The relationship between trade liberalization and gender disparity in education: Evidence from Pakistan

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ABSTRACT

Purpose: Over the past few decades, there has been an increasing interest in understanding the relationship between trade liberalization and gender inequality in developing countries. In Pakistan, due to its social, demographic, cultural and economic problems, gender disparity in education (GDE) is still prevalent. This study examines the impact of trade reforms on gender disparity in education using micro data from Pakistan.

Design/Methodology/Approach: The feasible generalized least-squares (FGLS) method is employed for empirical analysis. We used panel corrected standard errors (PCSEs) for robustness checks.

Findings: The analysis reveals that a reduction in import tariffs is associated with GDE. Trade liberalization gives rise to gender disparities. We added several control variables to the baseline model for robustness checks. Regarding the control variables, average family wage income, family size, urbanization, female-to-male labor force participation and the female share of the total labor force are identified as important determinants of GDE in Pakistan.

Originality or Value: This study contributes to the existing literature by studying the relationship between trade liberalization and gender disparity in education in Pakistan and employing a better measure of reductions in import tariffs for trade liberalization. We construct a provincial liberalization index. Second, this study takes into account the whole trade regime as a sample period (i.e., from 1990-2005) to assess the impacts of the trade regime as protection rates significantly reduced through this regime. Third, we measure the gender gap in education by comparing males and females' average years of schooling as opposed to previous studies that used secondary school enrolment ratios as a proxy for the gender gap in education. Fourth, we used panel data to explore the impact of trade liberalization on gender disparity in education for empirical analysis.

Keywords: Educational inequality, Gender disparity, Pakistan, Panel data analysis, Provincial liberalization index, Trade reforms.

1. INTRODUCTION

Trade liberalization and market access have been emphasized in the trade policies of developing countries in the past three decades. The Washington Consensus held that free trade combined with the freedom of investment recreation, deregulation of the private sector and financial laissez-faire and denationalization of state-owned corporations and services would promote the process of continuous economic expansion and advancement of productive capabilities in the 1990s (Busse & Spielmann, 2006; Miljkovic, de Miranda, Kassouf, & Oliveira, 2018; Rice, 2010; Wamboye & Seguino, 2015; Watch, 2011). The impact of trade openness on gender disparity is inconclusive in the existing literature (Ahmed & Hyder, 2006; Busse & Spielmann, 2006; Naranpanawa & Arora, 2014; Wamboye & Seguino, 2015).

National governments worldwide are gradually realizing the strategic importance of education in enhancing and sustaining international competition as well as its crucial role in ensuring long-term economic and social sustainability as the unlimited force of globalization affects all aspects of socioeconomic life (Robbins, 2003). Economists view trade openness as an opportunity to achieve a more efficient allocation of resources and increase employment levels. Although trade theoreticians frequently emphasize the potential benefits of trade expansion to the economy as a whole, they also emphasize that not everyone benefits equally (Elson, Grown, & Van Staveren, 2012). Gender is exposed to trade openness in different ways (Fontana, 2003; Ghiara, 1999; Kucera & Milberg, 2000). Though the influence of the liberalization of trade on numerous aspects of women's well-being and education has been widely discussed, its importance is sometimes ignored (Elson et al., 2012).

A basic Heckscher-Ohlin or Stolper-Samuelson model suggests that when a skill-deficient developing country liberalizes its economy, the total return to skills, together with its motivations for schooling will drop (Wood & Ridao-Cano, 1999). The relative factor supply outcome is taken into account when determining a country's initial education level. On the other hand, trade reflects the relative factor demand effect rather than skill-biased technical adjustment (Acemoglu & Pischke, 2001). The return of education, the allocation of real income, wages, and changing relative prices are possible channels through which trade liberalization operates (Goldberg & Pavcnik, 2005).

Gender disparities are a crucial element of overall inequality (Bussolo, Freije, Djiofack, & Rodríguez, 2011). Numerous studies have found that there are still significant gender gaps despite recent improvements (Alderman & King, 1998; Berik, Rodgers, & Seguino, 2009; Ferrant, 2010; Seguino, 2000). For example, adult females account for 56 percent of all (male and female) adults without a formal education in the developing world and only 46 percent of those with a secondary or higher education (Bussolo et al., 2011). As a result of these discrepancies, males and females cannot benefit equally from the opportunities generated by trade openness (Filmer, 2000; Marcoux, 1998; Michael, 1983).

