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***Estimating the contribution of SMEs output on GDP growth in Bangladesh-
A VECM Approach***

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Estimating the contribution of SMEs output on GDP growth in Bangladesh- A VECM Approach

Abstract

The output of SMEs has been regarded as essential to achieve long-term development through industrialization of a country. According to the Bangladesh Bureau of Statistics (BBS), the contribution of the manufacturing sector, which includes cottage, micro, small, and medium-sized enterprises, to GDP was 24.45 percent in FY22, up from 23.36 percent in FY21. The accelerated contribution of the SME sector to the GDP of Bangladesh has raised the necessity of conducting a study in this area. This study endeavors to analyze the potential role of SME output on the economic growth of Bangladesh considering some macroeconomic variables using unit root tests, cointegration techniques, and the Vector Error Correction Model (VECM) with yearly time series data from 1978 to 2020. This study has used GDP as a dependent variable and the GDP of small-scale industry (as a proxy of SME output) as an independent variable, with some other control variables. The findings of the study confirm a positive and significant impact of SME output on GDP growth. The results show that the contribution of the SME sector to GDP growth is about 30.4 percent. This study has policy implications for formulating economic policies to boost the economic growth of Bangladesh. However, the sector still requires a policy design to overcome the rooted problems that remain in this sector. These policies require a proactive strategy that can cater to more economic growth through the progress of SMEs. Investment in R&D to ensure SME intensification may be urged.

Keywords: SME, economic growth, VECM

JEL Classification: O40, C23

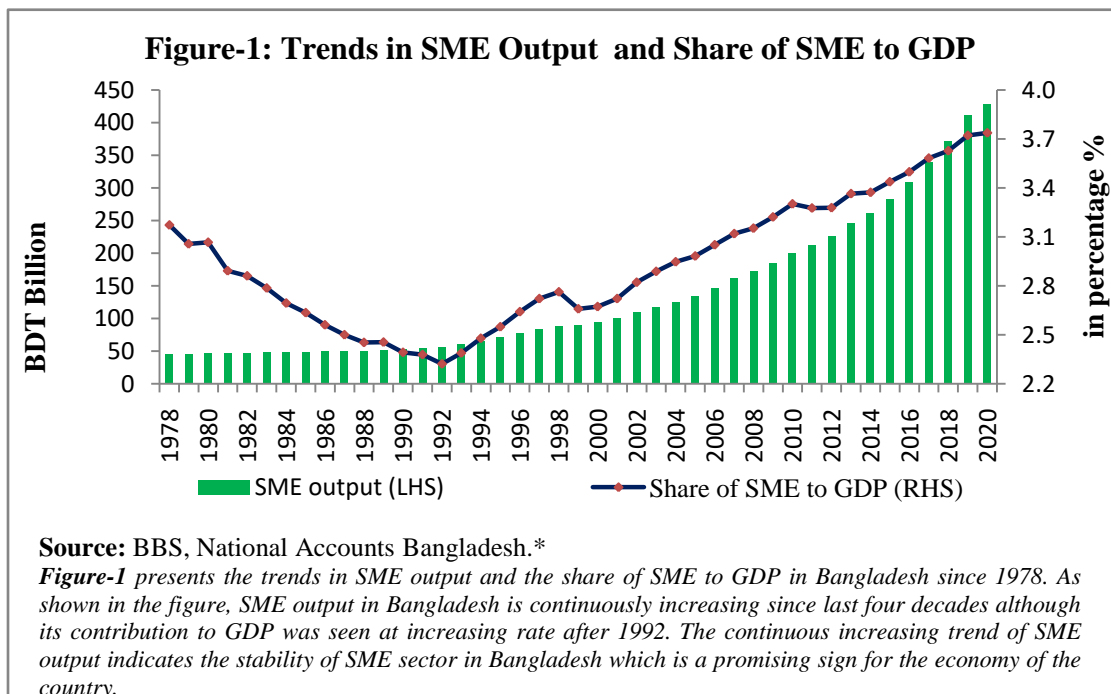
Disclaimer: Views expressed in this article are of the authors own and does not necessarily reflect the views of the organization they work. Comments and suggestions on any aspect of the article are highly welcomed and can be sent to mokhlesur.rahman2@bb.org.bd, rupok.chad@bb.org.bd and puja.bhattacharjee@bb.org.bd.

