product
9.6
9.4
9.2
9.0
8.8
8.6
8.4
1975Q1 1980Q1 1985Q1 1990Q1 1995Q1 2000Q1 2005Q1 2010Q1
date


Consumer Price Index
5.6
5.2
4.8
4.4
4.0
3.6
1975Q1 1980Q1 1985Q1 1990Q1 1995Q1 2000Q1 2005Q1 2010Q1
date


Federal Funds Rate
3
2
1
0
-1
-2
-3
1975Q1 1980Q1 1985Q1 1990Q1 1995Q1 2000Q1 2005Q1 2010Q1
date


Money (M1)
8.0
7.6
7.2
6.8
6.4
6.0
5.6
5.2
1975Q1 1980Q1 1985Q1 1990Q1 1995Q1 2000Q1 2005Q1 2010Q1
date


50
0
-50
-100
-150
-200
-250
Current Account
1975Q1
1980Q1
1985Q1
1990Q1
1995Q1
2000Q1
2005Q1
2010Q1
date


2.4
2.3
2.2
2.1
2.0
1.9
1.8
Credit Regulation
1975Q1
1980Q1
1985Q1
1990Q1
1995Q1
2000Q1
2005Q1
2010Q1
date

Appendix 2

Table 3: First Difference Phillips Perron and KPSS tests with intercept

Variable	Lags	Phillips-Perron Test Statistic		5% critical value		KPSS Test Statistic		5% critical value	
Variables are in logs (except current account)		**No Trend**	**Trend**	**No trend**	**Trend**	**No trend**	**Trend**	**No Trend**	**Trend**
House prices	8	-7.09	-7.64	**-2.88**	**-3.44**	0.36	0.09	**0.46**	**0.15**
CPI	8	-4.46	-6.48	**-2.88**	**-3.44**	1.04	0.17	**0.46**	**0.15**
Credit	8	-11.88	-11.88	**-2.88**	**-3.44**	0.17	0.07	**0.46**	**0.15**
Money M1	8	-9.71	-9.70	**-2.88**	**-3.44**	0.20	0.14	**0.46**	**0.15**
Federal Funds Rate	8	-11.50	-11.62	**-2.88**	**-3.44**	0.26	0.05	**0.46**	**0.15**
GDP	8	-8.43	-8.43	**-2.88**	**-3.44**	0.15	0.10	**0.46**	**0.15**
Current Account	8	-12.11	-12.06	**-2.88**	**-3.44**	0.07*	0.07	**0.46**	**0.15**
Credit Regulation	8	-4.06	-4.34	**-2.88**	**-3.44**	0.43*	0.07	**0.46**	**0.15**

Appendix 3

VEC MODEL:

A) Serial Correlation test

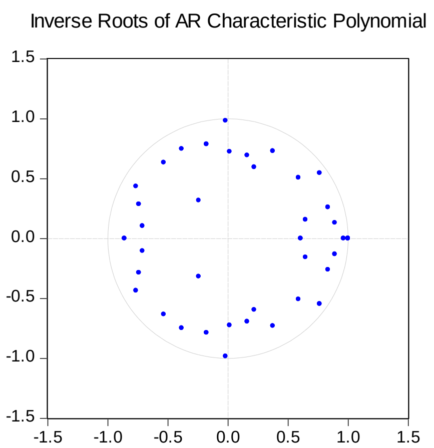
Lags	**LM-Stat**	**Prob**
1	58.17216	**0.0111**
2	87.48724	**0.0000**
3	57.34496	**0.0133**
4	74.36466	**0.0002**
5	35.26593	**0.5033**
6	64.67067	**0.0023**
7	40.38697	**0.2825**
Probs from chi-square with 36 df.		

1911Q1-2006Q4

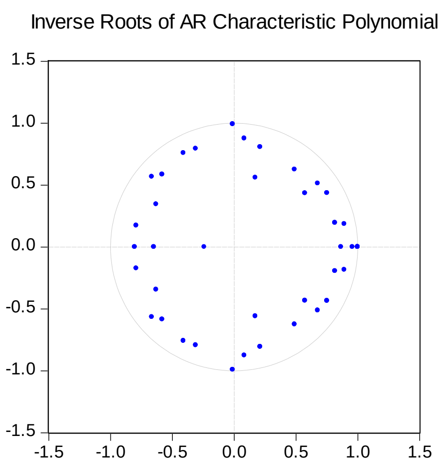
Lags	LM-Stat	Prob
1	37.14860	0.4159
2	44.66749	0.1523
3	66.00895	0.0017
4	55.99923	0.0179
5	38.70184	0.3486
6	33.75689	0.5757
7	49.76653	0.0632
Probs from chi-square with 36 df.		

