DOI: 10.52131/pjhss.2025.v13i2.2562

Pakistan Journal of Humanities and Social Sciences

Volume 13, Number 02, 2025, Pages 396-405
Journal Homepage:
https://journals.internationalrasd.org/index.php/pjhss

Does Trade liberalization widen Residual Wage Gap in Pakistan? A Sectoral Perspective

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ARTICLE INFO

Article History:
Received: March 22, 2025
Revised: June 18, 2025
Accepted: June 19, 2025
Available Online: June 20, 2025

Keywords:
Trade Liberalization
Residual Wage Gap
Sectoral Analysis
Oaxaca-Blinder Decomposition
Pakistan

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Between 1988 and 2005, Pakistan's trade policy saw significant transformations. This study examines the impact of trade liberalization (TL) on the residual wage gap (RWG) across manufacturing sectors, utilising micro-level datasets of Pakistan from 1990 to 2005. Neoclassical theory posits that TL enhances external competitiveness in developing nations, resulting in a reduction of the gender pay gap. The advantageous impact of TL on the RWG is illustrated using a two-step estimation method. Initially, we employ the methodologies of Oaxaca (1973) and Blinder (1973) to ascertain the RWG at sectoral levels. Subsequently, we utilise Fixed Effect (FE) and Random Effect (RE) models. The overall findings indicate a correlation between TL (measured by the fall in import tariffs) and RWG. TL is closely associated with the widening residual pay disparities across various sectors in Pakistan. The government should consider that new long-term plans must positively respect the TL.

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1. Introduction

In the 1980s and early 1990s, several less developed economies significantly lowered tariffs and non-tariff barriers, therefore opening themselves to global competition (Hufbauer & Kotschwar, 1998). Although trade openness was advocated to enhance economic development and productivity, several nations expressed concern that it would exacerbate income gaps between wealthy and low-income groups, leading to an inequitable distribution of income (Liu, Lai, & Liu, 2022) The contemporary classical theory of labour market discrimination forecasts a reduced wage disparity due to international trade competitiveness. In a capitalist market, employers may exhibit less discrimination against women due to competition diminishing profit margins (Becker, 2010). Proponents of non-neoclassical theory contend that expanding commerce may exacerbate the pay disparity between men and women, as women possess diminished negotiating power and inferior job status (Darity & Williams, 1985). The impact of TL on the female pays gap remains ambiguous (Artecona & Cunningham, 2002; Berik, Rodgers, & Zveglich, 2004; Black & Brainerd, 2004; Hazarika & Otero, 2004; Menon & Rodgers, 2009; Oostendorp, 2009; Salman & Javed, 2011; Ul-Haq, Nazeer, & Rahim, 2022). Trade can influence gender wage disparity in several manners. In gendered adaptations of the discrimination hypothesis and modern trade theory, TL diminishes the wage disparity between men and women (Becker, 2010), but in Heckscher-Ohlin trade theory and the bargaining power thesis, gender disparity in wages is exacerbated. The Becker discrimination hypothesis and bargaining power thesis propose that TL enhances female employment in a sector, although the Heckscher-Ohlin theory and contemporary trade theory indicate the contrary (Hinchey, 2013). The most intriguing

discoveries in the research pertain to the correlation between the wage gap and trade openness, which first increases and subsequently begins to diminish, contingent upon the degree of trade openness (Helpman, Itskhoki, & Redding, 2010).

Numerous developing nations have profited from TL for two primary reasons. The liberalisation of trade has resulted in a decrease in the cost of inputs utilised by producers and consumer products. The rise in export demand from developing nations has been driven by a reduction in tariffs in the destination markets of rich countries. Nevertheless, the benefits of TL for developing countries are little or insignificant due to the partiality exhibited by rich nations and the increased market access afforded to least developed countries (Siddiqui, 2009). To strengthen the industrial underpinnings of Pakistan, significant emphasis is placed on TL. Pakistan's trade strategy for products is constrained by inadequate infrastructure, political instability, and its status as an agricultural nation, resulting in a primary emphasis on agro-based sectors. Significant progress occurred in the late 1980s and 1990s with a substantial drop in tariffs from 17 to 10 percent. Furthermore, the most significant tariff decrease occurred between 1986-87 and 1994-95, decreasing from 225% to 70%, while quotas and other levies were also minimised. The government implemented numerous tariff exemptions and reductions (from 77% to 17%) to enhance the efficacy of the industrial sector. Furthermore, proactive measures were implemented to enhance exports by exempting levies on them, with just 251 products subject to export duties. Pakistan's comparative advantage in certain items in the international market has resulted in free trade agreements with Malaysia and Sri Lanka, which are significant measures towards this objective (Bashir, 2003). In 1995, following its accession to the WTO, Pakistan was permitted to enter into a trade agreement concerning clothes and textiles. In the 1980s and 1990s, developing nations experienced a significant reduction in tariff and non-tariff barriers, hence increasing their economies' vulnerability to international competition. This affects earnings variably across different skill levels, thereby influencing pay disparity as well.