1. Introduction

Small and medium enterprises (SMEs) are globally recognized for their intrinsic contribution to economic growth and creating employment opportunities. Both developed and developing countries comprehend that SMEs have become one of the key instruments to achieve sustainable economic growth. World Bank data (2022) has shown that SMEs represent about 90% of businesses and more than 50% of employment worldwide. Formal SMEs contribute up to 40% of national income (GDP) in emerging economies.¹ In many Asian countries, it has been estimated that SMEs contribute more than 90 percent of industrial output and create employment opportunities for 60 percent of the labor force (Veskaisri, Chan, & Pollard, 2007).

SMEs significantly contribute to the development of domestic industry by supporting both major and minor economic activities that generate employment. The contribution of this sector is more relevant in developing countries like Bangladesh as the production processes and products manufactured in this sector require less investment relative to large-scale enterprises.

The government of Bangladesh has launched sector-wise initiatives to boost economic growth, one of which is to make the SME sector more vibrant. SMEs contribute to economic growth in various ways, including desirable economic sustainability, innovation, and trade. GDP growth in FY17 was 6.59 percent, which increased to 7.32 and 7.88 percent in FY18 and FY19, respectively. However, due to the COVID-19 pandemic outbreak, growth in FY20 was 3.45 percent.



¹<http://www.worldbank.org/en/topic/sme/finance>

*Base year 2005-06

According to estimates from the Bangladesh Bureau of Statistics (BBS), the SME sector contributed 21.36 percent of GDP in FY17, followed by 21.98 percent in FY18 and 22.86 percent in FY19. However, In FY20, this sector's contribution declined to 22.40 percent due to the pandemic. This scenario of rising GDP growth, along with the contribution of the SME sector to GDP at an increasing rate, raised the necessity of conducting a study on this area.

The time series data demonstrates that the output of small and medium-sized enterprises (SMEs) remained steady from 1978 to 1992, while the GDP of Bangladesh expanded due to the other determinants of GDP. After 1992, however, the output of SMEs began to rise; in 1994, the output of SMEs was BDT 67.56 billion, and it rose to BDT 94.33 billion in 2000, which increased more than 100 percent to BDT 194.85 billion in 2005. Ten years later, it reached BDT 200.40 billion, and by 2020, it had risen to BDT 437.8 billion. Similarly, the share of GDP contributed by SMEs has increased steadily over the past two decades, from 2.55 percent in 1994 to 3.44 percent in 2015, and it was estimated at 3.74 percent in 2020.

Globally, all SMEs face the same constraints, but they differ in terms of determining the role of SMEs in the growth of the economy and the creation of job opportunities. In Bangladesh, the National Industrial Policy, published in 2005, classified industries as cottage, small, medium, and large according to the number of workers and size of capital for the case of Bangladesh. Afterwards, the National Industrial Policy (2010) included the term "micro" in the classification of enterprises.

Small and medium enterprises are thought to be the driving force behind the rapid economic growth in Bangladesh. Despite its significance in the economy, this sector has not realized its maximum capacity yet, facing some constraints to reach its full potential. Some studies demonstrate a strong and positive relationship between GDP growth and the output of SMEs. (e.g., Hu, 2010; Pandya, 2012; Mujahid and Begum, 2019; Alauddin et al., 2015). Therefore, the goal of this study is to determine the impact of Small and medium enterprises (SMEs) on GDP growth in our economy and to address some potential policies to ensure the intensification of this sector.

2. Overview of CMSMEs in Bangladesh

According to the latest Economic Census 2013, total number of establishment in industrial sector was 78,18,565 of which 78,13,315 or 99.9 percent were CMSMEs. Within this, 87.5 percent were cottage industries followed by micro (1.33%), small (10.99%) and medium (0.09%) enterprise category.² Due to labor-intensive nature, more than twenty-one million people were employed by CMSME enterprises at a comparatively low wage. A brief scenario of the total number of CMSME establishments and employment in this sector is shown in the table-1.

² Economic census 2013

Table 1: Scenario of CMSMEs of Total Industrial Sector

Type of industry	Total Number of Establishments (Location wise)			Total Number of People Engaged (TPE)		
	Urban Areas	Rural Areas	Total	Male	Female	Total
Cottage	1730150	5112734	6842884	11759565	1408762	13168327
Micro	41112	62895	104007	435043	123827	558870
Small	450601	408717	859318	5844088	756597	6600685
Medium	4141	2965	7106	538526	167586	706112
Total CMSMEs	2226004	5587311	7813315	18577222	2456772	21033994

Source: Economic Census 2013.

