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How do Wages and Employment Adjust to Trade Liberalization? A Case Study of Pakistan

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Abstract

This paper examines the impact of trade liberalization on employment and wages in Pakistan's manufacturing industries using a panel data set for the period 1970-71 to 2005-06. This research work is one of the pioneering studies in Pakistan, in particular in the context of bringing in labor market regulations and rigidities in the model for investigating the impact of trade on employment and wages. In order to examine the impact of trade liberalization on employment and wages, the empirical analysis is accomplished in the context of two different labor markets (flexible as well as rigid labor markets). The study uses two different measures of liberalization; exports plus imports over value added and average tariff rate. Empirical results show that if labor markets are flexible, trade liberalization (exports plus imports over value added) tends to have negative effect on employment but positive effect on real wages, however, if the alternative measure of liberalization (average tariff rate) is used it has positive effect both on employment and wages. On the other hand, when labor market regulations and rigidities are incorporated in the employment and wage equations, both measures of liberalization, exports plus imports over value added as well as average tariff rate, have positive effect on employment and real wages.

Key Words: Employment, wages, trade liberalization.

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1. Introduction

In 1990s, after dacades of inward oriented strategy, Pakistan under the strucural adjustment program, initiated a thorough liberalization of the economy. Reforms in the area of trade were one of the key instruments of structural adjustment program as the country lagged behind in comptitiveness and efficiency because of the past import substitution policies. The momentum of trade liberalization is appararent from appendix 1A.

The trend in average tariff rate shows that it has been quite smooth and uniterrupted. The government not only reduced tariff rates but also replaced most of the non-tariff barriers with tariffs. During the period 1986-87 to 1997-98, the maximum tariffs were reduced from 225 percent to 45 percent (Khan, 1998). In order to more suitably cascade the tariff structure, the earlier para tariffs were merged into statutory tariff regimes and most of the items are now importable with the exception of items prohibited on account of religious, health as well as security considerations.

Adjustment to the increased trade liberalization required a considerable reallocation of resources between different sectors of the economy of Pakistan i.e. it could be in the form of changes in real wages or employment. Industry wise growth rates of real wages and employment show an interesting adjustment pattern in the post liberalization period as shown in Appendix 2A and 3A. It shows that a rise or fall in real wages is accompanied by a simultanous fall or rise in employment. In most sectors of the economy, when the industry experienced an increase in real wages, it was accompanied by a decrease in employment level in the same sector or industry. However, compared to real wages in each industry establishment, the reduction in employment is more apparent than that of real wages. More possibly indicating wage rigidity in Pakistan.[1]

[1] Downward rigidity makes employer reduce their labor demand in the face of increasing competition in the market. Furthermore, in the presence of insider outsider models and trade unions, workers most likely influence wages for the already employed workers making the employers reluctant from increasing their labor demand.

For example during 1990-91 to 2005-06 (the liberaization period), food, tobacco and beverage industry experienced a negative growth in employment, whereas during the same time period, there is a positive growth in their real wages. In the same manner, textile, wearing apparel and leather industry show a negative growth in employment accompanied by a positive growth in employment in these industries during the same period. This pattern of adjustment either through employment or wages can be found for different industries. As far as the growth in employment and real wages is concerned, it shows no clear cut pattern rather an erratic trend is found after the liberalization episode of 1990s.

In a labor surplus economy like Pakistan, there remains a dilema between the desire to raise real wages or to raise the employment and cut into the surplus labor. Understanding how adjustment occurred at this level -- whether there was a trade off between employment and wage responses, is the key objective this study attempts to resolve.

2. Trade and Labor Market Rigidity

The traditional trade model of Hecksher-Ohlin model (HO) is used to understand the link between trade and labor market linkages. It is based on some strict assumptions that predict gains from liberalization for the relatively abundant factor. The traditional trade model assumes flexible labor markets with labor as the mobile factor across sectors. In the real world, most of the assumptions may not hold. In particular, in the presence of labor market rigidity, the demand and supply forces may not work properly and wages may remain higher than the market clearing wages. As a result there may be unemployment or under-employment in the labor market.

If labor markets are rigid and wages cannot move freely in response to labor demand shocks (consider trade shock), it may result in a reduction in output at least for some time. In case of flexible labor markets, real wages in the import competing sector should decline; pushing labor costs down across the economy and thus makes the exports more competitive. However, if

wages are downward rigid then "the import-competing sectors could be forced to shed more labor than is warranted whereas; the exports would remain uncompetitive". As a result, the adjustment and reallocation would take much longer than with a flexible labor market and may result either in increase in employment or under-employment (Forteza and Rama, 2006).

In developing countries, in particular, the formal sector of the economy is usually regulated by the government. These regulations include job security, minimum wages, collective bargaining and mandated contribution to social funds. These labor market regulations although are considered to protect the workers and increase their bargaining power, yet most of the economists agree that these labor market regulations impede or otherwise slow the adjustment process and therefore, attenuate the beneficial effects of trade for workers. Wage rigidities also tend to be the result of efficiency wage models. Workers are paid wages above the equilibrium level by firms in order to minimize turn over costs such as training, recruitment, hiring and firing costs. Trade liberalization need not erode such kind of wage rigidities, instead trade induced competitiveness and efficiency should reduce these costs.

