Analysing private equity finance and macroeconomic growth indicators

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Abstract

This study examines the relationship between South Africa's macroeconomic environment and private equity (PE) penetration, addressing the country's relatively low PE activity compared to other emerging markets despite its potential. Key macroeconomic indicators such as market capitalisation, GDP per capita, inflation, exchange rates, and bank credit are analysed for their influence on PE inflows. Using time-series econometric techniques, unit root properties were assessed through the Augmented Dickey-Fuller test, followed by Autoregressive Distributed Lag models (ARDL) bounds testing for long-run relationships and Granger causality tests for directional linkages. Findings indicate that market capitalisation, GDP per capita, and bank credit were initially non-stationary but became stationary after differencing, supporting the application of a Vector Error Correction Model. Johansen cointegration confirmed long-run relationships, with market capitalisation exerting a positive effect on PE, while GDP per capita and bank credit displayed negative impacts. Granger causality results showed that market capitalisation Granger-causes PE, and bidirectional causality exists between GDP per capita and inflation. These findings emphasise the need to deepen capital markets, maintain macroeconomic stability, and address income disparities to promote PE growth. The study provides valuable insights into how South Africa's distinct economic and institutional landscape influences PE penetration, thereby addressing a gap in the literature on emerging market PE determinants.

Introduction

Private equity (PE) is progressively recognised as a driver of economic development in emerging markets, offering long-term capital, improving corporate governance, and supporting job creation and innovation. However, despite South Africa's relatively sophisticated financial system and liberalised markets, private equity penetration (PEP) remains low by global and emerging market benchmarks, at less than 2% of assets under management compared to a global average of approximately 14% (Peter, McDougall, Hassan, & Augustyn, 2024). This gap between South Africa's potential and its limited PE activity raises critical questions about the macroeconomic conditions influencing PE investment within the country.

Globally, PE has shown resilience in navigating financial shocks. The 2008–2009 global financial crisis and the COVID-19 pandemic highlighted PE's capacity to provide patient capital and sustain portfolio firms during periods of economic instability (Strusani, Verma, and Manenti, 2020; McKinsey, 2023). In South Africa, PE investment exhibited recovery following the pandemic, with total investments rising to R14.9 billion in 2021 and fundraising increasing by 21% in 2022 (SAVCA, 2022; 2023). Nevertheless, structural challenges such as persistent unemployment, income inequality, policy uncertainty, and energy constraints continue to restrict PE growth, despite policy reforms including the relaxation of pension fund investment limits and enhanced regulatory clarity.

Existing literature has widely documented the economic and social contributions of PE, emphasising its positive effects on productivity, employment, and capital market development. Studies have highlighted the role of macroeconomic stability, market depth, and institutional quality in attracting PE capital (Nkam, Akume, and Sama, 2019). However, most empirical studies have concentrated on developed economies,

with limited evidence on how specific macroeconomic factors affect PE within South Africa's distinct economic and institutional setting.

This article addresses this gap by empirically analysing the relationship between key macroeconomic indicators, namely market capitalisation, GDP per capita, inflation, exchange rates, and banking credit, and PE flows in South Africa over the period 1999–2022. Using time-series econometric methods, the study examines both long-run and short-run relationships and investigates directional causality between PE activity and these macroeconomic variables.

The findings contribute to the expanding literature on private capital markets in emerging economies in two key ways. First, they provide new insights into the macroeconomic determinants of PE in South Africa, emphasising the roles of market development, inflation stability, and banking sector dynamics. Second, they offer policy implications by identifying areas where structural reforms and targeted interventions could strengthen the appeal of PE as a source of development finance.

Literature Review

Private equity penetration in South Africa remains relatively low despite the country's sophisticated financial system and large institutional investor base. Existing research suggests that macro-financial conditions such as capital market depth, inflation stability, exchange rate dynamics, and credit availability play an important role in shaping PE activity, particularly in emerging economies. However, most empirical evidence is drawn from developed markets, and South Africa specific work on the macroeconomic drivers of private equity penetration remains limited and fragmented. This study addresses this gap by examining how key macro-financial indicators jointly influence private equity inflows in South Africa over the period 1999–2022.

Macroeconomic Variables in PEP Analysis

Empirical studies often examine variables that reflect economic depth, stability, and opportunity. This study builds on the approaches of Malik and Dhankar's (2017), by Sagar (2024), Sesele (2018); and Ndlwana and Botha (2018). by focusing on stock market capitalisation, gross domestic product per capita (GDPPC), banking credit to the private sector (BCP), private investments (PI), inflation (INFL), real exchange rate (REX). These variables reflect the availability of capital, investment climate, and systemic risks. The interest rate variable was excluded due to severe multicollinearity, which undermined the reliability and stability of the VECM estimates.

Stock market capitalisation captures market depth and the ability to exit via initial public offerings (IPOs). GDPPC is a proxy for economic maturity and purchasing power, consistently linked to higher PEP (Bernoth and Colavecchio, 2014). Credit to the private sector indicates financial intermediation efficiency (Nkam et al., 2019). Inflation and real exchange rates are signals of macroeconomic stability and investor confidence.

Private Equity as an Alternative Investment

PE involves investments in privately held firms, offering long-term, often illiquid capital in exchange for ownership and strategic influence (Dziekoński and Ignatiuc, 2015). Organised as limited partnerships, PE funds comprise general partners (GPs) (active managers) and limited partners (LPs) (passive investors), typically pension funds, endowments, and high-net-worth individuals (Brigham, Ehrhardt and Fox, 2016).

Private equity (PE) strategies include leveraged buyouts (LBOs), growth equity, venture capital(VC), mezzanine financing, and real estate investments. LBOs typically use substantial debt to acquire underperforming or undervalued firms and improve their performance (Gaughan, 2017), whereas venture capital focuses on funding early-stage, high-growth companies (Megginson, 2011). PE's value proposition lies in aligning managerial expertise with capital deployment, creating value beyond what traditional financing channels provide.