In both urban and rural areas the number of cottage industry is higher than other industries. The same scenario is for employment; both male and female employment is higher in cottage industry followed by small, micro and medium enterprises.

2.1 Contribution to GDP

Over the past few years, the GDP of Bangladesh has exhibited an upward trend. In line with this, the contribution of the industrial sector to the overall economy has been steadily growing over the past several years. The Bangladesh Bureau of Statistics (BBS) estimates that the industrial sector's share of the GDP was 33.85 in FY18 which climbed to 35 percent in FY19, but then declined to 34.94 percent in FY20 because of the global pandemic crisis that was occurring at that time. The key driver of industrial sector growth is the manufacturing sector, which includes cottage, micro, small, and medium-sized enterprises. It is important to note that, the overall share of small and medium-sized enterprises (SMEs) in the industrial sector was 20.15 percent in FY20. The performance of this sector from 2015-16 to 2019-20 (at a constant price of 2015-16) is as follows:

Table 2: Volume, Growth Rate and Sectoral Share of Manufacturing Industry Sector

(Tk in crore)

Type of Industry	FY16	FY17	FY18	FY19	FY20
Cottage industry	72127 (-) [3.63]	78829 (9.29) [3.72]	84700 (7.45) [3.73]	96704 (14.17) [3.94]	100257 (3.67) [3.94]
Small, Micro, Medium Industry	129108 (-) [6.5]	142102 (10.06) [6.71]	157882 (11.10) [6.95]	174632 (10.61) [7.11]	179325 (2.69) [7.04]
Total Industry	644940.1 (-) [32.5]	698290.5 (8.27) [32.98]	769486.9 (10.2) [33.85]	859003.7 (11.63) [34.99]	890023.1 (3.61) [34.94]

Source: Bangladesh Economic Review 2022.

Note: Figures in () and [] parentheses indicate rate of growth and sectoral share of GDP (%) respectively.

* Provisional

The number of contributions made by CMSME enterprises has gradually increased over the course of the years. The cottage industry contributed 3.63 percent share of GDP in FY16 then increased that share to 3.73 percent of GDP in FY18 and reached to 3.94 percent in FY19. In

addition, the share of the sector held by the Small, Micro, and Medium industry climbed from 6.5% in 2015-16 to 6.95% in 2017-18 and then extended to 7.11% in 2018-19. On the other hand, despite the impact of the COVID-19 pandemic and the containment measures in the form of a statewide lockdown, the sectoral share of cottage industry (3.94) remained unchanged, whereas small, micro, and medium-sized industries (7.04) witnessed a falling trend in FY20. Moreover, the volume of the total industry has been on an upward trend, going from BDT 644940.1 crore in FY16 to as much as BDT 890023.1 crore in FY20.

3. Literature Review

Substantial research has been done on the roles that SMEs play in fostering economic growth. Evidence from various studies and research suggests that SMEs appear to be essential to economic growth in both high and low-income countries throughout the world.

3.1 Empirical studies related to developed and developing countries

SMEs play a crucial role in all economies around the world, specifically those with serious problems with employment and income distribution in developing countries. In static terms, SMEs contribute to output and the creation of jobs; in dynamic terms, they act as a breeding ground for future larger firms, make direct and frequently significant contributions to aggregate savings and investment, and take part in the development of appropriate technology (Schreyer 1996).

According to Harvie (2008), SMEs are crucial to East Asian economies, but the dynamic role they play differs greatly among different states. The findings of the study show that although they are not as numerous or employ as many people, SMEs are vital in Singapore because they offer a flexible, skilled manufacturing base that draws larger international corporations. Additionally, SMEs' contributions to exports vary substantially; they are more export-focused in China, Korea, and Taiwan than in Japan, Indonesia, Thailand, Malaysia, and Singapore.

Hu (2010) demonstrated a systemic favorable association between SMEs and economic growth using panel regression analysis. In addition, the author noted that in developed economies, the entrepreneurial spirit inherited from the SME sector drives economic growth, while in underdeveloped economies; these sectors primarily contribute to employment creation.

