



National Income and MSME Density: A Cross-Country Empirical Investigation

Radha Bahl

The Shri Ram School, Mousari
V-37, Mousari Ave, DLF Phase 3, Sector 24, Gurugram, Haryana 122010, India

Email- radhabahl22@gmail.com

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Abstract

Knowledge of determinants of MSME density is important to inform evidence-based economic policy, especially in developing economies where MSMEs are the main drivers of employment, poverty reduction, and inclusive growth. This study fills an important knowledge gap in the body of empirical literature by offering cross-country quantitative data on how the level of national income determines the formal MSME environment. This research paper examines the factors of the density of Micro, Small and Medium Enterprise (MSME) within economies through Ordinary Least Squares (OLS) regression analysis. The Data had been collected through SME finance forum, which was a collection of 150 cross-country observations, including the years 2002 to 2018. MSME density per 1,000 people is the dependent and GNI per capita (USD), and Year were the independent variables. The OLS regression model is statistically significant ($F(2, 147) = 8.42, p = 0.0003$) with GNI per capita and Year having a positive but marginally non significant effect ($0.0003992, p = 0.003$ and $1.658, p = 0.054$, respectively). These results imply that national income is a major contributor to formal MSME concentration, which is why income-growth and formalization policies should be specifically implemented in less affluent economies. The model needs to be extended to include more structural determinants in future research, including access to credit and quality of regulations, digital infrastructure, and institutional capacity, and use the panel data approach and more recent and current datasets as of 2018 to reflect the contemporary changes in the global MSME environment and increase the external validity of the findings.

Keywords: MSME Density; GNI Per Capita; OLS Regression; Economic Development; SME Policy

Introduction

SMEs are significant sources of employment, economic growth and innovation. SMEs constitute a huge share of the business population, employment, and GDP of developed economies (Bayraktar and Algan, 2019). MSMEs are important contributors to job creation. MSMEs comprise 90 percent of the businesses in the world. (Morales Pedraza, 2021). MSMEs are challenged and have opportunities by globalization. MSMEs need government assistance in order to grow and survive (Kumari & Chaudhary,

2024). In India, the MSME sector employs more than 23.14 crore people, the sector contributes to about 16 percent of the population, thus it is the second-highest employment generating sector after agriculture. The importance of MSMEs in economic development is evident in their contribution to GDP, industrial production, exports, and creation of employment. The researchers came to the conclusion that the effect of Micro, Small, and Medium Enterprises (MSMEs) on the development of the Indonesian economy in 2015-22 is significant and positive. MSMEs contributed around 80.2% to the variation in economic growth, as indicated by the coefficient of determination (R^2) (Ardiansyah et al., 2024). MSMEs enhance employment, GDP and export performance. The government support increases competitiveness and innovation among the MSMEs (Pandey & Chaudhary, 2024). It highlights the importance of MSMEs in terms of adding about 30 percent to the GDP of India and in terms of the jobs created to over 120 million Indians. The paper reports some of the major government initiatives, including the MSME Development Act of 2006 and Pradhan Mantri Mudra Yojana that seek to build a conducive MSME environment that promotes innovation and entrepreneurship among young entrepreneurs via the digital platform of provision (Pal, 2025). MSMEs are known to contribute about 30 percent of the GDP and 45-46 percent of total exports to India, which shows that they are playing a major role in the Indian economy. The industry provides an employment of more than 110 million individuals in 63-73 million businesses indicating its significance in creating jobs. In spite of their potentials to grow, MSMEs continue to be challenged by inadequate access to finance, inadequate technology, lack of infrastructure and intricate regulatory requirements (Saxena and Dhaka, 2025) a high credit gap to the Micro, Small, and the Medium Enterprises (MSMEs) in the developing countries, largely induced by poor creditworthiness and unwillingness of the financial institutions to lend. Creative financing approaches, including government venture capital financing and government-sponsored partnerships are also found to be suitable approaches to close the credit gap among MSMEs (Kumar, 2024). A stable long-run association amidst MSMEs financing, MSMEs output, and economic growth in Nigeria between 1992 and 2013. An output of MSMEs and economic growth were found to have a bi-directional causal relationship (Kalu et al., 2015). An unidirectional relationship between micro, small and medium enterprises (MSMEs) and exports. The augmented Dickey-Fuller Test and Philip Perron tests were used in the research to evaluate the data stationarity. Johanson cointegration method and Granger causality tests were used to determine the relationship between MSMEs and exports and foreign exchange reserves (Yadav and Mohan, 2023). In India, 49 percent of exports is contributed by MSEs. MSMEs contribute 45% to the manufacturing sector in India. (Uma & Anbuselvi, 2023). Micro, Small, and Medium Enterprises (MSMEs) play a considerable role in the national economy, as they amount to 61.97 percent of the total national GDP in 2020, which is equal to IDR 8,573.89 trillion (Mahfud and Mahfud, 2025). In the business sector, 97% of all the workforce was absorbed by MSMEs in the year 2020, thereby reflecting their significant contribution to employment (Stoesser, 2023). Microenterprises prevailed in the framework of Russian SMEs with the majority of them being sole proprietors. (Markin & Korableva, 2025). The regulatory complexities, lack of access to financing, infrastructure constraints and external factors were major barriers to the development of SMEs.

