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## Does Trade Liberalization Reduce Gender Wage Gap in the Manufacturing Sector of Pakistan?

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### ABSTRACT

*This research examines the impact of trade reforms on the gender wage gap (GWG) by using micro-level data of Pakistan. It is generally believed that the increased foreign competition in developing economies decreases the GWG. Therefore, by using the two-step estimation approach the beneficial effect of trade liberalization on the GWG is investigated. The results show that trade liberalization affects wages and reduces the GWG. The results indicate that a decrease in protection rates leads to a reduction in the GWG. The association between trade liberalization and the GWG is positive and significant regardless of the approaches used (i.e. gender industry wage premium and real log weekly GWG). Further, the findings show that lagged trade policy is also positively associated with a gender wage premium and the real log weekly GWG. Our findings are robust and insensitive to the inclusion of other controls. In order to lessen the GWG, the government should design certain policies that could contribute positively to liberalize trade.*

**Keywords:** Trade liberalization, gender wage gap, gender industry wage premium

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### INTRODUCTION

Tariffs and non-tariff barriers were reduced by a large number of developing countries in the 1980s and 1990s resulting in the exposure of their economies to external competition (Ul-Haq, Khanum, & Raza Cheema, 2020; Wu, Ul-Haq, Zafar, Sun, & Jiang, 2019). This has impacted wages differently for contrasting skill levels and in turn, has affected wage

inequality too. According to a new exploration in gender economics, it is found that trade is the main factor affecting female labor force participation. The general perception is that if trade expands in sectors that use female labor intensively, female labor force participation increases (Cooray, Dutta, & Mallick, 2017). However, the existing research shows that the impact of trade openness on GWG is inconclusive (Ben Yahmed, 2017; Durevall & Munshi, 2006; Seguno & Grown, 2006).

In the last two decades, much attention has been given to the problem of gender inequality after the instructions by the United Nations and the introduction of the Millennium Development Goals. Although there is huge awareness on the issue of inequality among genders internationally, no country has been successful in reducing the gap significantly (Augusto & Saadia, 2005). Thus achieving equality among genders is a sluggish procedure since it involves prejudices in human attitudes as well as deeply rooted biases (Ahmed & Hyder, 2006).

Trade liberalization has gendered effects on the labor force as access to resources varies for both males and females, and the activities of gender are also different in the household chores and the labor market (Sauré & Zoabi, 2014). Trade liberalization also changes the pattern of income distribution across the gender. The openness of trade changes goods' relative prices and this change alters the incentives and encourages the reallocation of the factor of production (FOP) among sectors. This result brings a change in employment as well as earnings of genders which in turn affects the GWG as the real income of the several groups differs and affects the groups differently because of the variation of their consumption patterns (Aguayo-Tellez, 2012).

Theoretically, trade liberalization generates more benefits for female labor in terms of increased job opportunities and wages (Aguayo-Tellez, Airola, Juhn, & Villegas-Sanchez, 2014). Thus, in this way wage gap across the gender should reduce. According to the Hecksher-Ohlin theory, the openness of trade will relocate the sectors that utilized intensively the relative abundant FOP, and the countries with labor abundant will practice job creation in their export-oriented industries. As developing countries are abundant in less-skilled labor than skilled labor, the demand for the relatively abundant factor (i.e. female labor) will increase, and the GWG will reduce (Chen, Ge, Lai, & Wan, 2013; Fatema, Li, & Islam, 2018). As well, the theory of Stolper-Samuelson (SS) also holds the point of view that, wages (relative) of the less skilled labor will increase over time and this may tend to reduce the GWG (Artecona & Cunningham, 2002; Black & Brainerd, 2004).

The findings of our study show that trade liberalization affects wages and reduces the gender's industry wage premium and real log weekly GWG. The results confirm that a decrease in import tariffs reduces the GWG regardless of the approach used. Further, the findings show that lagged trade policy also has a positive relationship between gender industry wage premium, and the real log weekly GWG. Hence, our results are robust and are not sensitive to the inclusion of trade-related variables. Our findings are consistent with those of Aleman-Castilla (2006); Chamarbagwala (2006); Papyrakis, Covarrubias, and Verschoor (2012) and contrast with those of Domínguez-Villalobos and Brown-Grossman (2010); Sauré and Zoabi (2014); Wolszczak-Derlacz (2013).

