QUEEN'S UNIVERSITY
Department of Economics

A Structural VAR Study of Food Inflation in Hong Kong

Prepared by: Emily Au
Advisor: Professor Huw Lloyd-Ellis

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Emily Au
Flat 41G Tower 2
28 Siu Sai Wan Road
Chai Wan, Hong Kong

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Department of Economics
Dunning Hall, Room 209
94 University Avenue
Queen's University
Kingston, Ontario K7L 3N6

This report entitled “A Structural VAR Study of Food Inflation in Hong Kong” was prepared as my Master’s essay as part of the Queen’s Economics MA Program requirement. The purpose of this report is to explore the movement of food inflation in Hong Kong using different techniques in time series analysis. Hong Kong was chosen as the economy of interest as its economy highly dependent on external factors and much less dependent on domestic factors.

The time period chosen for this study was 1999 to 2011. This period allows for the study of the deflationary period that took place after the 1997 Asian Financial Crisis as well as the rapid food inflationary period following the 2008 commodity price spike. The variables chosen in this study include both domestic and foreign variables that could have an influence on the movement of food prices in Hong Kong.

My work was managed by Professor Huw Lloyd-Ellis. This report was written entirely by me and has not received any previous academic credit at this or any other institution. I would like to thank Dr. Huw Lloyd-Ellis for providing me with valuable insights. I would also like to thank Mr. Darryl Shen for proofreading my report and improving its appearance. I received no other assistance.

Emily Au
ID: 10035774

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1.0 Introduction

The increase in food and energy commodity prices in 2008 has raised concerns regarding food security for many countries around the world. The observed increase in prices during this period can be attributed to the slow growth in production and a rapid increase in demand for certain commodities. In addition, the depreciation of the US dollar, the increasing cost of energy prices and agricultural production, and growth in US dollar holdings by major food-importing countries have also contributed to the increase in the observed commodity prices. (Trostle 2008)

A study by the International Monetary Fund stated that while oil prices have a moderate impact on domestic food prices and inflation, the impact of food commodity prices on inflation is much greater compared to the price of crude oil. (IMF 2008) As of Spring of 2011, the food price index compiled by the Food and Agriculture Organization of the United Nations (FAO) exceeded its previous peak level in 2008, causing 44 million people to fall into extreme poverty in low and middle income countries. (FAO 2011) With the prices of basic necessities characterized by such high volatility, low income consumers around the world have become vulnerable to rising food prices and are subjected to economic hardships as a result. Thus, rising food prices have become both a social issue and a political issue. For this reason, research and policy work are more established in this field compared to work regarding other types of commodities.

Although increasing food prices lowers the purchasing power of all consumers, Friedman and Levinsohn (2002) identify the urban poor as the most vulnerable group during a period of food inflation. Further, Cohen et al (2010) evaluate specific characteristics of urban life and determine that the urban poor are the most susceptible to the adverse effects of higher food prices because of their lack of alternatives to combat rising food prices.

With an increasing Gini Coefficient (Census and Statistics Department, Government of Hong Kong), periods of rapid food inflation, and a large urban population, the Hong Kong economy has become the ideal candidate to study the effects of food inflation on an urban population. Milton Friedman once wrote:

> "In today's world big government seems pervasive. We may well ask whether there exist any contemporaneous examples of societies that rely primarily on voluntary exchange through the market to organize their economic activity in which government is limited. ... Perhaps the best example is Hong Kong... Hong Kong has no tariffs or other restraints on International trade ... It has no government direction of economic activity, no minimum wage laws, no fixing of prices. ... Government plays an important role that is limited primarily to our four duties interpreted rather narrowly. It enforces law and order, provides a means for formulating the rules of conduct, adjudicates disputes, facilitates transportation and communication, and supervises the issuance of currency."
>
> - Friedman & Friedman 1981

With the exception of the implementation of Minimum Wage Laws in July 2010 and the announced transportation subsidies for low income workers, much of Hong Kong's economy has remained the same since the writing of Friedman & Friedman. The largely laissez-faire system has earned Hong Kong the title of The World's Freest Economy, according to the Index of Economic Freedom published jointly by the Heritage Foundation and Wall Street Journal. Hong Kong has held this title every year since the establishment of the Index in 1995.

The introduction of the currency board that fixed the Hong Kong Dollar to the US Dollar in 1983 reduced exchange rate volatility faced by the small open economy of Hong Kong. However, this advantage is offset by Hong Kong's lack of ability to control its own monetary policy through exchange rates, giving the government limited control over business cycles in the city. With the US Dollar depreciating in recent years, Hong Kong residents have faced rapid food price inflation in recent years. Hong Kong is largely dependent on food imports and the 2007-2008 commodity price spike forced the city to purchase food supplies at record prices. Food prices rose by 19.5% in Hong Kong between February 2007 and February 2008.The alarming rate of food inflation is expected to continue as the FAO food index has exceeded its previous record level in 2008. (OXFAM 2010)

Given the weighting that food is given in the Hong Kong CPI, it is important to understand the drivers and the movements of food price inflation over time. These factors will give policy makers the ability to forecast upcoming changes in future food prices and implement subsidies or policies to assist the population that is most adversely affected.

The objective of this study is to identify the relevant factors affecting food price inflation in Hong Kong. This study uses historical data to determine which explanatory variables are significant contributors to food price inflation. The derived model will be used as a tool to forecast the future movement of food price inflation in Hong Kong.

1.1 Hong Kong CPI System

The Hong Kong CPI is published monthly by the Census and Statistics Department (CSD) of Hong Kong. The CPI is constructed based on a basket of consumer goods and services with fixed weights and measures the price of a basket of goods and services consumed by a representative household. The weights in the CPI basket change over time to reflect price changes faced by consumers over time.

The CSD compiles four different series of CPIs, which reflect the different expenditure patterns of different representative households in the city. The CPI(A) is based on approximately the 10% of the population that have relatively low expenditure. The CPI(B) and CPI(C) are based on approximately the 30% and the 50% of the population that have medium levels of expenditure and high levels of expenditure, respectively. Lastly, the Composite CPI is compiled based on the expenditure patterns of all three types of households taken collectively. This study will focus on a specific component of the Composite CPI, which is the Food CPI.

Although the CSD changes the weights for the Composite CPI every five years, food and housing has consistently been given a large weighting compared to all other categories in the CPI. These components together make up about 60% of the Composite CPI for the period under study. The weights given to food and housing in the Composite CPI have been consistently greater than 26% and 29%, respectively, during the period under study.

Since food has a significant weight in the Composite CPI, it plays an important role in determining inflation each month in Hong Kong. Figure 2 shows the movement of the Hong Kong Food CPI for the period under study (Year 2005=100). Data collected indicate that food prices faced a decline between 2001 and 2003, but were relatively stable between 2004 to mid-2006. However, starting in mid-2006, food prices began to increase and faced a steady increase at a higher rate compared to prices at the beginning of the period. The increase in food prices can largely be attributed to the global commodity price spike.

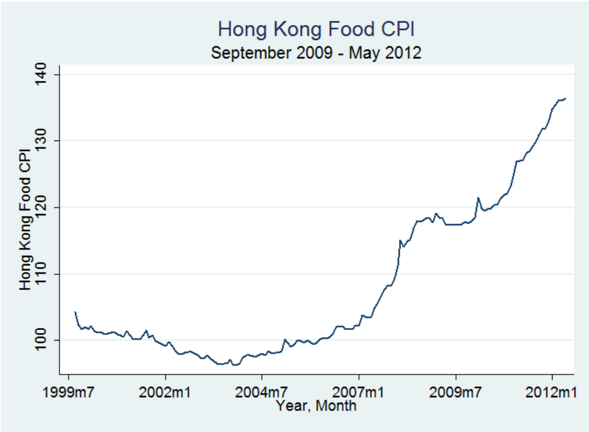


Figure 1: Monthly Hong Kong CPI, 1999 - 2012 (Census and Statistics Department Hong Kong)

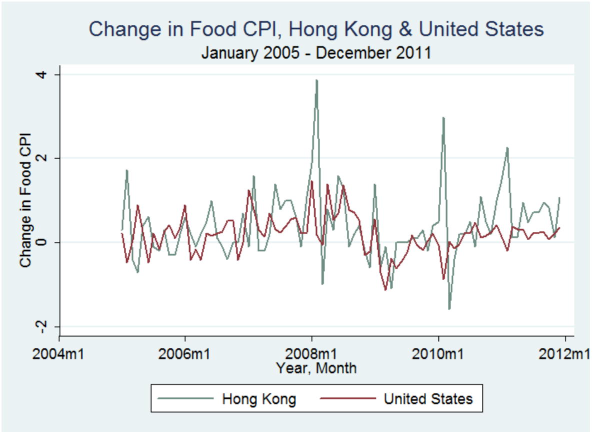


Figure 2: Change in Monthly Food CPI of Hong Kong and United States (Census and Statistics Department Hong Kong, OECD)

Figure 3 illustrates the movement of the change in Monthly Food CPIs in Hong Kong and the United States. From the figure, it can be seen that that the Hong Kong Food CPI is much more volatile compared to that for the United States. The volatility can be explained by Hong Kong's dependence on imports and its pegged currency against the US Dollar. The volatility of the Hong Kong CPI can be used as an indication of whether Hong Kong has been more affected by the recent increasing food prices.

When the change in Hong Kong Food CPI is compared to the Food CPI of other advanced economies, it is found that the volatility of the Hong Kong Food CPI is comparable the United Kingdom and Korea. The United Kingdom economy is also heavily import-dependent as indicated by the UN COMTRADE database. The figures for these comparisons can be found in Figures A1 and A2 in the Appendix.

2.0 Related Literature

Inflation refers to the persistent rise in the general prices of goods and services over time. This persistent rise in prices leads to the devaluation of money and can create a change in the overall distribution of income. It must be noted, however, that not all prices rise during an inflationary period, prices of certain goods and services may fall. Since prices also do not rise or fall at the same time in the same proportion, certain consumers can be impacted more deeply compared to other consumers during an inflationary period. This in turn causes an increase the inequality of income and wealth (Mukherjee 2002).

Hong Kong adopted a currency board system in October 1983, linking its exchange rate to the US dollar. The establishment of the currency board requires both the stock and flow of Hong Kong's monetary base to be fully backed by foreign reserves. The Inflation rate of a country that has adopted a currency board can be highly dependent on external factors. Genberg (2003) uses a semi-structural vector autoregression (VAR), incorporating both domestic and foreign variables in his model to explore the effects of external shocks on the Hong Kong economy. The study concludes that foreign shocks are dominant in the medium to long run, but domestic shocks have more impact in the short run.

In addition to external factors, domestic inflation is also dependent on domestic demand and the future expectations of consumers. If consumers base their expectation on information from the past, they are said to be backward looking. However, this method is often inaccurate as there are usually shortcomings while attempting to explain past data. Consumers are said to be forward looking if they base their inflation expectations on current and future economic policies and the evolution of other variables (Moreno and Villar 2010). Genberg and Pauwels (2003) identify a significant forward-looking component to expectations in Hong Kong consumers.

There are different causes of inflation and different theories of inflation have been developed as a result. To study inflation, economists draw the distinction between demand-pull inflation and cost-push inflation. Demand-pull inflation arises as a result of excess demand promoted by expansionary monetary and fiscal policies. However, demand-pull inflation does not affect Hong

Kong in the long run since domestic demand only impacts the Hong Kong economy for a short time (Genberg 2003, Genberg and Pauwels 2003, Cheung and Yuen 2002). In addition, Hong Kong has lost the independence of its monetary policy through the establishment of the currency board.

