Short-Run and Long-Run Marginal Propensities to Consume: A Case Study of China

Lucille Pointer[1], Ruth Robbins[2], Leonie Karkoviata[3] and Thai Nguyen[4]

Abstract

   Short-and long-run marginal propensities to consume play a critical role in economic development and stimulus policy measures. Insofar as it can be ascertained, there has been no empirical investigation into the magnitude of these Chinese variables. In an effort to fill this gap in the literature, this study specifies and uses available annual data to estimate a distributed lag model to derive the empirical values for these two variables for the Chinese economy. The empirical results reveal that the Chinese short-run MPC is 0.334164 and long-run MPC is 0.8730238 which are in fact much lower than the corresponding figures in emerging and advanced economies, and economies of its neighboring countries in Asia. This in turn suggests that macroeconomic policy is costlier for China, as compared to other countries.

 Keywords: Distributed lag model, reduced form, China; Short-run MPC, long-run MPC.

1.   Introduction

   Within the past three decades, the Chinese economy has experienced tremendous growth, and now it easily parallels the economic size of the three largest economies in the world: USA, EU and Japan (Tyers, 2014). According to Zhu (2012), the pace and scale of China's economic growth and transformation has no historical precedent. Much of this growth is attributed to the major economic reforms after 1978. It also reflected two major market trends: transition from a planned economy to a socialist market based economy, and the active adoption of modern technology and Western management concepts. Key to this tremendous growth was economies of scale and scope achieved in light manufacturing. Many economists within and outside of the country have questioned whether China can continue to sustain this phenomenal rate of growth (Zhu, 2012; Bull, 2013; Chang et al., 2015). To date, the current economic situation seems to corroborate this. In 2015, China's experienced only a 6.9% growth rate which is down considerably from previous years (Magnier, 2016). The projected rate of growth for the upcoming years is not expected to be any better than that of 2015 (BBC, January 19, 2016). Many feel that this downward trend will continue because export markets are not as strong since many international economies lack the ability to absorb the Chinese exports at the same rate as in previous decades. Additionally, Chinese labor costs have risen due to a decrease in the number of laborers moving from rural areas, a nation-wide population crisis stemming from China's one child policy, and an aging population.

   According to Magnier (2016), the economic tools used previously by the Chinese government to reverse short term declines in the economy are no longer effective. Among the tools used in the past, was an increase spending on infrastructure, easy credit and rapid

[1]   *Professor of Marketing and Chair, MMBA Department, College of Business, University of Houston-Downtown, Houston, Texas, e-mail:* pointerl@uhd.edu

[2]   *Professor of Management Information Systems, College of Business, FAMIS Department, University of Houston-Downtown, Houston, Texas, e-mail:* robbinsR@uhd.edu

[3] *Lecturer of Economics, College of Business, FAMIS Department, University of Houston-Downtown, Houston, Texas, e-mail:* karkoviatal@uhd.edu

[4] *Lecturer of Economics, College of Business, FAMIS Department, University of Houston-Downtown, Houston, Texas, e-mail:* nguyentha@uhd.edu

increase in exports. Zhu (2012) posited that the banking system, which is dominated by the state-controlled banks, lends disproportionally to special interests such as local government projects, and to firms in the state sector, results in economic distortions in the economy. In his opinion, this is a major obstacle to growth.

This aforementioned economic reality has forced the Chinese policy makers to restructure their economic development strategies. It would seem that a switch from an export-oriented to an inward-focused growth is simply a matter of sustaining high investment and substituting consumption for exports. But this has been problematic because the growth to date has emphasized light manufacturing while China's growing middle class demands quality products and services that are as yet poorly represented in its production basket. To diversify China's output towards these products, requires a major reform of its heavy manufacturing and services sectors and higher investment in associated human capital. This requires the extension of industrial reforms into previously protected heavy manufacturing and services industries, where reductions in costs and prices could have major stimulatory effects on the economy as a whole.

Additionally, key elements of the global imbalance to which China has contributed is associated with its high savings rate. Mihael et al. (2013) reported that Chinese household savings rate increased from 37.3% to 52.4% between 2002 and 2008. Xing (2010) indicated that the People's Republic of China (PRC) national saving rate is unusually high and much higher than the international norm. Knight and Wang (2011) reported that the unusually high savings rate actually exceeded consumption in 2009. A high savings rate is a direct result of an economy where there is poor health care, shortage of food, and doubts about future income capability.   A political backlash from the advanced economies has also contributed to China's need for reforms that foster more inward-oriented growth. As a consequence, the new reforms are directed not only toward continuing growth in output but also to the restoration of balance.

