



Original Article

Macroeconomic Determinants of Per Capita Consumption in Indonesia: Evidence from 1990–2023 Using an ECM Framework

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Abstract:

This study aims to examine the impact of GDP per capita, exchange rate (ER), and broad money (BM) on per capita consumption in Indonesia over the period 1990–2023. The data were obtained from the World Development Indicators (WDI), and the analysis was conducted using the Error Correction Model (ECM) to capture both short-term dynamics and long-term equilibrium relationships. The findings reveal that, in the long run, GDP per capita and exchange rate significantly influence per capita consumption, while broad money has no statistically significant effect. In the short run, only GDP per capita shows a significant impact. The error correction term (ECT) value of -0.490507 indicates a moderate speed of adjustment towards long-run equilibrium, suggesting that approximately 49% of the disequilibrium is corrected annually. This research contributes to empirical literature by providing updated evidence on macroeconomic determinants of household consumption in a developing country context, using a long-term dataset with rigorous econometric techniques. From a policy perspective, the findings underscore the importance of stable economic growth and prudent exchange rate management in sustaining household welfare through consumption. Policymakers should focus on maintaining macroeconomic stability, particularly through growth-enhancing and inflation-controlling measures, to ensure steady improvements in per capita consumption.

Keyword: GDP per capita, exchange rate, broad money, per capita consumption, error correction model

Introduction

Household consumption is a major component in gross domestic product (GDP) and is an important indicator in measuring a country's economic well-being, especially in developing countries such as Indonesia. Stability and growth in per capita consumption play a major role in maintaining domestic economic resilience and strengthening people's purchasing power (Todaro & Smith, 2009). Therefore, an in-depth understanding of the macroeconomic factors that affect per capita consumption is important in supporting the formulation of targeted economic policies.

Theoretically, consumption is influenced by various economic variables such



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as income, interest rates, price rates, exchange rates, and the availability of money supply ([Mankiw & Taylor, 2020](#)). One of the main determinants of consumption is real income, which in macroeconomic contexts is often represented by Gross Domestic Product (GDP) per capita. The increase in GDP per capita reflects an increase in people's incomes, which should theoretically encourage consumption. On the other hand, exchange rates also have an important influence, especially in open countries like Indonesia, where exchange rate fluctuations can affect the price of imported goods and people's purchasing power. In addition, monetary variables such as broad money are also often assumed to play a role in influencing consumption behaviour through the effects of liquidity and credit availability.

However, while there is a wealth of literature examining the relationship between these factors and consumption, there is a gap in long-term empirical studies that specifically examine the Indonesian context with a wide range of time frames. In addition, short-term and long-term dynamics are often not clearly distinguished, so the results of previous studies sometimes provide inconsistent conclusions. Therefore, econometric approaches that can capture both dynamics simultaneously, such as the Error Correction Model (ECM), are very relevant to use.

Through this study, an analysis was carried out on the influence of GDP per capita, exchange rate, and broad money on per capita consumption in Indonesia during the period 1990 to 2023. The use of annual data for more than three decades has made an important contribution to seeing long-term patterns and short-term fluctuations that occur. Using the ECM model, this study not only examines the long-term relationship between these variables but also assesses the extent to which adjustments occur when deviations from the long-term equilibrium occur.

The main purpose of this study is to analyse the influence of GDP per capita, exchange rate, and broad money on per capita consumption in Indonesia in the long term, as well as to examine the dynamics of the short-term relationship between these variables and per capita consumption.

This research makes several important contributions, both theoretically and practically, the use of the Error Correction Model (ECM) model allows simultaneous analysis of long-term and short-term relationships. This approach improves on the weaknesses of previous studies that relied only on static linear regression or short-term models without considering long-term equilibrium, and the findings of this study provide a solid foundation for policymakers in designing fiscal and monetary policies. For example, results showing that GDP per capita and exchange rates affect per capita consumption in the long term emphasize the importance of macroeconomic stability and strengthening economic fundamentals to maintain people's purchasing power. Meanwhile, the insignificance of broad money in the long-term model signals that monetary policy may need to be directed more selectively to influence consumption.

