

## Does trade liberalization increase child labor in rural Pakistan? A rural perspective

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**Abstract:** Trade liberalization has differentiated effects on the regions (i.e., urban and rural). Concerning regional importance, we investigate the association between trade liberalization (TL) and child labor (CL), with special emphasis on rural areas, using micro-level data from 1990-2005 in rural Pakistan. Our estimation approach analyzes geographical differences in the effects of trade policy through province-level exposure to a reduction in import tariffs. We construct provincial panel data for the investigation of the liaison between trade liberalization and child labor in rural Pakistan. The feasible generalized least-squares (FGLS) method is utilized for empirical analysis. Pakistan is related to trade liberalization and the prevalence of child labor in rural areas. In Pakistan, trade liberalization has given rise to child labor in rural regions. It might be the reason that children who are living in rural areas assist their parents with household chores and on-farm. In rural Pakistan, trade liberalization leads to a rise in child labor. Our results hold up well against a range of control variables. The policy implication of the study is that the government should provide free education programs and packages to the poor, especially in rural areas, for the survival of their lives and then parents should send their children to school instead of work.

**Keywords:** Child labor, Income inequality, Poverty, Rural Pakistan, Trade liberalization.

### 1. Introduction

The impact of trade liberalization on child labor in poor, especially agricultural economies, has stimulated a heated debate. Some studies demonstrate that liberalization of trade enhances the income of the household and therefore reduces the CL incidence (e.g., [1, 2]), whereas others contend that openness to trade enhances the demand for the product and generates employment opportunities for the unskilled CL, leading to a larger incidence of CL [3]. Based on available evidence, the findings of the net effect of openness to trade on CL are mixed [4].

The new millennium has seen increasing concern about the welfare of children as CL is growing in developing countries [5-7] and because it has longer impacts on human-capital accumulation and the development of the country. Moreover, CL is depicted in the eminent press as a rising issue driven by trade openness [8]. TL (measured by a policy-based proxy of import tariffs) is positively related to child employment [9] in India, as well as having a negative impact on CL [4] in China. In rural China, more than 70% of the population is working as a fisherman or farmer, and in all sectors that relate to the non-skilled worker, rural areas are usually much poorer as compared to their urban counterparts. Although the public pays more attention to the elimination of manufacturing CL, the larger portion of CL occurs in the agriculture activities of rural areas [10], and the population derives a larger portion of the income from the agriculture sector in developing economies.

In Pakistan, children perform labor in all sectors, especially home-based work, as well as in the informal sector [11]. According to the Child Labor Survey, in Pakistan, the distribution of CL is as 72%

CL active in rural areas in agriculture sector and only 11% in manufacturing, 9% in the trade sector, and 8% in the service sector [12]. CL tends to be larger and comes from rural areas and households with a larger size and lower income per capita.

However, TL has different impacts on CL across the regions (i.e., urban & rural). As Edmonds, et al. [1] find the tariff reduction effect on the decrease of CL and schooling increase, this effect is smaller for rural areas as compared to urban areas. The other micro-study explored that CL increased both in urban and rural regions during the boom of the coffee sector. Kruger [13] and Robertson [14] suggest that a reduction in tariffs has positive effects on income and declines poverty, eventually leading to a reduction of CL in rural regions. Overall, TL has both a negative and a positive sign for urban and rural CL, and it depends on the country's position. So, these indications show that TL has different impacts across regions, and a major part of CL exists in rural areas. Therefore, there is a crucial need to examine the existing situation of CL in rural areas. Our study focuses on rural areas of Pakistan to investigate the TL impacts on CL.

The findings of our study are that in rural areas, we found an increasing trend of CL due to TL. The 1 percentage point decrease in import tariffs leads to an increase of 0.09 percentage points in CL. Our results are robust and insensitive to the inclusion of other controls. The findings of our study are consistent with those of Zhao, et al. [4] and contrast with those of Robertson [14] for rural areas.

Our research contributes to the existing research in many ways: Firstly, to explore the TL impact on the CL in rural regions of Pakistan<sup>1</sup> using micro-level data from rural Pakistan. Second, we are utilizing the reduction of import tariffs as a proxy of TL to the best of my knowledge, which is a better proxy in comparison to past ones (i.e., trade ratios are used in the studies of Iram and Fatima [16] and Nawaz, et al. [17] in the case of Pakistan). Third, to address the existing inconclusive empirics about the TL impacts on CL, we are utilizing a more disaggregated dataset (i.e., panel data at the provincial level) as compared to existing work (utilized annual data) for the analysis. Fourth, our study employed the TL regime (1990-2005) for our empirical analysis.

The labor market flexibility helps more in describing the employment status of the labor market relative to trade policy. For the reason that no significant change arises throughout the sample period in regulations of the labor market, it provides an exclusive case for exploring the TL impacts on CL. We may possibly expect that it shows the pure TL policy impacts on children's employment because the regulations have a minimal role during TL [18].

This study is organized as: Section 2 offers the theoretical framework of the study. Section 3 describes the dataset. Section 4 gives the methodology. Section 5 discuss results and the last section is about the conclusion.

