



Research Article/ Araştırma Makalesi

**THE RELATIONSHIP OF WAGES AND EXPORTS FOR
THE TEXTILE INDUSTRY: THE CASE FROM THE UNITED STATES**

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Abstract

As the 1980s progressed, emerging nations made efforts to embrace growth models that were centered on exports, progressively moving away from the economic model that relied on import substitution. The rising prominence of global trade has stimulated researchers' interest in manufacturing processes, the transfer of manufactured goods to other countries, and the ramifications for employment. The aim of this study is to investigate the influence that bilateral trade, a significant consequence of global liberalization, has on national wages. The data analyzed in this study is sourced from the textile product mills sector in the United States of America (USA) and covers the years 1987 to 2023. Within the scope of this investigation, the Johansen Cointegration Test (1992) was utilized to investigate the model that originates from the Cobb-Douglas manufacturing function. The study concluded that exports affect the labor force over time, and this effect is expected to grow. An investigation is conducted, and the results of that investigation are used to formulate a policy recommendation.

Keywords: International economics, Export, Labor force, Wage rates, Cobb-Douglas production function

Jel Codes: F14, B17

**TEKSTİL ENDÜSTRİSİNDE ÜCRETLER VE İHRACAT İLİŞKİSİ:
AMERİKA BİRLEŞİK DEVLETLERİ ÖRNEĞİ**

Öz

1980 ve sonrasında, ekonomik olarak gelişme göstermeye başlayan ülkelerin ithal ürün ikamesine dayanan ekonomik büyüme modelinden uzaklaştıkları ve ihracat odaklı büyüme modellerini benimsemeye başladıkları görülmektedir. Bu süreçte konuyla ilgilenen araştırmacıların küresel ticaretin artmasıyla birlikte, ülkelerin üretim süreçlerine, üretilen malların ihracatına ve ihracatın istihdam üzerindeki etkilerine daha fazla odaklandıkları anlaşılmaktadır. Bu ilginin artışına paralel olarak, küresel liberalleşmenin önemli bir sonucu olan ikili ticaretin ulusal ücretler üzerindeki etkisi de araştırmacıların ilgisini daha fazla çekmektedir. Buradan hareketle bu çalışma, Amerika Birleşik Devletleri (ABD) için önemli bir iş gücü kaynağı olan tekstil sektörünü, tekstil endüstrisindeki ihracatın yine aynı sektördeki ücretler üzerindeki etkisi araştırmaktadır. Çalışmada kullanılan veriler, ABD tekstil endüstrisine ait ve 1987'den 2023'e kadar olan yıllık verilerdir. Bu araştırma kapsamında, Cobb-Douglas üretim fonksiyonundan kullanılarak üretilen model, Johansen Eşbütünleşme Testi (1992) kullanılarak analiz edilmiştir. Elde edilen analizin sonucunda, ihracatın bir süre boyunca işgücü üzerinde bir etkisi olduğu sonucuna varılmış ve bu etkinin ilerleyen yıllar itibarıyla daha da belirginleşmeye devam edeceği düşünülmektedir. Bunun yanında, araştırmanın sonuçları bir politika önerisi oluşturmak içinde kullanılmıştır.

Anahtar Kelimeler: Uluslararası ekonomi, İhracat, İşgücü, Ücretler, Cobb-Douglas üretim fonksiyonu

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Introduction

In a liberalized global economy, bilateral commerce is essential for the economic advancement of nations. Post-1980, with the cessation of the import substitution strategy globally, nations began to engage in the manufacture of high value-added goods and leveraged the benefits acquired in their bilateral commerce. The term “liberalization” here refers to the easing of restrictions on trade and money flows, leading to the integration of domestic markets and financial assets with the global economy. Liberalization provides nations with an expansive and unrestricted trading environment; nevertheless, it may also lead to items engaged in bilateral commerce and the laborers involved in their manufacture discovering broader job opportunities and facing varying pay rates.