Dixit and Panday (2011) looked at the causal links between SMEs' output, exports, employment, and fixed investment, as well as the GDP of India, total exports, and employment (public and private) for the years 1974 to 2007. The findings confirm a positive causal association between the GDP and the production of SMEs as well as a short-term relationship between the SMEs-related variables and GDP growth.

Pandya (2012), a study to trace the importance of SMEs for economic development in both developed and developing countries, found that SMEs make a significant contribution in both industrialized and developing nations. In addition, he emphasized that emerging nations should

adopt policies that will aid the SME sector in becoming the foundation of the country, just as industrialized nations.

To acquire a complete understanding of SMEs in the context of developed countries, Maerinskas, Vengrauskas, and Velikaite (2013) undertook a qualitative analysis of the economics of the member states of the European Union. The authors came to the further conclusion that the sector held great promise for fostering competition and, as a result, aiding Lithuania's economic expansion. The study also discovered that the SME sector was particularly responsive to changes in supply and demand and that it quickly changed, leading to market diversity in a short amount of time.

Bouazza (2015) assessed the impact of SME businesses on employment creation and economic growth in the case of Algeria. The research revealed that as Algeria's SMEs struggle to generate employment possibilities, it brings significant detrimental effects on the economy, particularly among young people.

An ARDL bound testing method was used by Mujahid and Begum (2019) to examine data from 1980 to 2017 for Pakistan. The dynamic model's estimation results demonstrated a clear and strong relationship between GDP growth and the output of SMEs. They also mentioned that a framework for policy is still needed to address the sector's problems.

3.2 Empirical studies related to Bangladesh

A vibrant SME sector is one of the principal driving forces in the development of the economy of Bangladesh. Therefore, this sector has garnered a lot of attention from policymakers, researchers, and academics focusing on policies and actions that will assist SMEs to grow and become more competitive.

According to Ahmed (1999), Bangladesh's SME sector cannot operate effectively in both local and international markets due to a lack of favorable regulatory measures and appropriate initiatives, highlighting that the absence of institutional finance options prevents SMEs from raising enough funding. As a result, the main obstacle to the development of SMEs in Bangladesh is a lack of operating capital investment.

Analyzing the data, Raihan (2001) estimated that just 49.5% of SMEs have access to legal sources of funding. Only 35.8% of these SMEs can access official sources of finance without any restrictions, while the remaining 13.7% can but face severe obstacles. Bank credit is only utilized by roughly 20% of entrepreneurs and represents only about 20% of their total spending. Although 50% of SMEs can get cash or loans via the financial system, 59.6% of SMEs choose to manage their working capital through bank credit.

A policy paper from Bangladesh Bank (2008) represents SMEs in the manufacturing sector are underperforming due to limited financial access, insufficient utilities, and outdated technology. Banks and other financial institutions are always attempting to fund large company clients in

order to reduce transaction costs and increase the receipt of collateral. SME financing is also a priority of Bangladesh Bank for reducing borrower's dependency on costly borrowing from microfinance institutions and informal sources.

Ahmed and Chowdhury (2009) attempted to pinpoint the issues that SMEs face in Bangladesh with the help of a descriptive research study, discovering that this sector's performance is below standard for a variety of reasons. They underline that the rate of development of SMEs falls short of expectations.

The economic potential of SMEs in Bangladesh was examined by Chowdhury, Azam, and Islam (2013) with the help of a survey analysis that revealed, based on a sample of 100 SME units, that SMEs had enormous potential for growth and poverty reduction. The report also lists some financial difficulties faced by small enterprises.

Using descriptive statistical tools, Alauddin, Rahman, and Rahman (2015) investigated the role of SMEs in Bangladesh's development. This study found that SMEs significantly contribute to the GDP and other areas. They claimed that lack of funding, political instability, and other factors prevent SMEs from operating efficiently.

Chowdhury (2019) analyzed the challenges and obstacles experienced by female entrepreneurs in Bangladesh's cottage, micro, small and medium enterprise (CMSME) sector and showed that legislative and regulatory change can ease many of these issues. This article examines the gender gap in formal loan availability, which has hampered the sector's growth. The paper studied the reforms using liberal feminist philosophy and showed that female entrepreneurs in Bangladesh are treated differently than men by financial institutions (2010–2018).