This paper makes a contribution to the literature by bringing forth the role of labor market rigidity/ flexibility into play when discussing the impact of trade liberalization on wages and employment in Pakistan's manufacturing sector. Furthermore, unlike the other studies related to Pakistan that focus on the impact of trade on employment or wages only, this study focuses on the impact of trade liberalization both on employment and wages. Simultaneous examination of trade on both employment and real wages is supposed to let us know about the adjustment that labor markets may have undergone either through wages or employment.

3. Empirical Evidence

In the last ten years literature on the relationship between free trade, wages, and employment has expanded a great deal and it is not easy to give

complete account of all the contributions. There is a vast research accomplished, mainly in the developed and developing countries regarding the relationship of trade, employment and wages but conclusions are rather sharply divided in different countries i.e. some studies report positive effect of trade on employment and wages while others report negative effect of trade on employment and wages (Krugman (2008), Leamer (1998) Feenstra and Hanson (2001) & Hanson and Harrison (1999)). On the other hand, some of the recent studies question the assumptions and predictions of traditional trade models in explaining changes in wages and employment. This study focuses in particular, on studies examining the impact of trade on wages and employment in the context of developing countries. Most of the studies are related to Latin American countries.

In this regard, an important study examining the impact of trade liberalization on employment in Latin American countries show some inconclusive findings. It is shown that unemployment increased in some industries, while at the same time it declined in other industries. However, "by and large liberalization attempts have not incurred significant transition costs by way of unemployment" (Michaely, Papageorgiou and Choski, 1991). Similar results also have been reported by (Corbo et al., 1986) for the Southern cone of Latin America. Rama (1994) investigates the impact of trade liberalization on employment and wages in Uruguayan manufacturing. It is shown that employment declined while wages remained unaffected as a result of trade liberalization. Similarly, a study by Revenga (1997) shows that tariff reduction in Mexican manufacturing resulted in decline in employment but increase in wages during 1985-88. The study also reports that across industries composition of employment increased because of increased liberalization.

A comprehensive study by Milner and Wright (1998) examining the impact of trade on employment and wages in Mauritius---an industrializing economy of the Africa, reports that employment in the exportable sector increased in the short as well as in the long run, however wages declined in the short run but increased in the long run. They attribute the reduced wages

in the short run to the increasing labor supply shift from import oriented sectors to the export sector, whereas in the long run because of the derived demand, wages tend to rise. Furthermore, the study also shows that both employment and wages rose in the importable sector both in the short and in the long run. Similarly, Kambhampati, Kambampati, Krishna, and Mitra (1997) using firm level data from India report positive effect of trade on employment in India.

Other than the direct effects of trade on employment and wages, some studies discuss the assumptions and predictions of traditional trade models in explaining the impact of trade on employment and wages. For example, Grossman and Rossi-Hansberg (2008) provide some explanations as to why the effect of trade on wages is not in conformity with the Stolper-Samuelson theorem (SS theorem). They show that trade affect wages through different channels, such as through the price effect (the one which has been predicted by the traditional SS theorem), the labor supply effect working through changes in specialization that results in labor displacement and also the technological affect that tends to raise returns to factors used intensively in the imports sector. In other words, a rise in return to factors indicates that the domestic factors work as a complement rather than as substitutes.

A study by Edwards and Lawrence (2010) question the assumption of HO/SS framework ---that the good which is produced domestically is also imported. The study shows this assumption is often violated and results in divergence of predictions of the model. Amiti and Davis (2008) link the labor market outcome with the degree of openness. They come up with the findings that tariff reduction on output tends to decrease wages in firms that are domestic oriented while it raises wages in export oriented firms. On the other hand, tariff reduction on inputs has no effect on firms that do not import but it has a positive effect on firms that import. Hence the degree of openness plays a role in determining the wage impact of trade.

Similarly, Mishra and Kumar (2005) investigate the link between trade liberalization and wage inequality in Indian manufacturing industries. They

come up with the conclusion that wages declined in the sector where there was high protection and increased in the sectors that experienced large tariff reduction. Trade liberalization has resulted in productivity change which helped increase wages in the industry. Some studies bring the concept of labor market regulations such as Edwards and Edwards (1994) show that the favorable impact of trade on labor markets is dependent upon labor market regulations. They show that trade tends to have more favorable effects on labor, where labor market regulations are less imposing on the ability of wages and employment to adjust in response to change in demand and supply situations.