Often researchers compare the Chinese savings rate to the Japanese savings as an indicator of economic problems. Xing (2010) mentioned that it appears that the Japan's household savings rate peaked in 1975, and the Chinese saving rate continued to grow after 2005. However, he indicates that this may not be the case.   In the Chinese household surveys, consumers' purchases of houses are classified as investments. The welfare allocation for housing was abolished by the government in 1998 (Chang et al., 2015). Faced with rising housing prices, mortgage payments have comprised a larger portion of the monthly expenditures of individual households in urban areas. Monthly mortgage payments are usually considered savings and not consumption. In addition, pitfalls in the survey methodology may underestimate household propensity for consumption. Peng (2009) reported that an official of the Chinese Statistics Bureau acknowledged that the survey methodology was designed in the 1980s and failed to reflect subsequent structural changes in the economy. Many consumption expenditures, such as school selection fees and under-the-table payments for visits to doctors in hospitals, are not covered by the survey. Rents for houses are based on house construction costs rather than on market value, thus underestimating household consumption. Given these facts, the difference between the peak in household saving rates in the PRC and Japan may not support the view that Chinese consumers save more than their counterparts in Japan

Another factor to consider in understanding the performance of the Chines economy is the share of household consumption as a percentage of GDP. Guo and N'Diaye (2010) reported that China's private consumption as a share of GDP declined from around 55 percent in the early 1980s to around 37 percent in 2008. The decline in a country's share of private consumption during the early development stages is not in itself a surprise - savings naturally rise at early stages of development as households move away from subsistence levels of

income, and greater capital accumulation is needed to finance investments and growth. However, the size of the fall in China's private consumption share certainly stands out.

The justification provided to explain the downward trend in private consumption relates both to households' savings rates and income as well as being statistical. Studies by Mihaela et al. (2013), Blanchard and Giavazzi (2005), Kuijs (2005), and Modigliani and Cao (2004), also attribute the decline in private consumption to a rise in households' saving rates, reflecting precautionary savings, particularly by elderly households, in the face of limited healthcare, pensions, and education benefits. Indeed, Chamon and Prasad (2008) find that it is the elderly that save the most in China, contrary to typical lifecycle patterns. Wei and Zhang (2009), on the other hand, attribute the increase in households' savings rate during 1990–2007 to growing gender imbalances as a lower number of females relative to men encourages a more competitive marriage environment that requires higher and higher savings in specific households. In a 2007 study, Aziz and Cui find that the fall in the share of private consumption is due to a decline in households' income as a share of GDP and that this decline is broad-based, affecting income from wages, savings, and government transfers. Bai and Qian (2009) showed that the decline in the labor share of income is mainly a statistical artifact resulting from changes in the way labor income is compiled.

It appears that 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, emphasized 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.

Marginal propensity to consume is one of the most important variables used in determining the effectiveness of macroeconomic policy actions. Insofar as it can be ascertained, there has been no empirical investigation into the magnitudes of the short-and long-run marginal propensities to consume in the Peoples' Republic of China. Therefore, the objective of this investigation is to empirically estimate the two measures (short- and long-run) of marginal propensities to consume. 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

Demand-side macroeconomics is predicated on the belief that consumer demand can be influenced by government intervention in markets. Often referred to as Keynesian economics, it postulates that heavy government spending is needed to increase aggregate demand. Increasing government spending, and manipulating the supply of money through fiscal and monetary policies are a bedrock of Keynesian economic theory. This is completely opposite to classical economic theory which proposes that economic activity is derived from natural market forces, and too much governmental involvement reduces the resources available for individual and business use. Keynesian theory has been an accepted economic growth model since the Great Depression in capitalist and non-capitalist nations. However, nations may differ in which components of the model are selected to stimulate economic growth. The consumption theory predicts a direct relationship between consumer

income and the level of aggregate consumption. Therefore, the effectiveness of macroeconomic policy measures is based on an economy's marginal propensities to consume.

