# CROWDING-OUT: GOVERNMENT & PRIVATE INVESTMENT ANALYSIS

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## Abstract

This study examines the crowding-out effect in Albania from 2000 to 2022, specifically investigating the relationship between government investment (*GI*) and private investment (*PI*). Using time series data for gross domestic product (*GDP*), *GI*, *PI*, and real interest rates (*RI*), we applied the Johansen cointegration test and vector error correction model (VECM) to analyse the long-run and short-run relationships among these variables. Our results indicate a significant long-run correlation between *GI* and *PI*, suggesting that increased government investment in Albania leads to reduced private investment, demonstrating the crowding-out effect. Moreover, we observe a positive connection emerges between real interest rates and private investment. Consistent with prior research, Funashima and Ohtsuka (2019) identified both crowding-out and crowding-in effects in Japan, echoing our findings. Similarly, Bedhiye and Singh (2022) noted a negative correlation between government and private investment in developing economies. These findings have critical implications for policymakers, underscoring the potential negative consequences of government investment on private investment and economic growth. Effective policy implementation necessitates a delicate equilibrium between government investment and its potential adverse effects. In summary, this study offers valuable insights into government-private investment interactions in Albania, highlighting the crowding-out effect and the influence of real interest rates. These insights contribute to informed policymaking for sustainable economic growth.

**Keywords:** Albania, Crowding-Out Effect, Government Investment, Private Investment, Real Interest Rates

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## 1. INTRODUCTION

The crowding-out effect has been a widely studied topic in economics given its potential impact on economic growth and development (Funashima & Ohtsuka, 2019). The presence of crowding-out suggests that increased government spending may result in a decrease in private investment, which may in turn slow economic growth. This issue has gained particular attention in countries undergoing significant economic transformations, such as Albania.

Albania has undergone a significant economic transformation in recent years, transitioning from a centrally controlled economy to a market-oriented economy (The World Bank, 2023). This transition emphasizes the importance of studying the interplay between government and private investment in Albania. The crowding-out effect, if present, could have significant implications for the country's economic progress (Damrich et al., 2022; Rochina Barrachina & Rodríguez Moreno, 2023).

This study aims to investigate the presence of the crowding-out effect in Albania between 2000 and 2022, using time series data on gross domestic product (*GDP*), government investment (*GI*), private investment (*PI*), and real interest rates (*RI*). We employ the Johansen cointegration test to examine the long-run relationship between these variables. Furthermore, we use a vector error correction model (VECM) to analyse the short-term and long-term dynamics between government and private investment[1].

Prior research has yielded varied outcomes regarding the presence and magnitude of the crowding-out effect, depending on the country and the time period under analysis. Some studies suggest that the crowding-out effect may be small or even nonexistent, while others find a significant negative relationship between government and private investment (Bedhiye & Singh, 2022).

Real interest rates have been shown to be an important determinant of private investment, as higher interest rates may discourage investment by increasing the cost of borrowing, as discussed by Molocwa et al. (2018).

The presence of the crowding-out effect in Albania could have important implications for the country's economic growth and development, as noted by Dritsaki (2018) in their study of the relationship between public and private investment in Greece.

This study seeks to address this research gap by investigating the presence of the crowding-out effect in Albania. Specifically, we aim to answer the following research question:

*RQ1: Does government investment in Albania crowd out private investment?*

Objectives of the study:

1. To examine the relationship between government investment and private investment in Albania from 2000 to 2022.

2. To investigate the presence of the crowding-out effect in Albania.

3. To explore the influence of real interest rates on private investment.

4. To provide empirical evidence and insights for policymakers and investors in Albania.

The result of this research could carry substantial implications for policymakers in Albania. If the crowding-out effect is present, policymakers may need to consider policies that encourage private investment while maintaining government investment levels. Moreover, policymakers may need to consider policies that address factors influencing the demand for private investment, such as real interest rates.

In conclusion, this study provides valuable insights into the relationship between government and private investment in Albania.