Over the past three to four decades, Pakistan has seen extensive liberalisation. In the 1980s, quotas were supplanted with tariffs, and in the 1990s, the tariff system was rationalised. Pakistan benefited from this, resulting in accelerated development and an increased percentage of industrial items in both imports and exports. The increase in textile exports led to a fall in income, poverty, and an enhancement in national welfare (Siddiqui & Kemal, 2006). The impact of TL on income inequality and the gender wage gap in Pakistan, following its accession to the WTO in 1995, is substantial. The World Bank's 2012 World Development Report indicates that TL and access to diverse information have resulted in the expansion of services for women. This has thus increased possibilities for women, so bolstering their economic empowerment. This indicates that transparency results in an increase in conflicts inside organisations and reduces the gender gap by mitigating expensive discrimination. The impact of free trade on economies in various regions may be analysed using the Heckscher-Ohlin model and the Stolper-Samuelson theory. The Heckscher-Ohlin theory posits that a country produces commodities utilising its abundant factors of production extensively. The model suggests that industrialised nations favour high-scale labour as a component of production for goods manufacturing. Developing nations such as Pakistan focus on the manufacturing of items that utilise unskilled labour as a plentiful resource (Salman & Javed, 2011). Consequently, the method only elevates the salaries of highly trained labourers in industrialised nations. According to the Stolper-Samuelson theory, TL in developing nations results in an increase in the comparative pricing of industries that utilise unskilled labour. Consequently, the remuneration of unskilled workers has risen, resulting in less pay disparity.

Gender discrimination can be examined across several domains that entail inequitable employment or labour market segmentation. The predominant classification of work is based on gender. This entails a distinction between productive and non-productive activities. Productive activities mostly encompass services that generate revenue and are predominantly dominated by males. Non-productive activities mostly encompass unpaid household work. These activities encompass the care, maintenance, development, and expansion of families. Women are primarily responsible for extensive, unrecognised, unpaid household labour that is often deprioritized. Consequently, in underdeveloped nations, females constitute the disadvantaged and impoverished segment of society. Women in underdeveloped nations constitute the segment of the population that is undernourished, less educated, and underpaid relative to their male counterparts (Ul-Haq, Nazeer, & Rahim, 2022). Current research regarding the effects of TL on the gender pay gap includes three studies from Pakistan. A study by Yasmin (2009) initially computed gender pay gap at the sectoral level using two specific time periods, 1990-1991 and

2005-2006, and posited that TL contributed to an increase in the female wage premium. The use of these two disparate points for trade is significantly flawed, as critiqued in the survey report by (Aguayo-Tellez et al., 2013). Secondly, the research by Salman and Javed (2011) employed export ratio, import penetration, and relative pricing metrics for trade analysis. These trade measures are based on outcomes rather than policies. Consequently, these outcome-based metrics are not precise for TL. The third study in this context is by Ul-Haq, Nazeer and Rahim (2022), which uses micro-level data from 1990 to 2005 and a two-step estimation approach to assess the impact of trade liberalization on the gender wage gap (GWG) in Pakistan's manufacturing sector. Their findings show that reductions in import tariffs significantly reduce the GWG, and the results remain robust across different measures and controls. The investigation's fundamental finding is that the RWG has not been employed to assess the gender wage gap, and no studies have contributed at the sectoral level in the context of Pakistan. Our study in Pakistan addresses this current gap. This study examines the effects of TL on the residual gender pay gap within manufacturing sectors, utilising micro-level data from Pakistan spanning 1990 to 2005. This study adds to TL and RWG nexus literature in the case of Pakistan in the following ways: Initially, we utilise import tariff reductions as a proxy for TL, which serves as a superior metric, and capture discrimination factor, compared to the trade ratios used in other studies. Secondly, this study is the first attempt utilising the RWG as a proxy for the gender wage difference following (Menon & Rodgers, 2009). This research is the first investigation of the effects of TL on the gender pay gap (measured by RWG) at the sectoral (manufacturing industry) level employing micro-data of Pakistan for period 1990 to 2005 (i.e., whole TL regime of Pakistan). This paper proceeds with an overview of the relevant literature to situate our study within the broader academic discourse. We then detail the adopted methodological framework and proceed to a comprehensive analysis of the results and their implications. The paper concludes with a summary of essential findings and their policy implications in the last section.