1973Q1-2006Q4

B) Stability Test



1973Q1-2011Q4



1973Q1-2006Q4

C) Homoskedasticity test

Chi-sq	df	Prob.
2424.847	2310	0.0472

1973Q1-2011Q4

Chi-sq	df	Prob.
2362.702	2310	0.2179

1973Q1-2006Q4

Appendix 4

Table 7.A: VEC estimates for 1973-2011

Vector Error Correction Estimates
Date: 04/12/13 Time: 15:31
Sample (adjusted): 1974Q4 2011Q4
Included observations: 149 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1					
LHP_NEW(-1)	1.000000					
CA(-1)	0.006898 (0.00058) [11.9636]					
LCPI(-1)	-1.088402 (0.14282) [-7.62083]					
LCR_REG(-1)	-2.787390 (0.42716) [-6.52545]					
LGDP(-1)	0.679309 (0.22776) [2.98262]					
LFFR(-1)	0.167779 (0.03932) [4.26702]					
C	1.156476					
Error Correction:	**D(LHP_NEW)**	**D(CA)**	**D(LCPI)**	**D(LCR_REG)**	**D(LGDP)**	**D(LFFR)**
CointEq1	-0.025370 (0.01298) [-1.95524]	18.53465 (11.7553) [1.57671]	0.010859 (0.00603) [1.80052]	0.021689 (0.00561) [3.86330]	-0.001947 (0.00887) [-0.21938]	-0.602019 (0.24513) [-2.45596]
D(LHP_NEW(-1))	0.430122 (0.09282) [4.63417]	-114.8236 (84.0879) [-1.36552]	-0.020363 (0.04314) [-0.47200]	0.013905 (0.04016) [0.34626]	-0.002250 (0.06347) [-0.03545]	1.823979 (1.75343) [1.04023]
D(LHP_NEW(-2))	0.074225 (0.09516) [0.78003]	-3.747601 (86.2093) [-0.04347]	0.125955 (0.04423) [2.84774]	0.004728 (0.04117) [0.11483]	0.156062 (0.06507) [2.39828]	-1.545664 (1.79767) [-0.85982]
D(LHP_NEW(-3))	0.161799 (0.08796) [1.83943]	25.93274 (79.6900) [0.32542]	0.081218 (0.04089) [1.98650]	0.122791 (0.03806) [3.22633]	-0.055807 (0.06015) [-0.92778]	3.292904 (1.66173) [1.98162]
D(LHP_NEW(-4))	0.548392 (0.09908) [5.53499]	-152.4358 (89.7610) [-1.69824]	-0.053611 (0.04605) [-1.16414]	0.078734 (0.04287) [1.83664]	0.128299 (0.06775) [1.89362]	-1.605829 (1.87173) [-0.85794]
D(LHP_NEW(-5))	-0.307195 (0.11376)	159.5733 (103.064)	0.032209 (0.05288)	-0.037357 (0.04922)	-0.030639 (0.07779)	-3.365083 (2.14912)