Feminist experts opine that gender is a crucial macroeconomic variable and that gender relations can affect economic advancement and growth (Seguino, 2000). Although a few previous studies have suggested that gender disparities in education could boost economic expansion (Barro & Lee, 1994), subsequent studies have shown that this is not the case (Alderman & King, 1998; Dollar & Gatti, 1999; Hill & King, 1995; Klasen, 2002). As gender effects are multifaceted, the effects of trade openness on gender disparities in a country might be either positive or negative depending on the situation (Busse & Nunnenkamp, 2009; Miljkovic et al., 2018; Siddiqui, 2009). Alternately, Busse and Spielmann (2006) point out an extremely strong positive link. Less gender disparity in educational attainment is positively linked to comparative advantage. Even if openness encourages trade and growth, women may not benefit in an absolute or comparative sense (Wamboye & Seguino, 2015). Gender equality has long been a priority for the international development community. According to the UN Millennium Development and Sustainable Development Goals, gender inequality in primary and secondary school attendance would have been eliminated at all levels of education by 2015 (Bank, 2001).

Education is the most significant instrument for human resource development (Baliamoune & McGillivray, 2015; Robbins, 2003). It has evolved into a global human right and a critical component of women's potential and empowerment (Busse & Nunnenkamp, 2009; Klasen, 2002). Women will be less educated and as a result, less skilled if there is a gender influence in education. Lower levels of human capital may have an adverse impact on the growth rates of gross domestic product (GDP) (Busse & Spielmann, 2006; Dollar & Gatti, 1999; Hill & King, 1995). Furthermore, disparities in obtaining resources particularly in education may limit the educational development of future generations and advancement in people's well-being in a large number of developing countries (Busse & Spielmann, 2006; Klasen, 2002).

The returns to education for women and human development outcomes such as health, child endurance and schooling are frequently greater than those for men when the level of female education rises (Bank, 2001; Hill & King, 1995; Schultz, 2014). The majority of research in this field explains the impact of gender disparities in education on economic growth (Dollar & Gatti, 1999; Lagerlöf, 2003), economic advancement (Klasen, 2002) and earnings (Galor & Tsiddon, 1996). These studies have not shown the impact of trade on gender disparities in education and health (Fatema, Li, & Islam, 2017) and yet, only a small amount of literature on the relationships between trade liberalization and gender disparities in education is available. Due to this gap in the literature, the authors believe that it is crucial to examine the connection between trade liberalization and gender disparity in education. This study therefore fills the gap in the literature by explaining the relationship between trade

liberalization and gender disparity in Pakistan's education system. Gender disparities in Pakistan can be observed through labor market separation, resource distribution across households and public service delivery, such as health care (Ahmed & Hyder, 2006). However, Pakistan has made little progress in closing the gender gap in education (Chaudhry, Malik, & Faridi, 2010).

Our study contributes to the current work in Pakistan in the following ways: first, we use declines in import tariffs as a proxy for trade openness which is a better measure than trade ratios used in previous studies (Ahmed & Hyder, 2006; Chaudhry et al., 2010; Farooq, Chaudhry, Khalid, & Tariq, 2019) to examine the impact of trade liberalization on gender inequality. Second, we measure the gender gap in education by comparing males and females' average years of schooling as opposed to previous studies that used secondary school enrolment ratios as a proxy for the gender gap in education (Ahmed & Hyder, 2006). Third, in contrast to previous studies that used time-series data (Ahmed & Hyder, 2006; Chaudhry et al., 2010), we used panel data to explore the impact of trade liberalization on gender disparity in education. Fourth, we used the real trade openness regime (i.e., 1990-2005) for this investigation.

1.1. Theoretical Framework

From a long-term perspective, the influence of openness strategies on gender findings may be of concern, as there is growing evidence that empowering women increases education and improves children's outcomes (Duflo, 2003; Juhn, Ujhelyi, & Villegas-Sanchez, 2014; Qian, 2008; Thomas, 1990). Two mainstream theories of international trade can be used to explain the impact of trade openness on gender imbalance (Fatema et al., 2017).

According to the Heckscher-Ohlin theory, countries should focus on producing commodities for which they have plentiful factors of production. This theory argues that developing countries will produce labor-intensive products because of their comparative advantage in unskilled labor. According to the Stolper-Samuelson theory, free trade benefits the owner of abundant factors. Trade openness will benefit workers in countries where labor is plentiful. Working women who make up a large portion of the overall unskilled labor force in less developed countries (LDCs) gain more than men employees in developing countries, the gender gap in the labor market would decrease. Furthermore, boosting female participation will increase their earnings which will increase their ability to spend on health care and education. As a result, trade liberalization improves women's health and education levels. Trade increases the government's revenue, allowing it to spend more on health, education and other social services (Fatema et al., 2017).

