Functional Relationship among the Dynamic Variables of India's MSMEs and GDP

[1]Sankaran Arumugam, Ph.D., [2]Rajkumar Ponnusamy, Ph.D.,*

[1]*Faculty of Economics, School of Management, Pondicherry Central University, Pondicherry, India.*

[2]*Professor of Sociology, School of Social Sciences, Madurai Kamaraj University, Madurai, Tamil Nadu, India.* (Corresponding author: rajsociology@gmail.com)

Abstract

The study examines the dynamic relationship among the number of units, number of persons employed, value of output, value of export and overall GDP in one of the fastest growing economy of the world. In order to pursue this exercise, time series annual data have been sourced on the above mentioned variables from the International Finance Statistics, Indiastat online data source, and Annual Report of the Ministry of Micro, Small and Medium Scale Enterprises, Government of India for the period of four decades from 1974 to 2016. With the intension of inspecting the above mentioned goal, the pair wise correlation matrix, unit root test, ARDL bounds test, Remsey RESET test, CUSUM and CUSUM of Square tests, and MWald test for causality have been used. The result of the study illustrates that employment is significantly influenced by number of units, production and export, while number of units and GDP Grange cause export. This trend calls for a new policy initiative that stimulates employment and export with the support of new entry, and increase in GDP.

Key Words

India's MSMEs, ARDL bounds test, MWald test, Dynamic relationship

Introduction

Industrial development is the *sine qua non* for achieving the paramount socio-economic development of a nation. The leading *American Economist cum Nobel Laureate Simon Kuznets* highlighted in his scholarly study about the importance of industrialization in achieving the overall development in a nation (1). Interestingly, in the industrial world Micro, Small and Medium Entrepreneurial (MSME) industries have been playing a significant role over the course of development. It has been portrayed as a backbone of developing countries as its contribution

is remarkable towards overall GDP, export, employment generation, introducing novel ideas in production process and taping the untapped potential resources which are available in that particular locality. Further, the development of MSME sector has been performing as a herculean weapon to remove the long pending problems (poverty, unemployment, backwardness and heavy dependency on primary sector) in developing nations. The industrialization is an effective instrument in solving the long pending socio-economic problems particularly in developing world (2). These problems can be removed with the support of MSMEs in an economy.

The importance of MSMEs not only meets its economic objective (contributes to production, export and GDP) but also fulfills its social responsibilities in contributing employment opportunities, and accommodating semi skilled labour with nominal salary across the world (3). The Micro, Small and Medium Enterprise (MSME) has the potential capacity to utilize the locally available resources at optimum level, improve efficiency in economic performance, adopts innovative techniques in production, improves personal income and ultimately reduces the level of poverty (4). The MSME sector is the backbone of an economy as it develops indigenous technology, ancillaries to major manufacturing industries, and generates good number of employment opportunities while engaging in diversified production activities (5). This sector has the capacity to accommodate a huge number of labour from rural background with a very limited dose of capital, and contributes substantially for overall production and export in a nation (6,7). Besides, the MSME has the ability to ensure regionally balanced and inclusive socio economic growth (8,9).

MSMEs in India

The recent report of the *World Bank* highlighted that the higher level of density of MSMEs was in East Asia and Pacific countries in the World. The major nations among them are Taiwan, Korea and Japan, while the lowest density is reported in countries like Thailand, Singapore, Malaysia, India and so on (10). The peninsular India is one of the noticeable democratic countries in the world, after independence in 1947; it has been experiencing a quite number of changes, challenges, deteriorations and developments. This spectrum illuminates that this nation experienced very serious problems, such as impact of exploitation, food shortage, higher rate of illiteracy, lackadaisical utilization of natural resources, out mode techniques in the

production process, infrastructural bottleneck coupled with poor industrial base. Hence, the socialistic government introduced different types of mechanism to rebuild, renovate and gear-up the economy. As a part of the attempt, in 1948, Industrial policy resolution was introduced to augment the economic condition by encouraging different types of industries with the support of private sector. But the small scale industries attracted the attention of the policy makers in 1956, while the government of India introduced the second industrial policy.