	[-2.70036]	[1.54830]	[0.60912]	[-0.75895]	[-0.39385]	[-1.56579]
D(LHP_NEW(-6))	-0.128038	15.93818	-0.009295	-0.037770	-0.176419	1.512539
	(0.10876)	(98.5363)	(0.05055)	(0.04706)	(0.07438)	(2.05472)
	[-1.17721]	[0.16175]	[-0.18387]	[-0.80259]	[-2.37195]	[0.73613]
D(CA(-1))	0.000531	-0.227570	9.07E-05	2.05E-05	-1.98E-05	0.003034
	(0.00013)	(0.11703)	(6.0E-05)	(5.6E-05)	(8.8E-05)	(0.00244)
	[4.10735]	[-1.94454]	[1.51089]	[0.36752]	[-0.22420]	[1.24329]
D(CA(-2))	0.000325	-0.381215	2.45E-05	-0.000199	2.40E-05	0.004295
	(0.00012)	(0.10793)	(5.5E-05)	(5.2E-05)	(8.1E-05)	(0.00225)
	[2.72871]	[-3.53217]	[0.44285]	[-3.85988]	[0.29444]	[1.90843]
D(CA(-3))	0.000184	-0.254196	4.28E-05	-6.22E-05	5.81E-05	0.006004
	(0.00014)	(0.12861)	(6.6E-05)	(6.1E-05)	(9.7E-05)	(0.00268)
	[1.29534]	[-1.97644]	[0.64924]	[-1.01231]	[0.59832]	[2.23862]
D(CA(-4))	-5.04E-05	0.103306	-7.41E-05	-0.000131	1.45E-05	0.001960
	(0.00013)	(0.12225)	(6.3E-05)	(5.8E-05)	(9.2E-05)	(0.00255)
	[-0.37352]	[0.84501]	[-1.18066]	[-2.25197]	[0.15704]	[0.76893]
D(CA(-5))	-0.000182	-0.079685	-2.83E-05	-0.000348	-1.01E-05	0.002812
	(0.00013)	(0.11512)	(5.9E-05)	(5.5E-05)	(8.7E-05)	(0.00240)
	[-1.43294]	[-0.69219]	[-0.47857]	[-6.32177]	[-0.11651]	[1.17149]
D(CA(-6))	0.000138	-0.311522	-9.23E-06	-1.98E-06	-7.95E-05	0.005313
	(0.00014)	(0.12363)	(6.3E-05)	(5.9E-05)	(9.3E-05)	(0.00258)
	[1.01201]	[-2.51980]	[-0.14550]	[-0.03349]	[-0.85224]	[2.06111]
D(LCPI(-1))	-0.350998	-195.8730	0.363681	-0.164636	0.198397	18.96606
	(0.21143)	(191.552)	(0.09828)	(0.09148)	(0.14459)	(3.99431)
	[-1.66009]	[-1.02256]	[3.70061]	[-1.79964]	[1.37217]	[4.74827]
D(LCPI(-2))	0.781562	-37.85742	-0.024266	0.078626	-0.391287	-13.78646
	(0.24859)	(225.219)	(0.11555)	(0.10756)	(0.17000)	(4.69634)
	[3.14393]	[-0.16809]	[-0.21000]	[0.73099]	[-2.30170]	[-2.93557]
D(LCPI(-3))	-0.331518	-52.93716	0.347982	-0.068289	0.038924	0.902195
	(0.26640)	(241.351)	(0.12383)	(0.11527)	(0.18218)	(5.03274)
	[-1.24443]	[-0.21934]	[2.81026]	[-0.59245]	[0.21366]	[0.17927]
D(LCPI(-4))	-0.022024	-116.8430	-0.138424	-0.074696	-0.092517	-2.601708
	(0.25232)	(228.593)	(0.11728)	(0.10917)	(0.17255)	(4.76671)
	[-0.08729]	[-0.51114]	[-1.18029]	[-0.68420]	[-0.53618]	[-0.54581]
D(LCPI(-5))	0.011104	302.5604	-0.023309	0.143102	-0.145662	3.306854
	(0.25255)	(228.804)	(0.11739)	(0.10927)	(0.17271)	(4.77111)
	[0.04397]	[1.32236]	[-0.19856]	[1.30958]	[-0.84341]	[0.69310]
D(LCPI(-6))	0.264432	129.4326	0.090560	-0.112068	0.268281	-0.675893
	(0.22289)	(201.927)	(0.10360)	(0.09644)	(0.15242)	(4.21066)
	[1.18641]	[0.64099]	[0.87414]	[-1.16207]	[1.76016]	[-0.16052]
D(LCR_REG(-1))	0.683727	-309.5092	-0.044191	0.961899	-0.002359	9.177248
	(0.22016)	(199.454)	(0.10233)	(0.09526)	(0.15055)	(4.15910)
	[3.10565]	[-1.55178]	[-0.43185]	[10.0980]	[-0.01567]	[2.20655]
D(LCR_REG(-2))	-0.151197	-20.94392	-0.043916	-0.032954	0.207204	-9.834537
	(0.27079)	(245.325)	(0.12586)	(0.11716)	(0.18518)	(5.11560)
	[-0.55836]	[-0.08537]	[-0.34891]	[-0.28126]	[1.11896]	[-1.92246]

