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IZA DP No. 16566

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ABSTRACT

Export and Labor Market Outcomes: A Supply Chain Perspective - Evidence from Vietnam*

Are the labor market changes from exports specific to exporting industries, or do they dissipate throughout the economy? To analyze this question, we study the case of Vietnam. Vietnam exported a total of $356B, making it the number 18 exporter in the world in 2021. Recent studies show provinces in Vietnam with greater exposure to tariff reductions observe greater rates of poverty decline and gains in wages and employment. We extend this literature by estimating the impact of exports propagated through domestic production linkages in Vietnam between 2010 and 2019. We find that direct exposure to exports has a limited impact, except for wages. When considering supply chain linkages, the impact on wages and income is more significant, especially for those in foreign sector and in the lowest income bracket. College premium decreases, and the gender wage gap narrows. With respect to employment variables, direct exposure to exports leads to increased employment and reduced inactivity and these findings remain consistent when accounting for supply chain linkages. The gains in employment are concentrated in workers with no schooling, while employment rate falls for more skilled workers.

JEL Classification: F16, J16, O19

Keywords: international trade, labor markets, inequality, poverty, jobs

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1. Introduction

Over the past two decades, developing countries have experienced increased integration into global trade and global value chains (GVCs). As a result, policymakers and researchers have become increasingly interested in understanding the labor market implications of this global integration. Consequently, a considerable body of literature has emerged, investigating the relationship between trade and local labor market outcomes, with studies like Topalova (2010) and others contributing to this growing area of research.

In this study, we aim to extend this existing literature by examining the overall impacts of exports while considering the crucial supply chain linkages that previous research has overlooked. Our analysis goes beyond solely focusing on directly exporting industries and takes into account the industries indirectly affected by the rising demand for exports.

A central motivation for this empirical inquiry stems from the well-documented fact that as economies undergo structural transformation, the proportion of domestic services or inputs in total outputs tend to rise (McCaig 2013; Ghosh 2021). At first glance, this might suggest that a larger proportion employment remains unaffected by trade, give the larger non-tradable component of services sector. However, even non-tradable industries can be indirectly influenced by trade if they serve as inputs to tradeable sectors.

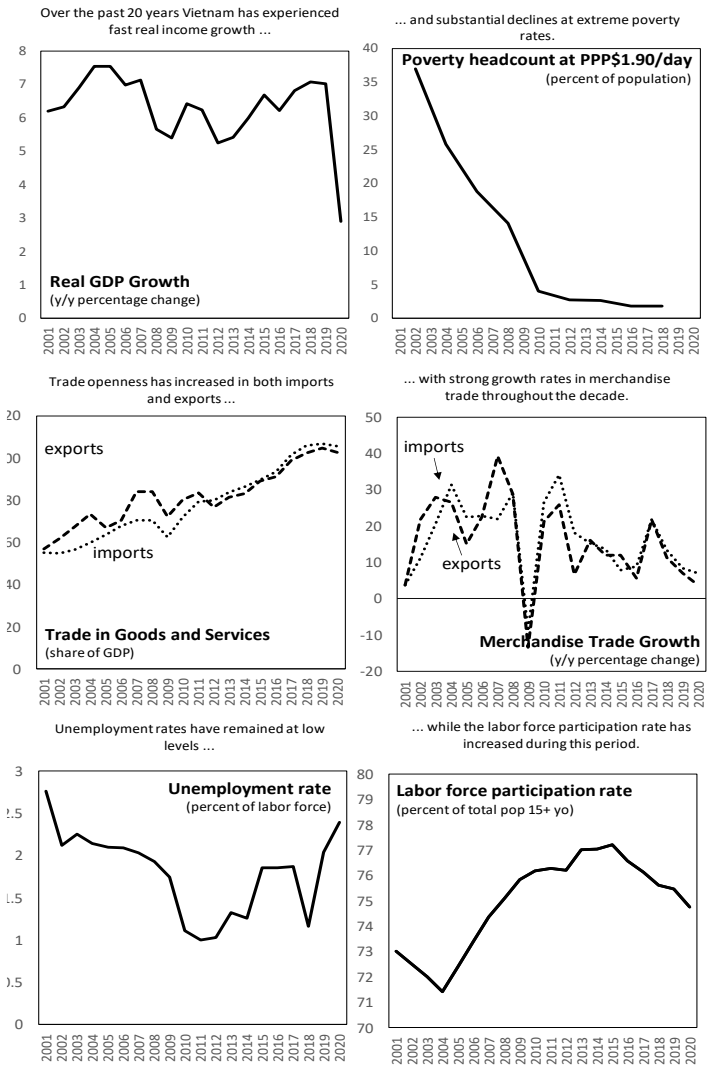
We conduct this analysis for the case of Vietnam for two reasons. First, Vietnam serves as a representative example of a country that has reaped the benefits of an export-led growth miracle in East Asia over the years. Second, the significance of domestic services in Vietnam's non-tradeable sectors cannot be overlooked, constituting an average of 10% of total output. Furthermore, about 50 percent of the non-service sector-country clusters have local services use share greater than 8 percent and for a minority of non-service sector-country cluster that share can be as large as 20 percent. Given this, this study will estimate the direct and indirect impacts of exports facilitated through supply chain linkages on labor market outcomes. We also explore potential effects on different types of workers such as urban, rural, young, high-skilled, and female workers.