## 2. Theoretical Background

Theoretically, when economies are opened, reducing their trade barrier affects the child's labor in an economy. According to Ricardo-Heckscher-Ohlin-Samuelson traditions, trade openness results as countries increase the production of the goods for which they have a comparative advantage. In less developed countries, there is generally a relative gain in the production of labor-intensive goods, so the production of those goods should increase as a result of trade openness. When labor-intensive comparative advantage industries indirectly make use of CL, then resource reallocation may raise the demand for CL. Opposed to an argument, the debate is that trade openness enhances the reward of factors of production (FOP) that are used intensively to produce goods in which they have a comparative advantage in the world economies. This shows that free trade in developing countries makes labor better off, as it increases the unskilled worker's wage. This, in return, increases CL.

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<sup>1</sup> As the study of Ul-Haq, et al. [15] investigated the trade liberalization impact on child labor in the urban regions of Pakistan. But the majority of the population lives in rural areas, and most of the child labor exists in rural areas as compared to urban areas [12]. Therefore, it is crucial to study the effect of trade reforms on rural child labor.

Considering the mechanism by which child employment is affected by TL, we proceed as reduced import tariffs decreases the protection of a nation. The reducing import tariff alters the final commodity prices. It is assumed that the impact is negative on prices, so the price of traded goods drops as a consequence of trade openness. However, it persuades households to move the direction of their child (substitute) away from the relatively expensive education sector and connect to the working sector. Because these reduced consumption prices increase the real wages of the CL, which makes it an incentives for parents to move away from child schooling [1].

The regions that are highly trade-exposed through larger tariff cuts might be expected to experience (all things remaining the same) a larger fall in product demand and thus more than proportionately fall in the wages. However, the other scenario could also be possible where the wages of the child increase. For instance, due to the loss resulting from protection, employment may shift to a less skill-intensive industry where CL demand increases.

Assume that trade openness will decrease education returns and increase CL if developing nations like Pakistan have a comparative advantage in goods produced by unskilled labor. The reduction of import tariffs reduced the price of intermediate goods, and this price reduction encourages producers to maximize exports. So, producers increase productivity by demanding more CL, and this will put upward pressure on the child's wage and attract more children.

Generally, CL falls as the income of the family rises, theoretically reasons [19] along with empirics support [20] for working children being specifically responsive to variation in the income that lifts the poor families from poverty. According to Topalova [21], the correlation between poverty and tariff reduction is positive at the district level.

- TL (import tariffs↓) → imported goods price ↓ → real wage of the working child ↑ → CL↑.
- TL (import tariffs↓) → imported goods price↓ → domestic goods demand↓ → domestic product output↓ → nominal wages↓ → demand for CL↓.
- TL (import tariffs↓) → loss of protection → demand for imported commodity↑ → domestic commodities demand↓ → production↓ → demand for labor↓ → skill employment shift towards less skilled labor → CL↑.
- TL (import tariffs↓) → imported goods price↓ → price fall leads to raising the real income of parents → basic needs of households fulfilled → poverty↓ → CL↓.
- TL (import tariffs↓) → intermediate goods price↓ → price fall persuades producers to enhance exports → domestic productivity↑ → CL demand↑ → wages of CL ↑ → child schooling↓ → CL↑.

The relationship between CL and TL is vague in prevailing theory; now empirical analysis can direct us more on this relationship.

### 3. Data and Empirical Strategy

#### 3.1. Variable Definition

A child who is below or equal to the age of 14 is known as child labor and CL is described as the participation of children between the ages of 10 to 14 in the labor force within the rural regions of Pakistan. Following Jameel, et al. [22]; Wu, et al. [18]; Ul-Haq, et al. [23]; and Ul-Haq, et al. [24], we are utilizing the reduction of import tariffs as a proxy of TL to the best of my knowledge, which is a better proxy in comparison to past ones (i.e., trade ratios are used). The Italian expert Corrado Gini made up a measure for income inequality known as the Gini index (GI). It is defined as a ratio of the area between the diagonal and the Lorenz curve to the total area of the half-square in which the curve lies [25]. As well, the most appropriate measures are the Atkinson Index ( $AI_e$ ) and the Generalized Entropy Index (GEI), which cover almost all the characteristics of a good measure. Poverty is the situation in which a person has a low-income level to meet the basic needs of life. As headcount ratio (HCR) measures the proportion of those people whose consumption is below the poverty line instead of the axioms of monotonicity and transferability, whereas the first one is fulfilled by the poverty gap (PG) and the other is square poverty gap (SPG). Average family wage income (AFWI) is the family's total

income produced by whole participants of 14 years of age or older in the same household.

### 3.2. Pakistan Trade Policy

There has been an extensive amendment in Pakistan's trade policy through the period of 1990–2005. When Pakistan opened its economy for the exchange of commodities, major changes were made in trade policy as part of the 1988 Structural Adjustment Programs Zaidi [26]. The import tariffs contraction was unanticipated and continuously varied across sectors [18]. Table 1 describes the tariff descriptive statistics throughout the study time epoch (i.e., 1990 to 2005). The average tariff rate declined gradually from 1990 (63 percent to 13 percent) to 2005. It shows how import tariffs have decreased over time, and this change reflects Pakistan's discussion with the World Trade Organization (WTO) about achieving national minimum tariffs [15, 22, 27].