The relationship between consumption and household income has been well documented in the literature. A comprehensive survey of the literature on this relation was done in 2014 by Tapsin, and Hepsag. Overall, they found a positive relationship between consumption and economic growth. Investigating the relationship between consumption expenditure and income in Nigeria, Alimi (2013) found that as income increases, the average propensity to consume decreases, but the relationship was not stable in the long run. In a study in 2013, Ofwona (2013) reported that consumption is determined by income in Kenya.

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 used a country's own GDP as the sole explanatory variable in the investigating process. A causal relationship between real consumption and GDP in Mexico and the United States was detected by Guisan (2004). He demonstrated a strong causal relationship of private consumption on GDP and a lower dependence when the variables are reversed. Gomez-Zaldivar and Ventosa-Santaularia (2009) investigated the causality between consumption and GDP in Mexico and the United States, and found no evidence of either causality or cointegration between consumption and GDP.

Генчев, (2012) studied the relationship between income and consumption in Bulgaria and Russia over the period 1990-2010, and found that there existed a positive and significant long run relationship between gross national income and consumptions for both countries. Investigating the relationship between consumption expenditure and economic growth in India during the period between 1950 and 2008, Mishra (2011) found a long-term unidirectional causality from real consumption expenditure to economic growth.

Using annual data from 1976-2009, Sakib-Bin-Amin (2011) examined the relationship between consumption and economic growth in Bangladesh. He reported a long-run unidirectional causal relationship running from economic growth to consumption expenditure. However, Nwabueze (2009) indicated that an increase in gross domestic product has no significant effect on the personal consumption expenditure, and that gross domestic product explained less than 4% of the personal consumption expenditure in Nigeria.

In response to the slowed GDP, China implemented a countercyclical governmental policy in the market during the 2008 financial crisis. This involved the injection of trillions in Chinese currency in heavy manufacturing (Chang et al., 2015). Thus far, this has not resulted in a major upward swing in GDP, which was expected. On the contrary, there are increasing signs that the economy has proceeded too far into heavy manufacturing. The government's most recent five year plan continue to emphasize economic reform with a stronger emphasis on higher domestic consumption and less on export led-developments for growth. This seems to signal a stronger reliance on demand orient policies, but major reforms in healthcare, education and employment opportunities are needed to increase market consumption (Mihaela et al., 2013). Haldar and Mallik (2010) concluded that investments in education and health are very important and has a significant positive long run effect on per capita GNP growth.

3. Methodology

To specify the model for this investigation, following Green (2008), we let L be the lag operator where $Lz_t = z_{t-1}$ and $L(Lz_t) = L^2 z_t = z_{t-2}$; then, the dynamic regression model, expressed in equation (1),

$$y_t = \theta + \sum_{i=0}^{\infty} \varphi_i x_{t-i} + \varsigma_t \tag{1}$$

can be rewritten as:

$$y_t = \theta + \sum_{i=0}^{\infty} \varphi_i L^i x_t + \varsigma_t \tag{2}$$

Also, let $B(L)$ be a polynomial in L, where $B(L) = \omega_0 + \omega_1 L + \omega_2 L^2 + \ldots\ldots.$, and considering a common polynomial in the lag operator that is in the form:

$$A(L) = 1 + aL + (aL)^2 + (aL)^3 + \ldots\ldots = \sum_{i=1}^{\infty} (aL)^i$$

$$\text{if } |a| < 1, \text{ then } \quad A(L) = \frac{1}{1 - aL} \; .$$

Also, a distributed lag model in the form:

$$y_t = \alpha + \beta \sum_{i=0}^{\infty} \gamma^i L^i x_t + v_t$$

can be rewritten as:

$$y_t = \alpha + \beta(1 - \gamma L)^{-1} x_{t-1} + v_t \tag{3}$$

if $|\gamma| < 1$; then equation (3) is defined by Green (2008) as the moving average form or distributed lag form. Multiplying through by $(1 - \gamma L)$ and collecting like terms yield the following autoregressive form,

$$y_t = \alpha \, (1 - \gamma L) + \gamma y_{t-1} + \beta x_t + (1 - \gamma L) v_t$$

More conventionally, the above expression can be expressed as:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_t + \varepsilon_t \tag{4}$$