The study of the determinants of household consumption has become a major concern in the economic literature, both in developed and developing countries. Consumption not only reflects individual well-being but is also the main driving force in the formation of Gross Domestic Product (GDP). Therefore, an understanding of the factors that affect per capita consumption, especially in the context of developing countries such as Indonesia, is essential for the formulation of effective and inclusive economic policies.

Within the framework of Keynesian theory, consumption is determined by disposable income. Early studies such as [Friedman \(1957\)](#) through the *Permanent Income Hypothesis* and [Modigliani & Brumberg \(1954\)](#) through the *Life-Cycle Hypothesis* have emphasized the importance of long-term income expectations to consumption patterns. These studies pave the way for an empirical approach that considers other macroeconomic determinants, such as interest rates, inflation, exchange rates, and money supply, in explaining household consumption

behaviour.

Several empirical studies in developing countries show that GDP per capita has a positive and significant relationship to consumption. For example, Based on the results of the study, the main conclusion is [that Piao, et al \(2023\)](#) stated that widening income inequality will increase consumption in the short term but hold back consumption in the medium and long term, as the relationship between the two will change from positive to negative. Similar research was also conducted by [Ogaki, et al \(1996\)](#) who observed that the elasticity of consumption to income tends to be higher in countries with lower middle-income levels.

In the Indonesian context, several previous studies have attempted to analyse the determinants of household consumption. Research by [Jappelli & Pistaferri \(2010\)](#) with title the consumption response to income changes shows that household consumption is very sensitive to income fluctuations. Meanwhile, a study by [Kang & Dagli \(2018\)](#) emphasized the importance of exchange rates in influencing consumption through the prices of imported goods, especially in the non-primary consumption sector.

However, many studies focused on the short term or used only partial data. For example, the study only used data up to 2023 and ignored the long-term dynamics between variables. In addition, the econometric approach used is largely limited to simple linear regression or VAR (Vector Autoregression) without considering the possibility of cointegration between macroeconomic variables. This has the potential to result in biased or misleading estimation results if the long-term relationship between variables is not considered.

Some study abroad also provides a relevant comparative framework. For example, research by [Arisoy and Ozturk \(2014\)](#) in Turkey used the Error Correction Model (ECM) to analyse the influence of money supply, inflation, and income on consumption. They found that broad money had a significant effect in the short term, but not significantly in the long term, suggesting differences in monetary transmission mechanisms in different periods. These results provide an empirical basis to test similar hypotheses in Indonesia.

The literature gap that this study aims to fill is the limitations in the use of long-term data covering more than three decades (1990–2023) and the application of an econometric approach that can distinguish between short-term and long-term influences simultaneously. The use of the Error Correction Model (ECM) model is an appropriate methodological choice because it can identify the adjustment process from short-term imbalance to long-term equilibrium. In addition, the use of annual data from reliable sources such as the World Development Indicators (WDI) adds to the validity of the empirical findings in this study.

Thus, this study not only expands the temporal scope of previous studies but also deepens the understanding of the dynamics of per capita consumption in the context of Indonesia's growing economy. In addition, by including the variables broad money and exchange rates in the model, the study examines the relevance of monetary policy and exchange rates to domestic consumption behaviour, an aspect that is increasingly important in the context of globalization and economic liberalization.

Research Methodology

This research is a quantitative study with a descriptive and inferential approach. The data used in this study are secondary data of an annual time-series from 1990 to 2023. All data is obtained from the World Development Indicators (WDI) issued by the World Bank. The variables used include:

1. Consumption per capita (CPC) – in US dollars constant prices,
2. GDP per capita (GDPPC) – in US dollars constant prices,

3. Exchange Rate (ER) – the exchange rate of the rupiah against the US dollar (in the mid-annual exchange rate),
4. Broad Money (BM) – the amount of money in circulation in a broad sense, in rupiah units

All data is converted into logarithmic form (natural log) to stabilize the variance and interpret the coefficient as elasticity.

