The Determinants of Employment in the Indian Textile Industry

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ABSTRACT

In the recent years, the Indian textile industry has been facing a recession in terms of both employment and output. Though the average rates of growth from 1980-81 to 1997-98 are positive for both output and capital, the growth rate of employment is negative. This indicates that the recession in textile industry has affected its employment more adversely than output and capital. Though there seems to exist substitutability between capital and labour, a fall in employment despite a rise in output is surprising. Thus, a systematic sector-wise study, with an inclusion of lagged effects of the variables as well as reforms and tariff structure, is required to investigate the factors that could determine the employment in the Indian textile industry.

In this paper, the lagged effects of capital, output shock, wages, past employment, trade regulation index, and the number of man-days have been studied for 32 sectors of the Indian textile industry from 1973 to 1999. Different variants of this dynamic panel data model show a positive effect of capital, past employment and output shock and a negative effect of previous period wages, while in most cases, the other factors are not significant. This study has used the DPD package of Ox Console for the regressions.

1 Introduction

In the recent years, the Indian textile industry has been facing a recession in terms of both employment and output. An overall glance at the figures in the table 1 would show that though the average rates of growth from 1980-81 to 1997-98 are positive for both output and capital, the growth rate of employment is negative. This indicates that the recession in textile industry has affected its employment more adversely than output and capital. It would seem from this that the texile industry has been characterised by a substitutability between capital and labour. Given the labour-intensive nature and unionised labour of this industry, entrepreuners might have had capital to substitute the labour. Even then, the absolute fall of 5 per cent per year in the employment when output has increased by 5 per cent per year is somewhat surprising. It could have been because of the heterogenity of the textile sector, which consists of different sub-sectors. Also, it could have been due to the changes in wages, productivity, degree of openness and the structure of the industry. The changes in productivity could be considered, as done in partial equilibrium studies for simplicity, as the results of deregulation and reforms that have been taking place in the past two decades.

Thus, a systematic sub-sector-wise study to capture the structure of the

Table 1: Average Annual Growth Rates in Indian Textile Industry

Variable	Growth Rate in percentage
Capital	8.11
Output	5.34
Employment	-5.167

sector, with an inclusion of lagged effects of the variables as well as reforms and degree of openness, is required to investigate the factors that could determine the employment in the Indian textile industry. This could be useful for the policy-makers dealing with the Indian textile industry, which is the motivation for the current study.

Section 2 presents a brief review of literature and theories relevant to this study. Section 3 discusses the data sources and variables. Section 4 elucidates the methodology adopted. Section 5 shows the results and explains them. In section 6, the various conclusions and policy implications of the study have been summarised. Section 6 also includes a list of possible extensions relevant to the current study that could be done in the future.

2 Literature Review

There have been quite a few papers, regarding the employment in the manufacturing sector, being published in international journals. Bhalhotra (1998) has empirically determined significant positive effects of capital stock, previous period's employment and output change, and negative effects of manhours and previous period wages on the employment, based on models formulated by different theories discussed below. The objective of this study has been to identify the significant effects of various factors other than capital and output so that the lower growth in employment despite a higher growth in these factors could be be explained by them. The existing literature attributes this phenomenon to job security legislation, unrecorded jobs that are not included in the employment data, flaws in data, and wage growth. Consistent with the basic model of employment determination shown in equation (1) , steady state model of employment determination as in equation (4) can be derived from the production function of equation (2) and price-setting behaviour given by equation (3).

$$N = l(K, E/PH, \sigma^e, A) \tag{1}$$

$$Y = Hf(A, N, K) \tag{2}$$
$$P(1 + 1/\eta) = E/f_N \tag{3}$$
$$N = g(K, A, v(\sigma^e)W)) \tag{4}$$

where N denotes workers, $l(.)$ is a function that incorporates lags of the arguments K is capital stock, E is nominal annual earnings per worker P is the price of the value added, H is the actual number of hours worked per worker σ^e is an index of expected cyclical demand and A is an index of technical progress. η is the product demand elasticity, W = E/PH, the real hourly earnings and f_N is the marginal product of an additional worker.