Literature Review

A study determined the critical elements of the performance of micro- and small-sector enterprises (MSMEs) in Indonesia and Malaysia in terms of exports. It analyses concomitant and partial impacts of exchange rates, inflation, interest rates, GNI per capita and labor on MSME exports in the two countries. (Salim et al., 2024). The interest rate has the most significant negative impact on MSMEs' accessibility, with a highly negative coefficient of -1.847789. Access is also adversely impacted by economic conditions with a coefficient of -0.391709. Return constraints have a positive impact on access, but the coefficient is 0.658254 (Yasrizal et al., 2023). MSME is an important source of employment in India with more than 120 million individuals working in this sector. It has determined that the economic role of MSMEs is about 29 percent of the GDP of India, emphasizing their significance in the economy

(Ghatge et al., 2024). More than 97% of the Indonesian workforce is employed by MSMEs. They make over 61 percent contribution towards GDP (Sinha et al., 2024). The study emphasizes that MSMEs are very important in meeting the Sustainable Development Goals (SDGs) as they contribute to economic growth and creation of employment. It highlights the efforts of the MSMEs in reducing poverty, creating equality between genders, practicing responsible production, and making the economy inclusive (Singh, 2025). The growth of MSMEs greatly affects the productivity of the local sectors and economic growth. The amount of government spending influences the productivity and growth of the local sector significantly. The productivity in the local sector has a great influence on economic growth (Alie, 2025). The rate of growth of MSMEs in terms of compounds, investment, production, employment as well as exports was high. When compared to other factors, the volatility of the number of MSMEs was greater (Vyas, 2013). The contribution of MSMEs to GDP and GVA is 30 and 32 percent in India respectively. MSMEs contribute to 40-50% of the total exports of India (Boateng et al., n.d.). MSMEs are a great contributor to the GDP and community. They are crucial in creation of jobs and alleviation of poverty. Some of the challenges that MSMEs are experiencing are inadequate access to funds and low digital literacy (Simanjuntak & Putri, 2025). SMEs are the ones that contribute 32 percent to the Gross Domestic Product (GDP) in Malaysia. The greatest contribution to GDP is in services sector (Tahir et al., 2018). Small businesses play a significant role in providing employment to the majority of the economies as they are a significant source of jobs (Rohatg, 2022). Interest rate, business angels, bank support and public support are the predominant factors that caused economic growth in the European Union. The policies should be implemented by national and regional authorities to promote SMEs (Batrancea et al., 2022). SMEs employment generation (SMEEG) has a negative impact on economic growth in the short run. The only significant effects it has on economic growth are those of NSMES, and the rest of the influences (CBSME, SMEEG and INTRT) are non significant (Nkamnebe et al., n.d.). In-house R&D key to SME success over the long term. However, government support can also influence the success of SMEs but it is temporary. (Song & Ahn, 2024). Geopolitical and economic factors led to growth and crisis cycles in the SME sector in Russia between 2010 and 2024. There was an increase in the number of SMEs, rising employment, and turnover during the analyzed period. Liquidation rates of businesses went down and this is a sign that the SME sector may be stabilized (Markin & Korableva, 2025). There was a statistically significant effort on funding small and medium enterprises (SMEs) on gross domestic product (GDP) in Jordan. It showed that financing of SMEs results in 95 percent