IMPACT OF GOVERNMENT SPENDING ON PRIVATE SECTOR CONSUMPTION IN THE ECONOMIES OF G7 COUNTRIES

HAMID REZA ARAB\textsuperscript{a1} AND ALI HAGHIGHAT\textsuperscript{b}

\textsuperscript{a}Young Researchers and Elite Club, Shiraz Branch, Islamic Azad University, Shiraz, Iran
\textsuperscript{b}Department of Economics, Shiraz Branch, Islamic Azad University, Shiraz, Iran

ABSTRACT

In the macroeconomic literature, survey of the impact of government spending on macroeconomic variables such as private sector consumption is important. Consumption as comprehensive discussions of macroeconomic, is one of the components of GNP of the economy of any country. Most studies about consumer behavior in private sector are put on Income and disposable income and the most important factor in determining the household disposable income, is government spending. Accordingly this study using annual data (1998-2012) of G7 countries to investigate the relationship of government spending and private sector consumption. The results of the model estimation by using fixed effects method, indicate the positive effect of government spending on private consumption. Hence, keynesian hypothesis of research based on positive relationship and complementary (Crowding-in) between these two variables for the G7 economies, is accepted

KEYWORDS: Government spending, Private sector consumption, Panel data, Fixed effects method, Member countries of G7

This article investigates one of the most comprehensive macroeconomic issues, the consumption. Consumption is one of the components of GDP of the economy of any country and for the economic evaluations, recognition components which affecting consumption and consumption function, is necessary (Rejaee and Ahmadi, 2013). Therefore, identifying the factors affecting consumption and their impact on this variable, helps economic policymakers, to conduct consumption in the terms of inflation and recession (Molood et al., 2009). Most studies of consumer behavior in private sector, are about income and disposable income. Government is the most important factor in determining the household disposable income. An appropriate government spending lead to economic mobility in different regions of a country (Sharifi and Alizadeh, 2003). The government can affect disposable income and therefore household consumption (Private sector consumption) through fiscal policy expansion or contraction. Therefore, recognizing the importance of the role of government spending, in order to assess its impact on consumer behavior and private consumption, is necessary (Agheli and Emamgholipur, 2013). Moreover, to understand the impact of fiscal policy on the welfare of the people, analyze the impacts of government spending on private consumption is important. Because private consumption as largest component of aggregate demand, often considered as one of the most important determinants of welfare (Horvath, 2009).

In discussing the impact of government spending on private consumption, there are different views. Book of Bailey (1971) is the first attempt in the framework of Keynesian macroeconomics that analyzes the channels that government spending affects consumption, and provided a model in which government spending in each period, is considered as a substitute for private consumption. In this regard, Berben and Brosens (2007) in their study showed that an increase in government spending leads to a decline in private consumption in OECD countries is. But Nieh and Ho (2006) showed that private consumption and government spending in 23 OECD countries are complementary to each other. Schclarek (2007) conducted a study for 19 industrialized and 21 developing countries and showed that government spending have Keynesian effects for both industrial and developing countries. D’Alessandro (2010) also examined this issue among the 20 selected areas of Italy and showed positive and significant effect of government spending on private consumption.

About interior study In this context, study of Hasani Sadrabadi and Kashmari (2008) can be cited that showed indirect effects of defense spending on private consumption is negative. Study of Hasani Sadrabadi et al. (2011) also confirmed negative indirect effect of health spending on private consumption. The study of Naseri and Naseri (2012) also confirmed the Crowding-Out effect in economy of Iran. Samadi and Seyadi (2013) divided government spending into two groups based on Barrow and showed that in the first group, government spending (spending affecting utility) and private consumption are

\textsuperscript{1}Corresponding author
complementary in the short run and independent in the long run. The second group spending (spending and services as inputs in the process of the private sector productions) in the short and long runs, has a direct relationship with private consumption (complementary).

Point to note is that Group7 countries consists of seven industrialized countries which forms very large percentage of the world economy and research on their economy is very important. What distinguishes this study with previous studies is that no study paid to the impact of government spending on private consumption in the economy of these countries with this approach yet. Therefore, a fundamental question in this research is that what effect government spending has on private consumption in the economy of G7 countries? So this study using econometric methods and panel of G7 member countries over the period 2012-1998 to determine empirical relationship between government spending and private consumption and find an appropriate answer to question of the study. Therefore the hypotheses in which government spending and private consumption are complementary in the economy of the G7 countries will be test. Data are obtained from World Development Indicators (WDI).