The model used in this study is the Error Correction Model (ECM). ECM was chosen because it can capture long-term relationships (through cointegration) as well as the dynamics of short-term adjustments between variables ([Basuki & Prawoto, 2019](#)). ECM is developed from the autoregressive distributed lag (ARDL) model and is particularly useful when the data is non-stationary but has a long-term relationship.

To build an ECM, there are several main stages that need to be carried out systematically:

1. Data Stationarity Test (Unit Root Test)

The first step is to test whether the time-series data is stationary using the Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) test ([Herranz, et al., 2017](#)). The test is carried out both at the level and at the first difference. The goal is to ensure that the variables used are I (1) – i.e. not stationary at level, but stationary after the first differentiation.

2. Cointegration Test

If all variables are I (1), then the next stage is to test whether there is a long-term relationship between variables using the Engle-Granger method or Johansen Cointegration Test. If a cointegration relationship is found, then an ECM ([Granger, 2004](#)) model can be built.

3. Long-Term Model Estimation

The long-term equation between per capita consumption and independent variables (GDP per capita, exchange rate, and broad money) is estimated using Ordinary Least Squares (OLS) regression:

$$\ln(\text{CPct}) = \alpha + \beta_1 \ln(\text{GDPPct}) + \beta_2 \ln(\text{ERt}) + \beta_3 \ln(\text{BMt}) + \varepsilon_t$$

The output of this regression will be used to calculate the residual (ε_t) which is then used as an *error correction term* variable in the short-term model.

4. ECM Model Estimation (Short Term)

The ECM model is formed by including changes in each independent variable (Δ) as well as the *error correction term* (ECT) of the long-term regression results ([Gujarati & Porter, 2009](#)):

$$\Delta \ln(\text{CPct}) = \gamma_0 + \gamma_1 \Delta \ln(\text{GDPPct}) + \gamma_2 \Delta \ln(\text{ERt}) + \gamma_3 \Delta \ln(\text{BMt}) + \lambda \text{ECT}_{t-1} + \mu_t$$

Δ = the first difference of each variable,

λ = ECT coefficient, indicating the speed of adjustment towards long-term equilibrium,

μ_t = error term.

The value of λ must be negative and significant for the ECM model to be valid, as this indicates that the system will return to long-term equilibrium after the occurrence of a shock.

5. Diagnostic Tests

The resulting ECM model was then tested for validity through several diagnostic tests, including:

- Autocorrelation Test (LM Test) – to test whether residual is autocorrelated ([Singh & Singh, 2022](#)).
- Heteroscedasticity Test (White Test / Breusch-Pagan Test) – to ensure homogeneous residuals ([Moffat & Akpan, 2019](#)).
- Normality Test (Jarque-Bera Test) – ensures that the residual is distributed normally ([Thadewald & Büning, 2007](#)).
- Stability Test (CUSUM and CUSUMSQ Test) – to ensure the stability of parameters in the long term ([Kočenda & Černý, 2015](#)).

Results of Analysis and Discussion

The following is an analysis of the **results of the stationarity test (Unit Root Test)** which is carried out in two stages: at the **level and first difference**.

Table 1. Stationary Test

Group unit root test: Summary					
Series: CONSCAP, GDPCAP, ER, BM					
Sample: 1990 2023					
Method	Statistic	Prob.**	Statistic	Prob.**	Obs
Levin, Lin & Chu t*	3.3269	0.9996	-7.4244	0.0000	132
Im, Pesaran and Shin W-stat	5.1123	1.0000	-7.2976	0.0000	132
ADF - Fisher Chi-square	0.7499	0.9994	60.1155	0.0000	132
PP - Fisher Chi-square	0.6657	0.9996	59.3600	0.0000	132
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.					

All methods show that all four variables are not stationary at the level, because all probability values > 0.05 (even close to 1). That is, there is not enough evidence to reject the null hypothesis that a variable contains a root unit. This means that the data is non-stationary at the level. All methods show that the four variables become stationary after the first differentiation is performed. The probability value is well below 0.05, so the null hypothesis can be rejected—in other words, all four variables are integrated of order one, or I (1).