of change in GDP and unemployment and thus, there is a high degree of correlation. The study showed that Jordan had a significant impact of reducing unemployment rates due to SME funding (Al-Afeef, 2020). Family SMEs inverted U-relationship with economic growth. Maximum economic growth through an equal combination of family and non-family SMEs (Memili et al., 2015). Unidirectional relationship between poverty and economic growth, urbanization, SMEs. One year positive impact of SMEs on poverty (Jauhari & Periansya, 2021). Small and medium enterprises (SMEs) are very critical in increasing the competitiveness of the U.S economy in the world job market. The U.S. SMEs do not bring the same level of efficiency to production as other SMEs in other countries, which means that there is a mismatch in economic activity comparisons. Although SMEs place a burden on the U.S. economy in terms of production efficiency, they have a positive impact on dynamic efficiency especially in terms of innovation and employment (Audretsch, 2002). There is a positive and statistically significant relationship between the growth of small and medium-sized enterprises (SMEs) and the economic growth in Iran. SMEs are singled out as a key determinant of job and economic development in developing nations. The researchers used mixed data of 2004-2005 in the context of augmented Solow growth model and panel data approach (Rahimlou Benis, 2014). Ghana has SMEs that contribute to GDP and provide 70 percent of working population. The paper suggests government subsidies and customized policies to SMEs. (Amoah et al., 2022). The contribution of SME to GDP has a positive impact on household incomes. Work in individual entrepreneurship improves the income and well-being (Imramziyeva et al., 2024). SMEs are major contributors to the GDP, work generation and exports of Pakistan. SMEs play a crucial role in economic and socio-economic development, Youth in Karachi lack economic opportunities for professional growth (Zafar & Mustafa, 2017). SMEs are involved in the economic growth and development of Oman. SMEs are complements of

large businesses that are crucial in an economy (Muthuramana, 2020). MSMEs increase employment, GDP, FDI and exports. The performance and competitiveness of MSMEs are improved with government support (Pandey and Chaudhary, 2024). Small and medium-sized enterprises (SMEs) indirectly influence the economic development in Oman significantly and positively with path coefficient of 0.274 and t-value of 2.562. The SMEs facilitate economic development in a number of ways, such as capacity building, job creation, and the competitive markets (Muthuraman, 2024). There have been massive economic shocks in the world due to the COVID-19 pandemic and the Russian war of aggression against Ukraine. These happenings have led to stunted growth and increased rates of inflation SMEs have been hampered by lockdowns, decreased demand, travel bans, and increased energy costs. SMEs have experienced additional problems due to the disruptions in supply chains in their struggle to survive (Foreword, 2022). Small and medium-sized enterprises (SMEs) have been especially susceptible to the economic impacts of this crisis. Severe drop in company revenues during lockdowns MSMEs regained their revenues with more online transactions (Cerda et al., 2023).

Analysis

Table 1

Summary of the Data

Variable	Obs	Mean	Std. dev.	Min	Max
MSMEDensity	150	40.92176	36.22465	.5679175	238.351
GNIperCapitaUSD	150	17645.93	22149.46	280	116300

The sample contains 150 cross-country records, and the average density of MSME is 40.92 enterprises per 1,000 citizens (SD = 36.22) and has a wide range of values, between 0.57 and 238.35. The average GNI per capita was USD 17,645.93 (SD = 22,149.46) with a low of USD 280 and a high of USD 116,300, which shows there were a great number of low-income to high-income economies.