Vietnam exemplifies East Asia's successful export-driven growth. Over two decades, it saw rising real income, lowered poverty (except due to Covid-19 in 2020), and expanded import-export alignment with GDP, signifying global value chain integration. Concurrently, the labor market thrived with reduced unemployment and higher female participation. Figure 1 visually showcases this economic progress driven by export focus.

The connection between non-service and service sectors is vital for amplifying the impact of exports on labor markets. In Vietnam, domestic non-service industries heavily rely on domestic services as inputs. Figure 2 illustrates that around 50% of Vietnamese non-service sectors use local services, making up more than 15% of their end output. Neglecting these indirect export effects on domestic services and input-supplying sectors overlooks a crucial link tying local labor markets to foreign demand changes. Recognizing and understanding these connections is crucial

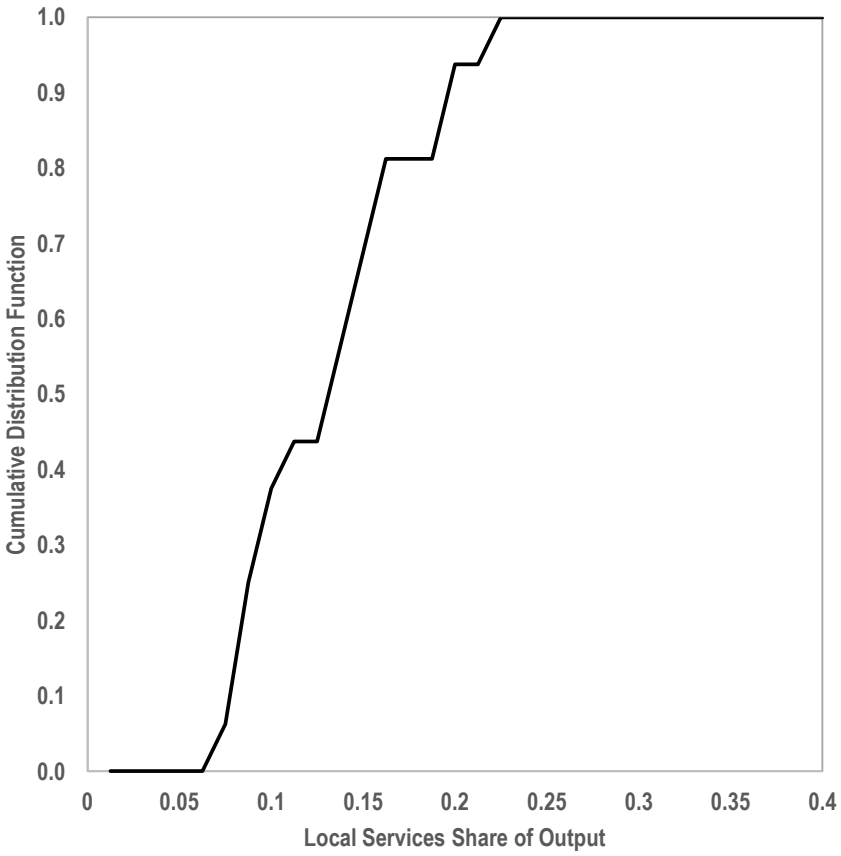
for grasping the wider effects of export-oriented economic activities in Vietnam. Our analysis focuses on estimating changes in labor market outcomes in response to an export shock, specifically wages, income, gender wage gap, college premium, at the provincial level in Vietnam from 2009 to 2019. Correspondingly, we find that direct exposure to exports has a limited impact, except for wages. When considering supply chain linkages, the impact on wages and income is more significant, especially for those in foreign sector and in the lowest income bracket. College premium decreases, and the gender wage gap narrows. With respect to employment variables, direct exposure to exports leads to increased employment and reduced inactivity and these findings remain consistent when accounting for supply chain linkages. The gains in employment are concentrated in workers with no schooling, while employment rate falls for more skilled workers.