**Table 1.**  
Tariffs descriptive statistics (Selected years).

Overall	1990	1992	1994	1996	1999	2001	2003	2005
N	18	18	18	18	18	18	18	18
Average	62.43	64.08	50.45	41.07	24.05	19.38	16.05	13.28
Std. dev.	37.55	28.05	20.62	19.53	11.36	10.02	8.19	8.67
Min.	0	0	0	0	0	1.83*	3.5	0.29*
Max.	163.24*	160	120	111.8*	83.52*	60	48.92*	45.71*

**Note:** \*' Point out the Ad-Valorem Equivalence and 'N' displays sectors in a particular year.

**Source:** Wu, et al. [18].

Pakistan liberalized its trade policies gradually by reducing import tariffs and tariff slabs and eliminating non-tariff measures of trading. Throughout the trade regime, the import tariffs diminished, but the most drastic variation took place during the period 1992–1999. Whereas, the most severe reduction of average tariffs across the sectors also altered the Pakistani protection structure.

### 3.3. National Household Survey

For empirical analysis, we connect reductions in protection rates to household-level labor data. We employ the Pakistan labor force (LFS) datasets collected, from 1990 to 2005, by the Bureau of Statistics (BOS) of Pakistan. LFS is a nationwide, representative cross-sectional household survey dataset. The major aim of the LFS is to gather data on a set of comprehensive statistics on several characteristics of the nation's civilian labor. LFS offers labor force data on many aspects of the country. The data on CL was collected from LFS. Table 2 describes the overall description of the variables used in this study.

**Table 2.**  
Descriptive statistics.

Variable	PLIB	CL	AFWI	HCR	PG	SPG	GI	GEI(0)	GEI(1)	AI <sub>ε</sub> (0.5)	AI <sub>ε</sub> (1)	AI <sub>ε</sub> (2)
N	52	52	52	32	32	32	32	32	32	32	32	32
Average	17.733	0.032	7.827	33.32	6.25	1.79	0.23	0.08	0.09	0.04	0.08	0.14
Std. dev.	9.775	0.008	0.318	8.08	2.27	0.86	0.02	0.02	0.03	0.01	0.02	0.03
Min.	4.863	0.018	7.19	20.2	3.23	0.77	0.18	0.05	0.06	0.03	0.05	0.1
Max.	34.945	0.057	8.44	57.05	14.88	5.26	0.26	0.12	0.18	0.07	0.11	0.19

To measure provincial liberalization, we take the data on import tariffs at the 2-digit sector level from the study of Wu, et al. [18] and Ul-Haq, et al. [27]. To calculate tariffs at the province level, we utilized the PLIB indicator by following Topalova [28], whose details are given in the empirical strategy. To check the robustness of our baseline findings, our study utilized several other variables as control, such as poverty (HCR, PG, & SPG), income inequality (GI, GEI, & AI<sub>ε</sub>), and the AFWI. If you want to do

robustness checks on poverty and income inequality, you can use data from the Household Income and Expenditure Survey as well as data on AFWI from [Cheema and Sial \[29\]](#) and [Cheema and Sial \[30\]](#).

### 3.4. Child Labor: Prevailing Situation

Pakistan is a developing country in which CL is prevalent to a larger extent. In Pakistan, the Human Rights Commission estimates that in the 1990 labor force, 10.2 percent of CL were under the age of ten. According to the Federal Bureau of Statistics in 1996, 8.3 percent of children aged 5–14 did full-time work [\[31\]](#), and 6.7 percent of children aged 10–14 are prevailing according to the labor force survey (henceforth LFS) 2014–15 in Pakistan [\[32\]](#). Pakistan implemented 34 conventions in total, including eight fundamental conventions of the ILO [\[15, 33\]](#).

## 4. Empirical Strategy

To empirically study the reduction of import tariffs and the CL using a panel dataset, Following [Shi, et al. \[34\]](#), [Al-Malki, et al. \[35\]](#), and [Jameel, et al. \[22\]](#), we utilized the Feasible Generalized Least Square (FGLS)<sup>2</sup> technique by adopting the share of CL as an explained variable and the import tariff reduction at the province level as the key explanatory variable. We employ the empirical strategy as follows:

$$CL_{pt} = \beta_0 + \beta_1 PLIB_{pt} + \beta_2 X_{pt} + \varepsilon_{pt} \quad (1)$$

$CL_{pt}$  is the child labor in  $p$  province at  $t$  time.  $\beta_1$  is the TL coefficient, and it captures the variation of CL. The PLIB is the crucial variable of our study as a measure of provincial TL.  $X_{pt}$  is a vector of other related control variables that are considered to play a vital role in influencing CL measures such as poverty (HCR, PG, & SPG) and income inequality ( $A_e$ , GEI, & Gini) as well as AFWI. Similar to [Castilho, et al. \[36\]](#), [McCaig \[37\]](#), and [Ul-Haq, et al. \[15\]](#), we utilized the [Topalova \[28\]](#) approach to compute province levels tariffs (PLIB) as a measure of TL. The PLIB is a weighted average of national industry-level tariffs, where weights are based on the number of persons within each region working in various industries expressed as a proportion of the entire workforce in the region at the initial period (i.e., the year of 1990) in the present work. The index to calculate provincial tariffs;

