# The Contribution of MSMEs in India's Total Exports and GDP Growth: Evidence from Cointegration and Causality Tests

Sanu, Md Sahnewaz

Aligarh Muslim University

October 2018

# The Contribution of MSMEs in India's Total Exports and GDP Growth: Evidence from Cointegration and Causality Tests

**Md Sahnewaz Sanu**

*Senior Research Fellow,*
*Department of Economics,*
*Aligarh Muslim University, Aligarh-202002 (U.P.), India.*
*E-mail: ssanu786@gmail.com*

## Abstract

Over the years, the MSME sector has emerged as a crucial component of the Indian economy and now it has taken the centre stage in India's economic development due to its significant contribution in terms of output, exports and employment. This paper investigates the causal relationship between MSME output, MSME exports, total exports and GDP of the Indian economy, using the Johansen-Juselius cointegration test and Granger causality test. The findings of the study, based on the Johansen-Juselius test indicate that there is no evidence of any robust long-run cointegrating relationship between the variables. However, Granger causality test results, obtained from the unrestricted VAR (of first differenced data) establish three cases of unidirectional Granger causality: (i) MSME export growth Granger causes India's GDP growth; (ii) MSME export growth Granger causes India's total export growth; and (iii) MSME production growth Granger causes MSME export growth.

***Keywords***
MSME Sector, GDP, Exports, Granger Causality, Cointegration, India.

## 1. Introduction

Globally, the role of Micro, Small and Medium Enterprises (MSMEs) in economic development has been well acknowledged as they are the primary sources of employment generation and economic development, not only in developing economies but also in developed and highly industrialized countries. Over the years, the MSME sector has emerged as a highly vibrant segment and one of the key drivers of growth for the Indian economy. The performance of this sector has a direct impact on the growth of the overall economy. The MSMEs not only play a significant and complementary role in the industrialization of the economy but also contributes enormously to the socio-economic development of the country.

The sector contributes about 45 percent of total manufacturing output and 40 percent of the total exports of the country and is the second largest employer of human resources. The employment in this sector has increased to 80.52 million in 2006-07 from 7.50 million in 1981-82 and it was projected that employment in this sector would reach to 117.13 million in 2014-15 (Ministry of Micro, Small and Medium Enterprises, GoI). Even as the Indian economy has taken to reforms and been globalizing since the early 1990s, MSMEs have grown significantly not only due to their continuing contribution to local income growth, job generation and export earnings, but also as a competent and responsive sector to changes in market and innovation, whether in the domestic or global spheres (Das, 2008). That is why the MSME sector has been accepted as the engine of economic growth in the early years of planning and the promotion of MSMEs in terms of various support measures- reservation, revision of investment ceiling, modernization, technological upgradation, marketing assistance and fiscal incentives etc. continued to remain an important and integral part of Indian development strategy.

Against this backdrop, this paper is a modest attempt to investigate the causal relationship between the various performance indicators of MSME sector, and GDP and total exports of the Indian economy for the period 1981-82 to 2011-12. In our causality analysis, we have included one dummy variable ($dum_{i2006-07}$) in order to take into account the structural changes undergone by the sector due to definitional changes and expansion in the coverage of the sector post promulgation of Micro, Small and Medium Enterprises Development Act, 2006 (MSMEDA, 2006).

The remaining part of this paper is structured as follows. Section 2 provides a brief overview of the existing literature that deals with the performance and other aspects of SSI/MSME sector in India. Section 3 presents a brief overview of the MSME sector and its role in the Indian Economy. Section 4 outlines the database, variables and econometric methodology used in the study while section 5 presents the results and discussion. Finally, conclusion and summary of the present study are presented in section 6.

## 2. Select Review of Literature on the Performance of MSME/SSI Sector in India

Since the very inception of economic planning in India, the Government has laid emphasis on the development of small-scale industries, envisaging their employment potential and expansion of industrial activity across the country. Hence, the performance of SSI/MSME sector in terms of industrial output, employment generation, contribution to GDP and export earnings as well as its efficiency and sickness has been the subject of intense research for the purpose of policy intervention and academic interest. One of the initial and comprehensive studies to look into the working of SSIs was made by Dhar and Lydall (1961), who found that small-scale industries were generating less amount of employment vis-à-vis large-scale industry. Later, some of the studies have been undertaken on the productivity and efficiency of small-scale industries (Hajra, 1965; Mehta, 1969; Goldar, 1988; Little et. al, 1987; Ramaswamy, 1990; Bhavani, 1991 and many others). On overall growth performance of SSI sector, emanating from various reports compiled by the Government Agencies or other agencies (e.g. SIDBI, 2002) that used data available from Ministry indicated a very healthy performance of the sector.

