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Non-Linear Effect of Government Spending on Private Consumption in Cambodia: Markov-Switching Autoregressive Model

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Abstract
The influence of government expenditure on private consumption has been debated among scholars. Some studies have found a positive linkage between the two while some others have found a negative one. In this study, the Markov-Switching Autoregressive (MSAR) model was used to investigate the non-linear impact of government spending on private consumption in Cambodia. The result based on Cambodia's annual data from 1987 to 2015 shows that private consumption responds positively to a rise in disposable income or a decline in saving interest rates. Inflation is statistically insignificant. The impact of government purchases on private consumption is linear, negative, and asymmetric. A non-linear effect of government investment on household consumption occurs in Cambodia during certain periods—times of political instability, which are 1994-1995, 1997-1998, and 2004-2006. This non-Keynesian effect during the period 2010-2015 occurs because of raising the present value of taxes. The contribution of the study is that an increase in the present value of taxes and political instability can prevent the efficacy of government spending on private consumption.

Keywords: Private Consumption, Government Investment, Government Consumption, Markov-Switching Autoregressive Model, Cambodia

JEL classification: C80, E62, G28, H50

1   Introduction

Scholars have debated fiscal policy's multiplier effect (i.e., a change in output with some value of multiplication in response to an increase or a decline in government spending (Jahan, Mahmud, and Papageorgious, 2014)) over a lengthy period. Keynesian theory with its assumptions of rigid wages and prices and initially underemployed economic resources predicts that a drop in government expenditure spoils private demand (private consumption) and output via the multiplier effect. There are two types of government spending (i.e., public investment and consumption). Government consumption produces a different multiplier effect from public investment (Boehm, 2019). The government purchases multiplier is lower than the government investment multiplier (Baxter & King,

1993). Under four assumptions (i.e., sticky nominal wage, monopolistic competition, the existence of rational expectation for firms with profit maximization and for households with utility maximization, and a change in the nominal interest rate in short-run), the New-Keynesian theory points out that the expansion of government spending diminishes the consumption multiplier (i.e., the reaction of household consumption to an increase in aggregate demand) due to higher interest rates. The countercyclical fiscal policy used rigorously over the last decade has aroused researchers' curiosity about the impact of government expenditure on economic activities (Jha et al., 2014). In the context of accumulated public debt, there are weakening commodity prices, slowing global economic growth, and improving global interest rates during a period, so a sustainable drop in government spending, especially government purchasing seems to be demanded (Dawood & Francois, 2018). Some empirical studies explore the linkage between government spending and private consumption. Bailey (1971) highlighted a notable signal that a degree of substitutability between private consumption and government expenditure, especially government consumption, probably takes place. Thus, an increase in government expenditure crowds out private consumption. Aschauer (1985) used a permanent-income approach and showed that private consumption on nondurables and services declines in the range of 23 to 42 percent in response to a rise in government expenditure in the United States of America (USA). Notably, his finding is entirely consistent with the research conducted by Kormendi (1983). Ahmed (1986) used a simple intertemporal substitution model and found that this negative influence exists in the United Kingdom (UK). Amano and Wirjanto (1997) employed a two-good permanent-income model and relative price approach and indicated that the USA's intratemporal substitution (i.e., the intraperoid elasticity of substitution) between government spending and private consumption is approximately 0.9, which suggests that private expenditure responds negatively to the expansion of government spending measured by government purchases. Their result corresponds with the outcome estimated by conducted by Ho (2001), who used the panel Dynamic Ordinary Least Square (DOLS) approach to determine the sum of public investment and government consumption to measure government spending.