The impact of wage fluctuations stemming from enhanced bilateral commerce owing to deregulation has garnered significant attention from scholars. The Heckscher-Ohlin-Samuelson (H-O-S) theory closely resembles the trade structure of the United States' international commerce with emerging nations (Sach and Shatz, 1994, p. 13). The HOS hypothesis suggests that a nation exports products that utilize relatively abundant resources intensively and imports products that utilize relatively scarce resources intensively. This idea posits that a developed country with a comparatively abundant trained workforce should export commodities that predominantly utilize skilled labor while importing goods that primarily rely on unskilled labor. This approach allows countries to optimize their economic advantages and enhance productivity. By focusing on their strengths, nations can foster innovation and growth in sectors where they hold a competitive edge, ultimately benefiting their overall economic landscape. In this scenario, international commerce results in an augmentation of the real income of a nation's plentiful factors and a diminution of the real income of its scarce components. (Aslan and Terzi, 2006, p. 7). The theory also says that an increase in the industry's exports would boost the earnings of skilled workers in the sector, while unskilled workers would need to accept lower salaries to compete with imported products. The idea posits that commerce influences product pricing between nations, but domestic factor prices may fluctuate due to variations in demand for those resources. This hypothesis posits that, even when analyzed by sector, a rise in bilateral commerce, or international trade, can positively influence wages within the respective sector. Research investigates the correlation between exports and wages in accordance with HOS theory, yielding data that align with the theory (Robinson and Paus, 1997, p. 539; Esquivel and Rodrigues, 2003, p. 552; De Santis, 2001, p. 121). All this research corroborates the theoretical framework.

This research investigates the influence of exports on the salaries of employees involved in the production of exported goods in the exporting nation, within the framework of bilateral trade theory. In other words, do changes in the export volume of the relevant sector affect the wage structure of the same sector? The analysis of the textile product mills industry in the USA utilizes yearly data from 1987 to 2023. The primary rationale for selecting an extensive data collection period is the importance of achieving more realistic findings. The study develops a model that incorporates yearly export numbers, total output, total labor force in production, and total annual export amounts within the relevant sector. The primary reason for selecting this sector is that the textile industry in the USA continues to be the most labor-intensive, closely followed by the food products sector. By 2024, the workforce in the industry will surpass 13 million individuals. This statistic, encompassing their families, indicates that 40 million individuals earn their livelihood from this industry. Put another way, the textile industry employs one in ten individuals in the United States, home to a population of 350 million. These statistics elucidate the rationale for selecting the textile industry for this investigation. This work distinguishes itself from other research in this regard and addresses a gap in the literature. The study employed the Johansen cointegration test (1992). The primary rationale for choosing this test is its superior ability to elucidate long-term relationships compared to alternative approaches.

This research is significant for several reasons: the substantial contribution of the selected sector to international trade, the preeminent status of the chosen country in global commerce, the extraordinary characteristics of the examined time, and the considerable workforce within the pertinent sector. The study's analytical approach and findings address a deficiency in economics. The escalating relevance of the connection between international commerce and salaries, prompted by the rise in global trade, highlights the study's importance and its potential value to stakeholders in the field.

The study has four sections. The initial portion serves as the introduction, elucidating the primary objective of the study and presenting foundational information. The literature review part, which analyzes research focused on elucidating the correlation between wages and exports, follows next. The third section of the research designates the methodology part, which elucidates the analytical methodologies employed in the econometric analysis. The part detailing the analysis results is the fourth portion. This section provides a concise assessment of the values derived from the analyses done. The conclusion section provides a comprehensive assessment of the study and offers succinct recommendations for future scholars and industry professionals engaged in this topic.

1. Literature Review

This part will review prior studies related to the model under investigation and those recognized in the worldwide literature, aiming to build a foundational framework for the research.