This research contributes to the literature by studying the relationship between trade liberalization and the GWG using sectoral level data of the manufacturing sector during the period 1990-2005. This study uses the reduction in protection rates as a measure for trade openness which is a better proxy as compared to previously used trade ratios. Secondly, this study covers the whole trade liberalization regime of Pakistan.<sup>1</sup> Many studies do not lay importance on the gender aspect of trade liberalization. This study fills this gap and observes the impact of trade liberalization with respect to gender specifically in the manufacturing sector of Pakistan. The variation in the division of labor is the salient feature that ensures gender differences in both the social as well as economic roles. Moreover, during the sample period of our study (i.e. 1990-2005) the conditions of the labor market have remained the same (i.e. no new mandate or law was executed).

The rest of this paper is arranged as follows: the theoretical framework in section 2, data and methodology in section 3, results and discussion in section 4, and conclusion of the study in section 5.

## **THEORETICAL FRAMEWORK**

The theoretical framework on the relationship between trade liberalization and the GWG relies on the Heckscher-Ohlin/Stolper-Samuelson theory and G. Becker (1957) theory of discrimination. Both of these theories indicate a beneficial effect of liberalization of trade on the GWG (Artecona & Cunningham, 2002). According to Heckscher Ohlin's theory, in developing countries trade liberalization raises the demand for less-skilled laborers and increases their relative wages (Domínguez-Villalobos & Brown-Grossman, 2010; Mukhopadhyay, 2015). In developing economies, female is considered to be the less-skilled labor and performed work in export processing zones and trade openness provides more job opportunities for female labor. Trade liberalization results in a drastic increase in female employment (i.e. cheap), by foreign-owned industries as well as export-oriented industries. Trade liberalization may shift the structures of industries in favor of sectors that employ more women. It leads to an increase in the demand for women's labor and wages (instead of male labor) and diminishes the GWG (Standing, 1999). Moreover, the theory of G. S. Becker (1957) asserts that if proprietors discriminate against female laborers and reduce their wages (pay less to female labor) in comparison to male labor, then the liberalization of the economy is expected to grow the demand for less-paid female laborers, bidding up their wages and decreasing the GWG (Mukhopadhyay & Chaudhuri, 2013).

According to previous studies the employment of females in the labor force varies and is not uniform among countries (Jensen, 2017; Joekes, 1995). Even if female employment increases, it does not necessarily mean that the GWG will reduce. According to the

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<sup>1</sup> According to [Aguayo-Tellez et al. \(2014\)](#), the study of [Yasmin \(2009\)](#) on the association between trade liberalization and the GWG simply calculated the GWG at two distinct points in time (i.e. 1990-91 & 2005-06) but did not use any trade-related variable. Moreover, [Salman and Javed \(2011\)](#) explored the variation in the wage gap by LFS (1996) as well as LFS (2005). Our study is the first one that covers the whole trade liberalization regime (i.e. 1990-2005) in case of Pakistan. Further, the negative perspective attached it is that they used data only for 7 industries. However, our study covers the 9 manufacturing industries.

neoclassical trade theory, the factors of production which are abundant will be benefitted by trade. Thus if the unskilled women's labor is abundant, trade openness will lead to more demand and employment of females, leading to an increase in the wages and reduction in the GWG (Chen et al., 2013; Fatema et al., 2018).

Theoretically, trade liberalization has mixed impacts on the GWG as several studies declare that trade liberalization reduces the GWG (Berik, 2000; Fontana & Wood, 2000; Hazarika & Otero, 2004; Oostendorp, 2004), while there exists a plethora of evidence that supports that the increasing GWG is as a result of trade liberalization (Berik, Rodgers, & Zveglic, 2004; Fontana, 2004). Thus, the impact of trade liberalization on the GWG is ambiguous and calls for empirical analysis.

## DATA AND BACKGROUND

### Pakistan's Trade Policy

1988-2005 was the era where huge progression was made with respect to the trade policy of Pakistan. During Zia ul Haq's tenure, under the Structural Adjustment Program, substantial changes were made and implemented in 1988. A significant difference in protection level occurred amongst sectors. The imports of the three most protected industries like furniture, wood products, and wood, handicrafts, textile, and related goods came across average tariffs of 106%, 94%, and 96% correspondingly. Facilitating manufacturing sectors suggests that Pakistan had to cope with the same circumstances as Brazil and Columbia due to intensive protection of the industries which promoted comparatively unskilled labor (Pavcnik, Blom, Goldberg, & Schady, 2003).