A fundamental change was introduced in every stratum of the economy in 1991 by commencing the new industrial policy. Through enacting this policy, a number of new avenues have been opened-up more or less in favour of the business environment. They include abolition of permit raj, free flow of capital, raw materials, machines and managerial skills from foreign counters, rights to determine the height of business, unleashed rule for fixation of price, increase in level of technology in production process (11,12). Further, the deep-seated change in the conventional policy includes special effort for sectroral and structural adjustment, and separate action for macroeconomic stabilization and so on (13,14,15). The paradigm shifts in the framework of the industrial policy introduced in 1991 disseminated some positive and negative impacts on the functions and performances of the Micro, Small and Medium enterprises in the India context.

Previous Literature

Even in the scholarly research works such as Cantillon, Say and Schumpeter, published in the historical period, it is well documented that there is a positive and significant inter-connection between the development of MSEs and economic wellbeing of a nation (16). While scrutinizing the role of SMEs in economic progress and generating employment opportunities in USA, this sector played a significant role in economic progress through employment growth over the period under the study (17). Though examining the role of MSEs in poverty alleviation and economic growth in 45 countries, Beck et.al, concluded that there was a significant and positive correlation between the share of MSEs and overall economic growth in those nations (18). In a comprehensive research work conducted in US, using both longitudinal business database and Census Bureau Business Dynamics Statistics, Haltiwanger, et. al., found that start-ups and young units are significantly contributing for economic development and employment generation (19).

In a seminal research, using World Bank Enterprises survey for 99 developing countries for the period from 2006 to 2010 concluded that the SMEs are the major contributors for employment generation and economic growth in more or less all the studied nations (20). While examining the success and sustainability of the SMEs, David Small Bone & Frederick Welter concluded that the effective utilization of existing resources and adaptable capacity to modern techniques have played significant role in achieving success by MSEs in Moldova, Belarus and Ukraine (21).

Few authors like Hajra, Mehta, Little et. al., Goldar, Ramaswamy, and Bhavani, using disaggregate level data for different periods assessed the performance of small-scale industries with special reference to productivity in the Indian context (22,23,24,25,26,27). Even though, the approaches of those scholars mottled extensively, they agreed the significant contribution of this sector towards the economic development. While studying the relevance of MSME sector in the Indian framework, Sudha Venkatesh reported that this sector plays a noteworthy role particularly in developing courtiers like India, which is labor abundant and scarcity of capital in nature (28). Uma in her research work highlighted that the industrialization is an effective instrument to achieve sustainable development and it could be achieved through the development of MSMEs particularly in developing countries like India (29). This result coincided with the findings of Kaliya Moorthy, et. al. (30). Abdul Naser in his paper concluded that the potential contribution of the MSMEs in the Indian economy in export, income, employment and poverty alleviation was commendable over the course of economic development (4). In a systematic exercise, Ishu Garg & Nidhi Garg concluded that MSMEs in Indian is the second largest contributor of employment next to agriculture with a very minimum of investment (7).

At the time of studying the importance of new economic reform in the circumstance of SSI, Chandraiah, & Vani, reported that this sector performs as a power and spirit in attaining the overall economic development in India (3). Hence, in order to increase the efficiency of this sector further, the government of India has introduced the new economic reform in 1991 to enhance the strength and increase the level of competitiveness. Over the period of 1990s researchers assessed the effect of the globalization in general and new industrial policy in particular on MSMEs. The quintessence of the existing studies portraits that the SSI sector happened to face a stiff completion during the liberalized regime and they became very vibrant