Kravis (1956) investigated the correlation between salaries and international commerce in the United States in his research. The study analyzed several industries and found that sectors with substantial exports had higher salaries, while areas with significant imports had lower salaries. Borjas, Richard, and Lawrence (1991) examined the impact of international trade on wages and employment via regression analysis in their research. Their study, utilizing data from the United States from 1960 to 1985, showed that international trade influenced salaries and, consequently, employment. Revenga (1992) examines the impact of heightened import competition on employment and earnings in the USA manufacturing sector, utilizing data from the manufacturing industry spanning 1977 to 1987. The author concludes that fluctuations in import prices substantially affect employment and salaries. In research that Krugman and Robert (1993) analyze the trade imbalance and income inequality, which are significant economic issues in the United States. The authors assert that a significant factor contributing to the international trade imbalance and income inequality is the importation of goods from low-income nations. The study by Beyer, Rojas, and Vergara (1999) utilized yearly data from Chile from 1960 to 1996, focusing on salaries, international trade openness, the price index of textile items, and the quantity of skilled labor as the primary factors. The study, employing regression estimates, indicated that trade liberalization exacerbated pay disparity by reducing prices of labor-intensive goods. Greenway, Hine and Wright (1999) performed their research in the United Kingdom. In their study, employing panel data analysis from 1979 to 1991, they concluded that trade intensity enhances wages by diminishing labor demand in the import and export industries. Haouas, Yagoubi and Heshmati (2002) investigated Tunisia and concluded that the long-term and short-term effects of trade on wages and employment varied between exports and imports. The authors employed yearly data from 1971 to 1996 and selected panel data analysis as their methodological approach. Ghosh, Saunders, and Biswas (2002) conducted comparable research. The study utilized a substantial dataset from 1967 to 2008 for the USA, focusing on factors associated with exports and salaries. Their investigation, which used regression estimates, revealed that the enhancement of productivity in skilled labor, along with international commerce, contributes to pay disparity. Cheung and Fan (2002) used the Stolper-Samuelson theorem in their research about the impact of rising trade volume on pay disparity. The study done in Hong Kong revealed that the real wages of emerging nations diminish when trade volume escalates. Avalos and Savvides (2003) did a study examining

Latin American and Far East Asian nations. The research, spanning from 1963 to 1998 and using panel data analysis, investigated salary, trade openness, and import factors. The study's findings indicate that trade openness diminishes wage disparities among the analyzed nations. Sakurai (2004) examines the impact of rising global trade during the 1980s on labor demand across various skill levels within the Japanese manufacturing industry. The study employed a time series analysis with a dataset from Japan spanning the years 1980 to 1990. The study's findings suggest that the rise in global trade during the 1980s has not substantially affected the Japanese industrial labor market. Breau and Rigby (2006) employed the variables of salary, capital, labor force ratio, export, age, education, and gender in their analysis utilizing data from Los Angeles. Breau and Rigby (2006) conducted their study from 1999 to 2000, using regression estimates, and found that pay premiums significantly influenced the impact of international trade on wages. Milner and Tandrayen (2007) examined the impact of enterprises' trading status in Africa on salaries. The study conducted a panel data analysis utilizing data from Cameroon, Ghana, Kenya, Tanzania, Zambia, and Zimbabwe from 1993 to 1995. The authors conclude that directing exports toward more competitive markets would only have a disciplined impact on the salaries of exporting enterprises. Munch and Skaksen (2008) conducted research in Denmark. Regression estimation guided the analysis of data from 1995 to 2002. The authors determined that export intensity exerts a mild and negative influence on wages. Kim and Thompson (2009) conducted a study that analyzed annual data from the USA spanning 1949-2006, utilizing variables such as wages, labor force, capital goods stock, and prices of manufacturing and service sector goods. Their findings revealed that tariff reductions led to decreased wages but enhanced purchasing power. Brambilla, Chauvin and Porto (2017) investigate that export markets present businesses with possibilities, and prosperous exporting companies pass along part of the advantages of exports to their employees in the form of salary and employment premiums. In order to demonstrate this situation, the authors used data from 61 developed and low-income countries. In their study, which employed panel data analysis, the global frequency of these mechanisms ultimately establishes a robust correlation with the projected wage premiums. Liang (2021) analyzed the influence of exports on employment and therefore salaries in the United States. The study employed the 2SLS approach using data from 1991 to 2007. The author determined that neither import nor export shocks had a major influence on wages. Cai et al. (2022) investigated the influence of salaries on Chinese export commodities in separate research. The research utilized data from the period 2009 to 2016 and favored the Ordinary Least Squares (OLS) analytical approach. The empirical model study indicates that wage increases have minimal effect on the export costs of the manufacturing sector. Euwals et al. (2022) examined the correlation between exports and salaries in the Deutschland region. They also examined the impact of China, utilizing pertinent data from 2001 to 2016. The authors utilized panel data analysis and determined that the Deutschland region, referred to as the Eurozone, did not have considerable effect on one another. This disparity is also thought to result from the elevated labor wages in these nations. Luna and Winkler (2024) studied the influence of exports on wages. Data from 1995 to 2009 were utilized for 60 nations and 45 industries. The examination of panel data indicates that personnel involved in export operations demonstrate greater productivity and obtain enhanced remuneration relative to their counterparts in non-export activities. Bae and Kuruvilla (2025) examined wages in six nations that export goods. The author conducted panel data analysis on six nations (Bangladesh, China, India, Indonesia, Mexico, and Vietnam) utilizing monthly data from 2011 to 2018. The research showed an increase in nominal salaries in exporting nations.