In the post-reform period, a large number of studies attempted to analyze the performance of SSI sector in the context of reservation policy (NCAER, 1993; Sandesara, 1993; Katrak, 1999; Mohan, 2001; Moriss et. al., 2001). Most of these studies did not support the policy of reservation and recommended that there were reasons to do away with reservation. Some of the studies examined the impact of globalization on the performance of small-scale industries (Mali, 1998; Subrahmanya, 2004; Bargal et. al. 2009). Mali (1998) found that Small and Medium Enterprises (SMEs) had to face increasing competition in the scenario of globalization and he suggested that small-scale industries would have to specifically improve themselves in the fields of management, marketing, product diversification, infrastructural development and technological upgradation. The study conducted by Subrahmanya (2004) indicated that small industry had suffered in terms of growth in units, employment and exports due to globalization. However, the policy changes have thrown open new opportunities and market for the sector. He suggested that to avail these opportunities the focus must be turned to technology development and strengthening of financial infrastructure in order to make Indian small industry internationally competitive and contribute to national income and employment. Bargal (2009) investigated the causal relationship among the three variables GDP, SSI output and SSI exports and also compared the performance of SSIs in the pre and post-liberalization period. The study revealed that the annual average growth rate of different parameters of SSIs had declined in the period of 90s vis-à-vis pre-reform years. The study also highlighted that there was not any evidence of lead-lag causal relationship between exports and production and GDP of Indian economy.

Despite the large body of literature on the performance evaluation of SSIs/MSMEs, very few attempts have been made to investigate the causal relationship between different performance parameters of MSMEs and their counterpart parameters of the whole Indian Economy. The purpose of this paper is to fill the gap by analyzing the causal relationship between the different performance indicators of the MSME sector and the whole Indian economy.

## 3. MSME Sector and Its Role in the Indian Economy: An Overview

MSME sector is a crucial component of India's industrial sector and it occupies a position of strategic importance in the Indian economic structure due to its significant contribution in terms of output, employment and exports. The definition of small-scale industries has undergone several changes over the years. The earliest definition of small-scale industries was given in 1950, on the basis of the twin criterion of investment limits and labour force; later the employment criterion was removed and the SSI/MSME sector was solely defined on the basis of invest limit in Plant and Machinery (P &M) with several revisions in cut-off limits. The recent Micro, Small and Medium Enterprises Development Act (MSMED) 2006, while increasing the upper limit of investment also divided the MSM enterprises into two separate categories namely, manufacturing and services enterprises. The manufacturing enterprises are defined in terms of investment in plant and machinery whereas the service enterprises are defined in terms of investment in equipment. The investment limit for both types of enterprises is shown in Table 1.

**Table: 1 Definition of MSMEs in India**

| Manufacturing Enterprises (investment in plant and machinery) | |
|---|---|
| Micro | upto Rs. 25 lakh |
| Small | More than Rs. 25 lakh but does not exceed Rs. 5 crore |
| Medium | More than Rs. 5 crores but does not exceed Rs. 10 crore |
| Service Enterprises (investment in equipment) | |
| Micro | upto Rs. 10 lakh |
| Small | More than Rs. 10 lakh but does not exceed Rs. 2 crore |
| Medium | More than Rs. 2 crores but does not exceed Rs. 5 crore |

*Source: Micro, Small and Medium Enterprises Development Act, 2006.*

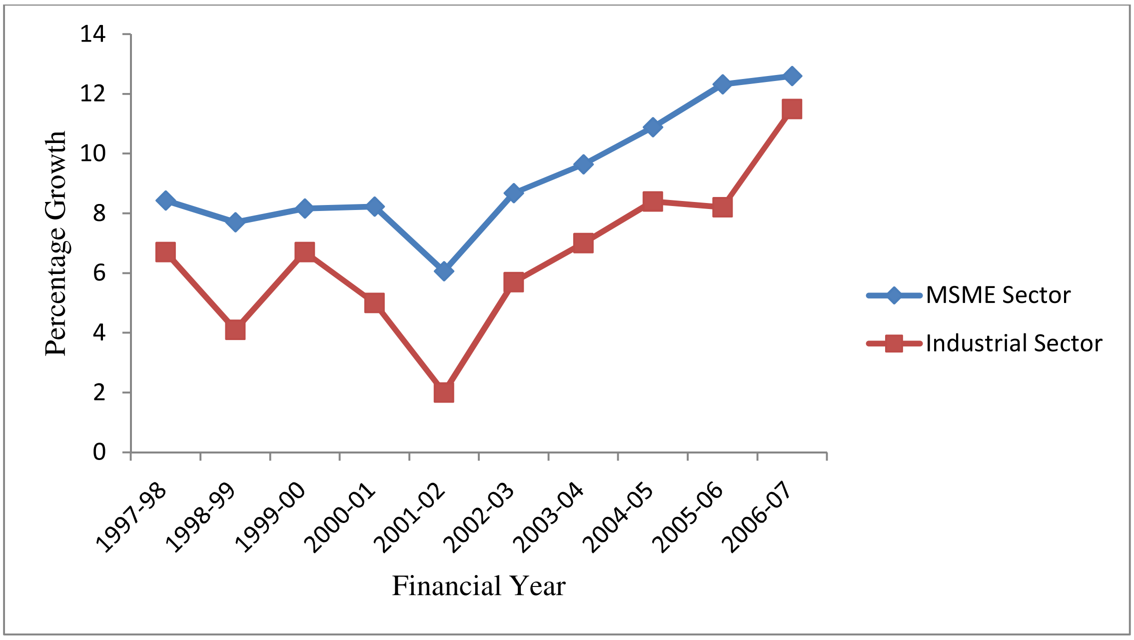
The latest census conducted was the Fourth All India Census of MSMEs, with the reference year 2006-07 wherein the data was collected till 2009 and results published in 2011-12. Some important characteristics of the final reports of the Fourth All India Census are reported in Table 2.