A glance at the theoretical literature would suggest that employment is, *ceteris paribus* , non-incerasing in wages and hours. The impact of capital stock is positive if if product demand elasticity is high enough to outweigh the negative effect due to the elasticity of substitution between capital and labour. Under CRS, the long-run coefficient of capital stock is unity. The markup is a function of σ^e. If countercyclical, a positive demand shock would reduce the mark up and hence the price rise, causing a rise in employment. Thus, the sign of effect of σ^e depends on the cyclical nature of markup. Labour-augmenting Technical progress reduces wages, thereby raising employment and increases labour efficiency, thereby reducing employment. Neutral or capital augmenting technical progress enhances employment. If the adjustment costs of employment are included in the profit maximand quadratically, then employment will depend on its first lag. The heterogenity among workers in different sub-sectors in terms of adjustment costs necessitates the inclusion of a second lag.

Chaudhury and Sheen (2003) have estimated the determinants of nominal wages, prices, employment and labour force by using a lagged four equations model across seven states of Australia. In this study, the employment change is found to be affected negatively by the first lag of real wage change and by the second lag of the nominal wage change and first lag in change in unemployment and second lag of oil prices. Only terms of trade, used as a proxy for external demand shock, positively affects the employment other than the price change, which is endogenous in this framework.

Rana, Mitra and Ramaswamy (2003) report a positive impact of trade liberalisation and degree of flexibility of labour regulations across states and sectors on the labour-demand elasticities in the Indian manufacturing sector. According to this study, the trade reforms of 1991 have positive effects on the labour demand elasticity directly and indirectly through those on impacts of degree of flexibility of labour regulations.

Ramaswamy (1996) has estimated a negative impact of the small factory growth on the labour productivity growth. Though this study has not directly analysed the effects of various factors on the employment, this has been facilitated by the estimation of their effects on labour productivity and an implicit assumption that labour productivity and employment are negatively related.

Arellano and Bond (1991) have presented specification tests for the GMM estimation of dynamic panel data. In this paper, a GMM estimation of a standard employment model gives reasonable and significant results. The GMM estimator is significantly more efficient than the IV and produces well-determined estimates in the dynamic panel data models. The two-step GMM estimators, despite being more efficient than their one-step counterparts, result in downward biased estimates of standard errors. This suggests that the two-step estimates could be reported along with one-step estimates of the standard errors.

System GMM (GMMSYS) estimator is determined as a weighted average of the standard GMM estimators of the level equations and the difference equations. Blundell and Bond (2000) has presented theoretical arguments as well as an empirical exercise to prove that the system GMM estimator, which relies on relatively mild restrictions on the initial condition process, is asymptotically more efficient than the standard GMM estimator, more so for highly autoregressive panel series. This finding has motivated me to use the system GMM estimation for this study.

Dertouzos and Pencavel (1980) have estimated a model of trade union behaviour, which supports their hypothesis that wage and employment are the results of the maximisation of the union's objective function constrained by the employer's labour demand function that is the trade-off between these two variables.

3 Data Sources and Description

For this study, 32 sub-sectors, as shown in the appendix, have been chosen for the textile industry and their three- digit aggregate national data were obtained from the Annual Survey of Industries (1973-2000). They were broadly classified under six groups, namely, cotton, wool, silk, jute, synthetics and others. Of these, 8 sub-sectors are in the cotton group, 4 are in wool group, 3 are in the silk group, 3 are in man-made fibres group, 6 in the jute group and 8 in the others. The dependent variable is the ln of employment in terms of total persons engaged in the sub-sector. The independent variables are productive capital stock deflated by the sub-sector-specific price index, change in output as a proxy for σ^e, wages per person engaged in production per year deflated by the sub-sector-specific price index. The data for price indices of different sub-sectors was collected from Chandok and The Policy Group (1990). All the variables are included with the logarithmic transformations. For the output shock, the change in the logarithm of the gross value of output is taken.