2. Methodology and Research Model

This section delineates the analytical procedures employed in the research and establishes the model. The model under examination is initially evaluated for each variable using the Augmented Dickey-Fuller (ADF) unit root test and the Phillips-Perron (PP) unit root test. The Johansen

Cointegration test (1992) is thereafter conducted to obtain the result. The analysis concentrates on the model that emerged from the Cobb-Douglas production function.

When the literature study was examined deeply, the relationship between wage² and export³ was investigated together with many other macroeconomic variables. Although there are many variables that can be used for the model, two important variables required in the model are the total output⁴ of products of the countries and labor⁵ that works in the sector to make the model significant (Kravis, 1956; Diewert, 1986; Bernard and Jansen, 1995; Schank, Schnabel and Wagner, 2007). Wage is preferred as a control variable for this research. The model used is thus in the form of $W = f(Q, L, EXP)$. Indicators, codes of variables, their usage patterns and the sources of data were obtained and are also presented in Table 1.

Table 1: A Brief Synopsis of Criteria

Indicators	Codes	Log./Orig.	Sources
Wage	<i>lnw</i>	<i>Logarithmic</i>	<i>U.S. Bureau of Labor Statistics</i>
Output	<i>lnq</i>	<i>Logarithmic</i>	<i>Fred Reserve Bank of St. Louis</i>
Labor	<i>lnl</i>	<i>Logarithmic</i>	<i>U.S. Bureau of Labor Statistics</i>
Export	<i>lnexp</i>	<i>Logarithmic</i>	<i>Fred Reserve Bank of St. Louis</i>

In the study utilizing time series analysis, the subsequent research model is such as:

$$\ln W_t = \beta_0 + \beta_1 \ln Q_t + \beta_2 \ln L_t + \beta_3 \ln EXP_t + \varepsilon_t \quad (1)$$

On the model, wage is a dependent variable and indices on model t represents the time dimension and ε_t represent the error term.

2.1. Cobb-Douglas Production Function

At all times, the economy possesses a certain quantity of capital, labor, and knowledge, which combine to generate production. Cobb-Douglas gave his own form of the production function, and the production function became such as (Romer, 2006, p. 11):

$$F(K, AL) = Y = K^\alpha (AL)^\beta, \quad 0 < \beta + \alpha < 1 \quad (2)$$

(Y): Output

(A): Knowledge or effectiveness of labor

(K): Capital

(L): Labor

The representative production function used by Milner and Wright (1998) and Haouas, Yagoubi, and Heshmati (2002) is as in equation 3:

$$Q_{it} = A^\gamma \cdot K_{it}^\alpha \cdot L_{it}^\beta \quad (3)$$

The sector selected for the study here is textile product mills. In the sector, Q_t denotes the actual production value (total output) at time t , K signifies the capital stock, L indicates employment, α and β represents the factor share coefficients for K and L , respectively, and the parameter γ reflects the efficiency of the production process. The model assumes that the economy's sectors can transfer employment, represented by L .