RESEARCH THEORETICAL FRAMEWORK

Private consumption

The relative income hypothesis

In Dosenbery consumption function, consumer behavior are depends on current income in the previous income levels and will regulate according to the highest previous level of income. The highest levels of income in previous periods affect consumption. So, the decrease in current income causes no change in the level of consumption. Dosenbery model, indicates that consumption is affected by current income and highest level of income up to now. The highest level of income is derived as follows:

$$y_{\text{Max}} = \text{Max}(y_{t-1}, y_{t-2}, \ldots)$$  \hspace{1cm} (1)

$$C_t = f(y_t, y_{\text{Max}})$$  \hspace{1cm} (2)

Dosenbery model developed by Brown. So people will change their behavior slowly, and disposable income and previous consumption or highest consumption levels affects the current consumption (Dornbusch and Fischer, 1997):

$$C_t = f(y_t, c_{\text{Max}})$$  \hspace{1cm} (3)

$$C_t = f(y_t, c_{t-1})$$  \hspace{1cm} (4)

Permanent Income Hypothesis

This theory are belong to Milton Friedman. This theory remark that people adjust their consumption by permanent income. So current income cannot determines consumer behavior. Random changes in income, does not affect consumption, and normal expected revenue or permanent income, regulates consumer behavior. Friedman consumption function is designed as follows:

$$C_t = kY_P$$  \hspace{1cm} (5)

So that $C_t$ is current consumption and $Y_P$ is current disposable and permanent income. Statistical information of permanent income are not available, for this reason Friedman assumes that this variable is weighting and reduction function of current income and income in previous periods (Dornbusch and Fischer, 1997):

$$Y_P = \lambda Y_t + \lambda(1-\lambda)Y_{t-1} + \lambda(1-\lambda)^2Y_{t-2} + \ldots$$  \hspace{1cm} (6)

Government Spending

In the discussion of government intervention in the economy, classical economists considered limited role for government. With the spread of Marxism and Socialism thought, presence of government in the economy was highlighted. Then with the appearance of Keynesian thoughts, government's role developed in underpin economies. So governments in economies that called “capitalism” considered as a complementary to private sector (Arabmazar and Chalak, 2011). The 1980s was a decade in which this idea eventually overcomed that in economy the public sector is less efficient than private sector and keynesian and socialist ideas must remove from the scene and it provided context for revival of the liberalism approach (Arabmazar and Chalak, 2011). It is noteworthy that based on the theoretical literature, there is no consensus about the relationship between government activities with private sector consumption.

Urban Population

Urbanization is the process of population transfer and labor force from rural to urban areas which mainly includes farmers entry to city and their employment in the industrial sector and related occupations. Urbanization occurs In industrialized countries and is one of the main features of economic development (Jones, 2004). The most important factors to migrate to urbans are income gap. And
this income gap is Because of concentration of factories and manufacturing companies in urbans. This migration and growth of urbanization, also increases consumption (Esazadeh and Mehranfar, 2013). Due to rapid population growth and subsequently urbanization growth and increase in consumptions and its effects on consumption patterns, study the relationship between urbanization and household consumption is essential for long run policies. Therefore this issue is considering by economists in recent decades (Esazadeh and Mehranfar, 2011).

Unemployment

Unemployment in economic are people who are not employed or ready to work or jobseeker (Faraji, 2006). Unemployment is one of the macroeconomic variables which plays an important role in economic decisions making and policies. Unemployment is considered as harmful and undesirable phenomenon to society and its increase causes disorder in private consumption expenditure, which is the engine of aggregate demand for economy. So decline in demand for consumer goods and services, through reducing investment, causes reduction in aggregate demand more than ever and creates a great economic crisis which also causes further reduction in demand for consumer goods and services (Hasanzadeh and Kyanvand, 2010).

