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Employment-Export Elasticities for the Indian Textile Industry

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EMPLOYMENT-EXPORT ELASTICITIES FOR THE INDIAN TEXTILE INDUSTRY

Tarun Arora*

Abstract

Potential for employment generation of Indian textile industry, as a result of increase in exports, is assessed at 3-digit level of National industrial classification 2008 using employment-export elasticities for the period 1988-2013. The employment and exports data are matched using the central product classification (Version 2) in order to get the concorded time series data for the period 1988-2013 and obtain sub-sector level elasticity estimates. Fully modified OLS (FMOLS) is used to estimate the long run employment-export elasticities. The elasticities are further used to forecast the employment till the year 2020 using time series ARIMA modeling technique. The results suggest remarkably high employment generation potential for sub-sector 139 (manufacture of other textiles) in comparison to sub sector 131(spinning, weaving and finishing of textiles). The analysis is useful in designing sub-sector specific employment generation policies for industrial sector.

Keywords: Employment-export elasticities, Concordance, FMOLS, Forecasting.
JEL Classification: F1. F14. J21.

1. Introduction

The fact that Indian textile industry currently is the second largest employer in the country after agriculture makes it notably obvious that the sector should get its due attention in the policy for employment generation. With direct linkages to the rural economy and the agriculture sector, textile industry provides source of livelihood to large segment of rural population. Approach Paper to the 12th five-year plan has categorically mentioned the objective of enhancing the global competitiveness of the Indian textile products through appropriate policy support and also to create additional employment to the tune of 15.81 million by 2016-17 (Government of India, 2013). Since the approach paper to the 12th five-year plan has clearly stated export promotion and employment generation in textile industry as its prime objectives it is important to fathom out ways to achieve the same.

It is critical to boost the employment in organized manufacturing segment for reasons pointed by Mazumdar and Sarkar (2014). Authors pointed out that the low employment elasticity in organized manufacturing is serious concern because organized manufacturing is traditionally expected to take lead in productive employment generation and have large multiplier effects on other sectors. Also because of low wages in the unorganized manufacturing, dependence on unorganized sector for manufacturing growth will not do much for raising living standards.

The prime objective of this paper is to undertake a disaggregated level analysis of Indian textile industry to fathom out which sub-sector has more employment generation potential and which sub-sector is lagging behind. Also there is an attempt to decipher the reasons for the same. The

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analysis will be conducted at the three digit level of disaggregation of NIC classification 2008. Since around 49 percent of the total textile output produced in India is exported to the world and the share of imports in the total Indian textile supply is merely seven percent according to the data by Ministry of Textiles for the year 2012, it is important to understand whether increase in exports of textile industry is inclusive in nature or not. Since the approach paper has listed increase in the global competitiveness of the textile industry as one of its prime objectives, it is important to focus on furthering the exports of the textile industry as increase in exports is considered as one of the prime indicators of increase in competitiveness of an industry (Roper & Love, 2002). Along with that it is also crucial that the employment of the industry grows with that. Thus, this paper aims at estimating the employment potential of various textile subsectors in the organized segment of the textile industry at three digit level as a consequence of increase in exports of Indian textile industry.

Section two of this paper focuses on existing literature on the similar theme. Section 3 briefs about the data sources and variables used for analysis. Section four underscores the methodology used for conducting the analysis. Section five presents the empirical results for employment-export elasticities for two sub-sectors of the Indian textile industry at 3-digit level of disaggregation. The section on forecasting follows after section five and section six winds up the discussion with the set of concluding remarks and policy implications.

2. Literature Survey

It is also imperative to have cognizance of the previous studies which have linked employment, wages and economic performance with trade. Among the empirical studies, Revenga (1992) used the panel data approach in order to investigate the effect of increased import competition on US manufacturing employment and wages for the period 1977-87. The study indicated that the appreciation of dollar between 1980 and 1985 has reduced the wages by 2 percent and employment by 4.5 to 7.5 percent.

Kraay (1997) used panel data to judge the economic performance of Chinese industrial enterprises between 1988 and 1992 due to exports. Author found that controlling for past firm performance and unobserved firm characteristics, past exports are significant predictor of current enterprise performance. Aho and Orr (1981) attempted to measure the impact of trade on employment opportunities by industries. The impact of imports on employment opportunities was measured by the number of jobs that would be required to produce the dollar value of the imports (including transportation margins and tariff duties) in the same industry in the United States. The impact of exports on job opportunities was measured by the number of jobs necessary to produce those exports. Study concluded that more than 1 in 8 manufacturing jobs now relate to exports, creating openings for workers with above average skills; however, imports have displaced job prospects in industries with less skilled labor and more women and minorities. Brulhart, Elliot and Lindley (2006) estimated the impact of intra-industry trade on workers' movement between industries and between occupations. The regression results suggested that intra industry trade does attenuate or weakens the labour movement between industries and occupations.

Among the Indian Studies, Menon and Rodgers (2009) tested how the increasing competitive forces from India's trade liberalization have affected women's wages and employment. The empirical estimates of the OLS and fixed effects regression indicated that increasing openness of trade is associated with larger wage gaps in India's concentrated manufacturing industries. Veeramani (2007) analyzed the industry specific determinants of intra-industry trade in Indian manufacturing Industries. Using the Tobit regression the study concluded that the intensity of intra-industry trade would be larger if an industry is characterized by a greater degree of product differentiation.