2. Literature Review

This part expands upon the theoretical and empirical discussions presented in the introduction, examining the current research on trade liberalisation and its effects on gendered labour market outcomes. This review contextualises the current study within the wider academic debate and identifies the gaps this research aims to fill. A lot of research has looked at the effects of trade liberalisation on the labour market in Pakistan at the sectoral level utilising small data sets. Jameel, Hina and Ul-Haq (2023) look at how trade liberalisation affects the skilled–unskilled wage gap (SUSWG) in Pakistan's manufacturing industry, both in terms of regions and sectors. They use Oaxaca–Blinder decompositions and various panel estimators to show that lowering tariffs, especially with lag effects, makes the SUSWG much bigger at both the industry and provincial levels. Aslam et al. (2022) look at how trade liberalisation affects the wage gap between formal and informal workers. They find that the gap got much bigger after liberalisation, both in terms of observed characteristics and residual discrimination, especially for vulnerable worker groups. Ul-Haq, Nazeer and Rahim (2022) also look at the gender wage disparity in Pakistan's manufacturing industry. They found that lowering tariffs slightly closed the difference, but the effect was limited by ongoing structural hurdles, such as occupational segregation. Wu et al. (2019) add to these findings by showing that liberalisation led to more informal work in Pakistan. They call this the "informality nexus." This shows that the growth of the informal sector could cancel out any gains in fairness by weakening protections for workers. In addition, Chen et al. (2024) show that changes in industry-specific wage premiums are closely linked to trade liberalisation. This has effects on wage inequality between sectors and the demand for labour at the company level. These studies give us a more detailed picture of how liberalisation affects the labour market in Pakistan in terms of skill, formality, and gender. However, none of them directly address the residual wage disparity at the sectoral level, which is what this study aims to do.

Chamarbagwala (2006) studied liberalization of the economy and wage disparities in India manufacturing and services sector with findings of economic liberalization in manufacturing sectors rewarding skilled men but negatively impacting skilled women leading to a widened gender pay gap. However, trade-in services have benefited both skilled men and women equally, implying a constant gender-pay gap. Kim (2020) investigated the effect of trade openness on gender-wage inequality in South Korea's labor market in manufacturing sector but failed to find evidence of reduced real wage gap between genders due to increased productivity or exports. Salman and Javed (2011) founded the consequence of TL policies on wage inequality in Pakistan was investigated for the period from 1996 to 2005. Three trade reform outcome measures were

used (i.e., import-penetration, export-penetration and relative-prices) for the manufacturing sector. The results indicate that (gender) inequality in wages has increased in Pakistan due to the effects of openness in trade, which is conflicting to the estimates of the Stolper-Samuelson Theorem. Yasmin (2009) explored the supply-side factors i.e., the role of human capital and labor characteristics, in the determination of wages during the TL period with no different findings than the increased gendered wage gap. Ul-Haq, Nazeer and Rahim (2022) checked the effect of trade openness on gender wage gap in manufacturing segment in Pakistan by using micro level data from 1990-2005. The result indicated that reduction in import tariffs will reduce gender wage gap. The results of this paper are robust and consistent with Stolper-Samuelson and Becker (1971) that gender wage gap declines as trade openness occurs. None of previous studies AlAzzawi (2014); Chen et al. (2024); Jameel, Hina and Ul-Haq (2023); Melitz (2003); Mumtaz et al. (2024); Piek and Von Fintel (2020); Wolszczak-Derlacz (2013) used RWG as proxy for gender wage gap in case of Pakistan. Our study is the first one in Pakistan which discussed the impact of trade liberalization on RWG. When the impact of TL on the RWG is seen mixed results are found, with some finding positive effects while others finding negative effects. The studies which found a decreased RWG as a result of TL include AlAzzawi (2014); Black and Brainerd (2004); Helpman, Itskhoki and Redding (2010); Rey (2013); Wolszczak-Derlacz (2013) among others. While the studies like Artecona and Cunningham (2002); Krishna, Poole and Senses (2011); Menon and Rodgers (2009), found increased RWG due to trade liberalization. Our study will fill this gap in the case of Pakistan by examining the impact of TL on RWG using micro-datasets of Pakistani sector.

3. Theoretical Framework

Here we show the link between the RWG and trade-liberalization with the help of a few channels. There are few studies which explain the association between TL and RWG (Artecona & Cunningham, 2002; Black & Brainerd, 2004; Hinchey, 2013; Menon & Rodgers, 2009).

3.1. New Classical Theory (Becker, 1971)

TL → import tariff↓ consumption ↑ costly discrimination → profit margin ↓ less able to discriminate against women → demand for under paid female labor ↑ female wages ↑ RWG ↓

3.2. Non New Classical Theory (Darity & Williams, 1985)

TL → import tariff ↓ low bargaining power of women → loss of jobs by female → segregated into lower paying → lower status job → wages decrease for women → RWG ↑

3.3. New Trade Theory (Melitz, 2003)

TL → export diversification → export ↑ production ↑ share of market ↑ firm hire worker → demand for labour ↑ real wages ↑ → higher cost → less productive firm can exit → industry productivity and size of firm ↑ →firm in the industry ↓ low wage female worker lose their Job → women reemployed in more productive plant → wages of female ↑→RWG ↓.

These theoretical frameworks predict that trade liberalisation could have opposite consequences on wage disparity. This study explores these effects in Pakistan.
Research Question:

Does trade liberalization increase gender wage discrimination in Pakistan's manufacturing sector?