Our study covers the sample period 1990-2005, which corresponds to the trade regime of Pakistan (Salman & Javed, 2011; Ul-Haq et al., 2020; Wu et al., 2019). This research includes the manufacturing sector of Pakistan where industrial codes of up to two-digit levels are used. The sample of this study is composed of nine industries from the manufacturing sector of Pakistan. Data for import tariffs and other trade-related is taken from the study of Wu et al. (2019). Figure 1 depicts the overall and sectoral level tariffs during 1990-2005. The figure shows the declining trend of import tariffs during the period of the trade regime.

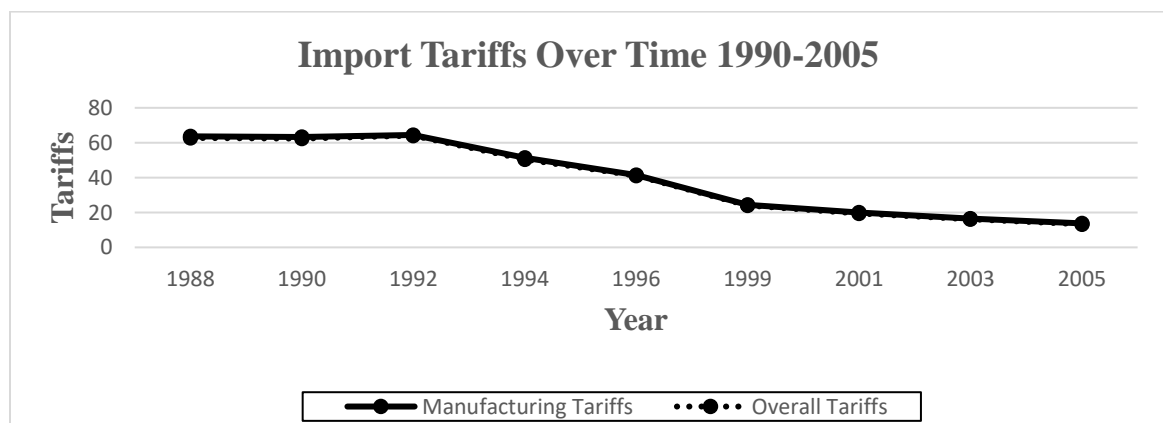


Figure 1: Import tariffs over time 1990-2005. Borrowed from Wu et al. (2019).

## Labour Force Survey

LFS is a representative cross-sectional survey data conducted quarterly to offset the seasonal fluctuations. The primary purpose of LFS is the collection of data for comprehensive statistics on different aspects of the labor force of a country. Thus data on multiple characteristics of the labor force is given by LFS. The characteristics included in the survey are literacy, gender, age, level of education, household head, profession, mobility of the population, and affiliation with the industry. The characteristics of the workforce comprised of information about the categorization of the workforce by sector, formal as well as informal industry, occupation, the status of the job, level of education, and working hours. Secondly, it includes information on the security of the workplace and statistics on the health conditions of employees. Thirdly, it comprises the jobless labor categorized by the level of education and previous experience of work. In the LFS, industries' employment is given at 2 digit ISIC codes.

## METHODOLOGY

A two-step procedure is engaged to examine the impact of trade reforms on the GWG. Two approaches have been used for measuring the GWG. The first consists of estimation of gender industry wage premium and the second comprises of estimation of real log weekly GWG as the dependent variable. To investigate the impact of trade liberalization on the GWG our study follows the Aleman-Castilla (2006) approach. The first step involves the estimation of the Mincerian wage equation to explain log wages. In the second step, an equation is used which takes the residual obtained from the first equation as the dependent variable. The import tariffs is the core independent variable of our study. Following Attanasio, Goldberg, and Pavcnik (2004); Ul-Haq (2016) we also include trade-related variables to checks robustness. The first step involves estimation of the log-wage equation as follows:

$$\lg wage_{ijt} = H_{ijt} \beta_H + I_{ijt} * GI_{jt} + \varepsilon_{ijt} \quad (1)$$

Where  $\lg wage_{ijt}$  shows the natural logarithm of workers  $i$ 's wage who is working in industry  $j$  at time  $t$ .  $H_{ijt}$  is a vector that shows variables including the characteristics of the worker as well as the geographical location.  $I_{ijt}$  is an interactive dummy of industry and gender and  $\varepsilon_{ijt}$  is the error term. The coefficient  $GI_{jt}$  indicates the portion of the variation in wages attributed to the industrial affiliation and gender of worker  $i$ . Equation (1) is calculated separately for each year in the sample.