with respect to their performance (31,32,33). In an extensive research, Ramaswamy, by considering unorganized and registered manufacturing into account in the case of India during 2000-01, 2005-06 and 2010-11 revealed that there was a considerable downturn trend in the level of employment in household units across the states and industries except Gujarat and Delhi (34). Further, his result highlighted that the states in predominant positions with regard to per capita NSDP registered decelerating trend during 2001 to 2011. Hence, the author directed the policy makers to reshape the policy to encourage the employment growth. Even though, a quite number of studies pursued in the Indian context, a comprehensive research using sophisticated econometric models in the recent period is missing in the existing body of literature. Hence, in order to fill the gap, the present study is an attempt to estimate the dynamic relationship among the economic variables of MSMEs and overall GDP in India for the period of four decades from 1974 to 2016.

Data and Econometric Methods

Micro, small and medium scale enterprises have been playing a catalytic role in the overall socio-economic development of a nation. The existing body of literature clearly enunciates the significant role played by this sector over the course of development both in developed and developing countries. Against this backdrop, the present study is an attempt to estimate the functional relationship among the number of units, number of persons employed, value of output and value of export of MSMEs and overall GDP in the context of the fastest growing Indian economy. In order to execute the research, secondary data have been sourced from International Finance Statistics, Indiastat online data source, and Annual Report of the Ministry of Micro, Small and Medium Scale Enterprises, Government of India for the period of four decades from 1974 to 2016. While, published articles, books, reports, working papers and online materials are the secondary sources of information. The data presented in the above mentioned sources vary widely. For instance, the time series data presented in the Indastat on number of units and total number of persons employed are in million, while production and exports are in terms of billion. Hence, in order to normalize the time series data, we converted all the variables into million. And further, these variables are transformed into natural log form. For the purpose of examining the dynamic relationship among these variables, the pair wise correlation matrix, unit root test, ARDL bounds test, Remsey RESET test, CUSUM and CUSUM

of Square tests, and MWALD test for causality have been used. The references of the study have been prepared based on the American Psychological Association (APA) format.

The ARDL form expressed in terms of equation

$$LNGDP_t = \alpha + \sum_{i=1}^{n_1} \gamma LNGDP_{t-i} + \sum_{i=0}^{n_1} \beta_1 LNUNIT_{t-i} + \sum_{i=0}^{n_2} \beta_2 LNEMP_{t-1} + \sum_{i=0}^{n_3} \beta_3 LNPRO_{t-1} + \sum_{i=0}^{n_4} \beta_4 LNEXP_{t-i} + \varepsilon_t .....1$$

The Error Correction Model as follows:

$$\Delta LNGDP_t = \alpha + \sum_{i=1}^{n_1} \gamma \Delta LNGDP_{t-i} + \sum_{i=0}^{n_1} \beta_1 \Delta LNUNIT_{t-i} + \sum_{i=0}^{n_2} \beta_2 \Delta LNEMP_{t-1} + \sum_{i=0}^{n_3} \beta_3 \Delta LNPRO_{t-1} + \sum_{i=0}^{n_4} \beta_4 \Delta LNEXP_{t-i} \delta + \delta ECT_{t-i} \varepsilon_t .....2$$

Results and Discussion

The recent pattern of the world's development explicates that governments in both advanced and developing nations recognized the MSME sector as a significant means for sustainable development and to resolve their socio-economic constraints as it performs as breeding ground of innovative ideas, gains foreign exchange and increases the per capita income. Further, it is quite obvious from the existing body of literature that the MSME sector preformed as main driver of socio-economic development in different parts of the world. Hence, it is recognized that the role of MSMEs is very much needed in populous, underdeveloped, unemployed, and regionally skewed nations. Against the background, the present study is an effort to assess the dynamic relationship among number of units, number of persons employed, value of output and value of export of MSMEs and over GDP in India.

In order to execute the research, at first, a correlation matrix has been presented for the collected time series data, the result of the experiment presented (Appendix-2) illustrates that logGDP, logUNIT logEMPL, logPRO, and logEXP are highly correlated over the period of study. For the purpose of capturing the causal links among the variables, it is the first step to check stationarity conditions of the time series variables. Hence, for this purpose, the researchers used the unit root test of Augmented Dickey Fuller (ADF) and Phillips and Perron (PP).