D(LCR_REG(-3))	-0.148650	384.0658	-0.024741	-0.130260	-0.104576	9.121211
	(0.25416)	(230.260)	(0.11814)	(0.10997)	(0.17380)	(4.80147)
	[-0.58487]	[1.66797]	[-0.20943]	[-1.18451]	[-0.60169]	[1.89967]
D(LCR_REG(-4))	-0.191935	115.4175	0.028475	-0.279856	-0.150207	1.904865
	(0.26263)	(237.935)	(0.12207)	(0.11363)	(0.17960)	(4.96151)
	[-0.73082]	[0.48508]	[0.23326]	[-2.46278]	[-0.83635]	[0.38393]
D(LCR_REG(-5))	0.005924	-307.1236	0.285403	0.306117	0.244070	0.646083
	(0.24040)	(217.796)	(0.11174)	(0.10402)	(0.16440)	(4.54157)
	[0.02464]	[-1.41014]	[2.55415]	[2.94296]	[1.48464]	[0.14226]
D(LCR_REG(-6))	0.490092	-161.4938	-0.231881	-0.100078	0.157673	1.025264
	(0.19031)	(172.417)	(0.08846)	(0.08234)	(0.13014)	(3.59531)
	[2.57519]	[-0.93665]	[-2.62133]	[-1.21537]	[1.21153]	[0.28517]
D(LGDP(-1))	0.002397	-249.0462	-0.029442	0.006709	0.223725	5.299235
	(0.14215)	(128.782)	(0.06607)	(0.06150)	(0.09721)	(2.68542)
	[0.01686]	[-1.93385]	[-0.44561]	[0.10907]	[2.30152]	[1.97334]
D(LGDP(-2))	0.096691	16.17871	0.040164	-0.021337	0.157283	-2.155897
	(0.14505)	(131.415)	(0.06742)	(0.06276)	(0.09919)	(2.74031)
	[0.66659]	[0.12311]	[0.59570]	[-0.33997]	[1.58561]	[-0.78674]
D(LGDP(-3))	0.051044	165.4160	0.122394	-0.025762	-0.078625	0.083266
	(0.13728)	(124.372)	(0.06381)	(0.05940)	(0.09388)	(2.59346)
	[0.37182]	[1.33001]	[1.91811]	[-0.43372]	[-0.83752]	[0.03211]
D(LGDP(-4))	0.144127	-75.69183	-0.032179	0.004893	-0.031976	-0.941649
	(0.13906)	(125.984)	(0.06464)	(0.06017)	(0.09509)	(2.62706)
	[1.03644]	[-0.60081]	[-0.49786]	[0.08133]	[-0.33626]	[-0.35844]
D(LGDP(-5))	0.030548	-3.197564	-0.021428	0.008749	0.017556	3.471844
	(0.13162)	(119.240)	(0.06118)	(0.05695)	(0.09000)	(2.48643)
	[0.23210]	[-0.02682]	[-0.35027]	[0.15364]	[0.19505]	[1.39631]
D(LGDP(-6))	0.196851	240.0576	0.069003	0.013692	-0.009348	-2.732783
	(0.12491)	(113.169)	(0.05806)	(0.05405)	(0.08542)	(2.35984)
	[1.57588]	[2.12123]	[1.18844]	[0.25332]	[-0.10944]	[-1.15804]
D(LFFR(-1))	-0.005446	-8.417984	0.000246	0.000892	0.000130	-0.113658
	(0.00539)	(4.88441)	(0.00251)	(0.00233)	(0.00369)	(0.10185)
	[-1.01014]	[-1.72344]	[0.09836]	[0.38253]	[0.03530]	[-1.11592]
D(LFFR(-2))	-0.010740	2.087660	-0.004411	-0.012105	-0.008205	-0.083813
	(0.00546)	(4.94372)	(0.00254)	(0.00236)	(0.00373)	(0.10309)
	[-1.96819]	[0.42228]	[-1.73889]	[-5.12706]	[-2.19870]	[-0.81302]
D(LFFR(-3))	-0.001244	-3.636109	-0.001947	0.003844	-0.003456	0.343963
	(0.00609)	(5.51761)	(0.00283)	(0.00264)	(0.00416)	(0.11506)
	[-0.20420]	[-0.65900]	[-0.68770]	[1.45869]	[-0.82989]	[2.98955]
D(LFFR(-4))	-0.009970	-3.728975	-0.000553	-0.003649	0.006797	-0.069552
	(0.00600)	(5.43836)	(0.00279)	(0.00260)	(0.00410)	(0.11340)
	[-1.66089]	[-0.68568]	[-0.19825]	[-1.40490]	[1.65568]	[-0.61332]
D(LFFR(-5))	-0.011038	3.457105	0.002163	-0.003511	-0.003867	-0.010072
	(0.00542)	(4.91404)	(0.00252)	(0.00235)	(0.00371)	(0.10247)
	[-2.03494]	[0.70352]	[0.85795]	[-1.49609]	[-1.04253]	[-0.09829]
D(LFFR(-6))	-0.016413	2.113852	-0.001437	-0.003593	-0.003149	-0.036231
	(0.00551)	(4.99283)	(0.00256)	(0.00238)	(0.00377)	(0.10411)