Other empirical studies provide the opposite results. Ambler, Bouakez, and Cardia (2017) study's conclusion, based on the vector autoregressions (VARs) approach, indicated that an elevated level of private consumption and real wages is the reaction to the expansion of public investment. Government purchases are complementary to private expenditures. Bouakez and Rebei (2007) applied the Maximum-likelihood (ML) method to USA data and found that a strong complementarity effect (Edgeworth complements) exists, where private consumption improves in response to an increase in government consumption. Karras (1994) followed Hall's random walk model (i.e., maximum consumption following a random walk) and suggested that a degree of complementarity between government expenditure and private consumption exists in the observed countries and varies among those countries. This complementarity degree diminishes when the value of government spending is more substantial. Giavazzi and Pagano (1990) and Amano and Wirjanto (1998) impose the nonlinear effect (i.e., the occurrence of both Keynesian and non-Keynesian impact in a certain period) of government expenditure on private consumption. The government spending follows the traditional Keynesian theory during usual times, but a firm contradictory fiscal policy provoked by a high level of debt leads to the existence of a non-Keynesian effect (Giavazzi & Pagano, 1990). Based on the Markov regime-switching model, Wang and Gao (2011) found that the impact of government investment on private consumption is linear and positive, but not symmetrical. The government purchases non-linearly influence private consumption. This non-linear impact of the fiscal policy in China is not associated with the initial fiscal status or the magnitude of fiscal consolidation. Alesina and Ardagna (1998)'s outcome, anchored in a probit model run on panel data of OECD countries, reflected that the effect of fiscal policy on private consumption is non-linear. Two main factors (magnitude and structure of fiscal adjustment) cause the occurrence of this non-linearity.

Household final consumption (private consumption) contributed significantly to aggregate demand in Cambodia as a lower middle-income country and ranged between 73 and 85 percent of GDP over a period from 2000 to 2015. Complex fiscal challenge is thought to have originated in Cambodia. In the early 2010s, Cambodia's government seemingly adopted a countercyclical fiscal policy. Notably, Cambodia's government consumption as a share of GDP progressively declined from 6.34 percent in 2010 to 5.39 percent in 2015. Public investment as a share of GDP also dropped from 8.20 percent to 5.30 percent, while the tax revenues in the same period continuously and sharply increased from 7.3 percent to 14.6 percent of GDP. This countercyclical fiscal policy can become a concern if this policy prevents the stimulation of Cambodia's private demand, especially household consumption, and the

progress of economic development. Therefore, it is necessary to advance the understanding of the effect of fiscal policy on private consumption in Cambodia.

As empirical studies mentioned above found, there is no consistency in the impact of fiscal policy on private consumption due to the variety of variables taken into account, the different countries investigated over different time intervals, and different methodologies. However, this paper intends to examine the nonlinear effect of government spending (i.e., government investment and purchases) on private consumption in one context, that of Cambodia. The study can provide a reference to other researchers interested in non-linearity and can inform Cambodia's policymakers about the characteristics, which cause the existence of a non-linear effect on private consumption in Cambodia's economy.

This paper is arranged as follows. Section 2 describes the methodology (e.g., specific model, data collection, and method). Section 3 shows the results with interpretation and discussion. Section 4 offers conclusions and policy implications.

2   Methodology

2.1   Specific model

Government spending can be divided into government consumption and investment. Barro (1981) introduced government consumption into the general model and investigated the consumption utility directly responds to a change in government purchases. Extensive research (seen in studies of Ahmed (1986), Karras (1994), Devereux, Head, and Lapham (1996), Giavazzi and Pagano (1996), and Giavazzi and Pagano (1996)) has demonstrated that government purchases play a direct role in influencing private consumption even though results vary regarding the relationship between them. Some empirical research undertaken by Wang and Gao (2011) and Ambler, Bouakez, and Cardia (2017) suggests that public investment also becomes involved in the elasticity of private consumption via fluctuation in real wages.

The disposable income is not taken into account, thereby lessening the robustness of the linkage between government expenditure and private consumption (Graham, 1993). Ho (2001), Wang and Gao (2011), and Varlamova and Larionova (2015) indicate that disposable income plays a vital role in the elasticity of private consumption because the improvement of households' capability reacts to an increase in disposable income.

Based on the basic concept, the disposable income of households equals the sum of consumption and saving. Under budget constraint (no change of disposable income), a higher interest rate on savings produces more disincentive to households to make expenditures. According to new-Keynesian theory, an alternative explanation is that households usually participate in the credit market to smooth their future expenditure. The growth of interest rates leads to households to reduce the current consumption and to keep their money for spending in the future. A change in interest rates, therefore, affects household behavior towards consumption.