3.4. Hypotheses

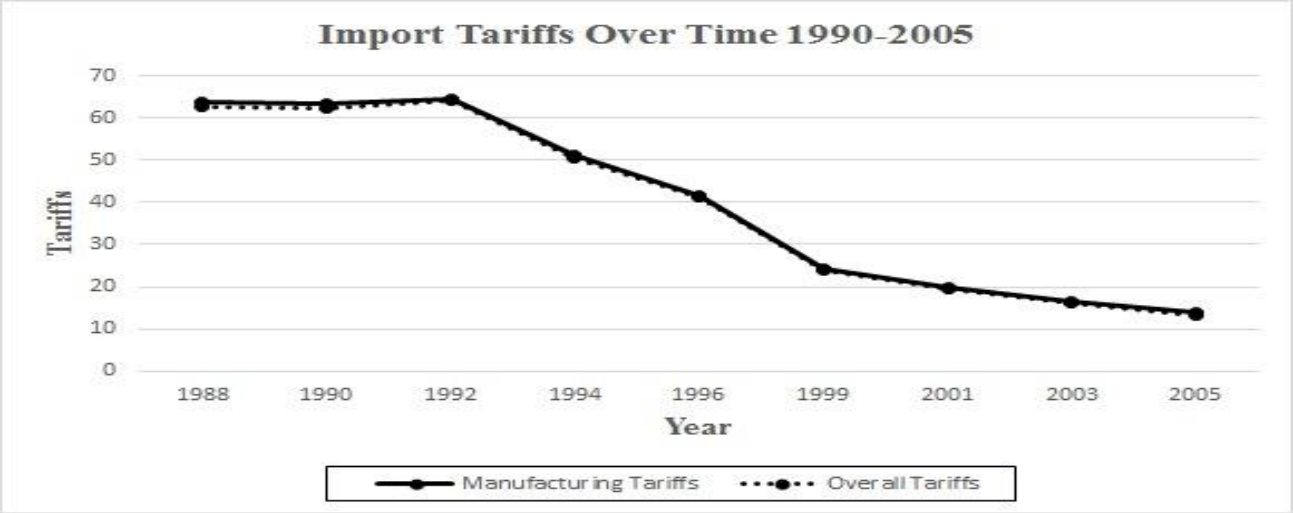
H1: Trade liberalization significantly increases RWG across sectors in Pakistan.

3.5. Pakistan's Trade Policy

During the period 1988–2005, Pakistan's trade policy experienced major changes. Despite the fact that Pakistan's trading climate improved dramatically during Zia's rule, major reforms in trade policy were presented in 1988 as a part of the Structural-Adjustment Program (SAP). Protection rate reductions were unexpected and steady throughout day-to-day activities and sectors. The levels of protection differed significantly between industries. Imports from the three of the most tightly protected sectors, timber, wooden articles & furniture, garment & fabric, and other industrialized & handicraft, gained the most, with reduced average tariffs of 106 percent, 96 percent, and 94 percent, respectively (Ul-Haq, 2016; Wu et al., 2019). It indicates that Pakistan protected relatively low-skilled labor-intensive industries, close to Brazil and Colombia

Goldberg and Pavcnik (2003) and that these outcomes are reliable with observed Mexico findings (Harrison & Hanson, 1999). Summarized detailed statistical data regarding industrial and other sectors is shown in Figure 1. This data covers our sample period from 1988 to 2005. The average protection rate decreased from 63% of 1988 to 13% in 2005 for all sectors. In the same duration tariffs have fallen from 64% to 14% for the manufacturing sector. Pakistan has progressively endeavoured to liberalise its trade and tariff policies by decreasing protection rates and eliminating non-tariff trade assistance. Protection levels diminished to zero over the sample period, however significant alterations occurred between 1992 and 1999. Additionally, the significant decrease in average tariffs across all sectors was accompanied by alterations to the protection standards for several industries in Pakistan. Figure 1 clearly illustrates that protection rates were significantly decreased after TL (Ul-Haq, 2016; Wu et al., 2019).

Figure 1: Average Tariffs Over 1990-2005 Overall



Note. Borrowed from the study of Wu et al., (2019).

4. Data and Methodology

4.1. Data

We link the exposure of trade with labor-force by using the data taken from Pakistan Labor Force Survey (henceforth LFS) conducted by the Pakistan Bureau of Statistics for the years 1990, 1991, 1992, 1993, 1994, 1996, 1997, 1999, 2001, 2003, and 2005. The LFS is a cross-sectional sample that is nationally representative. The LFS is a four-quarter annual survey that helps to compensate for seasonal fluctuations. The main goal of the LFS is data collection on a wide range of statistics on various facets of the labor force of the country. The LFS offered primary data having various characteristics of labor-force of Pakistan. Gender, age, head of household, marital-status, education-level, profession, literacy, affiliation of industry, and population movements are all included in the demographics. Data on labor force by working segment, (i) informal and formal-industry, occupation, employment rate, working hours, and literacy rate, (ii) working safety at place and statistics relating to the health of employees, and (iii) unemployed people by learning and previous experiences are among the aspects of work force. In LFS, industrial employment is listed using ISIC two-digit codes, giving us nearly 33 total segments and number of manufacturing-sectors per year is 9. The LFS is a nationally representative cross-sectional survey conducted by the Pakistan Bureau of Statistics using stratified sampling. It captures demographic and labor market indicators across urban and rural regions and is widely used in policy reports and academic studies (Akhlaque, Heltberg, & Mengistae, 2006; Ul-Haq, Nazeer, & Rahim, 2022). Despite its robustness, the LFS may underrepresent informal sector participation among women, a limitation discussed in our conclusion. Between 1996 and 2005, no new labour market regulations were enacted (for more information, see, Akhlaque, Heltberg and Mengistae (2006) World Bank. The most recent legislation is the Minors' Employment Act of 1991, which prohibits children from working in various professions and regulates the working environment in which they worked. As a result, we propose regulations of labour market to have little impact on our analysis.