RESEARCH METHODOLOGY

Theoretical model

Present study using panel of G7 countries to investigate the impact of government spending on private consumption. The model of this work is based on the models proposed by d’Alessandro (2010), Ganelli and Tervala (2009) and Linnemann and Schabert (2006). The utility function of household is:

\[
U = \log(C + \alpha G) - \frac{1}{1 + v} L^{1+v} + V(G)
\]  

(7)

Where C, G and L respectively denote private consumption, public spending and the amount of labor supplied. Public spending has also a separable utility impact through the term V(G). The parameter \( \alpha \) measures the elasticity of the marginal disutility of work. The marginal utility of private consumption is given by:

\[
\frac{\partial U}{\partial C} = \frac{1}{C + \alpha G}
\]  

(8)

A negative (positive) \( \alpha \) implies that an increase in G increases (decreases) the marginal utility of private consumption implying complementary(substitutability). The budget constraint of household is given by:

\[
C = PoL - P \tau + \int_0^1 D(i)di
\]  

(9)

Where P is the aggregate price level, w is the real wage rate, t is lump-sum tax rate and D are the dividends from firms. It’s important to note that much of the governments budget spend on goods and services that may even be produced by private sector and so can affect consumer utility function. Hence, identification of optimal fiscal policy depends on knowledge of the type of relationship between government spending and private consumption (Auteri and Costantini, 2010). So it was briefly shown that private consumption is a function of government spending.

Econometric model

In recent years the panel approach is widely used. Panel data approach using additional information from cross sectional dimension to improve estimations. In panel data approach, there is less heteroskedasticity and multicollinearity among the variables. According to research and theoretical framework about the effect of government spending on private consumption, the econometric model can be written as:

\[
LHCON_i = \beta_0 + \beta_1 LGOV_i + \beta_2 UNEMP_i + \beta_3 URPOP_i + \varepsilon_i
\]  

(10)

Where LHCON_i is the dependent variable and represents log of household consumption per capita for country i at time t. Independent variables include: LGOV_i is the log of government spending, UNEMP_i is the unemployment, URPOP_i is the urban population and \( \varepsilon_i \) is the error term. \( \beta_0,\ldots, \beta_3 \) is the coefficients that must be estimated. \( \beta_1 \) is the long run elasticity of government spending. The positive \( \beta_1 \) (negative) represents complementary (substitution) relationship between this two variables.

Model estimation method

First the stationarity of variables will be test. We expect that the variables are non-stationary. Accordingly in order to avoid the spurious regression problem a cointegration test will be require to be able to trust to the results of the model estimation. Thus the special unit root and cointegration test for panel data will also be use. Then by using relevant tests, appropriate method for estimation of model will select.
RESULTS

**Im, Pesaran and Shin unit root test (2003)**

IPS test is based on augmented dickey fuller (ADF) test. The null hypothesis is that each of the series in the panel contains a unit root. The null hypothesis and alternative hypothesis is as follows:

\[
\begin{aligned}
H_0 : \rho_i = 0 & \quad i = 1,2,\ldots,N \\
H_1 : \rho_i < 0 & \quad i = 1,2,\ldots,N \\
H_1 : \rho_i = 0 & \quad i = N_{i1},\ldots,N
\end{aligned}
\]  (11)

The Eviews7 is used to estimate the variables of the equation (10) which are shown at tables (1) and (2):

**Table 1: Im, Pesaran And Shin Unit Root Test, In Level**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Symbol</th>
<th>Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of household consumption per capita</td>
<td>LHCON</td>
<td>1.318</td>
<td>0.906</td>
</tr>
<tr>
<td>Log of government spending</td>
<td>LGOV</td>
<td>1.823</td>
<td>0.965</td>
</tr>
<tr>
<td>unemployment</td>
<td>UNEMP</td>
<td>1.032</td>
<td>0.150</td>
</tr>
<tr>
<td>urban population</td>
<td>URPOP</td>
<td>-2.358</td>
<td>0.009</td>
</tr>
</tbody>
</table>

**Table 2: Im, Pesaran And Shin Unit Root Test, In First Order Difference**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Symbol</th>
<th>Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of household consumption per capita</td>
<td>LHCON</td>
<td>-3.738</td>
<td>0.000</td>
</tr>
<tr>
<td>Log of government spending</td>
<td>LGOV</td>
<td>-3.207</td>
<td>0.000</td>
</tr>
<tr>
<td>unemployment</td>
<td>UNEMP</td>
<td>0.052</td>
<td>0.052</td>
</tr>
</tbody>
</table>

It can be seen that the log of household consumption per capita, unemployment and government spending variables are stationary in first order differencing with individual effect.

