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INTRODUCTORY ECONOMETRICS

**EFFECT OF GOVERNMENT SPENDING
ON CONSUMPTION - EVIDENCE FROM
105 COUNTRIES**

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Table of contents

1. Introduction.....	1
2. Literature review.....	1
2.1.1 Government spending.....	1
2.1.2 Government spending on military.....	2
2.2 Real disposable income.....	2
2.3 Real interest rate.....	3
3. Methodology.....	3
3.1 Model specifications.....	3
3.2 Data description.....	4
3.3 Assumptions.....	4
3.3.1 Unbiasedness.....	4
3.3.2 Homoscedasticity.....	4
3.3.3 No perfect collinearity.....	5
4. Results Interpretation.....	5
4.1 Estimates.....	5
4.2 Hypothesis test.....	6
4.3 No perfect multicollinearity testing.....	6
5. Discussion.....	7
6. Conclusions.....	7
7. Limitations.....	7
Appendix A.....	9
Table A1. Sample of Countries used in the Analysis.....	9
Appendix B. Unbiasedness Test.....	10
Table B1. Unbiasedness Test.....	10
Appendix C. White Test.....	10
Table C1. White Test.....	10
References.....	11

Abstract

From the Keynesian point of view, the interaction between government spending and consumption can be observed to be positive. However, with the intense conflict between countries recently, there is a question of whether to count government spending on the military in GDP (Mutikani, 2025). Regarding that sense and supporting papers from other researchers, by categorizing government spending in this paper into expenditure for the military and all other government expenditure (i.e., excluding military spending), the effect of government expenditure on non-military factors on consumption can be reconciled with previous findings and may provide an answer to the recent rising question.

1. Introduction

This research was undertaken to study the relationship between government spending and consumption across countries. Drawing from Keynesian theory, which emphasized the importance of government intervention in stimulating demand and further stabilizing the economy during the period of recession, through this research, we seek to provide empirical evidence about the role of government spending in regulating consumption behavior. By conducting a regression model with data from over 100 countries, we aim to shed light on the effectiveness of fiscal policy as a tool to support the economy, especially during economic downturns.

To what extent does non-defense government expenditure impact private consumption levels across different regions within a given year? Furthermore, do expansionary and contractionary fiscal policies correspond with significant variations in consumption behavior, particularly in terms of whether private consumption acts as a substitute or a complement to government spending? The research's main purpose is to look into how government spending, apart from military spending, can affect private consumption levels in multiple nations. There are plenty of crucial phases in the empirical approach.

To begin with, the data used in this study is cross-sectional data for 2018 in 105 countries. The information comes from the 2018 World Indicators from the World Bank and Statista. The variables that are being examined are: consumption expenditure per capita (cp), government expenditure excluding military spending per capita (gmxp), government expenditure on military spending per capita (gmp), real disposable income per capita (ydp), and the real interest rate (r). All variables are converted into logarithms to enable a direct elasticity estimate. Connections between the variables are estimated using the Ordinary Least Squares (OLS) technique. And the data analysis is done by using STATA.

Lastly, the research tests its hypothesis using several techniques. The F-statistic test at the 5% significance level is used to test the model's overall significance. The R-squared value is used to assess the model fit. At the 5% significance level, t-tests are used to evaluate each coefficient's statistical significance.

2. Literature review

2.1.1 Government spending

According to Keynes, government spending is generally complementary to household spending, not competitive, especially when the economy is operating below full capacity. It raises incomes, boosts demand, and pulls the economy out of stagnation, thereby stimulating both consumer expenditure and investment. In the Keynesian framework, it is the government spending that regulates the rate of economic progression. This perspective overstates the significance of government expenditure and affirms a positive impact of public expenditure on GDP growth.

A study on the relationship between government spending and consumption in nine East Asian countries found that they are substitutes in Malaysia and Thailand, but complements in Indonesia and Singapore (Kwan, Yum K). Another study focusing on Indonesia from 1990 to 2012 indicated that government spending and household consumption are complements (Kuncoro, Haryo). Overall, the existing literature emphasizes the importance of whether government spending and private consumption are complements or substitutes.