The Role of PE in the Real Economy

PE investments contribute to economic development by supplying growth capital, improving governance, and fostering innovation (Bo, 2020). PE has been shown to enhance productivity and

employment in developing countries (Berger & Udell, 1998; Hotchkiss, Strömberg and Smith, 2021, particularly in sectors like infrastructure, energy, and technology (SAVCA, 2023).

On a macro level, PE activity is associated with entrepreneurship and capital market development (Sagar, 2024). In emerging markets, PE serves as a conduit for foreign direct investment, filling gaps left by constrained public resources (Organisation for Economic Co-operation and Development (OECD, 2022). South Africa's National Development Plan (2011) acknowledges PE's role in reducing poverty and inequality through job creation and small and medium-sized enterprises' support.

Theoretical Perspectives

Several economic theories help explain PEP. The trade-off theory (Modigliani & Miller, 1958) and pecking order theory (Myers, 1984) suggest firms favour equity financing when debt becomes costly or constraining. The neo-classical investment theory (Jorgenson, 1973) and endogenous growth models (Rensman, 1996) highlight capital accumulation and innovation as drivers of growth, with PE acting as a catalyst.

Modern portfolio theory (Markowitz, 1952) supports PE's role in diversification, offering uncorrelated returns to institutional investors (Lukomnik & Hawley, 2021). Institutional theory emphasises the importance of governance, transparency, and regulatory frameworks in attracting PE (Molathlwe, 2016). Together, these frameworks suggest that a country's macroeconomic environment and institutional quality shape the supply and demand for PE capital.

Empirical Evidence from Developed and Emerging Markets

Empirical studies consistently identify GDPPC, stock market depth, and private credit as positive drivers of PE activity, while inflation and exchange rate volatility are often deterrents.

In Europe, Kelly (2012) found that market capitalisation and GDPPC drive PE activity, though venture capital and buyouts respond differently to economic cycles. Bernoth et al. (2014) highlighted the roles of bank lending and inflation alongside GDPPC. Groh and Wallmeroth (2016) stressed institutional quality and labour costs in shaping regional PE flows.

In emerging Asia, Oino (2014) found advanced stock markets fostered PE, while gross domestic product (GDP) growth was insignificant. In Sub-Saharan Africa, Oni (2017) linked venture capital supply to IPO activity and market depth. Kungu (2014) showed in Kenya that GDP growth, inflation, and lending rates significantly improve PE outcomes, while exchange rate volatility has a negative effect.

In South Africa, Molathlwe (2016) attributes its relative attractiveness to solid macroeconomic fundamentals, deep capital markets, and a skilled workforce, while noting that the quality of fund managers and Broad-Based Black Economic Empowerment policies also play critical roles. SAVCA (2022) data shows that PE in South Africa recovered after COVID-19, with infrastructure and technology receiving significant investment.

Macroeconomic Indicators and PEP

GDPPC reflects economic maturity and is strongly correlated with PEP (Nkam et al., 2019). However, Jeng & Wells (2000) caution that weak institutions can mute this effect in developing economies. Stock market capitalisation facilitates PE exits, making it a key determinant (Groh, von Liechtenstein, and Lieser, 2010; Kelly, 2012). Private credit enhances financial intermediation and complements PE capital (Nkam et al., 2019; Guler et al., 2010). Inflation and REX introduce risk and uncertainty, generally discouraging PE flows (Ndlwana and Botha, 2018). Real interest rates have mixed effects, signalling stability but raising borrowing costs (Ndlwana et al., 2018).

Literature Gaps and Contribution

Although macroeconomic stability and financial market depth are widely recognised as important drivers of PE investment, much of the existing evidence is drawn from developed economies. The South African case is shaped by distinct institutional realities, including persistent inequality, regulatory reform, infrastructure constraints, and policy uncertainty. As a result, international findings may not translate directly. This study addresses this gap by examining how key macroeconomic indicators interact with private equity activity in South Africa over the period 1999–2022.

Research Methodology

This study investigates the macroeconomic determinants of private equity (PE) investments in South Africa using a quantitative, time-series approach. By analysing secondary data over 1999–2022, the research establishes the relationships between PE penetration and key macroeconomic indicators within the South African context. The time-series data for the macroeconomic variables used in this study were obtained from reputable and authoritative sources to ensure accuracy and reliability. Real interest rates, GDPPC and the real exchange rate were sourced from the World Bank. Inflation data, private investment and domestic credit to the private sector were acquired from the South African Reserve Bank. Market capitalisation growth was derived from the World bank database. Finally, data on PEP were obtained from Southern African Venture Capital and Private Equity Association (SAVCA) and Statistics South Africa .

Model specification

The empirical strategy combines the Johansen cointegration technique and the Vector Error Correction Model (VECM) to test for long-term equilibrium relationships and short-run adjustments. Granger causality tests are further applied to assess the directionality of relationships between PEP and its determinants.

This study models the relationship between private equity penetration (PEP) and key macroeconomic variables stock market capitalisation (MCAP), GDP per capita (GDPPC), banking credit to the private sector (BCP), private investment (PI), inflation(INFL), and the real exchange rate (REX).

The empirical analysis proceeds in three stages. First, the long-run equilibrium relationship between private equity participation (PEP) and its macroeconomic determinants is specified as a linear function of stock market capitalisation (MCAP), per capita GDP (GDPPC), real exchange rate (REX), inflation (INFL), and the composite variable for private investment and credit (LNPI_BCP).

The Econometric model specification is given as:

$$\mathrm{LNPEP}_t = \beta_0 + \beta_1 \mathrm{LNMCAP}_t + \beta_2 \mathrm{GDPPC}_t + \beta_3 \mathrm{REX}_t + \beta_4 \mathrm{INFL}_t + \beta_5 \mathrm{LNPI\_BCP}_t + \varepsilon_t$$

This specification captures the long-run impact of financial market depth, economic growth, and macroeconomic stability on private equity flows. Second, to model short-term deviations from this long-run path while preserving cointegration properties.