**Im, Pesaran and Shin unit root test for residuals**

The use of panel cointegration techniques to test the presence of long run relationship among I(1) variables has been motivated by the necessity to find more powerful tests then those traditionally used in time series analysis. In this method after estimation of model, the Im, Pesaran and Shin unit root test must be tested on residuals of the model. IPS tests for cointegration uses the null hypothesis of no cointegration. The results are reported in the table (3):

**Table 3: Im, Pesaran And Shin Unit Root Test For Residuals**

<table>
<thead>
<tr>
<th>Residual</th>
<th>Statistic</th>
<th>Prob</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>-4.022</td>
<td>0.000</td>
<td>stationary</td>
</tr>
</tbody>
</table>

In the table (3) E represents residuals of estimated regression. Result show that the null hypothesis is rejected (using a 1% significance level) and the alternative hypothesis is accepted. Therefore, we have strong evidences that the variables are cointegrated.

**Pedroni Cointegration Test**

Pedroni examined cointegration in panel data. In the study which conducted by pedroni, seven different statistics are expressed that divided into two groups. Four “Within Dimension Statistics” which is called “Panel Cointegration
Statistics” and are shown with the prefix Panel. Three “Between Dimension Statistics” which is called “Group Mean Panel Cointegration Statistics” and are shown with the prefix group. These two variables, after standardization, are shown with the paneladf-stat and groupadf-stat symbols respectively. In both within dimension and between dimension statistics the null hypothesis is no cointegration. Only two of the seven statistics are parametric and others are Non-Parametric. Since the parametric statistics are appropriate for panel data, this statistics are used in this study. Table 4 reports the results of pedroni cointegration test:

Table 4: Pedroni cointegration test

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel  v-statistic</td>
<td>6.615</td>
<td>0.107</td>
</tr>
<tr>
<td>Panel  ρ - statistic</td>
<td>2.365</td>
<td>0.991</td>
</tr>
<tr>
<td>Panel pp-statistic</td>
<td>-3.633</td>
<td>0.000</td>
</tr>
<tr>
<td>Panel ADF-statistic</td>
<td>-2.978</td>
<td>0.001</td>
</tr>
<tr>
<td>Group  ρ -statistic</td>
<td>3.281</td>
<td>0.999</td>
</tr>
<tr>
<td>Group pp-statistic</td>
<td>-6.064</td>
<td>0.000</td>
</tr>
<tr>
<td>Group ADF-statistic</td>
<td>-4.436</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The obtained statistics from the test and their significance level, the null hypothesis is rejected. In other words results indicating cointegration among the variables of this study.

F-Limer Test (Pool or Panel Data Method)

F-limer test is also known in some sources as Chow test. In this research F-Limer test has been used for choosing between pool and panel data method. If obtained probability quantity is smaller than 0.5, panel method will be use and if it is not so, pool data method for measuring the model will be use. The null hypothesis shows that the intercept is the same among sections and it means pool data method must be used to estimate model (Jafari Samimi and Ekhtiari, 2009). Then if the results of F-limer test, indicates the panel data method, in order to choose between fixed effects and random effects methods for measuring model, Hasman test will be use. Brief results of F-limer test has been shown in table 5:

Table 5: F-limer test

<table>
<thead>
<tr>
<th>Kind of Test</th>
<th>F statistic</th>
<th>Chi-Sq. Statistic</th>
<th>Prob</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-limer</td>
<td>56.945</td>
<td>145.759</td>
<td>0.000</td>
<td>Panel data</td>
</tr>
</tbody>
</table>

As the results show, probability quantity for F-limer equals 0.000, which is less than 0.05. This probability rejecte the null hypothesis based on pool data method and indicates the panel data method will be use. In the next step Hasman test is used for selecting between fixed effects method and random effects method.