**Table: 2 Important Features of the Fourth All India Census of MSME**

| Characteristics | Registered Sector | Unregistered Sector | Economic Census,2005 | Total |
|---|---|---|---|---|
| Size of the Sector (in Lakh) | 15.64 | 198.74 | 147.38 | 361.76 |
| No of the Rural Units (in lakh) | 7.07 (45.20%) | 119.68 (60.22%) | 73.43 (49.82%) | 200.18 (55.34%) |
| No of Women Enterprises(in lakh) | 2.15 (13.72%) | 18.06 (9.02%) | 6.40 (4.34%) | 26.61 (7.36%) |
| Total Employment (in lakh) | 93.09 | 408.84 | 303.31 | 805.24 |
| Per unit Employment | 5.95 | 2.06 | 2.06 | 2.23 |
| Total Fixed Investment (in lakh) | 44913840 | 24081646 | - | 68995486 |
| Total Gross Output (in lakh) | 70751027 | 36970259 | - | 107721286 |

*Source: Annual Report of MSME, 2015-16 & Fourth All India Census of MSMEs, 2006-07.*

Table 2 shows the findings of the Fourth All India Census of MSMEs with regard to the size of the sector, number of rural units, number of women enterprises, total employment, per unit employment, total fixed investment and gross output/total production. The growth scenario of MSME segment and overall industrial sector in the post-reform period indicates that the MSME sector has outperformed the overall industrial sector considerably, recording higher annual growth rate throughout the period (SIDBI, 2010). The Fig. 1 depicts the comparative annual growth rates of production in the MSE/MSME segment vis-à-vis that of the industrial sector as a whole since 1997-98 to 2006-07. Furthermore, the MSME sector in India generates the largest employment opportunities, next only to the agriculture sector. The organized industrial sector requires an investment of Rs. 6.66 lakh to generate employment for one person, whereas the MSME segment creates employment to 1.27 persons with the same investment (SIDBI, 2010). MSME sector’s contribution to India’s exports has also grown tremendously over the years. Its capability to compete in the international market is reflected in its share of about 40 percent in national exports. The value of the exports from the sector has increased from Rs. 21 crore in 1981-82 to Rs. 2020.17 crore in 2006-07, with a compound annual growth rate of 19.20 percent. In case of items like readymade garments, leather goods, processed foods, engineering items, the performance of MSME sector has been commendable both in terms of value and their share in the total exports of the country; in some cases like sports goods, MSMEs have accounted for 100 percent export share.




*Source: SIDBI, 2010*

**Figure 1: Growth Trend of MSME and Overall Industrial Sector**

## 4. Methodological Framework, Database and Variable Descriptions

### 4.1. Econometric Methodology and Model Specification

This paper uses the Engle-Granger Methodology (Engle and Granger, 1981) to establish the causal relationship between different variables. Instead of employing a multivariate model, we used bivariate model between different variables separately to avoid the problem of multicollinearity as every performance parameter (variable) of MSMEs has a large share in the counterpart variable of the whole economy (e.g. MSME exports contributes almost 40% of India's total exports). ). Engle and Granger showed that if the two series $X_t$ and $Y_t$ are individually integrated of order one (have unit root), denoted by I (1) and cointegrated, then there would be causal relationship between the variables at least in one direction. The presence of cointegration among the variables rules out the possibility of spurious correlation. Although cointegration indicates the presence or absence of Granger causality among variables, it does not indicate the direction of causality between variables. This can be detected through the error correction model (ECM) derived from the long run cointegrating relationship. The Granger Representation Theorem states that if two variables $X_t$ and $Y_t$are cointegrated, the relationship between the two cab be expressed as an ECM.