As a result of the rapid growth effect of trade on education, many bilateral, regional and multilateral trade agreements have integrated provisions on trade and investment in education services which together make up the legal and institutional framework defining and controlling the openness of trade in educational services. The World Trade Organization administration's General Agreement on Trade in Services (GATS) provides the first multilateral framework for global trade and investment in services including educational services. Most LDCs face both challenges and opportunities as a result of these significant new trends in education in the global environment which include disparities in access, issues of quality education, the need to increase education sustainably and static governance structures and controlling practices (Xing & Zhou, 2018).

Gender imbalance is detrimental to per capita business income and the various quality of life improvements that come with it. There appears to be no consensus that gender disparities in education are more prevalent in low-income countries and among low-income individuals within countries (Baliamoune & McGillivray, 2015; Bank, 2001). Gender disparities in education reduce the benefits of high female education to society. According to the World Bank, the provision of more opportunities to females in terms of education, good health, property ownership, credit, work opportunities and political empowerment initiates a ' virtuous cycle' for their households and the country (Hamid & Ahmed, 2011).

It can be difficult to distinguish the influence of gender disparities in education, occupation and wages. Gender differences in one aspect tend to lead to gender differences. Gender disparity in education may automatically lead to a gender gap in the labor market particularly in the formal sector because employers will favor educated applicants and ignore the uneducated ones. Consequently, the gender gap in education and employment is nearly inextricably linked (Klasen & Lamanna, 2009).

2. HUMAN CAPITAL STATUS OF PAKISTAN

The state of human capital in Pakistan is not the best in the world. The average year of education for an individual was only 4.7 years in 2013. The high merit of education is much reduced since the individual's ability to read or create his name is additionally taken into consideration as being literate. One can imagine the position of human capital in Pakistan. In addition to the high merit, the number of years of education is similarly relatively reduced in contrast to the maximum possible of 12.9 years in the U.S.A. as well as Germany.

The World Economic Forum's (WEF) most recent step on human resources ranks Pakistan 112 out of a total of 122 nations demonstrating the country's low level of human capital. According to the UNDP (2010) report, Pakistan is ranked 120 out of 146 countries on the Gender-related Growth Index (GGI) and 92 out of 94 countries on the Gender Empowerment Measurement (GEM). The country intended to attain Millennium Development Goals and eliminate gender inequality at all levels of education and learning in 2015. However, the gender gap still exists in each of its four districts. Significant gender differences in both skills and academic achievements are especially observed in Pakistan's rural and urban areas. In light of this phenomenon, research on gender disparities in education is necessary.

Gender bias in education and learning can be measured in various ways such as gross and net enrolment rates as well as completion and dropout rates. Gender disparities in education are measured in Pakistan using primary secondary enrolment ratios, the gap in girls-to-boys primary education enrolment ratios, adult literacy rates, the ratio of female to male schools and the number of female teachers per school as well as net school enrolment and women's share of teachers (Ahmed & Hyder, 2006; Chaudhry et al., 2010; Fatema et al., 2017).

Many researchers have calculated the average year of education to measure gender disparity in education and learning. However, in Pakistan, Imran (2015) is the first researcher to have estimated the mean years of schooling (MYS) for both boys and girls at the district and town level for the Punjab province. At the national level, the average year of schooling has not yet been used to measure gender disparity in education. Measures of gender disparity in education that consider the age of 25 and above may be more reliable because the average years of schooling for this age group are minimally impacted by other variables. Using years of schooling captures the average years of education of the youthful population group as compared to the measure of gross enrolment ratio. Nonetheless, using years of schooling entirely implies that all mature group members have these average figures and that differences in years of schooling among the group are meaningless. The remaining measure of education inequality reduces these disparities to a limited extent.

 There is a need to calculate the average year of schooling at the national level and analyze its relationship with trade openness. The removal of gender differences at all levels of education requires a higher allotment of resources for female education.

3. TRADE POLICY IN PAKISTAN

Pakistan has adopted an import substitution program to shield its fledgling industries since 1997 (Siddiqui, 2009)**.** In 1980, Pakistan implemented trade openness by removing non-tariff barriers (licensing and quotas) and replacing them with tariffs. It adopted a more open and liberal trading strategy in the 1990s (Siddiqui, 2009)**.** During the period of openness, all prohibitions on imports into the country were abolished with the exception of those prohibited for religious or health reasons. Import tariffs as well as the number of tax brackets were reduced. As a result, Pakistan's effective rate of protection (ERP) decreased from 42.5 percent in 1990 to 27.4 percent in 2002 (Siddiqui, 2009) and Pakistan's trade deficit decreased from US\$3.12 billion in 1995 to US\$0.83 billion in 2003-2005 (Siddiqui & Iqbal, 2005).