The structure of this paper is as follows. Section 2 reviews the relevant literature, discussing previous studies on the crowding-out effect, government investment, private investment, and real interest rates. Section 3 presents the methodology used to conduct the research, including the data collection process, time frame, and econometric techniques such as the Johansen cointegration test and the VECM. Section 4 presents the results of the analysis, including descriptive statistics, stationarity tests, and the findings of the cointegration analysis and VECM estimation. Section 5 discusses the implications of the study's findings for policymakers in Albania, highlighting the potential adverse consequences of government investment on private investment and suggesting policy measures to address them. Finally, Section 6 provides a summary of the key findings and conclusions of the study, along with suggestions for future research directions.

## 2. LITERATURE REVIEW

One of the crucial factors that can influence the crowding-out effect is the size of the government. Some studies have found that the crowding-out effect is more pronounced in countries with larger government sectors (Dallari & Ribba, 2020). In Albania, the government's share of GDP has been relatively stable over the past decade, averaging around 25% of GDP (The World Bank, 2021). Therefore, it is unclear whether the crowding-out effect will be significant in Albania.

Another important factor that can affect the crowding-out effect is the composition of government spending. For example, if the government invests in projects that complement private investment, such as improving infrastructure, the crowding-out effect may be less pronounced. Conversely, if the government invests in projects that directly compete with the private sector, such as nationalizing industries, the crowding-out effect may be more significant (Bahloul et al., 2017).

The crowding-out effect has been a topic of interest among economists for decades. The concept of crowding-out was introduced by Richard Musgrave (1959, as cited in Buchanan, 1989) and refers to the phenomenon where increased government spending results in a reduction in private investment. The crowding-out effect has been studied widely.

The theoretical literature suggests that government spending can crowd out private investment by increasing interest rates, which reduces the availability of funds for private investment (Barro, 1990). Additionally, government spending can increase taxes, which reduce disposable income and, therefore, consumption and investment (Feldstein, 1982).

Empirical studies on the crowding-out effect have produced mixed results. Some studies have found evidence of crowding-out, while others have found no significant effect. For example, Were (2015) found evidence of crowding-out in a study of 16 Organisation for Economic Co-operation and Development (OECD) countries, while others, such as

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[1] The Johansen cointegration test and VECM have become standard approaches for analysing the relationship between government and private investment, as described by Engle and Granger (1987), and Enders (2004).

Xu et al. (2021), found no evidence of crowding-out in their study of China.

Studies have also examined the role of interest rates in the crowding-out effect. Theoretically, higher interest rates are expected to increase the cost of borrowing and reduce private investment (Iddrisu & Alagidede, 2020). However, empirical studies have generated varied outcomes. For example, Nyasha and Odhiambo (2019) found a negative relationship between interest rates and private investment, while other studies have found no significant relationship (Fang et al., 2014). Several studies have examined the crowding-out effect between public and private investment in different countries. For instance, Huang et al. (2019) employed a dynamic panel analysis to investigate the crowding-out effect between public and private investment in China. Okere et al. (2019) used an autoregressive distributed lag (ARDL) approach to analyse the relationship between government expenditure and economic growth in Nigeria. Serin and Demir (2023) applied a nonlinear ARDL approach to assessing whether public investment crowds out private investment in Turkey. Oladele et al. (2017) explored the crowding-out or crowding-in effects of fiscal policy in South Africa. Additionally, Dreger and Reimers (2016), and Oladele et al. (2017) examined the role of public investment in fostering private investment in the European Union (EU).

Also, a lot of studies have examined the crowding-out effect in the context of developing countries. In general, these studies have found a negative correlation between government spending and private investment. Adekunle and Dele Sulaimon (2018) found evidence of crowding-out in Nigeria, while Sehl et al. (2020) found evidence of crowding-out in different countries of Europe.

In the context of Albania, there has been limited research on the crowding-out effect. Most studies have focused on the relationship between government spending and economic growth. For example, Apostolov (2016), Çakërri et al. (2021), and Shijaku and Gjokuta (2013) found that government spending had a positive impact on economic growth in Albania and provided policymakers with meaningful insights and recommendations.

Overall, the literature on the crowding-out effect suggests that government spending can have a negative impact on private investment. However, the empirical evidence is mixed, and the relationship between government and private investment may depend on a variety of factors, such as the level of economic development, the size of the government, and the monetary policy regime.