² Textile Product Mills: Labor Costs (Wages).

³ The Textile Product Mills sector's total annual export amount is presented

⁴ Industrial production manufacturing for Textile Product Mills within 12 months

⁵ Number of employees who work in Textile Product Mills sector within 12 months.

Assume that a specific budget restriction aligns the output of firms with the marginal value of labor, which represents the wage (w), and the marginal product value of capital, which represents the cost (c).

Derive the revised equation from the model by eliminating capital, which It has no influence on wages.

$$Q_{it} = A^{\gamma} \left(\frac{\alpha L_{it} w_i}{\beta c} \right)^{\alpha} L_{it}^{\beta} \quad (4)$$

We can express the term A in the equation as a function of exports to incorporate the model under examination and analyze the impact of exports on wages (Greenway et al., 1999, p. 491).

$$A = e^t \cdot M_t \cdot X_t \quad (5)$$

In the equation, t represents time, M denotes imports in an industry, and X signifies exports in the pertinent industry. The study employs the logarithmic transformation of the pertinent series to render non-stationary time series stationary. Consequently, the series is more likely to attain stationarity. Therefore, after computing and reorganizing the logarithm of equation 5:

$$\ln W_t = \beta_0 + \beta_1 \ln A_t + \beta_2 \ln Q_t + \beta_3 \ln L_t + \varepsilon_t \quad (6)$$

The determinants of wages extend beyond those outlined in equation 6. However, the study's objectives constrain them.

The industry's pay equation can be obtained by substituting equation 5 into equation 6.

$$\ln W_t = \beta_0 + \beta_1 \ln Q_t + \beta_2 \ln L_t + \beta_3 \ln X_t + \beta_4 \ln M_t + \varepsilon_t \quad (7)$$

The study will concurrently evaluate the link between wages and export levels, assuming that employment levels and exports influence pay determination. Consequently, we established equation 1 as the model.

2.2. Johansen Cointegration Test (1992)

Johansen (1988, 1991, and 1994) developed the parametric. The cointegration relationship is expressed in equation 8, where the coefficient matrix is represented by; Π ($k \times k$), the endogenous variables vector is denoted as Z_t ($k \times 1$), and the deterministic terms encompass the constant term, trend, seasonal dummy(s), and other potential dummy variables in the dimension of D ($k \times 1$).

$$Z_t = \Pi_i Z_{t-1} + \dots + \Pi_j Z_{j-1} + \Phi D_t + \varepsilon_t \quad (8)$$

ε_t , is a ($k \times 1$) vector and is presumed to adhere to a white noise process. Equation 9 articulates the VAR representation, where Z_t consists of first-order integrated variables, specifically $I(1)$, as a Vector Error Correction Model (VECM).

$$\Delta Z_t = \Pi Z_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + \Phi D_t + \varepsilon_t \quad (9)$$

The equation is expressed as $\Pi = \sum_{i=1}^p \Pi_i - I$ and $\Gamma_i = -\sum_{j=i+1}^p \Pi_j$. Π denotes the long-term coefficient matrix, whereas the Γ_i matrices illustrate the short-term impacts of the model. To find the generalized eigenvalues, you can maximize the logarithmic likelihood function in equation 10 to get the cointegration vectors β and λ_i that are linked to the vector error correction model.

$$\log(\beta) = c - \frac{T}{2} \sum_{i=1}^p \log(1 - \lambda_i) \quad (10)$$

The generalized eigenvalues are the roots that give the solution to equation 11.

$$|\lambda_i S_{22} - S_{12} S_{22}^{-1} S_{12}| = 0 \quad (11)$$

In equation 11, the residual moment matrices are represented as $S_{12} = T \sum_{i=1}^T e_{2t} (e_{1t})'$. The residual vectors e_{1t} and e_{2t} originate from equations 12 and 13, respectively:

$$\Delta Z_t = B_1 \Delta Z_{t-1} + \dots + B_{p-1} \Delta Z_{t-p+1} + e_{1t} \quad (12)$$

$$Z_{t-1} = C_1 \Delta Z_{t-1} + \dots + C_{p-1} \Delta Z_{t-p+1} + e_{2t} \quad (13)$$