The strategy assisted in increasing exports despite the fact that few changes were made to compensate for the lack of revenue in the 1990s. The trading strategy of the 2000s was to urge the nation to export more while keeping government and high-class concerns in mind. The strategy's main goal was to minimize anti-export discrimination through a complete limitation on tariffs resulting in more sustainable exports and stronger economic expansion based on market forces. Policymakers worked hard and employed a variety of exchange and monetary policy instruments to encourage trading and add value to the goods and services that were exported in order to boost export earnings. In 2010, the current account balance became surplus due to encouraging remittances and strong export growth due to the positive terms of trade (TOT) shock which offset the strong import growth and stable exchange rate. The 2010 trade strategy sought to strengthen the export sector by

promoting export-oriented leather and textiles. Export growth is still widely spread with almost all sectors experiencing substantial positive growth (Umer, 2014).

4. EDUCATION SYSTEM IN PAKISTAN

Pakistan still has a gender imbalance in education due to the country's social, demographic, cultural and economic problems (Chaudhry, 2007). There are long-standing difficulties with quality, access and equal opportunities at all levels of education in Pakistan. Pakistan has a long history of ineffective reforms and academic advancement programs. The National Commission on Education published a report in 1959 that outlined the problems with Pakistan's educational system and proposed solutions. In general, the difficulties raised in that report have remained unresolved throughout Pakistan's educational strategies of 1970, 1972, 1979, 1992 and 1998. Such challenges have prompted the continuation of 5-year progress initiatives aimed at resolving issues in the academic sector in addition to broader progress efforts (Aziz et al., 2014).

According to Pakistan Economic Survey data, men have outperformed their female counterparts in terms of education and enrolment rates at the primary and secondary levels. According to the 2005 education census, the state had 227791 academic institutions with 25 percent for males and 21 percent for females and a 53 percent gender imbalance in the co-education system. In rural areas, there are 7.6 million females enrolled compared to 11.5 million males. However, the gap in school attendance has narrowed in urban areas with 6.7 million females registered compared to 7.5 million males (Chaudhry, 2007).

Recently, female enrollment in primary and secondary school has increased but still lags behind males with larger urban and rural regional disparities. More than half of the women in rural areas do not attend primary school and more than 70% do not enroll in secondary school (Aziz et al., 2014). Between 2001 and 2007, significant progress in literacy was made across regions and genders. In 2006-2007, girls' literacy increased by 42 percent. During this time, the adult literacy rate also increased. In 2006-2007, the adult literacy rate among people aged 15 and above was 52 percent. In 2006-2007 girls had a literacy rate of 38% while boys had a literacy rate of 65% (Chaudhry & Rahman, 2009).

5. NATIONAL HOUSEHOLD SURVEY

We relate education disparity data to the FBS's annual nationwide labor force survey of Pakistan for the period 1990 - 2005. The labor force survey is a nationwide cross-sectional survey that aims to assemble data on different aspects of the economy. Data on education is collected from LFS across the country. The data are repeated disaggregated-level data that cover the provinces. Some details about the variables are presented in Table 1. The data provide information on educational attainment, trade measures, average family wage, income, urbanization females' share of the total labor force, female to male labor force participation, residual gender wage gap and gender skill discrimination in wage. It provides data on the key variable of interest namely: gender disparity in education which is the ratio of females to males in the mean years of schooling of the population aged 25 and above (education disparity). The sectorial level import tariff data has been extracted from Ul-Haq (2016) and Wu, Ul-Haq, Zafar, Sun, and Jiang (2019). Besides these, numerous control variables are included in the model including average family wage income, urbanization, wage gender discrimination (Oaxaca), female to male labor force participation, family size, skill discrimination in wage and females' share of the total labor force. The data on control variables is from LFS.

6. MODEL DESCRIPTION AND METHODOLOGY

We begin our investigation by assuming the core model used to analyze the influence of trade liberalization on gender disparity is based on human capital literature (Becker, 1962; Mincer, 1974). Human capital variables and globalization indexes are then factored into our model. The explanatory variable in this study is trade liberalization and gender disparity in education defined as the ratio of female to male score for the mean year of schooling of people aged 25 and above is the dependent variable. We use the 1990-2005 period to capture the process of trade liberalization because it began in 1990 and continued until 2004-2005. Pakistan became a member of the World Trade Organization in the early 1990s leading to the acceleration of its process of trade liberalization. As a result, the years 1990–2005 are ideal for this analysis. The effects of trade liberalization can be thoroughly researched over this 15-year time frame as it allows for significant changes in trade-related variables.