The VECM captures short-term deviations from equilibrium:

$$\Delta Y_t = \gamma \Delta X_{t-1} - \lambda(Y_{t-1} - \theta X_{t-1}) + u_t$$

Granger's test of causality is given as:

$$\Delta \mathrm{LNPEP}\tau = \alpha_0 + \sum_{i=0}^{n} \alpha_{1\tau} \Delta \mathrm{LNMCAP}_{t-\tau} + \sum_{i=0}^{n} \alpha_{2\tau} \Delta \mathrm{GDPPC}_{t-\tau} + \sum_{i=0}^{n} \alpha_{3\tau} \Delta \mathrm{INFL}_{t-\tau} + \sum_{i=0}^{n} \alpha_{4\tau} \Delta \mathrm{REX}_{t-\tau} + \sum_{i=0}^{n} \alpha_{4\tau} \Delta \mathrm{LNPI\_BCP}_{t-\tau} + \varphi_1 \mathrm{ECM}_{t-1} + \mu_t$$

Here, $\mathrm{ECM}_{t-1} = (Y_{t-1} - \theta X_{t-1})$ denotes the lagged error correction term, and λ measures the speed of adjustment back to equilibrium following short-term shocks. Finally, Granger causality tests are conducted within the VECM framework to investigate both short-run and long-run causal linkages between PEP and its determinants.

Definition of Variables

The dependent variable, PEP, captures the volume of private equity transactions in South Africa, expressed as a proportion of the previous year's GDP. To identify the factors influencing PEP, several independent variables are included. Market capitalisation (MCAP) represents the total market value of publicly traded shares of domestic corporations, reflecting stock market depth and liquidity. Banking credit to the private sector (BCP) measures the aggregate loans and credit facilities extended by financial institutions to the private sector for productive activities. Gross domestic product per capita (GDPPC) is calculated as GDP divided by the total population, indicating average income and economic well-being. Private investment (PI) refers to total spending by the private sector, including non-profits, on fixed capital formation within the domestic economy. The inflation rate (INFL) captures the rate of increase in the general price level, serving as a proxy for macroeconomic stability. The real exchange rate (REX) reflects the relative

price of domestic versus foreign goods, indicating currency competitiveness and volatility. Lastly, real interest rates (INT) represent lending rates adjusted for inflation, reflecting the true cost of borrowing. The model also includes the lagged error correction $ECMt-1$ with coefficient $\varphi 1$, an error term μt, the difference operator Δ, and a specified lag length n.

The choice of these variables is supported by established empirical studies, notably those by Nkam, Akume, and Sama (2019); Sesele (2018); Ndlwana and Botha (2018); and Malik and Dhankar (2017). Stock market capitalisation, which signifies the advancement of capital markets, was incorporated due to its importance for PE investors who depend on well-functioning capital markets for accurate valuations and successful exit strategies. GDPPC was employed as a proxy for income levels, which significantly influence the demand for goods and services offered by companies backed by PE.

Time series analysis

The study used time series econometric models in establishing the cause-effect relationship between private equity, economic growth, job creation, interest rates and inflation. The linearity relationship is assumed between variables. This was tested using the Multivariate Time Series by Vector Error Correction Models VECM and Granger causality test.

Stationarity Test.

The estimation proceeds in two stages. First, unit root tests are conducted to confirm the integration order of each variable. The Johansen cointegration test then examines the presence and number of long-run relationships among the series. In the absence of cointegration, the VECM reduces to a standard vector autoregressive (VAR) model in first differences. To assess the stationarity of the time series data and avoid spurious regression, the Augmented Dickey-Fuller (ADF) test was employed. This widely used test examines the null hypothesis of a unit root, indicating non-stationarity, against the alternative of stationarity. Detecting unit roots is essential, as most macroeconomic variables tend to exhibit stochastic trends, making ordinary least squares estimates unreliable if unaddressed. The stationarity checks informed the appropriate modelling strategy for subsequent cointegration and causality analyses.

If two or more such non-stationary series are regressed directly, for example in the form:

$$Yt = \beta 0 + \beta_1 X_{1,t} + \beta_2 X_{2,t} + \cdots + \beta_k X_{k,t} + \varepsilon t ,$$

the resulting estimates may be biased, and the relationship may appear significant when it is not, a phenomenon known as spurious regression.

Cointegration test

Before conducting the cointegration and VECM analyses, it was necessary to assess the stationarity properties of the variables, given that macroeconomic time series are often nonstationary. Johansen (1988) emphasised that for cointegration analysis to be valid, all variables must be integrated of the same order, typically I (1), meaning they must become stationary after first differencing. To this end, the order of integration and stationarity of each series were tested using the Augmented Dickey-Fuller (ADF) procedure. Once it was confirmed that the variables are integrated of the same order, the Johansen cointegration test was employed to determine whether a long-run equilibrium relationship exists among them. The presence of cointegration justified the use of a Vector Error Correction Model (VECM), which allows for simultaneous modelling of short-term dynamics and adjustment towards long-term equilibrium.

Both the trace and the maximum eigenvalue tests are used to test for the co-integration ranks of the VAR model. Null hypothesis is that there is no co-integration between the PE and the independent variables in the study. Null hypothesis will be rejected if the critical value is exceeded by trace statistics or Max Eigen values exceed.

The null hypothesis is that there is r co-integrating vectors against an alternative of (r+1) co-integrating vectors (Brooks, 2014). Where $\lambda\ddot{\imath}$ is the estimated value for the ith ordered eigenvalue.