Table 2

Regression Model

Source	SS	df	MS	Number of obs	=	150
Model	20087.7348	2	10043.8674	F(2, 147)	=	8.42
Residual	175433.811	147	1193.42729	Prob > F	=	0.0003
Total	195521.546	149	1312.22514	R-squared	=	0.1027
				Adj R-squared	=	0.0905
				Root MSE	=	34.546

MSMEDensity	Coefficient	Std. err.	t	P> t	[95% conf. interval]
GNIperCapitaUSD	.0003992	.0001318	3.03	0.003	.0001389 .0006596
Year	1.658229	.8533896	1.94	0.054	-.0282683 3.344725
_cons	-3306.481	1718.516	-1.92	0.056	-6702.67 89.70746

The OLS regression model had a statistically significant value of 1% ($F(2, 147) = 8.42, p = 0.0003$), which reveals that both GNI per Capita and Year are statistically significant and contribute to the variation in MSME Density. The model accounts for about 10.27 percent of the variation in the MSME Density ($R^2 = 0.1027$) and adjusted R-squared of 0.0905, indicating a low, yet statistically significant, fit. GNI per Capita was observed to positively and significantly predict MSME Density ($= 0.0003992, = 0.003$), meaning that increased national income levels are related with an increase in MSME density per

1,000 population. Year presented a positive, but slightly insignificant coefficient ($= 1.658$, $p = 0.054$), indicating a slight but not strong upward trend in the density of MSMEs over the years that barely exceeds the conventional significance levels. The constant was a negative value that was very insignificant ($= -3306.481$, $p = 0.056$) which indicates the level of MSME density in the absence of any predictors.

Table 3

Multicollinearity test (VIF)

Variable	VIF	1/VIF
GNIperCapi~D	1.06	0.940503
Year	1.06	0.940503
Mean VIF	1.06	

Variance Inflation Factor (VIF) test was used to understand whether multicollinearity exists between the independent variables. The value of both GPI per Capita (VIF = 1.06) and Year (VIF = 1.06) was very near to 1, much lower than the generally accepted value of 10, which means that there is no multicollinearity between the predictors. The fact that the mean VIF is 1.06, is one more confirmation that the independent variables do not correlate with each other too much, which is one of the assumptions of OLS regression. Thus, multicollinearity is not an issue in this model and the regression coefficients may be confidently interpreted.

Table 4

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of **MSMEDensityper1000people**
H0: Constant variance
chi2(1) = **0.03**
Prob > chi2 = **0.8673**

Breusch-Pagan/Cook-Weisberg test was performed to test the hypothesis whether the error terms in the regression model are constantly varying (homoskedasticity). The null hypothesis of equal variance was not rejected because the test gave a chi-squared test of 0.03 with p-value of 0.8673, which is significantly higher than the 5% level of significance. This implies that the error terms' residuals are homoskedastic, i.e., the variance of the error terms is unaffected by all fitted values of MSME Density per 1,000 people. Thus, the heteroskedasticity does not exist in this model, which proves that one of the major assumptions of OLS is fulfilled, and the regression estimates are efficient and reliable.

Table 5

Ramsay RESET test for omitted variables

Ramsay RESET test for omitted variables
Omitted: Powers of fitted values of **MSMEDensityper1000people**
H0: Model has no omitted variables
F(3, 144) = **0.22**
Prob > F = **0.8822**

Ramsay RESET test was done to determine whether regression model is biased by omitted variables or it is misspecified by its functional form. The null hypothesis that the model did not include

any additional variables was not rejected because the test value of F is 0.22 with a p-value of 0.8822, more than 5% level of significance. This shows that the model is properly specified and that there are no significant variables or non-linear forms of functions not included in the regression. Thus, the model specification is considered sufficient, which proves that the association between MSME Density, GNI per Capita and Year is properly defined by the existing linear regression model.