Maskus (1991) in his study raised several issues with regard to concordance of various datasets especially trade and production datasets. Author also pointed out the need for development of international price deflators on consistent basis for outputs, inputs and trade. Nicita and Olarreaga (2001) in their World Bank study created a database which merges trade, production and tariff data available from different sources into a common classification: the International Standard Industrial Classification (ISIC), Rev. 2. Data availability varies, but the database potentially covers 67 developing and developed countries over the period 1976-1999. Pierce and Scott (2009) in their study established concordances between the ten-digit Harmonized System (HS) categories used to classify products in U.S. international trade and the four-digit SIC and six-digit NAICS industries that cover the years 1989 to 2006. Study also provided concordances between ten-digit HS codes and the five-digit SIC and seven-digit NAICS product classes used to classify U.S. manufacturing production. Study by Giovvani and Levchenko (2010) combined the sectoral output data from the UNIDO database for 55 developed and developing country during the period 1970-1999 with the bilateral sectoral trade series from the World Trade Database. Using the panel data approach the study concluded that the countries that trade more with each other exhibit higher business cycle correlation.

The studies mentioned above gives the idea about several attempts which tried to link trade with employment and economic performance and also highlights the attempts made to establish concordance among different databases. However, there are very few studies that delved deeply with the issues pertaining to trade and employment for a single sector. Also the studies that have focused on industry have not studied this issue of employment and trade at a disaggregated level.

3. Description of Data and Variables Used

The analysis is conducted at 3-digit level of disaggregation. The time frame for the analysis is from 1988 to 2013. The analysis requires estimation of employment-export elasticities which will infer about the employment potential of the textile sub-sectors due to increase in the exports. The data on employment and output is directly taken from ASI annual reports. The data on exports at the sub-sector level is sourced from UNCOMTRADE database.

Estimation of employment-export elasticities requires establishing concordance between two different data classifications. Since the data on employment is published in ASI reports follows the National Industrial Classification (NIC)[i] and the exports follow the HS-Classification[ii] it is important to match the two classifications so that the time series data on employment and exports are compatible. There have been several attempts to do concordance between various data classifications in order to derive inferences at much disaggregated level on issues pertaining to production and trade. In the current analysis the data on employment which is sourced from ASI reports is made compatible with the trade data using the Central Product Classification (version 2)[iii] which is developed by the United Nations to establish concordance between ISIC (International Standard Industrial Classification) Rev. 4 and HS classification-2007. The National Industrial Classification-2008 is constructed on the same lines of ISIC Rev.4 and thus with the help of CPC (version 2) it is possible to match the production and employment data with exports data. Unless the concordance is established the analysis cannot be conducted as the two data sets will not match. The concordance between the NIC and HS classification is appended at the end of the paper as Annexure 1. As mentioned above the time period is from 1988 to 2013, the data on both NIC and HS classification is matched for these 26 years to get the time series data on exports and employment for textile industry at three digit level. The data on exports is deflated using export value index sourced from the World Bank database.

The value of output is used for estimating employment-output elasticities and for employment the total persons engaged in the factory is used. For exports the value of exports is used. The reason behind taking the value of exports for different commodity codes, say 131 (Spinning, Weaving and finishing of textiles), is that each commodity code in NIC classification is an amalgamation of several commodities in HS classification which have different units of measurement. The only way the data of these commodities can be merged is by having a common unit of measurement. For this purpose all the exports are taken in value terms.

4. Methodology

The simple regression approach is often criticized of having no formal theoretical base and there is a need to proceed towards estimation of results with explicit theoretical structure. David Lim (1976) in his paper on estimating the employment- output elasticity for Malaysian manufacturing used the model which assumes that employers often tend to treat labour as a partially fixed factor of production. The rapid adjustment of the labour force to the changes in output is not possible because of technical and institutional factors. The model which reflects such constraints is Koyck-Nerlove adjustment model. Combining the basic equation and the equation for Koyck-Nerlove adjustment model equation one is derived (refer Appendix 1).

$$E_t = a_0 + b_0 Q_t + c_0 E_{t-1} + V_t \quad (1)$$

In this paper, the following changes are effected to equation 1 in order to get the desired results. Since prime objective of this paper is to estimate the elasticities, equation one is used in double log form. Another major change is replacing the value of output with value of exports so as to get the estimates for employment-export elasticities. The output can be replaced with exports as they are positively correlated.