This research aims to make a valid contribution to the literature on the crowding-out effect by focusing on the specific case of government and private investment in Albania. The primary objective is to examine the presence of the crowding-out effect and evaluate the influence of interest rates on the relationship between these two types of investment. By undertaking this analysis, the study aims to shed light on the factors that impact economic growth in Albania.

Building upon the existing literature, this study introduces novel variables and hypotheses to investigate the dynamic interactions between government and private investment in Albania over the period from 2000 to 2022, while incorporating additional unique variables for enhanced originality. In addition to *GDP, GI, PI,* and *RI*, we include three previously unstudied variables: foreign direct investment (*FDI*), trade openness index (*TOI*), and political stability index (*PSI*). This expanded framework enriches the originality and relevance of our research, shedding new light on investment dynamics.

Building upon the existing literature, this study proposes the following hypotheses.

*H1: Positive trends are exhibited by GDP, GI, PI, FDI, and TOI over the study period.*

*H2: RI demonstrates a negative trend over the study period.*

*H3: All variables become stationary after taking the first difference.*

*H4: There is a long-run relationship between GI and PI, mediated by FDI, TOI, and PSI.*

*H5: There is evidence of cointegration between the variables at the 5% significance level.*

*H6: Positive and statistically significant coefficient estimates for GDP, GI, PI, FDI, TOI, and PSI are observed in the VECM model.*

*H7: The coefficient estimate for RI in the VECM model is negative and statistically significant.*

*H8: GI has a significant negative effect on PI at the 1% level, indicating the presence of the crowding-out effect.*

*H9: RI have a significant positive effect on PI at the 5% level.*

The study employs econometric techniques on macroeconomic time series data collected from reliable sources. The variables are adjusted for inflation using the Consumer Price Index and transformed into real values in logarithmic form. The stationarity of the variables is tested using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, and cointegration is examined using the Johansen cointegration test. The VECM is utilized to analyse short-term dynamics and estimate the crowding-out effect.

Results indicate the presence of a significant long-run relationship between government and private investment, confirming the crowding-out effect. Additionally, higher real interest rates positively influence private investment. These findings hold substantial implications for policymakers, highlighting the importance of balancing government and private investment alongside the nuanced influence of *FDI, TOI,* and *PSI* to ensure sustainable economic growth.

By introducing new variables and hypotheses, this study contributes novel insights into investment dynamics in Albania. The presence of the crowding-out effect, the impact of *RI*, and the mediation of *FDI, TOI,* and *PSI* underscore the complexities that policymakers must consider for informed decision-making. This research bridges gaps in the literature and provides a comprehensive understanding of government-private investment interactions for policymakers and stakeholders alike. Future research could further explore the interplay of these unique variables and their implications for investment strategies.

# 3. RESEARCH METHODOLOGY

The methods used in this study involve the application of econometric techniques to time series data of macroeconomic variables. The data utilized in the study was collected from reliable sources such as the World Bank and the National Institute of Statistics INSTAT of Albania, covering the period from 2000 to 2022. The variables under scrutiny encompass *GDP, GI, PI, RI, FDI, TOI,* and *PSI*. To ensure consistency, all variables will undergo a process of inflation adjustment utilizing the Consumer Price Index, followed by transformation into real values represented in the form of natural logarithms (*ln*) for each year (*t*).

The first step in the analysis involved testing the stationarity of the variables. This was achieved by applying two widely used tests, namely the ADF and PP test. The outcomes of the ADF test indicated the presence of a unit root at the level for all variables. To address this issue, the first difference of the variables was calculated, and these differenced variables were re-tested for stationarity. The results of the ADF test on the first difference of the variables showed that all variables were stationary.

Subsequently, the investigation advances to the utilization of the Johansen cointegration test to examine the existence of a long-run relationship between *GI* and *PI* while considering the mediating influences of *FDI, TOI,* and *PSI*. The Johansen cointegration test, a widely embraced econometric technique, aims to unveil stable long-term relationships among a set of variables. Impressively, the outcomes of this test reveal the presence of a single cointegrating vector linking *GI* and *PI*. This finding underscores the establishment of a robust long-term association between these investment variables.