The fluctuation of inflation (i.e., a change in the price of commodities on a day-to-day basis) influences the cost of living and the capacity for household consumption. Some empirical studies carried out by Varlamova and Larionova (2015) and Sulekha, Mary, and Tharmalingam (2019) also indicate the existence of the connection between inflation and private consumption.

In this study, public investment and consumption, disposable income, interest rates, and inflation are taken into account. Thus, the regression model of private consumption can be written as follows:

$$CC_t = \beta_{0S} + \alpha_1 DIS_t + \alpha_2 RATE_t + \alpha_3 INF_t + \beta_{1S_t} GI_t + \beta_{2S_t} GC_t + \varepsilon_t, \tag{1}$$

where $t = 1987, 1988, \ldots, 2015$

CC_t stands for private consumption as a share of GDP of Cambodia at the time t;

DIS_t is disposable income as a share of GDP of Cambodia at the time t;

$RATE_t$ refers to saving interest rate of Cambodia at the time t ;

INF_t represents inflation of Cambodia at the time t ;

GI_t denotes government investment as a share of GDP of Cambodia at the time t ;

GC_t stands for government consumption as a share of GDP of Cambodia at the time t ;

ε_t is residual at the time t .

2.2   Data Collection

Gross fixed investment as a percent of GDP can be a substitution for interest rates on savings (as seen in the studies of Solow (1956, 1957), Phelps (1961), Mankiw, Romer, and Weil (1992), and Hajamini and Falahi (2018)). To avoid multicollinearity between public investment and gross fixed investment, private investment as a share of GDP serves as a proxy for the interest rate on savings. Cambodian data from 1987 to 2015 equals 29 observations. Variables collected for this analysis are:

- Household final consumption expenditure (private consumption) as a share of GDP: consumption of goods and services made by resident households;
- Government final consumption expenditure (government purchases) as a share of GDP: general government consumes goods and services and spends on collective consumption services;
- Gross domestic product (GDP) at constant price 2011: total value of goods and services produced during a year;
- Government fixed capital formation (public investment) at constant price 2011: gross fixed capital formation only provided by central and subnational governments;
- Gross national saving as a percentage of GDP: the sum of savings from individuals, businesses, and government;
- Private investment at constant price 2011: infrastructure services delivered by private sectors;
- Inflation: rate of change in the general price level of goods and services sold in the country.

The three principal sources report the data of variables mentioned above:

- The United Nations Statistics Division's National Accounts Main Aggregates Database. The data of household final consumption expenditure as a share of GDP and government final consumption expenditure as a share of GDP are retrieved from the link:
  https://unstats.un.org/unsd/snaama/dnlList.asp
- The International Monetary Fund's (IMF) World Economic Outlook 2017 database. The link to access the data of gross national saving as a share of GDP and inflation is:
  http://www.imf.org/external/pubs/ft/weo/2017/02/weodata/index.aspx
- The Investment and Capital Stock Dataset of the IMF offers the data of the rest of the variables via the link:
  https://www.imf.org/external/np/fad/publicinvestment/

The transformation made to obtain the independent variables for this regression can be explained as follows:

- Disposable income as a share of GDP is the sum of household final consumption expenditure as a share of GDP and gross national savings as a share of GDP,
- Government investment at a constant price 2011 and private investment at a constant price 2011 divided by GDP at a constant price 2011 is government investment as a share of GDP and private investment as a share of GDP, respectively.

The data analysis is performed in STATA 15.1.