Figure 1: Trends in Trade, Labor, and Socioeconomic Indicators in Vietnam (2001-2020)



Sources: World Bank staff calculations and World Development Indicators.

Figure 2: Vietnam: Domestic Service Sector Share in Total Output of Domestic Non-Service Sector, 2020
(Cumulative Distribution Function)



Source: World Bank staff calculation with Asian Development Bank data.

Related Literature: This work is primarily related to the literature on local labor market effects of trade integration. A key study by Autor, Dorn, and Hanson (2013) focused on the ”China Shock,” finding that the shock led to significant employment decline in the US in regions more exposure to this shock. This sparked more studies on impact of tariff changes or import competition on local labor markets (Pierre and Schott 2016; Acemoglu et al. 2016; Autor et 3 al. 2013, Dix-Carneiro and Kovak 2013). It is crucial to note that trade affects not only tradable sectors but also non-tradable sectors within the same local labor markets. While increased import competition or market access directly impact specific tradable sectors, there are indirect effects on non-tradable sectors such as retail, healthcare, or hospitality in the same region. The current literature largely abstracts from estimating these indirect effects propagated through domestic production linkages within a country with few exceptions (Wang et al. 2018). We contribute to this literature by estimating the direct and total impact of changes in exports driven by foreign demand shocks, rather than tariff changes or import competition, on income and employment variables, gender and college premium as well as informality. To the best of our knowledge, the only other study that estimates the direct and indirect export-induced demand is by Goutam et al. (2018) but they focus only on employment variables.

The paper is organized into five sections, each addressing different aspects of the study. In Section 2, we present a conceptual framework that allows us to examine the local labor market impacts of exports incorporating a supply chain perspective. Section 4 outlines the details of the data and methodology employed in our analysis. In Section 5, we discuss the key results derived from empirical methodology. The paper concludes with the final section, where we summarize our findings and present several hypotheses that could be driving these results.

2. Conceptual Framework

We apply a standard shift-share approach that assesses the effects of trade shocks on labor markets (Bartik, 1991). Relevant works in the literature include Autor, Dorn and Hanson (2013) and Dix-Carneiro and Kovak (2015). More directly related, exploring the effects of exports on local labor markets, Robertson et. al. (2021) and Góes, Lopez-Acevedo, and Robertson (2023).

Unlike the papers above, however, our index in this paper is not one of exports exposure, but one of total exports receipts exposure. By exploiting the input-output structure of production, we account for both direct and indirect payments to factors of production, and use trade data to move closer to regional production, which is what we would ideally like to observe.