To summarize the discussion, a number of studies have demonstrated a positive association between small and medium-sized enterprises (SMEs) and economic growth for developing economies (Afolabi, 2013; Leegwater & Shaw, 2008). Despite this, there is a paucity of relevant literature in the context of Bangladesh.

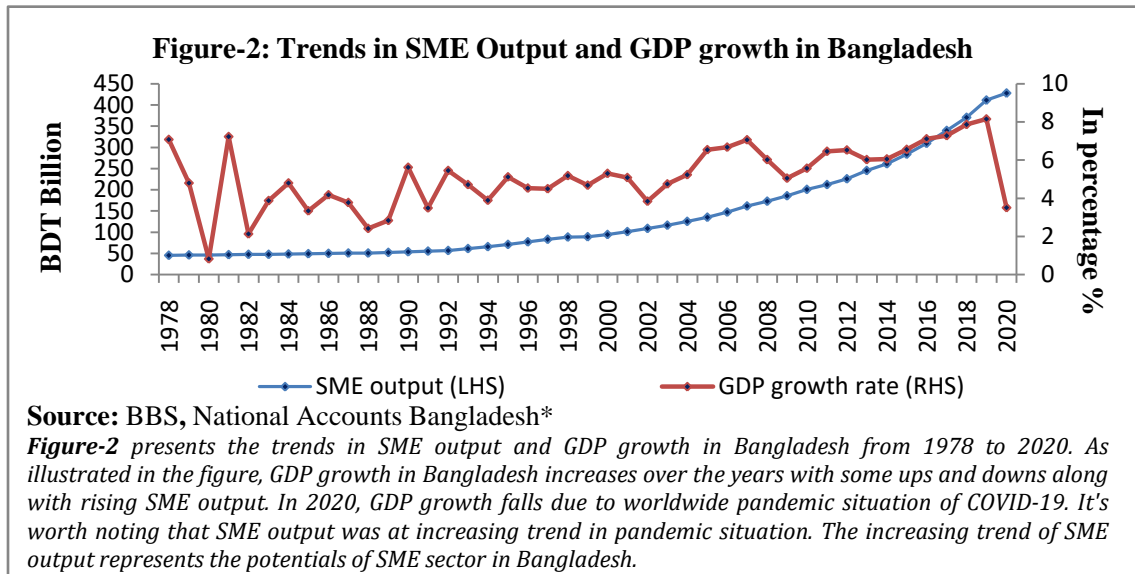
Therefore, the main purpose of this research is to analyze the link between SME output and GDP growth of Bangladesh. In addition to the existing studies discussed so far, this study will cover the said linkage for the case of Bangladesh using the latest available data.

4. Data and Methodology

4.1 Sources of data

To analyze the influence of the SME output on GDP growth, this study utilized the time series data for 1978-2020 using GDP (as a proxy of economic growth) as a dependent variable whereas GDP of small-scale industry (as a proxy of SME output) as an independent variable. Other than SME output, Government Expenditure, Trade Openness (% of GDP), and Domestic credit to

private sector by banks³ (% of GDP) have been considered as explanatory variables as these variables are one of the main factors that affect the GDP of a country. The data of GDP of small-scale industry (as a proxy of SME output) is collected from various issues of National Account Statistics, Bangladesh Bureau of Statistics whereas all other variables are from The World Development Indicators.



*Base year 2005-06

4.2 Model Specification

The theoretical framework of growth models represented by Solow (1956), Barro (1991), and Mankiw (1992) explained the impact of factors on economic growth. Nowadays, the growth theories have flourished and considered structural variables along with some traditional variables like labor, capital, technology, etc. Levine and Renelt (1992) and Durlauf et. al (2005) have added an extensive number of variables that can be used in growth regression. Recently Audretsch and Keibach (2004), Beck et al. (2005), and Mueller (2007) recognize SME as one of the important variables that influence economic growth.

This study follows the methodology proposed by Tulio, Becker, and Gourlay (2015) and Mujahid, Begam, and Nargis (2019) in order to analyze the impact of SMEs on economic growth. The mathematical formation of this theory is represented below

$$GDP = f(SMEO, GE, DC, OPEN) \dots \dots \dots (1)$$

Where, GDP = GDP, SMEO = SME output, GE = Government expenditure, DC = Domestic credit to private sectors by banks and Open = Trade openness.

³ Refers to financial resources provided to the private sector by banks through loans, purchases of non-equity securities, and trade credits and other accounts receivable.