Following the conventional approach, a three stages procedure is used in this paper to establish the direction of causality. An important first stage in the process is to test the order of integration with the data defined as the natural log of the levels of the variables, using Augmented Dickey-Fuller (ADF) test or such other tests. Conditional on the outcome of the test, the second stage involves in investigating the cointegrating relationship among the variables using Johansen Maximum Likelihood procedure (Johansen, 1988; Johansen and Juselius, 1990). The Johansen-Juselius test is a vector autoregressive (VAR) based test, on restrictions imposed by cointegration in the unrestricted VAR. If cointegration exists, there either unidirectional or bidirectional Granger causality must also exist, indicating the long-run relationship among the variables. If cointegration is detected, the third stage is to test for causality by employing appropriate types of causality tests.

The three-stage procedure discussed above leads to three alternative approaches for testing causality. If the series are integrated of order one, I(1) and cointegrated, Granger causality can be examined using levels of the variables because of the super-consistency properties of estimation, as in eq. (1) and eq. (2), where the null hypothesis of non-causality relates to the significance of $\phi$ and $\gamma$.

$$Y_t = \alpha + \sum_{i=1}^{m} \beta_i Y_{t-i} + \sum_{j=1}^{n} \phi_j X_{t-j} + u_{1t} \quad (1)$$

$$X_t = a + \sum_{i=1}^{q} b_i X_{t-i} + \sum_{j=1}^{r} \gamma_j Y_{t-j} + u_{2t} \quad (2)$$

Where $u_t$and $u_{2t}$ are zero-mean, serially uncorrelated disturbance terms.

Secondly, if the variables are I(1) and cointegrated, the Granger causality test may utilize the first-differenced data (denoted by $\Delta$) with an error correction term (ECT) derived from the cointegrating regression as in eq.( 3) and eq. (4). In this case, in addition to the significance of $\phi$ and $\gamma$, the cofficients of ECT can indicate the direction of causality. The lagged coefficient of error correction term (ECT) measures the speed of adjustment to equilibrium after a shock.

$$Y_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \sum_{j=1}^{n} \phi_j \Delta X_{t-j} + \delta ECM_{t-1} + u_{1t} \quad (3)$$

$$X_t = a + \sum_{i=1}^{q} b_i \Delta X_{t-i} + \sum_{j=1}^{r} \gamma_j \Delta Y_{t-j} + dECM_{t-1} + u_{2t} \quad (4)$$

Thirdly, if the variables are I(1) but not cointegrated, the valid Granger-type test requires transformation of the series by differencing to make them I(0) as in eq. (5) and eq. (6).

$$Y_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \sum_{j=1}^{n} \phi_j \Delta X_{t-j} + u_{1t} \quad (5)$$

$$X_t = a + \sum_{i=1}^{q} b_i \Delta X_{t-i} + \sum_{j=1}^{r} \gamma_j \Delta Y_{t-j} + u_{2t} \quad (6)$$

The optimum lag length $m, n, q\ and\ r$ are determined on the basis of Schwarz Information Criterion and/or Akaike Information Criterion.

### 4.2. Data Sources and Variable Descriptions

This paper uses the annual time series data of Gross Domestic Product (GDP), total exports, MSME production and MSME export for India covering the period 1981-82 to 2011-12. The data related to all the variables are mainly obtained from Handbook of Statistics on Indian Economy (various issues), RBI. To supplement this, data is also collected from Ministry of Micro, Small and Medium Enterprises (2015-16), GoI and Fourth All India Census of MSMEs, 2006-07. The brief descriptions of all the variables are as follows:

$lgdp$= GDP at current prices (in Rs. Crore).

$lpro$= MSME production (in Rs. Crore).

$ltx$= total exports of India at current prices (in Rs. Crore).

$lmsmex$= MSME export at current prices (in Rs. Crore).

$l$ indicates the natural logarithmic transformation of the variables. Visual representations of these series are given in Figure 2.