$$PLIB_{pt} = \frac{\sum_k (L_{pk1990} \times \text{Tariff}_{kt})}{L_{p1990}}$$

$PLIB_{pt}$  is the index of provincial liberalization at time  $t$ .  $\text{Tariff}_{kt}$  represents tariffs in industry  $k$  at the time  $t$ .  $L_{pk1990}$  is the number of workers employed in industry  $k$  at the starting point (i.e., 1990 in the unit of analysis in that province).  $L_{p1990}$  shows the total number of workers in the unit of analysis  $p$  for the year 1990. The present study examines the trade reforms' effects on rural CL by using a drop in protection rates as the best measure to study the effect of a pure liberalization regime. Protection rates are better than in the past because existing literature used trade ratios for trade openness. The problems of over-invoicing of exports as well as under-invoicing of imports are a prevailing phenomenon in developing countries, and Pakistan is also in this trap [\[38–41\]](#). Even though the popularity of trade ratio measures, this proxy measures country size as well as integration into globalization instead of trade policy orientation. To end with, the measure of trade ratio would be a profoundly defective proxy to capture the impact of TL. It's hard to prove the claim that the trade ratios vary only in response to trade policy changes [\[40\]](#). Thus, the utilization of import tariffs is one of the essential measures to capture trade policy effects [\[9, 42\]](#). The adoption of import tariffs brings an added advantage over the previously prevailing work in which measures such as export consumption ratio, import penetration, and relative prices were utilized. It is a better-recovering measure than the Sachs and Warner index (SWI) as well as the trade-adjusted ratio (which is a residual obtained by examining the association of openness) for the reason that it is more direct. The main reason for choosing tariffs (even though they denote a policy) is that the likelihoods of error are lower [\[43\]](#).

The FGLS method is employed for the calculation of the parameters of the model's co-variates (TL, CL, and other co-variates) in [Equation 1](#). The FGLS model, in which cross-section variations (unobserved

<sup>2</sup>Based on our panel diagnostics, we are using FGLS model for our empirical analysis.

heteroscedasticity) are collective, uses deviations in beta coefficients as standard errors [44]. The FGLS is better at handling the problem of heteroscedasticity than other methods (i.e., fixed-effect and random-effect models) [34, 45]. Furthermore, due to changing cross-sectional particular standard errors, FGLS can be made robust for cross-sectional dependence (CSD), serial correlation, and heteroscedasticity [44, 46]. The FGLS robust model is as follows:

$$B_{GLS} = (\hat{X}\Omega^{-1}X)^{-1}\hat{X}\Omega^{-1}y \quad (2)$$

$$Var(B_{GLS}) = (\hat{X}\Omega^{-1}X)^{-1} \quad (3)$$

$$\Omega = \sum_{n \times n} \theta I_{T_i * T_i} \quad (4)$$

$$\widehat{\sum_{i,j}} = \frac{\hat{\varepsilon}_i \hat{\varepsilon}_j}{T} \quad (5)$$

Here, during the calculation of the  $\beta$ s coefficients and their standard errors, the identity matrix  $\Omega$  is adjusted to take into consideration the autocorrelation and heteroscedasticity.

## 5. Results and Discussion

We discuss the results of the TL association with CL in this section. The estimated findings of the liberalization indicator (PLIB) on CL are given in Table 3 using the model presented in Equation 1. The findings indicate that CL increased as import tariffs were reduced in rural areas of Pakistan. There is a significant link between the TL and CL in rural regions. The coefficient of the provincial TL variable (PLIB) indicates that the fall in import tariffs increased CL. There is a rise in CL among children who are living in rural areas, the reason being that these children assist their parents in household chores and on-farm [47]. It is interpreted as a fall of 1 percentage point in import tariffs that is connected with the 0.09 percentage point (-0.0009) increase in CL. However, we evaluate a negative association concerning trade policy and CL. Our results are matched by Zhao, et al. [4] and contrast with those of Robertson [14] for rural areas.

**Table 3.**  
Trade policy and rural child labor.

Variable	1	2	3	4
PLIB	-0.001* (0.0005)	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
GI		0.255*** (0.076)	0.246*** (0.080)	0.158* (0.092)
HCR			3.34e-05 (0.0001)	0.0001 (0.0001)
AFWI				-0.014* (0.007)
Time indicators	Yes	Yes	Yes	Yes
Wald statistic	36.08	51.89	50.15	63.05

**Note:** Child labor is a predicted in Feasible generalized least square (FGLS) models. S.E is specified in parentheses. Asterisks indicate significance level i.e., 10 for \*, and 1 for \*\*\* percent. N is 52 observations in column 1 and 32 in columns 2-4. The p-value is less than 0.05 in all models.

To check the robustness of our results, whether our results are robust or not in the case of Pakistan. We add various other control variables to our main model, such as poverty, with its associated measure of headcount ratio, which gives the proportion of those populations whose expenditures or consumptions fall below the poverty line. The headcount index is sensitive to the numbers of poor people, but it is calculated easily. The axioms of monotonicity and transfer are not satisfied by the headcount ratio. However, despite all its defects, it is the most widely used as a measure of poverty [29] and income inequality. Utilizing the Gini index to measure the distribution of income among the people, as used by Cheema and Sial [29], is derived from the Lorenz curve.

These control variables are the major determinants of CL, such as poverty [48], income inequality [49], and AFWI [50], that play an important role in deciding family status [51]. The influencing factors of CL are income inequality and poverty, both of which are positively and significantly associated with CL [52]. However, the affiliation between AFWI and CL is negative. The improvement in family income decreased CL. The evaluations of robustness checks indicate robust findings and are not sensitive, which means these controls do not affect the significance of the protection coefficient or its sign. To sum up, there was an increase in CL in rural Pakistan, which practiced larger tariff cuts.