The results of those investigations presented in table 1 depicts that all the time series variables are non stationary at level but, turned into stationary at first difference. Hence, one can infer that there is a long run behaviour. Hence, the quite familiarly used ARDL bounds test has been used to capture the existence of association among the variables.

Table No 1 *Result of Unit root test*

Variables	ADF		PP	
	Level	1st Diff	Level	1st diff
logGDP	-0.02	-4.36***	0.28	-4.30***
logPRO	0.01	-6.03***	0.01	-6.03***
logEMP	0.06	-6.64***	0.13	-6.64***
logUNIT	-0.65	-6.67***	-0.60	-6.74***
logEXP	-1.32	-2.67*	-0.70	-7.06***

Notes: *, ** and *** denotes rejection of null hypothesis at 10%, 5% and 1% level, respectively.
Lag selection for ADF-SIC.
Source: *Computed from Secondary Data*

Further, the analysis proceeded with the AIC criterion of four lags as the model suggested that the four lag is the optimal lag value. Quite expectedly, the result of ARDL bounds test revealed that there is a co-integrating relationship among the variables as the value of F statistics is significant at 10 per cent level (presented in table 2). On the other hand, it can be interpreted as those variables logGDP, logUNIT, logPRO, logEMP and logEXP are moving together or they have long run association.

Table 2 *Result of ARDL Bounds test*

Test Statistic	Value	k
F-statistic	4.15*	4

Source: *Computed from Secondary Data. * indicates 10% level of significant*

The short run result of ARDL test reported in table 3: enunciates that the error correction coefficient is negative and significant at 1 per cent level. This trend reveals that there is a short run relationship among the variables. At the same time, the speed of adjustment towards the long run equilibrium is 54 per cent per annum. Further, GDP is influenced by its own past values indicating previous years' shocks crept into the present value which is aptly modeled. At the same moment, export also revealed to be a significant short run influence on GDP. While the computed result of R^2 says that the model is significant and the DW value revealed that there is no autocorrelations in the model.

Table 3 *Short run elasticity*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.36**	0.15	2.51	0.02
D(GDP(-2))	0.13	0.12	1.10	0.28
D(GDP(-3))	0.46***	0.12	3.75	0.00
D(PRODUCT)	-0.02	0.02	-0.97	0.34
D(EMPLOYMENT)	-0.02	0.02	-0.66	0.51
D(UNITS)	0.00	0.02	0.10	0.92
D(EXPORT)	0.08**	0.04	2.38	0.02
D(@TREND())	0.02***	0.01	3.73	0.00
CointEq(-1)	-0.54***	0.12	-4.70	0.00
R-squared	0.527845			
Adjusted R-squared	0.381314			
Akaike info criterion	-6.1			
Durbin-Watson stat	1.735534			
F-statistic	3.602274***			
Prob(F-statistic)	0.004067			

Notes: *, ** and *** denotes rejecting of null hypothesis at 10%, 5% and 1% level, respectively.
Source: *Computed from Secondary Data*

The long run elasticity result elucidates that at 5 per cent level of significant export alone explain the GDP in Indian context. This trend implies that one per cent increase in export increases 0.16 per cent in GDP. Hence, the export of MSME can be used as a special enhance to increase the GDP in future. Further, there is a specific long run behavior in the model as the probability value of trend is significant at one per cent level. Additionally, it should be mentioned here is that no other variables influence the GDP in the long run as the probability values are not significant.