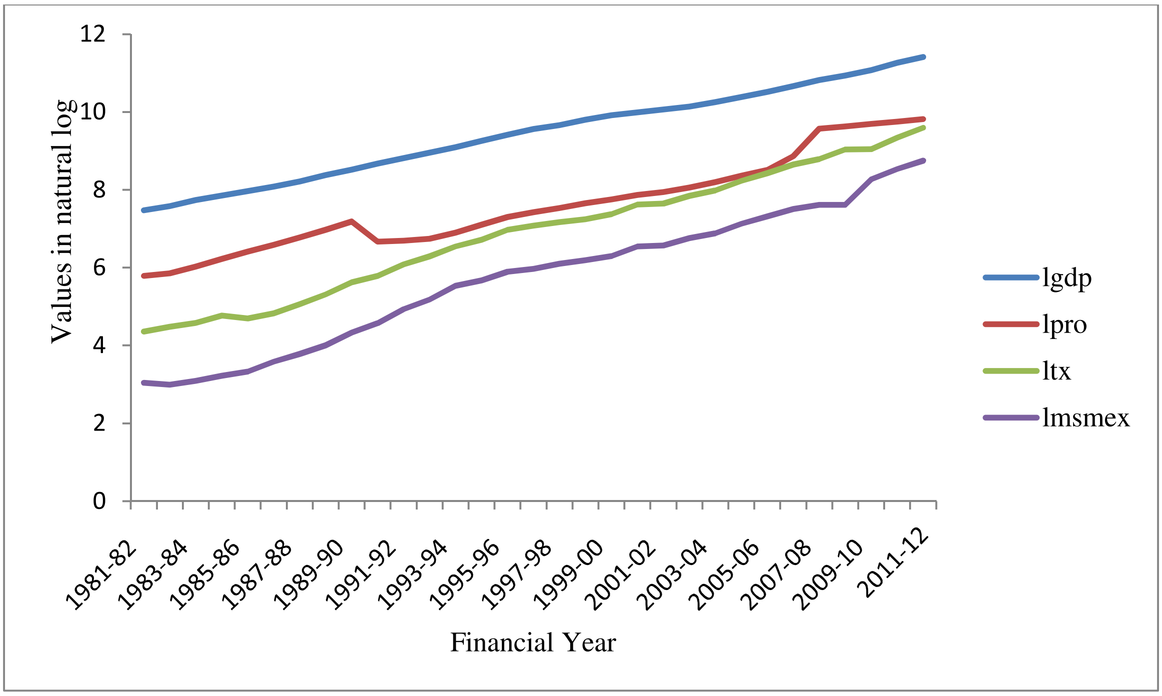



**Figure 2: Plots of GDP (lgdp), MSME Production (lpro), Total Export (ltx) and MSME export.**

## 5. Estimation Results and Discussion

A necessary but not sufficient condition for cointegration is that each of the variables should be integrated of the same order (more than zero) or that each series should contain a deterministic trend (Granger, 1988). In order to investigate whether this preliminary condition is fulfilled, in the first stage, the unit root of the variables- $lgdp$, $lpro$, $lmsmex$ and $ltx$ is tested. Table 3 reports the results of unit root tests of the variables based on Augmented Dickey Fuller (Dickey and Fuller, 1981) test and Phillips-Perron (Perron, 1988; Phillips and Perron, 1988) test. It is evident from table 3 that the null-hypothesis of non-stationarity cannot be rejected at levels of the variables, but they become stationary after taking first difference. These results indicate that all the variables are individually integrated of order one, I(1).

Given that $lgdp$, $lpro$, $lmsmex$ and $ltx$ are integrated of the same order, in the second stage, we proceed to test for the presence of a common trend or equivalently a long run cointegrating relationship between the variables using Johansen maximum likelihood procedure. This provides a unified framework for estimation and testing of cointegrating relations in the context of a VAR error correction model. The cointegration rank, r of the series can be tested using two test statistic- *trace statistic* ($\lambda_{trace}$) and *maximum eigenvalue statistic* ($\lambda_{max}$), but here in this paper we have just used trace statistic ($\lambda_{trace}$) for simplicity reason. Denoting the number of cointegrating vector by $r_0$, the trace test is calculated under the null hypothesis that $r_0 \leq r$ against $r_0 \geq r$. The results of Johansen-Juselius likelihood test for cointegration are presented in Table 4.

**Table 3: Results of Unit Root Tests**

| Variable | ADF | p-value | PP | p-value |
|---|---|---|---|---|
| At Levels | | | | |
| $lgdp$ | -0.2012 | 0.9277 | -0.0058 | 0.9508 |
| $lpro$ | 0.3278 | 0.9759 | 0.2300 | 0.9700 |
| $lmsmex$ | 0.6617 | 0.9891 | 0.5948 | 0.9872 |
| $ltx$ | 0.5248 | 0.9848 | 0.5421 | 0.9854 |
| At First Difference | | | | |
| $\Delta lgdp$ | -2.95* | 0.0515 | -2.96* | 0.0503 |
| $\Delta lpro$ | -4.35* | 0.0019 | -4.32* | 0.0020 |
| $\Delta lmsmex$ | -5.31* | 0.0002 | -5.32* | 0.0002 |
| $\Delta ltx$ | -5.33* | 0.0001 | -5.33* | 0.0001 |