### 5.1. Robustness Checks

In this section, for the robustness check of our findings, we used various other related variables of poverty and income inequality as the major factors to affect CL. For robustness checks, our study used the PG as well as the SPG, which is the most efficient measure of poverty. It measures the distances that poor people fall from the poverty line and expresses that as a percentage of the poverty line. It measures the mean shortfall in consumption expenditure from the poverty line and shows the depth of poverty. However, it fulfills only the axioms of monotonicity, not transfer axiom. Our robustness check results are in Table 4 and Table 5.

**Table 4.**  
Trade policy and rural child labor (Robustness checks-I).

Variable	1	2	3	4	5	6	7
PLIB	-0.0009* (0.0005)	-0.003*** (0.0009)	-0.002*** (0.0008)	-0.004*** (0.001)	-0.002* (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
PG		3.66e-05 (0.0005)	0.0002 (0.0004)	-0.0001 (0.0005)	0.0003 (0.0005)	-4.41e-05 (0.0005)	-8.59e-06 (0.001)
GEI(0)		0.303*** (0.095)					
GEI(1)			0.174*** (0.047)				
GI				0.260*** (0.079)			
AI <sub>ε</sub> (0.5)					0.199 (0.138)		
AI <sub>ε</sub> (2)						0.214*** (0.076)	
AI <sub>ε</sub> (1)							0.354*** (0.104)
Time indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald statistic	36.08	50.60	57.42	51.93	29.99	44.58	54.19

**Note:** CL is a regress and in above FGLS models. S.E is shown in parentheses. Asterisks indicate significance level i.e., 10 for \*, and 1 for \*\*\* percent. N is 52 observations in column 1 and 32 in columns 2-7. The prob value is less than 0.05 in all models.

The result revealed that our findings are robust with the addition of other controls. The distance that is captured by the PG is taken as the square of that distance in the SPG and shows the severity of the poverty. However, it covers the drawbacks of both measures of poverty, i.e., monotonicity and the transfer axioms [29]. In Table 5, we check the robustness by adding the SPG and another measure of income inequality. The income inequality concept is multifaceted as well as complicated and therefore cannot be perfectly captured with a single measure [53]. We used the GI, GEI, and AI<sub>ε</sub> for income inequality. These measures satisfy approximately all anticipated characteristics of income distribution, such as Pigou-Dalton Transfer sensitivity, Population size independence, Mean independence, Statistical testability, Symmetry, and Decomposability [30].

**Table 5.**  
Trade policy and rural child labor (Robustness checks-II).

Variable	1	2	3	4	5	6	7
PLIB	-0.0009* (0.0005)	-0.004*** (0.001)	-0.003*** (0.0008)	-0.004*** (0.001)	-0.002* (0.0008)	-0.004*** (0.001)	-0.004*** (0.001)
SPG		-0.0002 (0.0012)	0.0004 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
GEI(0)		0.311*** (0.095)					
GEI(1)			0.177*** (0.047)				
GI				0.267*** (0.078)			
AI <sub>ε</sub> (0.5)					0.204 (0.140)		
AI <sub>ε</sub> (2)						0.224*** (0.076)	
AI <sub>ε</sub> (1)							0.363*** (0.104)
Time indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald stats	36.08	51.79	57.90	53.48	30.06	46.14	55.53

**Note:** CL is an outcome variable in above FGLS models. S.E is shown in parentheses. Asterisks indicate significance level i.e., 10 for \*, and 1 for \*\*\* percent. N is 52 observations in column 1 and 32 in columns 2-7. The p-value is less than 0.05 in all models.

The correlation between CL and poverty is significant and positive. It may be because a large part of the population lives in rural areas. So, our results are matched with those of [Jayaraj and Subramanian \[54\]](#) and [Akarro and Mtweve \[55\]](#). While the cases in which poverty is negatively related to CL are also matched with the studies of [Ray \[56\]](#) and [Abdullahi, et al. \[57\]](#). The reduction of poverty plays a vital role in the decrease of CL in the study of [Naeem, et al. \[58\]](#). According to [Nawaz, et al. \[17\]](#) these are positive effects on the CL of income inequality in Pakistan. However, [Swinerton and Rogers \[59\]](#) establish a negative connection between CL and income inequality.

### 5.2. Lagged Trade Policy Impacts on Rural Child Labor

As a final point, we explore the amendment of the CL as a result of a decline in import tariffs. It might take time to act by scrutinizing the relationship between the lagged tariff and the CL. The findings are presented in [Table 6](#), which is estimated in the same way as we examined in [Table 3](#), except for essential provincial TL. The coefficient is negative and significant for the lagged trade policy. The influence of the lagged trade policy is similar to CL. We also found that our lagged trade policy results are robust in the presence of several controls and propose that the relationship between CL and lagged trade policy is negative. The sign with the lagged trade policy coefficient is the same as we evaluated in [Table 3](#).

To sum up, we evaluate a significant association between CL and TL in rural Pakistan (i.e., the decline of import tariffs is negatively associated with CL). Our study evaluates a significant relationship between lagged trade policy and CL. The estimated results are too robust with the addition of controls. Since throughout this time frame there was no momentous variation in labor market regulation, we could trust that the pure influence of trade reforms on CL.