4. Empirical Model

To investigate the impact of trade liberalization and labor market rigidity on wages and employment, this study estimates reduced form equations for employment and wages using data from Pakistan. The employment and wage equations are of the following form:

$$\ln N_{it} = \theta_0 + \theta_1 \ln W_{it} + \theta_2 \ln N_{it-1} + \theta_3 \ln Y_{it} + \theta_4 \ln Z_{it} + \theta_5 \ln(1+ ILO)_{it} + \theta_6 (Rig * Z)_{it} + \theta_7 V_{it} + \mu_{it} + \eta_{it} \quad (1)$$

and

$$\ln W_{it} = \theta_0 + \theta_1 \ln N_{it} + \theta_2 \ln W_{it-1} + \theta_3 \ln Y_{it} + \theta_4 \ln Z_{it} + \theta_5 \ln(1 + ILO)_{it} + \theta_6 (Rig * Z)_{it} + \theta_7 V_{it} + \mu_{it} + \eta_{it} \quad (2)$$

Where N, W and Y represent total employment, average real wages and output in industry i and time t, wherever t=1, 2….T. Z represent liberalization i.e. exports plus imports divided by value per industry and average tariff rate as well. The number of International Labor Organization (ILO) conventions ratified by Pakistan is represented by ILO. The term ln (1+ ILO) is used in order to deal with observations for which the number of ILO conventions is equal to zero. “Rig” represents rigidity index interacted with liberalization variable. V denotes a vector of variables that affect labor demand such as exports, imports and time trend, all used as a proxy for

technology. θ_0 is the intercept, while θ_1, θ_2 , θ_3 and θ_4, θ_4 θ_5 θ_6 and θ_7 are other unknown parameters to be estimated. Whereas μ_{it} and η_{it} represent error terms that pick up random measurement errors in employment and wages respectively.

5. Estimation Procedure

To examine the impact of trade liberalization and labor market regulations on wages and employment, this study separately estimates employment and wage equations. Hamermesh (1986) shows that some of the regressors actually may be endogenous and there may be the possibility of endogeneity in estimating employment and wage equations. In case of endogenity, the least-squares parameter estimates are inconsistent (Greene, 2000).

Secondly, both demand for and supply of labor depends on wages, this raises the identification problem in estimating employment and wage equations. Hamermesh (1993) shows that in case of identification problem, one is not sure which combination of labor-demand as well as labor-supply elasticities can be achieved by regressing labor quantities on wages. To overcome this problem, Slaughter (1997) and Greenaway et.al (1999) assume that labor supplies are perfectly elastic[2]. Thus labor demand can be identified or traced out by the labor supply shift, measured as movement in wages. The coefficient of relative wage in the estimated labor equation may be considered as elasticity of labor demand.

For estimation purpose, Generalized Method of Moments (GMM) has been used to account for endogeneity in estimation of employment and wage equations. The application of GMM approach is appropriate for the type of data that involve dynamic adjustment such as wages and employment. The GMM estimator introduced by Arellano and Bond has the characteristic that

[2] This assumption is much realistic, especially in developing countries like Pakistan where there is abundant low skilled labour. For firms, there are many workers available, if one does not want to work at the specific wage level, the other is ready to do it.

it exploits all available linear orthogonality conditions. It is an instrumental variable approach followed to estimate wage and employment equations with the instruments optimally weighted by the expected variance-covariance matrix of the orthogonality conditions, as required by an optimal GMM estimator (Riihimaki, 2005).

6. Data

The data set consists of a panel of time series data covering a period of 1970-71 to 2005-06 and a cross section of 18 large scale manufacturing industries at 3-digit level of Pakistan Standard Industrial Classification (PSIC). Data is used with a gap of 5 years as continuous time series data were not available on regular basis.

The data on output, wages, and employment is collected from various issues of Census of Manufacturing Industries (CMI) published by the Federal Bureau of Statistics (FBS). The data on industry-wise exports and imports are taken from the Federal Bureau of Statistics publication, "The 50 Years of Pakistan in Statistics (FBS)". The data on import duties is taken from various issues of CBR Year book published by the Federal Board of Revenue (FBR). As a proxy for liberalization, two measures are used in the study; the share of imports plus exports over value added per industry and average tariff rate which is constructed as import duty divided by the volume of imports.

Value of output (Y) is converted into real values by deflating it with the whole sale manufacturing price index. The variable representing wages (W) is constructed as employment cost divided by total number of employees and is converted into real wages by deflating it with the consumer price index (CPI). As part of the data analysis, an examination of the correlation between variables is presented in Table-1 below. This is to get some preliminary view regarding the type of association that prevails among the variables. The correlation results show that employment is correlated positively with output, imports, exports, and ILO conventions whereas; it is correlated negatively with wages, openness, and average tariff rate. On the other hand, wages are

correlated positively with output, imports, exports, and ILO conventions but it has a negative relationship with openness and average tariff rate.

Table 1
Correlation Matrix

Variables	Employment	Wages
Real production	0.58	0.84
Employment	1.00	-0.82
Wages	-0.82	1.00
Imports	0.03	0.18
Exports	0.85	0.93
Openness	-0.11	-0.10
Average tariff rate	-0.09	-0.07
ILO Conventions	0.02	0.32

7. Maximum and Minimum Values of Key Variables

Maximum and minimum values of the variables are reported in Table-2[3] that provides some interesting insights regarding individual industries. Maximum values show that the most protected industries were the electrical goods followed by paper, printing and wood industries. Similarly, machinery industry is highly protected followed by beverages and transport industries. The minimum values show that the least protected industry was wearing apparel industry followed by rubber industry, textile, and chemical industries.