2.3 Markov-switching autoregressive model

Identifying and defining potential periods of the nonlinear impact of fiscal adjustment becomes a sensitive issue in testing the non-linear relationship between fiscal policy and private consumption. Based on the empirical studies in this area, researchers usually adopt two methods. In the case of the first method, the possible periods of the nonlinear effect of fiscal adjustment are pinpointed exogenously. Some empirical studies typically use various indicators as the identification of the potential periods. Cour et al. (1996) and McDermott and Wescott (1996) consider the primary structural balance to be one of the indicators, that causes trouble with inflation and real interest rates. The second indicator is the adjustment of government debt or purchases as a percent of GDP (Bertola & Drazen, 1993; Perotti, 1999). Distinctive indicators produce different definitions of time length for expansionary or contractionary fiscal policy. A year in length is used for the fiscal policy adjustment in the study of Alesina and Ardagna (1998). To reduce the possible occurrence of fiscal adjustment lasting a year, Giavazzi and Pagano (1996) impose some stringent conditions that refer to dummy variables of the cumulative change in structural deficit (see their study for more details). The methods of exogenous identification of the potential period of nonlinear fiscal effects are seemingly no different but generate disparate empirical outcomes. Based on the study of Kamps (2001) of 14 European countries, the significant level of this nonlinearity sensitively relies on the definitions of time length for nonlinear fiscal effects. The endogenous identification of possible periods of nonlinear fiscal impact is another method that does not limit the number of this nonlinearity's potential periods, which are estimated based on the real dataset (Höppner and Wesche, 2000; Wang and Gao, 2011).

The method of exogenous identification can generate an excessive number of possible periods of nonlinearity or miss fiscal adjustment periods of less than a year in length. Thus, this study adopts the Markov-switching autoregressive (MSAR) model (see Hamilton (1989) and Chang, Choi, and Park (2017)) as the method of identifying the potential periods of nonlinear fiscal effects endogenously. The MSAR model refers to a discrete-time process, which depends on two components, such as dynamics of the observed process (i.e., dependent variable's process) and hidden process (i.e., finite-state or finite-regime Markov chain). The MSAR model is also conditional upon autoregressions and classifies sample observations into a small number of homogenous groups, so-called regimes. The Markov regime-switching model with AR improves the accuracy of estimated transition probabilities and the effectiveness of parameter estimates.

In our model, we do not deal with systematic errors due to tag time series. The measurement errors can be recorded from two components (i.e., random and systematic error). We had no technical information to qualify the systematic error, so it was assumed to be null. The MSAR model in our study is a homogenous hidden Markov chain and autoregressive model. AR term in this MSAR model becomes an AR(p) process of residual time series. p denotes the number of AR. Based on the literature, scholars argue that two effects (negative or positive) of government spending on private consumption may exist in a certain period. Wang and Gao (2011) used two regimes (i.e., $s_t = 1$ and $s_t = 2$) of the Markov regime-switching model and estimated with annual data and time interval from 1978 to 2008. Thus, we propose two regimes and assume the errors to be homogenous across the regime in our analysis. The optimal lags selected by BIC (Bayesian Information Criterion developed by Schwarz (1978)) are one ($p = 1$). This study only uses the first level of AR. Therefore, equation (1) can be rewritten under the MSAR model with the first level of AR:

$$CC_t = \beta_{0s_t} + \alpha_1 DIS_t + \alpha_2 RATE_t + \alpha_3 INF_t + \beta_{1s_t} GI_t + \beta_{2s_t} GC_t$$

$$+ \phi_{1,s_t} \left(CC_{t-1} - \beta_{0s_{t-1}} - \alpha_1 DIS_{t-1} - \alpha_2 RATE_{t-1} - \alpha_3 INF_{t-1} - \beta_{1s_{t-1}} GI_{t-1} - \beta_{2s_{t-1}} GC_{t-1} \right) + \varepsilon_t, \tag{2}$$

where β_{0s_t}, β_{1s_t}, and β_{2s_t} are the parameters with characteristics of regime-switching or state-dependence. α_1, α_2, and α_3 assume no change with states (regimes) and are included in the regression model to increase the number of degrees of freedom. ϕ_{1,s_t} refers to a coefficient of the first AR term. ε_t is residual (random error) with zero mean and state-dependent variance $iid(0, \sigma^2)$.