The prime objective of the paper is to estimate the employment-export elasticities and in order to obtain the elasticity coefficients following model will be estimated.

$$logE_t = c_0 + b_0 logX_t + b_1 logE_{t-1} + b_2 log\left(\frac{K}{L}\right) + V_t \quad (2)$$

E_t represents employment and X_t represents exports for the year 't'. Capital-labour ratio is added to control for technology. It is also cardinal to take account of any major policy changes that could have had an impact on the variables. Introduction of Agreement of textiles and Clothing (ATC) under WTO in 1995 is definitely one such policy change. Due to ATC all the trade restrictions under the previous Multi-fiber trade arrangement (MFA) were revoked and trade became liberalized. However MFA was repealed in a phased manner and ATC came into full force in 2005. Hence, in order to incorporate the impact of these policy changes on employment two dummy variables for the year 1995 and 2005 are added during the estimation.

b_0 is the coefficient for employment-export elasticity and is expected to have a positive sign.. The increase in the rate of growth of exports, as a determinant of aggregate demand, pushes the output growth through increase in employment and investment in the exportable sector (Fugarolas, Manalich , & Matesanz, 2007). Increase in liberalization is associated with the process where the inefficient firms exit the industry and efficient firms take charge of the means of production. This leads to increase in productivity of the overall sector which in turn leads to labour getting attracted to such industries from agriculture and other non-productive sectors leading to increase in employment (Kotwal, Ramaswamy, & Wadhwa, 2011). b_2 is the coefficient for capital-labour ratio and is assumed to be negative. Increase in capital-labour ratio can happen only through two ways i.e. either increases in capital or reduction in employment. If employment reduces then the capital-labour ratio will increase and because of this reason the sign of the coefficient is assumed to be negative.

For any time series analysis of such kind it is important to first test the time series properties of the data. It is quite possible that time series data exhibit a time trend and can therefore be non-stationary i.e. the variables have means and variances and co-variances that are not time invariant. It is crucial to detect whether the series has presence of any unit root so that it can be removed by differencing it accordingly. Presence of unit root in a series is a sign of non-stationarity. According to Engle and Granger (1987) direct application of OLS to such series will yield spurious results primarily because the standard errors are highly misleading. Granger and Newbold (1974) in their seminal paper cautioned against the spurious regressions where one might witness a low Durbin Watson, a high R^2, and apparently high significance of the coefficients. The conventional way to resolve stationarity issues is to difference the series. Each non-stationary series is integrated of order I(d) where d is the number of times the series is differenced in order to make it stationary[iv].

4.1. Tests for Unit Root and Cointegration

However, there exist several tests to check for stationarity of a series, Augmented Dickey fuller (ADF) test (Dickey & Fuller, 1979) and Phillips-Perron test (Phillips & Perron, 1988) for stationarity are most widely used. Table 4.1 presents the results of the unit root tests performed separately for both textile sub sectors.

Table 4.1: Tests for Unit Root

Variable	ADF (p-value[v] in Parentheses)		Phillips-Perron (p-value[v] in Parentheses)		Order of Integration I(m)
	Level	**Δ**	**Level**	**Δ**	
Sub-sector 131: Spinning, Weaving and Finishing of Textiles					
LnEMP	-1.600 (0.46)	-4.846*** (0.00)	-1.720 (0.409)	-4.859*** (0.00)	**I(1)**
LnEXPORTS	-0.756 (0.81)	-7.366*** (0.00)	-0.7901 (0.804)	-8.055*** (0.00)	**I(1)**
Ln(K/L)	-0.304 (0.56)	-3.717*** (0.01)	-1.053 (0.91)	-7.10*** (0.00)	**I(1)**
Sub-sector 139: Manufacture of Other Textiles					
LnEMP	-1.312 (0.60)	-6.207*** (0.00)	-1.231 (0.64)	-6.344*** (0.00)	**I(1)**
LnEXPORTS	0.0688 (0.95)	-5.197*** (0.00)	0.619 (0.987)	-5.449*** (0.00)	**I(1)**
Ln(K/L)	-0.716 (0.82)	-4.224*** (0.00)	-0.719 (0.82)	-4.214*** (0.00)	**I(1)**

Source: Author's Estimations

Note: Ln = natural logarithm. **Δ =** first difference. I(m) = series is integrated of order m. ***,**,and * denote level of significance at 1%, 5% or 10%.

[v] MacKinnon's one-sided p-values.

Emp = Total persons Engaged in a particular textile sub-sector, Exports= Value of exports for a particular textile sub-sector, K/L= Capital-Labour ratio for a particular textile sub-sector

From the results presented in the table above it is established that all the series for both textile sub-sectors are non-stationary and are integrated of order 1. Once it is proved that all the series are integrated of the same order the next step is to check for existence of any co-integrating vector in the series. Co-integration is about testing the existence of a long run relationship between multiple economic series even though each series is considered to be an I(1) process (Shin , 1991). In order to test the co-integrating relationship among the series, Johansen approach for cointegration (1988)[v] is followed. The Johansen trace test and Eigen value tests are used for the test of cointegration in this analysis. The Johansen trace test and the Eigen value test attempt to determine the number of cointegrating vectors among variables. There must exist at least one cointegrating vector for a possible cointegration among different economic series (Katircioglu, 2009). Table 4.2 displays the results of the Johansen test for cointegration for both textile sub-sectors.

