

# China's Real Domestic Consumption and Economic Growth

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## **Abstract**

*A Vector auto-regression model was estimated using annual data from 1980 to 2014 to assess the causal relationship between China's real consumption and Gross Domestic Product (GDP). The estimation results suggest Chinese real consumption and real GDP mutually affect each other. This finding suggest that while the People's Republic of China government promotes exports in the age of globalization and the fashionable Washington Consensus Development doctrine, it should simultaneously promote domestic consumption to develop the economy. This empirically supported approach certainly mitigates negative impacts of the international adverse economic conditions on the national economy.*

**Keywords:** VAR model; Granger causality; China; real consumption; real GDP.

## **1. Introduction**

Periods of instability are prevalent in the growth and progress of every economy regardless of whether that economy is developed or otherwise. Consequently, internal and external shocks and disturbances have impacted essentially all economies of the world at some point in time. The internal factors that have caused such shocks and disturbances which lead to destabilization of economies include unstable investment and consumption patterns combined with improper implementation of public policies. Moreover, instability of economies have been influenced by external events such as wars, revolutions, population growth rates and migration, technological transfer and changes and the openness of an economy.

Cyclical fluctuations in economic activities have resulted in both periodic increase in unemployment and inflation rates and in disequilibria in the external sector (Gbosi, 2001). These fluctuations are further advanced in this age of globalization and encouraged by the so called "Washington Consensus Development Hypothesis". These fluctuating cycles are further enhanced by large improvements in telecommunications, internet capabilities, transportation, computerization usage in production and the adherence to post World War II neoclassical export development along with increased membership and participation in the World Trade Organization. Exports have been relied on by many countries as the means of generating growth in its GDP.

This development strategy of generating GDP growth through exports has resulted in economic development in transitional economies. Transitional economies such as that of Vietnam and the People's Republic of China have relied on exports in this globalization age as a primary means of generating GDP growth. However, this strategy has also had the adverse consequence of creating downturns to the economic growth of countries. These economic downturns are also a casual effect of international financial crisis that spread from region to region. As an example, the recent United States subprime mortgage crisis and the European sovereign debt phenomenon caused spreading effects that extended to many developing nations. In fact, many countries experienced significant disruptions in exports

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and, in some cases, significant decreases in exports due to the US subprime mortgage crisis. To address the decreases in exports and the direct economic consequences of such, some countries were compelled to adjust their development strategies by promoting the very costly approach of domestic consumption as their primary economic growth tool.

Economic development is a putty-clay process; therefore, the costs to rebalance the economy in terms of national resources, capital and labor is the costs to transform an infrastructure designed for an export-led strategy to production facilities required to produce commodities for domestic consumption. Additionally, for the rebalancing to be successful, there must be a least a unidirectional Granger causality from domestic consumption to GDP.

As revealed in the following section, results of empirical investigations of the causal relationship between GDP (as proxy measure for income) and consumption, postulated by the demand side of macroeconomics, yielded contradictory results for different economies. This suggests that the nature of their causality in a given economy should be empirically determined. Therefore, the objective of this investigation is to study the causal relationship between Chinese real consumption and its GDP. The remainder of the study is organized as follows: the immediately following section briefly reviews the literature; the next section discusses the methodology and model specification; the subsequent section reports the empirical results; and the final section provides some concluding remarks and policy implications.

## 2. Review of Literature

The demand-side macroeconomic school of thought has long claimed a causal relationship between consumption and GDP growth which is the theoretical foundation for the countercyclical macroeconomic policy framework. In addition, the consumption theory in macroeconomics clearly assumes that GDP and hence consumer's income, stand as the main determinant of the level of aggregate consumption. The aforementioned theories collectively posit a bidirectional causality, at least in the Granger sense, between aggregate consumption and GDP. While the bidirectional causality between aggregate consumption and GDP has been well articulated theoretically, the empirical investigation of this theoretically articulated bidirectional causality remains very limited.

Tapsin and Hepsag (2014) provide a fairly complete survey of literature on the relationship between consumption and gross domestic product. Guisan (2001) provided an extensive review of causality and cointegration between private consumption and GDP in twenty-five OECD countries over the period of 1960-1997. The author suggested using a country's own GDP (excluding GDPs of other countries in the group) as the sole explanatory variable in the investigating process. Guisan (2004) evaluated the power of Granger Causality, Modified Granger Causality, Engle-Granger Cointegration, Two Stage Least Squares and Hausman tests in detecting the causal relationship between real consumption and GDP in Mexico and the United States. He found that there exists a strong degree of causal dependence of private consumption on GDP and a lower dependence when the variables are reversed.