Table 1. Variables' definition.

Variables	Variables codes	Explanation
Gender disparity in education	GDE	Female average year of schooling/male average years of schooling, aged 25 and above (Source: LFS)
Trade liberalization	LIB	Trade openness means a decline in import tariffs. source: (Ul-Haq, 2016; Ul-Haq, Khanum, & Raza Cheema, 2020; Ul-Haq, Wajid, Visas, Cheema, & Abbas, 2022; Wu et al., 2019)
Control variables: Family size	FS	Average family members of the household, source: LFS
Share of the female labor force	FLFP	Total female contribution to the labor force, source: LFS
Urbanization	URBAN	Urban population/total population, source: PBS
Average family wage income	AFWI	Average family wage income is the total wage income earned by all members divided by the total family members of the household who are age 15 and above. source: LFS
Female to male labor force participation	F2M	Total female labor force to total male labor force ratio ages 15-64, source: LFS
GD-RWG residual wage gap	GD-RWG	Gender discrimination in wages, source: LFS
SK-RWG residual wage gap	SK-RWG	Skill discrimination in wages, source: LFS

The basic model is given as:

$$GDE_{pt} = \beta_0 + \beta_1 LIB_{pt} + \beta_2 X_{pt} + \varepsilon_{pt} \qquad (1)$$

Where GDE_{pt} is the gender disparity in education in province p at time t. Following Barro and Lee (2000); Busse and Nunnenkamp (2009); Ganguli, Hausmann, and Viarengo (2014) and Klasen (2002), we measure gender disparity in education as the ratio of female to male score for the mean year of schooling in adults aged 25 and above. The vector X_{pt} is a vector of control variables including average family wage income, urbanization, wage gender discrimination (Oaxaca), female to male labor force participation, family size, skill discrimination in wage and females' share of the total labor force. Following Castilho, Menéndez, and Sztulman (2012), we used the approach employed by Topalova (2007) to estimate provincial trade liberalization scales. The LIB is a weighted mean of nationwide sector level protection rates. Equation 2 presents the LIB formula that was used to calculate the provincial openness index.

$$LIB_{pt} = \frac{\Sigma k \, (Lpk1990 \times Tariffkt)}{Lp1990} \qquad (2)$$

LIB_{pt} is an openness index of province p at time t. $Tariff_{kt}$ is the tariff on industry k at time t. L_{pk1990} denotes the labor force in industry k in 1990 in province p. L_{p1990} denotes the total labor force in province p in 1990.

We evaluate the influence of trade openness on gender disparity by adopting the model of trade liberalization in Pakistan. In this study, the decline in import tariffs is used as a measure of liberalization which is a better criterion than the trade ratios used in past studies. It is common for LDCs to over-invoice imports and Pakistan is no exception (Bhagwati, 1964; Lane, 2008; Mahmood, 1997; Mahmood & Azhar, 2001; Sheikh, 1974). Using the trade ratio as a proxy for trade openness does not capture its true effect. Therefore, we used import tariff declines that are superior to those used in previous studies (Edmonds, Topalova, & Pavcnik, 2009; Pinelopi Koujianou Goldberg & Pavcnik, 2003; Wu et al., 2019).

6.1. Descriptive Statistics

The descriptive statistics of trade liberalization, gender disparity in education, average family wage income, urbanization, wage gender discrimination (Oaxaca), female to male labor force participation, family size, skill discrimination in wage and women's share of the total labor force are given below. It consists of the number of observation, the minimum, maximum and standard deviations of all variables. Table 2 presents the descriptive statistics of the variables:

Table 2. Descriptive statistics.