The number of non-zero eigenvalues shows the rank of the matrix Π . Johansen (1988, 1991, and 1994) and Johansen and Juselius (1990) came up with two ways to find the rank by counting the eigenvalues and putting them in decreasing order. In the maximum eigenvalue test, the null hypothesis posits r cointegration vectors, whereas the alternative hypothesis asserts $r + 1$ cointegration vectors.

$$\lambda_{max} = (r, r + 1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (14)$$

The trace test evaluates the null hypothesis of k cointegration vectors, according to the number of variables, against the alternative hypothesis of at most k cointegration vectors, also related to the number of variables. The trace test is represented by equation 15, where $\hat{\lambda}_i$ is the greatest eigenvalue:

$$\lambda_{iz} = (r, k) = -T \sum_{i=r+1}^k (1 - \hat{\lambda}_i) \quad (15)$$

We reject the null hypothesis if the computed statistics for both tests exceed the critical threshold. The final section will showcase the results of this examination.

3. Empirical Finding

The analytical methodology employed in the study was assessed utilizing Stata and EViews, with an annual dataset including the years 1987-2023. The outcomes derived from the used approach and conducted analysis are presented below. These results constitute the foundation for the assessment and suggestions necessary for the concluding portion.

Table 2 displays the statistical data pertaining to the factors utilized in the relevant sector study.

Table 2: Descriptive Statistics

Variables	Obs.	Mean	Std. dev.	Min.	Max.
Wage	37	15.8171	3.4669	10.777	21.122
Output	37	148.0601	40.9267	82.6406	206.1644
Labor	37	171.6475	57.8454	107.196	250.54
Export	37	54.9228	10.4804	39.31	73.674

Table 3 displays the findings of the correlation study. The analysis indicates that the dependent variable ($\ln w$) exhibits the strongest correlation coefficient (0.9311) with exports ($\ln \text{exp}$). In summary, our analysis connects export and wage with the highest significance.

Table 3: Correlation Analysis

	$\ln w$	$\ln q$	$\ln l$	$\ln \text{exp}$
$\ln w$	1.0000			
$\ln q$	0.8727	1.0000		
$\ln l$	0.9303	0.9254	1.0000	
$\ln \text{exp}$	0.9311	0.9343	0.8996	1.0000

To determine the number of lags in the research, each equation was approximated, and the Akaike Information Criterion (AIC) was considered. Table 4 indicates the number of delays acquired. The analysis was conducted based on the specified number of lags, and a cointegration test was executed.

Table 4: *Lag Structure Selection Criteria*

Lag	FPE	AIC	HQC	SIC
0	1.7258	-6.5165	-6.4555	-6.3351
1	2.1587	-13.2352	-12.93	-12.3282
2	1.1569	-13.9789	-13.4295	-12.3463*
3	9.4567	-14.2166	-13.4231	-11.8584
4	6.9125*	-14.7816*	-13.7440*	-11.6979

Note: Final Prediction Error (FPE), Aikake's Information Criterion (AIC), Hannan-Quinn Criterion (HQC), Schwarz Information Criterion (SIC).

3.1. Unit Root Test

This study assessed the stationarity levels of the time series using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. For the ADF and PP tests, we analyzed two different regression equations that incorporate constant and trend information. Table 5 illustrates the findings.

Table 5: *Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Test*

Variables	ADF		PP	
	Level	First difference	Level	First difference
lnwage (Constant)	-0.721	-4.058*	-0.981	-4.079*
lnwage (Trend)	-1.338	-3.980**	-1.742	-3.993**
lnoutput (Constant)	0.445	-4.275*	0.056	-4.333*
lnoutput (Trend)	-1.596	-4.508*	-1.788	-4.551*
lnlabor (Constant)	-0.121	-4.525*	-0.290	-4.566*
lnlabor (Trend)	-1.652	-4.424*	-1.938	-4.465*
lnexport (Constant)	-0.798	-4.631*	-1.018	-4.645*
lnexport (Trend)	-2.144	-4.565*	-2.284	-4.579*
Critical Values				
	ADF		PP	
	Constant	Constant & Trend	Constant	Constant & Trend
1%	-3.675	-4.288	-3.675	-4.279
5%	-2.969	-3.56	-2.969	-3.556
10%	-2.617	-3.216	-2.617	-3.214

Note: *, ** and *** indicate that the unit root null hypothesis is rejected according to the critical values of 1%, 5% and 10%, respectively.