Table 4 *Long Run Coefficients (Dep- GDP)*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
logPRO	-0.03	0.03	-1.06	0.30
logEMP	-0.03	0.05	-0.66	0.52
logUNI	0.00	0.03	0.10	0.92
logEXP	0.16	0.06	2.42	0.02
C	5.42	0.31	17.51	0.00
@Trends	0.05	0.01	8.85	0.00

Notes: *, ** and *** denotes rejecting of null hypothesis at 10%, 5% and 1% level, respectively.
Source: *Computed from Secondary Data*

Interestingly the results of diagnostic check presented in (Appendix table: 3) can be interpreted as follows: the computed result of Ramsey RESET tells that the model is correctly specified; LM test demonstrated that there is no serial correlation. At the same time, the result of Jarque-Bera test disclosed that the error term is normally distributed and it can be said that there is no heteroskedasticity problem form the ARCH result presented here.

Figure 1: *Result of CUSUM and CUSUM of Square*
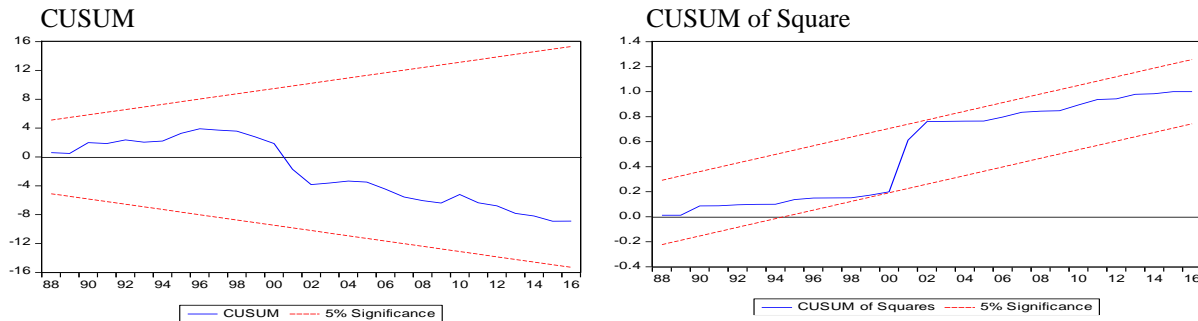
For the purpose of examining the robustness of models, CUSUM) and CUSUMSQ) tests, propounded by Pesaran and Pesaran, have been used (35). The result presented in the form of graphical representation revealed that CUSUM and CUSUMSQ are within the boundaries for the study period; hence we can conclude that there is no violation of stability.

At the final stage, the dynamic causal relationship among the variables has been examined using the result of MWALD test. The composite result of MWALD statistics presented in table: 5 says that number of units, production and export Granger cause the employment in Micro, Small and Medium scale industries in the Indian context over the period under the study. Among them, production export and number of units Granger cause the employment at 1, 5 and 10 per cent levels of significant. Hence, it is possible in future to create the employment opportunity by augmenting output and increasing the volume of export. Further, it can be highlighted that the number of units Granger causes employment at 10 per cent level of significant, which is contrary to what the jobless growth experienced by the economy.

Table 5 *MWALD Test / VAR Block Exogeneity Test*

Dependent variable: GDP			
Excluded	Chi-sq	df	Prob.
PRODUCT	0.007	2	0.996
EMPLOYMENT	0.138	2	0.933
UNITS	1.528	2	0.466
EXPORT	1.488	2	0.475
All	5.145	8	0.742
Dependent variable: PRODUCT			
Excluded	Chi-sq	df	Prob.
GDP	0.691	2	0.708
EMPLOYMENT	1.999	2	0.368
UNITS	4.478	2	0.107
EXPORT	0.791	2	0.673
All	5.809	8	0.669
Dependent variable: EMPLOYMENT			
Excluded	Chi-sq	df	Prob.
GDP	0.089	2	0.957
PRODUCT	35.373	2	0.000
UNITS	4.851	2	0.088
EXPORT	6.563	2	0.038
All	45.662	8	0.000
Dependent variable: UNITS			
Excluded	Chi-sq	df	Prob.
GDP	0.784	2	0.676
PRODUCT	42.192	2	0.000
EMPLOYMENT	37.064	2	0.000
EXPORT	6.5653	2	0.038
All	175.205	8	0.000
Dependent variable: EXPORT			
Excluded	Chi-sq	df	Prob.
GDP	7.817	2	0.021
PRODUCT	2.960	2	0.228
EMPLOYMENT	0.532	2	0.766
UNITS	9.220	2	0.01
All	23.118	8	0.003