The test statistic for Trace test and Maximum Eigenvalue is computed as:

$$\lambda_{\text{Trace}}(r) = -T\sum_{i=r+1}^{g} \ln(1 - \hat{\lambda}_i)$$

$$\lambda_{\text{Max}}(r, r+1) = -T\ln(1 - \hat{\lambda}_{r+1})$$

Vector Error Correction Model (VECM)

Following Engle and Granger (1987), the existence of cointegration implies an error correction representation, whereby changes in the dependent variable reflect both deviations from the long-run equilibrium (captured by the error correction term) and contemporaneous changes in explanatory variables. Granger further noted that cointegrated variables can be appropriately expressed within the VECM framework. In this study, the VECM was specified as follows:

$$\Delta LNPEP\tau = \alpha_0 + \lambda ECM_{t-1} + \sum_{i=1}^{n} \alpha_{1\tau} \Delta LNPEP_{t-\tau} + \sum_{i=0}^{n} \alpha_{2\tau} \Delta GDPPC_{t-\tau} + \sum_{i=0}^{n} \alpha_{3\tau} \Delta INFL_{t-\tau} + \sum_{i=0}^{n} \alpha_{4\tau} \Delta REX_{t-\tau} + \sum_{i=0}^{n} \alpha_{5\tau} \Delta LNPI\_BCP_{t-\tau} + \sum_{i=0}^{n} \alpha_{6\tau} \Delta LNMCAP_{,} + \mu_t$$

Where:

$$ECM_{t-1} = LNPEP_{t-\tau} + \beta_0 - \beta_1 GDPPC_{t-\tau} + \beta_2 LNP\_BCP_{t-\tau} + \beta_3 MCAP_{t-\tau} + \beta_4 REX_{t-\tau} + \beta_5 INFL_{t-\tau}$$

To account for major macroeconomic shocks, dummy variables are incorporated to capture the effects of the Global Financial Crisis (2008–2009) and the COVID-19 pandemic (2020–2021), thereby isolating structural breaks that may distort long-run relationships.

Granger Causality Test

Next, the Granger causality test was employed to examine the predictive relationships between private equity participation (PEP) and key macroeconomic variables, including GDP per capita (GDPPC), market capitalisation (MCAP), inflation (INFL), the real exchange rate (REX), private investment (PI), and banking credit to the private sector (BCP). This test assesses whether past values of one variable help explain current movements in another. The null hypothesis posits that lagged values of an explanatory variable do not improve the prediction of the dependent variable, implying no Granger causality. An F-test is then applied to evaluate this hypothesis against the alternative hypothesis of causality. Granger causality is assessed using the F-statistic and its associated p-value. The null hypothesis of no Granger causality is tested against the alternative hypothesis of predictive causality. The null hypothesis is rejected at the 5 percent significance level if the p-value is less than 0.05, indicating evidence of Granger causality. Conversely, if the p-value exceeds 0.05, the null hypothesis of no Granger causality is not rejected.

- H0: X1 does not cause X2
- H1: X1 causes X2

In formal terms, the test estimates equations of the form:

$$LNPEP\tau = \alpha_0 + \sum_{i=1}^{n} \alpha_{1\tau} LNPEP_{t-\tau} + \sum_{j=1}^{n} \beta_j X_{t-j} + \varepsilon_t$$

Where x represents each macroeconomic variable in turn, and tests whether βj=0 for all j. Rejection of the null hypothesis indicates that x Granger-causes PEP, while failure to reject suggests no predictive power. Similarly, reverse causality is tested by switching the dependent and explanatory variables. The analysis distinguishes between unidirectional causality, where only one null is rejected, and bidirectional causality, where both nulls are rejected. This framework allows us to assess whether PEP acts merely as a passive reflection of macroeconomic conditions or actively contributes to economic dynamics.

The regression equation form for Granger's test of causality is provided as follows:

$$\Delta LNPEPi\tau = \emptyset_0 + \sum_{i=1}^{n} \emptyset_{1i} \Delta GDPPC_{t-1} + \sum_{i=1}^{n} \emptyset_{2i} \Delta INFL_{t-1} + \sum_{i=1}^{n} \emptyset_{3i} \Delta REX_{t-1} + \sum_{i=1}^{n} \emptyset_{4i} \Delta LNPI\_BCP_{t-1} + \sum_{i=1}^{n} \emptyset_{5i} \Delta LNMCAP_{t-1} + \rho_5 \varepsilon_{t-1} + \mu_{5t}$$

Data And Empirical Analysis

This section presents the empirical results of the study, supported by tables, figures, and diagnostic tests. The analysis, performed using EViews 12, begins with descriptive statistics, followed by unit root and cointegration tests, estimation of the VECM, Granger causality tests, and diagnostic evaluations.

Descriptive Statistics

Table 1 summarises the key descriptive statistics of the macroeconomic variables.

Table 1. Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Private Equity Penetration (PEP)	1.99	1.27	4.72	1.00	1.24
GDP per capita (GDPPC)	0.47	1.08	4.59	-7.11	2.72
Inflation (INFL)	8.34	6.96	18.65	-0.69	4.54
Real Exchange Rate (REX)	107.69	101.99	181.52	70.67	29.41
Private Investment (PI)	13.99	13.59	18.91	10.77	2.16
Real Interest Rate (INT)	4.08	4.03	12.69	-11.01	3.99
Market Capitalisation (MCAP)	173.78	157.11	322.71	62.44	70.48
Bank Credit to Private Sector (BCP)	100.95	105.28	142.42	50.09	26.42

Source : Authors interpretation using EViews 12

Note: All variables are based on annual data for South Africa over the period 1999-2022 (22 observations).

The mean private equity participation (PEP) is 1.98% of GDP, reflecting modest but stable activity over time (SD = 1.24). GDP per capita (GDPPC) exhibits significant volatility (mean = 0.47; SD = 2.72), consistent with South Africa's exposure to global and domestic shocks. Real exchange rate (REX) and inflation (INFL) also show high variability, reflecting macroeconomic instability. Banking credit to the private sector (BCP) and private investment (PI) demonstrate moderate variability, while market capitalisation (MCAP) is highly volatile, underlining its sensitivity to financial market cycles. These patterns align with previous literature, highlighting South Africa's dual characteristics of market depth and vulnerability.