Minimum value of employment variable indicates that petroleum and coal industry is the least labor intensive compared to other industries. On the other hand, textile industry is more labor intensive i.e. a major employment

[3] To work out descriptive statistics of all the variables for each industry in panel data, it is necessary to take the average of a particular variable over the years; otherwise, an industry may have more wages, employment, exports, and imports etc for a particular year. And on the basis of that single year one cannot determine the status of an industry regarding the maximum and minimum. Therefore, the values for the variable used in summary statistics are first taken as average values, and then afterwards descriptive statistics have been sorted out.

creating sector. As far as real wages are concerned, drugs, and medicine industry is the highest paying industry compared to paper, printing and wood industry which is the least paying industry on the average.

Table 2
Descriptive Statistics of Key Variables

Variable	Mean	Standard Deviation	Median	Maxima	Minima
Employment	29.7	53.4	15.1	225.1	1.34
Wages	1129.5	1446.4	748.3	6442.3	141.4
Value of production	17162.2	22951.0	10296.2	95144.7	1746.1
Value added	5686.0	6323.0	3606.1	26732.6	653.2
Imports	21.6	18.8	12.7	77.0	5.4
Export	796.7	938.5	557.0	3704.5	26.3
Average tariff rate	1.8	2.6	0.5	10.4	0.1

Source: Calculated by Author

In terms of export orientation, textile sector is a major export oriented industry, while iron and steel industry is the least export oriented industry. Measured by their import content, petroleum industry ranks the highest import oriented industry, whereas tobacco industry ranks the lowest.

8. Measures of Labor Market Rigidity

It is a complex task to introduce variables reflecting the nature of labor market regulations over time. However, according to (Forteza and Rama, 2000) different labor market regulations can be used as a good measure of rigidity if coded appropriately. In this regard, the number of ILO[4] conventions ratified and enforced in a country at any given point in time can be used as one of the indicators reflecting labor market regulations.

[4] Founded in 1919, ILO is the main international body which is concerned with the implementation and monitoring of labour standards. Through a tripartite organizational structure, composed of representatives of labour, business, and governments, the ILO has prepared and promoted over 180 Conventions covering the conditions and terms under which labour is employed.

ILO conventions are related to terms and conditions of employment and issues like safety of working conditions, discrimination in employment, child labor, the right to collective bargaining , minimum wages etc. These conventions become legally obligatory for a country when it is ratified by it. Thus, labor markets of a particular country are considered to be regulated, once they have ratified these conventions.

The number of ILO convention ratifications, therefore is an indicator used to determine the nature of rigidity of a country's labor market.[5] From the standard neoclassical perspective, a country with more (less) ratifications may be considered as having more rigid (flexible) labor markets. However, there are some issues in using ILO conventions as a measure or indicator of rigidity / flexibility of labor markets; since, ILO does not have the power to enforce these conventions, therefore it is also possible that a convention may be ratified by a country but not enforced.

Secondly, not all conventions may be equally relevant to the issue of labor market flexibility / rigidity. It is also possible that a country may not have ratified a specific convention still it may comply with it according to the policy of a country. To take into account the enforcement issues, Rodrik (1996), Rama and Forteza (2000) attempt to adjust the number of ILO conventions ratified by interacting them with an appropriate indicator of civil liberties and political rights. It is a composite indicator that is formed with a formula: [14-(Civil Liberties + Political Rights)]/14 (See Rodrik, 1996 for details). The indicators of civil liberties and political rights range from 1 (maximum rights) to 7 (minimum rights). This study also uses an alternative labor market rigidity index introduced by Rama and Forteza (2000) that is based on averaging the information on minimum wages, mandated benefits, trade unions, and government employment. The rigidity index based on this information is normalized which ranges from 0 (maximum flexibility) to 1 (maximum rigidity). Since this rigidity indictor is country specific rather than country *and* year specific, indicating that this variable cannot be used

[5] Sometimes, the previous conventions are denounced by the country, thus in obtaining information about these numbers, this phenomenon is taken into account.

separately, rather it needs to be accompanied by another independent variable which in our case is the liberalization variable.[6]

9. Results

The empirical results presented in Appendix 5A are based on the estimation of equations (1) and (2) described above. The dependent variable in equation (1) is annual employment measured as number of workers employed. The independent variables include average real wages, real output, variables of trade liberalization measured as exports plus imports over value added per industry and average tariff rate measured as import duties divided by value of imports. Furthermore, independent variables also include time trend used as a proxy for technology and labor market rigidity variables that include (i) the number of ILO convention ratifications (ii) labor market rigidity indicator based on minimum wages, mandated benefits, labor market unions, and government employment. In addition, lagged employment and lagged real wages, are also included among the right-hand side variables of employment and real wage equations for allowing the possibility of slow employment adjustment.

The empirical analysis is carried out with two different labor market assumptions; rigid as well as flexible labor markets. Regression results reported in equation (1) and (2) in Appendix 5A show estimation results of employment equation with the assumption that labor markets are flexible with two different measures of trade liberalization; exports plus imports divided by value added and average tariff rate.