3   Results and Discussion

3.1   Estimation

It is strictly necessary to identify the natural data trend before executing the time series analysis. The unit-root test demonstrates that the time series of data consists of a deterministic trend (stationary data in order zero) or stochastic trend (stationary data in order one) (Kirchgässner, Wolters, and Hassler, 2013). The Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), like the famous unit-root test, is based on differencing to transform non-stationarity to stationarity. However, the ADF test heavily depends on lag length, so choosing the optimal time lag is subject to minimizing the value of Bayesian Information Criterion (BIC) proposed by Schwarz (1978). The null hypothesis of this test suggests a unit root or non-stationarity. The result of the unit-root test reported in Table 1 indicates that explained and explanatory variables are stationary at order zero I(0). Exceptionally, a predictor ($RATE$) is stationary at first order I(1).

Table 1: Unit root test

Test	Augmented Dicky-Fuller (ADF)	
	X_i	ΔX_i
CC	-2.264**	
DIS	-2.358**	
RATE	-1.208	-3.473***
INF	-1.871**	
GI	-1.671*	
GC	-3.691 ***	

Note: Δ is the first difference. * , **, and *** represent the significance level at 10, 5, and 1 percent, respectively.

Table 2: Results of Markov-switching Autoregressive model

CC_t	Coefficient	Standard Error	T-statistic
α_1	0.243***	0.025	9.59
α_2	-1.944***	0.090	-21.43
α_3	0.009	0.006	1.33
AR(1)	-0.844***	0.111	-7.55
Regime 1			
$\beta_{1s}(s_t=1)$	0.319**	0.144	2.21
$\beta_{2s}(s_t=1)$	-1.461***	0.123	-11.87
$\beta_{0s}(s_t=1)$	81.901***	2.451	33.41
Regime 2			
$\beta_{1s}(s_t=2)$	-1.735***	0.130	-13.31
$\beta_{2s}(s_t=2)$	-2.020***	0.148	-13.56
$\beta_{0s}(s_t=2)$	97.477***	3.482	27.99
Log-likelihood	-53.081		
sigma	0.988		

Note: *, ** and *** indicate the significance level at 10, 5, and 1 percent, respectively.

Table 2 reveals the results of the Markov-switching autoregressive (MSAR) model subject to gradient-based optimization. The value of log-likelihood equals -53.081. All of the predictors with the exception of inflation are statistically significant at the 5 percent level. Disposable income has a positive impact on private consumption because an increase in disposable income improves the household capacity to consume. A higher saving interest rate reduces private consumption. From a fundamental perspective, household saving and expenditure are substitution goods subject to no change in disposable income. Thus, a rise in the interest rate on savings encourages households to save rather than to make expenditures. There is a linear effect of government purchases on private consumption because the result in both regimes provides the same negative sign but different values of the coefficients ($\beta_{2s}(s_t = 1)$=-1.461 and $\beta_{2s}(s_t = 2)$ =-2.020). The extension of government purchasing crowds out private consumption--that is, public consumption is a substitute for household expenditure in Cambodia. In the case of government investment, there is a different sign of coefficient in regime 1 ($\beta_{1s}(s_t = 1)$=0.319) and regime 2 ($\beta_{1s}(s_t = 2)$=-1.735). This result indicates that a non-linear effect of government investment on private investment exists in the Cambodian economy. The main reasons for the occurrence of this nonlinearity can be explained in the part of identifying non-Keynesian years and discussion. The coefficient of AR(1) is statistically significant at 5 percent level and means that residual at the time t depends on its first lag.

Table 3: Regime-switching probability matrix

i j	Regime 1	Regime 2
Regime 1	0.5819	0.4180
Regime 2	0.3645	0.6354

Note: i and j represent a different regime.

The estimated results of the regime-switching probability matrix presented in Table 3 offer a valuable clue to identify the average duration for the existence of the same regime. The calculation of average duration follows the formula:

$$D(s) = \frac{1}{1 - p_{ii}},$$
(3)

where $D(s)$ stands for the average duration of the regime (state), and p_{ii} denotes regime-switching probability.

