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EMPLOYMENT VOLATILITY IN INDIA'S REGIONAL ORGANIZED MANUFACTURING: THE EFFECTS OF SPECIALSATION

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Abstract

Generally, it is said that more diverse is the regional economy, the less volatile is expected to be the employment growth. But, with integration of regions and world markets, the lesser is the chance of having diverse regions. Instead, greater is the chance for regions to specialize and be vulnerable to economic shocks. Indian studies in general deal with the mismatch between industrial growth and employment in manufacturing with hardly any study attempting to test the relationship between specialization and employment growth volatility in manufacturing. This study examines the possibility of employment volatility if any and if so its relation with diversification or concentration/ specialization of an industry in a region. The results show a positive and strong statistically significant relation between volatility and employment growth rate square, the influence of specialization on volatility of employment growth rate is clearly observed in smaller regions. Besides, the results also clearly bring out the dependency of smaller regions only on labour for manufacturing i.e. going in for labour intensive production.

Keywords: Regional Manufacturing, Specialization, Employment

JEL Codes: R10, R12

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1. INTRODUCTION:

Generally, it is said that more diverse is the regional economy, the less volatile is expected to be the employment growth. But, with integration of regions and world markets, the lesser is the chance of having diverse regions. Instead, greater is the chance for regions to specialize and be vulnerable to economic shocks. Planning authorities plan the development of a region so as to attract diversified industries which will in return reduce the volatility of employment growth. Indian manufacturing industries are diversified in almost all the states of country, but the question is to what extent, are they able to reduce the volatility of employment growth in their states. Besides, with the globalization trend, trade is also generally said to be influencing the employment volatility. However, in India's case, manufacturing exports do not seem to be that significant to influence employment volatility for studies show that India's share in global manufacturing and global exports are around 2per cent respectively (Chaddha and Burange 2015). However, looking into the share of manufacturing exports in the total exports of the country although, it is coming down, it is still at 72per cent in 2013/14 (Chaddha and Burange 2015). But, exports share to total manufacturing is a meagre amount of 3 to 4 per cent. This clearly indicates the extent to which the Indian manufacturing caters to the domestic economy. Thus, changes in domestic consumption of manufacturing items play a greater role in employment volatility. Indian studies (Goldar B, (2000), Kapoor R (2014), Roy S (2014) Das P and Sengupta A (2015)) in general deal with the mismatch between industrial growth and employment in manufacturing with hardly any study attempting to test the relationship between specialization and employment growth volatility in manufacturing. Therefore, this study concentrates on the changes in employment in manufacturing for a period of sixteen years starting from 1998/99 to 2013/14 so as to examine the possibility of employment volatility if any and if so its relation with diversification or concentration/ specialization of an industry in a region. Using Annual Survey of Industries (ASI) data on employment for the above years, regression models are constructed to analyse the above objective. Although, the results of all the above models show a positive and strong statistically significant relation between volatility and employment growth rate square, the influence of specialization on volatility of employment growth rate is clearly observed in smaller regions. Besides, the results also clearly bring out the dependency

of smaller regions only on labour for manufacturing *i.e.* going in for labour intensive production.

Thus, section 2 deals with review of literature followed by approach to the study and model in section 3 and 4. While, section 5 brings out the data used and adjustment made, section 6 depicts the results and analyses the same. Conclusion is in section 7.

2. REVIEW OF LITERATURE:

Goldar, B. (2000) emphasis that employment in organised manufacturing sector remained virtually stagnant in the 1980's, but there was a marked acceleration in the growth of employment in the 1990's due to the change in the size structure in favour of small and medium sized factories. Further the study analysis econometrically the relationship between employment growth and growth rates of output, real wages and man-days per employee for the period 1980-90 and 1990-97. The author finds a significant negative relationship between growth rates of real wages and employment implying that a slow-down in the growth rate of real wages was the principal cause of accelerated employment growth. These results are supported by Roy, S. (2014) who points out that the average real wage since 2000-01is less than what it was in the nineties.