As far as equation (1) is concerned, it shows that trade liberalization (exports plus imports divided by value added) has significant negative effect

[6] The rigidity indicator used by Forteza and Rama is taken as an average of individual indicators such as minimum wages, mandated benefits, trade unions, and government employment. The average of these indicators is normalized that ranges between 0 and 1. All of these individual indicators tend to limit the flexibility of labor markets. Forteza and Rama estimate the value as 0.28 for Pakistan indicating low degree of rigidity in Pakistan according to this rigidity measure.

on employment. The coefficient on wage rate in the employment equation is negative and significant. The impact of lagged employment is significantly positive on current level of employment whereas time trend used as proxy for technology has a significant positive effect on employment. Similarly, the impact of real output is positive but insignificant on employment.

Equation (2) shows the employment equation estimations with the assumption of flexible labor markets using average tariff rate as a measure of liberalization. It shows that reduction in average tariff rate tend to increase the employment level. In other words, trade liberalization (average tariff rate) has positive impact on employment. Other independent variables do have signs consistent with the theory such as real wages have negative effect on employment while lagged employment as well as real output have a positive effect on employment. Imports tend to have a negative effect on employment, whereas exports have a positive effect. It is interesting to mention that the coefficient of exports is larger than the coefficient of imports indicating that the employment creating effect of exports tend to offset the job displacement effect of imports.

Equations (3) and (4), in Appendix 5A, report regression results for the employment equation incorporating labor market rigidity in the model. Unlike equation 1, equation 3 shows that when we include indicators of labor market rigidity in the employment equation, trade liberalization (exports plus imports divided by value added) has a significant positive effect on employment. However, the labor market rigidity indicators have differential effect on employment. The number of ILO conventions have a significant positive effect on employment but on the other hand, labor market rigidity index interacted with liberalization has a significant negative effect on employment. Other variables have signs according to what the theory suggests. Real wages have a significant negative effect while real output and lag of employment has a positive effect on employment although the effect of real output is insignificant.

Equation (4) shows the impact of trade liberalization (average tariff rate)

on employment while incorporating labor market rigidity in the model. It shows that reduction in average tariff rate tends to have a positive effect on employment but its impact is insignificant. Inclusion of rigidity variable in the employment equation tends to slacken the positive effect of trade liberalization (average tariff rate) on employment as compared to equation 2. Real wages and real output have signs according to the theory i.e. real wages have a negative effect while output has a positive effect on employment. Again labor market rigidity indicators have differential effect on employment. However, contrary to equation 3, equation 4 show number of ILO conventions have a significant negative effect on employment while labor market rigidity index interacted with liberalization has a significant positive effect on employment. Imports and exports both have a negative effect but the impact of imports is significant. On the other hand, lagged employment as well as technology has a significant positive effect on current level of employment.

Just like the employment equations estimated above, the regression results reported in equation 5 and 6 in Appendix 6A show the impact of trade liberalization on wages with the assumption that labor markets are flexible. Equation 5 shows that trade liberalization (exports plus imports divided by value added) has a significant positive effect on real wages. The coefficient on employment is negative and significant. The lagged wage variable has a significant positive impact on current level of wage rate whereas time trend used as proxy for technology has a significant positive effect on it. Real output also has significant positive effect on wages.

As far as equation 6 is concerned it shows that trade liberalization (average tariff rate) also tend to have a positive effect on real wages. Other independent variables have signs that are in accordance with the theory. Such as lagged wages and real output have significant positive effect on real wages. On the other hand, both imports as well as exports have a positive effect on real wages but the coefficient of exports is not significant.

The wage equations incorporating rigidity of labor markets are estimated

in equation 7 and 8 as shown in Appendix 6A. It shows that trade liberalization (exports plus imports divided by value added) has a negative but insignificant effect on real wages as shown by equation 7 whereas; trade liberalization (average tariff rate) has a significant positive effect on real wages as reflected in equation 8. Equation 7 and 8 also show that the number of ILO convention ratifications have a significant negative effect on real wages when exports plus imports divided by value added is used as a measure of liberalization. On the other hand, ILO convention ratifications have a significant positive effect on real wages when average tariff rate is used as a measure of liberalization. All other variables do have signs according to the theory.

Overall analysis presented above has some interesting policy implications especially more important are the impact of liberalization, rigidity indicators, exports and imports variables. The impact of trade liberalization (exports plus imports divided by value added) is sensitive to the measure of liberalization. It has a positive effect when labor markets are flexible however its impact turns negative when average tariff rate is used as a measure of liberalization in both employment and wage equations. This result is not surprising neither is it in contrast with the standard theory that is based on flexible labor markets assuming free labor mobility across sectors. Whereas regulated labor markets keep a kind of restriction on firms in the form of job security, trade unions and mandated wage benefits. All these factors restrict the free adjustment of employment and wages. Another important implication that our empirical results do reflect is that in case of flexible labor markets adjustment of labor market is in terms of employment i.e. trade liberalization (exports plus imports divided by value added) has a positive effect on employment while negative effect on real wages. However, after incorporating rigidity in the model, trade liberalization (exports plus imports divided by value added) tend to have a positive effect on real wages but negative effect of this on employment indices that because of mandated wage benefits and trade unions, employers pay higher wages to workers but at the cost of reduced employment.