	[-2.97826]	[0.42338]	[-0.56105]	[-1.50663]	[-0.83569]	[-0.34800]
C	-0.004558	-2.866399	0.000698	-0.001106	0.006345	-0.073152
	(0.00332)	(3.00819)	(0.00154)	(0.00144)	(0.00227)	(0.06273)
	[-1.37271]	[-0.95287]	[0.45196]	[-0.77003]	[2.79455]	[-1.16618]
R-squared	0.841313	0.686832	0.730735	0.874117	0.479797	0.595047
Adj. R-squared	0.788417	0.582442	0.640980	0.832156	0.306396	0.460062
Sum sq. resids	0.011224	9212.262	0.002425	0.002101	0.005249	4.005691
S.E. equation	0.010056	9.110069	0.004674	0.004351	0.006876	0.189967
F-statistic	15.90514	6.579518	8.141454	20.83165	2.766978	4.408261
Log likelihood	495.8563	-518.6855	610.0091	620.6825	552.4804	57.98730
Akaike AIC	-6.145722	7.472289	-7.677975	-7.821241	-6.905778	-0.268286
Schwarz SC	-5.379614	8.238396	-6.911868	-7.055134	-6.139670	0.497821
Mean dependent	0.010997	-0.800268	0.009999	-0.001729	0.006808	-0.034145
S.D. dependent	0.021861	14.09819	0.007801	0.010620	0.008257	0.258527

Determinant resid covariance (dof adj.)	3.14E-18
Determinant resid covariance	5.37E-19
Log likelihood	1865.536
Akaike information criterion	-21.89981
Schwarz criterion	-17.18220

Vector Error Correction Estimates
Date: 04/12/13 Time: 15:33
Sample (adjusted): 1974Q4 2006Q4
Included observations: 129 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LHP_NEW(-1)	1.000000
CA(-1)	0.008726 (0.00143) [6.09142]
LCPI(-1)	-0.966004 (0.28907) [-3.34171]
LCR_REG(-1)	-7.872157 (2.19088) [-3.59316]
LGDP(-1)	1.289751 (0.31897) [4.04347]
LFFR(-1)	0.409877 (0.07932) [5.16755]
C	6.196351

Error Correction:	D(LHP_NEW)	D(CA)	D(LCPI)	D(LCR_REG)	D(LGDP)	D(LFFR)
CointEq1	-0.023039 (0.01008) [-2.28481]	2.772573 (9.09581) [0.30482]	-0.001577 (0.00502) [-0.31429]	0.011295 (0.00325) [3.47378]	0.007570 (0.00857) [0.88279]	-0.351625 (0.17761) [-1.97978]
D(LHP_NEW(-1))	0.550210 (0.10425) [5.27791]	-123.6969 (94.0358) [-1.31542]	0.051747 (0.05186) [0.99782]	-0.004192 (0.03362) [-0.12471]	0.057113 (0.08865) [0.64425]	0.526632 (1.83618) [0.28681]
D(LHP_NEW(-2))	0.110771 (0.11805) [0.93835]	-114.1221 (106.484) [-1.07173]	0.002387 (0.05872) [0.04064]	0.046593 (0.03807) [1.22399]	0.156388 (0.10039) [1.55788]	-1.558766 (2.07925) [-0.74968]
D(LHP_NEW(-3))	0.041629 (0.10790) [0.38581]	36.89626 (97.3292) [0.37909]	0.101703 (0.05368) [1.89475]	0.042578 (0.03479) [1.22373]	-0.152386 (0.09175) [-1.66080]	1.949971 (1.90049) [1.02604]
D(LHP_NEW(-4))	0.391406 (0.10987) [3.56240]	79.36172 (99.1087) [0.80075]	-0.012488 (0.05466) [-0.22847]	0.024523 (0.03543) [0.69216]	0.310054 (0.09343) [3.31849]	1.225506 (1.93523) [0.63326]
D(LHP_NEW(-5))	-0.181302 (0.12119)	-95.72499 (109.322)	-0.052869 (0.06029)	-0.021640 (0.03908)	-0.110848 (0.10306)	-2.160694 (2.13467)