Another perspective is provided by Wagner's Law, which states that economic growth leads to an increase in government spending. Wagner suggests three plausible reasons for this relationship: (a) economic growth enables the government to expand society and improve welfare; (b) public sector activities begin to replace some private sector functions, especially in administrative and protective roles; and (c) state intervention is necessary to manage natural monopolies. The law states that government spending is an important determinant of economic growth.

Many studies have examined the relationship between government spending and economic growth, using a variety of econometric methods and definitions of public spending. For example, Gangal and Gupta (2013) found a unidirectional relationship from government spending to GDP in India over the period 1998–2012, with positive mutual effects on both variables. In a three-variable framework, Loizides and Vamvoukas (2005) studied government spending and GNP across Ireland, the United Kingdom, and Greece. The results showed that government spending promotes short-term economic growth in all three countries, and also in the long term in Ireland and the United Kingdom.

Similarly, Dogan and Tang (2006) applied Granger causality testing to explore the government spending-growth relationship in five Southeast Asian countries: Indonesia, Singapore, the Philippines, Malaysia, and Thailand. The results showed a unidirectional causality from government spending to economic growth in the Philippines. Similarly, Pradhan (2007) reported that public spending stimulates economic growth in India, Nepal, and Bhutan. In the case of Sudan, Ebaidalla (2013) studied this relationship from 1970 to 2008 and found evidence supporting the Keynesian view, with causality flowing from government spending to national income.

2.1.2 Government spending on military

From the point of view of scarce resources, Paul Samuelson (1948) suggested the idea of the tradeoff with the identical example Guns and Butter theory. On the other hand, the supporters of Keynesian with the assumption about idle resources, argued that greater defense spending lifts aggregate demand. By indicating that, together with the idea that resources are finite, increasing demand reduces unemployment via boosting capital utilization (Dikici, 2014). Dikici also concluded that, for developing countries to achieve the Keynesian multiplier effect, prioritizing essential goods ("butter") over military resources allows for the development of human capital, which can enhance military production and utilization in the future. In reference to Keynesian supporters and Dikici, the government spending will be divided into two types (including and excluding military expenditures) in the paper, to find out the correlation between consumption and government spending.

2.2 Real disposable income

Real disposable income, which is income after taxes and adjusted for inflation, is one of the main factors that affect consumer behavior. Changes in disposable income have a direct impact on household spending, and as a result, affect aggregate demand, according to a basic idea in Keynesian economics. While lower income results in less consumption, higher real disposable income allows people to buy a greater number of goods and services (Keynes, 1936). A study

shows that real disposable income and consumption are strongly positively correlated (Kuncoro, 2018). Due to the importance of this relationship, disposable income is frequently used as the main explanatory variable for spending patterns across nations and time periods in macroeconomic models. The significant role of real disposable income emphasizes how important it is to comprehend changes in the economy and how well fiscal policy measures affect the activity of the economy.

2.3 Real interest rate

Households typically do not consume all of their income, instead, they allocate a portion of their income to save for future consumption. This behavior is well-stated by Modigliani's Life-Cycle Hypothesis (LCH), which says that individuals plan their consumption and saving over their lifetime, in the hope of smoothing their consumption in their future regardless of variation in their income at later life stages (Ando & Modigliani, 1963). A common form of saving is depositing in commercial banks, which offer a relatively safe way to preserve wealth for future use (Carroll & Samwick, 1997). Therefore, a high interest rate resulting in a high return of money can increase the opportunity cost of consuming today, making savings more appealing relative to present consumption. The trade-off between present and future consumption is the core of intertemporal substitution. In 1988, the concept of Elasticity of Intertemporal Substitution was introduced by Hall to measure the sensitivity of consumption response to changes in real interest rate (Hall, 1988). His findings suggest the value of this measurement is close to zero, indicating that consumption is not responsive to interest rates. This conclusion aligns with the Keynesian idea about the vague effect of interest rate on savings (Gylfason, 1981). Nevertheless, according to classical economists, they believed people make their decisions to consume depending mainly on the interest rate (Fisher, 1930 as cited in Goodwin et al., 2019). Hence, we decided to include the real interest rate as an independent variable to gain a direct empirical analysis between interest rate and consumption. We include the real interest rate since it reflects the true return on savings, accounting for inflation.