Causes of Inflation: Cost-Push Theory of Inflation, Import, Retail Rent Prices & Wages

For Hong Kong, the cost-push theory of inflation plays a critical role in rising prices. Under the cost-push theory, prices rise due to the increased cost of factors of production. Genberg and Pauwels (2003) find that import prices, property rental rates and wages are important components of the marginal cost of production in the Hong Kong economy. Thus, these components will be incorporated into the model of this study through the use of the Hong Kong commercial rental rate index, nominal wages index and the prices of food commodities.

A large part of cost-push inflation for the economy of Hong Kong can be attributed to the rise in prices of imported foodstuffs and other goods and services caused by external shocks. Since the Hong Kong Dollar is pegged to the US Dollar, the depreciation of the US Dollar in recent years has led to an increase in foreign prices of imports for Hong Kong and also to domestic currency depreciation. Using a vector autoregression model, McCarthy (2000) examines the influence of exchange rates and import prices on the producer price index and the consumer price index in selected advanced economies. He concludes that import prices have a much stronger effect on domestic price inflation compared to the impact of exchange rates. In addition, the effects were larger on countries that were more import-dependent.

Ha et al (2002) study the transmission mechanism and the effects of economic shocks to the Hong Kong economy by constructing a small macroeconomic model of Hong Kong. This particular study includes property prices as a significant explanatory variable. The authors note that property prices, which are influenced by interest rates, have a strong effect on domestic demand.

In addition to affecting domestic demand, changes in property prices have a direct impact on inflation through rental prices, which is given a significant weight when calculating the composite Hong Kong CPI.

Consistent with the study of Ha et al (2002), Genberg (2003) also finds that the property market in Hong Kong responds very strongly to domestic shocks and affects inflation in Hong Kong. However, Genberg also concludes that domestic shocks to the property market in Hong Kong only have modest impacts on the overall macroeconomic environment of Hong Kong. Lastly, Goodhart and Hofmann (2002) study the effects of property prices and conclude that they do have an impact on future inflation in advanced economies.

Although Hong Kong has one of the largest per capita incomes in Asia, the low monthly median income of 11,000 Hong Kong Dollars (HKD) as reported by the Hong Kong Census and Statistics Department illustrates the increasing inequality present in the city. The increasing inequality called for the implementation of Minimum Wage Laws in Hong Kong. The city implemented Minimum Wage Laws until July 2010 and a minimum wage came into effect in May 2011.

Changes in wages and labour market inflexibilities are major contributors to domestic inflation for developed economies (Dlamini et al 2001). Using an error correction model, Mehra (1993) studies the United States economy and finds that unit labour costs and consumer prices are correlated in the long run. Mehra (1993) also indicates that this correlation reflects Granger causality between the variables in both directions, implying that unit labour costs contain information regarding future inflation.

Hong Kong established a currency board system in October 1983 and pegged the current value of the Hong Kong Dollar to the US Dollar. This peg set the exchange rate of the Hong Kong Dollar (HKD) to the US Dollar (USD) at $7.8 HKD to $1.0 USD. Since the creation of this peg, the law has required notes and coins in circulation in Hong Kong to be fully backed by US dollar reserves. While the establishment of the currency board has helped bring stability to the Hong Kong economy and protection against exchange rate volatility, it has also taken away the city's ability to defend its economy from external shocks. Mostly importantly, the establishment of the currency board has taken away Hong Kong's independent monetary policy and thus, its ability to control for inflation (Cheung & Yuen 2002).

The Singapore economy is similar to that of the Hong Kong economy, as both economies are committed to *lassiez-faire* policies and free trade. Unlike Hong Kong, Singapore operates under a managed flexible exchange rate system (Cheung and Yuen 2002) which can help reduce the inflation transmission mechanism present under the fixed exchange rate system (Friedman 1953). While a flexible rate system does not fully insulate an economy from inflation caused by external shocks, Darby et al (1983) demonstrates that a flexible system can offer a country more control over domestic inflation. For this reason, inflation in Hong Kong was consistently higher than in Singapore between 1984 and the Asian Financial Crisis.

Several studies have attempted to explain inflation in Hong Kong using domestic factors or external shocks. Using a semi-structural vector autoregression (VAR) model, Genberg (2003) incorporates both domestic and foreign variables to explore the inflation transmission mechanism caused by external shocks on the Hong Kong economy. This particular study shows that external factors are much more dominant compared to domestic factors in the short and long run. Specifically, Genberg (2003) states that beyond a period of three years, most domestic shocks are phased out and fluctuations of all domestic variables are influenced by foreign shocks. Although Genberg (2003) is able to identify the role of external shocks to the Hong Kong economy, a great limitation to this study is that it does not specify the origin of the shocks. The origin of the shock becomes critical when deciding which foreign variables should be included into this study.

It is expected that the US economy would have a strong influence on the Hong Kong economy given its importance in the world economy and Hong Kong's establishment of the currency board. Conventional theories of inflation transmission under a fixed exchange rate system suggest that the rate of inflation in the larger, more dominant economy should influence inflation of the smaller country (Cheung and Yuen 2002, Dlamini et al 2001). In the case of Hong Kong, the expectation is that US inflation, which affects the nominal exchange rate, should have a pass through effect on Hong Kong prices (Genberg and Pauwels 2003).

In support of this literature, Cheung and Yuen (2002) demonstrate that the CPI in Hong Kong and the US are cointegrated between the years of 1984 and 1997. Using a two-variable vector error correction model (VECM), the study concludes that shocks to the US CPI have a strong influence on the Hong Kong CPI with a lag of two years. Consistent with the conclusions in Genberg (2003), Cheung and Yuen (2002) also discover that external price shocks carry a much stronger influence on the Hong Kong economy compared to domestic price shocks. Cheung and Yuen (2002) concluded that US price shocks have a high and sustained impact on the Hong Kong economy, whereas the effects of domestic shocks decline over time.

From Genberg (2003) and Genberg and Pauwels (2003), it is evident that prices in Hong Kong respond strongly to external shocks. Moreover, Cheung and Yuen (2002) indicate that the Hong Kong economy responds very strongly to price shocks originating from the USA. However, it has been shown that prices can deviate from the purchasing power parity for a long time, allowing domestic variables to influence the Hong Kong economy (Genberg and Pauwels 2003). Thus, this study will incorporate the HKD:USD exchange rate, US CPI, as well as the domestic variables mentioned above to explore the effects these two variables have on food price inflation in Hong Kong.

Another factor that may have contributed to food inflation in Hong Kong is the food and energy crisis of 2008. Hong Kong is roughly 95% dependent on imports for its food supplies (Yuen 2008), with little government intervention and price distortions, Hong Kong importers purchased supplies at record prices and passed on the increased price burden to Hong Kong residents.

There has been little quantitative work done in attempting to model the 2008 food and energy commodity crisis. Davidson et al (2001) point out that simple statistical measures such as correlations and covariances have been used to explain the causes of the sharp increase in the prices of food and energy commodities. Other literature includes qualitative studies coupled with policy analysis to explain the cause and effects of the crisis (Mitchell 2008, Summer 2009, Trostle 2008, Yuen 2008).

There is a general consensus that food and energy commodities will remain at higher levels and be more volatile compared to previous decades. It has also been established that the rise in prices of food and energy commodities can be attributed to a mixture of factors including demand, supply and policy. These components can further be broken down into long run or short run effects. Long run effects include demand from emerging economies and reduced supplies, while exchange rates, speculation, weather adversities, renewable energy initiatives, and policy are classified as short term determinants of increasing prices (Mitchell 2008, Trostle 2008).

In addition to food commodity prices driving up import prices for Hong Kong, the increasing price of transport may also be transferred on to consumers. The literature relating to commodities has documented a link between soft and hard commodities: it has been observed that there is a relationship between soft commodity prices and energy prices, specifically that of oil. Piesse and Thirtle (2009) fid that the US dollar exchange rate, and the transport and the production of commodities using oil impacts the prices of soft commodities.

Blanchard and Gali (2007) use a four variable VAR model to study the link between the price of oil and inflation during different points in time. Their study concludes that oil prices affect prices differently at different points in time. For example, the price of oil was partly responsible for stagflation in the 1970s and was a contributor to high inflation in the 1980s. In addition, the authors point out that the effects of oil price on inflation has decreased over time.

However, as an import dependent country, the cost of food commodities and the price of delivering the imports to Hong Kong will continue to affect Hong Kong, To study the effects of food commodity prices and oil prices and their ability to influence inflation in Hong Kong, the food index and the oil price index released by the World Bank are incorporated into the model as explanatory variables.

3.0 Data

The period covered by the study is 1999 - 2011, capturing the effects of the deflationary period that followed the 1997 Asian Financial Crisis as well as the rapid inflationary period following the 2005 - 2008 commodity spike. The variables to be incorporated in the model should include both domestic and foreign variables that could have an influence on food inflation in Hong Kong. However, it is important to limit the number of the number of parameters in the model so as to not over fit the model under study.

The Hong Kong Dollar to U.S. Dollar exchange rate, U.S. inflation, crude oil prices, the World Bank Food Commodity Index, the Hong Kong nominal wage index, and the Hong Kong private retail rent index were used as explanatory variables in the model. The variables chosen closely follow the methods of Davidson et al (2011) and Dlamini et al (2001), as these variables are commonly used to measure food prices in empirical studies. Hong Kong food prices were used as the dependent variable in this study. This variable is represented by the food CPI, which is a specific component in the Hong Kong composite CPI.

Time series were collected from different sources and incorporated into the model. The time series data for the Hong Kong Food CPI was obtained through the Monthly Report on the Consumer Price Index published by the Hong Kong Census and Statistics Department (CSD). The monthly Hong Kong Dollar to US Dollar exchange rate and the quarterly nominal wage index were both obtained from the Hong Kong CSD. The quarterly wage index was transformed into a monthly wage index via cubic spline interpolation in STATA. The monthly commercial retail price index was obtained through the Rating and Valuation Department of Hong Kong.

The monthly time series for the US CPI was obtained from the Bureau of Labour Statistics. The monthly price of crude oil and the monthly food index were obtained from the World Bank Commodity Outlook database. All indices were rebased to the year 2005 and adjusted for seasonality using dummy variables using the month of April as the monthly control group. To correct for seasonality, a regression was constructed involving only the dependent variable and a set of dummy variables, one for each month. From this regression, it is possible to obtain coefficients that roughly indicate the seasonal effects. The coefficients can then be used to linearly transform the data.

Since some of the variables that were integrated into the model under study were shown to be integrated in previous studies, the techniques of cointegration and vector error correction modelling (VECM) were initially employed to study the relationship between the drivers of food inflation and the movement of the food CPI in Hong Kong. Cointegration analysis was a good choice for this study as it considers the long run equilibrium relationship of the model and increases the quality of the forecast generated by the model. (Davidson et al 2011)

If unit roots are present in two series under study, the residuals from regressing on on the other are most likely to possess unit roots as well. This is the cause of the spurious regression problem which results in misleading statistical tests and R-squared values. However, in some cases the unit roots in the two series may cancel each other out and the residuals will have not a unit root, which avoids the spurious regression problem. This specification is known as cointegration.