Unit Root and Stationarity Tests

ADF unit root tests in table 2 reveal that all series are integrated of order one, I(1), becoming stationary after first differencing. This justifies the use of Johansen cointegration and VECM approaches, which are appropriate for exploring long-run relationships among non-stationary series.

Table 2. Summary on Stationarity

Variable	ADF at Levels (p-value)	ADF at 1st Diff (p-value)	Order of Integration	Conclusion
LNPEP	-1.29 (0.61)	-3.54 (0.016)	I(1)	Stationary at 1st difference
LNMCap	-1.46 (0.53)	-5.63 (0.0003)	I(1)	Stationary at 1st difference
REX	-0.23 (0.91)	-4.48 (0.0028)	I(1)	Stationary at 1st difference
GDPPC	-3.55 (0.015)	-4.06 (0.0009)	I(1)	Stationary at 1st difference
INFL	-2.03 (0.27)	-5.21 (0.0006)	I(1)	Stationary at 1st difference
INT		-5.20 (0.0004)	I(1)	Stationary at 1st difference
LNPI	-2.14 (0.23)	-2.95 (0.055)	I(1)	Stationary at 1st difference
LNBCP	-1.60 (0.46)	-3.19 (0.036)	I(1)	Stationary at 1st difference
PI_BCP	-1.68 (0.43)	-3.32 (0.0285)	I(1)	Stationary at 1st difference

Source : Authors interpretation using EViews 12

Note: Significance is determined at the 5% level, first-difference stationarity confirmed where p-value < 0.05

Lag Length Selection

The optimal lag length was determined using the Akaike Information Criterion (AIC), Final Prediction Error (FPE), and Hannan-Quinn Information Criterion (HQIC). All three criteria reached their minimum at lag 2, indicating that a two-lag structure is appropriate for the VECM model. As shown in Figure 1 and table 3, all lag selection criteria (AIC, FPE, and HQIC) indicate that the optimal lag length for the VAR model is 2.

To address potential multicollinearity in the explanatory variables, the interest rate variable (INT) was excluded from the final specifications. Additionally, a composite variable (LNPI_BCP), combining private investment (PI) and banking credit to the private sector (BCP), was constructed to capture their joint effect on PEP.

Table 3. VAR Lag Order

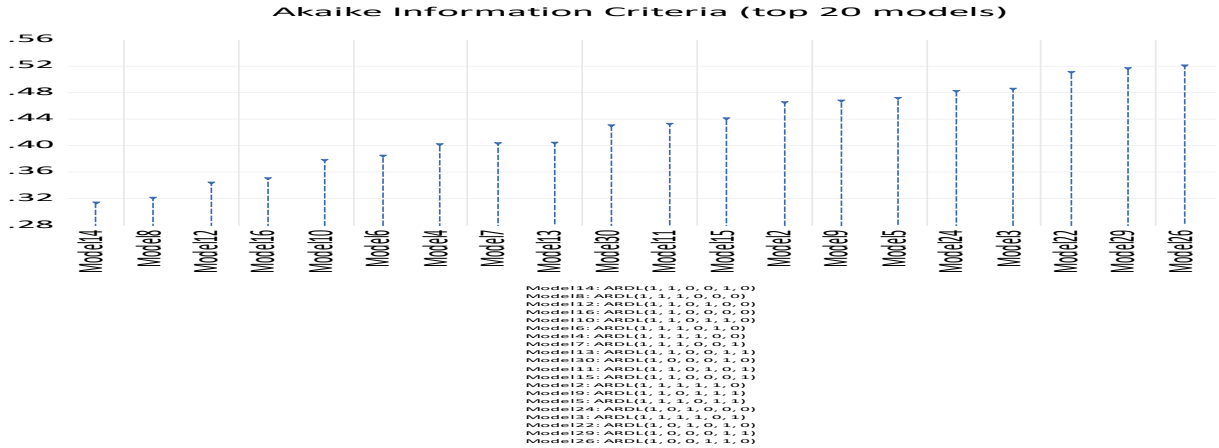
Endogenous variables: LNPEP, LNMCAP, REX, GDPPC, INFL, LNPI_BCP
Sample period: 1999–2022

Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-153.7391	NA	0.081663	14.52173	14.81929	14.59183
1	-66.82848	118.5144	0.000915	9.893499	11.97640	10.38417
2	-4.289503	51.16826*	0.000206*	7.480864*	11.34911*	8.392105*

Source : Authors interpretation using EViews 12

Figure 1: Lag length Selection



Source : Authors interpretation using EViews 12

Johansen Cointegration Test

Both the trace and maximum eigenvalue tests indicate the presence of at least three cointegrating vectors at the 5% significance level, confirming a long-run equilibrium relationship between PEP and the macroeconomic variables. This finding in table 4 supports the hypothesis that financial development and macroeconomic conditions jointly influence private equity flows in South Africa.

Table 4. Cointegration analysis

Method	Null Hypothesis	Statistic	Critical Value (5%)	p-value	Conclusion
Trace Statistic	r = 0	160.89	95.75	0	Reject H0: ≥1 cointegration vector
Trace Statistic	r ≤ 1	105.78	69.81	0	Reject H0: ≥2 vectors
Trace Statistic	r ≤ 2	67.43	47.85	0.0024	Reject H0: ≥3 vectors
Trace Statistic	r ≤ 3	47.15	29.79	0.0005	Reject H0: ≥4 vectors
Max-eigenvalue	r = 0 vs r = 1	81.62	40.07	0	Reject H0
Max-eigenvalue	r = 1 vs r = 2	42.96	33.88	0.0046	Reject H0
Max-eigenvalue	r = 2 vs r = 3	31.82	27.58	0.0166	Reject H0

Source : Authors interpretation using EViews 12

VECM Estimation

$$\text{LNPEP} = 2.5399 \cdot \text{LNMCap} - 0.0344 \cdot \text{REX} + 2.0987 \cdot \text{GDPPC} - 1.9873 \cdot \text{INFL} - 40.7608 \cdot \text{LNPI\_BCP} + c$$

Long-run Equation

The estimated long-run coefficients from the VECM reveal important insights into the determinants of private equity participation (PEP) in South Africa. Market capitalisation (MCAP) exhibits a positive coefficient of +2.54, indicating that a more developed and liquid stock market enhances PEP by facilitating exit opportunities and bolstering investor confidence. Similarly, GDP per capita (GDPPC) has a positive coefficient of +2.10, suggesting that higher income levels support PEP through increased demand and expanded market opportunities.