Variables	Obs.	Mean	Std. dev.	Min	Max
LIB	44	19.19	9.893	4.914	35.044
GDE	44	0.535	0.063	0.426	0.639
FLFP	44	0.093	0.059	0.013	0.236
F2M	44	0.107	0.076	0.012	0.309
SK-RWG	44	0.420	0.187	0.224	1.039
GD-RWG	44	0.295	0.181	0.004	0.896
AFWI	44	8.015	0.313	7.36	8.58
FS	44	7.905	0.735	6.68	10.05
URBAN	44	0.414	0.043	0.341	0.465

Following Hanif, Arshed, and Aziz (2020); Hassan, Bukhari, and Arshed (2020); Shi, Visas, Ul-Haq, Abbas, and Khanum (2022); Ul-Haq et al. (2020) and Ul-Haq et al. (2020) , we make use of the generalized least squares (FGLS) method to inspect if the link between trade liberalization and gender disparity exists or not. The FGLS approach is better than the panel corrected standard error (PCSE) and fixed effect (FE) strategies due to the fact that it addresses concerns of heteroscedasticity as well as first order autocorrelation (Beck & Katz, 1995; Hanif et al., 2020; Hassan et al., 2020; Maddala & Lahiri, 2006).

FGLS is used when the cross-sectional variability of the model is likely to influence the standard errors of estimates rather than intercepts (in repaired or arbitrary impact designs) or slopes (in arbitrary coefficient designs) (Greene, 2008; Maddala & Lahiri, 2006). This design allowed for the existence of cross-sectional autocorrelation, cross-sectional heteroscedasticity and time series autocorrelation by adjusting the difference-covariance matrix which appropriately provides cross-sectional-specific standard errors of coefficients.

Existing research has used a panel feasible generalized least squares (FGLS) design where the distinctions in the random samples (unobserved heteroscedasticity) are integrated using variations in the standard errors of the estimates (Davidson & MacKinnon, 1993). The FGLS performs better in controlling heteroscedasticity than competing designs like the panel fixed effect (FE) and panel random effect (RE) models where cross-sectional differences are only described by changes in intercept (Hassan et al., 2020). Beck and Katz (1995) suggested that the FGLS version is more reliable than the PCSE and FE models. This research employs feasible generalized least squares (FGLS) in a panel setting to address the issue of heteroscedasticity. The FGLS proposed by Parks (1967) and Kmenta and Klein (1971) is appropriate for empirical examination when T > N, so we employed the FGLS as N = 4 and T = 11 in our dataset. As our focus is on mini information, stationary is not an issue (Servin-Gonzalez & Torres-Reyna, 1999).

7. RESULTS AND DISCUSSION

Table 3 displays the results of the relationship between trade liberalization and the gender gap in education in Pakistan. Empirical evidence indicates that variables related to trade openness, public strategy and income play a significant role in characterizing changes in gender disparity. The regression results in Table 3 indicate that there is a statistically significant relationship between trade openness and gender disparity in education. The trade liberalization coefficient is positive and statistically significant at the 1% level. Pakistan's trade openness has a positive and statistically significant relationship with gender disparities in education. This panel study not only provides the additional advantage of having more observations but it also allows us to examine the temporal relationships, i.e. it takes into account the evolution of both the dependent and independent variables. Inequity in the distribution of educational resources is primarily responsible for gender gaps in school completion (Ahmed & Hyder, 2006).

The positive sign of the trade openness coefficient corresponds to the theoretically predicted results. Gender disparities in education exist in all developing countries. In the last three decades, gender disparity in education has dramatically increased in LDCs (Bank, 2001). In developing countries, gender enrolment disparities are greater than in developed countries. The reasons for gender disparities in education are influenced by the decisions of households. The primary reasons for low investment in female education are societal choices such as culture and customs, the absence of additional parental benefits from female education, early marriages and low or negative

returns from female education (Alderman & Gertler, 1989; Dollar & Gatti, 1999). Pakistan is a male-dominated society with gender as a guiding factor (Ur Rahman, Chaudhry, & Farooq, 2018).

Table 3. Trade liberalization and gender disparity in education.

Variable	FGLS model	PCSE model
LIB	0.027***	0.024***
	(0.005)	(0.004)
Constant	-0.299**	-0.214
	(0.149)	(0.152)
N	44	44
Wald test	33.89	25.89
P-value	0.000	0.006

Note: Gender disparity in education (GDE) is the dependent variable in the estimation. Standard errors are displayed in parentheses, *** $p<0.01$, ** $p<0.05$ are levels of significance at 1% and 5% respectively. Number of observations: N= 44 in all cases. Column 1 is estimated using GLS. Column 2 is estimated using PCSE.