To test for the VEC specification, the Dickey Fuller- Generalized Least Squares (DF-GLS) test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test were used as complementary tests for the presence of unit root and stationarity. The DF-GLS test controls for heteroskedasticity prior to performing a Dickey-Fuller test against a null of unit root non-stationarity. Elliot et al (1996) have shown this test to have greater power compared to the Augmented Dickey-Fuller Test. The KPSS test tests against the null of stationarity. When used together, these tests can indicate whether a series is fractionally cointegrated. Also, these tests were used to test for stationarity needed in a structural vector-autoregressive (SVAR) specification.

3.1 Model Specification

A SVAR specification with imposed short run restrictions was used to model the data. This particular specification allow for current values of variables in the model to influence each other, whereas the VAR specification assumes that only past values of variables affect the current value. This effect where both past and current values affect the independent variable is known as the contemporaneous effect. It must be noted that the contemporaneous effect is not a long lasting effect, a SVAR with long run restrictions should be used to test for long run effects. The goal of a SVAR model is to provide impulse response functions analysis with the short-run implications that utilizes the Cholesky decomposition.

Like the VAR model, the SVAR model explores the effect of a unit shock of one variable on another variable. However, a VAR model does not impose any restrictions on the contemporaneous correlations between variables. This study presents a recursive model, also called causal chain model because the model implies a certain order in which variables affect each other within the model.

The structure of a short run Structural VAR model without exogenous variables is of the following form:

$$\boldsymbol{A}(\boldsymbol{I}_k - \boldsymbol{A}_1 L - \boldsymbol{A}_2 L^2 - \ldots - \boldsymbol{A}_p L^p)\, y_t = \boldsymbol{A}\varepsilon_t = \boldsymbol{B}e_t$$

Where L is the lag operator, ***A***, ***B***,*and* ***A1,…, Ap*** are $k \times k$ matrices of parameters, ε_t is a $k \times 1$ vector of innovations with $\varepsilon_t \sim N(0, \Sigma)$ *and* $E[\varepsilon_t\, \varepsilon_t] = 0_t$ for all $s \neq t$; *and* e_t *is a* $k \times 1$ *vector of orthogonalized disturbances.*

Restrictions are placed on the matrices of **A** and **B**, which are assumed to be non-singular and model the contemporaneous correlations in the model. **A** is a lower triangular matrix that is used to pre-multiply the vector of explanatory variables. This ensures that shocks to the model are orthogonal and that a structural shock happens independently from shocks to other variables. **B** places restrictions on the error structure of the model; it scales the errors of the model to have unit variance. The scaled unit variance allow for the impulse response functions obtained from the model to be interpreted as the causal effect one variable has on another after one time unit increase.

This particular model is composed of a seven-variable recursive or casual chain as illustrated below. The seven-variable recursive or casual chain model with the following order: $Crude_t > Food_t > USCPI_t > HKD{:}USD\ Exchange_t > Rent_t > Wage_t > HK\ Food\ CPI_t$. Thus, a shock to *Crude* affects all the other variables in the same period; a shock in *Food* affects *Food* and all other variables with the exception of *Crude*, and a shock in *HK Food CPI* affects only *HK Food CPI*. In the following period, all the variables are affected by any shock because of the lagged inclusion of all variables in each others' equations. Note that all series in the model were transformed using the The recursive model in this study can be written in the following equations as follows:

$$\ln C_t = \alpha_0 + \alpha_1 \ln C_{t-1} + \alpha_2 \ln F_{t-1} + \alpha_3 \ln US_{t-1} + \alpha_4 \ln FX_{t-1} + \alpha_5 \ln R_{t-1} + \alpha_6 \ln W_{t-1} + \alpha_7 \ln FCPI_{t-1} + \varepsilon_t^C$$

$$\ln F_t = \beta_0 + \beta_1 \ln C_t + \beta_2 \ln C_{t-1} + \beta_3 \ln F_{t-1} + \beta_4 \ln US_{t-1} + \beta_5 \ln FX_{t-1} + \beta_6 \ln R_{t-1} + \beta_7 \ln W_{t-1} + \beta_8 \ln FCPI_{t-1} + \varepsilon_t^F$$

$$\ln US_t = \delta_0 + \delta_1 \ln C_t + \delta_2 \ln F_t + \delta_3 \ln C_{t-1} + \delta_4 \ln F_{t-1} + \delta_5 \ln US_{t-1} + \delta_6 \ln FX_{t-1} + \delta_7 \ln R_{t-1} + \delta_8 \ln W_{t-1} + \delta_9 \ln FCPI_{t-1} + \varepsilon_t^{US}$$

$$\ln FX_t = \phi_0 + \phi_1 \ln C_{t-1} + \phi_2 \ln F_{t-1} + \phi_3 \ln US_{t-1} + \phi_4 \ln FX_{t-1} + \phi_5 \ln R_{t-1} + \phi_6 \ln W_{t-1} + \phi_7 \ln FCPI_{t-1} + \varepsilon_t^{FX}$$

$$\ln R_t = \varphi_0 + \varphi_1 \ln C_{t-1} + \varphi_2 \ln F_{t-1} + \varphi_3 \ln US_{t-1} + \varphi_4 \ln FX_{t-1} + \varphi_5 \ln R_{t-1} + \varphi_6 \ln W_{t-1} + \varphi_7 \ln FCPI_{t-1} + \varepsilon_t^R$$

$$\ln W_t = \gamma_0 + \gamma_1 \ln C_{t-1} + \gamma_2 \ln F_{t-1} + \gamma_3 \ln US_{t-1} + \gamma_4 \ln FX_{t-1} + \gamma_5 \ln R_{t-1} + \gamma_6 \ln W_{t-1} + \gamma_7 \ln FCPI_{t-1} + \varepsilon_t^W$$

$$\ln FCPI_t = \theta_0 + \theta_1 \ln C_t + \theta_2 \ln F_t + \theta_3 \ln US_t + \theta_4 \ln FX_t + \theta_5 \ln R_t + \theta_6 \ln W_t + \theta_7 \ln C_{t-1} + \theta_8 \ln F_{t-1} + \theta_9 \ln US_{t-1} + \theta_{10} \ln FX_{t-1} + \theta_{11} \ln R_{t-1} + \theta_{12} \ln W_{t-1} + \theta_{13} \ln FCPI_{t-1} + \varepsilon_t^{FCPI}$$

Where,
$FCPI_t$: Hong Kong Food CPI, index
FX_t: HKD: USD Exchange Rate
US_t: United States CPI
C_t: Price of crude oil, World Bank Commodity Outlook Database
F_t: World Bank Food Commodity Index
W_t: Hong Kong worker's wage Index (nominal)
R_t: Hong Kong Retail Rent Index

Note that the contemporaneous $Crude_t$ is included as an explanatory variable in the $Food_t$ and other equations that require the use of $Crude_t$ as a contemporaneous explanatory variable, while the contemporaneous $FCPI_{tt}$ is not an explanatory variable in any of the equations. The Schwarz-Bayes Information Criterion selected for an optimal of one lag in this model, thus one lag was included in each of the equations.

The ordering of the variables implies that the change in crude price is not affected contemporaneously by any other variable in the model. However, it implies the change in crude price is affected by the lag of other variables in the model. This assumption is valid as the change in crude price is largely driven by other world factors, which can in turn affect the other variables in the model. The model implies that the World Bank Food Commodity Index depends contemporaneously on the change in crude price, since the transportation cost of food commodities is entirely dependent on the price of crude oil.

The change in the price of crude oil and the World Bank Commodity Index collectively affect the US CPI contemporaneously, and depend of the remainder of the variables with a lag. Lastly, the model implies that Hong Kong Food CPI can be explained by all variables contemporaneously. This makes sense as Genberg and Pauwel (2003) have pointed out that prices in Hong Kong sensitive and tend to respond quickly to external and domestic shocks.

Vector Autoregression models require for all time series used in the model to be stationary. After obtaining the first differenced series of each variable, the DF-GLS test and the KPSS test were used to test for stationarity of each series. The first differenced series of each variable with the exception of Hong Kong Retail Rent Index proved to be stationary. The Hong Kong Retail Rent Index only proved to be stationary when the second-differenced series was used. Using the transformed series, the Structural VAR specification was used to model the movement of the Hong Kong Food CPI.

The model was estimated using STATA 11. Given the characteristics of the series in question, it seems plausible that the series may be tainted by serial correlation of the error term. To control for this possibility, a lag selection procedure using the Schwarz-Bayes Information Criterion was used to account for serial correlation in the DF-GLS test. The KPSS test was also conducted as a complement to the GF-GLS test; the results of these tests are summarized in Tables A3 to A9 in the Appendix. It is worth noting that the number of lags was not selected for the HKD:USD exchange rate. Under the currency board arrangement in Hong Kong, the HKD:USD exchange rate is dependent on the movement of the American dollar, and not dependent on previous pegged values.

The model was estimated using STATA 11. Given the characteristics of the series in question, it seems plausible that the series may be tainted by serial correlation of the error term. To control for this possibility, a lag selection procedure using the Schwarz-Bayes Information Criterion was used to account for serial correlation in each series through the DF-GLS test. The KPSS test was also conducted as a complement to the GF-GLS test; the results of these tests are summarized in Tables A3 to A9 in the Appendix. It is worth noting that the number of lags was not selected for the HKD:USD exchange rate. Under the currency board arrangement in Hong Kong, the HKD:USD exchange rate is dependent on the movement of the American dollar, and not dependent on previous pegged values.

Following the establishment of stationarity of the series in the model, the appropriate number of lags to be included in the SVAR estimation was determined through the Schwarz-Bayes Information Criterion. The criterion specified one lag to be sufficient for the SVAR model. The results of this test can be found in Table A10, in the Appendix. Once the model was estimated, it was tested for stability, autocorrelation and normality.

The recursive dynamics of a SVAR model imply that the interpretation of coefficients is difficult. Two tools assist with the interpretation of the coefficients of a SVAR include impulse response functions (IRFs) analysis and forecast error variance decompositions (FEVDs). IRFs assess the responsiveness of the dependent variable to shocks placed on explanatory variables for the following periods. FEVDs provide information regarding the percentage of forecasting error for a variable due to each orthogonalized shock at a given time. The results of the model along with the results from the tests mentioned above are summarized in the following section of the report.

4.0 Structural VAR Model Results

The appropriate number of lags to be included in the VAR estimation was determined to be one through the Schwarz' Bayesian Information Criterion. The results of the model are summarized in the Table A11 in the Appendix. Referring to the structure of a short run Structural VAR model without exogenous variables in the model specification section, it can be seen that matrix **A** is on the left-hand side of the set of equations and contains the information regarding contemporaneous effects. Moving these effects to the left-hand side reverses the signs.

For example, Table A11 demonstrates that the World Bank Food Commodity Index has a small positive effect on the contemporaneous Hong Kong Food CPI (with a coefficient of 0.028). It must be noted that the coefficients from a SVAR illustrate only part of the total effect on Hong Kong Food CPI due to the recursive nature of the system. In this model, the World Bank Food Commodity Index contemporaneously affects the change in Hong Kong wages, which in turn contemporaneously affects the change in Hong Kong Food CPI. Thus, the coefficient on the World Bank Food Commodity Index is only part of the total effect.

HONG KONG FOOD CPI EQUATION

In the Hong Kong Food CPI equation, it was found that US CPI, the World Bank Food Commodity Index, and the domestic wage levels in Hong Kong have a small and positive effect on Hong Kong Food CPI. These results are consistent with the literature presented in the section above, where it was found that Hong Kong's inflation is affected by external factors and that food inflation is more dependent on international food prices than it is on crude. Domestic wage levels affected the change in Hong Kong Food CPI, which is also consistent with literature as it states that domestic variables should have an influence on the Hong Kong economy in the short run. It is also expected that wages should have a positive influence on the change in Hong Kong food

CPI, as this is consistent with the cost-push theory of inflation. The effects of shocks will be further explored through the examination of Impulse Response Functions in the following section of this report.