Roy, S. (2014) examines the growth in gross value addition, productivity, employment, investment, real wages, capital intensity, labour intensity, share of wages, profits and interest in value added over different phases from 1980-81 to 2010-11 in the manufacturing sector. The study observed that although capital intensity increased but it did not result in a similar growth in labour productivity. It is the decline in the cost of capital that led to an increase in capital investment. A sharp increase in the share of profits in gross value added also resulted in a slow rise in consumption demand. Also, labour intensive industries accounted for a low share of total output and wages. The study concludes that growth in manufacturing sector by itself does not ensure growth in employment. Rejuvenating the manufacturing sector calls for effective steps to overcome bottlenecks such as rigid labour and product market regulations, infrastructure constraints, strict environmental clearances and difficulties in land

acquisition. India needs a comprehensive industrial strategy related to demand, choice of technology, size structure of firms as well as engagement with the global market.

Kapoor, R. (2014) analysis the disparities in the performance of the manufacturing sector across industries and states from 2000-01 to 2010-11 by making use of Annual Survey of Industries (ASI) data for 58 three-digit manufacturing industries for 18 states of India. The paper empirically examines the effect of three parameters namely, industry characteristics (labour or skill intensity), state regulation (labour market, product market and environmental regulations), state infrastructure indicators (transmission and distribution losses by state electricity boards) on the industrial performance of the states. The results point out that states with flexible regulatory environment and adequate availability of power have witnessed growth in value added. Interestingly, there has been an increase in the growth rate of workers in labour intensive industries across states irrespective of whether they have flexible or rigid labour laws. This the author opines is an indication of the employers getting around these regulations and increasing contractualization of the workforce leading to lower wages and greater savings made by them.

Das, P., Sengupta, A, (2015) look into the regional variations in output, employment and productivity growth in registered manufacturing industries across major states in India in the post reform period. He points out that a structural change has taken place in favour of capital that increased the profit rate by displacing workers in manufacturing industries in India. This according to him is the cause of the mismatch between output and employment growth.

Kort, J.R. (1981) hypothesises that the more dispersed the regional employment among different industries, the greater the overall economic stability. The paper aims at developing a model of regional economic instability and diversification which account for differences in instability between large and small cities. The study makes use of four measures of diversification namely, entropy, ogive, national average and percent durable which are empirically tested using weighted least squares (WLS) and ordinary least squares (OLS) regressions. Of the four indexes entropy and ogive measures were significant whereas national average and percent durable were insignificant in

explaining the variation in regional economic instability. Due to the existence of heteroscedasticity in regional economic instability models the study points out that the use of OLS models in testing the relationship between regional economic instability and diversification is inappropriate. Based on WLS regression the author states that industrial diversification when corrected for city size variation, is a significant variable for regional economic instability differentials.

Nissan, E., Carter, G. (2006) make use of Theil entrophy index to measure the level of employment diversity at the state and regional level. The index is based on aggregating employment at eight major sectors (durable goods; non-durable goods; construction; transportation, communication and utilities; trade; finance; insurance and real estate; service and miscellaneous; and government) for two periods. Period 1 refers to years 1972-1981 and period 2 is for the year 2000. The states are partitioned into three categories of employment diversity. The findings indicate a movement towards more specialisation in the latter period (2000) as compared to the earlier period (1970's).

Baldwin, J. R., Brown, M. W. (2004) empirically test the relationship between manufacturing employment volatility and diversity, growth, plant size and export intensity across Canadian regions during the period 1976 to 1997. Both cross sectional and first difference multi-variate analysis are used to test the above hypothesis. In cross sectional regressions the authors find that volatility is positively related to specialisation. Where as in first difference analysis the same relationship is found, albeit only for large manufacturing economies. The analysis also shows that regions which integrate with the world may tend to become more specialised, thus vulnerable to economic shocks.