In the second step, the gender industry wage differential for each industry obtained from the first step is pooled over time. They are regressed on the industry trade-related characteristics. The second-step regression is as follows:

$$GI_{jt} = T_{jt} \beta_T + D_j \beta_D + u_{jt} \quad (2)$$

Where  $GI_{jt}$  is the GWG for industry  $j$  at time  $t$ .  $T_{jt}$  shows the vector of trade-related attributes of the industry. Tariffs is the main variable included in  $T_{jt}$ . Import tariffs is a better measure of trade liberalization because they provide an additional advantage over

the existing empirical works that use exports and imports as proxies for trade liberalization. Empirical studies have proven that in developing countries, there exists under-invoicing as well as over-invoicing issues in the imports and exports data (Bhagwati, 1964; Lane, 2007; Mahmood, 1997; Mahmood & Azhar, 2001; Sheikh, 1974).

The measures that are widely used in most studies like imports, exports, growth of imports and exports, prices of products, price indices of exports, and imports are vividly debatable since they have theoretical problems in their elaboration when used as an independent variable. This is because it results in simultaneity biases. Several studies analyzed the impact of trade liberalization on the GWG by using the proxy of export and import to GDP (trade%) for trade liberalization (Kimura, 2016; Menon & Van der Meulen Rodgers, 2009; Sauré & Zoabi, 2014), but there is less literature available on the better proxy (i.e import tariffs) (Goldberg & Pavcnik, 2003; Ul-Haq et al., 2020; Wu et al., 2019). The use of import tariffs is a better measure to capture the effects of trade liberalization. It provides an extra benefit over the already existing works, which have used other measures such as import penetration, export consumption ratio, and relative prices (Casabianca, 2016; Goldberg & Pavcnik, 2005; Schady, Blom, Goldberg, & Pavcnik, 2003). Moreover, the issue of the GWG is interesting particularly in South Asian countries which have embarked on trade liberalization policies as well as characterized by less-paid women labor-intensive export-oriented sectors.

## RESULTS AND DISCUSSION

In this section, we discuss the impact of tariff reduction resulting from the trade liberalization regime, on GWG. The econometric investigation used in the research begins with estimating the impact of the reduction in import tariffs on gender industry wage premium and the real log weekly GWG. As mentioned in the methodology section, a two-step methodology is used in which, the first comprises of the estimation of the Mincerian wage equation in log form which is available upon request. In the second stage, Equation (2) is estimated in Table (1) in which the dependent variable of column (1) is the industry gender wage premium and column (2), the real log weekly GWG.

Table 1: Trade Liberalization and Gender Wage Gap

| <b>Variables</b>  | <b>(1)</b>            | <b>(2)</b>             |
|-------------------|-----------------------|------------------------|
| Nominal tariff    | 0.0180**<br>(0.00804) | 0.00656**<br>(0.00303) |
| Sector indicators | Yes                   | Yes                    |
| Year indicators   | Yes                   | Yes                    |

Note: Industry gender wage premium is the dependent variable in model 1 and real log weekly GWG in model 2. Standard errors are indicated in parentheses. Level of significance at 1%, 5% and 10% is depicted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 respectively. N is 72 in 1-2 columns.

The first column (1) represents the impact of tariffs on the industry GWG. The findings show that the coefficient of the import tariffs is positive. Thus the association between protection rates and the industry wage differential is positive and significant at 5% i.e. a reduction in protection rates reduces the GWG. Thus, trade liberalization decreases the

industry GWG. A 1 percentage point decrease in the import tariffs decreases the industry gender wage premium by 0.0180 percentage points. The effect of trade liberalization on the GWG is also estimated in column (2) by taking into consideration the real log weekly GWG. The results show that trade liberalization is positively related to the GWG i.e. a 1 percentage point decrease in import tariffs decreases the real log weekly GWG by 0.00656 percentage points. The coefficient of the import tariffs is significant at 5%. The study of Re Siddiqui, Hamid, Siddiqui, Akhtar, and Soomro (2006) concludes that trade liberalization resulted in an excessive negative influence on female labor in export-oriented industries of Pakistan. Trade liberalization by reducing tariffs as well fiscal adjustments through cuts in government expenditure narrows the GWG (Rizwana Siddiqui, 2007). On the other hand, trade policy by licensing deregulation or reducing tariffs enhances the competitive forces in manufacturing sectors and reduces women's bargaining power, which results in the widening of the wage gap (Menon & Van der Meulen Rodgers, 2009).