4.2. Methodology

The Blinder-Oaxaca decomposition helps us figure out which parts of the gender wage difference are explained (connected to human capital) and which are not (perhaps discriminatory). This strategy works well in places like Pakistan, where biases in institutions may affect certain sectors (Menon & Rodgers, 2009; Ul-Haq, Nazeer, & Rahim, 2022). We thought about using other methods, such matching or quantile regressions, but they aren't as good at figuring out sector-level averages over time. The Blinder (1973); Oaxaca (1973) method facilitates in determining the extent to which the observed productivity differences between both genders can describe the overall wage gap (Blinder, 1973; Oaxaca, 1973). The gap in the level of wages in given years is decomposed into two portions, first explain the average differences in groups for productivity and second explain the portion of residual usually recognized as discrimination. The gender wage difference is decomposed for a given cross-section by articulating the normal real wages (w) logarithm for male denoted by (i=m) and female denoted by (i=f) jobs as follows:

$$w_i = X_i\beta_i + \varepsilon_i \tag{1}$$

This is the first step in our methodology. By using Blinder (1973); Oaxaca (1973), we generate RWG of male and female of manufacturing sector. Notation X refers to a number of worker's features that affect wage. Within the context of X, we use dummy variables for the level of education achieved, a variable indicator of whether the individual have primary school, middle school, matric, inter education, post graduate, age, age^2, head of household, marital status, literate, binary variables for regional locations, number of kids (Ul-Haq, Nazeer, & Rahim, 2022; Wu et al., 2019). The ε is an error term which is assumed to be spread normally having variance σ^2 the gender gap can then be described as follows:

$$w_m - w_f = (X_m\beta_m - X_f\beta_f) + (\varepsilon_m - \varepsilon_f) \tag{2}$$

When the regressions models are estimated at the means of the log-wage distributions, with the last term zero. Adding and subtracting $X_f B_m$ to get traits of male prices.

$$w_m - w_f = (X_m - X_f)\,\beta_m + X_f(\beta_m - \beta_f) + (\varepsilon_m - \varepsilon_f) \tag{3}$$

The complete log-wage differential is the left-hand side of Equation 3. They explained gap (the portion of the gap attributed to gender differences in calculated productivity characteristics) and the residual gap (the portion attributed to gender differences in market returns to those characteristics) are the first and second words on the right-hand side, respectively. Since decomposition is typically performed at the means, the remaining term is usually ignored; otherwise, the sum of the last two terms is called the residual gap. For further detail see (Menon & Rodgers, 2009). Now come towards the second stage,

$$\text{RWG}_{\text{it}} = \beta_\circ + \beta_1 T_{\text{it}} + \beta_2 X_{\text{it}} + u_{it} \tag{4}$$

RWG_{it} Is residual wage gap of Sector (i) and year (t). T_{it} include the sectoral tariffs variable. And X_{it} is control variable that measures domestic concentration by sector and year. Where X_{it} include Share of female, NEER (Nominal effective exchange rate), IPR (import penetration ratio), XCR (export consumption ratio), LX (lagged export) and LM (lagged import). And LX*NEER, LM*NEER, IPR*NEER, XCR*NEER is interaction term (Ul-Haq, Nazeer, & Rahim, 2022; Wu et al., 2019). And u_{it} is the error term.

5. Results and Discussion

5.1. TL and RWG in Manufacturing Sector

As proposed in Equation 4, we link sector RWG to trade restructurings (Protection rates, precisely). We may potentially mitigate certain estimation errors in the relationship between tariffs and RWG arising since changes in compositions of individual across sectors by accounting on behalf of individual workers' qualities in the first step. The difference in employee distribution between sectors cannot influence the consequences of our additional step (second step) because we are justified for worker qualities in the first step (and so regulate sector arrangement each period). In addition, our second-step regressions include FE and RE for the sector. These extra controls variable reduce the likelihood of estimation biases. Table 1 shows the findings for all of the sectors. Table 1 provides the coefficients and p-values for each explanatory variable. The

evaluations as of the regression model of sector RWG regarding protection rates, industry indicators, and temporal indicators are reported in the first column. The rate of protection has a negative coefficient that is statistically significant. This suggests that the chance of a RWG and the protection rate have a statistical relationship.

Table 1: **TL and RWG in Manufacturing Sector**

	FE	**RE**
Nominal Tariffs	-0.0093***	-0.0078***
	(0.0017)	(0.0016)
Constant	1.0343***	0.9744***
	(0.0704)	(0.1165)
F/Wald Statistic	29.96	22.30
P-Value	0.002	0.000

Note. Residual wage-gap is dependent variable in FE and RE. In parentheses the robust standard errors are presented. The number of asterisks indicates level of significance (i.e., '***' for 1%, '**' for 5%, and '*' for 10%). The N is 48 in both columns.