Table 4.2: Tests for Cointegration using Johansen Approach

	No. of cointegrating equations	Trace Statistic (p-value** in Parentheses)	Max Eigenvalue Statistic (p-value** in Parentheses)	Outcome
Sub-sector 131: Spinning, Weaving and Finishing of Textiles				
Between LnEmp, LnExports, and Ln(K/L)	None*	41.79 (0.00)	20.86 (0.0544)	**Both tests indicates presence of 3 co-integrating equations**
	At Most 1*	20.93 (0.00)	13.45 (0.066)	
	At Most 2*	7.478 (0.00)	7.478 (0.00)	
Sub-sector 139: Manufacture of Other Textiles				
Between LnEmp, LnExports, and Ln(K/L)	None*	39.84 (0.09)	27.58 (0.02)	**Maximum Eigen Value tests indicate presence of single co-integrating equation**
	At Most 1	12.26 (0.79)	8.17 (0.80)	
	At Most 2	4.08 (0.73)	4.08 (0.73)	

Source: Author's Estimations

Note: Emp = Total persons Engaged in a particular textile sub-sector, Exports= Value of exports for a particular textile sub-sector, K/L= Capital-Labour ratio for a particular textile sub-sector

* Denotes rejection of the hypothesis at the 0.05 level

** Mackinnon-Haug-Michelis (1999) p-values.

From the Johansen test results displayed in the table 4.2 it is verified that the series in both the textile sub-sectors are cointegrated. For the sub-sector 131 (spinning, weaving and finishing of textiles) there exist three co-integrating vectors. In case of 139 (manufacture of other textiles) there exist a co-integrating vector. The maximum number of cointegrating vectors makes no difference to the analysis, but there must exist at least a single cointegrating vector in order to ensure long-term trend. The choice of estimation technique to obtain the employment-export elasticities is contingent upon the results of the results of Granger causality. The results of this test will help ascertain the ideal econometric technique to proceed and estimate the elasticities.

4.2. Granger Causality

In order to then test for the relationship between exports and employment and to find whether there exists a bi-directional or uni-directional causality between exports and employment Granger causality tests are performed. Toda & Yamamato, (1995) proposed a two-step procedure to check for causality. Generally in non-regular cases such as non-stationarity of series the standard Wald statistic does not follow asymptotic chi-square distribution under the null hypothesis (Lutkepohl & Burda , 1997). In such scenario it is required to estimate an augmented VAR even there is cointegration which assures the asymptotic distribution of the Wald statistic (Zapata & Rambaldt, 1997).

If the causality between exports and employment is to be empirically tested, the following VAR model is considered,

$$(Emp)_t = a_0 + a_1(Emp)_{t-1} + ...+ a_p(Emp)_{t-p} + \alpha_1(Exp)_{t-1} + ... + \alpha_p(Exp)_{t-p} + u_t \quad (3)$$

$$(Exp)_t = c_0 + c_1(Exp)_{t-1} + ... + c_p(Exp)_{t-p} + \beta_1(Emp)_{t-1} + ... + \beta_p(Emp)_{t-p} + v_t \quad (4)$$

Hence, testing H_0: $\alpha_1 = \alpha_2 = ...= \alpha_p = 0$, against H_A: 'Not H_0', is a test that Exports does not Granger-cause Employment. Similarly, testing H_0: $\beta_1 = \beta_2 = ...= \beta_p = 0$, against H_A: 'Not H_0', is a test that Employment does not Granger-cause Exports. In both the cases, if the null is rejected it implies there is Granger causality.

After establishing the maximum order of integration for the group of variables (say Lnemp, Lnexports and Ln(K/L)) for which the causality is to be tested (all series are I(1) in nature (refer table 3.1)), a VAR model in levels[vi] of the data is set up and the appropriate maximum lag length (p) for the variables in VAR using Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) is determined. In case of both the textile sub-sectors the suggested lag length is 2 (refer Appendix 2). VAR thus constructed is tested for serial autocorrelation and dynamic stability (refer Appendix 2). For model to be dynamically stable, all the roots should be within the unit root circle. After ensuring that the constructed VAR is free for serial autocorrelation, one (i.e. maximum order of integration) additional lag is added to the equation. After this, the hypothesis that coefficients of Lnexports with p lagged values are zero is tested using standard Wald test. The same procedure is conducted for the coefficients of the lagged values of the other variables entering the VAR (Ln(K/L) in this case). Rejection of the null hypothesis implies rejection of Granger non-causality, i.e. causality exists. Table 4.3 presents the Granger non-causality test results for the sub sector 131 (Spinning, Weaving and finishing of textiles) and 139 (manufacture of other textiles).

Table 4.3: Granger Non-causality Test Results for Textile Industry Sub-sectors

Direction of Causality	Lag Length	131 (Spinning , Weaving and Finishing of Textiles	139 [Manufacture of Other Textiles]
		Chi-square Statistic	Chi-square Statistic
LnExports to LnEmp	2	**11.8596*** (0.00)**	**5.6438* (0.06)**
Ln(K/L) to LnEmp	2	**14.6056*** (0.00)**	4.0660 (0.13)
LnEmp to LnExports	2	1.2661 (0.53)	**4.9441* (0.08)**
Ln(K/L) to LnExports	2	3.3977 (0.18)	0.0365 (0.98)
LnEmp to Ln(K/L)	2	0.2101 (0.90)	2.1950 (0.33)
LnExports to Ln(K/L)	2	0.7347 (0.69)	4.2359 (0.12)

Source: Author's Estimates

*, **, and *** indicate the 10%, 5% and 1% level of significance.