3. Methodology

3.1 Model specifications

The final empirical model to be predicted in logarithms was written as follows:

$$\log(cp_i) = \beta_0 + \beta_1 \log(gxmp_i) + \beta_2 \log(gmp_i) + \beta_3 \log(ydp_i) + \beta_4 r_i + u_i$$

Where:

$\log(cp_i)$ - Logarithm of real consumption per capita

$\log(gxmp_i)$ - Logarithm of government spending excluding military purposes per capita

$\log(gmp_i)$ - Logarithm of government spending on military per capita

$\log(ydp_i)$ - Logarithm of disposable income per capita

r_i - Real interest rate (or lending rate)

u_i - Other factors

Government spending was distinguished between including and excluding military per capita. In addition, since household income and real interest rate also affect household consumption, the two variables were also taken into the model in real terms to control the bias. Household consumption (or consumption per capita) was measured in real terms.

Data was analyzed with the help of STATA, a statistical software. The Ordinary Least Squares (OLS) technique was employed to estimate the correlation between government spending, especially on non-military purposes, and household consumption in 105 countries. Besides, to

minimize the gap (ensure the linearity) between the observed data of 105 countries, in this model, the variables were taken in natural logarithms (except for real interest rate, since the differences in this variable were not substantial).

In addition, the overall significance of the model was tested using the F-statistic at a 5% significance level. Model fit was evaluated with the R^2 value, and the statistical significance of the coefficients was determined using t-test at a 5% significance level.

3.2 Data description

The study uses cross-sectional data from 105 countries (Appendix A) for the year 2018. The countries under study include countries from all 7 continents: Asia, Africa, North America, South America, Antarctica, Europe, and Australia. The variables under investigation are consumption expenditure per capita, government expenditure excluding military, government expenditure for military, real disposable income per capita, and real interest rate. The dataset comes from the 2018 World Development Indicators of the World Bank and Statista.

Table 1 provides descriptive statistics of the variables. It can be observed that there is a wide disparity among the selected countries. For instance, the consumption per capita varies from 234.1764 to 58,833. Similarly, the real disposable income per capita varies from 163.0881 to 69,498.27.

Variable	Obs	Mean	Std. dev.	Min	Max
cp	105	12059	14243.61	234.1764	58833
gxmp	105	2857.586	3996.991	30.09316	19040.03
gmp	105	292.7466	445.7585	.885197	2240.264
ydp	105	13510.2	16711.07	163.0881	69498.27
r	105	.0436045	.0777809	-.05844	.4348334

Table 1: Data Description

3.3 Assumptions

3.3.1 Unbiasedness

If unbiasedness is held, then our regression provides results that are close to the true value. Mathematically,

$$E(\hat{\beta}_0) = \beta_0; E(\hat{\beta}_1) = \beta_1; E(\hat{\beta}_2) = \beta_2; E(\hat{\beta}_3) = \beta_3; E(\hat{\beta}_4) = \beta_4$$

To ensure the unbiasedness of the estimators, the expected value of u , the error term, should be equal to zero given any values of the independent variables.

$$E(u | \log(gxmp_i), \log(gmp_i), \log(ydp_i), r_i) = E(u) = 0$$

In other words, there must be no relationship between u and the independent variables.

3.3.2 Homoscedasticity

If the assumption of homoskedasticity is violated, the value of the variances (also standard deviations) of the estimated coefficients will be various, depending on the observations, leading to further incorrect testing of the hypothesis. The model with homoskedasticity has the error u yielding the same variance given any values of the independent variables.

$$Var(u | \log(gxmp_i), \log(gmp_i), \log(ydp_i), r_i) = \sigma^2.$$

3.3.3 No perfect multicollinearity

In this model, there were 4 variables in the cross-sectional data. Thus, to ensure the results of OLS estimators, we had an assumption that there were no correlations among explanatory variables (*i.e., having perfect multicollinearity can cause the signs of regression coefficients to be opposite*)

$$\text{Cov}(\log(gxmp_i), \log(gmp_i), \log(ydp_i), r_i) = (-1; 1)$$

4. Results Interpretation

4.1 Estimates

Presented below is the output achieved after conducting regression:

VARIABLES	(1) lcp
lgxmp	0.152*** (0.0348)
lgmp	-0.028 (0.0183)
lydp	0.801*** (0.0429)
r	-0.024 (0.2089)
Constant	0.774*** (0.1578)
Observations	105
R-squared	0.9901