In contrast, the real exchange rate (REX) shows a small negative effect (–0.03), highlighting that exchange rate volatility discourages PEP due to heightened currency risk. Inflation (INFL) also exerts a significant negative impact (–1.99), reflecting how macroeconomic instability undermines long-term investment decisions. Lastly, the composite variable combining private investment and banking credit (LNPI_BCP) displays a large negative coefficient (–40.76), consistent with a substitution effect, where greater access to conventional credit and private investment reduces reliance on PE funding. These results underscore the importance of financial market depth and macroeconomic stability in promoting a vibrant private equity sector.

The negative association between bank credit and private equity penetration may reflect a substitution effect within South Africa's financing structure. In environments where conventional bank lending is accessible and relatively deep, firms may rely more heavily on debt financing rather than equity-based alternatives such as private equity. This suggests that private equity may function more as a complementary source of capital during periods of constrained credit conditions rather than expanding alongside traditional financial intermediation.

The insignificant effect of GDP per capita suggests that aggregate income growth alone may not automatically deepen private equity markets in South Africa. While rising average income typically signals economic maturity, it does not necessarily translate into improved investment conditions or broader entrepreneurial activity. As a result, higher GDP per capita does not automatically deepen private equity markets in contexts where growth remains uneven and structurally constrained.

Short-run Adjustment

The error correction term is negative but statistically insignificant, suggesting that deviations from long-run equilibrium are corrected slowly. This highlights structural rigidities and frictions in the South African PE market. The VECM results confirm a significant long-term cointegration between PEP and key macroeconomic variables, with market capitalisation and GDP per capita positively influencing PE activity, while exchange rate volatility (REX) negatively affects it. The composite variable combining private investment and credit (LNPI_BCP) shows a strong negative relationship, suggesting that greater access to

conventional financing may reduce PE reliance. However, none of the adjustment coefficients are statistically significant at the 5% level, indicating that short-term deviations from equilibrium are not quickly corrected.

Table 5. Error Correction Term Analysis

Dependent Variable	ECT Coefficient	t-statistic	Interpretation
D(LNPEP)	–0.00774	–1.33	Not statistically significant: LNPEP does not adjust strongly to restore long-run equilibrium.
D(LNMCap)	0.00818	0.51	No significant correction.
D(REX)	–0.1961	–0.51	Exchange rate deviations do not adjust meaningfully.
D(GDPPC)	0.1596	0.83	Insignificant short-run effect.
D(INFL)	–0.1626	–1.28	Weak and statistically insignificant.
D(LNPI_BCP)	–0.00473	–0.96	Also insignificant.

Source : Authors interpretation using EViews 12

Granger Causality Tests

The Granger causality results uncover several notable predictive relationships between private equity participation (PEP) and key macroeconomic variables, as shown in table 6. Market capitalisation (MCAP) Granger-causes PEP ($p = 0.002$), indicating that greater market depth facilitates PE flows, aligning with existing evidence that developed capital markets enhance exit opportunities and attract investment. Inflation (INFL) also Granger-causes PEP ($p = 0.016$), reflecting the sensitivity of PE activity to macroeconomic risk and price instability.

Conversely, PEP itself Granger-causes GDP per capita (GDPPC) ($p = 0.024$), suggesting that private equity investment contributes to economic growth and plays a developmental role. Additionally, MCAP Granger-causes the real exchange rate (REX) ($p = 0.046$), highlighting the influence of financial market developments on exchange rate dynamics. Other variables, such as REX and GDPPC, do not exhibit Granger-causality towards PEP in the short run, implying predominantly unidirectional rather than bidirectional relationships within the observed period. These findings reinforce the importance of financial sector depth and macroeconomic stability for fostering private equity investment and its growth-enhancing potential.

Table 6. Granger Causality Tests

Direction	F-Statistic	p-value	Granger-Causal?	Interpretation
LNMCap → LNPEP	9.11	0.002	Yes	Market development predicts PE participation.
INFL → LNPEP	5.29	0.016	Yes	Inflation affects PE via macro risk.
LNPEP → GDPPC	4.67	0.024	Yes	PE contributes to economic output.
LNMCap → REX	4.38	0.046	Yes	Financial markets influence exchange rate dynamics.
REX → LNPEP	1.21	0.322	No	No evidence of exchange rate predicting PE.
GDPPC → LNPEP	0.45	0.645	No	Income level does not predict PE.
LNPI_BCP → LNPEP	2.26	0.135	No	Bank credit is not predictive of PE flows.

Source : Authors interpretation using EViews 12

Correlation and Multicollinearity

Correlation analysis in table 7 shows strong positive correlation between PEP and MCAP (0.78), and a strong negative correlation with REX (–0.74). Inflation and GDPPC exhibit weaker, less intuitive correlations. Variance Inflation Factor (VIF) values are all below 5, indicating that multicollinearity does not materially distort the estimates. This suggests that as South Africa's capital markets deepen and flourish, PE activity tends to escalate. This finding aligns with empirical evidence from emerging economies, which demonstrates that mature financial markets bolster investor confidence, improve exit opportunities, particularly via IPOs and foster more dynamic PE ecosystems (Gompers & Lerner, 2000; Avdjiev et al., 2014).

Similarly, although the correlation between PEP and BCP is modest at 0.05, it concurs with theoretical expectations that increased credit availability can facilitate leveraged buyouts, portfolio company expansion and transaction financing.