The degree of integration of time series is crucial in unit root testing. If all series are integrated to the same order, a cointegration tests may be conducted. The results of the ADF and PP unit root test indicated that the variables were non-stationary at the level, but they became stationary when the initial differences of all series were taken into account. Consequently, the integration levels are I(1).

3.2. Cointegration Test

The integration of all variables at the first degree, I(1), permits the use of the cointegration test. Cointegration among the series signifies a long-term association; conversely, the absence of cointegration implies a lack of such a relationship. The data utilized for unit root testing underwent

the Johansen cointegration test (1992), employed to assess multivariate cointegration. Table 6 presents the results of the analysis.

Table 6: *Johansen Cointegration Test Result*

Null hypothesis	Trace statistic	%5 Critical value	Max-Eigen statistic	%5 Critical value
$r = 0$	87.0524*	0.0000	34.0884*	0.0089
$r \leq 1$	52.9639*	0.0003	24.9055*	0.0211
$r \leq 2$	28.0584*	0.0034	19.4281*	0.0133
$r \leq 3$	8.6302	0.0631	8.6302	0.0631

Note: *, the null hypothesis is rejected at the 5% significance level.

The results of the unconstrained cointegration rank test in Table 6 show that at a 5% significance level, both the trace test and Max-Eigen statistics indicate three cointegration vectors among the variables. In this situation, the trace test and Max-Eigen statistics indicate the acceptance of three cointegration vectors among the variables. The cointegration vector may be analyzed in the long run by normalizing it with respect to the dependent variable, wage.

The equation delineating the long-term relationship and the values of β_i ($i = 1, 2, 3,$) are as follows:

$$\ln w_t = 2.215 \ln q_t + 0.147 \ln l_t + 0.024 \ln x_t \quad (16)$$

The econometric estimations indicate that variations in output, employment, and exports exert positive, albeit heterogeneous, effects on wage levels in the long run. Specifically, the long-run elasticity of wages with respect to output is estimated at 2.21, implying that a 1% increase in output is associated with a 2.21% rise in earnings, holding other factors constant. Employment exerts a smaller but statistically significant effect, with a long-run elasticity of 0.14, suggesting that labor market expansion contributes positively to wage formation. By contrast, the elasticity of wages with respect to exports is estimated at 0.02, indicating a marginal and economically negligible impact. Although export growth appears to generate some wage gains within the relevant industry, the coefficient's small magnitude suggests limited pass-through effects from trade expansion to labor remuneration. From a policy perspective, these findings underscore the dominant role of domestic output growth and employment generation in sustaining wage improvements, while highlighting the comparatively weak transmission mechanism from export performance to wage growth.

4. Conclusion and Recommendations

This research aims to examine the impact of overall exports in the USA's textile product mills industry on salaries within that sector. The study analyzed yearly data from 1987 to 2023, focusing on the association between the variables. The correlation between exports and wages is greater than that of the other variables. This outcome elucidates the significance of the study more distinctly. The number of delays was determined to establish the foundation for the chosen cointegration testing technique in the study. The study included ADF and PP unit root tests to assess stationarity. These tests yield results that align with the Johansen cointegration test (1992), the chosen methodology for this study, aiding in the identification of the long-term relationship between wages and exports. The unit root test findings show that all variables are constant and non-stationary at both the constant and trend levels, but they achieve stationarity after differencing. In other words, all series display the characteristics of $I(1)$.