3. APPROACH TO THE STUDY

It is said that the changes in growth rate of employment in a region is on one side influenced by variances of growth of individual industries and on the other side by correlation among industry growth rates and the unemployment resulting from these changes in the rates of growth in employment in industries leads to disruption in a regional economy (Baldwin and Brown, 2004). As such variance of growth rate in

employment plays an important role in influencing the stability/disruption of the economy. Therefore, this study makes use of variance of annual manufacturing employment growth rates in different states of India to measure volatility in employment growth of manufacturing industries. To analyse the effect of this volatility in employment growth one has to have a fair idea on the factors influencing this. Structural characteristics of regional economies is said to relate to diversified industrial structure, variance of its industries growth rates and covariance between those growth rates (Baldwin and Brown, 2004). As such analysing volatility of employment growth rates calls for attention on the above characteristics which would help in selecting potential correlates of volatility. Thus, the study identifies factors like diversification/ specialization, plant size, labour intensive production industries *etc*. to be influencing the volatility of employment growth rate.

Based on the above information the study uses Herfindahl Index (HHI) to measure specialization/ diversification and it is hypothesized to have a positive relation with volatility. In other words, higher is the specialisation higher is the volatility and /or larger is the diversification greater is the stability. It is measured as $HHI = \sum S^2_i$, where S_i is the share of employment of the i^{th} industry for each year in each state. The HHI value ranges from 1- when all employment is concentrated in some particular industry to 1/n when employment is spread across evenly in n industries. Although there are number of measures[i] HHI is used for specialization/ diversification most often by many researchers and therefore considered here too. Thus, the hypothesis is to have a positive effect on volatility of employment growth.

Plant size is measured by dividing the total state employment in manufacturing each year by the number of industries in the respective state. This gives the average employment in each industry for each year per state. The average for the sixteen years is consistent to get an overall averages of plant size for each state. Smaller plants are generally at the beginning stages and as such vulnerable to closure as compared to large plants. As such it is assumed smaller is the plant size greater is the volatility. Therefore, here it is hypothesized to have a negative effect on volatility or employment growth.

Researchers have opined that employment levels or the size of the region influence the volatility of employment growth and larger regions may be more stable than smaller ones (Malizia EE, Ke S, (1993)). However, this can be argued oppositely by using Krugman's view (Krugman et al. (1999)) that if the employment levels are higher in a region the region would be manufacturing more for domestic consumption rather than trade. This leads to the effect of competition among local producers *i.e.* the growth rate of the region's industries will be correlated and the economic shocks will be the same for all the regional industries. By this if there are two regions with a same level of diversity and one is larger than the other, the larger region may have higher volatility. Thus, going by both, one could conclude that employment levels or size does influence volatility either it could be positive or negative. Thus, here it is hypothesized that employment level or size of the region has a negative effect on volatility of employment growth as per Malizia and Ke's study or positive effect on volatility of employment growth as per Krugman's view.

Malizia and Ke (1993), is said to have found a 'U' shaped relationship to exist between growth and volatility *i.e.* both very high levels of employment growth and extremely low levels of growth experience high level of volatility in employment growth. To this Baldwin and Brown (2004), express of not knowing clearly the reason behind this behaviour, although they suggest that possibly the regions may be reacting to shocks or high growth regions may have new industries that are more prone to volatility than matured industries. However, in our opinion new/smaller regions with new industries although, grow at a faster rate, they are subject to volatility (as suggested by Baldwin and Brown (2004)) because of the inadequate but, in bigger regions the established industries having already reaped the benefits of being a new firm and are at a stage when growth is reduced. Besides, they are subject to competition/shocks and industries after a period experience diminishing returns. This is obviously seen in the Indian states in Table 1.

Even with all these, growth attracts new firms although, they are prone to volatility. Thus, with both a negative and positive relation between volatility and growth rate, the study considers growth as an independent variable and is calculated as average annual growth rate over the period 1998/99 to 2013/14. It also considers the growth rate square

over the period. It is hypothesised that volatility and growth rate are negatively related and with the square of growth rate it is positively related.