Probability values in Parenthesis ( )

From the results of the Granger non-causality tests it is established that there exist uni-directional causality from Exports and capital-labour ratio to employment for the sub-sector 131 (spinning, weaving and finishing of textiles). However there is an evidence of bi-directional causality between exports and employment for the sub-sector 139 (Manufacture of other textiles). Since chi-square coefficient values for the causality moving from exports to employment and capital-labour ratio to employment are the only significant ones for sub-sector 131, the null hypothesis for granger non-causality from exports to employment is rejected and existence of causality from exports to employment is empirically verified. There is no evidence of existence of causality from employment to exports from the results of the Granger non-causality tests for sub-sector 131. Since for sub-sector 139 the null for non-causality from employment to exports is rejected, in order to estimate the long run employment-export elasticities for both textile industry sub-sectors Fully Modified OLS is used.

4.3. Fully Modified Ordinary Least Squares

FMOLS was originally designed by Phillips and Hansen (1990) to provide optimal estimates of cointegrating regressions. FM-OLS estimator produces asymptotically unbiased estimates of the long-run elasticities and efficient, normally distributed standard errors. In addition, the FM-OLS uses a semi-parametric correction for endogeneity and residual autocorrelation (Liddle, 2012). Phillips (1991) in his paper assumed a cointegrated model with two series X(t) and Y(t) and represented them as:

$$Y(t) = \alpha + \beta X(t) + \mu(t) \tag{5}$$

$$X(t) = \eta(t) \tag{6}$$

Both X(t) and Y(t) are I(1) and μ(t) is I(0) suggests that the OLS estimator of β is consistent, but not fully efficient in general. For such an estimator the asymptotic distribution is dependent on various parameters engendered by serial correlation in μ(t) and by correlation between μ(t) and innovation term for X(t).

Following is the representation for μ(t) by Phillips (1991),

$$\mu(t) = \sum_{j=-k}^{k} \delta(j)\, \eta(t-j) + \varepsilon(t) \tag{7}$$

The $\varepsilon(t)$in equation (7) is not correlated with $\eta(t-j)$. The cointegrating model in equation (5) can be augmented with the leads and lags of **Δ**X(t) to resolve the problem of cross correlation between μ(t) and η(t). By substituting (6) into (7), the FMOLS cointegration estimator can be expressed as

$$Y(t) = \alpha + \beta X(t) \sum_{j=-k}^{k} \delta(j)\, \Delta X(t-j) + \varepsilon(t) \tag{8}$$

Since $\varepsilon(t)$ is not correlated with η(t) it is also uncorrelated with **Δ**X(t) in equation (8). Thus **Δ**X(t) asymptotically eliminates the effect of endogeneity of X(t) on the distribution of OLS estimator of β (Singh, 2010). For precisely this reason, FMOLS technique is used to estimate the elasticity results. FM-OLS technique is widely used [see Amarawickrama & Hunt (2007); Bashier & Wahban (2013); Bashier & Siam (2014); Singh (2010); Inder & Silvapulle (1993) and others] to estimate the long run elasticities and is also used as a prime methodology to estimate the long-run employment-export estimates for textile industry sub-sectors.

4.4. FORECASTING

Along with empirically estimating the elasticities, the objective is to use the long-run employment-export elasticity estimates to forecast the employment till 2018 for both the textile sub-sectors at three digit level of NIC classification. For forecasting the employment figures a three-stage procedure is followed. Firstly, the data on exports is extrapolated using time series ARMA modeling technique. Secondly, the growth rate of exports for each textile sub-sector is calculated for the extrapolated years. Growth rate is then multiplied with the elasticities to obtain the percentage change in the employment for each sub-sector separately. The percentage changes are then used to get the employment figures for the period 2014 to 2018.

5. Empirical Results

Abovementioned fully modified OLS technique is used to estimate the long-run employment elasticities. All the pre-conditions for using the FMOLS methodology are satisfied. The pre-conditions include existence of cointegration among data series, existence of bi-directional causality and dynamic stability. The estimated long run elasticity results for both textile industry sub-sectors are displayed in table 5.1. These results are corrected for endogeneity and infer about the potential for employment generation in both textile sub-sectors. The estimated elasticity results are free from any serial autocorrelation and heteroscedasticity as displayed in the table 5.1 where test statistic for both LM test for serial autocorrelation and BPG test for heteroscedasticity is non-significant implying absolutely no presence of both in the data.

All the coefficients in the table 5.1 meet a-priory sign conditions which is positive for the employment-export elasticity and negative for capital-labor ratio. The dummy variables signifying policy change of MFA getting revoked in a phased manner also satisfy the a-priori sign expectations which is positive in both the cases.

For the sub-sector 131(Spinning, weaving and finishing of textiles) the employment-export elasticity coefficient is merely 0.076 implying an increase of 0.07 percentage points (approx.) for a percentage increase in exports. An argument which possibly can explain this result is the advancement in the technology of the industries which is displacing labour in order to make the exports price competitive. High capital-labour ratio corroborates the argument.

In case of sub-sector 139 (manufacture of other textiles) the elasticity coefficient is remarkably high in comparison to sub-sector 131. The employment-export elasticity coefficient is 0.624 implying an increase of 0.6 percentage points (approx.) for a percentage increase in exports of sub-sector 139. This sector includes manufacture of carpets, ropes, rugs, textiles with embroidery work which requires skills in not only producing the fabric but also designing and other areas. This is where labour is demanded in large numbers. The low coefficient for the capital- labour ratio corroborates this argument and this is one of the reasons this sub-sector has been employing at a large scale.