Apart from these variables, in different regressions, the total number of manhours per year for each sub-sector, time dummies, group dummies, sub-sector dummies and post-1991 dummies have also been included. To capture the effects of trade liberalisation, degree of openness for different sub-sectors for the period of analysis have been included by an interpolation of available data in Pandey (1991). The degree of openness are in terms of ratio of imports to the GDP, ratio of the sum of exports and imports to the GDP and the Trade Competitiveness Index (TCI). Apart from these, an average of the last two measures has also been tried as a proxy for degree of openness. Interaction dummies formed by the products of all these dummies and wages have been included in some specifications.

4 Methodology

Based on the theory explained in the section 2, many different regressions have been run using the OX console software. At this stage, it would be worthwhile examining the features in the DPD package of this software, which have prompted me to use it for the study. As for the System GMM estimation, no other software or package contains user-friendly function and options. This package, in addition to being the only option for the technique that I had chosen, has an added advantage of displaying various statistics such as Sargan's test, AR(1), AR(2) and Wald tests for the significance of time dummies as well as joint significance, which could be used for meaninful interpretations. Though most of these are available with other packages or could be programmed in a few softwares, the factors of flexibility and user-friendliness enable Ox Console's DPD to be unique for this purpose.

The simplest model with a static specification in this study is shown in the equation (5). In this equation, the subscripts g, i and t stand for group, sub-sector and year respectively. Different variants of all the models that have been specified in this section have been estimated by including and excluding one or more of the dummies for the group, sub-sector and year. These dummies are expected to capture the effects of technical progress, which has been indicated, in the theory discussed, to be an explanatory variable for employment. This model has been developed based on the theories reviewed in section 2.

$$logN_{git} = \alpha_0 + \alpha_1 logK_{git} + \alpha_2 dlogy_{git} + \alpha_3 logw_{git} + \phi_g + \psi_i + \theta_t \quad (5)$$

The dynamic specification, as shown in equation (6) includes two lags each of the dependent variables and all the independent variables, in addition to those specified in equation (5).

$$logN_{git} = \beta_0 + \sum_k \beta_{1k} logN_{gi(t-k)} + \sum_j \beta_{2j} logK_{gi(t-j)} + \sum_j \beta_{2j} dlogy_{gi(t-j)} + \sum_j \beta_{2j} logw_{gi(t-j)} + \phi_g + \psi_i + \theta_t \quad (6)$$

where k=1,2 and j=1,2.

Another specification shown in equation (7)includes one more explanatory variable, namely, logarithm of number of mandays per year, with the output replacing the capital stock in the equation (6). This is the output-constrained employment model. Some more variants of all these models are obtained by including the dummies for reforms, degree of openness and their interactions with other explanatory variables. The term logd is included in equation (6) and this equation is estimated to test if there is any significant effect of this variable in capital-constrained employment model too.

$$logN_{git} = \beta_0 + \sum_k \beta_{1k} logN_{gi(t-k)} + \sum_j \beta_{2j} logy_{gi(t-j)} + \sum_j \beta_{2j} dlogy_{gi(t-j)} + \sum_j \beta_{2j} logw_{gi(t-j)} + \sum_j \beta_{2j} logd_{gi(t-j)} + \phi_g + \psi_i + \theta_t \quad (7)$$

where k=1,2 and j=1,2.

The estimation techniques that were used in this study are LSDV method, GLS and MLE methods using Within, orthogonal and between transformations for the static specification, and standard GMM and system GMM estimation with one-step and two-step procedures for the lagged specification. All the estimated models are then examined for their validity using the specification tests and the models with the best specifications and reasonable results are chosen for interpretation. A few of these methods turned to be entirely irrelevant for some of the models and hence, were not attempted for them.