The model found that change in crude oil prices, HKD:USD exchange rate, and the change in domestic Hong Kong rental prices did not have an influence on the Hong Kong Food CPI. It was expected for the change in the price of crude oil to affect the change in Hong Kong Food CPI as the Hong Kong economy is heavily dependent on exports. In addition, this result is surprising as domestic variables have been shown to at least have a short run effect on the Hong Kong economy. The HKD:USD exchange rate also did not have an effect on inflation, which is also surprising because as the HKD:USD exchange rate increases, Hong Kong dollars depreciate, which should theoretically result in inflation.

HKD:USD EXCHANGE RATE & US CPI

The SVAR model indicates that the change in the price of crude oil and the World Bank Food Commodity Index have very small but significant impact on the change of US CPI. This result is expected as food and crude oil prices are given a large weighting in the determination of the US CPI (United States Bureau of Labour Statistics). However, it is a bit surprising that the impact of the change in crude oil and the World Bank Food Commodity Index is negative The model also indicates that neither the change in crude oil prices, World Bank Food Commodity Index, and the US CPI have an influence on the HKD:USD exchange rate. Lastly, the model indicates that the neither the change in crude prices, the World Bank Food Commodities Index, nor the US CPI has an influence on the HKD:USD exchange rate.

CRUDE & FOOD INDEX

The variables incorporated in this model do not have the explanatory power to examine the movement of the change in crude oil prices. Thus, the change in crude oil prices was used as a contemporaneous variable in estimating the other equations. However, as explained above, the change in crude oil prices can explain the movement of the World Bank Food Commodities Index. This model demonstrates that the change in crude oil prices has a negative impact on the World Bank Food Commodities Index. Although it is expected the change in crude oil prices will have an impact on the World Bank Food Commodities Index, it was expected that the impact would be positive instead of negative. This is a surprising result as the increase in crude oil prices should increase transport costs, resulting in an increase in the price of food commodities.

DOMESTIC WAGE & RENT

The model estimates that only the change in US CPI has a negative and significant impact on the change in the Retail Rent Index in Hong Kong. The model indicated that the World Bank Commodity Food Index, the change in US CPI, and the change in domestic retail rent levels have small impacts on the Hong Kong domestic wage levels. All three variables were estimated to have a negative impact on domestic wages. These results are consistent with the literature, as wages, a domestic variable is influenced by external variables and a domestic variable.

Although these results are somewhat consistent with literature, the impact of these variables on the Hong Kong Food CPI is very small. From these results, it is difficult to deduce the impact of these variables on the movement of the Hong Kong Food CPI. To understand the direction of causation, Granger Causality tests were conducted in order to provide a little more insight into the variables thought to affect Hong Kong Food CPI.

4.1 Other Diagnostic Tests

The stability of the model was tested, along with the tests for autocorrelation and normality. The results are summarized in the Tables below. The varstable test was used to evaluate the stability properties of the system. As indicated by Table 1, the model is stable as all Eigen values lie within the unit circle with only one value relatively close to 1.

Table 1: Stability Test of Model

Eigen value stability condition	
Eigen value	**Modulus**
.8941816	.894182
.6943467	.694347
.4843655	.484366
-.4507472	.450747
.2614111 + .2894512i	.390023
.2614111 - .2894512i	.390023
-.05143553	.051436

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

The varlmar command was uses a Lagrange Multiplier test to test for serial correlation in the residuals of VAR models. Table 2 summarizes the results of this test, indicating that serial correlation exists between the residuals in the model. This result is unexpected since the varsoc command was used to control for serial correlation in each series prior to the estimation of the SVAR model.

Table 2: Test for Serial Correlation in Model

Lagrange-Multiplier Test			
Lag	chi2	df	Prob > chi2
1	169.132	49	0.00000
H0: no autocorrelation at lag order			

Lastly, the Jarque-Bera test was used to test for the normality properties of the model. Table 3 shows the estimated model rejects the null hypothesis that the skewness and kurtosis of the model matches the one of a normal distribution. This result is not very surprising as the properties of the time series used in the study may not allow for the residuals to be symmetric.

Table 3: Jarque-Bera Test for Normality

Jarque-Bera Test for Normality			
Equation	chi2	df	Prob > chi2
d1acrude	12.491	2	0.00194
d1afood	0.929	2	0.62841
d1auscpi	79.089	2	0.00000
aexchange	26.812	2	0.00000
d2arent	0.617	2	0.73452
d1awage	10.598	2	0.00500
d1afcpi	20.786	2	0.00003
ALL	151.322	14	0.00000

Judging from the results of the tests above, it can be deduced that the model will not be able to provide a meaningful impulse response function analysis or forecast. However, as part of fitting the SVAR model to the data, the following section will include the impulse function analysis and a forecasting exercise.

4.2 Impulse Response Functions & Forecast Error Variance Decomposition Analysis

Impulse response functions (IRFs) allow for the examination of the short run and long run relationship between two variables under study. However, the specification of this model only considers the short run dynamics between two variables. The structural IRF of the SVAR model are derived from the constraints imposed on the SVAR, and the magnitude of the shock corresponds to one unit of standard deviation.

Since this is a level-level model, the SIRF graphs presented below can be interpreted in the following manner: a one standard deviation increase in the impulse variable corresponds to an absolute change in the response variable by a factor of its standard deviation (σ). Using the graphs and tables given below, an example of how to interpret an IRF for this model will be provided. The IRF tables including the upper and lower bound of IRF calculations can be found in the Appendix in Tables A13 through A15.

Table 4: Standard Deviation of Variables

Variable	Standard Deviation (σ)
d1food	0.040
d1afcpi	0.776
d1auscpi	0.006
d1awage	0.008

Table 5: Absolute change in the first-differenced series of Hong Kong Food CPI

	Impulse		
Step	d1afood	d1auscpi	d1awage
0	0.189	0.185	0.159
1	0.153	0.319	-0.035
2	0.025	0.055	-0.034
3	0.031	-0.022	-0.017
4	0.030	-0.023	-0.007
5	0.019	-0.011	-0.004
6	0.009	-0.003	-0.003

As demonstrated in Table A11, the change in the World Bank Food Commodity Index has a positive influence on the change in Hong Kong Food CPI. Figure 3 demonstrates that a shock to the change in World Bank Food Commodity Index (d1afood) results in an increase in the change of Hong Kong Food CPI (d1afcpi). Referring to Tables 4 and 5, it can be deduced that a shock to the impulse (d1afood) at Step 0 causes the response (d1afcpi) to change by 0.189σ.

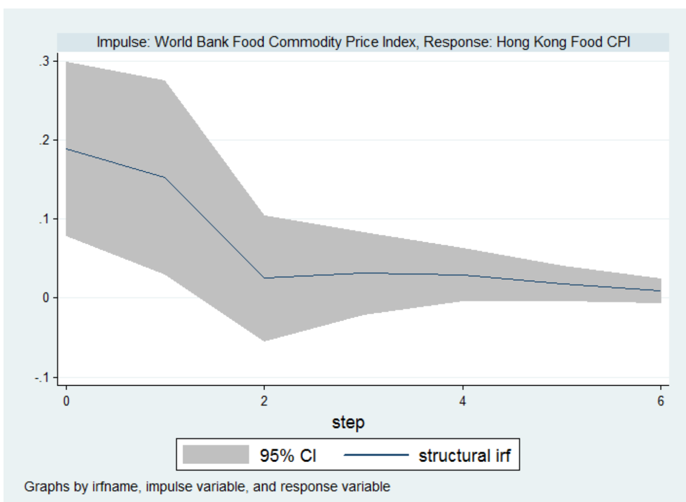


Figure 3: Impulse Response Function, Impulse: World Bank Food Commodity Index. Response: Hong Kong Food CPI.

The corresponding value for d1afcpi (change in Hong Kong Food CPI) at Step 0 is the last point of the data set from the d1afcpi variable. The last available data point for this series is 0.811 and was given for the month of September in 2011. Thus, the new value of the change in Hong Kong Food CPI would be: 0.811 + 0.189σ, where σ = 0.776 at Step 0 of the IRF. The percentage change would then be (0.189 σ/0.811)x100, which amounts to 18.08%. For the steps in the future, the factor of its standard deviation will be added to forecasted values of the change in Hong Kong Food CPI outlined in the forecasting section of this report. For six steps into the future, the change in Hong Kong Food CPI with respect to a one standard deviation shock to the change in the World Bank Food Commodity Index would be:

$d1afcpi_{n} + 0.189\sigma$, $d1afcpi_{n+1} + 0.153\sigma$, $d1afcpi_{n+2} + 0.025\sigma$, $d1afcpi_{n+3} + 0.031\sigma$, $d1afcpi_{n+4} + 0.030\sigma$, $d1afcpi_{n+5} + 0.019\sigma$, $d1afcpi_{n+6} + 0.009\sigma$. However, the large confidence interval associated with this impulse response function suggests that this result is not very reliable.

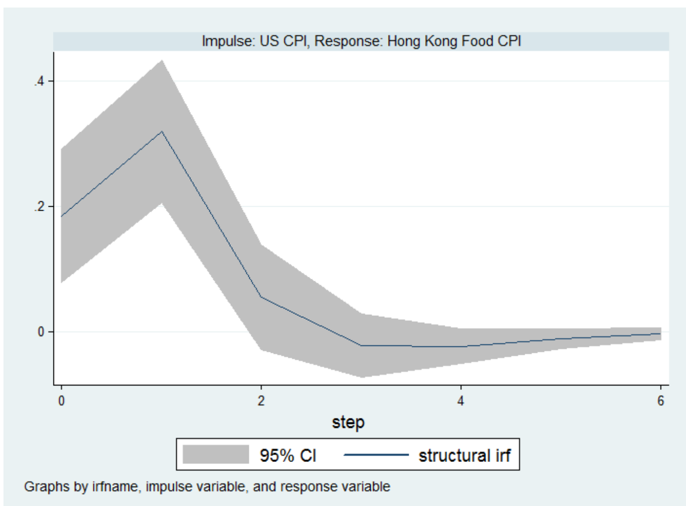


Figure 4: Impulse Response Function, Impulse: US CPI. Response: Hong Kong Food CPI.

Figure 4 demonstrates the change in the response variable (d1afcpi) with respect to a one unit shock to the standard deviation of the change in US CPI (d1auscpi). Referring to Tables 4 and 5, it can be deduced that a shock to the impulse (d1auscpi) at Step 0 causes the response (d1afcpi) to change by 0.185σ. Unlike a shock to the change in World Bank Food Commodity Index, a shock to the US CPI causes positive and negative changes in a d1afcpi series. The value of d1auscpi at Step 0 (September 2011) is 1.211. Thus, the new value of the change in Hong Kong Food CPI with respect to a one unit shock to d1auscpi at Step 0 would be 1.211 + 0.185σ, where σ = 0.776. The percentage change would then be (0.185 σ/1.211)x100, which amounts to 11.86%. For six steps into the future, the change in Hong Kong Food CPI with respect to a one standard deviation shock to the change in the World Bank Food Commodity Index would be: $d1afcpi_{n} + 0.185\sigma$, $d1afcpi_{n+1} + 0.319\sigma$, $d1afcpi_{n+2} + 0.055\sigma$, $d1afcpi_{n+3} - 0.022\sigma$, $d1afcpi_{n+4} - 0.023\sigma$, $d1afcpi_{n+5} - 0.011\sigma$, $d1afcpi_{n+6} - 0.003\sigma$.