Let *s,d* be industry index, *i,j* be country index, and let $\gamma_{s,d}$ denote the intermediate use shares of a good of industry s in the production process of a good of industry d .*s* in country *i* in the production process of a good of industry *d* in country *j*. Under the assumptions of perfect competitive or monopolistic competitive product markets, a constant fraction of total sales will be paid to the factors of production. If domestic factor markets are competitive, there are no mark-ups or mark-downs on factor prices. Under those assumptions, then, up to a first-order approximation, the value of export sales can be distributed through the production network in the following fashion:

$$\underbrace{P_d Q_d}_{\text{value of exports of sector } d \text{ of country } j} \propto \underbrace{\left(\sum_s \gamma_{s,d} P_s P_d\right)}_{\text{Value of intermediate use of sector d}} + \left(\underbrace{VA_d}_{\text{Value added of sector d}}\right)$$

Therefore, we can account for total payments to each source sector s by summing over payments to sector s from every sector d in addition to the value added of sector s:

$$(Total\ Export\ Exposure) \propto (Indirect\ Export\ Exposure) + (Direct\ Export\ Exposure)$$

So far, we have defined these relationships in terms of input-output linkages. To turn to the empirical effects over labor markets, we now define local labor markets exposure to total export receipts. Let r denote different regions in the country, exposure to total export receipts growth at regional level is defined as:

$$\Delta X_{r,s,t+h} \equiv \sum_{s} \frac{L_{r,s,t}}{L_{s,t}} \equiv \sum_{s} \frac{L_{r,s,t}}{\sum_r L_{r,s,t}} . \Delta X_{s,t+h}$$

where $X_{r,s,t}$ denotes total export exposure of industry s to region r at period t , as defined above; $L_{r,s,t}$ denotes total employment of industry s in region r at time t. The term $\frac{L_{r,s,t}}{L_{s,t}}$ measures the share of region r in the national employment of industry s.

3. Data

The goal of the paper is to assess the direct and indirect impact of export expansion on local labour market outcomes in Vietnam, accounting for supply chain linkages, exploiting variation in export expansion across provinces and industries, between 2010 and 2020. To this effect, we combine export data from UNCOMTRADE data, input-output coefficient matrix from GTAP data, and information on local labour market outcomes from LFS data. Details on each dataset and cleaning techniques are described below

3.1. Labour Force Data and Descriptive Statistics

Our main source of labour market data is the labour force survey (LFS) provided by General Statistics office of Vietnam (GSO), and available for years between 2010 and 2020, and implemented every year. The LFS surveys have observations at individual and household level and collect information in a host of areas including: key labour market characteristics, household 5 characteristics, and individual demographic characteristics. Our analysis look at two main sets of outcome variables: wage outcomes and employment outcomes. The wage outcome sets include real annual wages, real annual income, college degree wage premium and gender wage premium. The employment outcome sets include employment rate, inactive rate, informality status and female labour force participation. All of the outcomes are constructed from survey questionnaires, of which the wage outcomes are calculated at province x sector level while the employment outcomes are aggregated at province level because we do not observe sector information for those who are not employed Over the period 2010 and 2020, several changes were introduced in the Vietnamese LFS together with updates in concepts and definitions which are standardized to make key labour market outcomes, administrative geographies as well as industry classifications comparable over time.

3.2. Construction of Export Exposure using Input-Output Linkages

Any changes in the foreign export demand for products of particular sector will have dual effects. First, it will lead to a direct increase in demand for output in that sector. Secondly, it indirectly affects the upstream sectors that supply inputs to the directly impacted sector. Not accounting for these linkages will lead to an underestimation of the export exposure at the province level, as

some provinces may not have concentration of industries directly exporting but still be supplying to exporting sectors. The literature represents this chain of responses using Leontief inverse of an input-output production matrix for an economy, which clearly track the use of intermediate inputs by each sector (Goutam et al. 2017; Acemoglu et al. 2016).

To explore potential effects of exports through domestic inputs, we employ the 2011 Vietnam Input-Output table to calculate the input shares of each industry. These shares are determined by dividing the input usage by the gross output (which includes the value added in the own sector with own sector inputs). The resulting shares are then multiplied by the exports of the final sector and aggregated over the input industry to obtain the total value of exports for each input sector (representing the cumulative effect of servicing multiple exporting sectors). In this sense, non-traded sectors that are assigned a value zero for exports will also have an implied value and will be used to estimate the total export exposure index at the province level using the following index.