Table 6

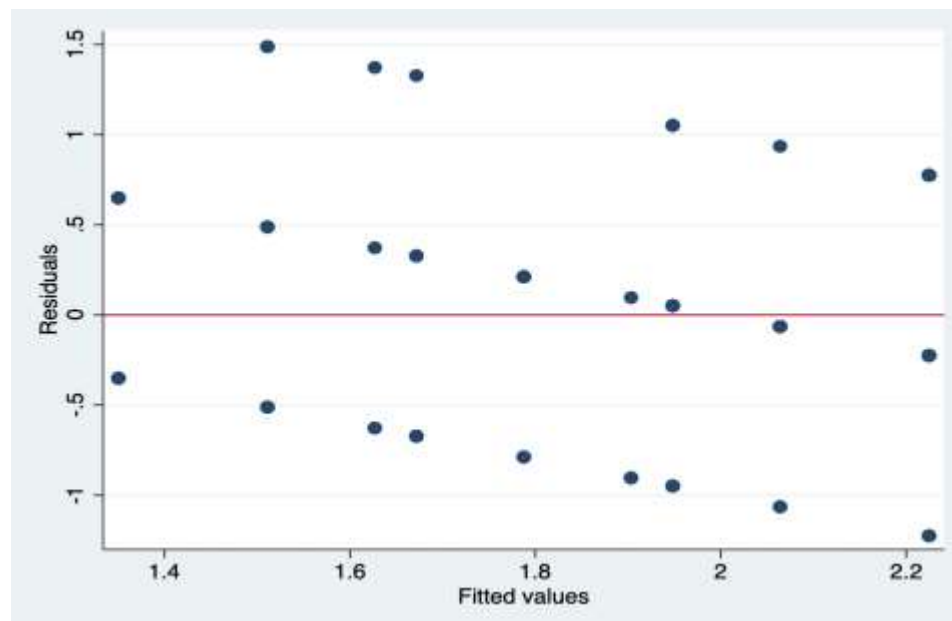
Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	1.54	5	0.9090
Skewness	4.51	2	0.1047
Kurtosis	2.25	1	0.1336
Total	8.30	8	0.4048

The decomposition of the IM-test performed by Cameron and Trivedi was done to evaluate jointly, the heteroskedasticity, skewness and kurtosis of the regression residuals. The heteroskedasticity test gave a chi-squared test of 1.54 (df=5, p=0.9090), which means that there is no heteroskedasticity and this is supported by the Breusch-Pagan test results. The skewness element gave a chi-square value equal to 4.51 (df = 2, p = 0.1047) and the kurtosis element gave a chi-square value equal to 2.25 (df = 1, p = 0.1336), which are not statistically significant at the 5% level, indicating that the residuals are not significantly non-normally distributed. The overall IM-test value of 8.30 (df = 8, p = 0.4048) is significantly higher than the 5% significance threshold, which means that the model residuals are homoskedastic and normal at the same time. Hence, the outcomes of this decomposition provide additional confirmation of the accuracy and effectiveness of the estimates of the OLS regression used in this research.