Here we see that there is a negative relationship between TL and RWG, because the coefficient sign is negative as import tariffs decrease the RWG increases. The result is significant at 1% level of significance in both models. Our study discovered that TL is significantly connected with RWG in sectoral level of Pakistan. TL increases RWG in Pakistan. In particular 1% decrease in import tariffs increases RWG by 0.9 (i.e., 0093) percent using FE model and increases by 0.8 (i.e., 0.0078) using RE. The intensity of the effect is lower as compared to case of India (i.e., 0.538) by Menon and Rodgers (2009). From now on, we will exclusively discuss the outcomes of the manufacturing sector. In Tables 2 and 3 exclusively show the findings of the manufacturing industry. The coefficients for each explanatory variable, as well as their p-values, are listed in the table. The evaluations from the regression model of manufacturing sector the effect of RWG on protection rates, dummies for sector, and dummies of time are shown in first column. The rate of protection has a negative coefficient that is significant statistically. This suggests that there is a statistical link stuck between the likelihood of a RWG and the rate of protection. The results from the manufacturing sector case in column 1 are consistent and practically identical to the overall scenario. The rate of protection has a negative coefficient that is statistically meaningful. This indicates a statistical correlation between the probability of a residual pay difference and the level of protectionism. A one percentage point decrease in the sector's rate of protection is associated with an increase in the probability of the RWG by 0.93 percentage points (i.e., 0.0093) using FE. After the inclusion of control variables our key findings are also robust. Our results are consistent with Menon and Rodgers (2009) for India and contradict with AlAzzawi (2014) for Egypt and Black and Brainerd (2004) for global sample. The first three columns in Table 2 presented regression findings based on industry indicators and time indicators, respectively. To ensure robustness, we incorporated other trade-related factors, and the findings are presented in columns 2-4. These additional variables are not included in regression models because of some trade theory. Our findings are robust and unaffected by the presence of these variables. In all models, they are statistically significant, and the sign of protection is negative.

Table 2: **TL and RWG in Manufacturing Sector (Robustness Checks)**

	(1)	**(2)**	**(3)**	**(4)**
Nominal Tariffs	-0.0093***	-0.0084***	-0.0043**	-0.0049**
	(0.0016)	(0.0014)	(0.0017)	(0.0016)
Share of Female		3.3685***	3.6145***	3.0507***
		(0.8988)	(0.8455)	(0.7951)
Lagged X (LX)			1.58e-10	7.86e-09***
			(9.02e-10)	(2.76e-09)
Lagged M (LM)			5.86e-09***	7.45e-09**
			(1.97e-09)	(2.87e-09)
LX*NEER				-1.83e-10**
				(6.31e-11)
LM*NEER				-5.32e-11
				(6.06e-11)
Constant	1.0343***	0.6599***	0.3467***	0.7401***
	(0.0704)	(0.1202)	(0.1231)	(0.1742)
F-Stat	29.96	28.37	19.83	17.88
P-Value	0.002	0.000	0.000	0.000

Note. Residual wage-gap is explained variable in all FE models. In parentheses the standard errors are presented. The number of asterisks indicates a level of significance (i.e., ***' for 1%, **' for 5%, and *' for 10%). The N is 48 in the first two columns and 42 in the remaining two columns. NEER stands for nominal effective exchange rate.

The magnitude and significance of the protection coefficient are unaffected by these additional explanatory variables. Finally, we investigate the relationship between lagged protection rates and RWGs to see if firms take time to adjust RWGs to trade openness estimated in Table 2. The coefficient sign (of lagged tariffs) is negative in 3rd and 4th Colum and is statistically significant too. In Table 3, we check the robustness check by introducing time and industry control variable. The signs of all 3 Columns in Table 3 are negative and statistically significant.

Table 3: **TL and RWG in Manufacturing Sector (Robustness Checks)**

	(1)	**(2)**	**(3)**
Nominal tariffs	-0.0093***	-0.0096***	-0.0053*
	(0.0016)	(0.0016)	(0.0030)
IPR		-0.2808	0.0960
		(0.7753)	(0.8498)
XCR		-0.4556*	-0.1515
		(0.2504)	(0.4331)
IPR*NEER			-0.0094
			(0.0063)
XCR*NEER			-0.0028
			(0.0041)
Constant	1.0343***	1.2888***	1.2342***
	(0.0704)	(0.2683)	(0.2669)
F-Stat	29.96	12.49	8.27
P-Value	0.002	0.000	0.000

Note. RWG is explained variable in all FE models. In parentheses the standard errors are presented. The number of asterisks indicates a level of significance (i.e., ***' for 1%, **' for 5%, and '*' for 10%). The N is 48 in all columns. IPR stands for Import penetration ratio, XCR stands for export consumption ratio, NEER stands for nominal effective exchange rate.