On the other hand, liberalization (average tariff rate) has a positive effect

on wages and employment in both the flexible as well as rigid labor markets. However, in flexible labor markets again trade liberalization (average tariff rate) has a significant positive effect on both employment and real wages, which in other words support the standard trade theory that employment in a labor intensive country would increase as a result of trade liberalization. However, after incorporating labor market rigidity in both the employment and real wage equations, it is shown that trade unions and labor market regulations do affect the outcomes of labor markets, though trade liberalization (average tariff rate) has a positive effect on both employment and wages. Nevertheless the impact on employment is insignificant but significant on real wages.

From the policy point of view these results are very important. Compared to the exports plus imports divided by value added measure, the average tariff rate is a good measure of liberalization. Different factors such as a favorable condition of the economy, size of the economy's GDP or population of the country tend to upward bias the ratio of exports plus imports divided by value added. Although average tariff rate too is not free from limitations such as existence of non-tariff barriers and under-invoicing of imports and exports may understate the impact of trade liberalization reflected by average tariff rate. In spite of the limitations of both the measures of liberalization, average tariff rate is relatively a good measure of liberalization. Since our empirical results show that trade liberalization (average tariff rate) has a significant positive effect on employment and wages in both the flexible and rigid markets (i.e. the results are robust) making a good case for free trade.

Individual effects of both indicators of liberalization show that these indicators are sensitive to the measure of liberalization. A large number of ILO convention ratifications tend to have a positive effect on employment and a negative effect on real wages, when exports plus imports over value added is used as a measure of liberalization. While the results are exactly the reverse when average tariff rate is used as a measure of liberalization. It has a negative effect on employment but positive effect on real wages. More or less a similar situation exist in case of the rigidity variable (rigidity Index *

liberalization). It has a negative effect on real employment and positive effect on real wages when exports plus imports over value added is used as a measure of liberalization, whereas it has a positive effect on employment but positive and insignificant effect on real wages.

Finally, imports have almost insignificant effect on employment and wages on the whole, whereas exports have almost a positive effect on both employment and real wages.

The reported results are also similar to Banga (2005), Hasan (2001), and Rama (1994) who show mixed results of trade liberalization on employment and wages when examining the impact of trade on labor demand for Indian as well as Uruguayan manufacturing industries.

10. Diagnostic Tests

To account for the endogeneity problem in estimating employment and wage equations, this study has used Generalized Method of Moments (GMM), following Arellano and Bond (1991). Almost in all of the analysis, other than the independent variables, the first difference lag of the first difference of dependant variable or second lag of the dependant variable are used as instruments.

In order to check for the validity of over identifying restrictions, Hansen J-test is used in this paper. Hansen J-test is used to check for the validity of instruments used in the model. Hansen J-test is the J-statistic times the number of regression observations asymptotically $\chi 2$ with degrees of freedom equal to the number of over-identifying restrictions.

Under the null hypothesis of Hansen J-test, validity of over-identifying restrictions is supposed to be satisfied if there is no second order correlation of the residuals. However, results of the Hansen-J test do not allow the authors to reject the hypothesis of the validity of instruments used in the study.

As far as hetrosckedasticity and autocorrelation are concerned, all estimates are based upon HAC (Hetrosckedasticity-Autocorrelation Consistent) robust standard errors.

To check whether specific explanatory variables should be included or omitted from the model, the Wald test is used for testing the significance of particular explanatory variables in the model. If the Wald test is not significant then these explanatory variables can be omitted from the model. In our case, however the p-value of Wald test is almost zero in all the cases indicating that the explanatory variables to be included in the model are not zero

11. Conclusion and Policy Implications

After a period of import substition policies, the economy of Pakistan has gone through a process of liberalization whereby import duties have been reduced significantly. Liberalization tends to have some adjustment costs for labor of a country in terms of employment and real wages. With this objective in mind, this study has attempted to examine at length the impact of trade liberalization on wages and employment in manufacturing industries of Pakistan. In developing countries like Pakistan, labor markets are supposed to be more rigid or regulated. So less flexible labor markets tend to have less degree of free labor mobility to the sectors where they are in demand. As a result, trade liberalization may not have favorable effect in the spirit predicted by the traditional trade theory. This study therefore, has incorporated labor market rigidities and regulations in the model to exmine the impact of trade liberalization on employment and wages. Other than the regualted and rigid markets, this study also has examined the impact of trade liberalization with the assumption of flexible labor markets.

Empirical results show that if labor markets are flexible, trade liberaization tend to have a negative effect on employment but positve effect on real wages, however, when average tariff rate is used as a measure of liberalization, it has a positve effect both on employment and wages. On the

other hand, when labor market regulations and rigidities are incorporated in the employment and wage equations, both measures of liberalizaion have positive effect on employment and real wages. Overall results show that empirical results obtained with average tariff rate are relatively better and robust.