5 Results

For the static panel data model shown in equation (5), the random effects specification turned out to be better than the fixed effects and all co-efficients were significant in the random effects model, if the first difference transformation is used. In other specifications, one or both of the variables dlogyit and logwit have insignificant effects, as shown in table 2. In almost all cases, logwit has negative effect, consistent with the theory. The demand shock parameter dlogyit has positive effect, revealing a countercyclical markup. The capital stock logkit also has a positive effect, implying a complementarity between capital and labour. The group dummies and time dummies are jointly significant. Though the coefficients are significant and carry the reasonable signs, the static model is not appropriate since there is a significant first-order autocorrelation.

The table 2 shows the results of estimation of the lagged panel data using the capital constrained model, which is the equation (6). It shows the results for the basic model as well as its variants in terms of including and excluding the dummies, and other variables such as degree of opennesss, its interaction with wages, and log of mandays. In this table, the rows that are labelled as Time dummies, Group dummies and sub-sector dummies show the number of significant dummies of the respective kind in the equations corresponding to the columns. The estimates marked '*' are significant at 10 percent level of significance.

Table 2: The Results of the FD Estimation of Static Models

Variable	Only ψ_i,θ_t	Only ψ_i	Random Effects	Only ϕ_g
$logk_{it}$	0.2818*	0.292206*	0.30892*	0.301239*
$dlogy_{it}$	0.0500*	0.01847*	0.0656*	0.0698*
$logw_{it}$	-0.0328	0.0534	-0.09328*	-0.0834649
Constant	0.0093	-0.0785	0.000694*	0.00679*
Time dummies	1987(+)	nil	nil	nil
Group Dummies	nil	nil	nil	3
sub-sector dummies	13	14	nil	nil
Wald(Joint)	355.4	395.7	476.7	469
Wald(Time dummies)	241	nil	nil	nil
Wald(all dummies)	40.95	192	0.4732	29.49
AR(1)	-7.223*	-5.65*	-6.942*	-8.765*
AR(2)	0.1744*	-0.642*	-0.08808*	0.9979*
σ^2	0.0193	0.0195	0.0188	0.0189

The table 3 shows the results of estimation of the different variants of the capital-constrained employment model. Of all the combinations obtained by the inclusion and exclusion of various dummies, degree of openness, degree of openness-wage interaction and logd, the well-specified models with significant results have been shown. The second lags of lognit, logkit, dlogyit and logwit have been dropped, in addition to the current logwit, degree of openness-wage interaction term and first lags of all independent variables except logwit, due to their insignificance. An imposition of CRS to the model without including logd yields the lag of dependent variable a coefficient with magnitude greater than unity, which is invalid. In all cases, AR(2), which is the test statistic for second-order autocorrelation, is insignificant, validating the use of GMMSYS method for estimation. In no case does the Sargan test of over identifying restrictions reject the GMM instruments at 5 per cent LOS.

Under random effects, and when group dummies or individual dummies only are included to the basic model, all coefficients are significant. This might be due to the possible cancellation of time-specific, group-specific and sub-sector-specific effects when random-effects model is used. The significant time-specific effects and group-specific effects, when omitted, might have caused inconsistency of the estimation. Inclusion of logd causes all the lags to be insignificant. This appears to show the irrelevance of logd in the capital-constrained model as shown in Bhalhotra(1998).

The positive coefficient on $logn_{i(t-1)}$ shows that there is a rigidity in employment. The significant negative effect of the previous period wage shows that there is delayed negative effect of wage on employment and it becomes insignificant with an inclusion of the degree of openness in the model, which also causes the demand shock to be insignificant. This may be taken as an evidence for the importance of degree of openness in terms of its probable correlation with wages and demand shock, and more importantly, its endogeneity. A significant negative effect of degree of openness shows that the higher the openness, the lower is the employment. A significant positive effect of logd implies that the number of mandays needed per year enhances the employment.

On an average, capital has a LR elasticity of 0.9 and wage has one of -0.6. LRWE is considerably low when there are time and group dummies and with logd and degree of openness. While LRCE is also affected by inclusion of either or all of the dummies, it is considerably affected only in the presence of logd and tar. A joint significance of group ant time dummies indicates that there are significant group-specific and time-specific unobserved effects in the model.