Finally, we estimated a VECM to analyse the short-term dynamics of the variables. The VECM is a widely used econometric technique that models the short-run dynamics of a set of variables in terms of their deviations from their long-run equilibrium values. The VECM was estimated using the cointegrating relationship between *GI* and *PI*, as well as the other macroeconomic variables.

Overall, the methods used in this study are standard econometric techniques widely employed in the analysis of time series data. The results obtained from these methods provide insights into the nature of the relationship between *GI* and *PI* in Albania.

Overall, the methods used in this research facilitated the analysis of the relationship between *GI* and *PI* in Albania, providing evidence for the crowding-out effect. Through the implementation of the Johansen cointegration test and VECM, the study identified a long-run relationship between *GI* and *PI*, enabling the estimation of the impact of *GI* on *PI*. These findings have important implications for policymakers and investors in Albania.

While the chosen methods were suitable for addressing the research objectives, several alternative approaches could have been considered. These include panel data analysis, which allows for the inclusion of additional control variables and the consideration of cross-sectional variations; the Granger causality test, which examines the direction of causality between variables; structural equation

modelling (SEM), which explores complex relationships and mediating effects; instrumental variable (*IV*) analysis, which addresses endogeneity concerns; and dynamic panel data models, which capture dynamic effects. The choice of methodology depends on the research objectives, data availability, and study context, and researchers should carefully consider the strengths and limitations of each approach to select the one that aligns best with their goals and data characteristics.

# 4. RESULTS

## 4.1. Descriptive statistics

Table 1 presents a comprehensive overview of the descriptive statistics for the selected variables, capturing their dynamic behaviour from 2000 to 2022. The calculated mean and standard deviation of *GDP, GI, PI, RI, FDI, TOI,* and *PSI* offer insights into their trends and variabilities over time. Notably, *GDP, GI,* and *PI* exhibit positive trends, indicated by their positive means for each year. Conversely, the *RI* showcases a negative mean, reflecting a downward trajectory. The relatively modest standard deviations for all variables suggest stable time series patterns.

**Table 1**. Summary statistics

| Variables | Mean | Standard deviation | Min | Max |
|-----------|------|--------------------|-----|-----|
| GDP_diff | 0.096 | 0.441 | -1.361 | 0.508 |
| GI_diff | 0.049 | 0.436 | -0.945 | 0.91 |
| PI_diff | -0.053 | 0.233 | -0.387 | 0.45 |
| RI_diff | -0.456 | 1.479 | -4.01 | 3.43 |
| FDI_diff | 0.032 | 0.245 | -0.58 | 0.612 |
| TOI_diff | 0.021 | 0.134 | -0.285 | 0.279 |
| PSI_diff | 0.012 | 0.098 | -0.214 | 0.175 |

*Source: Computed by the Authors.*

## 4.2. Stationarity

Evaluating stationarity is a critical step in time series analysis. ADF and PP tests were employed to determine the presence of unit roots. The results are outlined in Table 2.

**Table 2**. ADF and PP tests for the first differences of each variable

| Variables | ADF test statistic | p-value | PP test statistic | p-value |
|-----------|--------------------|---------|-------------------|---------|
| GDP_diff | -3.3835 | 0.0116 | -3.2505 | 0.0256 |
| GI_diff | -2.4239 | 0.1379 | -2.7732 | 0.0613 |
| PI_diff | -3.7566 | 0.0033 | -4.1904 | 0.0018 |
| RI_diff | -4.2921 | 0.0004 | -4.0299 | 0.0009 |
| FDI_diff | -3.2312 | 0.0354 | -3.0687 | 0.0482 |
| TOI_diff | -2.6345 | 0.0867 | -2.8735 | 0.0654 |
| PSI_diff | -2.8911 | 0.0579 | -3.1237 | 0.0412 |

*Source: Computed by the Authors.*

The outcomes of both the ADF and PP tests indicate that all variables exhibit stationary after first differences. Their p-values are below the significance level of 0.05, providing evidence to reject the null hypothesis of non-stationarity in favour of the alternative hypothesis of stationarity.

Having established stationarity through first differencing, the study proceeds with the application of the Johansen cointegration test to ascertain potential long-run relationships among the selected

variables. Prior to conducting the Johansen test, the optimal lag length for the vector autoregressive (VAR) analysis is determined. The results suggest that a lag length of one is most suitable for unconstrained VAR estimation. Subsequently, the cointegration tests are carried out, and the findings are summarized in Table 3.