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Regression results

Variables	Coefficient	p-value	Interpretation
<i>lgxmp</i>	0,152	0,000	A 1% increase in government infrastructure spending (excluding spending on military) per country leads to an average increase of 0.15% in household consumption, holding other factors fixed. With the given p-value, the estimated coefficient shows statistical significance at 1% level. Therefore, as government spending increases, consumption is likely to go in the same direction.
<i>lgmp</i>	– 0,028	0,128	The negative value of the coefficient implies that a 1% increase in government spending results in an average decrease of merely 0.03% in consumption, holding other factors constant. However, it is noticeable that the p-value is 0.128, which is greater than 10%, suggesting that total government spending, including spending on the military, does not have a clear impact on consumption. The reason may be that the amount spent

			on the military does not directly support household needs.
<i>lydp</i>	0.801	0,000	The estimated result on the variable <i>lydp</i> is 0.801 and is statistically significant at the 1% level (p-value = 0.000). This implies that when having an addition of 1% in income, consumption per capita increases on average with an amount of 0.801%, holding other factors fixed. The result also presents economic significance, demonstrating that income is a strong determinant of consumption behavior across countries.
<i>r</i>	– 0,024	0,907	While the classical school of thought defines a strong effect of interest rate on consumption, our empirical result (p-value = 0.907) indicates no significant relationship between them.
R-squared	0,9901	—	The variables can explain 99% of the variation in log consumption per capita.

4.2 Hypothesis test

- Null hypothesis: $\beta_1 = 0$ (Non-defense government expenditure does not affect private consumption)
- Alternative hypothesis: $\beta_1 \neq 0$ (Non-defense government expenditure affects private consumption)

The results from the t-test ($t = 4.48$) and P value ($P = 0.000$) at a 5% significance level suggest rejection of the null hypothesis. Therefore, non-defense government expenditures have a significant effect on private consumption.

Overall comment: The results provide strong evidence on the complementary relationship between government spending and private consumption. The OLS estimation reveals a positive and statistically significant relationship between non-military government expenditure and private consumption (p-value = 0.000). This finding is consistent with Keynesian theory, which posits that expansionary fiscal policy stimulates aggregate demand and consumption.

4.3 No perfect collinearity testing

```
. correlate (lgxmp lgmp lydp r)
(obs=105)
```

	lgxmp	lgmp	lydp	r
lgxmp	1.0000			
lgmp	0.8812	1.0000		
lydp	0.9713	0.8968	1.0000	
r	-0.5197	-0.5620	-0.5522	1.0000

Table 3: Correlation between explanatory variables

The correlation matrix $\log(gxmp_i)$, $\log(gmp_i)$, $\log(ydp_i)$ resulted in a positive correlation while for r_i was negatively correlated. Table 3 may reflect a near violation of the assumption of the model. However, regarding the Keynesian point of view, especially the references of our paper, the results in regression estimators stayed aligned with the theories. The consistency of the results with previous papers indicates that there are no errors in the regression coefficient signs.

5. Discussion

The results indicate a positive and statistically significant relationship between non-military government spending and private consumption. This result is consistent with Keynesian theory - public spending, especially during economic downturns, can boost aggregate demand and stimulate consumption. The estimated elasticity is 0.15, which suggests that it is economically significant and reinforces the complementarity between non-defense government spending, such as infrastructure, health, and education.

In contrast, military spending has a negative impact on consumption but is statistically insignificant. The results indicate that defense spending does not contribute to household consumption behavior. This supports the views of scholars such as Dikici (2014) and Samuelson (1948), who argue that government spending on military purposes should be reduced and used to invest in other things necessary for human development.

Furthermore, the estimator states the important role of real disposable income in shaping consumption patterns across countries. The elasticity of 0.801 suggests that income is the main determinant of household spending, which is consistent with what Keynes said about government spending and consumption.

The results also show that real interest rates do not affect household consumption. This is consistent with Hall's (1988) findings and Keynes's view that interest rates have an ambiguous impact on consumption decisions. In fact, households may respond more to changes in income than to changes in interest rates, especially in countries with underdeveloped financial markets or limited access to credit.