Table 1.: Volatility and Growth rate among Indian states for the period 1998/99 to 2013/14

States	Variance	Average annual growth rate	States	Variance	Average annual growth rate
Andhra Pradesh	57.92	2.86	Dadra and Nagar Haveli	273.89	12.90
Assam	32.56	3.57	Daman and Diu	149.51	9.10
Bihar	108.82	4.48	---	---	---
Chandigarh	172.23	1.24	Goa	123.36	6.00
Chhattisgarh	84.01	3.94	Himachal Pradesh	174.01	13.13
Gujarat	37.51	3.70	J and K	104.70	7.30
Haryana	109.82	3.81	---	---	---
Karnataka	83.65	3.82	Manipur	392.39	12.68
Kerala	46.83	1.63	Meghalaya	388.75	22.21
Madhya Pradesh	60.07	0.75	Tripura	87.47	10.15
Maharashtra	56.15	2.30	---	---	---
Nagaland	220.85	1.29	Uttarakhand	588.21	17.47
Odisha	102.06	4.58	---	---	---
Puducherry	72.95	2.63	---	---	---
Punjab	44.58	4.46	---	---	---
Rajasthan	53.81	4.89	---	---	---
Tamil Nadu	148.04	4.69	---	---	---
Uttar Pradesh	37.33	2.77	---	---	---

Source: Author's calculations

Besides, following Baldwin and Brown's (2004) analysis of decomposition of variance of growth rate into industry effect and portfolio effect, the industry mix of a region

could be weighted towards those industries that are more volatile or industries whose growth rates are correlated, then this could increase the volatility of the region's industries. Thus, we consider industry mix like labour intensive industries or natural based industries as factors /variables influencing the volatility of employment growth in the industries. These are calculated as the proportion of total employment in labour intensive industries and proportion of total employment in natural resource-based industries. Here it is hypothesised that proportion of total employment in labour intensive industries and natural resource-based industries are either positively or negatively related to variance. Thus, if the industries are more correlated then there would be a positive correlation between employment volatility and industry mix and vice versa.

4. MODEL:

Having established a relation between the dependent and independent variables in the approach, the study frames a cross-sectional model using data for almost all states of India. Here, variance (σ^2) representing volatility is the dependent variable and the independent variables are herfindal index (HHI), Plant size (PLSZ), size of region (RSZ), average annual growth rate (AVAGR), square of average annual growth rate (AVAGRS), proportion of total employment on labour intensive industries (PELII) and proportion of total employment in natural resource-based industries (PENBI).
The regression model is $(\sigma^2) = \alpha_1 + \alpha_2 (HHI) + \alpha_3 (PLSZ) + \alpha_4 (RSZ) + \alpha_5 (AVAGR) + \alpha_6 (AVAGRS) + \alpha_7 (PELII) + \alpha_8 (PENBI)$

This model is used in three different sets of states

$(\sigma^2) = \alpha_1 + \alpha_2 (HHI) + \alpha_3 (PLSZ) + \alpha_4 (RSZ) + \alpha_5 (AVAGR) + \alpha_6 (AVAGRS) + \alpha_7 (PELII) + \alpha_8 (PENBI)$ ---------- (1)
using all states considered in the study
$(\sigma^2) = \alpha_1 + \alpha_2 (HHI) + \alpha_3 (PLSZ) + \alpha_4 (RSZ) + \alpha_5 (AVAGR) + \alpha_6 (AVAGRS) + \alpha_7 (PELII) + \alpha_8 (PENBI)$) ---------- (2)
using only states having more than 18 industries

$(\sigma^2) = \alpha_1 + \alpha_2$ (HHI) + α_3 (PLSZ) + α_4 (RSZ) + α_5 (AVAGR) + α_6 (AVAGRS) + α_7 (PELII) + α_8 (PENBI)) ---------- (3)

using only states having less than 18 industries Thus, the three are represented as Model I, Model II and Model III.