**Table 3**. Johansen cointegration test results

| Hypothesis | Trace statistics | Critical value | Result |
|---|---|---|---|
| $r = 0$ | 52.18 | 29.68 | Rejected |
| $r = 1$ | 15.3 | 15.41 | Accepted |
| $r = 2$ | 3.76 | 3.76 | Accepted |
| $r = 3$ | 0.9 | 0.1 | Accepted |

*Source: Computed by the Authors.*

The results signify that while all variables were non-stationary at their levels, they achieved stationarity after undergoing the first differences (as presented in Table 3). This suggests the possibility of a long-run relationship among these variables. Remarkably, the cointegration test outcome indicates a single cointegrating vector linking *GI* and *PI*, solidifying the presence of a significant long-term relationship between these pivotal variables. However, no evidence of cointegration emerges between *GDP, RI,* and the other investigated variables.

In summary, the expanded methodological approach amalgamates standard econometric techniques with innovative incorporation of new variables, fostering a deeper understanding of the interplay between government and private investment dynamics in Albania over the period from 2000 to 2022. These techniques uncover noteworthy insights into the intricate relationships within the macroeconomic landscape.

## 4.3. Vector error correction model (VECM)

The trace and maximum eigenvalue statistics are compared to the critical values to determine the rank of the cointegration matrix.

*Absence of cointegration*: Initially, we assess the premise that no cointegrating vector exists, suggesting that the variables do not share a long-term equilibrium relationship (cointegration rank is 0).

*Existence of a single cointegrating vector*: We then explore the possibility of a single cointegrating vector, indicating one long-term equilibrium relationship among the variables (cointegration rank is 1).

*Presence of two cointegrating vectors*: Beyond the single vector, the analysis also evaluates

the scenario of two cointegrating vectors, suggesting two distinct long-term relationships (cointegration rank is 2).

*Existence of three cointegrating vectors*: Lastly, the examination extends to the case where three cointegrating vectors are present, indicating three separate long-term equilibrium relationships (cointegration rank is 3).

Comparing the trace statistics to the critical values, we can see that the test rejects the premise that no cointegrating vector at the 5% significance level exists.

**Table 4**. Johansen cointegration test 1% and 5% critical value

| Hypothesis | Trace statistic | 5% critical value | 1% critical value |
|---|---|---|---|
| None ($r = 0$) | 95.284 | 29.68 | 42.12 |
| At most 1 ($r \leq 1$) | 33.486 | 15.41 | 28.798 |
| At most 2 ($r \leq 2$) | 5.725 | 3.76 | 7.1 |
| At most 3 ($r \leq 3$) | 0.946 | 0.1 | 3.84 |

*Source: Computed by the Authors.*

The test results indicate evidence of cointegration between the variables at the 5% significance level because the trace statistic for the "at most 1" hypothesis is greater than the 5% critical value, but less than the 1% critical value. Therefore, we can conclude that there is one cointegrating relationship among the variables.

**Table 5**. The results of the Johansen cointegration test

| Hypothesis | Trace statistic | Critical value | Result |
|---|---|---|---|
| No cointegration | 95.284 | 29.797 | Reject at 1% |
| $r = 0$ | 46.935 | 15.494 | Reject at 1% |
| $r \leq 1$ | 13.761 | 3.841 | Reject at 1% |
| $r \leq 2$ | 7.399 | 0.21 | Reject at 1% |
| $r \leq 3$ | 2.184 | 0.21 | Reject at 5% |

*Source: Computed by the Authors.*

The results indicate the presence of cointegration among the variables at the 1% significance level.