From the policy point of view these results are very important and indicate that the long run effect of tariff reduction could be positive if the trade policy is used with careful consideration and complemented by other reforms. As far as the role of regulations is concerned, they have not worsened the impact of trade on employment and wages, instead the results have improved after controlling for labor market regulations. These regulations are good for the welfare of labor and are the motto of ILO, a body of United Nations. However, it is also important to mention that parallel to ILO are the IMF and the World Bank like institutions, both are the major supporters of market mechanism and liberalization and do not support government interventions for it has distortive effects in the economy. In spite of its positive effect on labor welfare, regulations need to be seen in a broader context of liberalization as they also are a source of labor market rigidity.

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Appendix 1A

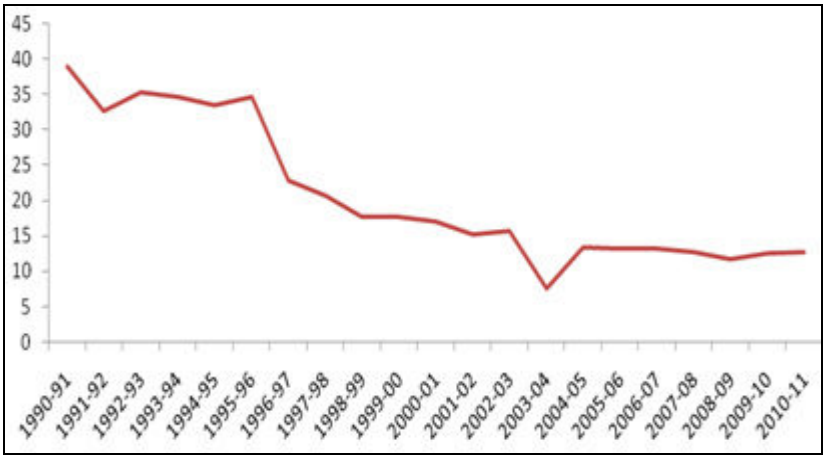
Average rate of Import Duty with and without Exemption/Concessions

Year	Average Tariff rate*	Average Tariff rate**	Year	Average Tariff rate*	Average Tariff rate**
1990-91	23.0	39.0	2001-02	9.1	15.1
1991-92	17.9	32.6	2002-03	9.3	15.6
1992-93	20.8	35.3	2003-04	4.8	7.5
1993-94	20.6	34.7	2004-05	8.8	13.3
1994-95	21.6	33.5	2005-06	8.1	13.1
1995-96	21.6	34.6	2006-07	7.1	13.1
1996-97	19.6	22.9	2007-08	6.5	12.7
1997-98	15.7	20.7	2008-09	5.7	11.7
1998-99	13.5	17.7	2009-10	5.7	12.5
1999-00	12.3	17.7	2010-11	5.6	12.7
2000-01	10.5	17.0			

*With dutiable imports, ** Without dutiable imports

Appendix 2A

Average Tariff Rate



Appendix 3A

Growth in Average Daily Employment (percent)

Industry	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06
i) Food, Tobacco and beverages	0.04	5.57	4.17	4.01	-1.83	-0.91	14.86
ii) Textile, Apparel and Leather	3.35	-4.51	-1.01	9.00	-1.93	10.96	7.44
iii) Paper Printing and Wood	1.79	3.76	5.86	6.30	-1.71	-1.67	-25.82
iv) Chemical and Rubber	17.28	-10.93	10.50	-3.81	2.00	-5.58	14.66
v) Glass & Non-Metallic Products	17.94	-15.63	9.92	3.57	-6.57	-2.71	23.80
vi) Fabricated Metal	-4.91	-4.18	-3.08	7.01	-14.18	13.18	-4.32
vii) Machinery Equipments & Electric goods	6.67	-0.65	4.46	4.64	-3.46	-2.91	3.47
viii)Drugs and Medicine	18.11	-11.11	7.87	4.29	3.91	3.91	-36.50
ix) Iron bars and Steel	15.56	-0.94	23.91	0.75	-6.90	-7.51	5.58
x) Transport goods	8.35	1.37	-6.43	1.82	-7.15	9.52	14.52
Grand Total (i to x)	5.21	-3.01	3.4	5.52	-2.40	4.51	6.10

Source: Author's own calculation based on CMI data

Appendix 4A

Growth in Real wages (percent)

Industry	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06
i) Food, tobacco and Beverages	-0.04	-5.27	-4.00	-3.86	1.86	0.92	-12.94
ii) Textile, Apparel and Leather	-3.24	4.73	1.02	-8.26	1.96	-9.88	-6.93
iii) Paper Printing and Wood	-1.76	-3.63	-5.53	-5.92	1.74	1.70	34.80
iv) Chemical and Rubber Industry	-14.73	12.28	-9.50	3.96	-1.97	5.91	-12.79
v) Glass & Non-Metallic Products	-15.21	18.52	-9.03	-3.45	7.03	2.79	-19.22
vi) Fabricated Metal Industries	5.16	4.36	3.18	-6.55	16.53	-11.64	4.51
vii)Machinery Equip. & electric goods	-6.25	0.65	-4.27	-4.43	3.58	3.00	-3.36
viii)Drugs and medicine industry	-15.34	12.50	-7.30	-4.11	-3.76	-3.76	57.48
ix)Iron bars and Steel Industry	-13.46	0.95	-19.29	-0.74	7.42	8.11	-5.29
x)Transport goods	-7.71	-1.35	6.87	-1.79	7.70	-8.69	-12.68
Grand Total (I to x)	5.81	5.21	11.99	10.82	-1.61	3.47	5.55