Based on the FGLS estimation, a 1% reduction in LIB (import tariff) is associated with a 0.02 percentage point (0.0268) rise in gender inequality in education. In Pakistan, trade liberalization does not reduce gender disparities. The findings support (Ahmed & Hyder, 2006; Arora, 2012; Baliamoune & McGillivray, 2015) and contrast (Bussmann, 2009; Iqbal, Mughal, Aslam, Khan, & Mohmand, 2020; Korinek, 2005; Sajid, 2014; Yamamura, 2016). Pakistan has made steady but slow progress in terms of the Gender Parity Index (GPI) which measures the ratio of female to male students enrolled in school. In Pakistan, the current level of gender inequality in primary and secondary education is a result of low enrolment and higher dropout rates for females. Female school attendance is influenced by numerous factors which include the direct and indirect costs associated with education, the size and quality of school services and the size of the family (Hamid & Ahmed, 2011).

7.1. Robustness Check
We added several control variables to the baseline specification to check the robustness of our findings. The results are presented in Tables 4 and 5. The control variables include: socio-economic causes of gender inequality in education, family size, urbanization and average family wage. Several studies have found a negative relationship between the number of siblings and various education measures particularly in Asia (Lloyd, 1993). An increase in family size is often linked with a decrease in the likelihood of attending school. A negative relationship between family size and children's education has also been established for Thailand (Knodel, Havanon, & Sittitrai, 1990; John Knodel & Wongsith, 1991). Chishti and Lodhi (1988) revealed that the decision to attend school was influenced by the student's gender and family size and had a negative impact on school enrollment.
Using the binary Probit model to investigate school enrollment in China, Connelly and Zheng (2003) found that boys have a higher likelihood of enrolling in school than girls. However, Eloundou-Enyegue and Davanzo (2003) observed that family size does not affect the educational differences among females and males within families in Cameroon. Baluch and Shahid (2008) demonstrated that school distance and family size were positively related to educational accomplishment. In terms of gender, empirical results show that household size has a negative influence on females' educational achievement than males' in Pakistan.
Although the role of education in addressing urbanization concerns has been widely acknowledged (Wolff & Gordon, 2008), education disparities among urban dwellers continue to be significant (Camp-Yeakey, 2012). One of the major issues faced by new urban residents is equal education opportunities for their children (UNICEF, 2015). As more rural migrants move to cities, their education and the effects of the disparity between rural and urban residents become critical. Females benefit from urbanization in various ways, including increased access to education, livelihood, health, credit or coaching for ambitious skills and high-paying career opportunities (Sylvia Chant & McIlwaine, 2013; Gillani, Shafiq, & Ahmad, 2019). According to Kar and Somani (2008), urbanization raises educational levels which leads to women's empowerment and self-sufficiency.
However, in Pakistan, urbanization presents both positive and problematic consequences. It helps the country's sagging economy; it also places a huge strain on an already overburdened labor market, severely limiting the country's ability to provide basic services in cities. The urban environment presents great obstacles, inequalities

and insecurity for women (Evans, 2015; Reichlin & Shaw, 2015). In urban areas, women do not receive the same benefits as men. Although urban environments provide educational benefits in comparison to rural areas, there are still barriers, particularly for girls from low-income urban households. Female education is a low priority especially when domestic income generation is concerned (Chant & McIlwaine, 2015). The absence of space, light, serenity and other amenities in slums severely limits subsequent school studies (Chant & McIlwaine, 2013). This demonstrates the persistent human capital divide in urban areas.

Throughout the first half of the twentieth century, many people saw urban regions as economically active, attracting and employing immigrant citizens from small towns, urban areas and abroad. Nonetheless, urban areas have caused problems for the vast numbers of miserable people and minorities who lived in cities in the second half of the twentieth century. Such negative consequences in urban areas have a significant impact on education and have shaped the nature of urban schooling (Konuk, Turan, & Ardali, 2016).

Table 4. Trade liberalization and gender disparity in education (Robustness check-I).

Variable	(1)	(2)	(3)	(4)
LIB	0.027***	0.009***	0.015***	0.014***
	(0.004)	(0.003)	(0.004)	(0.004)
Family size		-0.073***	-0.061***	-0.071***
		(0.007)	(0.008)	(0.010)
Urbanization			-0.267***	-0.247**
			(0.103)	(0.105)
AFWI				-0.057**
				(0.041)
Constant	-0.299**	0.826***	0.659***	1.196***
	(0.149)	(0.143)	(0.149)	(0.394)
Year indicators	Yes	Yes	Yes	Yes
Wald test	33.89	322.47	402.67	336.37
P-value	0.000	0.000	0.000	0.000

Note: Standard errors are indicated in parentheses, *** $p<0.01$, ** $p<0.05$ are levels of significance at 1% and 5% respectively. The number of observations are N= 44 in all cases. Gender disparity in education (GDE) is a dependent variable in the estimation.