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	[-1.49596]	[-0.87562]	[-0.87691]	[-0.55372]	[-1.07556]	[-1.01219]
D(LHP_NEW(-6))	-0.149333	157.4316	0.057584	-0.024334	-0.187452	0.816674
	(0.11103)	(100.155)	(0.05523)	(0.03580)	(0.09442)	(1.95567)
	[-1.34496]	[1.57188]	[1.04254]	[-0.67963]	[-1.98532]	[0.41759]
D(CA(-1))	0.000376	-0.182960	1.85E-05	-8.09E-05	-0.000118	-0.003495
	(0.00014)	(0.12269)	(6.8E-05)	(4.4E-05)	(0.00012)	(0.00240)
	[2.76624]	[-1.49122]	[0.27277]	[-1.84339]	[-1.01999]	[-1.45897]
D(CA(-2))	0.000313	-0.273652	1.07E-05	-9.44E-05	-4.22E-05	0.003171
	(0.00014)	(0.12792)	(7.1E-05)	(4.6E-05)	(0.00012)	(0.00250)
	[2.20863]	[-2.13919]	[0.15138]	[-2.06414]	[-0.34972]	[1.26943]
D(CA(-3))	0.000165	-0.041286	0.000142	-6.45E-05	-7.47E-05	0.003175
	(0.00015)	(0.13727)	(7.6E-05)	(4.9E-05)	(0.00013)	(0.00268)
	[1.08497]	[-0.30076]	[1.87069]	[-1.31437]	[-0.57755]	[1.18435]
D(CA(-4))	8.46E-05	0.479789	3.55E-05	-9.81E-05	2.18E-05	0.002648
	(0.00015)	(0.13160)	(7.3E-05)	(4.7E-05)	(0.00012)	(0.00257)
	[0.57973]	[3.64593]	[0.48869]	[-2.08619]	[0.17538]	[1.03035]
D(CA(-5))	0.000220	-0.076837	8.85E-05	-9.94E-05	-8.82E-05	0.006907
	(0.00016)	(0.14271)	(7.9E-05)	(5.1E-05)	(0.00013)	(0.00279)
	[1.39168]	[-0.53841]	[1.12470]	[-1.94763]	[-0.65565]	[2.47852]
D(CA(-6))	9.73E-05	-0.150640	0.000119	-1.57E-05	-0.000190	0.001810
	(0.00016)	(0.14205)	(7.8E-05)	(5.1E-05)	(0.00013)	(0.00277)
	[0.61803]	[-1.06047]	[1.52324]	[-0.30875]	[-1.41782]	[0.65261]
D(LCPI(-1))	-0.519902	-666.1373	0.404403	-0.139209	-0.014699	3.891673
	(0.23548)	(212.410)	(0.11714)	(0.07593)	(0.20024)	(4.14760)
	[-2.20787]	[-3.13609]	[3.45224]	[-1.83331]	[-0.07341]	[0.93830]
D(LCPI(-2))	0.676662	524.0863	-0.050621	0.033076	-0.305495	-11.76776
	(0.28131)	(253.750)	(0.13994)	(0.09071)	(0.23922)	(4.95482)
	[2.40543]	[2.06536]	[-0.36173]	[0.36463]	[-1.27706]	[-2.37501]
D(LCPI(-3))	-0.109530	139.6365	0.375251	0.042671	0.152399	12.29265
	(0.28845)	(260.192)	(0.14349)	(0.09301)	(0.24529)	(5.08060)
	[-0.37972]	[0.53667]	[2.61512]	[0.45876]	[0.62130]	[2.41953]
D(LCPI(-4))	0.260527	93.90228	0.034291	-0.072657	-0.268617	-0.895446
	(0.27894)	(251.614)	(0.13876)	(0.08995)	(0.23720)	(4.91311)
	[0.93399]	[0.37320]	[0.24712]	[-0.80777]	[-1.13243]	[-0.18226]
D(LCPI(-5))	-0.322659	435.1600	-0.155615	0.059672	0.024388	-1.328392
	(0.27208)	(245.424)	(0.13535)	(0.08774)	(0.23137)	(4.79224)
	[-1.18592]	[1.77310]	[-1.14974]	[0.68013]	[0.10541]	[-0.27720]
D(LCPI(-6))	0.282100	-478.5424	0.168378	-0.033018	0.111332	0.305005
	(0.23355)	(210.669)	(0.11618)	(0.07531)	(0.19860)	(4.11360)
	[1.20789]	[-2.27154]	[1.44926]	[-0.43842]	[0.56058]	[0.07415]
D(LCR_REG(-1))	0.519179	391.4221	0.150708	0.806226	0.365338	4.159726
	(0.30464)	(274.801)	(0.15155)	(0.09824)	(0.25906)	(5.36587)
	[1.70422]	[1.42438]	[0.99444]	[8.20694]	[1.41024]	[0.77522]
D(LCR_REG(-2))	-0.174637	-593.3421	0.039591	0.030433	0.029117	5.837951
	(0.36781)	(331.780)	(0.18297)	(0.11861)	(0.31278)	(6.47847)
	[-0.47480]	[-1.78836]	[0.21637]	[0.25659]	[0.09309]	[0.90113]