Hausman Test (Fixed Or Random Effects)

Hausman test is the most common tests for selecting between fixed or random effects method. The null hypothesis shows that the pool method will be use. Brief results of Hausman test has been shown in table 6:

Table 6: Hausman Test

<table>
<thead>
<tr>
<th>Kind of Test</th>
<th>Chi-Sq. Statistic</th>
<th>Chi-Sq. d.f.</th>
<th>Prob</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section Random</td>
<td>85.730</td>
<td>3</td>
<td>0.0000</td>
<td>Random effects method</td>
</tr>
</tbody>
</table>

According to the results, obtained probability quantity for this test equals 0.000 and is less than 0.05 and rejecte the null hypothesis based on using random effects method and fixed effects method will be use in order to estimate the model.

The Estimation of Model Using Fixed Effects Method

The results of the table 7 shows that government spending has a direct relationship with private consumption and it’s coefficient in the model is (0.2210) positive and also significant. Note that since the government spending variable entered in the model in logarithm form, its coefficients represent elasticity. It means that a one percent increase in government spending, the private consumption by will increase 0.2210 percent. In other words, government spending has complementary and incentives aspects for demand of private sector. Brief results of estimating the model by using panel data method – fixed effects method has been shown in table 7:
Table 7: Estimating Regression Model With Panel Data
Method – Fixed Effects Method

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>7.2095</td>
<td>3.9183</td>
<td>0.0002</td>
</tr>
<tr>
<td>LGOV</td>
<td>0.2210</td>
<td>3.7964</td>
<td>0.0003</td>
</tr>
<tr>
<td>UNEMP</td>
<td>-0.0086</td>
<td>-4.7491</td>
<td>0.0000</td>
</tr>
<tr>
<td>URPOP</td>
<td>0.0315</td>
<td>4.2205</td>
<td>0.0001</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.9811</td>
<td>154.0441</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Regression Statistics

- R-squared : 0.99
- \( R^2 \) -squared : 0.99
- F-statistic : 19543.57
- Prob(F-statistic) : 0.000

The estimated coefficients for unemployment equals -0.0086 which indicates an inverse relationship between unemployment and private sector consumption. Thus, the increase in unemployment in the economy of studied countries reduces household consumption through a reduction in household income and consequently reduction in demand. Although, this effect is negligible. Obtained coefficient quantity for urban population equals 0.0315 which indicates a direct relationship and positive effect of urban population on the private sector consumption. Noteworthy point is that the coefficient of AR (1) is positive and significant. In other words, the presence of first order autocorrelation in the model were confirmed. As discussed in the theoretical, according to the theory of Friedman and especially Dosenbery consumption functions, in which consumption in period t-1 affects the consumption in period t, existence of autocorrelation was totally expected.

CONCLUSION

The purpose of this study is to investigate the impact of government spending on private consumption in G7 countries over the period from 2012 to 1998 using panel data approach. It was shown that some of the variables are I(1). To avoid the spurious regression problem, we used Pedroni cointegration test which its results indicated cointegration among the variables of this study. Then, use of F-limier test, proved the panel data method and Hausman test confirmed fixed effects method in order to estimate the model. The results of estimation, confirmed the Keynesian approach in the context of the relationship between government spending and private sector consumption in the under study economies. Thus, the increase in government spending increases aggregate demand and employment, and it causes consumers income to increase, and since consumption is a function of income, ultimately lead to increase consumption. It means that government spending has a complementary effect on private consumption. In other words government spending crowds-in private consumption and implies that the hypothesis of the study is accepted. The obtained results of study are similar to Nieh and Ho (2006), Schlacerek (2007) and D’Alessandro (2010). The other obtained results of this study, is the negative relationship between unemployment and private consumption, and the other is positive relationship between urban population and private consumption.

A suggestion in this regard is that the estimated coefficient (elasticity) of government spending can be considered as an instrument for economic policymakers in G7 countries. In other words, how many percent of government spending must be increase (decrease), if the government wants to increase (decrease) the private sector consumption to a certain level in the recession (inflation).

REFERENCES


HAMID AND HAGHIGHAT: IMPACT OF GOVERNMENT SPENDING ON PRIVATE SECTOR CONSUMPTION IN THE...

Finance and Administrative Sciences, 18: 1450-2275.