More recently, Gomez-Zaldivar and Ventosa-Santaularia (2009) further investigated the causality between consumption and GDP in Mexico and the United States. The authors found no evidence of either causality or cointegration between Mexican series for consumption and GDP but in the case of the US series, the authors found that the two are cointegrated with a unidirectional causality from consumption to GDP. Mishra (2011) investigated the dynamic relationship between real consumption expenditure and economic growth in India over the period of 1950-2008 and found a long-term unidirectional causality from real consumption expenditure to economic growth. However, the author reported that there is no short-term Granger causality between these two macroeconomic variables.

Alimi (2013), investigated the relationship between consumption expenditure and income in Nigeria. The model was tested by ordinary least squares for the period of 1970-2011. The author estimated the marginal propensity to consume and average propensity to consume and found that as income increases, the average propensity to consume is reduced and that although marginal propensity to consume is less than one it is not stable in the long run. Nwabueze Joy Chioma (2009), analyzed the casual relationship between gross domestic product and personal consumption expenditure using the data from Nigeria for the years of 1994 – 2007. The author indicated that an increase in gross domestic product has no significant effect on the personal consumption expenditure and the gross domestic product explained about 3.5% of the personal consumption expenditure in Nigeria.

Ofwona (2013), reported that consumption is determined by income in Kenya over the period of 1992. Генчев, (2012), studied the relationship between income and consumption in Bulgaria and Russia over the period of 1990-2010 and found that there exist positive and significant long run relationship between gross national income and consumptions for both Bulgaria and Russia.

Sakib-Bin-Amin (2011), investigated the causal relationship between consumption expenditure and economic growth in Bangladesh using annual data from 1976-2009. The method used in this study is Johansen and ARDL cointegration tests. The empirical results revealed a long run unidirectional causal relationship running from economic growth to consumption expenditure.

As to China, Blanchard and Giavazzi (2005) articulated that China began the process of rebalancing its economy after pursuing the export-led development strategy for decades. This is the right move for China since there are increasing signs that the economy has proceeded too far into manufacturing for export markets to the point that the country's capital stock is misallocated: too much in manufacturing, too little in domestic service industry—in particular in the provision of health services.

### 3. Chinese Economy

The Bureau of East Asian and Pacific Affairs of the United States Department of State (2016) reported that two-way trade between China and the United States has grown from \$33 billion in goods in 1992 to over \$562 billion in 2013. China is currently the third largest export market for U.S. goods (after Canada and Mexico), and the United States is China's largest export market. The stock of U.S. foreign direct investment (FDI) in China was \$61 billion in 2013, up from \$54 billion in 2012. These investments are primarily in the manufacturing sector.

The World FactBook (February 25, 2016) produced by the United States Central Intelligence Agency, C.I.A. (2016), reported that the Chinese government faces numerous economic challenges including: (a) reducing its high domestic savings rate and correspondingly low domestic consumption; (b) facilitating higher-wage job opportunities for the aspiring middle class, including rural migrants and an increasing number of college graduates; (c) reducing corruption and other economic crimes; and (d) containing environmental damage and social strife related to the economy's rapid transformation. Economic development has progressed further in coastal provinces than in the interior, and by 2014 more than 274 million migrant workers and their dependents had relocated to urban areas to find work. One consequence of China's population control policy is that China is now one of the most rapidly aging countries in the world. In addition to the aging situation, another long-term problem for China is the deterioration in the environment - notably air pollution, soil erosion and the steady fall of the water table, especially in the North. China continues to lose arable land because of erosion and economic development. The Chinese

government is seeking to add energy production capacity from sources other than coal and oil and focusing on nuclear and alternative energy development.

China's economic growth is being hampered by several converging factors, including debt overhang from its credit-fueled stimulus program, industrial overcapacity, inefficient allocation of capital by state-owned banks and the slow recovery of China's trading partners. The government's 13th Five-Year Plan, unveiled in November 2015, emphasizes continued economic reforms and the need to increase innovation and domestic consumption in order to make the economy less dependent in the future on fixed investments, exports and heavy industry. However, China has made only marginal progress toward reaching these rebalancing goals. The new government of President XI Jinping has signaled a greater willingness to undertake reforms that focus on China's long-term economic health, including giving the market a more decisive role in allocating resources.