TABLE 5.1: Long-run Employment-export Elasticties

(Results of Regression Analysis (FMOLS) –Log (Emp) as Dependent Variable)

Textile Sub-sector / Independent Variables (in logs)	131 (Spinning, Weaving and Finishing of Textiles)	139 (Manufacture of Other Textiles)
$LogX_t$	0.0767** (0.0329)	0.6249*** (0.1777)
$LogE_{t-1}$	0.8340*** (0.0941)	0.4682*** (0.1354)
$Log(K/L)_t$	- 0.9057*** (0.0242)	- 0.4994*** (0.1720)
Constant	0.6688 (1.1700)	- 7.0839** (3.3553)
$D_{(1995)}$	0.0663* (0.0330)	0.5412*** (0.1784)
$D_{(2005)}$	0.0355 (0.0344)	0.0023 (0.1512)
N	26	26
R^2	0.77	0.87
LM test for Serial Autocorrelation (F stat)	1.308 [0.30]	0.034 [0.96]
BPG test for Heteroscedasticity (Obs-R^2)	18.92 [0.16]	8.809 [0.63]
Jaque-Bera test for Normality	0.706 [0.70]	2.212 [0.33]

Source: Author's Estimations

Note: standard errors are reported in brackets ( ) below the elasticity estimates.

Probabilities are displayed in Parenthesis [ ] below the test statistics.

* Significant at the .10 level; ** at the .05 level; *** at the .01 level.

Log = natural log.

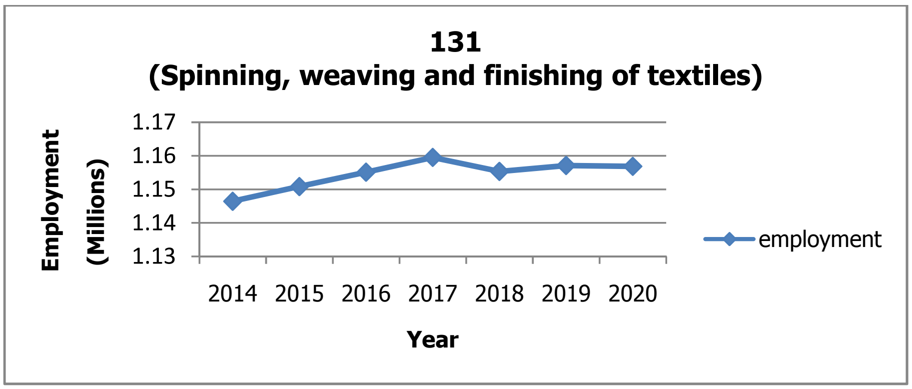
X_t= exports for the time period t. E_t = Employment in time period t. $(K/L)_t$ = capital-labour ratio in time period t. D(1995)= dummy variable for the period 1995. D(2005) = dummy variable for the period 2005.

The dummy variables $D_{(1995)}$ and $D_{(2005)}$ capture the impact of significant policy changes occurred during these two years. The empirical results displayed in table 5.1 clearly show a significant and positive impact of change in the trade policy for both textile industry sub-sectors. However, the impact is found to be significant only for the year 1995 when the first phase of replacing Multi-fiber agreement (MFA) with Agreement on textiles and Clothing (ATC) got initiated and not for the year 2005 when ATC came to fore in full force. This makes it clear that the policy which was initiated in order to expose the industry to competition by removing all the trade barriers has in fact benefitted the industry by increasing its employment potential.

6. Forecasting

The forecasting is done using the long-run employment-export elasticity estimates using the methodology mentioned above. Figure 6.1 shows the employment forecasts for the sub sector 131 (Spinning, weaving and finishing of textiles) for the period 2014-2020. The employment in this textile sub-sector shows a positive and increasing trend and reaches its peak in the year 2017. The employment sees a decline in the year 2018 but eventually accelerates. Despite the recovery, growth rate of employment is not that impressive through the forecasted period. The employment in this sub-sector crosses only 1.16 million mark in the year 2017 from 1.14 million in the year 2014.

Figure 6.1: Employment Forecasts for the Sub-sector 131



Source: Author

Figure 6.2 gives the employment forecasts for the textile sub-sector 139 i.e. manufacture of other textiles. Here as well the forecast show a rosy picture as far as employment growth is concerned. The employment in this sub-sector grows at an increasing rate with employment crossing the 0.3 million mark in 2018. The growth rate of employment in this sub-sector is quite remarkable. Clearly this sub-sector will have much more employment generation potential in comparison to sub-sector 131 in the coming years as suggested by the forecasting analysis.

Figure 6.2: Employment Forecasts for the Sub-sector 139

Source: Author

6. Conclusion and Policy Implications

Increasing the competitiveness of the industry ensures that the industry is able to fare well in exports. But increase in exports must not come at the cost of employment in the industry. The textile industry which is the second largest employer after agriculture is been absorbing a large chunk of rural population since independence. All the policies focusing on enhancing the competitiveness of the industry must also ensure that employment in the industry also increases proportionally. It was important to study the textile industry at a disaggregated level in order to decipher which sub-sector has the highest potential for job creation and which sub-sector is lagging behind. Even though the time period considered in this study is relatively small (26 years) and is one of the limitations of the study, the sign of the coefficients does meet a-priori assumptions.