Figure 5 shows that a shock to the change in Hong Kong domestic wages causes very temporary effects in the change in Hong Kong Food CPI. This result is expected because related literature has stated that domestic variables have been shown to impact the Hong Kong economy for a short period of time. The results from Table 4 and Table 5 show that the movement in the change in Hong Kong Food CPI is as follows: $d1afcpi_{n} + 0.159\sigma$, $d1afcpi_{n+1} - 0.035\sigma$, $d1afcpi_{n+2} - 0.034\sigma$, $d1afcpi_{n+3} - 0.017\sigma$, $d1afcpi_{n+4} - 0.007\sigma$, $d1afcpi_{n+5} - 0.004\sigma$, $d1afcpi_{n+6} - 0.003\sigma$.

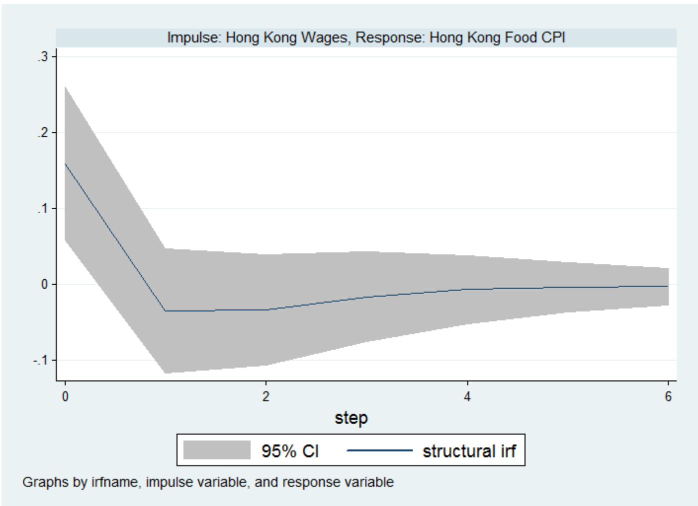


Figure 5: Impulse Response Function, Impulse: Hong Kong Wages. Response: Hong Kong Food CPI.

Consistent with results in literature, it can be seen that the external variables have a greater impact on the change in Hong Kong Food CPI compared to the domestic variable. Although the examination of the above IRFs presents large confidence intervals, all three IRFs demonstrate a significant contemporaneous increase that persists between one and two periods. The long run impacts of these variables are statistically insignificant as the response function is stationary. In addition, the findings in the IRF analysis are consistent with the estimated Structural VAR model.

The Forecast Error Variance Decomposition (FEVD) analysis provides information regarding the percentage of forecasting error for a variable due to a specific shock at a given time. In this model, the FEVD is structural, meaning that the shocks to the system are orthogonalized. In Table 4, the coefficient of 0.073 in Step 1 indicates that shocks to the change in the World Bank Food Commodity Index explains 7.3% of a one-step ahead forecast error in the change of Hong Kong Food CPI. It should also be recognized that the forecasting errors increase with each time step.

Table 6: Structural Forecast Error Variance Decomposition (SFEVD), Impulse: World Bank Food Commodity Index, Response: Hong Kong Food CPI

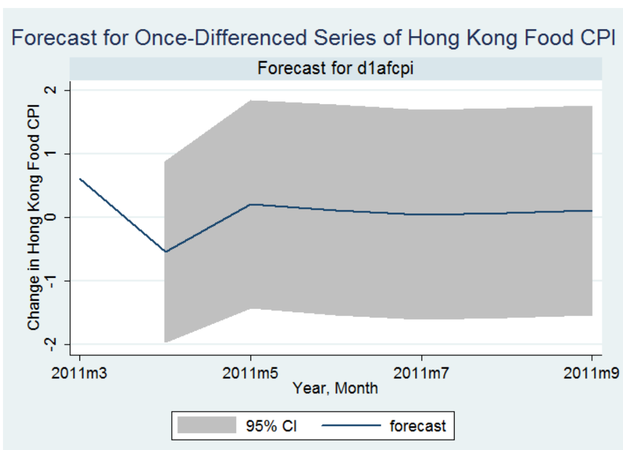
Results from World Bank Commodity Index, Hong Kong Food CPI			
Step	**sfevd**	**lower**	**upper**
0	0.000	0.000	0.000
1	0.073	-0.008	0.153
2	0.092	0.012	0.172
3	0.089	0.010	0.169
4	0.090	0.011	0.169
5	0.091	0.012	0.170
6	0.092	0.013	0.170

95% lower and upper bounds reported
(1) irfname = foodcpi, impulse = d1afood, and response = d1afcpi

The SFEVD tables for US CPI and Hong Kong wages can be found in the Appendix, in Tables A16 and A17. It can be seen that the forecasting error for US CPI is very large, whereas the forecasting error for Hong Kong wages is moderate.

4.3 Forecasting

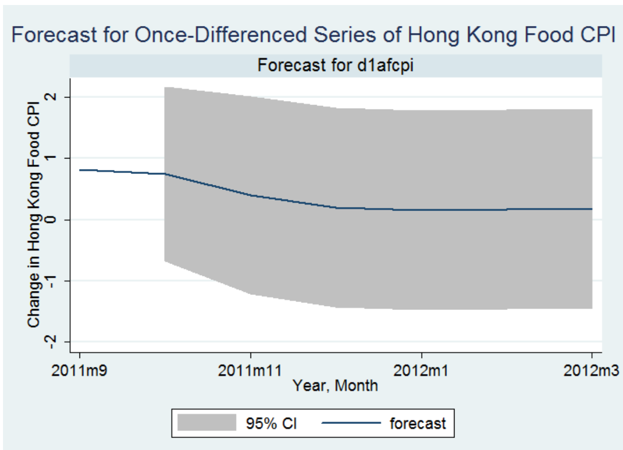
In an effort to test the predicative power of the VAR model estimated above, an in-sample forecast was generated for the first-differenced series of the Hong Kong Food CPI. For the construction of the in-sample forecast, the sample was restricted to the end of March 2011 and the forecast was set to predict the change in Hong Kong Food CPI six months following March 2011. The results from the in-sample forecast were compared to the actual data obtained from the Hong Kong Census and Statistics Department. Figure 7 below outlines results from the forecast, more detailed results are included in the Appendix (Table A18 and A19).



Date	Actual	Predicted	Standard Error
2011m 4	0.337	-0.537	0.724
2011m 5	0.803	0.218	0.829
2011m 6	0.015	0.120	0.839
2011m 7	0.333	0.047	0.838
2011m 8	0.694	0.073	0.837
2011m 9	0.811	0.115	0.836

Figure 6: Results of In-Sample Forecast of Hong Kong Food CPI. Actual, Predicted Values and Standard Errors

It can be seen from Figure 6 that this model has very poor predicative power. However, this is not an unexpected result. It was outlined in the above analysis and tests that this model presented serial correlation in the residuals even after controlling for this issue for each individual series used in the model. Although the SVAR estimation presented results that were somewhat consistent with literature, the statistical significance of the estimated parameters was very low and some variables did not have very high explanatory power. Given the properties and the low explanatory power of the model, it is not surprising that the model will contain little to no predictive power and high standard errors, which explains the wide prediction interval demonstrated in Figure 6. A forecast was generated at the end of the sample period to demonstrate the predicative power of this model. Unlike the forecast presented above, this forecast cannot be compared with actual values.



Date	Predicted	Standard Error
2011m 10	0.745	0.719
2011m 11	0.401	0.815
2011m 12	0.196	0.825
2012m 1	0.155	0.824
2012m 2	0.171	0.823
2012m 3	0.187	0.823

Figure 7: Results of Forecast of Hong Kong Food CPI. Predicted Values and Standard Errors.

Like Figure 6, Figure 7 demonstrates that a forecast generated at the end of the sample period does not provide any useful information regarding the Hong Kong Food CPI. The forecast associated with Figure 7 is also affected by very large standard errors and a very large prediction interval, leading to a very disappointing and distorted forecast. More details of this forecast are included in Table A14 of the Appendix.

Although forecasts obtained from VAR models have proved to be more accurate from the forecasts from more complex simultaneous equation models, the sample size in this study may have posed a restriction on obtaining a good forecast. Furthermore, this study shows that a SVAR specification may not be the best model to forecast Hong Kong Food CPI, and that the ability of being able to find cointegrating or equilibrium relationships between these variables may have increased the reliability of the forecast.

5.0 Conclusion

This study set out with the expectation of encountering cointegration relationships between the variables and using a vector error correction model to forecast the movement of Hong Kong Food CPI. While each series used in the study proved to contain a unit root and was non-stationary, the fitting of the error correction model ultimately failed as the residuals of supposedly cointegrated variables contained a unit root. Therefore, the data was transformed into stationary data and a Structural VAR specification was used to forecast the future movements of Hong Kong Food CPI instead.

Although the estimates from the Structural VAR model were somewhat consistent with what was found in the preceding literature, the latter diagnostic tests proved the model to be unreliable in producing Impulse Response Functions and forecasts. Even though Schwarz-Bayes Information Criterion was used to control for serial correlation in the residuals of each series, the model was still tainted by serial correlation. However, the model did demonstrate that the Hong Kong Food CPI is more affected by external variables compared to domestic variables. Overall, this model fitting exercise demonstrates a SVAR may not be the best model for the data as it did not present any clear implications about the impact of these variables on the future movement of Hong Kong Food CPI.

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Data Sources

Data	Source	Website
HK Food Inflation Index	Hong Kong Census and Statistics Department	http://www.censtatd.gov.hk/hkstat/sub/sp270.jsp?productCode=B1060001
USD:HKD Exchange Rate	Hong Kong Census and Statistics Department	http://www.censtatd.gov.hk/hkstat/sub/sp110.jsp?subjectID=11&tableID=124&ID=0&productType=8
US Inflation Index	United States Bureau of Labour Statistics	http://www.bls.gov/cpi/#tables
Oil Prices	World Bank	http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:21574907~menuPK:7859231~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html
Food Commodity Index	World Bank	http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:21574907~menuPK:7859231~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html
HK Wages Index	Hong Kong Census and Statistics Department	http://www.censtatd.gov.hk/hkstat/sub/sp210.jsp?subjectID=21&tableID=022&ID=0&productType=8
Retail Rent Prices Index	Hong Kong Rating and Valuation Department	http://www.rvd.gov.hk/en/publications/pro-review.htm
OECD Food CPI	Organisation For Economic Co-operation and Development. StatExtracts	http://stats.oecd.org/Index.aspx?DatasetCode=MEI_PRICES#
Trade Statistics	UN COMTRADE Database	http://comtrade.un.org/db/

Appendix

The following Figures how the comparable volatility between Hong Kong and the respective countries.