D(LCR_REG(-3))	-0.629586	479.6699	-0.180244	0.023074	-0.198002	-7.976441
	(0.33634)	(303.389)	(0.16732)	(0.10846)	(0.28601)	(5.92409)
	[-1.87190]	[1.58104]	[-1.07727]	[0.21274]	[-0.69228]	[-1.34644]
D(LCR_REG(-4))	0.015257	-272.5289	0.023856	-0.545299	0.266327	0.887273
	(0.35369)	(319.041)	(0.17595)	(0.11405)	(0.30077)	(6.22971)
	[0.04314]	[-0.85421]	[0.13558]	[-4.78114]	[0.88549]	[0.14243]
D(LCR_REG(-5))	0.383979	-12.86418	0.055908	0.511289	0.263600	3.439731
	(0.39105)	(352.743)	(0.19453)	(0.12610)	(0.33254)	(6.88780)
	[0.98192]	[-0.03647]	[0.28739]	[4.05462]	[0.79269]	[0.49940]
D(LCR_REG(-6))	0.048961	280.6252	0.185062	-0.124008	-0.026517	4.989786
	(0.31430)	(283.514)	(0.15636)	(0.10135)	(0.26728)	(5.53601)
	[0.15578]	[0.98981]	[1.18360]	[-1.22353]	[-0.09921]	[0.90133]
D(LGDP(-1))	0.059772	13.17633	0.065859	0.013275	0.185538	4.154748
	(0.13045)	(117.672)	(0.06490)	(0.04207)	(0.11093)	(2.29772)
	[0.45820]	[0.11197]	[1.01485]	[0.31557]	[1.67253]	[1.80821]
D(LGDP(-2))	0.128868	-49.23076	-0.004126	0.013171	0.130079	0.119860
	(0.12940)	(116.721)	(0.06437)	(0.04173)	(0.11004)	(2.27913)
	[0.99592]	[-0.42178]	[-0.06409]	[0.31566]	[1.18215]	[0.05259]
D(LGDP(-3))	0.011800	77.13927	0.123086	-0.026416	-0.124647	-1.407916
	(0.12029)	(108.510)	(0.05984)	(0.03879)	(0.10229)	(2.11880)
	[0.09810]	[0.71090]	[2.05684]	[-0.68099]	[-1.21851]	[-0.66449]
D(LGDP(-4))	0.102186	11.51092	0.025917	-0.048479	-0.060756	-1.216191
	(0.11927)	(107.588)	(0.05933)	(0.03846)	(0.10143)	(2.10080)
	[0.85676]	[0.10699]	[0.43681]	[-1.26047]	[-0.59902]	[-0.57892]
D(LGDP(-5))	0.008196	0.144505	-0.007486	0.044958	0.058867	4.240352
	(0.10965)	(98.9052)	(0.05455)	(0.03536)	(0.09324)	(1.93126)
	[0.07475]	[0.00146]	[-0.13725]	[1.27153]	[0.63134]	[2.19564]
D(LGDP(-6))	0.114747	82.31458	0.056051	0.008012	-0.061451	-3.120324
	(0.10934)	(98.6284)	(0.05439)	(0.03526)	(0.09298)	(1.92586)
	[1.04946]	[0.83459]	[1.03049]	[0.22723]	[-0.66091]	[-1.62023]
D(LFFR(-1))	-0.004609	-3.266135	-0.002130	0.001242	0.001817	0.142255
	(0.00659)	(5.93998)	(0.00328)	(0.00212)	(0.00560)	(0.11599)
	[-0.69997]	[-0.54986]	[-0.65028]	[0.58470]	[0.32454]	[1.22648]
D(LFFR(-2))	0.008971	-3.247752	-0.002154	-0.005030	-0.011067	0.022324
	(0.00645)	(5.82175)	(0.00321)	(0.00208)	(0.00549)	(0.11368)
	[1.38999]	[-0.55787]	[-0.67101]	[-2.41683]	[-2.01640]	[0.19638]
D(LFFR(-3))	0.003498	-1.742185	-0.000952	0.002252	-0.008109	0.239399
	(0.00681)	(6.14708)	(0.00339)	(0.00220)	(0.00580)	(0.12003)
	[0.51336]	[-0.28342]	[-0.28071]	[1.02492]	[-1.39927]	[1.99449]
D(LFFR(-4))	-0.004695	5.647649	-0.002394	0.001143	0.004858	0.091712
	(0.00665)	(6.00053)	(0.00331)	(0.00215)	(0.00566)	(0.11717)
	[-0.70572]	[0.94119]	[-0.72351]	[0.53269]	[0.85883]	[0.78274]
D(LFFR(-5))	-0.009097	-5.150773	0.006139	-0.001957	-0.006045	0.173082
	(0.00650)	(5.86411)	(0.00323)	(0.00210)	(0.00553)	(0.11450)
	[-1.39941]	[-0.87836]	[1.89841]	[-0.93338]	[-1.09355]	[1.51157]
D(LFFR(-6))	-0.000985	5.625946	-0.001312	-0.006349	-0.005532	-0.174307
	(0.00662)	(5.96723)	(0.00329)	(0.00213)	(0.00563)	(0.11652)