A robust correlation exists between TL and the residual pay difference. The negative association indicates that as TL occurs, the RWG increases. In the case of Pakistan, there exists a significant correlation between trade openness and the residual pay difference. In other words, reduced tariffs are associated with an expansion of the residual wage difference. These results remain consistent when including various trade-related indicators across all situations and estimation methods (i.e., industry fixed effects and random effects). A robust correlation has been identified between a delay in trade policy and the residual pay difference. These findings are likewise robust, with the sign of the lagged value being negative and statistically significant. We may infer that TL significantly influences the residual pay difference in the manufacturing sector, particularly given the absence of labour market regulation during the period under review.

6. Conclusion

This paper examines the effects of TL on the RWG across the manufacturing sector during the period from 1990 to 2005. Our estimates shown that TL is significantly associated with the RWG across manufacturing sectors. TL has led to an increase in RWG in the manufacturing sector. The robustness check demonstrated that our findings remain consistent across the sectoral level in the context of Pakistan. Our results are similar to those of Menon and Rodgers (2009) in India, where trade liberalisation made the gender wage gap in manufacturing bigger. In Egypt, similar impacts were seen (AlAzzawi, 2014), however Black and Brainerd (2004) found different results for the U.S., where liberalisation made gender pay gaps less. Differences in labour market structures, gender norms, and how well anti-discrimination laws are enforced may explain why these countries are different. The findings align with the work of Menon and Rodgers (2009), indicating that TL leads to an increase in the RWG across sectors. The findings we present challenge the theory of discrimination proposed by Becker (2010). As TL enhances competition, the costs associated with discrimination rise, leading employers to be less inclined to discriminate against women. Consequently, we can assert that this dynamic contributes to narrowing the gender wage gap between working men and women, fostering a healthy and competitive environment in workplaces, whether in manufacturing or the services sector.

- The government should implement policies that enhance TL, which is expected to positively impact the reduction of the gender wage gap. It is essential to enhance

educational facilities for females. This improved education will not only assist individuals in securing better jobs in industries that benefit from trade, but it will also enhance the wages of women across all sectors. This is expected to create a beneficial effect on them over time through a decrease in the gender wage gap.

- Enhanced enforcement in Pakistan of equal wage and equal opportunity legislation will reduce discriminatory wage practices.

References

Aguayo-Tellez, E., Airola, J., Juhn, C., & Villegas-Sanchez, C. (2013). Did Trade Liberalization Help Women? the Case of Mexico in the 1990s. In S. W. Polachek & K. Tatsiramos (Eds.), *Research in Labor Economics* (Vol. 38, pp. 1-35). Emerald Group Publishing Limited.

Akhlaque, A., Heltberg, R., & Mengistae, T. (2006). Pakistan labor market study: Regulation, job creation, and skills formation in the manufacturing sector.

AlAzzawi, S. (2014). Trade liberalization, industry concentration and female workers: the case of Egypt. *IZA Journal of Labor Policy*, *3*(1), 20. https://doi.org/10.1186/2193-9004-3-20

Artecona, R., & Cunningham, W. (2002). Effects of trade liberalization on the gender wage gap in Mexico.

Aslam, N., Ul-Haq, J., Cheema, A. R., & Visas, H. (2022). Does trade liberalization increase the formal-informal wage-gap in Pakistan? *Edelweiss Applied Science and Technology*, *6*(1), 26-42. https://doi.org/10.55214/25768484.v6i1.303

Bashir, Z. (2003). The Impacts of Economic Reforms and trade Liberalisation on Agricultural Export Prformance in Pakistan.

Becker, G. S. (2010). *The economics of discrimination*. University of Chicago press.

Berik, G., Rodgers, Y. V. D. M., & Zveglich, J. E. (2004). International Trade and Gender Wage Discrimination: Evidence from East Asia. *Review of Development Economics*, *8*(2), 237-254. https://doi.org/10.1111/j.1467-9361.2004.00230.x

Black, S. E., & Brainerd, E. (2004). Importing Equality? The Impact of Globalization on Gender Discrimination. *ILR Review*, *57*(4), 540-559. https://doi.org/10.1177/001979390405700404

Blinder, A. S. (1973). Wage Discrimination: Reduced Form and Structural Estimates. *The Journal of Human Resources*, *8*(4), 436. https://doi.org/10.2307/144855

Chamarbagwala, R. (2006). Economic Liberalization and Wage Inequality in India. *World Development*, *34*(12), 1997-2015. https://doi.org/10.1016/j.worlddev.2006.02.010

Chen, Z., Ul-Haq, J., Zafar, N. U., & Visas, H. (2024). The impact of trade reforms on industry wage premia in Pakistan: A sectoral perspective. *Asian Economic and Financial Review*, *14*(7), 497-512. https://doi.org/10.55493/5002.v14i7.5085

Darity, W. A., & Williams, R. M. (1985). Peddlers forever?: Culture, competition, and discrimination. *The American economic review*, *75*(2), 256-261.