The evaluation of the study's data indicates that the cointegration test results demonstrate a link among the identified variables, consistent with findings from other research (Were and Kayizzi-Mugerwa, 2009; Wang, 2013; Brambilla and Porto, 2016). Equation 16 illustrates that total exports

from the pertinent sector over the specified time in the USA have a positive impact on salaries within that industry. Nonetheless, the impact of the changes that transpired within the designated period is perceptible, albeit constrained. These changes can be evaluated as follows: during the analyzed period in the USA, investments in the textile products mills sector have declined due to alterations in global manufacturing practices. It is generally acknowledged that investments have transitioned from labor-intensive industries to capital-intensive industries (Toyne et al., 1983; Yasuda, 1994; Singletary and Winchester, 1996; Kilduff and Priestland, 2001). China's dominance in the textile industry, characterized by the relocation of production capacity to China due to its low manufacturing costs, has diminished the USA's textile output and, therefore, its exports. The impact of declining exports on wages has been minimal. Examining the designated eras reveals that the USA has experienced wars (like the Gulf catastrophe and 9/11) as well as a global disaster, specifically the pandemic. We urge policymakers to shift the sector from labor-intensive to capital-intensive industries, particularly through investments in more technical items. Such changes may contribute to the restricted growth of salaries.

The empirical findings reveal that the growth rate of textile product exports remains modest, indicating that the current level of production expansion is insufficient to trigger significant upward pressure on input costs or to erode wage levels. Cost structures within the textile industry appear to be stable, suggesting that the sector's operating expenses are not substantial enough to constrain remuneration for labor. Furthermore, the structural shift from labor-intensive to capital-intensive production processes has not yet reached a magnitude capable of materially altering the industry's cost composition. This stability in production costs implies that the sector retains the capacity to generate considerable value-added, enabling profitability for both employers and relatively stable earnings for employees.

From a structural economics perspective, the textile sector's continued reliance on labor-intensive methods, combined with its potential to integrate capital-intensive technologies, presents a unique dual-growth pathway. Enhanced adoption of advanced manufacturing technologies—such as automation, digital fabrication, and AI-assisted production management—could improve productivity and lower unit production costs. In turn, reduced costs could translate into competitive pricing in global markets, facilitating deeper penetration into additional export destinations. The sector may also leverage the United States' strong global brand image to differentiate its products in high-value consumer segments, thereby increasing both export volumes and unit export prices.

Moreover, the anticipated efficiency gains from technological upgrading have the potential to stimulate employment indirectly, as reduced production costs can enable expansion into new product lines and niche markets. This expansion could lead to greater job creation across the value chain, from design and marketing to distribution and after-sales services. Simultaneously, the generation of new business opportunities could foster entrepreneurship, attract foreign direct investment into the textile supply chain, and reinforce the industry's role as a contributor to sustainable economic growth.

The industry produces essential items that meet human needs. At this juncture, fostering stronger connections between employers and employees within the profit and gain framework, offering cost benefits associated with exports in the sector, and developing new goods in response to evolving conditions and demands would enhance the sector's appeal. This circumstance may positively influence workers' earnings both in the short and long run. Consequently, it is undoubtedly advantageous to utilize technology more efficiently across all sectors to enhance its waning competitiveness. Furthermore, long-run wage elasticity with respect to output is 2.21, the highest among all. For this reason, implement fiscal stimulus measures, targeted industrial policies, and infrastructure investments that boost domestic production capacity. Support innovation and productivity-enhancing technologies to sustain output growth, thereby maximizing its positive

spillover to wages. On the other hand, employment elasticity is 0.14 and statistically significant, indicating a direct wage-enhancing effect. Therefore, promote active labor market policies, such as vocational training, apprenticeships, and job-matching programs, to increase workforce participation. Encourage sectoral diversification to absorb labor into high-value industries, ensuring stable wage growth across economic cycles. Lastly, export elasticity is 0.02, economically negligible. The policy action should be such that while export promotion remains important for trade balance and GDP growth, its direct impact on wages appears limited. Policymakers should therefore avoid overreliance on export-led wage growth strategies and instead integrate export promotion with domestic value-added creation and industrial upgrading.

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