#### 4. Data and Descriptive Statistics

This study uses available annual data on China's real GDP and private consumption over the period of 1980 to 2014. All data series were obtained from the IMF databases. The annual Chinese logarithmic real GDP and private consumption are denoted by  $GDP_t$  and  $COS_t$ , respectively (their measures are on the left side vertical axis). The difference between the annual Chinese logarithmic real  $GDP_t$  and private consumption,  $COS_t$ , is defined as the spread and is denoted by  $SP_t$  (its measure is on the right vertical axis.)

Figure 1 displays the behavior of the respective annual Chinese logarithmic real GDP and private consumption over the sample period. As Figure 1 suggests, both the annual Chinese logarithmic real  $GDP_t$  and private consumption,  $COS_t$ , oscillated around a moderately upward trend over the sample period, except for the logarithmic real private consumption in 1990.

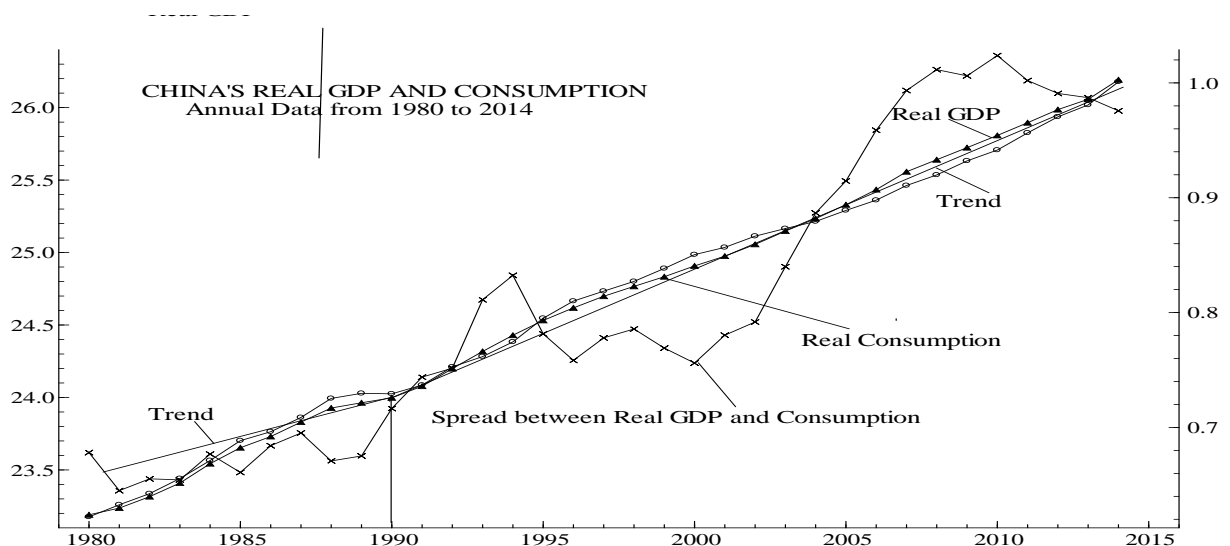


Figure 1

The mean of the logarithmic  $GDP_t$  during the sample period was 25.47 and ranged from 23.85 to 27.15 with a standard error of 0.99. The mean private consumption,  $COS_t$ , over the same period was 24.66 and ranged from 23.18 to 26.18 with a standard error of 0.87. Their correlation was 99.86 which is fairly high. The mean of the spread between real GDP

and consumption was 0.81 ranging from 0.65 to 1.02 with a standard error of 0.13. Moreover, as suggested in Figure 1, it is likely that the spread between the Chinese logarithmic real  $GDP_t$  and private consumption,  $COS_t$ , experienced structural breaks over the sample period in 1990 and 2014. The Chow test statistic confirmed these breaks.