Table 7. Correlation Test

Variable	LNPEP	LNMCAP	REX	GDPPC	INFL	INT	LNPI	LNBCP
LNPEP	1.00	0.78	−0.74	−0.51	0.14	−0.55	0.20	−0.05
LNMCAP	0.78	1.00	−0.50	−0.42	−0.15	−0.47	0.13	0.09
REX	−0.74	−0.50	1.00	0.57	−0.45	0.47	0.02	0.22
GDPPC	−0.51	−0.42	0.57	1.00	−0.07	0.19	0.02	0.07
INFL	0.14	−0.15	−0.45	−0.07	1.00	0.00	0.28	−0.09
INT	−0.55	−0.47	0.47	0.19	0.00	1.00	−0.00	0.17
LNPI	0.20	0.13	0.02	0.02	0.28	−0.00	1.00	0.75
LNBCP	−0.05	0.09	0.22	0.07	−0.09	0.17	0.75	1.00

Source : Authors interpretation using EViews 12

Model Diagnostics

Autocorrelation

Durbin-Watson (DW = 1.77) and Breusch-Godfrey LM tests confirm that residuals are free of significant autocorrelation. This validates the use of OLS and VECM estimators.

Table 8. empirical results

Variable	Coefficient	Std. Error	t-Statistic	Probability
LNMCAP	0.7380	0.2476	2.981	0.0088
REX	−0.0220	0.0083	−2.651	0.0174
GDPPC	−0.0064	0.0253	−0.254	0.8028
INFL	−0.0408	0.0374	−1.089	0.2924
INT	−0.0115	0.0318	−0.362	0.7224
LNPI	1.7610	0.7606	2.315	0.0342
LNBCP	−1.4489	0.8212	−1.764	0.0967
Constant (C)	1.4930	3.0186	0.495	0.6276
Statistic	Value	Statistic		Value
R-squared	0.8402	Mean dependent variable		0.8925
Adjusted R-squared	0.7702	Std. dev. of dependent variable		0.5014
S.E. of regression	0.2403	Akaike information criterion		0.2475
Sum squared residuals	0.9240	Schwarz criterion		0.6402
Log likelihood	5.0300	Hannan-Quinn criterion		0.3517
F-statistic	12.0153	Durbin-Watson statistic		1.7723
Prob(F-statistic)	0.0000			

Source : Authors interpretation using EViews 12

The empirical results indicate several notable relationships between macroeconomic variables and private equity participation (PEP). A 1% increase in market capitalisation is associated with a 0.738% rise in PEP, underscoring the role of deep and liquid financial markets in enhancing exit opportunities and attracting investor interest in private equity ventures. Conversely, a 1% appreciation in the real exchange rate is linked to a 0.022% decline in PEP, suggesting that exchange rate volatility or a strengthening rand can dampen investor confidence. Per capita income does not exhibit a significant effect on PE activity, which may reflect persistent structural income inequality in South Africa and the forward-looking, opportunity-driven nature of PE investments. This finding suggests that aggregate income growth alone may not be sufficient to deepen private equity markets in South Africa. Structural factors such as persistent income inequality, uneven sectoral development, and limited entrepreneurial scaling may weaken the transmission from higher average income levels to private capital formation. In this context, improvements in GDP per capita do not necessarily translate into broader investment dynamism or increased demand for private equity financing.

Inflation shows a negative but statistically insignificant relationship with PEP, implying that while inflation-induced uncertainty may deter some investors, its impact on long-term equity commitments is limited. Similarly, interest rates do not significantly influence PE flows, consistent with the equity-based and less debt-reliant nature of PE financing. Notably, a 1% increase in private investment (PI) correlates with a 1.76% increase in PEP, supporting the idea that a vibrant investment climate complements PE expansion. Interestingly, higher private sector credit shows a negative association with PEP, supporting the substitution hypothesis. In financially deeper credit environments, firms may prefer conventional debt due to lower cost, familiarity, or shorter funding horizons. As a result, private equity may play a complementary or gap-filling role, becoming more relevant when credit conditions tighten. In financially deeper credit environments, firms may prefer debt due to lower cost, familiarity, or shorter funding horizons. As a result, private equity in South Africa may play a more complementary or gap-filling role, becoming more relevant when traditional credit conditions tighten rather than expanding proportionally with bank intermediation.

Heteroskedasticity

White and Breusch-Pagan tests find no evidence of heteroskedasticity, confirming the homoskedasticity of residuals and supporting the validity of inference. The findings provide no evidence of heteroskedasticity in the model's residuals. The residual variance seems constant across various levels of the explanatory variables, thereby fulfilling the Gauss-Markov requirement for homoskedasticity. This supports the legitimacy of the OLS estimators for inferential purposes. All p-values exceed the 0.05 threshold, suggesting an inability to reject the null hypothesis.

Table 9. Breusch-Pagan Heteroskedasticity Test Results

Test Statistic	Value	Probability
F-statistic	0.7731	0.5815
Obs*R-squared	4.2427	0.5150
Scaled explained SS	2.4680	0.7813

Auxiliary Regression Results

Dependent variable: Squared residuals (RESID²)

Test Statistic	Value	Probability
F-statistic	0.7731	0.5815
Obs*R-squared	4.2427	0.5150
Scaled explained SS	2.4680	0.7813

Statistic	Value	Statistic	Value
R-squared	0.1768	Mean dependent variable	0.0535
Adjusted R-squared	−0.0519	Std. dev. of dependent variable	0.0790
S.E. of regression	0.0806	Akaike information criterion	−1.9861
Sum squared residuals	0.1170	Schwarz criterion	−1.6916
Log likelihood	29.8329	Hannan-Quinn criterion	−1.9079
F-statistic	0.7731	Durbin-Watson statistic	2.2932
Prob(F-statistic)	0.5815		