Table 7

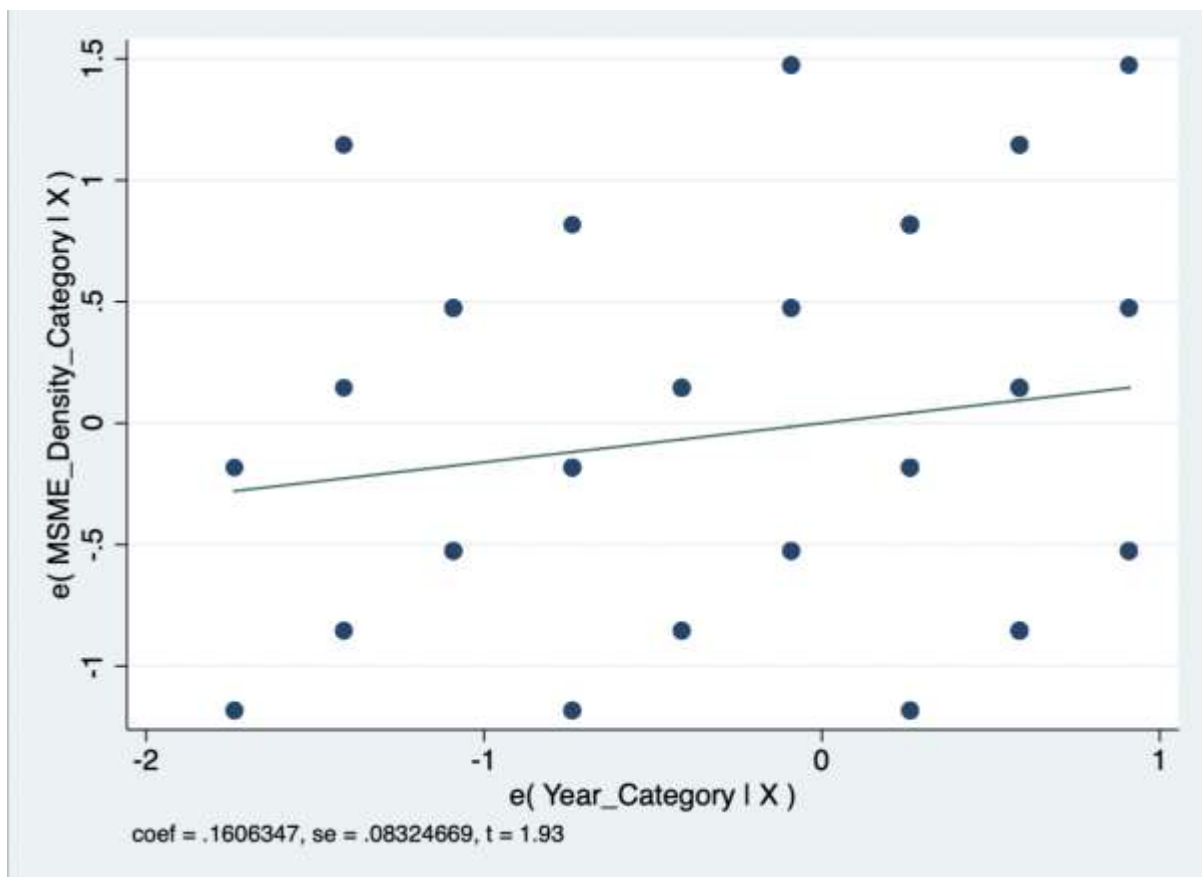
Residual v/s Fitted values



To determine the OLS assumption of homoskedasticity and linearity in the model, the Residual versus Fitted Values plot was analyzed. The residuals also seem to be randomly distributed above and below the horizontal reference line at 0 across all the fitted values between about 1.3 and 2.3, and no noticeable systematic pattern or trend. Such random distribution of the residues ensure the non-existence of heteroskedasticity and implies that the linear functional form of the model is suitable. The plot thus offers a visual validation of the results of the Breusch-Pagan and IM tests, which can be further used as confirmation that OLS assumptions are met satisfactorily in the regression model.

Table 8

MSME Density and Year



Year Category, Added Variable Plot looks at the partial dependence of MSME Density and Year under the influence of GNI per Capita. The plot shows that there is a weak positive association between Year and MSME Density (coef = 0.1606, se = 0.0832, t = 1.93), meaning that the effect of Year on the latter is weak but positive when GNI per Capita is held constant. Nevertheless, the data points are so widely dispersed around the regression line, indicating that the Year is only a minor contributor to the variation of MSME Density, as indicated by the insignificant p-value of 0.056 in the primary regression. In general, the plot indicates that although the increase in MSME Density over time is modest, the association is not so significant that the relationship can be considered conclusively significant at the traditional 5% level.

Methodology

Research Design

This paper is based on the quantitative research design and uses Ordinary Least Squares (OLS) regression analysis to analyze the determinants of MSME density in different economies. The quantitative approach is suitable since the goal is to determine quantifiable, statistically testable correlations of economic variables. This is a non-experimental, explanatory research design that will utilize secondary cross-country data to determine the extent to which GNI per capita and year are the two explanatory variables of the variation in MSME density per 1000 people in 150 observations.