**Table 6.**  
Lagged trade policy impacts on rural child labor.

Variable	1	2	3	4
Lagged-PLIB	-0.0009** (0.0004)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
GI		0.265*** (0.074)	0.265*** (0.079)	0.204** (0.095)
HCR			-6.91e-06 (0.0001)	0.0001 (0.0002)
AFWI				-0.010 (0.008)
Time indicators	Yes	Yes	Yes	Yes
Wald statistic	30.36	52.18	51.04	58.51

**Note:** CL is a regress and in all FGLS models. S.E are shown in parentheses. Asterisks indicate significance i.e., \* for \*\*, and \*\*\* for \*\*\* percent. N is 48 observations in column 1 and 28 in columns 2-4. The prob value is less than 0.05 in all models.

## 6. Conclusion

Using a micro-level dataset from 1990 to 2005 in Pakistan, we investigated the link between CL and TL in rural areas of Pakistan. We find that there is a strong connotation between TL and CL. TL raised CL in rural Pakistan. A major cause of rising CL is that children assist their parents in household chores and on-farm work, and the majority of our population lives in rural areas of Pakistan. Further, we also found that our findings of robustness checks are robust by including income inequality, poverty, and AFWI. We also scrutinized lagged effects of trade policy on CL. The estimations exposed that lagged trade policy also has a similar effect on rural CL. Our findings with lagged trade policy are robust with other related controls.

Labor market regulations, in comparison to trade reforms, are considered to be the basic element in expressing the prevalence of workers in the marketplace. Fortunately, throughout the study period, there was no execution of new regulations in the labor market that could influence the rigidity or flexibility of the labor market in Pakistan. Thus, Pakistan is an exceptional case that offers an exclusive case for exploring the trade openness impacts on CL in the labor reforms' absence. In this aspect, it is sensible to apply the findings virtuously to trade reforms.

The findings of the study will help policymakers make policies that provide the best means for CL. Because increasing CL is a hot-going issue for developing economies, especially in rural areas.

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The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

### Competing Interests:

The authors declare that they have no competing interests.

## Authors' Contributions:

All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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## References

- [1] E. Edmonds, N. Pavcnik, and P. Topalova, "Trade liberalization, child labor and schooling: Evidence from India. The Mario Einaudi Center for International Studies, Working Paper No. 07-06," Retrieved: <https://ecommons.cornell.edu/server/api/core/bitstreams/3a1ad53c-2e11-4aa5-ac43-96176ef76f71/content>. 2006.
- [2] R. B. Davies and A. Voy, "The effect of FDI on child labor," *Journal of Development Economics*, vol. 88, no. 1, pp. 59-66, 2009. <https://doi.org/10.1016/j.jdeveco.2008.02.001>
- [3] K. Maskus, *Core labor standards: Trade impacts and implications for international trade policy, world bank international trade division Mimeo*. Washington, DC: World Bank, 1997.
- [4] L. Zhao, F. Wang, and Z. Zhao, "Trade liberalization and child labor in China," Institute of Labor Economics (IZA). (No. 10295), 2016.
- [5] C. Grootaert and R. Kanbur, "Child labour: An economic perspective," *International Labour Review*, vol. 134, no. 2, pp. 187-203, 1995.
- [6] Labour International Programme on the Elimination of Child, *Every child counts: New global estimates on child labour. ILO/ International Programme on the Elimination of Child Labour*. Geneva: ILO, 2002.
- [7] K. Basu and Z. Tzannatos, "The global child labor problem: What do we know and what can we do?," *The World Bank Economic Review*, vol. 17, no. 2, pp. 147-173, 2003. <https://doi.org/10.1093/wber/lhg021>
- [8] A. Cigno, F. C. Rosati, and L. Guarcello, "Does globalization increase child labor?," *World Development*, vol. 30, no. 9, pp. 1579-1589, 2002. [https://doi.org/10.1016/S0305-750X\(02\)00053-0](https://doi.org/10.1016/S0305-750X(02)00053-0)
- [9] E. V. Edmonds, P. Topalova, and N. Pavcnik, "Child labor and schooling in a globalizing world: Some evidence from urban India," *Journal of the European Economic Association*, vol. 7, no. 2-3, pp. 498-507, 2009. <https://doi.org/10.1162/jeea.2009.7.2-3.498>
- [10] UNICEF, "Strategies for eliminating child labour: Prevention, removal and rehabilitation," presented at the International Conference on Child Labour, 1997.
- [11] R. Ray and K. Basu, "The collective model of the household and an unexpected implication for child labor: Hypothesis and an empirical test," *Policy Research Working Papers*, 2001. <https://doi.org/10.1596/1813-9450-2813>
- [12] C. L. Survey, *Child labour survey: Main report*. Islamabad: Federal Bureau of Statistics, 1996.
- [13] D. Kruger, "Coffee production effects on child labor and schooling in rural Brazil," *Journal of Development Economics* vol. 82, no. 2, pp. 448-463, 2007. <https://doi.org/10.1016/j.jdeveco.2006.04.003>
- [14] R. Robertson, *Globalization and working conditions: A framework for country studies. In Globalization, Wages, and the Quality of Jobs: Five Country Studies, edited by Raymond Robertson, Drusilla Brown, Ga lle Le Borgne Pierre, and Maria Laura Sanchez-Puerta*. Washington D.C: The World Bank, 2009.
- [15] J. Ul-Haq, S. Khanum, and R. A. Cheema, "The impact of trade liberalization on child labor in Pakistan," *International Review of Applied Economics*, vol. 34, no. 6, pp. 769-784, 2020. <https://doi.org/10.1080/02692171.2020.1782853>
- [16] U. Iram and A. Fatima, "International trade, foreign direct investment and the phenomenon of child labor: The case of Pakistan," *International Journal of Social Economics*, vol. 35, no. 11, pp. 809-822, 2008. <https://doi.org/10.1108/03068290810905432>
- [17] M. Nawaz, M. Nasir, A. Ali, and W. Chaudhry, "Trade liberalization and child labor: A case study of Pakistan," *Transition Studies Review*, vol. 18, no. 2, pp. 361-376, 2011.
- [18] M. Wu, J. Ul-Haq, N. U. Zafar, H. Sun, and J. Jiang, "Trade liberalization and informality nexus: Evidence from Pakistan," *The Journal of International Trade & Economic Development*, vol. 28, no. 6, pp. 732-754, 2019. <https://doi.org/10.1080/09638199.2019.1593489>
- [19] K. Basu and V. Pham, "The economics of child labor," *American Economic Review*, vol. 88, no. 3, pp. 412-27, 1998.
- [20] E. V. Edmonds, "Does child labor decline with improving economic status?," *Journal of Human Resources*, vol. 40, no. 1, pp. 77-99, 2005. <https://doi.org/10.3386/w10134>
- [21] P. Topalova, "Factor immobility and regional impacts of trade liberalization: Evidence on poverty and inequality from India," *Three Empirical Essays on Trade and Development in India*, 2004. <https://doi.org/10.2139/ssrn.1750706>
- [22] M. Jameel, H. Hina, and J. Ul-Haq, "Sectoral and regional impacts of trade liberalization on the skilled-unskilled wage-gap in Pakistan," *Edelweiss Applied Science and Technology*, vol. 7, no. 2, pp. 87-103, 2023. <https://doi.org/10.55214/25768484.v7i2.374>