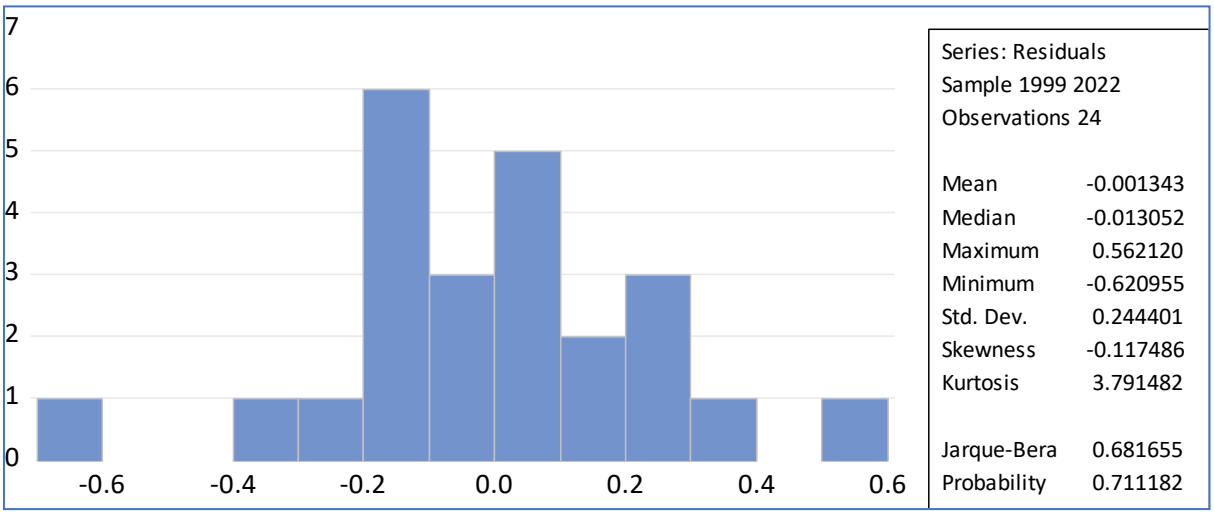
Source : Authors interpretation using EViews 12

Note: Probability values greater than 0.05 indicate failure to reject the null hypothesis of homoskedasticity.

Normality

Jarque-Bera test (p = 0.711) and graphical analysis confirm that residuals are normally distributed, meeting another key assumption of classical regression.

Figure 2 Normality of residuals



Source : Authors interpretation using EViews 12

Key Findings and Interpretation

The analysis shows that PEP in South Africa is strongly influenced by the depth of the stock market and by broader macroeconomic stability. Deep and liquid capital markets, reflected in MCAP, foster PE inflows by improving exit options and investor confidence. Higher GDPPC and private investment also positively contribute, though their effects are less pronounced. Conversely, exchange rate volatility and inflation exert significant negative pressure on PE activity, underscoring the importance of macroeconomic stability for long-term investment.

Granger causality results reveal that PE not only responds to market and macroeconomic conditions but also contributes to economic development by enhancing GDP per capita. This aligns with international evidence on the dual role of PE as both influenced by and contributing to economic growth.

Conclusion

This study examines the macroeconomic determinants of private equity penetration (PEP) in South Africa using annual time-series data from 1999 to 2022. Johansen cointegration, a Vector Error Correction Model (VECM), and Granger causality tests are used to assess long-run relationships, short-run dynamics, and predictive linkages between PEP and key macro-financial indicators.

The evidence points to a clear long-run connection between private equity penetration and South Africa's macroeconomic environment. Stock market capitalisation is positively associated with PEP, consistent with the idea that deeper and more liquid capital markets improve exit opportunities and investor confidence. Inflation and exchange rate volatility, by contrast, are linked to weaker private equity penetration, highlighting the role of macroeconomic uncertainty in discouraging long-horizon investment in an economy already exposed to recurring shocks. The composite measure of bank credit and private investment shows a negative effect, which is consistent with a substitution channel where conventional financing reduces reliance on private equity funding.

The causality results reinforce these patterns. Market depth and inflation predict movements in PEP, while PEP itself predicts GDP per capita, suggesting that private equity can contribute to broader economic outcomes rather than only responding to them. At the same time, limited feedback from GDP or exchange rate movements to PEP points to the importance of structural constraints, including persistent inequality, infrastructure bottlenecks, and the energy supply challenges that continue to shape South Africa's investment climate.

These results have practical implications. Policy credibility and price stability remain central to attracting long-term private. Continued development of capital market infrastructure, governance, and transparency also remains essential, particularly in strengthening exit conditions for investors. Policy reforms such as the gradual relaxation of Regulation 28 investment limits have improved the scope for institutional participation in private markets, but sustained progress will depend on broader macro-financial stability and investor confidence.

South Africa's recent experience also highlights the importance of institutional and regulatory credibility. Developments such as FATF greylisting have added an additional layer of uncertainty for international investors (IMF, 2023; SAVCA, 2023), reinforcing the need for strong governance, transparency, and financial integrity to support private capital inflows. At the same time, industry evidence from SAVCA (2023) indicates that fundraising and investment activity have shown resilience in parts of the post-pandemic period, suggesting that private equity can expand when conditions are supportive, particularly in sectors such as infrastructure, energy, and technology.

Finally, while expanding access to conventional finance remains necessary, there is a strong case for blended finance and equity-based funding models that can support SMEs and high-growth firms that often fall outside traditional lending channels. This is especially relevant in South Africa, where private capital is increasingly expected to complement public investment priorities linked to employment creation and inclusive development.

This study adds to the emerging-market literature by providing South Africa-specific econometric evidence on the macroeconomic conditions associated with private equity penetration. Future research could extend the analysis by incorporating institutional quality measures, regulatory dynamics, and firm-level drivers, as well as distinguishing between private equity strategies to better capture differences in participation and outcomes.

Overall, a stable macro-financial backdrop, deeper capital markets, and credible institutional reforms can strengthen private equity penetration and enhance its role in sustainable and inclusive growth in South Africa.

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