Goldberg, P. K., & Pavcnik, N. (2003). The response of the informal sector to trade liberalization. *Journal of Development Economics*, *72*(2), 463-496. https://doi.org/https://doi.org/10.1016/S0304-3878(03)00116-0

Harrison, A., & Hanson, G. (1999). Who gains from trade reform? Some remaining puzzles. *Journal of Development Economics*, *59*(1), 125-154. https://doi.org/10.1016/S0304-3878(99)00008-5

Hazarika, G., & Otero, R. (2004). Foreign Trade and the Gender Earnings Differential in Urban Mexico. *Journal of Economic Integration*, *19*(2), 353-373. https://doi.org/10.11130/jei.2004.19.2.353

Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and unemployment in a global economy. *Econometrica*, *78*(4), 1239-1283. https://doi.org/https://doi.org/10.3982/ECTA8640

Hinchey, E. E. (2013). *Three essays on the relationship between trade and gender in US manufacturing*. American University.

Hufbauer, G. C., & Kotschwar, B. (1998). The future course of trade liberalization. *Peter G. Peterson Institute for International Economics, Washington DC*.

Jameel, M. A., Hina, H., & Ul-Haq, J. (2023). Sectoral and regional impacts of trade liberalization on the skilled-unskilled wage-gap in Pakistan. *Edelweiss Applied Science and Technology*, *7*(2), 87-103. https://doi.org/10.55214/25768484.v7i2.374

Kim, S. (2020). The Impact of Trade Liberalization on Gender Wage Inequality of South Korea's Labor Market.

Krishna, P., Poole, J. P., & Senses, M. Z. (2011). *Trade Liberalization, Firm Heterogneity, and Wages: New Evidence from Matched Employer-Employee Data*. World Bank.

Liu, J., Lai, M. Y., & Liu, Z. S. (2022). Trade liberalization, domestic reforms, and income inequality: Evidence from Taiwan. *Review of Development Economics*, *26*(3), 1286-1309. https://doi.org/10.1111/rode.12875

Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, *71*(6), 1695-1725. https://doi.org/10.1111/1468-0262.00467

Menon, N., & Rodgers, Y. V. D. M. (2009). International Trade and the Gender Wage Gap: New Evidence from India's Manufacturing Sector. *World Development*, *37*(5), 965-981. https://doi.org/10.1016/j.worlddev.2008.09.009

Mumtaz, M., Khan, Z. U., Ul-Haq, J., & Cheema, A. R. (2024). The gendered impact of trade liberalization on informal employment in Pakistan: A sectoral perspective. *IBT-JOURNAL OF BUSINESS STUDIES*, *20*(1), 108-123. https://doi.org/https://doi.org/10.46745/ilma.jbs.2024.20.01.05

Oaxaca, R. (1973). Male-Female Wage Differentials in Urban Labor Markets. *International Economic Review*, *14*(3), 693. https://doi.org/10.2307/2525981

Oostendorp, R. H. (2009). Globalization and the Gender Wage Gap. *The World Bank Economic Review*, *23*(1), 141-161. https://doi.org/10.1093/wber/lhn022

Piek, M., & Von Fintel, D. (2020). Sectoral minimum wages in South Africa: Disemployment by firm size and trade exposure. *Development Southern Africa*, *37*(3), 462-482. https://doi.org/10.1080/0376835X.2019.1702504

Rey, I. C. (2013). Trade Liberalization and Regional Impacts on Residual Wage Inequality: Evidence from Brazil.

Salman, Z., & Javed, M. (2011). The impact of trade liberalisation on wage inequality: case of Pakistan. *The Pakistan Development Review*, 575-594.

Siddiqui, R. (2009). Modeling Gender Effects of Pakistan's Trade Liberalization. *Feminist Economics*, *15*(3), 287-321. https://doi.org/10.1080/13545700902964295

Siddiqui, R., & Kemal, A. R. (2006). Poverty-reducing or poverty-inducing? A CGE-based analysis of foreign capital inflows in Pakistan.

Ul-Haq, J. (2016). Trade liberalization, wages and work environment nexus: Evidences from Pakistan. *Beijing: School of International Trade and Economics, University of International Business and Economics*.

Ul-Haq, J., Nazeer, N., & Rahim, N. (2022). Does Trade Liberalization Reduce Gender Wage Gap in the Manufacturing Sector of Pakistan?

Wolszczak-Derlacz, J. (2013). Mind the Gender Wage Gap – the Impact of Trade and Competition on Sectoral Wage Differences. *The World Economy*, *36*(4), 437-464. https://doi.org/10.1111/twec.12026

Wu, M., Ul-Haq, J., Zafar, N. U., Sun, H., & Jiang, J. (2019). Trade liberalization and informality nexus: Evidence from Pakistan. *The Journal of International Trade & Economic Development*, *28*(6), 732-754. https://doi.org/10.1080/09638199.2019.1593489

Yasmin, B. (2009). Trade Liberalization and the Lead Role of Human Capital and Job Attributes in Wage Determination: The Case of Pakistan's Labor Market. *THE LAHORE JOURNAL OF ECONOMICS*, *14*(1), 1-37. https://doi.org/10.35536/lje.2009.v14.i1.a1