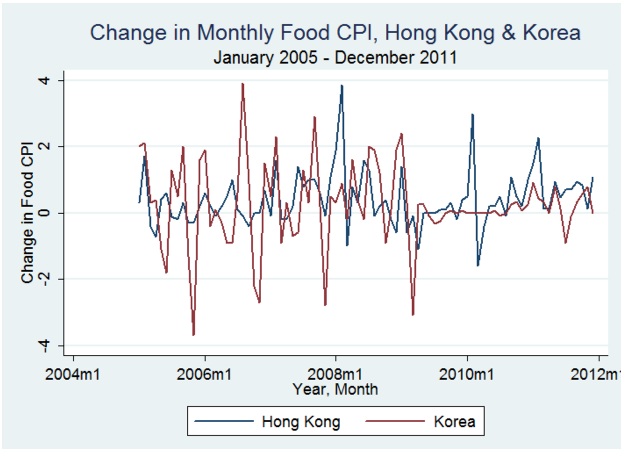

Figure A1: Change in Monthly Food CPI, Hong Kong and Korea

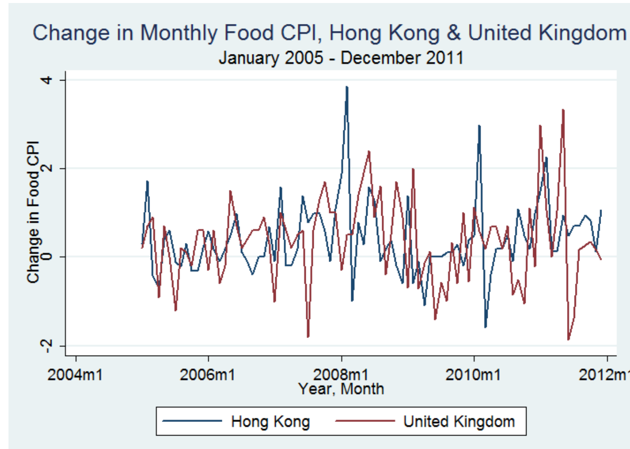

Figure A2: Change in Monthly Food CPI, Hong Kong and United Kingdom

The following table shows the output for obtaining linear transformation coefficients used to dampen the effects of seasonality in each series.

Table A1: Linear transformation Coefficients for Hong Kong Food CPI, HKD:USD Exchange Rate, Crude Oil Prices, World Bank Food Commodity Index, Hong Kong Nominal Wage Index, Hong Kong Retail Rent Index

Linear Transformation Coefficients

Month	Hong Kong Food CPI	HKD:USD Exchange Rate	US CPI	Price of Crude Oil	World Bank Food Index	Hong Kong Nominal Wage Index	Hong Kong Retail Rent Index
September	1.17	0.00	-0.20	-0.86	-2.26	3.73	2.97
October	-1.04	-0.01	-1.50	-6.08	-10.16	4.80	0.71
November	-1.20	-0.01	-1.71	-7.12	-8.39	8.32	1.16
December	-1.00	-0.01	-1.92	-8.18	-6.44	11.32	1.03
January	-0.40	0.00	-1.50	-6.76	-2.81	11.88	0.34
February	0.71	0.00	-1.06	-5.70	-0.57	8.85	0.34
March	0.22	0.00	-0.43	-2.33	-0.63	4.03	0.46
May	0.15	0.00	0.32	1.10	0.99	-1.31	1.34
June	0.62	0.00	0.60	3.26	1.63	-0.53	1.85
July	1.00	0.00	0.71	4.22	1.53	1.09	2.37
August	1.03	0.00	0.83	3.58	1.31	2.61	2.56
Constant	106.33	7.79	101.28	56.42	124.57	90.83	103.54

Base Month: April

Figure A1 to A7 outline the stationary variables of the different time series, excluding HKD:USD exchange rate used in the VAR analysis.

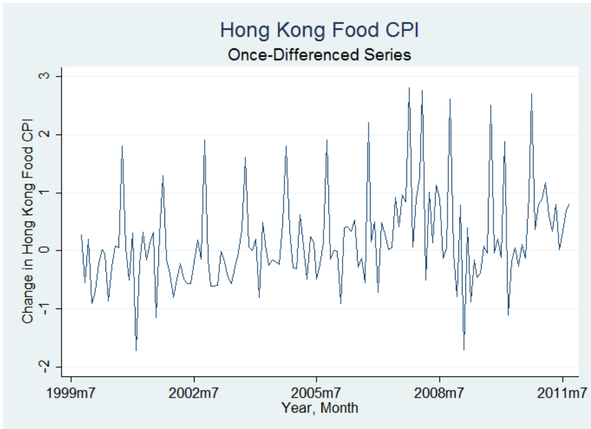

Figure A3: Once-Differenced Series of Hong Kong Food CPI

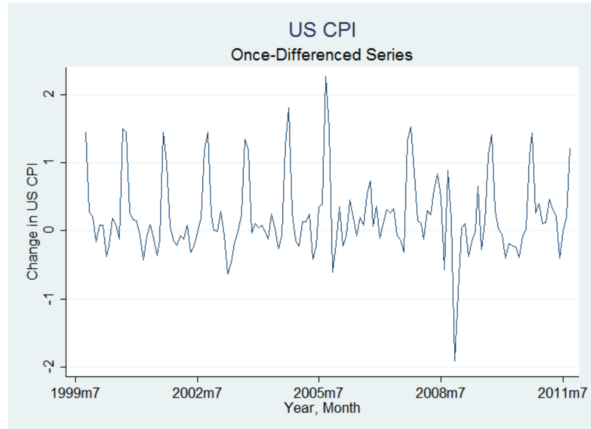

Figure A4: Once-Differenced Series of US CPI

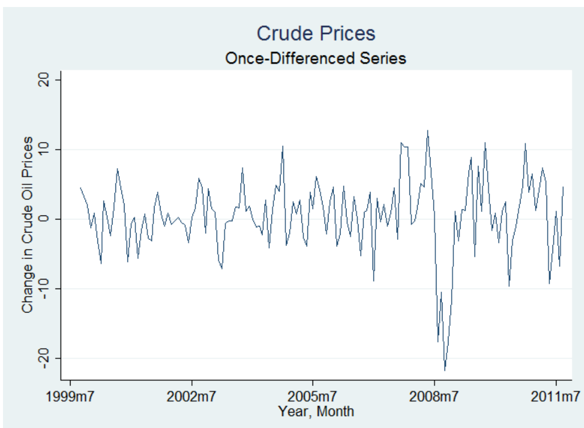

Figure A5: Once-Differenced Series of Crude Oil Prices

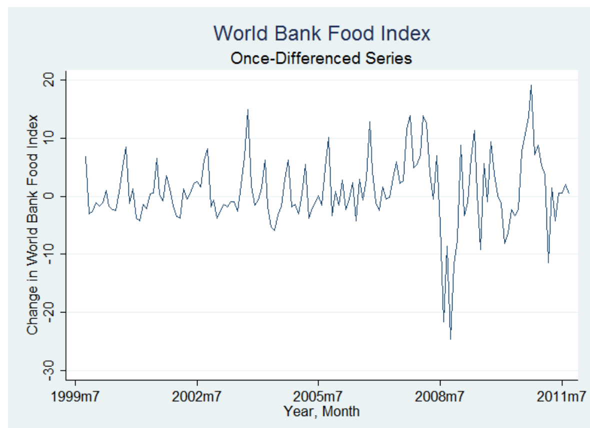

Figure A6: Once-Differenced Series of World Bank Food Commodity Index

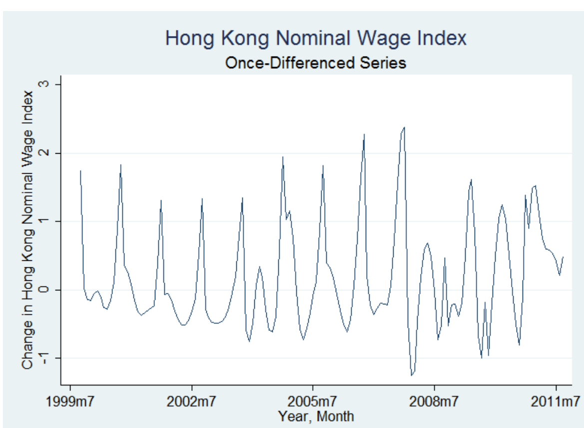

Figure A7: Once-Differenced Series of Hong Kong Nominal Wage Index

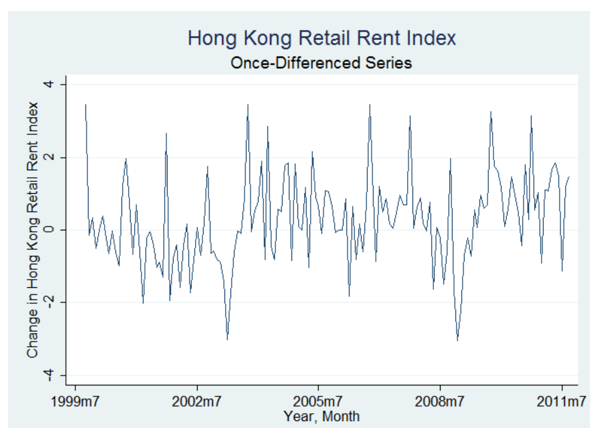

Figure A8: Once-Differenced Series of Hong Kong Retail Rent Index

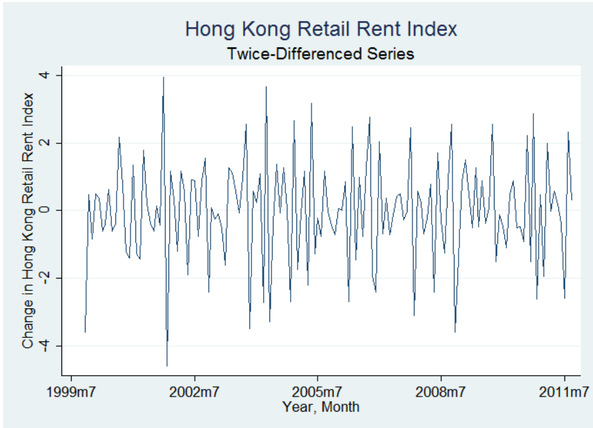

Figure A9: Twice-Differenced Series of Hong Kong Retail Rent Index

Tables A2 through A7 outline the lag selection procedure for DF-GLS test of once-differenced Series in the model. Table A8 highlights the twice-differenced series of the Hong Kong Retail Rent Index, the twice-differenced series was used in the VAR estimation since the DF-GLS test failed to null of unit root non-stationarity for the once-differenced series.