#### 4.2 Stationarity of the Time Series

Econometrically, to estimate a Vector-autoregressive (VAR) Model, the time series data must be non-stationary and cointegrated. To this end, this study uses two standard unit root tests: the augmented Dickey-Fuller (1979) (ADF) test and the Phillips-Perron (1988) (PP) tests to determine stationarity and co-integration of the Chinese  $GDP_t$  and  $COS_t$ . The null hypothesis for both tests is that a unit root exists in the autoregressive representation of the series. The augmented Dickey-Fuller and Phillips-Perron unit root test results are reported in Table 1. An analysis of the test results suggests the presence of unit roots in level. Both series are stationary after the first differencing. These findings indicate that the series under consideration are non-stationary and integrated of order one, I(1).

**Table 1: ADF and PP Test Results, China's Annual Data from 1980 to 2014**

Series	<u>Augmented Dickey- Fuller</u>		<u>Phillips- Perron</u>	
	<i>t-Statistic</i>	<i>Probability*</i>	<i>t-Statistic</i>	<i>Probability*</i>
$CON_t$	-2.9425	0.0506	-2.9243	0.0527
$GDP_t$	-2.6578	0.0916	-2.6860	0.0866

Note: \* MacKinnon (1996) one-sided p-values; Null Hypothesis: the variable has a unit root.

#### 4.3 Long-run Cointegrating Relationship

Additionally, Engle and Granger (1987) argued that if two series are integrated of order one, I(1), there is a need to test for the possibility of a long-run cointegrating relationship among the variables. Since the cointegration and error correction methodology is well documented (Engle and Granger, 1987; Johansen and Juselius, 1990; Banerjee et al., 1993) only a brief overview is provided here. Johansen and Juselius' (1990) multivariate cointegration model is based on the error correction representation given by:

$$\Delta X_t = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \quad (1)$$

where  $X_t$  is an ( $n \times 1$ ) column vector of  $p$  variables,  $\mu$  is an ( $n \times 1$ ) vector of constant terms,  $\Gamma$  and  $\Pi$  represent coefficient matrices,  $\Delta$  is a difference operator,  $k$  denotes the lag length, and  $\varepsilon_t \sim N(0, \Sigma)$ . The coefficient matrix,  $\Pi$ , is known as the impact matrix and contains information about the long-run relationships. Johansen and Juselius' (1990) methodology requires the estimation of the VAR equation (1) and the residuals are then used to compute two likelihood ratio (LR) test statistics that can be used in the determination of the unique cointegrating vectors of  $X_t$ . The number of cointegrating vectors can be assessed by using two statistics: the trace test and the maximal eigenvalue test. The testing results are reported in Table 2.

**Table 2: Johansen Cointegration Test Results, Chinese Annual Data 1980 to 2014**

Number of cointegrating vectors	<u>Trace Statistics</u>		<u>Max-Eigen Statistics</u>	
	Statistics	C (5%)	Statistics	C (5%)
$r \leq 0$	22.1502*	18.3977	19.1208*	17.1477
$r \leq 1$	3.0294	3.8415	3.0294	0.0818

Note: \* denotes rejection of the hypothesis at the 5 percent level.

As shown in Table 2, results for cointegration tests suggest the existence of, at most, one cointegrating vector. This implies the presence of one independent common stochastic trends in this system of two variables, i.e., these two variables have a long-run cointegrating relationship.

### 5. Methodology and Model's Specification

As mentioned above, the objective of this investigation is to empirically study the causal relationship between Chinese real consumption and GDP. To achieve this objective, the following system of two equations are jointly determined by the Vector auto-regression.

$$COS_t = \alpha_0 + \sum_{p=1}^P \alpha_p COS_{t-p} + \sum_{q=1}^Q \alpha_q GDP_{t-q} + \alpha_{d,1} DUM_{1,1} + \alpha_{d,2} DUM_{1,2} + \varepsilon_{1,t} \quad (2)$$

$$GDP_t = \beta_0 + \sum_{m=1}^M \beta_m COS_{t-m} + \sum_{n=1}^N \beta_n GDP_{t-n} + \beta_{d,1} DUM_{2,1} + \beta_{d,2} DUM_{2,2} + \varepsilon_{2,t} \quad (3)$$

where  $COS_t$  and  $GDP_t$  are previously determined.  $\alpha_i$  and  $\beta_j$ , are parameter to be estimated and  $\varepsilon_{k,t}$  are disturbances.  $DUM_{k,l}$  is a dummy variable. One assumes a value of 1 for 1990 and 0 elsewhere and the other one assume a value of 1 for 2014 and 0 elsewhere to account for the structural beaks in the relationship between  $COS_t$  and  $GDP_t$  in 1990 and 2014.