### Robustness Checks

For robustness checks of our core findings presented in Table 1, we include the log of GDP, log of GFCF for the log of gross fixed capital formation, lagged XNEER for exported nominal effective exchange rate, and lagged MNEER for the imported nominal effective exchange rate, IP for import penetration ratio and XCR for export consumption ratio in Table 2.

Table 2: Trade Liberalization and Gender Wage Gap (Robustness Checks)

| <b>Variables</b>  | <b>(1)</b>            | <b>(2)</b>            | <b>(3)</b>            | <b>(4)</b>           | <b>(5)</b>              |
|-------------------|-----------------------|-----------------------|-----------------------|----------------------|-------------------------|
| Nominal tariff    | 0.0173**<br>(0.00862) | 0.0195**<br>(0.00943) | 0.0229**<br>(0.00920) | 0.0182*<br>(0.0101)  | 0.0202**<br>(0.0102)    |
| Log GDP           | -0.124<br>(0.128)     |                       | 0.239<br>(0.157)      |                      | -0.0377<br>(0.212)      |
| Log GFCF          | 0.123<br>(0.125)      |                       | -0.186<br>(0.121)     |                      | -0.0126<br>(0.133)      |
| Lagged XNEER      |                       | 0***<br>(0)           | 0<br>(0)              | -0<br>(0)            | -0<br>(0)               |
| Lagged MNEER      |                       | -1.34e-10***<br>(0)   | -1.35e-10***<br>(0)   | -1.04e-10***<br>(0)  | -8.73e-11<br>(5.56e-11) |
| IP                |                       |                       |                       | -0.414***<br>(0.158) | -0.517<br>(0.426)       |
| XCR               |                       |                       |                       | 0.615***<br>(0.182)  | 0.570<br>(0.348)        |
| Sector indicators | Yes                   | Yes                   | Yes                   | Yes                  | Yes                     |
| Year indicators   | Yes                   | Yes                   | Yes                   | Yes                  | Yes                     |

Note: Industry gender wage premium is the dependent variable in all columns. NEER is abbreviated for the nominal effective exchange rate. Standard errors are indicated in parentheses. Level of significance at 1%,

5% and 10% is depicted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 respectively. N is 72 in column 1 and 63 in 2-5 columns.

Our estimates are robust and insensitive to the inclusion of other control variables. Other controls does not influence the sign of coefficient of protections rates and its significance. The sign of protection is positive and statistically significant in all models. Moreover, we find the same result with the real log weekly GWG measure. The results of the real log weekly GWG of robustness checks are available upon request. In garments industries GWG were found to be reducing during 1983-1990 but increasing during 1990-1997, owing to a large proportion of male laborers taking up skilled jobs and the rise in temporary labors among women (Bhattacharya & Rahman, 1999; Paul-Majumder & Begum, 2000).

### Lagged Trade Policy and Gender Wage Gap

Moving forward, columns (1) and (2) of Table 3 show the changes in wages as a result of the effects of the decrease in tariffs that take time to appear. The impact of lag of import tariff reduction on real gender industry wage premium and real log weekly wage gap is calculated.

Table 3: Lagged Trade Policy and Gender Wage Gap

| Variables         | (1)                    | (2)                     |
|-------------------|------------------------|-------------------------|
| Lagged tariff     | 0.0330***<br>(0.00640) | 0.00814***<br>(0.00228) |
| Sector indicators | Yes                    | Yes                     |
| Year indicator    | Yes                    | Yes                     |

Note: Industry gender wage premium is the dependent variable in model 1 and real log weekly GWG in model 2. Standard errors are depicted in parentheses. Level of significance at 1%, 5% and 10% is depicted by \*\*\* p<0.1, \*\* p<0.05, \* p<0.1 respectively. N is 63 in columns 1-2. All columns are estimated using industry fixed effect indicators.

Table 3 depicts the impacts by taking into account 1 year lagged value of tariffs. The Table suggests that the impact of lagged import tariffs is smaller but still significant statistically. Thus, this Table shows that there is a positive relationship between lagged import tariffs and the GWG regardless of whether the dependent variable is the industry gender wage premium (column 1) or real log weekly GWG (column 2). Thus, a decline in tariffs also decreases the GWG. Also, the association between trade liberalization and the GWG is positive and significant in both approaches (i.e industry gender wage premium or real log weekly GWG).