The econometric specification can be represented as follows

$$(\ln GDP)_t = \alpha_0 + \beta_1(\ln SMEO)_t + \beta_2(\ln GE)_t + \beta_3(\ln DC)_t + \beta_4(\ln OPEN)_t + \varepsilon_t \dots \dots \dots (2)$$

The coefficients $\beta_1, \beta_2, \beta_3$ and β_4 show the elasticity of all those exogenous variables. α_0 and ε_t represents the intercept and white noise error term respectively. Although the signs of the coefficients are intrusive in nature, our focus will be on the magnitude of the coefficients.

4.3 Estimation Technique

In general, time series data is non-stationary, meaning the mean and variance are not time-invariant. To make the time series data stationary, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test (PP) have been used. Since all of the data is stationary at I(1), VECM was used in this study to examine the causal relationship between GDP, SME output, and other control variables. A Pair-wise Granger Causality test was performed to show the causalities among the variables. For optimal Lag selection, Optimum lag selection criteria and for cointegration, the Johansen test of cointegration was used (Dickey & Fuller, 1979; Granger, 1988). In addition to these statistical tests, residual diagnostic tests were also performed for the violation of classical linear regression model (CLRM) assumptions.

4.4 Limitations of the Study

One of the main limitations of this study is the unavailability of required data on SMEs' employment generation and other measures of inclusive growth, such as education level, income, and standard of living. Due to this, the study only analyzes SMEs' impact on economic growth. Furthermore, the data on SME output is not accessible; hence, this study used the GDP of the small-scale industry as a proxy for SME output. Many factors affect a country's GDP growth, but we have used only a few of them.

5. Empirical Findings

5.1 Unit root test

It is a common practice to check the underlying stationarity or, in other words, the presence of a unit root in the case of time series data, which is a precondition to avoid any sort of spurious outcome. Of the several practices available for this, generally, the Augmented Dickey-Fuller (ADF) and the Phillips Peron (PP) test methods have been adopted in this case. The results of the ADF and PP are shown in table-3.

Table 3: Unit Root Test

Variables	ADF				PP			
	Level		1 st difference		Level		1 st difference	
	Constant	Constant & linear trend	Constant	Constant & linear trend	Constant	Constant & linear trend	Constant	Constant & linear trend
lngdp	-1.00	-3.27	-6.77*	-6.66*	-0.97	-2.23	-6.87*	-6.81*
lnsmeo	-0.44	-1.82	-6.43*	-6.39*	-0.43	-1.94	-6.52*	-6.44*
lnge	2.05	-1.21	-19.28*	-19.61*	3.57	0.01	-19.46*	-62.12*
lndc	-0.66	-1.99	-6.32*	-6.27*	-0.66	-2.06	-6.33*	-6.27*
lnopen	-1.11	-1.60	-8.03*	-7.95*	-1.12	-1.68	-7.95*	-7.87*

*denotes significant at 5% level

This result of both methods ensures that all of the lngdp, lnsmeo, lnge, lndc, and lnopen are integrated of order one, i.e., I(1), which means that all of the variables tend to be stationary after differencing once only. At the same time, as all of the variables are I(1), it permits us to go for a VECM model in case any cointegration is found among the variables of interest.

5.2 Granger Causality

Before proceeding to test for any relationship, it is recommended to test for pair-wise causalities among the variables. This kind of test is powered not only with the causalities but also with the direction of causality within the variables. The table below displays the results of the pair-wise causality test developed by Engel and Granger.

Table 4: Pair-wise Granger Causality Test

Null Hypothesis	F-statistics	Probability	Direction of Causality
GE does not granger cause GDP	24.92	0.00	GE → GDP
GDP does not granger cause GE	5.06	0.11	
SME does not Granger Cause GDP	7.91	0.00	SMEO → GDP
GDP does not Granger Cause SME	0.60	0.55	
DC does not Granger Cause GDP	16.23	0.00	DC → GDP
GDP does not Granger Cause DC	1.09	0.35	
OPEN does not Granger Cause GDP	5.31	0.01	OPEN → GDP
GDP does not Granger Cause OPEN	0.30	0.74	

The test results disclose that, although there is no bidirectional causality, there are unidirectional causal relationships among all the variables and the direction of causality is seen from the last column of the above table.