- [23] J. Ul-Haq, N. Nazeer, and N. Rahim, "Does Trade liberalization reduce gender wage gap in the manufacturing sector of Pakistan?," *Competitive Social Science Research Journal*, vol. 3, no. 1, pp. 119-130, 2022.
- [24] J. Ul-Haq, S. Khanum, and K. Imran, "Skill-biased impact of trade liberalization on employment in the manufacturing sector of Pakistan," *Global Economics Review*, vol. 6, pp. 212-226, 2021.
- [25] M. P. Todaro, *Economic development*. Pearson Education India. ISBN 978-0-13-801388-2, 2002.
- [26] S. A. Zaidi, *Issues in Pakistan's economy*, 3rd ed. Karachi: Oxford University Press, 2015.
- [27] J. Ul-Haq, F. Wajid, H. Visas, A. R. Cheema, and S. Abbas, "The nexus between trade liberalization and poverty: A disaggregated analysis," *Asian Economic and Financial Review*, vol. 12, no. 4, pp. 279-295, 2022.
- [28] P. Topalova, "Trade liberalization, poverty and inequality: Evidence from Indian districts. In Globalization and Poverty." Chicago/ Ann Harrison: University of Chicago Press, 2007, pp. 291-336.
- [29] A. R. Cheema and M. H. Sial, "Estimating the consistent and comparable poverty rates for Pakistan from 1992-93 to 2007-08," *International Research Journal of Finance and Economics*, vol. 7, no. 93, pp. 95-109, 2012.
- [30] A. R. Cheema and M. Sial, "Estimating income inequality in Pakistan: HIES 1992-93 to 2007-08," *Interdisciplinary Journal of Contemporary Research in Business*, vol. 4, no. 9, pp. 886-902, 2013.
- [31] W. Mohtasib, "Wafaqi Mohtasib," 2019 Report on the State of Children in Pakistan UNICEF, 2019.
- [32] W. Mustafa, "Pakistan's Sindh province cracks down on child labor. Reuters," Retrieved: <https://www.reuters.com/article/us-pakistan-childlabour/pakistans-sindh-province-cracks-down-on-child-labor-idUSKBN15A2O7>. 2017.
- [33] Z. Chen, J. Ul-Haq, H. Visas, and A. R. Cheema, "Globalization and working environment nexus: Evidence from Pakistan," *SAGE Open*, vol. 9, no. 2, pp. 1-12, 2019. <https://doi.org/10.1177/2158244019852474>
- [34] J. Shi, H. Visas, J. Ul-Haq, S. Abbas, and S. Khanum, "Investigating the impact of export product diversification on environmental degradation: Evidence from Chinese Provinces," *Environment, Development and Sustainability*, vol. 25, no. 10, pp. 11455-11486, 2023. <https://doi.org/10.1007/s10668-022-02536-8>
- [35] A. M. Al-Malki, M.-U. Hassan, and J. Ul-Haq, "Nexus between remittance outflows and economic growth in GCC countries: The mediating role of financial development," *Applied Economics*, vol. 55, no. 46, pp. 5451-5463, 2023. <https://doi.org/10.1080/00036846.2022.2139812>
- [36] M. Castilho, M. Menéndez, and A. Sztulman, "Trade liberalization, inequality, and poverty in Brazilian states," *World Development*, vol. 40, no. 4, pp. 821-835, 2012. <https://doi.org/10.1016/j.worlddev.2011.09.018>
- [37] B. McCaig, "Exporting out of poverty: Provincial poverty in Vietnam and US market access," *Journal of International Economics*, vol. 85, no. 1, pp. 102-113, 2011. <https://doi.org/10.1016/j.jinteco.2011.05.007>
- [38] J. Bhagwati, "The pure theory of international trade: A survey," *The Economic Journal*, vol. 74, no. 293, pp. 1-84, 1964. <https://doi.org/10.2307/2228112>
- [39] Z. Mahmood, "Research note: Determinants of under-invoicing of imports in Pakistan," *Journal of International Development*, vol. 9, no. 1, pp. 85-96, 1997. [https://doi.org/10.1002/\(sici\)1099-1328\(199701\)9:1%3C85::aid-jid223%3E3.3.co;2-l](https://doi.org/10.1002/(sici)1099-1328(199701)9:1%3C85::aid-jid223%3E3.3.co;2-l)
- [40] D. Lane, *So you want to use a measure of openness?*, In: Banaian, K., Roberts, B. (eds) *The Design and Use of Political Economy Indicators*. New York: Palgrave Macmillan. [https://doi.org/10.1057/9780230616622\\_2](https://doi.org/10.1057/9780230616622_2) 2008.
- [41] M. A. Sheikh, "Underinvoicing of imports in Pakistan," *Oxford Bulletin of Economics and Statistics*, vol. 36, no. 4, pp. 287-296, 1974. <https://doi.org/10.1111/j.1468-0084.1974.mp36004004.x>
- [42] P. K. Goldberg and N. Pavcnik, "The response of the informal sector to trade liberalization," *Journal of Development Economics*, vol. 72, no. 2, pp. 463-496, 2003. <https://doi.org/10.3386/w9443>
- [43] P. K. Goldberg and N. Pavcnik, "Trade, wages, and the political economy of trade protection: Evidence from the Colombian trade reforms," *Journal of International Economics*, vol. 66, no. 1, pp. 75-105, 2005. <https://doi.org/10.3386/w8575>
- [44] R. Davidson and J. G. MacKinnon, *Estimation and inference in econometrics*. New York: University of Oxford, 1993.
- [45] M. S. Hassan, S. Bukhari, and N. Arshed, "Competitiveness, governance and globalization: What matters for poverty alleviation?," *Environment, Development and Sustainability*, vol. 22, no. 4, pp. 3491-3518, 2020. <https://doi.org/10.1007/s10668-019-00355-y>
- [46] G. Maddala and K. Lahiri, *Introduction to econometrics*. New York: Wiley, 2006.
- [47] M. Fafchamps and J. Wahba, "Child labor, urban proximity, and household composition," *Journal of Development Economics*, vol. 79, no. 2, pp. 374-397, 2006. <https://doi.org/10.2139/ssrn.882822>
- [48] S. Amin, M. S. Quayes, and J. M. Rives, "Poverty and other determinants of child labor in Bangladesh," *Southern Economic Journal*, vol. 70, no. 4, pp. 876-892, 2004. <https://doi.org/10.2307/4135277>
- [49] P. Ranjan, "Credit constraints and the phenomenon of child labor," *Journal of Development Economics*, vol. 64, no. 1, pp. 81-102, 2001. [https://doi.org/10.1016/s0304-3878\(00\)00125-5](https://doi.org/10.1016/s0304-3878(00)00125-5)
- [50] B. D. I. A. Hoz, *Child labor in Mexico: A reality to overcome*. In A. (. Brizzio, *Child labor in Mexico*. Mexico: UNICEF, 1996.
- [51] S. Ahmed, W. Haider, and D. Khan, *Determinants of child labor in Khyber Pakhtunkhwa: An econometric analysis*. Germany: University Library of Munich, 2012.
- [52] A. Hussain, "Child labour in Lahore," *A Survey Sponsored by Syed Engineers, Lahore*, vol. 96, pp. 54-56, 1985.