Tables 4 and 5 present the results of the robustness checks. The results indicate that a 1% reduction in the rate of trade protection is associated with a 0.02 percentage point (0.0268) increase in the gender gap in schooling. The implication is that trade liberalization in Pakistan does not reduce gender gaps in education. As shown in column 1 of Tables 4 and 5, the relationship between import tariff reduction and gender disparities in schooling is positive and statistically significant at the 1% level. To demonstrate the robustness of our results, we also included additional control variables in Equation 1 including average family wage income, urbanization, wage gender discrimination (Oaxaca), female to male labor force participation, family size, wage discrimination in skill, female labor force share, urbanization and AFWI. Any decrease in AFWI will exacerbate the gender disparity in education. The outcomes of our robustness check are similar to those of Akhtar (2012); Gillani et al. (2019) and Siddiqui and Iram (2007) for family size, Chant and McIlwaine (2015) and Reichlin and Shaw (2015) for urbanization. There is a negative relationship between family size and children's schooling in all cases (Akhtar, 2012; Gillani et al., 2019; Knodel et al., 1990; Knodel & Wongsith, 1991; Siddiqui & Iram, 2007).

Gender disparity in education is projected to be positively associated with the share of FLF and the female or male ratio. The results of the robustness checks presented in Table 5 reveal that the female labor force participation rate and the female or male ratio are significantly positively related to gender disparity in education. The findings demonstrate that when female labor force participation rates rise, the gender gap in schooling between men and women decreases. Higher educational achievement has enabled women to increase their labor force contribution over time. As a result, their anticipated benefits from increased educational investment have encouraged them to plan careers rather than working and being the "alternative worker" in the household (Goldin, 2006). A rise in female educational achievement is expected to be linked with more female labor force contributions (Ganguli et al., 2014). As far as gender disparity in education is concerned, it appears that the gender gap in labor force contribution will continue to narrow (Ganguli et al., 2014). The coefficient of the gender residual wage gap (GD-

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RWG) is positive and statistically significant. The European Commission notes that education is the most important factor that describes the income gap between women and men (Mussida & Picchio, 2014). The coefficient of the gender residual wage gap in skills (SK- RWG) is negative and also statistically significant.

Table 5. Trade liberalization and gender disparity in education (Robustness check-II).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LIB	0.026***	0.007**	0.007**	0.007**	0.010***	0.010***	0.023***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.005)
Family size		-0.077***	-0.078***	-0.076***	-0.077***	-0.076***	
		(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	
Share of FLF			0.208**				
			(0.085)				
Female/Male		0.153**		0.163**			
		(0.065)		(0.065)			
GD RWG			0.051**	0.051**		0.058***	0.083**
			(0.026)	(0.025)		(0.022)	(0.034)
SK RWG					-0.107***	-0.111***	-0.095***
					(0.033)	(0.028)	(0.035)
Constant	-0.299**	0.904***	0.893***	0.886***	0.854***	0.853***	-0.183
	(0.149)	(0.141)	(0.140)	(0.139)	(0.142)	(0.135)	(0.151)
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Test	33.89	265.17	284.11	287.74	306.53	388.63	42.99
P-Val	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: Standard errors are indicated in parentheses, *** $p<0.01$, ** $p<0.05$ are levels of significance at 1% and 5% respectively. Numbers of observation N= 44 in all cases. Gender disparity in education (GDE) is the dependent variable in the estimation.

8. CONCLUSION

Pakistan still has a gender disparity in education due to the country's social, demographic, cultural and economic issues. In Pakistan, there are various problems with quality, access and equal opportunities at all levels of education. The current level of gender inequality in Pakistan's primary and secondary education is due to the low enrollment and higher dropout rates of females. Female school enrolment is influenced by numerous factors such as the direct and indirect costs of education, the size and quality of the school and the size of the family. This paper examines the relationship between trade liberalization and gender disparities in Pakistan's education system. We find a statistically significant correlation between trade liberalization and gender education gaps in Pakistani cities. To test the robustness of our findings, we include average family wage income, urbanization, wage gender discrimination (Oaxaca), female to male labor force participation, family size, wage skill discrimination and women's share of the total labor force as control variables. The results indicate that trade liberalization has a significant effect on the gender gap particularly in the area of education. The majority of gender disparities in educational achievement can be attributed to unequal access to educational resources. The positive sign of the trade openness coefficient corresponds to theoretically anticipated outcomes. In developing countries, gender enrollment disparities are greater than in developed countries. The primary reasons for low investment in female education are cultural preferences, the absence of additional parental benefits from female education, early marriages and low or negative returns from female education.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the conception and design of the study.

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