Source: Author's own calculation based on CMI data

Appendix 5A

Regression Results of Employment Equations

Variable	Eq-1	Eq-2	Eq-3	Eq-4
	(without controlling for labour market regulations and rigidity)		(Controlling for labour market regulations and rigidity)	
	X+M/V	Tariff rate	X+M/V	Tariff rate
Intercept	2.562 (5.218)**	0.268(-0.412)	-12.046 (-2.275)*	15.602 (2.509)**
Real wages	-0.374 (-4.002)**	-0.248(-2.725)**	-0.134 (-1.792)*	-0.158 (-1.957)**
Employment lag	0.877 (2.960)**	1.081 (2.215)**	0.928 (3.405)**	0.888 (7.719)**
Output	-0.045 (-1.289)	-0.033(-0.789)	-0.007 (-0.222)	0.068 (1.830)*
Liberalization	-0.037 (-1.687)*	-0.053(-1.950)*	4.023 (1.699)*	-0.008 (-0.425)
ILO Ratification	-	-	2.678 (2.430)*	-3.951 (-2.247)**
Rigidity Index*liberalization	-	-	-4.043 (-1.713)*	0.007 (0.505)**
Imports	-	-0.053(-1.867)*	-	-0.058 (-2.908)**
Exports	-	0.047(1.959)**	-	-0.013 (-0.584)
Time Trend	0.006(3.474)**	0.002(-1.279)	-0.015 (-2.157)*	0.023 (2.305)**
R-squared	0.685635	0.612073	0.715013	0.730215
No. of Observation	144	144	144	144
No. of Industries	18	18	18	18
Hansen J-Test :P-value	0.15623	0.0742	0.09166	0.16707
Wald Test (Joint Significance): p-value	0.000	0.000	0.000	0.000

Notes: *significant at 10% level, ** significant at 5% level a) Robust t-statistics are given in parentheses. b) Standard errors are HAC (heterosckedasticity-and autocorrelation-consistent) or Newey-West standard errors.

Appendix 6A

Regression results of Wage equation

Variable	Eq-5	Eq-6	Eq-7	Eq-8
	(without controlling for labour market regulations and rigidity)		(Controlling for labour market regulations and rigidity)	
	X+M/V	Tariff rate	X+M/V	Tariff rate
Intercept	0.034 (3.644)**	0.041 (3.253)**	0.891 (3.674)**	0.584 (2.436)**
Employment	-0.01 (-3.569)**	-0.011 (-3.946)**	-0.009 (-3.453)**	-0.009 (-3.663)**
Wage lag	0.16 (4.758)**	0.135 (3.837)**	0.143 (4.704)**	0.136 (4.090)**
Output	0.009 (3.417)**	0.006 (3.684)**	0.008 (3.032)**	0.007 (3.397)**
Liberalization	0.002 (2.782)**	-0.003 (-2.746)**	-0.04 (-1.556)	-0.004 (-3.470)**
ILO Ratification	-	-	-0.233 (-3.357)**	0.002 (2.736)**
Rigidity Index*liberalization	-	-	-0.042 (-1.628)	-0.012 (-0.721)
Imports	-	0.002 (2.568)**		-0.158 (-2.297)**
Exports	-	-0.001 (-1.433)		0.001 (4.053)**
Time Trend	0.001 (4.322)**	0.001 (4.883)**	0.006 (3.734)**	0.005 (2.842)**
R-squared	0.249568	0.314488	0.226709	0.327763
No. of Observation	144	144	144	144
No. of Industries	18	18	18	18
Hansen J-Test :P-value	0.327818	0.07262	0.328423	0.101389
Wald Test (Joint Significance): p-value	0.000	0.000	0.000	0.000

Notes:*significant at 10% level, ** significant at 5% level a) Robust t-statistics are given in parentheses.

b) Standard errors are HAC (heterosckedasticity-and autocorrelation-consistent) or Newey-West standard errors.

Appendix 7A

List of Industries used for Regression Analysis

No. of Industry	Industry	No. of Industry	Industry
1	Food	10	Other chemicals
2	Tobacco	11	Coal and Petroleum
3	Leather & Foot Wear Industry	12	Rubber Products
4	Textile	13	Glass & non-metallic products
5	Wearing Apparel	14	Iron bars and Steel Industry
6	Beverages	15	Fabricated metal products
7	Paper Printing and Wood	16	Machinery Industry
8	Drugs and medicine industry	17	Electrical goods
9	Industrial Chemicals	18	Transport goods