	[-0.14893]	[0.94281]	[-0.39859]	[-2.97623]	[-0.98343]	[-1.49596]
C	-0.000917	-2.598785	-0.001658	-0.000537	0.007643	-0.045966
	(0.00322)	(2.90348)	(0.00160)	(0.00104)	(0.00274)	(0.05669)
	[-0.28479]	[-0.89506]	[-1.03571]	[-0.51784]	[2.79224]	[-0.81077]
R-squared	0.748281	0.705098	0.791796	0.780232	0.450120	0.423031
Adj. R-squared	0.645934	0.585193	0.707142	0.690876	0.226542	0.188439
Sum sq. resids	0.006024	4901.806	0.001491	0.000626	0.004356	1.868959
S.E. equation	0.008136	7.339346	0.004048	0.002624	0.006919	0.143311
F-statistic	7.311210	5.880458	9.353290	8.731703	2.013257	1.803262
Log likelihood	460.1365	-417.6648	550.2076	606.1331	481.0441	90.07773
Akaike AIC	-6.544752	7.064571	-7.941203	-8.808265	-6.868900	-0.807407
Schwarz SC	-5.702327	7.906996	-7.098778	-7.965840	-6.026475	0.035019
Mean dependent	0.015740	-1.435504	0.010688	0.000393	0.007635	-0.005985
S.D. dependent	0.013674	11.39552	0.007479	0.004719	0.007867	0.159081

Determinant resid covariance (dof adj.)	1.85E-19
Determinant resid covariance	2.28E-20
Log likelihood	1819.026
Akaike information criterion	-24.57405
Schwarz criterion	-19.38648