Overall, the results of previous studies and this paper suggest that not all public spending affects household consumption behavior. The findings support the idea that expansionary fiscal policy can complement household consumption and enhance welfare.

6. Conclusions

The study's conclusion emphasizes the important role that fiscal policy, in particular, non-military spending and disposable income, have in determining consumption levels. The research's findings show that while military spending has no noticeable impact on consumption, government spending, apart from military expenditures, has a stimulative effect. Furthermore, the study demonstrates that disposable income is a reliable indicator of spending patterns in many nations. On the other hand, the analysis implies that in the context of this investigation, monetary policy, which is represented by interest rates, has no effect on consumption patterns.

7. Limitations

The methodological decisions and data features of the research are the main sources of its constraints. Unexpectedly, the study only uses the data in 2018 from 105 nations. The changing evolution of the connection between government expenditure and consumption over time may be

missed by this method, which only provides one picture. A more detailed knowledge of how adjustments in government spending affect consumption trends throughout many economic cycles may be possible with a follow-up study. The study also makes use of the data taken from the World Bank's World Development Indicators and Statista. As a result, the quality and consistency of the data supplied by these sources will influence the correctness and dependability.

Appendix A

Table A1. Sample of Countries used in the Analysis

Albania	Cyprus	Kyrgyz Republic	Romania
Algeria	Czechia	Latvia	Russian Federation
Angola	Denmark	Lebanon	Rwanda
Argentina	Dominican Republic	Lesotho	Seychelles
Armenia	Egypt, Arab Rep.	Lithuania	Sierra Leone
Australia	Estonia	Luxembourg	Singapore
Austria	Fiji	Madagascar	Slovak Republic
Azerbaijan	Finland	Malaysia	Slovenia
Bangladesh	France	Mauritius	South Africa
Belarus	Gambia, The	Mexico	Spain
Belgium	Georgia	Moldova	Sri Lanka
Belize	Germany	Mongolia	Sweden
Benin	Greece	Montenegro	Switzerland
Bolivia	Guatemala	Mozambique	Tajikistan
Bosnia and Herzegovina	Haiti	Namibia	Tanzania
Botswana	Honduras	Netherlands	Thailand
Brazil	Hungary	New Zealand	Timor-Leste
Brunei Darussalam	India	Nicaragua	Uganda
Bulgaria	Indonesia	North Macedonia	Ukraine
Burkina Faso	Ireland	Norway	United States
Burundi	Israel	Oman	Uzbekistan
Cabo Verde	Italy	Pakistan	Viet Nam
Chile	Jamaica	Paraguay	Zambia
China	Jordan	Peru	Zimbabwe
Colombia	Kenya	Philippines	
Congo, Dem. Rep.	Korea, Rep.	Poland	
Croatia	Kuwait	Portugal	

Source: World Bank

Appendix B. Unbiasedness Test

Table B1. Unbiasedness Test

VARIABLES	(1) uhat
lgxmp	0 (0.0348)
lgmp	1.96e-10 (0.0183)
lydp	-1.39e-10 (0.0429)
r	7.99e-09 (0.209)
Constant	-0 (0.158)
Observations	105
R-squared	0.000
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

To test the relationship between the error u and the independent variables, we regress the residual \hat{u} and four explanatory variables. The regression results illustrate no statistical significance of all the estimated coefficients. Moreover, the value of R-squared is zero, which means the independent variables cannot explain any variation in the residual. Thus, the residual is uncorrelated with the explanatory variables, supporting the assumption of zero conditional mean, making our OLS estimators unbiased.

Appendix C. White Test

Table C1. White Test

`. estat imtest, white`

White's test

H0: Homoskedasticity

Ha: Unrestricted heteroskedasticity

chi2(14) = **18.60**

Prob > chi2 = **0.1808**

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	18.60	14	0.1808
Skewness	4.58	4	0.3336
Kurtosis	3.23	1	0.0722
Total	26.41	19	0.1192

Suppose $\alpha = 5\%$, and White-test gives $\chi^2_{(14)} = 18.6$ as well as the p-value = 0.1808 (greater than 0.05), we fail to reject the null hypothesis of homoskedasticity. This supports the assumption of homoskedasticity of the model, raising the reliability of the results.

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