In the estimation process, the estimated coefficients,  $\alpha_i$  and  $\beta_j$ , are retained based on the t-statistics. The exclusion test in the VAR, having a  $\chi^2$  distribution, is used to test for lag exclusion. Failure of the exclusion test to reject the null hypothesis that all estimated  $\alpha_q$ 's in equation (2) are equal to zero indicates that Chinese real  $GDP_t$  Granger causes real consumption,  $COS_t$ , i.e., there is unidirectional Granger causality from real  $GDP_t$  to real consumption  $COS_t$ . Similarly, failure of the exclusion test to reject the null hypothesis that all estimated  $\beta_m$ 's in equation (3) are equal to zero indicates that Chinese real consumption  $COS_t$  Granger causes real GDP; i.e., there is unidirectional Granger causality from real consumption  $COS_t$  to real  $GDP_t$ . Finally, if real  $GDP_t$  Granger causes real consumption,  $COS_t$ , and real consumption,  $COS_t$ , Granger causes real  $GDP$ , then there is a bidirectional Granger causality between Chinese real consumption,  $COS_t$ , and real  $GDP_t$ .

### 6. Empirical Result

The estimation results for the VAR system of equations (2) and (3), using the annual data from China over the period of 1980-2014 are reported by equations (4) and (5).

**Table 3: VAR Estimation Results, People's Republic of China's Annual Data, 1980 to 2014**

$$COS_t = 1.1402 + 0.66291COS_{t-1} + 0.3179GDP_{t-1} - 0.0832DUM_{1,1} + 0.0863DUM_{1,2} + \varepsilon_{1,t} \quad (4)$$

(3.083\*)      (5.77\*)      (3.34\*)      (-3.14\*)      (3.83\*)

$$GDP_t = 0.7956 - 0.2399COS_{t-1} + 1.2049GDP_{t-1} - 0.555DUM_{2,1} + 0.0606DUM_{2,2} + \varepsilon_{2,t} \quad (5)$$

(3.46\*)    (-2.85\*)      (16.40\*)      (-2.71\*\*)      (3.46\*)

Log-likelihood = 165.547       $R^2$  (LR) = 0.9998       $F$ -statistic (8, 54) = 654.967\*

**Note:** Values of t-statistics are in parentheses. “\*” and “\*\*” indicate the 1 percent, 5 percent, significant level, respectively.

A closer look at the estimation results reveals that on the strength of the t-statistics, the lag length of one or both of the real consumption,  $COS_t$ , and real  $GDP_t$  are retained in the model. Additionally, the calculated exclusion test statistic,  $\chi^2$ , testing the null hypothesis that the estimated coefficients of  $GDP_{t-1}$  in equation (4) are equal to zero is 11.139 with the p-value of 0.0008. Similarly, the calculated exclusion test statistic,  $\chi^2$ , testing the null hypothesis that the estimated coefficients of  $COS_{t-1}$  in equation (5) are equal to zero is 8.1040 with the p-value of 0.0044. Taken together, these two exclusion test results indicate that there is a bidirectional Granger causality between Chinese real consumption,  $COS_t$ , and real  $GDP_t$ ; i.e., Chinese real consumption,  $COS_t$ , and real  $GDP_t$  mutually affect each other.

## 7. Concluding Remarks and Policy Recommendations

Literature on empirical investigations of the causal relationship between GDP (as proxy measure for income) and consumption, postulated by the demand side of macroeconomics, yielded contradictory results for different economies. This suggests that the nature of their causality in a given economy should be empirically determined. The objective of this investigation is to study the causal relationship between Chinese real consumption and GDP. To achieve this objective, this study specified and estimated a VAR system of two equations using annual data from China from 1980 to 2014.

The estimation results suggest that there is a bidirectional Granger causality between Chinese real consumption,  $COS_t$ , and real  $GDP_t$ ; i.e., Chinese real consumption,  $COS_t$ , and real  $GDP_t$  mutually affect each other.

As to the policy implications, the above findings suggest that as much as the Chinese government like to promote exports in the age of globalization and the fashionable Washington Consensus Development doctrine, it is well advised that the Chinese government simultaneously promote domestic consumption to develop its economy. This approach not only is supported by empirical evidence, it also mitigates the negative impact of the international adverse economic conditions on the Chinese economy.

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