The total export exposure (accounting for supply chain linkages) is measured as the growth in exports in industry i between time periods, t and $t+1$ captured by the term $\Delta W_{i,t+h} = W_{i,t} - W_{i,t+h}$. This change is allocated to each province r in Vietnam using the share of provinces in total national employment in each industry i.

$$\Delta X_{r,t+h} = \sum_{s} \frac{L_{r,i,r,t}}{L_{i,t}} \cdot \Delta W_{i,t+h} = \sum_{i} \frac{L_{i,r,t}}{\sum_{r} L_{i,r,t}} \cdot \Delta W_{i,t+h}$$

To construct the total exposure index at the province level in Vietnam, we utilize several databases. Initially, we gather data on export value from the UNCOMTRADE database. In order to account for the demand generated in other sectors as a result of exports and calculate the overall exposure index, we incorporate the 2011 input-output (I-O) tables from Global Trade Analysis Project (GTAP).

We begin by computing the input-output coefficients from the GTAP I-O tables which capture the interdependencies between sectors in an economy. We match these coefficients with trade data from the United Nations Commodity Trade Statistics database (UNCOMTRADE) to compute the total export value for each sector, accounting for indirect changes in export demand through input output linkages. Annex 2 of the study provides a detailed explanation of how these coefficients are computed and merged with UNCOMTRADE data.

The next step is to link these total export data with the labor force surveys. To this effect, we utilize concordance tables available online which provide mappings between International Standard classification (ISIC) rev 3.1. codes and HS codes. By leveraging this concordance, we merge the micro-data on labor force variables at the industry and area level in Vietnam with total export data. Once the integrated labor and trade data is prepared, we are able to calculate the total trade exposure index based on provinces, as previously explained. The starting point for the analysis is the idea that the impact of a trade shock is differentiated across regions, depending on each province-industry composition.

A fundamental principle for this approach is the existence of segmented labor markets. Existing labor mobility barriers or rigidities (such as commuting costs or lack of transport infrastructure) allow us to observe variations in local labor market outcomes and, as a result, to estimate the effects of differentiated exposure to trade. One heuristic method for assessing labor-market integration involves examining the standard deviation of wages for across regions and over time. This heuristic measure is used because various factors can prevent wage equalization across regions. In order to investigate the level of labor-market integration in Vietnam, we calculate province and industry × province premiums. These premiums can serve as indicators of segmented labor markets. Table 1 in annex clearly show that the wages are not equalized across provinces and industry-provinces in Vietnam providing a strong support for segmented labor markets during our study period.

4. Methodology

The goal of the current empirical strategy is to understand the impact of rising export expansion on real wages, informality and female labor force participating, exploiting the cross-regional exposure to total exports in Vietnam between 2010 and 2020. To this effect, we consider the following simple linear regression model:

$$\Delta Y_{r,t+h} = \beta_0 + \beta_1 \Delta X_{r,t+h} + \beta_2 K_{r,t} + \epsilon_{r,t}$$

where $\Delta Y_{r,t+h}$ is the change in outcomes of interest, may it be employment rate, informality rate, female participation rate, average annual income average annual wage, college premium or gender wage gap, etc. identified at province r over the period from time t and $t+h$. $\Delta X_{r,t+h}$is our main independent variable, which stands for the change at regional level of total export exposure, as defined in the previous section. The key coefficient of interest is β_1, which measures the impact of total trade exposure on the outcome after accounting for the I-O structure, $K_{r,t}$ is the vector of ex-ante control variables including individual demographic background taken from the LFS such as urban dummy, gender, marital status, age group, education level, social security ownership, etc.