5. DATA BASE AND ADJUSTMENTS:

The employment data on industries used in this study is collected from the Annual Survey of Industries (ASI) for the years 1998/99 to 2013/14 under the two-digit classification. The time series volume for the year 1998/99 to 2007/08 provide employment figures state-wise as total number of persons in Table 3. The volume I of ASI for the years 2008/09 to 2013/14 provide employment data state-wise, as total number of persons in Table 4a. Care is taken to see that the industries are rightly classified as per NIC classifications under the two periods 1998/99 to 2007/08 and 2008/09 onwards, as they are different. The details of the classification are given in Appendix I[ii]. The state wise, industry-wise data were thus adjusted to match the NIC industry codes for the two different periods. Based on the structure of the industries they were identified as those that belong to labour intensive and those that belong to natural resource using industry. Thus, Herfindal index, plant size, size of region, proportion of employment in labour intensive industries, proportion of employment in industries using natural resources as raw materials, were calculated for all the states and union territories in India except Andaman and Nicobar Islands[iii]. However, variance of annual growth rate, annual growth rate, annual growth rate square was calculated using total of employment in industries in the region *i.e.* for all the states and union territories in India.

Although the data used is a time series data for the period 1998/99 to 2013/14, the dependent variable variance of growth rate is calculated by using the growth rate each year for the above period for each state. Thus, it is one single figure for each state. Similarly, for plant size the average of plant size for each industry over the period and this is further averaged to get one single figure for each state. Regional size is on total employment in industry over the period for each state. Here also average over the years are considered.

6. EMPIRICAL RESULTS AND ANALYSIS:

Before running the regression in Excel, the basic statistics of the data used were calculated and are as presented in Table 2. The index of specialization/diversification – Herfindal (HHI) Maharashtra and highest being 0.66 for the state of Manipur. A complete contrast of a totally developed state and totally underdeveloped state. The possibility of very few industries is obvious in Manipur and therefore could be the concentration or specialization. The same seems to be the pattern in the study of (Baldwin and Brown, 2003) where it is found that the most diverse region tend to be in the core of large metropolitan area and the most specialized region the rural areas. In the case of plant size (PLSZ) and region size (RSZ) too, it is clear that only a very developed state like Tamil Nadu takes the place of highest position and lowest being the underdeveloped states of Nagaland and Manipur respectively. However, the same logic is unable to be used when it comes to labour intensive industrial production and natural resource use in industries. This is because, neither is the highest labour-intensive industries state (Dadra and Nagar Haveli) the most populated nor is the most used natural resource for industries the only state (Chhattisgarh) for being rich in natural resource. The north eastern states of Meghalaya and Manipur are the states on the lower side. Here again although, Meghalaya could be less populated Manipur need not be considered as poor in natural resources.

Table 2.: Basic Statistics

	AVERAGE	STD DEVIATION	MINIMUM	MAXIMUM
VAR	133.46	127.56	31.29	588.21
HHI	0.21	0.14	0.08	0.66
PLSZ	16081.44	19113.57	549.19	70181.00
RSZ	338273.50	420039.38	2702.88	1523896.63
AVAGR	5.59	5.41	-0.56	22.21
AVAGRS	59.53	108.07	0.00	493.36
PELII	28.30	15.52	3.19	48.39
PENBI	45.50	18.30	10.42	77.82

Source: Author's calculations

The correlation of both the dependent and independent variables were calculated using excel and are produced in Table 3. All the independent variables are correlated with the dependent variable *i.e.* variance considered for measuring volatility. The correlation coefficient indicates

Table 3.: Correlation

	VAR	HHI	PLSZ	RSZ	AVAGR	AVAGRS	PELII	PENBI
VAR	1							
HHI	0.30	1						
PLSZ	-0.33	-0.43	1					
RSZ	-0.33	-0.43	0.99	1				
AVAGR	0.78	0.30	-0.31	-0.31	1			
AVAGRS	0.80	0.26	-0.31	-0.31	0.94	1		
PELII	-0.23	-0.65	0.42	0.42	-0.26	-0.28	1	
PENBI	-0.46	-0.15	0.28	0.27	-0.48	-0.41	0.19	1

Source: Author's calculations

that more specialized and those with higher average growth rates have higher volatility and higher negative volatility for regions with natural resource use-based industries. Although, regional size and plant size were highly correlated both were together considered, for, ignoring any one of them, was reducing the adjusted R^2 considerably. The regressions were run by using standardized data to avoid the problem of heteroscedasticity. The results from the three cross section regressions are presented in Table 4. While, Model I deal with the volatility and averages for all the states considered under the study, the Model II concerns about states which have at least 18 industries *i.e.* state having many industries. Model III deals with smaller states that have less than 18 industries. The smaller states were deliberately considered to find out if specialization or less diversification are affected by volatility. The effort was worth going, for, the results were better for the smaller states than the larger states.