5.3 Selection of optimal lag

Prior to estimating any cointegration among the variables in this model, the optimal lag length must be selected. Various information and probability criteria can do it easily and the result of all the available criteria is presented at Table 5. Most of the criteria hint for 2 as the optimal lag for this model.

Table 5: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	228.41	NA	0.00	-10.16	-9.95	-1.70
1	497.94	465.55	0.00	-21.27	-20.05	-10.47
2	545.49	71.33*	0.00*	-22.30*	-20.06*	-21.47*

* indicates lag order selected by the criterion

5.4 Johansen test of cointegration

To investigate the existence of possible long-run relationship (if any) among the variables, Johansen test of cointegration is performed with 2 lag and the results (Presented at table 5) suggest that λ_{max} rule out the possibility of one cointegrating equation at 1% level of significance while λ_{trace} statistic indicates there is one cointegrating equations in both 1% and 5% level. The positive link of SMEs to GDP is attributed to a number of conventional justifications as the economic fundamentals of various economies theories with the contribution of SMEs. The same was asserted from the previous causality tests also.

Table 6: Johansen Test of Cointegration

Null Hypothesis	Trace statistics			Max-Eigen statistics		
	λ_{trace}	5% critical value	1% critical value	λ_{max}	5% critical value	1% critical value
$r=0$	79.686**	68.52	76.07	38.159*	33.46	38.77
$r \leq 1$	41.526	47.21	54.45	19.462	27.07	32.24
$r \leq 2$	22.064	29.68	35.65	14.201	20.97	25.52
$r \leq 3$	7.863	15.41	20.04	7.474	14.07	18.63
$r \leq 4$	0.388	3.76	6.65	0.388	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level.

5.5 Vector Error Correction Model (VECM) Test

VECM technique is handy in estimating the required level or period for bringing back to equilibrium state after some shock, foreseen or unforeseen, to any or some of the variables of the model. So, this model captures the underlying long-run and, most importantly, short-term dynamics among the dependent and independent variables. As one of the preconditions i.e. existence of at least one cointegrating relation among the variables of interest, is met, we can proceed to the VECM model. Table 7 represents the long run components of the test.

Table 7: Long-run Estimates

	Constant	GDP	SMEO	GE	DC	OPEN
Coefficient	-4.169	1.00	-0.30*	-0.60*	-0.28	-0.505
Std. Dev.	-	-	0.136	0.168	0.743	0.365
t-statistics	-	-	-2.234	-3.570	-0.377	-1.386

*denotes 5% level of significance.

The results presented in table 7 i.e. the long run component, can alternatively be represented in the following equation form

$$\ln GDP_t = 4.17 + 0.601 \ln GE_t + 0.304 \ln SMEO_t + 0.280 \ln DC_t + 0.505 \ln OPEN_t + \dots (3)$$

This equation (4) states that, as expected, SME output has a positive and significant impact on GDP. In a more specific way, assuming all other things are constant, a 1 percent increase in SME output will push the GDP to increase by, on average, 0.30 percent. Likewise, government expenditure showed a positive and significant impact as well and numerically a 1% increase in GE will increase GDP by 0.60 percent on average. However, domestic credit to private sector sectors and trade openness also showed a positive impact on GDP, even though this is not statistically significant. The short run dynamics of the VECM model are presented in table 9. As stated previously, this short run dynamics depicts the convergence path, if any, following any sort of shock that caused temporary disequilibrium.

Table 8: Error Correction Equations

Dependent Variable: ΔGDP				
Regressors	Coefficient	Std. Dev.	t-statistic	
Constant	0.0816	0.032	2.56**	
EC_{t-1}	-0.174	0.0654	-2.66**	
$\Delta GDP(-1)$	0.185	0.141	1.31	
$\Delta GDP(-2)$	0.216	0.090	2.37*	
$\Delta GE(-1)$	-0.039	0.1086	-0.37	
$\Delta GE(-2)$	0.150	0.055	2.69**	
$\Delta SMEO(-1)$	-0.107	0.084	-1.27	
$\Delta SMEO(-2)$	-0.157	0.102	-1.54	
$\Delta DC(-1)$	1.672	0.378	4.42**	
$\Delta DC(-2)$	0.350	0.390	0.896	
$\Delta OPEN(-1)$	-0.136	0.176	-0.77	
$\Delta OPEN(-2)$	0.050	0.153	0.33	
$R^2 = 0.825$				
Adjusted $R^2 = 0.763$				
F-Statistics = 13.29				
**and *denotes significance at 1% and 5%				

The cointegrating equation is as follows:

$$\Delta \ln GDP = 0.0816 - 0.174 EC_{t-1} - 0.601 \ln GE_{t-1} - 0.304 \ln SMEO_{t-1} - 0.280 \ln DC_{t-1} - 0.505 \ln OPEN_{t-1} - 4.17 \dots (4)$$

The most important component of the short run dynamics i.e. EC_{t-1} is presented in table 9.