It should be noted here that equation (4) is the reduced form of the indefinite distributed lag model expressed in equation (1); therefore, β_1 is the sum of all the impacts of a change in x_t on y_t in all subsequent periods. This study defines C_t and Y_t as household consumption expenditure and national income, respectively and follows Green (2008) to use the procedure deriving equation (4) to specify a reduced formed consumption function with short-run and long-run marginal propensities to consume as follows:

$$\ln C_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln C_{t-1} + \varepsilon_t \tag{5}$$

As articulated by Green (2008), in this specification, β_1 is the short-run marginal propensity to consume (MPC_s) (elasticity since the variable are in logs) and the long-run marginal propensity to consume is MPC_l where

$$MPC_l = \frac{\beta_1}{(1-\beta_2)} \tag{6}$$

To test the null hypothesis that MPC_l is greater than or equal to 1, note that if $MPC_l = 1$, then $\beta_1 = 1 - \beta_2$, or $\beta_1 + \beta_2 = 1$. Consequently, the null hypothesis that $H_0 : \beta_1 + \beta_2 = 1$ can be tested with a linear restriction on the estimated coefficients of equation (6). The test-statistic for this hypothesis $t_{(n)}$ or $F_{(1,n)}$, where n is the degrees of freedom.

4. Data Description and Empirical Results

This study used available annual data on China's national income and household consumption expenditure over the period from 1989 to 2014. All data series were obtained from the IMF databases, published by the International Monetary Fund. The annual Chinese logarithmic national income and household consumption expenditures are denoted by $\ln Y_t$ and $\ln C_t$, respectively.

The mean of the logarithmic Y_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, C_t, over the same period was 24.66, and ranged from 23.18 to 26.18 with a standard error of 0.87, and correlation of 99.86 which is fairly high.

4.2 Empirical Results and Discussion

The estimation results for equation (5), using the annual data from Chinese over the period 1985-2014, are summarized in Exhibit 1.

Exhibit 1: Estimation Results for Equation (5), China's Short and long-Run MPCs

$$\ln C_t = 0.988298 + 0.334164 \ln Y_t + 0.617254 \ln C_{t-1} + \varepsilon_t$$

$$(0.228440) \quad (0.069776) \quad (0.080048)$$

$\overline{R}^2 = 0.9990$; Log likelihood $= 78.2004$; DW $= 1.23167$; $F_{(2,32)} = 17{,}380.5531^*$; AIC= -4.2972

Note: Data from International Financial Statistics, IMF.

An analysis of the estimation results indicates that, based on the strengths of the calculated $t_{(32)} = 4.250979$ and $F_{(1,32)} = 18.070825$, the null hypothesis that $H_0 : \beta_1 + \beta_2 = 1$ should be rejected at any conventional level of significance. Rejection of the null hypothesis indicates that the long- run marginal propensity to consume in Chinese economy is significantly less than 1.

Also, as indicated in the Methodology section, given the estimated coefficients for equation (5), the short-run MPC for the People's Republic of China is 0.334164 and, in fact, the numerical value of long-run MPC is derived by equation (6) to be:

$$MPC_l = \frac{0.334164}{(1-0.617254)} = 0.8730238$$

which are much less than the figures in the advanced and emerging economies.

5   Concluding Remarks and Policy Recommendations

After more than three decades of reforms and spectacular growth, 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. Chinese policy makers are forced to restructure their economic development strategies.

The new development strategy emphasized 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.

Marginal propensity to consume is the most important variable determining the effectiveness of macroeconomic policy actions. Insofar as it can be ascertained, there has been no empirical investigation into the magnitude of the effects of short- and long-run marginal propensities to consume (MPC) in the Peoples' Republic of China.

In an effort to fill out the literature gap, this study specified, using available Chinese annual data to estimate a distributed lag model where the estimated coefficients allowed us to derive the short- and long-run marginal propensities to consume. The empirical results reveal that the Chinese short-run MPC is 0.334164 and long-run MPC is 0.8730238 which are in fact much lower than the corresponding figures in emerging and advanced economies, as well as in the economies of neighboring countries in Asia. From the Keynesian school of thoughts, the magnitude of the MPC in the economy determines the consumption, investment, government expenditure, import and export multipliers, in the fashion that the smaller the MPC, the smaller the multipliers are, the larger the countercyclical policy measure must be to achieve a certain macroeconomic policy objective.

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