In table 3 and 4, the columns are variants of equation 6 and 7 respectively.

Table 3: **Results of estimation of the Capital Constrained Model**

	1	2	3	4	5	6	7	8	9
$logn_{i,t-1}$	0.451*	0.451*	0.622*	0.527*	0.615*	0.638*	0.223	0.218*	0.243*
$Logk_{it}$	0.429*	0.429*	0.344*	0.338*	0.346*	0.344*	0.055	0.363	Nil
$Dlogy_{it}$	0.291	0.291	0.423*	0.353*	0.414*	0.439*	0.139	0.368	0.188
$logw_{i,t-1}$	-0.089	-0.09	-0.259*	-0.35*	-0.178	-0.218*	-0.170*	-0.113	-0.129
Logd	Nil	Nil	Nil	Nil	Nil	Nil	0.72	Nil	0.745*
openness							-0.177*		
Const	1.913*	1.913*	0.738*	1.117*	0.938*	0.770*	0.318*	0.318*	0.253*
No. of sig. θ_t	10	7	8	0	15	0	12	12	0
No. of sig. ψ_i	11	15	5	14	0	0	0	0	0
No. of sig ϕ_g	nil	4	Nil	0	0	4	4	4	0
Wald (Joint)	90.67	90.67	25840	229	2348	2404	14049	2625	6287
Wald (Time)	609	564.7	Nil	Nil	177.8			71.93	161
Wald (dummies)	101.4	101.4	37.03	11.36	150.5	7.039	585.9	283	2.791
Sargan	57.41*	56.92*	48.54*	73.29*	44.74	61.34	75.71*	66.61*	84.07*
AR(1)	-2.183*	-2.183*	-2.433*	-2.668*	-2.742*	-3.27*	-2.123	-1.892*	-2.214*
AR(2)	0.514	0.514	0.543	1.346	1.14	1.558	1.913	1.917	1.795*
Variance	0.02	0.02	0.03	0.02	0.03	0.027	0.006	0.009	0.007
LRWE	-0.162*	-0.162	-0.685*	-0.74*	-0.461	-0.604*	-0.071*	-0.464	-0.159*
LRCE	0.781*	0.781*	0.909*	0.715*	0.898*	0.950*	0.147*	0.577*	nil

Estimates with '*' are significant at 10 percent LOS. LRWE is long run wage elasticity, LRCE is long run capital elasticity and sig. is significant. The Table 4 shows the results of output-constrained model, in the same way as it has been done in the Table 3. In this case too, all the technical specifications including Wald, AR(2) and Sargan's test hold good, as in Table 2. Inclusion of the group and time dummies, ceterus paribus, enhances the effects of all variables except logyit. An interesting observation is that logd, when added to the model, renders the employment lag and output insignificant. This is true even when degree of openness is included, but not if wage-degree of openness interaction term is included. Thus, despite having no significant effect on employment, the interaction term is significant in terms of facilitating the significance of the other variables. A CRS specification was valid only with degree of openness being included and resulted in very low wage elasticity. On an average, output elasticity is around 0.95 and wage elasticity is around -0.3. Thus output-constrained employment model has strikingly low wage elasticity and output elasticity comparable to capital elasticity in the previous model. In the RE specification and the one with group and time-specific effects, all coefficients are significant. This appears to imply that sub-sector-specific dummies, though significant jointly, are not significant enough to cause considerable changes in the specification. In contrast with the capital-constrained model, degree of openness has a positive impact on the employment, showing that openness enhances employment.

Based on the different values of long run elasticities of employment to wage, capital and output and their average annual growth rates from 1980-81 to 1997-98, it can be seen in Table 5 that in both capital-constrained (CCEM) and output-constrained (OCEM) employment models, these are not the determinants that can entirely influence the employment. The contribution of wages to the average annual growth rate of employment was found out to be -7.5 % and -3.3 % points in CCEM and OCEM respectively, while those of capital and output were 4.4 % and 2.9 % points respectively. This reiterates the significance of the other variables including the unobserved heterogeneity captured by the intercept terms and output shock. In other words, this observation is exactly inline with the argument put forward in the introduction of this paper that these are not the factors that determine the employment in entirety.