The following is a long-term analysis of the regression estimation results in the Error Correction Model (ECM). This estimate represents a long-term relationship between per capita consumption and three independent variables: GDP per capita, exchange rate, and broad money.

Table 2. Long-Term Regression Results

Dependent Variable: LOG(CONSCAP)				
Sample: 1990 2023				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPCAP)	0.819669	0.027870	29.41037	0.0000
LOG(ER)	0.078985	0.006196	12.74764	0.0000
LOG(BM)	0.009017	0.025419	0.354753	0.7253
C	1.612804	0.488300	3.302896	0.0025
R-squared	0.997888	Mean dependent var		16.61628
Adjusted R-squared	0.997677	S.D. dependent var		0.309596

S.E. of regression	0.014923	Akaike info criterion	-5.461645
Log likelihood	96.84797	Schwarz criterion	-5.282073
F-statistic	4724.237	Hannan-Quinn criter.	-5.400406
Prob(F-statistic)	0.000000	Durbin-Watson stat	1.547118

GDP per capita and exchange rates have a positive and significant influence on per capita consumption in the long run. This supports the hypothesis that income is a major determinant of consumption, and that exchange rates affect consumption through the relative prices of imported and domestic goods. Broad money has no significant effect, suggesting that monetary instruments have not yet had a dominant role in driving long-term consumption.

The model is statistically robust, with statistically high R^2 and F-levels, and shows no indication of serious autocorrelations.

The analysis of the cointegration test is based on two approaches commonly used in the ECM model, namely the Engle-Granger (residual-based) and the Johansen Cointegration Test.

Table 3. Cointegration Test

Null Hypothesis: ECT has a unit root			
Exogenous: Constant			
Lag Length: 0 (Automatic - based on SIC, maxlag=8)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.372533	0.0015
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
*MacKinnon (1996) one-sided p-values.			

If the Engle-Granger or Johansen results show that there is a cointegration between the variables in the model, then the conditions for forming an ECM are met. Because the conditions were met, it proceeded to the stage of forming a short-term ECM and inserting the Error Correction Term (ECT) from the long-term regression. The ECT coefficient must be negative and significant to indicate the process of adjustment to long-term equilibrium.

Table 4. Short-term regression (ECM)

Dependent Variable: D(LOG(CONSCAP))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(GDPCAP))	0.710786	0.098378	7.225084	0.0000
D(LOG(ER))	0.029202	0.01639	1.7817	0.0856
D(LOG(BM))	0.06843	0.042284	1.618337	0.1168
ECT(-1)	-0.490507	0.170454	2.877646	0.0076
C	0.003802	0.004375	0.868974	0.3922
R-squared	0.848247	Jarque_ bera		0.065002
F-statistic	39.12759	Probability		0.968022
Prob(F-statistic)	0.0000	Heteroskedasticity Test: Dependent Variable: RESID		
Breusch-Godfrey Serial Correlation LM Test		F-statistic		2.313819
Obs*R-squared	8.561005	Prob(F-statistic)		0.063571

Prob. Chi-Square (2)	0.0731	Durbin-Watson stat	1.406791
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Coefficient Analysis:

a. Changes in GDP per Capita

Coefficient: 0.7108; t-Statistics: 7,225; Probability: 0.0000 (significant at the 1% level). Interpretation: An increase in GDP per capita by 1% in the current period will increase per capita consumption by 0.71% in that period. This suggests that the change in income is very significant and positive in driving short-term consumption.

b. Exchange Rate Changes

Coefficient: 0.0292; t-Statistics: 1.7817; Probability: 0.0856 (significant at the 10% level). Interpretation: A change in the exchange rate of 1% will increase per capita consumption by 0.0292%. Although the p-value is slightly greater than 0.05, at a significance level of 10%, this is still considered quite significant. However, the effect is not as large as GDP per capita and may depend more on other factors such as the impact of inflation or monetary policy.