In Table 4, we include trade-related variables to check the robustness of our lagged findings. The results of our robustness check are described in Table 4 with industry gender wage premium as the dependent variable.

Table 4: Lagged Trade Policy and Gender Wage Gap (Robustness Checks)

| Variables     | (1)                    | (2)                    | (3)                    | (4)                   |
|---------------|------------------------|------------------------|------------------------|-----------------------|
| Lagged tariff | 0.0336***<br>(0.00678) | 0.0164***<br>(0.00579) | 0.0312***<br>(0.00661) | 0.0178**<br>(0.00717) |
| Log GDP       | 0.0308<br>(0.122)      |                        |                        | -0.0253<br>(0.143)    |



|                     |                     |                     |                      |                         |
|---------------------|---------------------|---------------------|----------------------|-------------------------|
| Log GFCF            | -0.0256<br>(0.0973) |                     |                      | 0.0197<br>(0.1/17)      |
| Lagged XNEER        |                     | 0***<br>(0)         |                      | -6.31e-11<br>(6.12e-11) |
| Log MNEER           |                     | -1.25e-10***<br>(0) |                      | -6.31e-11<br>(5.80e-11) |
| IP                  |                     |                     | -0.552***<br>(0.195) | -0.579<br>(0.407)       |
| XCR                 |                     |                     | 0.656**<br>(0.275)   | 0.808**<br>(0.342)      |
| Industry indicators | Yes<br>Yes          | Yes<br>Yes          | Yes<br>Yes           | Yes<br>Yes              |
| Time indicator      |                     |                     |                      |                         |

Note: Industry gender wage premium is the dependent variable in all models. Standard errors are depicted in parentheses. Level of significance at 1%, 5% and 10% is depicted by \*\*\* p<0.1, \*\* p<0.05, \* p<0.1 respectively. N is 63 in all 1-4 columns. All columns are estimated using industry fixed effect indicators.

Columns 1-4 of table 4 show that the impact is robust; that is, lagged import tariff is statistically significant and positively related to gender industry wage premium after the inclusion of other variables. The impact of lagged import tariff reduction on the real log weekly GWG is also investigated and is available upon request. The results with the real log weekly GWG represent the effects by taking into account 1 year lagged value of import tariffs. The results suggest that the impact of lagged import tariffs is statistically significant. Hence, the results are robust and significant.

To sum, the association between trade liberalization and the GWG is positive and statistically significant in all models. Our results are robust after the inclusion of several control variables. Moreover, our findings of lagged trade policy are also robust and insensitive to various controls. The findings of our study are consistent with those of Aleman-Castilla (2006); Chamrabortwala (2006); Papyrakis et al. (2012) and contrast those of Domínguez-Villalobos and Brown-Grossman (2010); Sauré and Zoabi (2014); Wolszczak-Derlacz (2013).

## CONCLUSION

Our study finds that the association between trade liberalization and the GWG is positive and statistically significant. Trade liberalization reduced the GWG in the manufacturing sector of Pakistan during the period of the trade liberalization regime (1990-2005). Further, the findings of this research are also robust after the inclusion of trade-related variables. The findings of lagged trade policy confirm the positive relationship between trade liberalization and the GWG and are statistically significant in all specifications.

This study concludes that the decrease in import tariffs has led to an increase in wages. There was a larger rise in wages in the industries in which the reduction of the tariff was more. It is very essential to lay emphasis on what this significant impact of import tariffs implies. Generally, to safeguard output and the wages being given to the workers, domestic industries lobby for increased tariffs. The estimation done recommends that industries exhibiting increased protection will suffer because of more costs incurred by them. Thus, the results imply that trade openness results in a decline in wage inequality and this is consistent with Stolper–Samuelson theorem. Our results are in line with G. S. Becker

(1957) which states that as a result of trade, competition among firms rises and the GWG reduces by decreasing costly discrimination and increasing the participation of females in the labor force.

The findings of this research suggest that the major impact of trade liberalization on inequalities between genders can be studied through its effect on gender wage premium. This shows that if the structure of the industry, skill and individual features are controlled; trade liberalization will reduce the GWG in Pakistan by decreasing discrimination and labor rights improvement. Thus, the study empirically proved that import tariff reduction decreased the GWG regardless of the measure used (i.e. gender industry wage premium or real log weekly GWG). The findings of the study have some important policy implications. To lessen the GWG government should design certain policies that could contribute positively to increase trade liberalization.

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