Table 9: Error Correction Term

Error Correction Term	Coefficient	Std. Deviation	t-value
EC_{t-1}	-0.1739	0.0654	-2.657

The coefficient of EC_{t-1} (i.e. -0.17) which is termed as the speed of adjustment and the negative sign indicates that the short run dynamics act to converge to the long run equilibrium. The fact that the absolute value of less than one indicates its convergence path will not be oscillatory in nature and the absolute value of 0.17 of the error correction signifies that approximately 17 percent of the shock of any particular year will disappear in the very next year. This implies that this adjustment toward long run equilibrium will require almost six years. Last but not least, the adjusted R^2 of 0.763 points out that approximately 76.3 percent variation in the dependent variable is explained by the independent variable included in the model.

5.6 Diagnostics tests:

To test the health of the estimated model, roll out and data or model related misspecification as well as the possibility of spurious correlation, relevant statistical tests have been performed. The finding from normality test, performed using Jarque-Bera, ensures that error terms are normally distributed as the p-value is more than 5%. In case of serial correlation, the P-value of VEC Residual serial correlation LM test shows it is greater than 5 percent level up to 10 lag. This implies that the residual terms are free from serial correlation. Furthermore, VEC Residual heteroskedasticity test indicate that the residual terms are free from heteroskedasticity as the P-value is more than 5%.

6. Conclusion and policy recommendations

SMEs are strategically important if an economy is to live up to expectations of increased economic growth and development. This study used VECM to evaluate the link between SME output and economic growth. The estimating approach found a positive and significant long-run relationship between SME output and Government expenditure with GDP growth. Domestic credit to private sector by banks and trade openness have a positive but statistically insignificant link with GDP growth.

The SME sector has been contributing to the economic development of marginal people by ensuring access to institutional financing for small and medium-sized entrepreneurs across the country. It is observed from our study that the SME sector significantly contributes to our economic growth and is expected to promote employment and increase income which virtually increases the standard of living and eradicate poverty. Despite its significance to the economy, SMEs have not reached their full potential due to several constraints which limit their expansions. The government has been providing necessary support to Small and Medium enterprises to increase self-reliance, create jobs, and promote entrepreneurship. Bangladesh Bank has been continuing its refinancing facilities in SME sectors in order to promote SME

loans at a low cost, which will contribute various emerging sectors and potential segments of people and ensure women's empowerment through the expansion and development of the SME sector. Yet, some policy recommendations are represented for the policymakers as it may support to SMEs to build on their strengths in the future.

- Government and financial institutions may provide adequate finance for modernization and technological advancement for the SME sector to compete in the advanced international market.
- To accelerate the potential output of SMEs, it is necessary to expedite the export orientation of the country in new area/sectors as it will foster the process of internationalization in the economy.
- The government and Bangladesh Bank should adopt import substitution policies. Some relevant policies should be formulated to restrict massive imports of SMEs' products and encourage the local producers via easing interest rates who are facing competition with foreign products.
- To encourage young people to emerge as SME entrepreneurs, the government may decide to enhance the Start-Up Fund for new entrepreneurs on easy terms and conditions.
- As a developing country, adopting appropriate policies will enable the SME sector to emerge as a key driver along with the ready-made garment industries.
- In this era of intense competition, continuous planning and quality improvement act as a prerequisite for the survival of SMEs. Thus, the government should take initiatives to prepare an SME sector database and invest in R&D to ensure the intensification of SME for future research.
- Our study provides evidence that SME output has a positive and substantial impact on economic growth. The next area of investigation by researchers may be how SMEs' expansion helps to enhance our country's inclusive growth.
- A solid focus on the SME sector by the government and other organizations can make this sector another well-known one alongside the RMG sector as Bangladesh moves from being the least developed country to developing.

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