c. Changes in Broad Money

Coefficient: 0.0684; t-Statistics: 1,618; Probability: 0.1168 (insignificant) Interpretation: Changes in broad money (the amount of money supply) do not show a significant effect on per capita consumption in the short term, because the p value is greater than 0.05. This suggests that monetary or liquidity policy does not directly encourage consumption in the near term.

d. Error Correction Term

Coefficient: -0.4905; t-Statistics: -2.8776; Probability: 0.0076 (significant at the level of 1%). Interpretation: A negative and significant ECT coefficient indicates that the system will return to long-term equilibrium with an adjustment rate of 49.05% per period. That is, if there is an imbalance in per capita consumption (as in the long run), then consumption will adjust half of it in a short period of time to return to equilibrium.

e. Jarque-Bera (Residual Normality Test):

Probability: 0.0650; Interpretation: The p-value is greater than 0.05, which means there is no evidence to reject the null hypothesis that the residual is normally distributed. This shows that the residual model does not have any significant distribution problems.

f. Breusch-Godfrey Serial Correlation LM Test: 8.561005; The p-value is greater than 0.0731 above 0.05; Interpretation shows that there is no autocorrelation problem.

g. Uji Heteroskedastisitas (Breusch-Godfrey Serial Correlation LM Test):

h. F-statistic: 2.3138; probability: 0.0636; Interpretation: A p value above 0.05 indicates that there is no problem of heteroscedasticity in residuals.

The relationship between GDPs per Capita and Consumption

Positive Elasticity: A coefficient of 0.8197 indicates that in the long run, any 1% increase in GDP per capita will cause per capita consumption to increase by 0.82%. This indicates a very strong relationship between national per capita income and consumption levels in the long run. **Statistical Significance:** A very small P-value (0.0000) indicates that the influence of GDP per capita on consumption is very significant.

Research conducted by [Nolan, et al \(2016\)](#) with the title *GDP per capita versus average household income: what causes divergences over time?* shows that per capita income is a very strong factor in determining the level of consumption, especially in developing countries. This is due to an increase in income that usually provides more purchasing power to the public, which then encourages an increase in the consumption of goods and services. On the other hand, a study by [Balango \(2020\)](#) with a link between Ethiopia's economic growth and a decline in consumer purchasing power states that his

research applied inductive reasoning methods and used secondary data. The study found that there is a negative relationship between Ethiopia's economic growth and consumer purchasing power (consumer price index) which is synonymous with macroeconomic inflation-growth trade.

Short-Term Positive Elasticity: In the short term, every 1% increase in GDP per capita will increase per capita consumption by 0.71%. Although it is slightly smaller compared to the long-term influence, it suggests that GDP per capita remains a very important factor in influencing consumption in the short term. **Significance:** With a very small p-value (0.0000), it can be ascertained that the relationship between GDPs per capita and consumption in the short term is significant and relevant.

[Palley's \(2010\)](#) research under the title of the theory of consumption of relative permanent income: the Keynes-Duesenberry-Friedman synthetic model states that in the short term, consumption will be influenced by temporary income. This suggests that although changes in GDP in the short term may be temporary, there is still a significant relationship between income and consumption, in line with the findings in this ECM model.

The Relationship between Exchange Rate (ER) and Consumption

Based on the results of the long-term model, the exchange rate (LOG(ER)) is not included in the long-term ECM model equation, which shows that the exchange rate does not have a significant influence on long-term per capita consumption in Indonesia. Although the exchange rate can affect the purchasing power of imports or the price of foreign goods, its effect on consumption in the long term in Indonesia is not as large as the influence of GDP per capita.

In a study by [Dornbusch & Fischer \(1986\)](#), it was found that exchange rates affect consumption in the short term through the price of imported goods, but the impact is more limited in the long term. This is in line with the findings in this study, where exchange rates affect consumption more in the short term than in the long term.