From the results it is established that sub-sector 131 which is spinning, weaving and finishing of textiles has very low employment-export elasticity. The sub-sector 139 which is manufacture of other textiles is the sector which is generating the maximum employment over the years. The whole idea behind conducting the forecasting exercise was to make sure in advance that the sub-sectors which may lag behind in terms of employment generation are focused upon and are made competitive with right policy interventions. The forecasts for both the industries are showing increasing employment over the forecasted period. However, the rate of growth for the sub-sector 131(spinning, weaving and finishing of textiles) is not so impressive and thus it is important to come up with policy initiatives to strengthen the employment generation potential of this sub-sector. The major policy changes which can strengthen the employment generation potential of this sub-sector include adoption of labor-intensive production techniques which would lead to decline in the capital-labour ratio and increase in employment. There is a positive and significant impact of trade reforms in case of both the sub-sectors and thus liberalization in case of Indian textile industry is a welcome move. Thus making a mark in the international market by making the goods competitive should not mean the employment is compromised in any which way. The objective of employment generation has been at the heart of the India textile industry and must not be ignored.

Notes

[i] The National Industrial Classification (NIC) is an essential Statistical Standard for developing and maintaining comparable data base according to economic activities. Such classifications are frequently used in classifying the economically active population, statistics of industrial production and distribution, the different fields of labour statistics and other economic data such as national income. Comparability of statistics available from various sources, on different aspects of the economy, and usability of such data for economic analysis, are prerequisite for standardization of a system of classification.

[ii] The Harmonized Commodity Description and Coding System (HS) is an international commodity classification of export and import statistics developed by the World Customs Organization. Almost 200 Countries representing about 98 percent of World trade use the HS as a basis for the trade negotiations, collecting international trade statistics, and statistical and economic research and analysis

[iii] The Central Product Classification System developed and maintained by the United Nations is a complete product classification system covering both goods and services. The main purpose of the CPC is to provide a framework for the international comparison of statistics dealing with products and to serve as a guide for developing or revising the existing classification schemes for products in order to make them compatible with international standards. Each CPC goods product category is directly linked to one or more HS codes. CPC covers the production, intermediate and final consumption, capital formation and foreign trade or prices.

[iv] If the series is stationary at levels, the series is termed as integrated of order zero I(0). The number of times a series is differenced in order to make the series stationary determines the order of integration of a series. Suppose, the series turns stationary after first difference itself then the series will be integrated of order 1 and will be termed as I(1).

[v] Johansen Approach uses two statistic tests -Trace test and Max-Eigen value. The likelihood Ratio (LR) test is based on the trace statistic (λ trace) which tests the H_0: $r \leq q$ against H_1: $q = r$. The trace statistics is calculated such: λ_{trace} (r) = - T ∑ ln(1 - λi) where $\lambda_{r+i} + \ldots \lambda_n$, are the least value of eigenvectors (p - r). The second test is the maximal eigenvalue test (λ_{max}) which tests the H_0: there are r co-integrating vectors against the H_1: there are r +1 co-integrating vectors and is calculated as follows: $\lambda_{max}(r, r+1) = - T \ln(1 - \lambda_{r+1})$ (Johansen, 1988).

[vi] At "Levels" means that the data has not been differenced. The series may be in the original units or logarithms.

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Annexure 1: Matching between NIC-2008 and HS-2007 Classification Based on Central Product Classification Version-2

Table 1A: Concordance between NIC-2008 and HS-2007

NIC -2008		HS Classification-2007
131: Spinning, Weaving, and Finishing of Textiles	1311: Preparation and spinning of textile fibres	5002+510121+510129+510130+510310+5105+5203+530390+530121+ 530129+530130+530290+530500+5506+5507+5004+5006+510610+ 510710+510620+510720+5108+5109+5110+520+5205+520710+5206+ 5205+520710+5206+520790+5306+5307+5308+5401+5508+540261+ 540262+540263+540264+540265+540267+ 540268+540269+540341-49+5406+5509.11-.42+551110+5509.51-.99+551120+5510.20-90+551130
	1312: Weaving of textile fibres	5007+511111+511119+511211+511219+511120-90+5111220-90+5113+5309+5310+5311+5208+5209+5210+ 5211+5212+5407.10-30+540810+540741-74+540821-24, 540781-94+540831-34+5512+551611-14+5513+5514+551641-44+551513+551522+551631-34+551511+551512+551519+551521+551529+551591+551599+551621-24+551691-94+580121-26+580131-36+580110+580190+580211+580219+ 580220+5803+580230+701940-59
139: Manufacture of other textiles	1391: Manufacture of Knitted and Crocheted fabrics	6001+6002+6003+6004+6005+6006
	1392: Manufacture of made-up textile articles, except apparel	630120-90+6302+6303+3805+6304+6308+6305+6306+8804+ 940430+940490+6307
	1393: Manufacture of carpets and rugs	5701+5702+5703+5704+5705
	1394: Manufacture of cordage, rope, twine and netting	5607+5608+5609
	1399: Manufacture of other textiles n.e.c.	5806-5808+5804+5810+5602+5603+5601+5604+5605+5809+5606+5902+ 59001+5903+5907+5908-5911+5811

Source: Central Product Classification (Version 2)