Research Approach

A deductive research approach is applied in this study since hypotheses are based on the existing theoretical frameworks on MSME development and economic growth and then tested against empirical evidence. The analytical approach is multiple OLS regression, which is determined with Stata 14. The regression model estimates MSME Density (per 1,000 people) as the dependent variable, and GNI per Capita (USD) and Year as the independent variables. The model is as follows: $MSME\ Density = 8.044 + 1(GNI\ per\ Capita) + 1(Year) + \epsilon$. Numerous diagnostic tests were performed such as VIF test of multicollinearity, Breusch-Pagan and Cameron-Trivedi IM tests of heteroskedasticity and Ramsey RESET test of model specification.

Sampling Design

The data will be 150 observations that will be obtained through the SME finance forum, (smefinanceforum.org). The sample encompasses various nations with different income levels, over the year 2002-2018. The sampling method is purposive with the economies being sampled on the basis of availability of all the data on MSME density, GNI per capita, and year. The sample consists of both low-income and high-income economies with USD 280 to USD 116,300 GNI per capita values and cross-income diversity is provided by the sample.

Data Collection Methods

The secondary sources were used as the sole sources of data collection. The main dataset was the database of MSME Economic Indicators at the SME Finance Forum (smefinanceforum.org/data-sites/msme-country-indicators). MSME Density per 1,000 people (dependent variable), GNI per Capita in USD, Year of observation were the independent variables. The data was then cleaned in Stata 14 and categorized and analysed.

Data Analysis Technique

Stata 14 was used to analyse the data with multiple OLS regression. To test the assumptions of the models, five post-estimation diagnostic tests were performed, namely, (1) Variance Inflation Factor (VIF) test to determine the presence of multicollinearity with a threshold of $VIF < 10$; (2) the Breusch-Pagan/Cook-Weisberg test to test the homos

Reliability and Validity

A well-established and peer-reviewed dataset that is collected by SME finance forum and which is based on official national statistical sources is used to ensure the reliability of this study. The use of several diagnostic tests improves validity by validating the OLS assumptions of no multicollinearity (VIF

= 1.06), homoskedasticity (Breusch-Pagan $p = 0.8673$), and appropriate model specification (Ramsey RESET $p = 0.8822$). The triangulation is done through the corroboration of the statistical findings with graphical evidence of residual plots and added variable plots to ensure that the results are similar in both quantitative and visual measures of assessment.

Conclusion

The paper has compared the determinants of MSME density among economies using an OLS regression equation with GNI per capita and Year as independent variables, using a set of 150 cross-country observations obtained in the SME finance forum, MSME Economic Indicators database. The statistical significance of the regression model was estimated to be significant at the 1% level $F(2, 147) = 8.42$, $p = 0.0003$, and it was observed that the national income levels and time trends have an effect on the density of formal MSMEs. The GNI per capita has proved to be a statistically significant positive predictor of MSME density ($= 0.0003992$, $p = 0.003$) and as such, has confirmed the hypothesis that more prosperous economies are more likely to support more formal MSMEs per 1,000 people. Year had a positive yet slightly insignificant impact (1.658, $p = 0.054$), indicating a slight upward trend over time in MSME density, which is not significant by traditional statistical standards. The explained variance in the model of MSME density was about 10.27 which means that although the model predictors are meaningful, a large percentage of variation is explained by the factors that are not captured by this model. All the diagnostic tests indicated the satisfaction of the OLS assumptions: no multicollinearity was observed (Mean VIF = 1.06), the residuals were homoskedastic (Breusch-Pagan $p = 0.8673$), and the model was specified correctly (Ramsey RESET $p = 0.8822$). These results emphasize the importance of economic development in promoting the growth of MSMEs, and the necessity of policy measures to provide MSMEs with better income levels and formalization to increase their density. The variables that need to be included in future research to enhance the explanatory capability of the model are access to credit, regulatory environment, digital infrastructure and institutional quality. These findings can be further enhanced with longitudinal panel data models and more recent data than 2018.

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