Table 4: Estimation of duration in each regime

	Sample size	Frequency	Average duration
Regime 1	12	0.429	2.391
Regime 2	16	0.571	2.742

Table 4 reports frequency and average duration for the two regimes: 57.1 percent of the total sample belongs to the regime with non-Keynesian impacts, but the rest of this sample comprises 12 observations in the regime with Keynesian effects. The average duration is 2.391 years for Keynesian impacts and 2.742 years for non-Keynesian effects.
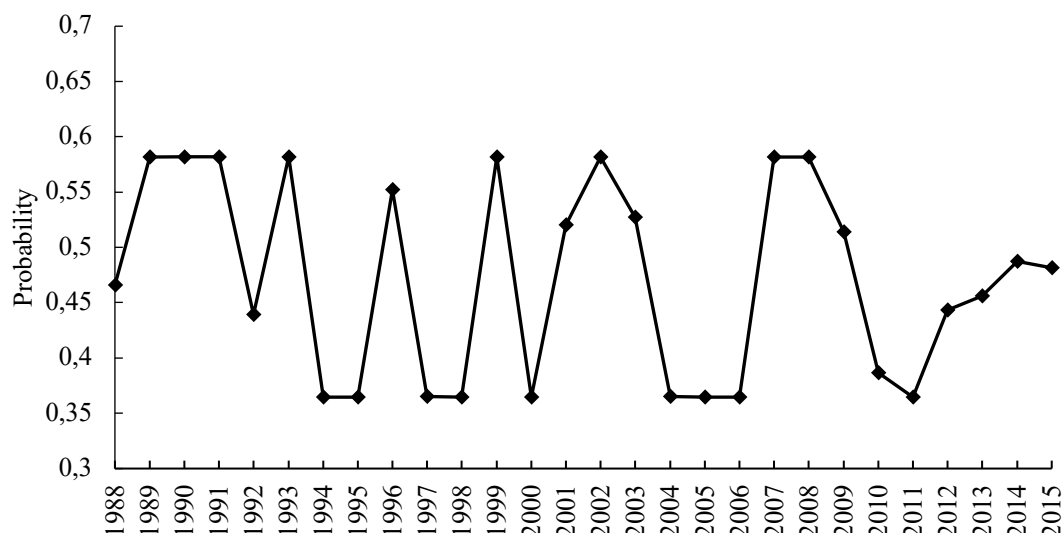
Figure 1: Smooth switching probability of Keynesian effect regime, 1988-2015
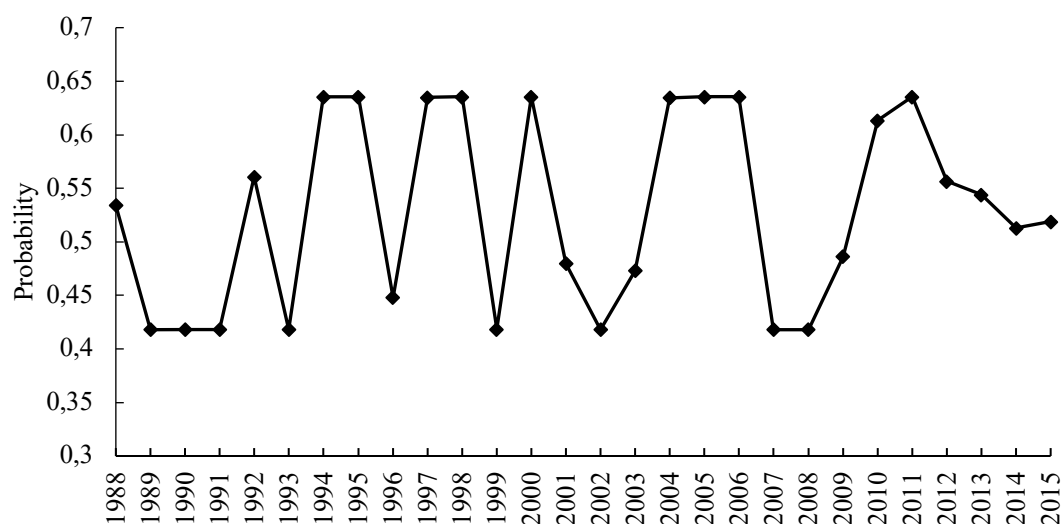
Source: Author's estimation