A relevant issue we need to address is the potential endogeneity in the export exposure covariate. Since we observe changes in labor outcomes and exports simultaneously, we cannot identify which one is driving the other. To ensure truly exogeneity of our export exposure, we need a variable that predicts exports from Vietnam based solely on its trading partners internal demand growth, rather than supply-side determinants. Hence, we construct our instrument using time-series regressions of Vietnam exports to its trading partners on the trading partner's GDP by industry at the four-digit level as follows:

$$\Delta Z_{r,,t+h} \equiv \sum_s \frac{L_{i,r,t}}{L_{i,t}} \cdot \sum_j \left(\frac{Q_{j,i,t}}{Q_{i,t}} \cdot \Delta Y_{j,t+h}\right)$$

where, $\frac{Q_{j,i,t}}{Q_{i,,t}} = \frac{Q_{j,i,t}}{\sum_j Q_{j,i,t}}$ denotes country $j's$ share of industry $i's$ exports; $\Delta Y_{j,t+h}$ is the change in real GDP in destination country j.

Predicted values or exports from these regressions would serve as a proxy for Vietnam's exports to its trading partners explained exclusively by the latter's domestic aggregate demand. These predicted exports will be combined with I-O coefficients to generate total exports accounting for supply chain linkages. Subsequently, these total exports will be used to generate the export exposure at the province level in Vietnam.

Then, estimation will take the form of two-stage least squares, with the first stage being:

$$\Delta X_{r,t+h} = \tilde{\alpha} + \tilde{\beta}\Delta Z_{r,t+h} + \widetilde{\boldsymbol{\delta}} K_{r,t} + \tilde{\varepsilon}_{r,t}$$

and the second stage:

$$\Delta Y_{r,t+h} = \beta_0 + \beta_1 \Delta \hat{X}_{r,t+\mathrm{h}} + \beta_2 K_{r,t} + \epsilon_{r,t}$$

where $\Delta \hat{X}_{r,t+\mathrm{h}}$ are the predicted values obtained from the first stage regression:

$$\Delta \hat{X}_{r,t+\mathrm{h}} = \hat{\alpha} + \hat{\beta}\Delta Z_{r,t+h} + \widetilde{\boldsymbol{\delta}} K_{r,t}$$

5. Results

Income outcomes: Table 1 shows the results of the two-stage least squared regression of the change in income-related variables — wages and income —along with gender and college premium on the change in exposure to exports instrumented by the change in exposure to foreign demand. All specifications include time- and province and sector level fixed-effects as well socio-demographic controls. In Columns 2,4,6 and 8, calculation of export exposure does not incorporate the consideration of supply chain linkages, and represents the direct exposure of change in exports at the industry level in a province.

Direct exposure to exports does not significantly impact income variables, except for wages. The coefficients for wages which is -5.78 indicate that an increase in 1 billion USD for an industry in a province more exposed to export shock is associated with a statistically significant annual decrease in wages by 5.78 USD, with a confidence level of 10 percent. When incorporating supply chain linkages, the results reverse with larger magnitudes. These augmented estimates are shown in columns 1,3,5 and 7 of Table 1. The coefficient for wages - 10.22 - is now positive and significant, indicating an increase in total export exposure by 1 billion USD for an industry in a province more exposed to this shock is associated with a 10 USD increase in annual wages with a confidence level of 10 percent. Similarly, a billion dollar increase in export exposure for an industry in a province more exposed to this shock leads to a statistically significant increase in income by 14.99 USD at 5 percent significance level.

A noteworthy finding is that when considering supply chain linkages, the previously observed positive but non-significant impact of export changes on college premium changes to an instance where the college premium actually declines by 10.66 USD with a 1 billion dollar change in export

for an industry in a province more exposed to shock, indicating declining wage gains to workers with a college degree. Finally, the previously insignificant negative relationship between exports and gender gap changes to a positive and larger absolute impact when considering supply chain linkages. This finding indicates that a 1 billion dollar change in export results in a decline in wage gap between women and men by 16.56 USD.

Heterogeneity: Tables 2 and 3 show these results for different segments of population by economic sector and income quantiles. Our findings indicate that a USD 1000 increase in total export exposure measure at the industry-province level has a statistically significant positive effect on wages in the foreign sector (Table 2) and individuals in the lowest income bracket (Table 3).