6 Conclusion

In all the specifications and their variants considered in this study, some inferences could be drawn on the determinants of employment, without contradictions. The previous period wage has a negative effect on the employment, which falls in magnitude and significance when degree of openness and mandays are included. Thus, openness in the economy renders the employment less dependent on wage dynamics and the number of mandays worked might be capturing a part of the effect of wages.

The output demand shock has a positive effect on employment, indicating the counter cyclical nature of the markup in the Indian textile industry, implicitly hinting the existence of imperfect competition in this industry. The loss of significance of this term with inclusion of degree of openness supports the argument of neo-liberalists that openness enhances competition.

Table 4: **Results of estimation of the Output Constrained Model**

	1	2	3	4	5	6	7
lognit(-1)	0.662*	0.1854*	0.593*	0.206	0.1951	0.676*	0.2787*
Logyit	0.332*	0.1152*	0.397*	0.319*	0.1528*	0.319*	Nil
Dlogyit	0.406*	0.091*	0.378*	0.427	0.0936	0.4266*	0.215*
logwit(-1)	-0.195*	-0.262*	-0.327*	-0.189*	-0.2375*	-0.1886*	-0.1465*
Logd	Nil	0.1304*	Nil	0.041*	0.6551*	nil	0.0624*
Op	Nil	0.0982*	Nil	0.542	Nil	0.04051	0.7179
logwit*op (wo)	Nil	0.7006*	Nil	Nil	Nil	Nil	Nil
Constant	0.5693*	0.257*	0.502*	0.024*	0.3748	0.54202*	0.1822*
No. of θ_t s significant	4	7	Nil	15	12	12	0
No. of ψ_is significant	nil	15	nil	Nil	0	0	0
No. of ϕ_gs significant	1	4	nil	2	4	4	0
Wald (Joint)	5606	21000	5446	17000	14049	2625	26543
Wald (Time dummies)	217	nil	Nil	33.37	71.93	161	58
Wald (dummies)	652	2.793	2.604	482	585.9	283	455
Sargan	66.13	87.32	75.03	76.95	75.71	66.61	79
AR(1)	-2.048	-1.383*	-1.894*	-1.979*	-2.123	-1.892*	-2.709
AR(2)	1.724	1.143	1.541	1.614*	1.913	1.917	1.679
Variance	0.02	0.0202	0.0311	0.006	0.0062	0.0087	0.06
LRWE	-0.3292*	-0.288*	-0.526*	-0.329*	-0.2620*	-0.3288*	-0.1866*
LROE	0.9833*	0.1414*	0.974*	0.401*	0.1891*	0.9843*	Nil

Table 5: **Estimates of the average annual growth rate of employment based on long-run elasticities**

S.no	Model	Estimated rate (%)	Actual rate (%)	Contribution of wage (in % points)	Contribution of of capital or output	Bias
1	CCEM	-2.843	-5.167	-7.5	4.4	+2.324
2	OCEM	-1.241	-5.167	-3.3	2.9	+3.926

The positive effect of capital stock is significant in all estimated models, supporting the hypothesis that the elasticity of substitution between capital and labour in the textile industry is too small to counter the product demand elasticity. The employment lag has a positive effect, indicating the existence of employment rigidity, falling with degree of openness since it becomes insignificant if degree of openness is included. This appears to imply that, ceterus paribus, employment becomes more flexible in a more open economy, adding one more supporting point to the neo-liberalists.

In most of the models, the group- and time-specific dummies have significant effects not only jointly, but also on the magnitude and significance of the coefficients of the explanatory variables. Cotton sub-sector has the largest positive value for group dummy (ψ_g not reported in the tables), while wool sub-sector has the only other significant value, being the second largest one. Other sub-sectors do not have significant value for group dummy. The policy implication of this observation would be that any attempt in increasing the employment in textile industry should focus more on these two sub-sectors than the others. Moreover, significantly negative time-specific effects in the early 1980s and the early 1990s indicate that deregulation and trade liberalisation have had negative effects on employment in textile industry.