Figure 2: Smooth switching probability of Non-Keynesian effect regime, 1988-2015

Source: Author's estimation

Figures 1 and 2 show that some years and periods, with the probability of Keynesian impacts more than 0.5 or close to 1 and the probability of non-Keynesian effects less than 0.5 or close to 0, lead to the existence of the Keynesian effects. However, some years and periods in the time interval of this study have the probability of non-Keynesian impacts higher than 0.5 and Keynesian effects' probability lower than 0.5, thus generating the occurrence of non-Keynesian effects for those years and periods. As a result, there is a non-linear influence of fiscal policy, mainly public investment, on private consumption in Cambodia's economy.

Table 5: Identification of regimes

	Years	Probability
Non-Keynesian regime	1988	0.5342
	1992	0.5608
	1994-1995	0.6354
	1997-1998	0.6351
	2000	0.6354
	2004-2006	06351
	2010-2015	0.5635
Keynesian regime	1989-1991	0.5819
	1993	0.5819
	1996	0.5519
	1999	0.5816
	2001-2003	0.5430
	2007-2009	0.5592

Source: Author's estimation

The precise identification of regimes shown in Table 5 illustrates in which periods Keynesian or non-Keynesian effects of government spending exist. The existence of the Keynesian effects in the 1989-1991, 2001-2003, and 2007-2009 periods indicates that expansionary fiscal policy enhances private consumption. However, the 1994-1995, 1997-1998, and 2004-2006 periods have non-Keynesian effects, probably because political instability discourages households from increasing their expenditures. During 1994-1995, Cambodia faced political uncertainty because the Cambodia People's Party (CPP) leaders intended to refuse to accept the election outcome. The disagreement about the national election 1993's result spun out political turmoil and led to a political impasse during 1994-1995. Before the national election of 1998 came, a political stalemate had seemingly started to increase since March 1997. After the national election in 2003, Cambodia reached political deadlock because it was unable to form the new government until July 2004. The non-Keynesian impact of government expenditure also occurs during 2010-2015 because Cambodia's government seemingly used countercyclical fiscal policy at that period. According to the ADB database, the tax revenues as a share of GDP progressively and dramatically grew from 7.3 percent in 2010 to 14.6 percent in 2015. Increasing the present value of taxes contributes negatively to the private wealth effect (i.e., a change in household consumption based on asset value via price level, disposable income, and interest rates) because a higher present value of taxes can increase the price of goods and services in the market and decrease disposable income, thereby harming household spending.

3.2   Discussion

The result of this study, which highlights the nonlinear effect of government spending on private consumption, agrees with the outcomes of Giavazzi and Pagano (1990), Blanchard (1990), Alesina and Ardagna (1998), Perotti (1999), Höppner and Wesche (2000), Aarle and Garretsen (2003), and Wang and Gao (2011). However, various reasons are raised to point out the emergence of the non-Keynesian effect of government expenditure on private consumption. This study emphasizes two main reasons – political instability and increasing the present value of taxes – which causes a negative influence on the wealth effect through inflation and a reduction in disposable income. Giavazzi and Pagano (1990) spotlight the substitution between public and private consumption because government consumption, which seems to be a waste of resources, does not offer consumers any utility. They raised an example of the Danish government in 1983-84—that is, Danish private consumption increases in response to contractionary government consumption. Also, agent (household) expectations about the future policy cause the existence of non-Keynesian effects. Based on perfect knowledge and rational expectation, households cut down their expenditures in response to the extension of government expenditure because they anticipate that the government will raise the present value of taxes to finance its spending and intends to balance its budget. In term of fiscal consolidation, Ho (2001) suggests that issuing government bonds to finance its own expenditure leads to speed up increases in the interest rates, thereby slowing down household consumption as well as other components of aggregate demand. In another case, the initial value of government spending above a threshold