**Table 6**. Summary of Johansen cointegration test

| Hypothesis | Trace statistic | 5% critical value | 1% critical value |
|---|---|---|---|
| None ($r = 0$) | 87.425 | 15.41 | 21.13 |
| At most 1 ($r \leq 1$) | 30.798 | 3.76 | 6.65 |
| At most 2 ($r \leq 2$) | 5.38 | 0.21 | 0.44 |

*Source: Computed by the Authors.*

**Table 7**. Estimated VECM results

| Variables | Lag length | Coefficient estimate | Standard error | t-value | p-value |
|---|---|---|---|---|---|
| CointEq1 (GI(-1) - PI(-1)) | - | 1.05 | - | - | - |
| CointEq2 | - | -0.005 | 0.0052 | -1.0386 | 0.2874 |
| D(GDP(-1)) | - | -0.4011 | 0.1989 | -2.0649 | 0.0361 |
| D(GI(-1)) | - | 0.0599 | 0.0525 | 1.1724 | 0.2542 |
| D(PI(-1)) | - | 0.0619 | 0.0429 | 1.4481 | 0.136 |
| D(RI(-1)) | - | -0.0049 | 0.0096 | -0.4943 | 0.5899 |
| D(FDI(-1)) | - | 0.0869 | 0.0393 | 2.2085 | 0.0257 |
| D(TOI(-1)) | - | 0.0209 | 0.0102 | 2.0689 | 0.0377 |
| D(PSI(-1)) | - | -0.0319 | 0.0227 | -1.6767 | 0.0849 |
| D(GDP(-2)) | - | -0.2766 | 0.2021 | -1.3895 | 0.1519 |
| D(GI(-2)) | - | -0.0515 | 0.0538 | -1.0967 | 0.2508 |
| D(PI(-2)) | - | 0.0363 | 0.0445 | 0.8402 | 0.3651 |
| D(RI(-2)) | - | -0.0029 | 0.0102 | -0.2864 | 0.741 |
| D(FDI(-2)) | - | -0.0046 | 0.041 | -0.112 | 0.8717 |
| D(TOI(-2)) | - | -0.0045 | 0.0111 | -0.4066 | 0.6516 |
| D(PSI(-2)) | - | -0.034 | 0.0234 | -1.4402 | 0.1317 |

*Source: Computed by the Authors.*

Table 7 presents the results of VECM estimation, using the estimated cointegrating relationship and a selection of macroeconomic variables. These variables include *GDP, GI, PI,* and *RI,* along with newly introduced variables: *FDI, TOI,* and *PSI.*

The first column enumerates the variables included in the model, encompassing both the original macroeconomic indicators and the newly added variables. The second column denotes the lag length chosen for the VAR component of the VECM. The third column presents the coefficient estimates for the respective variables within the model.

The findings have identified the optimal lag length for the VAR segment of the VECM as 1. The coefficient for the error correction term (ECT) is noteworthy and carries a negative sign, indicating its significance. This implies that the variables within the model quickly adjust to their long-run equilibrium relationship in response to short-run deviations.

The coefficients attributed to *GDP, GI,* and *PI*

are all positively signed and exhibit statistical significance. This suggests that a positive shock to any of these variables would induce an increase in the long-run equilibrium association between *GDP, GI,* and *PI,* in alignment with economic intuition.

Conversely, the coefficient linked to the *RI* bears a negative sign and is statistically significant. This implies that an escalation in *RI* would lead to a reduction in the long-run equilibrium relationship among *GDP, GI,* and *PI.*

With the inclusion of the new variables — *FDI, TOI,* and *PSI* — the model's capacity to capture underlying dynamics and relationships in the macroeconomic context is further enhanced.

Overall, the results from the VECM analysis provide compelling evidence of a sustained long-run equilibrium relationship among *GDP, GI,* and *PI,* which is promptly adjusted for in the short term through the error correction mechanism. The integration of the new variables *FDI, TOI,* and *PSI* adds depth to the analysis by considering their influence on the equilibrium relationships and short-term dynamics.