*Notes: The optimal lags for the ADF test are selected using Schwarz Bayesian Criterion (SBC). For PP, Barlett Kernel is used as the spectral estimation method and the bandwidth is selected using Newey-West method. Both the tests are conducted including an intercept term. * represents rejection of the null hypothesis of unit roots at 5% level of significance.*

**Table: 4 Results of Johansen Test for Cointegration**

| Null | Alternative | Trace Statistic | CV (p-value) | Optimal lag |
|---|---|---|---|---|
| Between $lgdp$ and $lpro$ | | | | |
| $r = 0$ | $r > 0$ | 5.665 | 15.49 (0.7346) | 1 |
| $r \leq 1$ | $r > 1$ | 0.032 | 3.84 (0.8567) | |
| Between $lgdp$ and $lmsmex$ | | | | |
| $r = 0$ | $r > 0$ | 6.933 | 15.49 (0.5854) | 1 |
| $r \leq 1$ | $r > 1$ | 0.261 | 3.84 (0.6094) | |
| Between $ltx$ and $lmsmex$ | | | | |
| $r = 0$ | $r > 0$ | 9.039 | 15.49 (0.3617) | 1 |
| $r \leq 1$ | $r > 1$ | 0.037 | 3.84 (0.8456) | |
| Between $lpro$ and $ltx$ | | | | |
| $r = 0$ | $r > 0$ | 4.380 | 15.49 (0.8706) | 1 |
| $r \leq 1$ | $r > 1$ | 0.541 | 3.84 (0.4620) | |
| Between $lpro$ and $lmsmex$ | | | | |
| $r = 0$ | $r > 0$ | 6.591 | 15.49 (0.6010) | 2 |
| $r \leq 1$ | $r > 1$ | 0.496 | 3.84 (0.4810) | |

*Notes*: *(a) CV stands for critical values at 5% level which are taken from Mackinnon-Haug-Michelis (1999). (b) The optimum lag lengths are determined by Schwarz Information Criterion (SIC). (c) The figures in parentheses are p-values.*

As mentioned earlier in the methodology section, we are interested in checking the causality relationship between different variables in a bivariate format so as to keep our model free from multicollinearity. Therefore, we examined here if there exists any cointegrating relationship in different pairs of variables separately. Starting with the null hypothesis of no cointegration (r=0) between the first pair of variables i.e. $lgdp\ and\ lpro$, the trace statistic is 5.66 which is below the 95 percent critical value of 15.49. Hence, the null hypothesis of r=0 cannot be rejected at 5 percent level of significance. Therefore, the trace statistic indicates that there is no long run cointegrating relationship between $lgdp\ and\ lpro$. Similarly, in case of $lgdp\ and\ lmsmex$, the trace statistic (6.93) is lower than the 95 percent critical value of 15.49, indicating absence of any cointegrating relationship between $lgdp\ and\ lmsmex$. Likewise, we checked the cointegrating relationship between other pairs of variables i.e. between $ltx\ and\ lmsmex$; $lpro\ and\ ltx;$ $lpro\ and\ lmsmex$ and have not found any evidence of long run cointegrating relationship. Given the importance of selecting appropriate lag length, we used Schwarz Information Criterion for choosing optimal lag. In all the cases, the optimal lag length is found to be one, except $lpro\ and\ lmsmex$ where it is two.

**Table 5: Results of Granger Causality Test**

| Null Hypothesis | Wald Chi-Sq ($\chi^2$) | Dof[a] | p-value |
|---|---|---|---|
| Between $lgdp\ and\ lpro$ | | | |
| $\Delta lpro \nrightarrow \Delta lgdp$ | 0.3671 | 1 | 0.5446 |
| $\Delta lgdp \nrightarrow \Delta lpro$ | 0.0248 | 1 | 0.8747 |
| Between $lgdp\ and\ lmsmex$ | | | |
| $\Delta lmsmex \nrightarrow \Delta lgdp$ | 5.3368* | 1 | 0.0209 |
| $\Delta lgdp \nrightarrow \Delta lmsmex$ | 0.3130 | 1 | 0.5758 |
| Between $ltx\ and\ lmsmex$ | | | |
| $\Delta lmsmex \nrightarrow \Delta ltx$ | 4.7168* | 1 | 0.0299 |
| $\Delta ltx \nrightarrow \Delta lmsmex$ | 0.3263 | 1 | 0.5678 |
| Between $lpro\ and\ ltx$ | | | |
| $\Delta lpro \nrightarrow \Delta ltx$ | 0.5387 | 1 | 0.4630 |
| $\Delta ltx \nrightarrow lpro$ | 0.5549 | 1 | 0.4563 |
| Between $lpro\ and\ lmsmex$ | | | |
| $\Delta lpro \nrightarrow \Delta lmsmex$ | 14.0428* | 2 | 0.0009 |
| $\Delta lmsmex \nrightarrow \Delta lpro$ | 3.2498 | 2 | 0.1969 |