Employment outcomes: Table 4 shows the results of the two-stage least squared regression of the change in employment variables: employed, inactive population, informal worker, and female employed on the change in exposure to exports instrumented by the change in exposure to foreign demand. All specifications include time- and province fixed-effects as well socio-demographic controls. In Columns 2,4,6 and 8, calculation of export exposure per worker does not incorporate 9 the consideration of supply chain linkages, and represents the direct exposure of increased exports per worker.

The coefficients for employment as well as female employment, which are 2.83 and 1.92, indicate that an increase in direct export exposure per worker by 1000 USD per worker is associated with a statistically significant annual increase in total employment and female employment by 2.83 percent and 1.92 percent, respectively, with a confidence level of 5 percent for both. Correspondingly, an increase in direct export exposure per worker by 1000 USD per worker is also associated with significant decrease in inactive population by nearly 7.89 percentage points, indicating movement from inactivity to employment in provinces more exposed to rising exports per worker. There is also an observed decline in informality. The results are consistent when accounting for supply chain linkages. The coefficients for employment and female employment are 1.83 and 1.45 which means a 1.83 percent change in employment rate and female employment rate per every 1000 USD change in exposure per worker, with a confidence level of 5 percent for both. Analogous patterns emerge for inactivity.

Heterogeneity: Tables 5, 6 and 7 show how these employment results vary for different segments of population by education level, economic sector, and income quantiles. Our findings indicate that a USD 1000 increase in total exports per worker regarding employment changes, a 1000 USD increase in exports per worker results in an increase in employment for workers without education by 0.24 percent. However, it is associated with a 0.26 percent decrease in employment rate for those with primary/secondary schooling and 0.07 percent for those with college degrees (Table 5). With respect to economic sector, those engaged in household-based farming activities experience a 0.93 percent increase in employment rate (Table 6).

Overall, these results underscore the salience of accounting for supply chain linkages, as evident in larger and significant augmented coefficients for total exposure on income variables. It is also noteworthy to mention that exports result in decreased inactivity and an associated rise in total and female employment, correspondingly wages and income go up and gender wage gap declines.

Table 1: **IV Impact of trade exposure on labor market in Vietnam, 2010 - 2019**

	Change in labor outcomes							
	WAGE		INCOME		COLLEGE PREMIUM		GENDER WAGE GAP	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TOTAL EXPOSURE	10.22*		14.99**		-10.66*		-16.56***	
	(5.09)		(5.16)		(5.42)		(4.18)	
EXPORT EXPOSURE		-5.78*		-5.85		4.21		-1.87
		(2.84)		(3.01)		(3.05)		(2.50)
Observations	7434	7434	7435	7435	7370	7370	7434	7434
Adjusted R2	0.015	0.015	0.022	0.022	0.005	0.005	0.008	0.008

*** p<.001, ** p<.05, * p<.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure. Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Specification for Gender Wage Gap excludes Gender from controls.

Specification for College Degree Premium excludes Education Level from controls.

Wage and wage premium measured in US dollars per year, Export Exposure measured in billion US dollar.

Unemployed, Inactive, Informal and Female Employed measured in percentage point.

Table 2: **Impact of trade exposure on labor market by economic sector**

	HH Farm	HH Business	Private	State	Foreign
TOTAL EXPOSURE	5.88	25.04	-8.07	-5.79	-42.29**
	(8.40)	(16.84)	(5.01)	(9.65)	(15.55)
Observations	378	334	288	294	221
Adjusted R2	0.129	-0.009	0.050	0.004	-0.022

*** p<.001, ** p<.05, * p<.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Outcome variable is wage measured in US dollars per year, Export Exposure measured in billion US dollar.

Table 3: **Impact of trade exposure on labor market by income level**

	Income quantile 1	Income quantile 1	Income quantile 1	Income quantile 1
TOTAL EXPOSURE	26.37***	-0.85	0.49	4.58
	(4.81)	(2.93)	(3.01)	(3.53)
Observations	504	431	473	499
Adjusted R2	0.310	0.106	0.125	0.115

*** p¡.001, ** p¡.05, * p¡.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Outcome variable is wage measured in US dollars per year, Export Exposure measured in billion US dollar.