Table A2: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of Hong Kong Food CPI

Sample: 2000m3 - 2011m9 Number of obs = 139

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-169.628				.691835	2.46947	2.48663	2.51169
1	-126.729	85.799	1	0.000	.378602	1.8666	1.89234	1.92993
2	-104.996	43.465	1	0.000	.280953	1.56829	1.60261	1.65274
3	-90.2201	29.552	1	0.000	.230438	1.37007	1.41297	1.47563
4	-80.5516	19.337*	1	0.000	.203421*	1.24535*	1.29682*	1.37202*

Endogenous: d2afcpi
Exogenous: d1afcpi _cons

Table A3: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of US CPI

Sample: 2000m11 - 2011m9 Number of obs = 131

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-102.843				.290189	1.60065	1.61849	1.64455
1	-91.0596	23.566	1	0.000	.246143	1.43602	1.46278	1.50187
2	-58.918	64.283	1	0.000	.153006	.960581	.996255	1.04837
3	-44.2786	29.279	1	0.000	.124246	.752345	.796938	.862086
4	-25.5759	37.405	1	0.000	.094824	.482075	.535586	.613764
5	-8.54942	34.053	1	0.000	.074245	.237396	.299825	.391032
6	8.78666	34.672	1	0.000	.05786	-.01201	.059338	.163575
7	26.5877	35.602	1	0.000	.044772	-.268514	-.188248	-.070981
8	46.0119	38.848	1	0.000	.033797	-.5498	-.460615	-.33032
9	67.3187	42.614	1	0.000	.02479	-.859828	-.761724	-.618399
10	83.3879	32.138	1	0.000	.019698	-1.08989	-.98287	-.826514
11	91.7921	16.808	1	0.000	.017595	-1.20293	-1.08699	-.917608
12	97.1333	10.682*	1	0.001	.016469*	-1.26921*	-1.14435*	-.961937*

Endogenous: d2auscpi
Exogenous: d1auscpi _cons

Table A4: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of Crude Oil Prices

Sample: 2000m11 - 2011m9 Number of obs = 131

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-416.936				35.0965	6.39598	6.41381	6.43987
1	-406.73	20.412	1	0.000	30.4948	6.25543	6.28218*	6.32127*
2	-405.875	1.7116	1	0.191	30.5624	6.25763	6.2933	6.34542
3	-404.781	2.1878	1	0.139	30.5191	6.25619	6.30079	6.36593
4	-404.087	1.3867	1	0.239	30.6632	6.26088	6.31439	6.39256

Endogenous: d2acrude
Exogenous: acrude _cons

Table A5: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of Food Commodities Index

Sample: 2000m11 - 2011m9 Number of obs = 131

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-407.166				30.2332	6.24682	6.26465	6.29071
1	-390.068	34.197	1	0.000	23.6454	6.00104	6.02779	6.06688
2	-380.888	18.361	1	0.000	20.8695	5.87615	5.91182	5.96394
3	-370.976	19.823	1	0.000	18.2152	5.7401	5.78469	5.84984
4	-364.135	13.682	1	0.000	16.6617	5.65092	5.70443	5.78261
5	-354.15	19.971	1	0.000	14.5263	5.51374	5.57617	5.66738
6	-340.116	28.068	1	0.000	11.9057	5.31474	5.38609	5.49033
7	-329.706	20.819	1	0.000	10.3132	5.17109	5.25135	5.36862
8	-315.723	27.967	1	0.000	8.45945	4.97286	5.06205	5.19234
9	-305.946	19.553	1	0.000	7.39933	4.83887	4.93697	5.0803
10	-295.512	20.867	1	0.000	6.40758	4.69484	4.80187	4.95822
11	-288.422	14.181	1	0.000	5.83944	4.60186	4.7178	4.88718
12	-281.624	13.595*	1	0.000	5.34569*	4.51335*	4.63821*	4.82062*

Endogenous: d2afood

Exogenous: d1afood _cons

Table A6: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of Hong Kong Nominal Wage Index

Sample: 2000m2 - 2011m9 Number of obs = 140

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-122.287				.345644	1.77553	1.79261	1.81755
1	-120.964	2.6458	1	0.104	.344055	1.77092	1.79653	1.83395
2	-107.847	26.235	1	0.000	.289371	1.59781	1.63197	1.68186
3	-91.3192	33.056*	1	0.000	.231805*	1.37599*	1.41868*	1.48105*

Endogenous: d2awage
Exogenous: d1awage _cons

Table A7: Lag Selection-order Criteria for DF-GLS of Once-Differenced Series of Hong Kong Retail Rent Index

Sample: 2000m11 - 2011m9 Number of obs = 131

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-213.041				1.56079	3.28307	3.30091	3.32697
1	-178.517	69.049	1	0.000	.935548	2.77125	2.798	2.83709
2	-161.12	34.794	1	0.000	.728371	2.52091	2.55659	2.60871
3	-151.271	19.697	1	0.000	.636342	2.38582	2.43041	2.49556
4	-144.587	13.368	1	0.000	.583466	2.29904	2.35255	2.43073
5	-137.173	14.829	1	0.000	.529055	2.20111	2.26354	2.35475
6	-132.986	8.3739	1	0.004	.503955	2.15246	2.2238	2.32804
7	-126.304	13.364	1	0.000	.462108	2.0657	2.14597	2.26324
8	-122.176	8.2547	1	0.004	.440599	2.01796	2.10714	2.23744
9	-117.814	8.7248	1	0.003	.418593	1.96662	2.06473	2.20805
10	-112.542	10.544	1	0.001	.392211	1.90141	2.00843	2.16478
11	-104.895	15.293	1	0.000	.354413	1.79993	1.91587	2.08525*
12	-102.75	4.2908*	1	0.038	.348326*	1.78244*	1.9073*	2.08971

Endogenous: d2arent
Exogenous: d1arent _cons

Table A7: Lag Selection-order Criteria for DF-GLS of Twice-Differenced Series of Hong Kong Retail Rent Index

Sample: 2000m2 - 2011m9 Number of obs = 140

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-222.333				1.46401	3.21905	3.24466	3.28208
1	-116.75	211.17	1	0.000	.328617	1.725	1.75915	1.80905
2	-54.5453	124.41*	1	0.000	.137079*	.850647*	.89334*	.955706*

Endogenous: d3arent
Exogenous: d2arent d1arent _cons

The following tables show the results of the DF-GLS and the KPSS test for each variable.

Table A8: DF-GLS Results Once-Differenced and Twice-Differenced Series

DF-GLS Tests					
		DF-GLS mu Test	Critical Values		
Variable	Lags	Statistic	1%	5%	10%
HK Food CPI	4	-4.063	-2.594	-2.044	-1.734
US CPI	4	-3.247	-3.527	-2.933	-2.647
Crude Price	1	-5.343	-3.527	-2.966	-2.676
Food index	4	-3.578	-2.594	-2.044	-1.734
Wage	3	-2.576	-2.594	-2.051	-1.741
Rent (Once Differenced)	4	-2.060	-3.527	-2.933	-2.647
Rent (Twice Differenced)	2	-3.056	-3.528	-2.957	-2.668
Critical values for H0: series is trend unit root non-stationary					

Table A9: KPSS Test for Once-Differenced and Twice-Differenced Series

KPSS Tests						
			Critical Values			
Variable	Lag Order	Test Statistic	10%	5%	2.50%	1%
HK FCPI	9	0.054	0.119	0.146	0.176	0.216
Exchange	9	0.439	0.347	0.463	0.574	0.739
US CPI	7	0.035	0.119	0.146	0.176	0.216
Crude	8	0.035	0.347	0.463	0.574	0.739
Food index	8	0.083	0.347	0.463	0.574	0.739
Wage	4	0.274	0.347	0.463	0.574	0.739
Rent (Once Differenced)	9	0.060	0.119	0.146	0.176	0.216
Rent (Twice Differenced)	5	0.043	0.119	0.146	0.176	0.216
Critical values for H0: series is trend stationary						

Table A10: Lag Selection for VAR Model

Selection-order criteria
Sample: 2000m11 - 2011m9 Number of obs = 131

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-1051.24				.024508	16.1564	16.2188	16.31
1	-800.872	500.74	49	0.000	.001134	13.082	13.5814	14.3111*
2	-708.445	184.85	49	0.000	.000588	12.419	13.3554*	14.7236
3	-658.622	99.646	49	0.000	.00059	12.4064	13.7799	15.7864
4	-617.291	82.663	49	0.002	.000683	12.5235	14.334	16.979
5	-588.642	57.298	49	0.194	.000979	12.8342	15.0817	18.3651
6	-544.553	88.178	49	0.001	.001137	12.9092	15.5937	19.5156
7	-500.135	88.835	49	0.000	.001359	12.9792	16.1006	20.661
8	-453.503	93.264	49	0.000	.001637	13.0153	16.5738	21.7726
9	-400.376	106.25	49	0.000	.001884	12.9523	16.9478	22.785
10	-314.446	171.86	49	0.000	.001406	12.3885	16.821	23.2967
11	-174.967	278.96	49	0.000	.000506	11.0071	15.8766	22.9908
12	-28.9652	292*	49	0.000	.000185*	9.52619*	14.8327	22.5853

Endogenous: d1afcpi aexchange d1auscpi d1acrude d1afood d1awage d2arent
Exogenous: _cons