*Notes: [a] is the degrees of freedom. * indicates statistical significance at 5% level. ↛ denotes 'does not Granger cause'.*

Consequently, the bivariate systems- $\Delta lgdp\ and\ \Delta lpro$; $\Delta lgdp\ and\ \Delta lmsmex$; $\Delta ltx\ and\ \Delta lmsmex$; $\Delta lpro\ and\ \Delta ltx$; $\Delta lpro\ and\ \Delta lmsmex$ where $'\Delta'$ is the first difference operator and hence defined the growth of the variables, can be modelled as unrestricted VAR (model third, eq. 5 and eq. 6). We have included one dummy variable ($dum_{i2006-07}$) in our

VAR model to take into account the structural changes taken place in MSME/SSI sector due to definitional changes of MSME sector, post implementation of MSMED Act, 2006.

Finally, Granger causality test to the different bivariate VAR systems has been examined and results are reported in table 5. The Granger causality of the dependent variables (eqs. 5-6) is tested through the significance of the sum of the lags of each explanatory variable ($\phi_j$ in eq. 5 and $\gamma_j$ in eq. 6) by a joint Wald $\chi^2$ test.

As shown in table 5, in case of $lgdp\ and\ lpro$, the null hypotheses of non-causality from MSME production growth ($\Delta lpro$) to GDP growth ($\Delta lgdp$) as well as non-causality from GDP growth to MSME production growth cannot be rejected as in both the cases observed $\chi^2$ statistics with one degree of freedom is clearly not statistically significant. This indicates that there is no lead-lag relationship between MSME production growth and GDP growth. Turing to the our second bivariate case, $lgdp\ and\ lmsmex$, the null hypothesis of non-causality from GDP growth ($\Delta lgdp$) to MSME export growth ($\Delta lmsmex$) cannot be rejected, while the null hypothesis of non-causality from MSME export growth to GDP growth is found to be statistically significant. This suggests that there is a unidirectional Granger causality running from MSME export growth to GDP growth without any feedback effect. While testing our third bivariate case, $lmsmex\ and\ ltx$, the $\chi^2$ statistic with one degree of freedom is found to be statistically significant in total export equation, but it is not significant in MSME export equation. This shows that MSME export Granger causes total export growth without any feedback. In case of $lpro$ and $ltx$, we have found that the $\chi^2$ statistic with one degree of freedom is not statistically significant both in MSME production growth equation and total export growth equation, indicating absence of any causality relationship between them. Finally, in case of $lpro\ and\ lmsmex$, the null hypothesis of non-causality from MSME production growth to MSME export growth is rejected as the $\chi^2$ statistic is found statistically significant, whereas it is not significant for non-causality from MSME export growth to MSME production growth. This shows that there exists a unidirectional Granger causality from MSME production growth to MSME export growth without any reverse flow.

To sum up the results of Granger causality test, we have observed three cases of unidirectional Granger causalities without any feedback effect: (i) MSME export growth Granger causes India's GDP growth; (ii) MSME export growth Granger causes India's total export; (iii) MSME production growth Granger causes MSME export growth. These results are consistent with the findings of Dixit and Pandey (2011) and, Subrahmanya Bala and Kasturi (2011) while the study conducted by Bargal *et al*. (2009) contradicts our Granger causality results.

To check the robustness of our VAR models, we have performed residual serial correlation test and heteroscedasticity test. The Lagrange Multiplier (LM) test indicates no evidence of serial correlation in the residuals, while White's heteroscedasticity test shows that all the residuals are homoscedastic.

## 6. Summary and Conclusions

Since the very inception of economic planning in India, the SSI/MSME sector has emerged as a very crucial component of the Indian economy and today it has taken the center stage in India's economic development due to its significant contribution in terms of output, exports and employment. The sector not only plays a significant and complementary role in the industrialization of the economy but also contributes enormously to the socio-economic development of the country. Therefore, it is imperative to examine the causal relationship between the MSME sector and the whole of the Indian economy. In this paper, we investigated the causal relationship between MSME output growth and India's GDP growth; MSME export growth and India's GDP growth; MSME export growth and India's total export growth for the period 1981-82 to 2011-12, using Johansen-Juselius cointegration test and Granger causality test.