Appendix 1

Derivation of Equation 1

The basic equation is $E_t^* = a + bQ_t + U_t$, which is combined with the Koyck - Nerlove model: $E_t - E_{t-1} = \beta(E_t^* - E_{t-1})$ to get equation one. E_t^* is the desired level of employment and β is the adjustment coefficient. After substituting E_t^* from the basic equation to the Koyck-Nerlove equation the final equation estimated by Lim (1976) is derived which is $E_t = a_0 + b_0 Q_t + c_0 E_{t-1} + V_t$. The steps to arrive at the final equation are as follows,

1) Calculate the value of E_t^* from Koyck – Nerlove equation which is

$$E_t - E_{t-1} = \beta(E_t^* - E_{t-1})$$

⇨ $E_t + E_{t-1}(\beta - 1) = \beta(E_t^*)$

⇨ $E_t + E_{t-1}(\beta - 1) / \beta = E_t^*$

Substitute for E_t^* in equation $E_t^* = a + bQ_t + U_t$,

⇨ $E_t + E_{t-1}(\beta - 1) / \beta = a + bQ_t + U_t$

⇨ $E_t + E_{t-1}(\beta - 1) = a\beta + b\beta Q_t + \beta U_t$

⇨ $E_t = a\beta + b\beta Q_t + E_{t-1}(1 - \beta) + \beta U_t$

⇨ $E_t = a_0 + b_0 Q_t + c_0 E_{t-1} + V_t$

$(a_0 = a\beta,\ b_0 = b\beta,\ c_0 = (1 - \beta),\ V_t = \beta U_t)$

The above equation is the final equation.

Appendix 2

TABLE 2A: Results for the Lag length Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LNEMP LNEXPORTS LN(K/L)
Exogenous variables: C D1995 D2005
Sample: 1988 2013
Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
Sub-sector 131: Spinning, Weaving and Finishing of Textiles						
0	28.55933	NA	3.41e-05	-1.778121	-1.331785	-1.672977
1	85.90473	83.41150*	4.37e-07	-6.173157	-5.280486*	-5.962871
2	97.14743	13.28683	**3.97e-07***	**-6.377039***	-5.038033	**-6.061610***
3	105.8253	7.888974	5.23e-07	-6.347755	-4.562413	-5.927182
4	114.5305	5.539691	8.91e-07	-6.320958	-4.089280	-5.795242
Sub-sector 132: Manufacture of Other Textiles						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	2.090146	NA	0.000378	0.628169	1.074504	0.733312
1	41.30281	57.03660*	2.52e-05	-2.118437	-1.225766	-1.908151
2	46.12319	5.696809	**4.11e-05***	-1.738472	**-0.399465***	**-1.423042***
3	62.22084	14.63423	2.76e-05	-2.383713	-0.598371	-1.963140
4	81.34149	12.16768	1.82e-05	-3.303772*	-1.072094	-2.778055

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Author's Estimates

Table 2B: Tests for Serial Autocorrelation

Breusch-Godfrey Serial Correlation LM Test			
Sub-Sector 131: Spinning Weaving and Finishing of textiles			
F-statistic	1.308	Prob. F(2,11)	0.30
Sub-sector 139: Manufacture of other textiles			
F-statistic	0.034	Prob. F(2,11)	0.96

Source: Author's Estimations

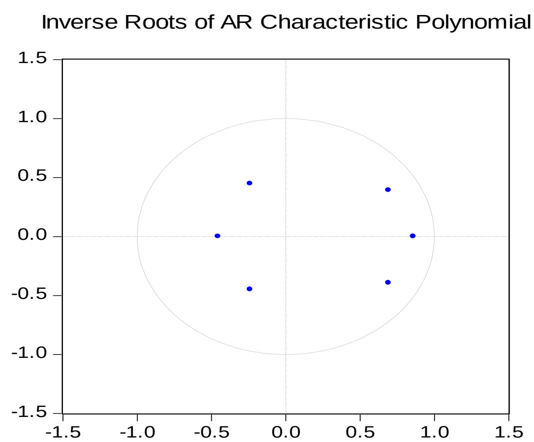
Table 2C: Test for Heteroscedasticity

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
Sub-Sector 131: Spinning Weaving and Finishing of textiles			
Obs. R^2	18.926	Prob. Chi-Square (14)	0.16
Sub-sector 139: Manufacture of other textiles			
Obs. R^2	0.623	Prob. Chi-Square (14)	0.77

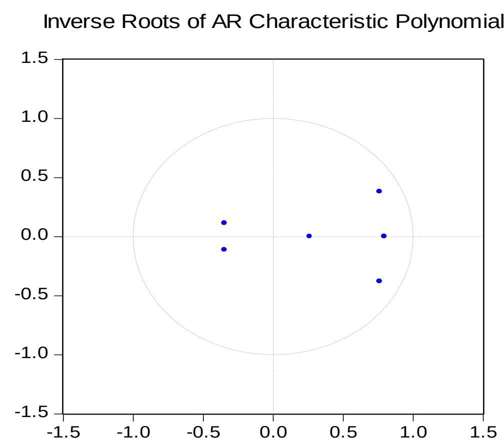
Source: Author's Estimations

Figure 2A: Results for Dynamic Stability

Sub-sector 131: Spinning, Weaving and finishing of textiles



Sub-sector 139: Manufacture of other textiles



Source: Author's Estimations

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