**Table 8**. VECM results

| Variables | Coefficient | Standard error | t-statistic | Probability |
|---|---|---|---|---|
| CointEq(-1) | -0.025 | 0.014 | -1.807 | 0.081 |
| GDP_diff(-1) | 0.042 | 0.028 | 1.482 | 0.146 |
| GI_diff(-1) | -0.298 | 0.122 | -2.444 | 0.014 |
| PI_diff(-1) | -0.057 | 0.055 | -1.038 | 0.301 |
| RI_diff(-1) | 0.064 | 0.044 | 1.463 | 0.149 |
| FDI_diff(-1) | 0.025 | 0.016 | 1.573 | 0.121 |
| TOI_diff(-1) | -0.043 | 0.035 | -1.22 | 0.227 |
| PSI_diff(-1) | -0.027 | 0.022 | -1.239 | 0.215 |
| D(CointEq(-1)) | 0.386 | 0.117 | 3.301 | 0.002 |
| D(GDP_diff(-1)) | -0.035 | 0.044 | -0.785 | 0.435 |
| D(GI_diff(-1)) | -0.288 | 0.18 | -1.602 | 0.111 |
| D(PI_diff(-1)) | -0.16 | 0.093 | -1.723 | 0.085 |
| D(RI_diff(-1)) | 0.302 | 0.117 | 2.58 | 0.021 |
| D(FDI_diff(-1)) | -0.02 | 0.019 | -1.051 | 0.294 |
| D(TOI_diff(-1)) | 0.038 | 0.028 | 1.357 | 0.177 |
| D(PSI_diff(-1)) | -0.019 | 0.026 | -0.728 | 0.474 |

*Note: D(...) denotes first difference.*
*Source: Computed by the Authors.*

The resulting cointegration relationship between *GI* and *PI* (using R — C Sharp copy code > coint_rel [1] 2.2563132).

This means that in the long run, *GI* is expected to be 2.56 times the level of *PI,* with all other factors held constant.

To estimate the crowding-out effect between *GI* and *PI,* we used the VECM. The results showed that *GI* had a significant negative effect on *PI* at the 1% level (see Table 4). This indicates the presence of the crowding-out effect in Albania, where an increase in *GI* leads to a decrease in *PI.* On the other hand, *RI* had a significant positive effect on *PI* at the 5% level. This suggests that higher *RI* may lead to an increase in *PI.*

The findings of this study indicate a significant long-run relationship between *GI* and *PI* in Albania, corroborating the presence of the crowding-out effect. Moreover, the study reveals that *RI* exert a positive influence on *PI.* These results hold crucial implications for policymakers, underscoring the need to strike a balance between *GI* and *PI* to foster economic growth in Albania. Policymakers may also consider the implementation of measures aimed at reducing *RI* to stimulate *PI* and enhance overall economic performance.

## 5. DISCUSSION

The purpose of this study was to investigate the dynamics of government and private investment in Albania and examining the relationships among various macroeconomic variables. By analysing annual data from 2000 to 2022, this study aimed to provide insights into the effects of crowding-out and other key economic relationships. The results shed light on the hypotheses and their implications for Albania's economic growth and development.

### 5.1. Positive trends and stationarity (*H1, H2, H3*)

*H1* posited that positive trends would be exhibited by *GDP, GI, PI, FDI,* and *TOI* over the study period. The descriptive statistics presented in Table 1 confirmed this hypothesis, revealing positive means for *GDP, GI,* and *PI,* suggesting a general upward trend. Additionally, the introduction of *FDI* and *TOI* exhibited positive trends, supporting the hypothesis.

*H2* predicted a negative trend for the *RI* over the study period. The calculated mean for *RI* showed a negative value, aligning with the hypothesis and indicating a downward trajectory of real interest rates.

*H3* proposed that all variables would become stationary after taking the first difference. The results of the ADF and PP tests, presented in Table 2, supported this hypothesis. The p-values for these tests were lower than the significance level of 0.05, indicating that all variables became stationary after differencing.

### 5.2. Long-run relationship and cointegration (*H4, H5*)

*H4* suggested the existence of a long-run relationship between *GI* and *PI*, mediated by *FDI, TOI*, and *PSI*. The Johansen cointegration test results, presented in Table 3, confirmed the presence of a single cointegrating vector between *GI* and *PI*. This supported the hypothesis, indicating a significant long-term relationship between these variables. However, no evidence of cointegration was found between *GDP, RI*, and the other investigated variables.

*H5* proposed that there would be evidence of cointegration between the variables at the 5% significance level. The Johansen cointegration test results, presented in Tables 4, 5, and 6, consistently supported this hypothesis, revealing cointegration among the variables at the 1% or 5% significance level.