level (optimal value) triggers the non-Keynesian effects – that is, the positive or negative influence of government expenditure relies on the magnitude of that expenditure (Bertola & Drazen, 1993). Wang and Gao (2011) propose personal charactoristics (i.e., a quota restriction plan for comodities, minumum employment programes and like this) of commodities and labor market as an important reason leading to the existence of non-linear effects in China's economy. It is possible to demonstrate conclusively that the structure and magnitude of government expenditure, agent expectations, characteristics of commodities and labor market, and environment change (political instability) contribute to the occurrence of the non-linear effect of government spending on private consumption.

Most studies found that non-linearity exists on government purchases (seen in Cour et al., (1996), Perotti (1999), Aarle and Garretsen (2003), and Wang and Gao (2011)). On the other hand, the outcome of this study indicates that public investment has a non-linear effect on private consumption. This study provides insight into the non-linear effect, which can occur in government investment as well.

4   Conclusions and policy implications

4.1   Conclusions

The debate about the effectiveness of public policy has been taking place since the global crisis in 2008. The government spending in this study is divided into two types (government consumption and investment) and analyzed separately in the model. The Markov-switching Autoregressive (MSAR) model is used to estimate the non-linear impact of government expenditure on private consumption in Cambodia in the time interval from 1987 to 2015. The result indicates that non-linearity exists on Cambodia's public policy, mainly public investment. Political instability leads to the existence of the non-Keynesian effect during those periods (i.e., 1994-1995, 1997-1998, and 2004-2006). Also, the non-Keynesian impact reacts to raising the present value of taxes in the period 2010-2015. However, the linear and asymmetric effect occurs in public consumption, and government purchases are substitutes for private consumption. Private consumption negatively reacts to a decrease in disposable income and an increase in saving interest rate while inflation is statistically insignificant. The outcomes of this study provide a fascinating insight into the existence of the non-linear effect of fiscal policy (government spending) on private consumption. The two primary reasons (political instability and putting up the present value of taxes) contribute to the occurrence of the non-linear impact of government expenditure and private consumption.

4.2   Limitation

There are limited data. This study cannot cover all variables which influence private consumption. Notably, tax revenues and income distribution suggested by Wang and Gao (2011) are not included in the regression model because the data are limited or unavailable. The disposable income is calculated based on the sum of household final consumption expenditure and gross national saving, which takes into account government saving. This computation, therefore, can produce calculated disposable income above the actual value of household disposable income. The limited data of interest rate leads to the usage of private investment as a share of GDP to be a proxy of saving interest rates. The sample period with 28 annual observations used in the MSAR estimation is small, any empirical inference is a challenge, and results will likely be fragile.

4.3   Policy implications

Since 2010, insufficient productive private consumption (household consumption) for economic growth has occurred in Cambodia's economy because household final consumption expenditure as a share of GDP dropped from 81.29 percent in 2010 to 76.80 percent in 2015. This study of the non-linear effect of government spending on private consumption can offer a reference point for Cambodia's government, which controls macro policy and advances the efficacy of fiscal policy under changing economic circumstances. The investigated non-linearity proposes a new perception to evaluate the efficacy of government expenditure. The Cambodian government has pursued a policy of raising the present value of taxes during the period 2010-2015, thereby influencing households through negative weal effect and the existence of the non-linear effect of government expenditure on private consumption. Political instability during the 1990s can reduce the efficiency of government investment to private consumption in Cambodia. It negatively affects household behavior on their expenditures because they intend to

keep money on their hand rather than to make expenditures. The government should ascertain the circumstances which produce the Keynesian and non-Keynesian impact of government expenditure, mainly public investment, and thus take proper action to promote private consumption effectively. The integration of fiscal and monetary policy may be a better idea to enhance private consumption undoubtedly because households very often get involved in the financial market to smooth their spending. In the case of the improvement of private consumption, government purchases should be reduced because there is a substitution between public and private consumption.

Conflicts of interest

The author has no conflict of interest.

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