Table A11: Estimation of VAR Model

```
Estimating short-run parameters
Iteration 0:   log likelihood = -14949.883
Iteration 1:   log likelihood = -8337.4197  (backed up)
Iteration 2:   log likelihood = -5935.6043
Iteration 3:   log likelihood = -3835.8421
Iteration 4:   log likelihood = -3333.5994
Iteration 5:   log likelihood = -2839.3363
Iteration 6:   log likelihood = -2467.2369
Iteration 7:   log likelihood = -2152.6361
Iteration 8:   log likelihood = -1764.5519
Iteration 9:   log likelihood =  -1484.704
Iteration 10:  log likelihood = -1287.1313
Iteration 11:  log likelihood = -1142.2903
Iteration 12:  log likelihood = -1003.7183
Iteration 13:  log likelihood = -890.06648
Iteration 14:  log likelihood = -849.72832
Iteration 15:  log likelihood = -847.45615
Iteration 16:  log likelihood = -847.41989
Iteration 17:  log likelihood = -847.41989

Structural vector autoregression

 ( 1)  [a_1_1]_cons = 1
 ( 2)  [a_1_2]_cons = 0
 ( 3)  [a_1_3]_cons = 0
 ( 4)  [a_1_4]_cons = 0
 ( 5)  [a_1_5]_cons = 0
 ( 6)  [a_1_6]_cons = 0
 ( 7)  [a_1_7]_cons = 0
 ( 8)  [a_2_2]_cons = 1
 ( 9)  [a_2_3]_cons = 0
 (10)  [a_2_4]_cons = 0
 (11)  [a_2_5]_cons = 0
 (12)  [a_2_6]_cons = 0
 (13)  [a_2_7]_cons = 0
 (14)  [a_3_3]_cons = 1
 (15)  [a_3_4]_cons = 0
 (16)  [a_3_5]_cons = 0
 (17)  [a_3_6]_cons = 0
 (18)  [a_3_7]_cons = 0
 (19)  [a_4_4]_cons = 1
 (20)  [a_4_5]_cons = 0
 (21)  [a_4_6]_cons = 0
 (22)  [a_4_7]_cons = 0
 (23)  [a_5_5]_cons = 1
 (24)  [a_5_6]_cons = 0
 (25)  [a_5_7]_cons = 0
 (26)  [a_6_6]_cons = 1
 (27)  [a_6_7]_cons = 0
 (28)  [a_7_7]_cons = 1
 (29)  [b_1_2]_cons = 0
 (30)  [b_1_3]_cons = 0
 (31)  [b_1_4]_cons = 0
 (32)  [b_1_5]_cons = 0
 (33)  [b_1_6]_cons = 0
 (34)  [b_1_7]_cons = 0
 (35)  [b_2_1]_cons = 0
 (36)  [b_2_3]_cons = 0
 (37)  [b_2_4]_cons = 0
 (38)  [b_2_5]_cons = 0
 (39)  [b_2_6]_cons = 0
```

```
 (40)  [b_2_7]_cons = 0
 (41)  [b_3_1]_cons = 0
 (42)  [b_3_2]_cons = 0
 (43)  [b_3_4]_cons = 0
 (44)  [b_3_5]_cons = 0
 (45)  [b_3_6]_cons = 0
 (46)  [b_3_7]_cons = 0
 (47)  [b_4_1]_cons = 0
 (48)  [b_4_2]_cons = 0
 (49)  [b_4_3]_cons = 0
 (50)  [b_4_5]_cons = 0
 (51)  [b_4_6]_cons = 0
 (52)  [b_4_7]_cons = 0
 (53)  [b_5_1]_cons = 0
 (54)  [b_5_2]_cons = 0
 (55)  [b_5_3]_cons = 0
 (56)  [b_5_4]_cons = 0
 (57)  [b_5_6]_cons = 0
 (58)  [b_5_7]_cons = 0
 (59)  [b_6_1]_cons = 0
 (60)  [b_6_2]_cons = 0
 (61)  [b_6_3]_cons = 0
 (62)  [b_6_4]_cons = 0
 (63)  [b_6_5]_cons = 0
 (64)  [b_6_7]_cons = 0
 (65)  [b_7_1]_cons = 0
 (66)  [b_7_2]_cons = 0
 (67)  [b_7_3]_cons = 0
 (68)  [b_7_4]_cons = 0
 (69)  [b_7_5]_cons = 0
 (70)  [b_7_6]_cons = 0

Sample:  1999m12 - 2011m9                          No. of obs      =       142
Exactly identified model                           Log likelihood  = -847.4199

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       /a_1_1 |          1          .        .       .            .           .
       /a_2_1 |  -.6369451   .0797218    -7.99   0.000     -.793197   -.4806933
       /a_3_1 |  -.0504074   .0092222    -5.47   0.000    -.0684826   -.0323321
       /a_4_1 |   .0002373   .0001913     1.24   0.215    -.0001376    .0006121
       /a_5_1 |   .0192604   .0293279     0.66   0.511    -.0382212    .0767421
       /a_6_1 |   .0147115   .0110388     1.33   0.183    -.0069241    .0363472
       /a_7_1 |   .0108494   .0151118     0.72   0.473    -.0187693     .040468
       /a_1_2 |  (omitted)
       /a_2_2 |          1          .        .       .            .           .
       /a_3_2 |  -.0157498   .0080631    -1.95   0.051    -.0315532    .0000535
       /a_4_2 |  -9.31e-06    .000154    -0.06   0.952    -.0003112    .0002926
       /a_5_2 |  -.0256594   .0234912    -1.09   0.275    -.0717014    .0203825
       /a_6_2 |  -.0207727   .0088655    -2.34   0.019    -.0381489   -.0033966
       /a_7_2 |  -.0279414   .0122924    -2.27   0.023    -.0520341   -.0038486
       /a_1_3 |  (omitted)
       /a_2_3 |  (omitted)
       /a_3_3 |          1          .        .       .            .           .
       /a_4_3 |  -.0007343   .0015819    -0.46   0.642    -.0038348    .0023661
       /a_5_3 |  -.8254544   .2414496    -3.42   0.001    -1.298687   -.3522219
       /a_6_3 |  -.4357893   .0944027    -4.62   0.000    -.6208153   -.2507633
       /a_7_3 |  -.2400976   .1377345    -1.74   0.081    -.5100523     .029857
       /a_1_4 |  (omitted)
       /a_2_4 |  (omitted)
       /a_3_4 |  (omitted)
       /a_4_4 |          1          .        .       .            .           .
       /a_5_4 |   11.92793   12.79891     0.93   0.351    -13.15747    37.01333
```

```
      /a_6_4 |   5.925667   4.824802     1.23   0.219    -3.530771    15.38211
      /a_7_4 |   2.043345   6.598875     0.31   0.757    -10.89021     14.9769
      /a_1_5 |  (omitted)
      /a_2_5 |  (omitted)
      /a_3_5 |  (omitted)
      /a_4_5 |  (omitted)
      /a_5_5 |          1          .        .       .            .           .
      /a_6_5 |  -.1103081   .0315383    -3.50   0.000     -.172122   -.0484942
      /a_7_5 |  -.0311075   .0447176    -0.70   0.487    -.1187525    .0565374
      /a_1_6 |  (omitted)
      /a_2_6 |  (omitted)
      /a_3_6 |  (omitted)
      /a_4_6 |  (omitted)
      /a_5_6 |  (omitted)
      /a_6_6 |          1          .        .       .            .           .
      /a_7_6 |  -.3584512   .1141699    -3.14   0.002    -.5822202   -.1346823
      /a_1_7 |  (omitted)
      /a_2_7 |  (omitted)
      /a_3_7 |  (omitted)
      /a_4_7 |  (omitted)
      /a_5_7 |  (omitted)
      /a_6_7 |  (omitted)
      /a_7_7 |          1          .        .       .            .           .
-------------+----------------------------------------------------------------
      /b_1_1 |   4.486917   .2662495    16.85   0.000     3.965078    5.008757
      /b_2_1 |  (omitted)
      /b_3_1 |  (omitted)
      /b_4_1 |  (omitted)
      /b_5_1 |  (omitted)
      /b_6_1 |  (omitted)
      /b_7_1 |  (omitted)
      /b_1_2 |  (omitted)
      /b_2_2 |   4.262548   .2529357    16.85   0.000     3.766803    4.758293
      /b_3_2 |  (omitted)
      /b_4_2 |  (omitted)
      /b_5_2 |  (omitted)
      /b_6_2 |  (omitted)
      /b_7_2 |  (omitted)
      /b_1_3 |  (omitted)
      /b_2_3 |  (omitted)
      /b_3_3 |    .409557   .0243027    16.85   0.000     .3619245    .4571895
      /b_4_3 |  (omitted)
      /b_5_3 |  (omitted)
      /b_6_3 |  (omitted)
      /b_7_3 |  (omitted)
      /b_1_4 |  (omitted)
      /b_2_4 |  (omitted)
      /b_3_4 |  (omitted)
      /b_4_4 |   .0077204   .0004581    16.85   0.000     .0068225    .0086183
      /b_5_4 |  (omitted)
      /b_6_4 |  (omitted)
      /b_7_4 |  (omitted)
      /b_1_5 |  (omitted)
      /b_2_5 |  (omitted)
      /b_3_5 |  (omitted)
      /b_4_5 |  (omitted)
      /b_5_5 |   1.177486   .0698709    16.85   0.000     1.040542    1.314431
      /b_6_5 |  (omitted)
      /b_7_5 |  (omitted)
      /b_1_6 |  (omitted)
      /b_2_6 |  (omitted)
      /b_3_6 |  (omitted)
      /b_4_6 |  (omitted)
      /b_5_6 |  (omitted)
```

```
      /b_6_6 |   .4425255   .0262591    16.85   0.000     .3910587    .4939923
      /b_7_6 |  (omitted)
      /b_1_7 |  (omitted)
      /b_2_7 |  (omitted)
      /b_3_7 |  (omitted)
      /b_4_7 |  (omitted)
      /b_5_7 |  (omitted)
      /b_6_7 |  (omitted)
      /b_7_7 |   .6020523   .0357252    16.85   0.000     .5320322    .6720725
------------------------------------------------------------------------------
```

Table A13: Impulse Response Function Table, Impulse: Change in World Bank Food Commodity Index, Response: Change in Hong Kong Food CPI

```
irf table sirf, impulse(d1afood) response(d1afcpi)
Results from foodcpi
+----------------------------------------------+
|        |     (1)         (1)         (1)     |
|  step  |    sirf       Lower       Upper     |
|--------+-------------------------------------|
|0       | .188643     .07856      .298725     |
|1       | .153112     .031097     .275127     |
|2       | .025023     -.054124    .10417      |
|3       | .031294     -.020156    .082743     |
|4       | .029522     -.003701    .062745     |
|5       | .018586     -.003435    .040606     |
|6       | .008915     -.006128    .023958     |
+----------------------------------------------+
95% lower and upper bounds reported
(1) irfname = foodcpi, impulse = d1afood, and response = d1afcpi
```

Table A14: Impulse Response Function Table, Impulse: Change in US CPI, Response: Change in Hong Kong Food CPI

```
irf table sirf, impulse(d1auscpi) response(d1afcpi)
Results from foodcpi
+----------------------------------------------+
|        |     (1)         (1)         (1)     |
|  step  |    sirf       Lower       Upper     |
|--------+-------------------------------------|
|0       | .184687     .078974     .290401     |
|1       | .319038     .205658     .432418     |
|2       | .055154     -.02739     .137698     |
|3       | -.021949    -.071592    .027694     |
|4       | -.022957    -.050583    .004669     |
|5       | -.010513    -.026405    .005378     |
|6       | -.003028    -.012589    .006533     |
+----------------------------------------------+
95% lower and upper bounds reported
(1) irfname = foodcpi, impulse = d1auscpi, and response = d1afcpi
```

Table A15: Impulse Response Function Table, Impulse: Change in Hong Kong Wages, Response: Change in Hong Kong Food CPI

```
irf table sirf, impulse(d1awage) response(d1afcpi)
Results from foodcpi

+------------------------------------------+
|        |    (1)         (1)         (1)    |
|  step  |   sirf       Lower       Upper    |
|--------+----------------------------------|
|0       | .158624     .057897     .259351   |
|1       | -.03461     -.116489    .04727    |
|2       | -.034099    -.107075    .038876   |
|3       | -.016617    -.075542    .042308   |
|4       | -.00718     -.051727    .037367   |
|5       | -.004042    -.036777    .028693   |
|6       | -.00325     -.027114    .020614   |
+------------------------------------------+
95% lower and upper bounds reported
(1) irfname = foodcpi, impulse = d1awage, and response = d1afcpi
```

Table A16: Structural Forecast Error Variance Decomposition (SFEVD), Impulse: US CPI, Response: Hong Kong Food CPI

Results from USCPI, Hong Kong Food CPI			
Step	**sfevd**	**lower**	**upper**
0	0.070	-0.006	0.145
1	0.211	0.109	0.314
2	0.208	0.106	0.310
3	0.207	0.106	0.308
4	0.207	0.107	0.308
5	0.207	0.107	0.308
6	0.070	-0.006	0.145
95% lower and upper bounds reported			
(1) irfname = foodcpi, impulse = d1auscpi, and response = d1afcpi			

Table A17: Structural Forecast Error Variance Decomposition (SFEVD), Impulse: Hong Kong Wages, Response: Hong Kong Food CPI

Results from Hong Kong wages, Hong Kong Food CPI			
Step	**sfevd**	**lower**	**upper**
0	0.000	0.000	0.000
1	0.051	-0.012	0.114
2	0.041	-0.010	0.092
3	0.041	-0.010	0.093
4	0.041	-0.011	0.093
5	0.041	-0.011	0.093
6	0.000	0.000	0.000
95% lower and upper bounds reported			
(1) irfname = foodcpi, impulse = d1awage, and response = d1afcpi			

Table A18: VAR Model In-Sample Forecast Results

Date	Actual Hong Kong Food CPI	Predicted Hong Kong Food CPI	Predicted Lower Bound	Predicted Upper Bound	Model Standard Error
2011m4	0.337	-0.537	-1.956	0.882	0.724
2011m5	0.803	0.218	-1.406	1.843	0.829
2011m6	0.015	0.120	-1.525	1.764	0.839
2011m7	0.333	0.047	-1.596	1.689	0.838
2011m8	0.694	0.073	-1.568	1.713	0.837
2011m9	0.811	0.115	-1.525	1.754	0.836

Table A19: VAR Model Out-Sample Forecast Results

Date	Predicted Hong Kong Food CPI	Predicted Lower Bound	Predicted Upper Bound	Model Standard Error
2011m10	0.745	-0.665	2.154	0.719
2011m11	0.401	-1.197	1.998	0.815
2011m12	0.196	-1.422	1.813	0.825
2012m1	0.155	-1.460	1.771	0.824
2012m2	0.171	-1.443	1.784	0.823
2012m3	0.187	-1.425	1.800	0.823