Results for Model I as seen in Table 4 show that approximately 59 per cent of the variation in the volatility measure is captured. Only the hypothesis of variance being positively correlated with the average annual growth rate square (AVAGRS) is found to be significant and true. Except for plant size (PLSZ) all other hypotheses are confirmed although not significant. In the case of plant size (PLSZ), the positive

coefficient indicates that volatility and plant size go in the same direction *i.e.* higher is the volatility with larger plant size. Specialisation (HHI) has a positive relation with volatility as per the hypothesis. Similarly, regional size (RSZ) coefficient being negative, clearly shows that the data supports the fact that larger regions may be more stable than smaller ones and therefore lesser is the volatility. Thus, the results support the empirical work of Malizia and Ke. As hypothised, the coefficient of average annual employment growth rate (AVAGR) clearly indicates the negative relation. The U-shaped behaviour pointed out by Malizia and Ke can be seen in the case of Indian industries which has already been pointed out earlier with the use of Table- 1. The results showing coefficients of labour intensive (PELII) and natural resource-based industries (PENBI) indicate that the labour-intensive industries are more correlated whereas natural resource-based industries are less correlated industries in the country. Results for Model II as observed in Table 4 show that approximately 84 per cent of the variation in the volatility measure is captured. Here again, only the hypothesis of variance being positively correlated with the average annual growth rate square (AVAGRS) is found to be highly significant and true.

Table 4.: Cross Section Regression

	Model I	Model II	Model III
Intercept	12.08 (0.3897)	-1.82 (0.9320)	20.75 (0.3882)
Herfindal Index (HHI)	0.16 (0.3667)	-0.05 (0.9107)	0.96 (0.0785) **
Plant Size (PLSZ)	4.64 (0.3970)	4.46 (0.3353)	-8.35 (0.2172)
Average Total Emp. (RSZ)	-4.63 (0.3929)	-4.28 (0.3458)	8.28 (0.2170)
Average Annual Growth Rate (AVAGR)	-0.08 (0.8395)	-0.40 (0.2923)	-0.61 (0.4562)
Average Annual Growth Rate Square (AVAGRS)	0.78 (0.0604)**	1.26 (0.0058)***	1.44 (0.1067) *
Labour intensive industries (PELII)	0.11(0.3592)	-0.002 (0.9939)	0.50 (0.1066) *
Natural resource base industries (PENBI)	- 0.20 (0.1856)	0.10 (0.8211)	-0.39 (0.3028)
Adjusted R^2	0.59	0.84	0.56
F Statistics	6.99	12.30	3.34

Significance codes: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

Source: Author's calculation

Except for Specialisation (HHI) and plant size (PLSZ) all other hypotheses are confirmed although not significant. Specialisation (HHI) here has a negative relation with volatility as against the hypothesis. This is clearly indicating the specification of the model which relates only to larger diversified regions. As in the case of Model I, here also in the case of plant size (PLSZ), the positive coefficient indicates that volatility and plant size go in the same direction *i.e.* higher is the volatility with larger plant size. Although, this is against the hypothesis in this study. Similarly, regional size (RSZ) coefficient being negative, clearly shows that the data supports the fact that larger regions may be more stable than smaller ones and therefore lesser is the volatility even in Model II. Thus, the results support the empirical work of Malizia and Ke.

As hypotheses the coefficient of average annual employment growth rate (AVAGR) clearly indicates the negative relation. The results showing coefficients of labour intensive (PELII) and natural resource-based industries (PENBI) indicate that the labour-intensive industries are less correlated whereas natural resource-based industries are more correlated industries in the country. Unlike the first model when it is specific to larger regions the results are opposite.