Exchange rates have a positive effect on consumption in the short term. With a coefficient of 0.0292, a change in the exchange rate of 1% will increase consumption by 0.0292%. Although the effect is smaller compared to GDP, these results show that exchange rates influence consumption in the short term, although the effect is not as large as GDP. Although the p value is slightly greater than 0.05, the effect of the exchange rate on consumption is still significant at the level of 10%, which suggests that exchange rate fluctuations can still affect people's purchasing power in the short term.

Research by [Nenkova & Kovachevich \(2022\)](#) with title The Balkan Countries Fiscal and Monetary Policy Effectiveness in the Context of the Mundell-Fleming Model in open economy macroeconomics theory showed that exchange rate changes can affect consumption through import prices and domestic purchasing power, although the effect is smaller compared to national income. Research by [Gohar, et al \(2023\)](#) with title The asymmetric effect of exchange rate on the household consumption expenditures, found that movements in the exchange rate have asymmetric impacts on household consumption in all the included emerging economies, excluding Nigeria.

The Relationship between Broad Money (BM) and Consumption

In the long-term model, Broad Money (BM) does not have a significant influence on per capita consumption in Indonesia, which can be seen from the coefficient value and p-value greater than 0.05. Although monetary policy related to the money supply can affect consumption levels in economic theory, in the case of Indonesia, the BM does not show a significant influence in the long term. Research by [Mishkin \(2007\)](#) shows that broad money plays a role in influencing household consumption through interest rate and liquidity mechanisms. However, research by [Afonso & Sousa \(2012\)](#) suggests that the direct impact of monetary policy on consumption can depend on context and other factors, such as inflation or interrelated fiscal policy.

Changes in broad money do not have a significant effect on per capita consumption in the short term in Indonesia. Although broad money influences market liquidity, the direct effect on household consumption is not strong enough to show a significant relationship.

Research by [Bernanke & Gertler \(1995\)](#) on monetary and consumption policy shows that although the money supply can affect liquidity in the economy, the direct influence on household consumption can be limited, especially in developing countries that have different financial market structures.

Conclusion

The results of the analysis show that GDP per capita has a very significant positive influence on per capita consumption in the long and short term. This shows that changes in national income directly impact the level of household consumption in a short period.

The exchange rate (ER) does not show a significant influence on per capita consumption in the long run. Exchange rates have a positive effect on consumption in the short term. This shows that although exchange rate fluctuations can affect people's purchasing power of imported goods, the effect on consumption is not as great as the influence of GDP.

Broad money (BM) does not have a significant influence on per capita consumption in the long term or in the short term. This may be due to the limited direct impact of monetary policy on consumption in Indonesia, where other factors such as income are more dominant.

A significant ECT coefficient value (-0.4905) indicates that the imbalance in consumption can be adjusted in a short period of time, which is about 49% in a single period. This indicates a rapid adjustment process towards a long-term balance between consumption and GDP per capita.

Based on the findings of this study, here are some policy recommendations that can be taken:

Given that the influence of the exchange rate (ER) on consumption is only significant in the short term, exchange rate stabilization policies that maintain the stability of the price of imported goods and the purchasing power of the public for foreign goods can help reduce uncertainty that can affect consumption. Although the influence of exchange rates is small, control of exchange rate fluctuations remains important to maintain people's purchasing power and promote economic stability.

Broad money policy or monetary policy must be more focused on controlling inflation and lowering interest rates to affect consumption more directly. However, this policy needs to be balanced with fiscal policies that support equitable income distribution, so that the positive impact on consumption is more optimal. Bank Indonesia must remain cautious in regulating the money supply, because although monetary policy is important, its impact on household consumption is still limited.

Overall, the results of this study emphasize the importance of national income as a dominant factor in influencing per capita consumption in Indonesia, both in the short and long term. Although other factors such as exchange rates and broad money can affect consumption, the role of both is more limited and more pronounced in the short term. Therefore, policies that focus on increasing per capita income and deepening the domestic market will be key to encouraging sustainable consumption in the Indonesian economy.

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