The empirical results based on Johansen-Juselius test did not support for a robust long-run cointegrating relationship between the variables, indicating that various performance indicators of MSME sector are not related to their counterpart variables of the whole Indian economy in the long-run. This is perhaps due to the reason that as compared to the whole Indian economy, the MSME sector has experienced more fluctuations in its growth due to frequent changes in definition, globalization and various policies initiated by the Government of India during the period under study. These factors, in turn, hindered the MSME sector and whole Indian economy to move together smoothly in the long-run.

However, our Granger causality test results, obtained from the unrestricted VAR (of first differenced data) established three cases of unidirectional Granger causalities without any feedback effect: (i) MSME export growth Granger causes India's GDP growth; (ii) MSME export growth Granger causes India's total export growth; (iii) MSME production growth

Granger causes MSME export growth. These results are sensible provided that recently a significant amount of GDP growth experienced by the Indian economy has been fuelled by the total export growth (export-led growth) and a substantial portion of India's total export was contributed by MSMEs (almost 40 percent) during the period 1981-82 to 2011-12.

## References


Bargal, H., Dashmishra, M., & Sharma, A. (2009). Performance Analysis of Small Scale Industries-A study of pre-liberalization and post-liberalization period. *International Journal of Business and Management*, *1*(2), 55.

Bhavani, T. A. (1991). Technical efficiency in Indian modern small scale sector: an application of frontier production function. *Indian Economic Review*, 149-166.

Das, K. (2008). *Micro, Small and medium enterprises in India: Unfair fare*. Ahmedabad: Gujarat Institute of Development Research.

Dhar, P.N. and Lydall, H.F. (1961*), The Role of Small Scale Enterprises in Indian Economic Development,* Asia Publishing House, Bombay.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, *74*(366a), 427-431.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Granger, C. W. (1988). Causality, cointegration, and control. *Journal of Economic Dynamics and Control*, *12*(2-3), 551-559.

Goldar, B.N. (1988), ''Relative efficiency of small scale industries in India'', in Suri, K.B. (Ed.), *Small Scale Enterprises in Industrial Development: The Indian Experience*, Sage Publications, New Delhi.

Government of India (2016), Annual Report 2015-16. *Ministry of Micro, Small and Medium Enterprises,* New Delhi.

Hajra, S. (1965). Firm Size and Efficiency in Measuring Industries. *Economic and Political Weekly*, (August).

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, *12*(2-3), 231-254.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, *52*(2), 169-210.

Katrak, H. (1999). Small-scale enterprise policy in developing countries: an analysis of India's reservation policy. *Journal of International Development*, *11*(5), 701.

Little, I. M., Page, J. M., & Mazumdar, D. (1987). *Small Manufacturing Enterprises*. New York: Oxford University Press.

MacKinnon, J. G. (2010). *Critical values for cointegration tests* (No. 1227). Queen's Economics Department Working Paper.

Mali, D. D. (1998). Development of Micro, Small and Medium Enterprises of India: Current Scenario and Challenges. *SEDME (Small Enterprises Development, Management and Extension) Journal*, *25*(4).

Mohan, R. (2002). Small-Scale Industry Policy in India. *Economic policy reforms and the Indian economy*, 213.

Morris. S (2001d), "Reservation Quality and Government Purchase", in *Morris, S. et al (2001)*

NCAER (1993), Structure and Promotion of Small Scale Industries in India- Lessons for Future Development, *National Council of Applied Economic Research, Summary Report*, New Delhi.

Newey, W. K., & West, K. D. (1986). A simple, positive semi-definite, heteroskedasticity and autocorrelationconsistent covariance matrix.

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, *75*(2), 335-346.

Ramaswamy, K. V. (1993). Capital Intensity, Productivity and Returns to Scale In Modern Small Industries in India. *Indian Economic Review*, 157-173.

RBI (Various Issues), *Handbook of Statistics on Indian Economy.*

Sandesara, J. C. (1993). Modern Small Industry, 1972 and 1987-88: Aspects of Growth and Structural Change. *Economic and Political Weekly*, 223-229.

Ahmad, M. F., & Sanu, M. S. (2016). MSMEs and Inclusive Growth in India: Current Scenario and Future Prospective. *Intellection: A Bi-annual Interdisciplinary Research Journal*, 4(2), 86-98.

Sanu, M. S., & Ahmad, F. (2017). The Linkage between Energy Consumption and Economic Growth in India: Evidence Based on Cointegration and Error Correction Modelling Techniques. *Asian Journal of Research in Social Sciences and Humanities*, *7*(8), 250-260.

SIDBI (2010), *SIDBI Report on Micro, Small and Medium Enterprises Sector*, Lucknow, India.

Subrahmanya, M. B. (2004). Small industry and globalisation: Implications, performance and prospects. *Economic and Political Weekly*, 1826-1834.