- [53] F. De Maio, "Income inequality measures," *Journal of Epidemiology & Community Health*, vol. 61, no. 10, pp. 849-852, 2007.
- [54] D. Jayaraj and S. Subramanian, "Out of school and (probably) in work: Child labour and capability deprivation in India," *Journal of South Asian Development*, vol. 2, no. 2, pp. 177-226, 2007. <https://doi.org/10.1177/097317410700200202>
- [55] R. R. Akarro and N. A. Mtweve, "Poverty and its association with child labor in Njombe District in Tanzania: The case of Igima Ward," *Current Research Journal of Social Sciences*, vol. 3, no. 3, pp. 199-206, 2011.
- [56] R. Ray, "Analysis of child labour in Peru and Pakistan: A comparative study," *Journal of Population Economics*, vol. 13, pp. 3-19, 2000. <https://doi.org/10.1007/s001480050119>
- [57] I. I. Abdullahi, Z. M. Noor, R. Said, and A. Z. Baharumshah, "Does poverty influence prevalence of child labour in developing countries?," *International Journal of Economics and Financial Issues*, vol. 6, no. 1, pp. 7-12, 2016.
- [58] Z. Naeem, F. Shaukat, and Z. Ahmed, "Child labor in relation to poverty," *International Journal of Health Sciences*, vol. 5, no. 2 Suppl 1, pp. 48-49, 2011.
- [59] K. A. Swinnerton and C. A. Rogers, "The economics of child labor: Comment," *American Economic Review*, vol. 89, no. 5, pp. 1382-1385, 1999. <https://doi.org/10.1257/aer.89.5.1382>