Source: *Computed from Secondary Data*

Further, the result reported that, both production and employment of MSMEs Granger caused the number of units. This trend may be due to horizontal and vertical expansions in the already existing units in India. Interestingly, both the number of units and GDP Granger cause exports in the Indian context.

This environment explains, it is GDP that Granger cause exports rather than the other way, indicating MSME export is not big enough to influence the GDP and another dynamic aspect related to this is as GDP expands, the export horizon of MSME extends which must be attributed to structural change that is happening in the economic progress over the period of time. As the Classical theories rightly pointed out that the international trade is the extension of domestic trade. Hence, the increase in number of units facilitated to enter into international trade. Mention should be made here that GDP Granger causes export, this may be due to the fact that increase in GDP offered support system in the form of subsidies infrastructure, and other facilities to the MSMEs in India. In the whole system it is found that there is feedback causality between number of units and export reflecting both reinforce each other in the Indian context.

Conclusions

The study examined the dynamic relationship among the economic variables (number of units, output, employment and export) of MSMEs and GDP in the Indian context for the period of four decades from 1974 to 2016. All the time series variables are converted into natural log and they are non stationary at level and stationary at first difference. The result of the ARDL bounds test demonstrated the existence of long run association among the variables. The negative sign of error correction tern and significance of probability value testify the short run causality and the seed of adjustment is 54 per cent per year. At the same time the long run co-efficient reported that the export is significantly explaining GDP. The comprehensive result of the MWALT statistics concluded that employment is significantly influenced by number of units, production and export, while export is strongly influenced by number of units and GDP. This trend explains that the export of MSME is not big enough to influence the GDP and another dynamic aspect related to this is as GDP expands, the export horizon of MSME extends which must be attributed to structural change that is happening over the course of economic development. Hence, it can be suggested that the number of units and export should be increased by revamping the existing policies to create more number of employment opportunities. In turn, the same policies should be reshaped to harvest benefits from global market by establishing new units and increase GDP as they are closely connected with export.

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Appendix Part:

Appendix No 1 *Descriptive Statistics*

Measures	GDP	PRODUCT	EMPLOYMENT	UNITS	EXPORT
Mean	7.04	6.36	1.31	0.69	5.32
Median	7.09	6.18	1.28	0.88	5.46
Maximum	8.18	7.37	2.14	1.71	6.93
Minimum	5.93	5.53	0.60	-0.38	3.60
Std. Dev.	0.70	0.58	0.46	0.67	1.04
Skewness	-0.03	0.57	0.40	0.01	-0.03
Kurtosis	1.77	1.96	2.07	1.67	1.76
Jarque-Bera	2.72	4.29	2.71	3.16	2.78
Probability	0.26	0.12	0.26	0.21	0.25
Observations	*43*	*43*	*43*	*43*	*43*

Source: *Computed from Secondary Data*

Appendix No 2 *Pair wise correlation matrix*

Correlation	logGDP	logPRO	logEMP	logUNI	logEXP
logGDP	1.00				
logPRO	0.93	1.00			
logEMP	0.97	0.96	1.00		
logUNI	0.98	0.90	0.97	1.00	
logEXP	1.00	0.93	0.97	0.99	1.00

Source: *Computed from Secondary Data*

Appendix No 3 *Diagnostic check*

Ramsey RESET test	LM test	Jarque-Bera test	ARCH test
2.735867(0.06)	2.465047(0.11)	1.49(0.47)	0.79(0.37)

The value in Parenthesis is P value
Source: *Computed from Secondary Data*

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