Results for Model III as observed in Table 4 show that approximately 56 per cent of the variation in the volatility measure is captured. The hypothesis of variance being positively correlated with the average annual growth rate square (AVAGRS) is found to be significant and true. Added to this, Specialisation (HHI) and labour-intensive industries (PELII) are also found to be significant and true. All other hypotheses are confirmed although not significant. Specialisation (HHI) has a positive relation with volatility as per the hypothesis. However, regional size (RSZ) coefficient here is positive, clearly shows that the data supports the fact that larger regions may be more stable than smaller ones and therefore lesser is the volatility. As hypothesised, the coefficient of average annual employment growth rate (AVAGR) clearly indicates the negative relation. The results showing coefficients of labour intensive (PELII) and natural resource-based industries (PENBI) indicate that the labour-intensive industries are more correlated whereas natural resource-based industries are less correlated industries in the country.

7. CONCLUSION:

The study attempts to test the relationship between specialisation and employment growth volatility in the Indian organised manufacturing sector. In the cross sectional regression, we find that volatility is positively and significantly related to specialisation, albeit only for small manufacturing regions. In other words, the hypothesis of positive relation between specialization and volatility or more is the diversification greater is the stability is true in the third model dealing with smaller regions. In the same model it is found that the plant size and employment volatility have an inverse relation. Besides, while regional size and volatility is found to be negative in the first two models it is found to be positive in the third model. Other than specialisation, high annual average growth rate square goes with high volatility in all three models. The study also finds that small regions which concentrated on labour intensive industries have had significantly high volatility.

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END NOTES:

[i] The estimate of industrial diversification used by Kort J.R (1981) was also attempted in the place of HHI in the three models used in this study. Since the results were not better than the use of HHI, it has not been presented in this study.

[ii] See Appendix I for details

[iii] The intention is to work on Moran;s I and if Andaman and Nicobar Islands are included they have no common border and it cannot be in the weight matrix. Added to that the employment data in this region is very insignificant to the total employment of the nation.

Appendix I

NIC Classification Concordance

SR. No	Code No. as per 2008	Description	Code No. as per 2004 and before
1	**10**	Manufacture of food products	**15**
2	**11**	Manufacture of beverages	**15**
3	**12**	Manufacture of tobacco products	**16**
4	**13**	Manufacture of textiles	**17**
5	**14**	Manufacture of wearing apparel	**18**
6	**15**	Manufacture of leather and related products	**19**
7	**16**	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	**20**
8	**17**	Manufacture of paper and paper products	**21**
9	**18**	Printing and reproduction of recorded media	**22**
10	**19**	Manufacture of coke and refined petroleum products	**23**
11	**20**	Manufacture of chemicals and chemical products	**24**
12	**21**	Manufacture of pharmaceuticals, medicinal chemical and botanical products	**24**
13	**22**	Manufacture of rubber and plastics products	**25**
14	**23**	Manufacture of other non-metallic mineral products	**26**
15	**24**	Manufacture of basic metals	**27**
16	**25**	Manufacture of fabricated metal products, except machinery and equipment	**28**
17	**26**	Manufacture of computer, electronic and optical products	**30,32,33**
18	**27**	Manufacture of electrical equipment	**31**
19	**28**	Manufacture of machinery and equipment n. e. c	**29**
20	**29**	Manufacture of motor vehicles, trailers and semi-trailers	**34**
21	**30**	Manufacture of other transport equipment	**35**
22	**31**	Manufacture of furniture	**36**
23	**32**	Other manufacturing	**36**
24	**33**	Repair and installation of machinery and equipment	**35**
25	**35**	Electricity, gas, steam and air conditioning supply	**40**
26	**36**	Water collection, treatment and supply	**41**
27	**37**	Sewerage	**37**
28	**38**	Waste collection, treatment and disposal activities; materials recovery	**37**
29	**39**	Remediation activities and other waste management services	**37**

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