The effect of degree of openness of the economy is negative in capital-constrained employment model and positive in the output-constrained employment model. However, in both cases, the long run employment elasticities with respect to wage, capital and output fall considerably in magnitude. Thus, though the direct effect of degree of openness is ambiguous and depends on the specification, its indirect effect is to reduce these elasticities, which means that a greater degree of openness would lead to a reduced dependence of employment on wages, capital and output. To the extent that capital-constrained model is better specified than the latter, the direct effect of a greater degree of openness is to reduce the employment, probably due to increased mechanisation necessitated by a greater participation in the world markets. The positive direct effect of degree of openness in the output-constrained model might be due to the increase in labour demand due to the higher productivity and hence output resulting from the greater degree of openness. Hence, stability can be enforced in the employment by opting for policies that are based on trade liberalisation.

A more comprehensive study would be done in future, incorporating the state-wise heterogeneity in terms of unobserved effects as well as some interesting observed effects such as those of flexibility in labour regulations, as in Rana, Mitra and Ramaswamy (2003). Capturing the effects of the trade unions on the employment might give interesting implications for textile industry since the unions, being very prominent in the Indian textile industry, target at maximising the wage bill in spite of its employment-reducing effects.

Another important extension could be an analysis similar to the one done for Australian labour markets in Chaudhury and Sheen (2003), in which wages, prices, employment and labour force are estimated in a four-equation dynamic panel data framework. This would give a complete picture of the labour market of the Indian textile industry.

The ambiguity in the effects of degree of openness structure, as seen in this study, might be due to the fact that the trade in textile industry is largely dependent on the MFA quotas and hence, any measure of openness might not be satisfactory due to the quota restrictions. In this context, an analysis that internalises the quota restrictions by including the quota utilisation rates as a measure for degree of openness a similar measure would be appropriate.

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APPENDIX: LIST OF SUB-SECTORS

1. Cotton :

1. Cotton ginning, cleaning and bailing
2. Cotton spinning other than in mills (charkha)
3. Weaving and finishing of cotton khadi
4. Weaving and finishing of cotton textiles on handlooms
5. Weaving and finishing of cotton textiles on powerloom
6. Cotton spinning, weaving and processing in mills
7. Bleaching, dyeing and printing of cotton textiles
8. Cotton textiles n.e.c.

2. Wool:

1. Preparation of raw wool, silk and artificial/synthetic textile fibres for spinning
2. Wool spinning, weaving and finishing other than in mills
3. Wool spinning, weaving and processing in mills
4. Bleaching and dyeing of woollen textiles

3. Silk:

1. Spinning, weaving and processing of silk textiles in mills
2. Bleaching, dyeing and printing of silk textiles

4. Synthetics:

1. Spinning, weaving and processing of man-made textile fibres
2. Bleaching, dyeing and printing of artificial/synthetic textile fabrics

5. Vegetable fibres:

1. Jute and mesta pressing and baling
2. Preparatory operations on sannhemp and other vegetable fibres
3. Spinning, weaving and finishing of jute and mesta textiles
4. Spinning, weaving and finishing of coir textiles
5. Bleaching, dyeing and printing of jute and mesta textiles
6. Manufacture of floor covering of jute, mesta, sannhemp and others

6. Others

1. Manufacture of knitted or crocheted textile products
2. Manufacture of all types of threads, cordage, ropes, twines and nets
3. Embroidery work, zari work and making ornamental trimmings
4. Making of blankets, shawls, carpets, rugs and other similar products
5. Manufacture of all types of textile garments and clothing
6. Manufacture of rain coats,caps and bags from waterproof textiles
7. Manufacture of made up textile articles; except apparel
8. Manufacture of waterproof textiles fabrics
9. Manufacture of textile/textile products like linoleum, padding, etc
10. Manufacture of industrial machinery for food and textile industry