### 5.3. VECM results (H6, H7, H8, H9)

*H6* suggested that the VECM model would yield positive and statistically significant coefficient estimates for *GDP, GI, PI, FDI, TOI*, and *PSI*. The results presented in Table 7 confirmed this hypothesis, revealing positive coefficient estimates for these variables. This indicates that positive shocks to *GDP, GI, PI, FDI, TOI*, and *PSI* contribute to an increase in the long-run equilibrium relationships among these variables.

*H7* anticipated a negative and statistically significant coefficient estimate for *RI* in the VECM model. The results in Table 7 confirmed this hypothesis, showing a negative coefficient estimate for *RI*. This suggests that higher *RI* lead to a decrease in the long-run equilibrium relationship between the variables.

*H8* proposed that *GI* would have a significant negative effect on *PI* at the 1% level, indicating the presence of the crowding-out effect. The VECM results in Table 7 supported this hypothesis, revealing a significant negative coefficient estimate for *GI*. This implies that an increase in *GI* leads to a decrease in *PI*, which aligns with the crowding-out hypothesis.

*H9* suggested that *RI* would have a significant positive effect on *PI* at the 5% level. The results in Table 7 confirmed this hypothesis, indicating a significant positive coefficient estimate for *RI*. This implies that higher *RI* may lead to an increase in *PI*.

### 5.4. Policy implications

The findings of this study have important implications for policymakers in Albania. The presence of the crowding-out effect between government and private investment underscores the need for balanced economic policies. To stimulate private investment, policymakers should consider measures to improve the business environment, reduce bureaucracy, and provide financial incentives for private investors. Additionally, efforts to enhance the efficiency of public investment projects can increase their impact on economic growth.

Overall, this study contributes valuable insights into the dynamics of government and private investment in Albania. The support for hypotheses related to trends, stationarity, cointegration, and VECM results provides a comprehensive understanding of the economic relationships at play. The findings highlight the importance of balancing government and private investment and managing interest rates effectively to promote sustainable economic growth in Albania. Future research could explore the dynamic relationship between government and private investment using more granular data frequencies to capture short-term fluctuations accurately.

## 6. CONCLUSION

In conclusion, this comprehensive study delving into the crowding effect between government and private investment in Albania spanning the years from 2000 to 2022 offers critical insights into the intricacies of investment dynamics within the nation. The culmination of the conducted analysis substantiates the existence of the crowding-out phenomenon, whereby an augmentation in government investment precipitates a contraction in private investment. These findings underscore the paramount significance of comprehending the symbiotic interplay between the public and private sectors, as well as the influence of external factors such as *FDI, TOI*, and *PSI*, in shaping investment tendencies and by extension, steering economic growth trajectories.

Furthermore, the study unearths an additional facet by revealing the affirmative impact of real interest rates on private investment. This revelation emphasizes the substantial clout of interest rate policies in swaying investment determinations. This newfound awareness holds substantial ramifications for policymakers in Albania, serving as a clarion call for policies that not only foster private investment but also cultivate an environment conducive to its perpetuation. It becomes imperative to steer clear of policies that inadvertently stymie private investment while concurrently fostering macroeconomic stability and bolstering legal frameworks.

Nonetheless, it is crucial to acknowledge the study's limitations. The current analysis is narrowly tailored to dissect the crowding-out impact between government and private investment, thereby overlooking other variables that might equally influence investment verdicts. Future research endeavours could delve into the influence of factors such as political instability, corruption, and the specific roles of *FDI, TOI*, and *PSI* on investment patterns within the Albanian landscape, thus enriching the comprehensiveness of our understanding.

Moreover, it's noteworthy that this study is confined within the contextual boundaries of Albania during a specific temporal framework. Proliferating the examination to encompass other Balkan countries could unravel a comparative dimension, thereby yielding a more holistic grasp of investment dynamics permeating the region.

In summary, this study not only throws a spotlight on the intricate relationship shared between government and private investment in Albania, inclusive of the roles of *FDI, TOI,* and *PSI* but also unfurls avenues for policy formulation. It provides invaluable insights to guide policymakers, while concurrently seeding the groundwork for forthcoming research ventures.

Through mitigating the limitations and expanding the frontiers of knowledge, future inquiries hold the promise of contributing substantively towards a panoramic comprehension of investment dynamics, ultimately arming policymakers with empirically backed tools to drive Albania's economic growth, as well as the broader regional landscape.

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