Table 4: **IV Impact of trade exposure on labor market in Vietnam, 2010 - 2019**

	Change in labor outcomes							
	EMPLOYED		INACTIVE		INFORMAL		FEMALE EMPLOYED	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TOTAL EXPOSURE	1.83*		-7.89***		0.87		1.42**	
	(0.83)		(1.74)		(2.36)		(0.53)	
EXPORT EXPOSURE		2.83**		-10.75***		-7.33***		1.92**
		(0.90)		(1.62)		(1.97)		(0.62)
Observations	503	503	503	503	503	503	503	503
Adjusted R2	0.138	0.157	0.232	0.345	0.165	0.167	0.163	0.177

*** p¡.001, ** p¡.05, * p¡.01.

Standard errors clustered at province.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy.

Specification for Female Employment excludes Gender from controls.

Wage and wage premium measured in US dollars per year, Export Exposure measured in billion US dollar per individual.

Unemployed, Inactive, Informal and Female Employed measured in percentage point.

Table 5: **Impact of trade exposure on labor market by income levels**

	NO EDUCATION	PRIMARY/SECONDARY SCHOOL	HIGH SCHOOL	COLLEGE
TOTAL EXPOSURE	0.24***	-0.26***	-0.02	-0.07***
	(0.07)	(0.07)	(0.02)	(0.02)
Observations	504	504	504	504
Adjusted R2	0.050	0.042	0.003	0.109

*** p¡.001, ** p¡.05, * p¡.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Outcome variable is employment measured in percentage point, Export Exposure measured in billion US dollar.

Table 6: **Impact of trade exposure on labor market by economic sector**

	HH Farm	HH Business	Private	State	Foreign
TOTAL EXPOSURE	0.93***	-0.09	0.04	-0.24	0.03
	(0.27)	(0.08)	(0.04)	(0.14)	(0.10)
Observations	3149	1998	4314	1565	1193
Adjusted R2	0.040	-0.000	0.000	-0.006	0.013

*** p¡.001, ** p¡.05, * p¡.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Outcome variable is employment measured in percentage point, Export Exposure measured in billion US dollar.

Table 7: **Impact of trade exposure on labor market by income levels**

	EMPLOYED				INFORMAL			
	Quantile 1	Quantile 2	Quantile 3	Quantile 4	Quantile 1	Quantile 2	Quantile 3	Quantile 4
TOTAL EXPOSURE	0.19	0.12	0.13*	0.07	0.28	-0.61	-0.87*	-0.30*
	(0.12)	(0.10)	(0.05)	(0.05)	(0.34)	(0.39)	(0.34)	(0.12)
Observations	122	104	139	139	122	104	139	139
Adjusted R2	0.181	0.130	0.106	0.117	0.609	0.174	0.154	0.159

*** p¡.001, ** p¡.05, * p¡.01.

Standard errors clustered at province x sector level.

Total Exposure = Direct Exposure + Indirect Exposure.

Additional controls include Age, Gender, Education level, Urban/Rurual dummy, Economic Sector and Hours of work.

Outcome variable is employment and informality measured in percentage point, Export Exposure measured in billion US dollar.

6. Conclusion

Are the labor market changes from exports specific to exporting industries, or do they spillover to sectors throughout the economy? Any changes in the foreign export demand for products of particular sector will have dual effects. First, it will lead to a direct increase in demand for output for that particular sector. And second, it will impact indirectly the sectors that supply to the particular sector directly impacted. The literature represents this chain of responses using Leontief inverse of an input-output production matrix for an economy, which clearly track the use of intermediate inputs by each sector (Acemoglu et al. 2016; Acemoglu et al. 2012). To account for these direct and indirect effects, we modify a standard shift-share approach that assesses the effects of trade shocks on labor markets (Autor, Dorn and Hanson 2013; Dix-Carneiro and Kovak 2015). Unlike the existing literature, however, we exploit the input-output structure of production to account for both direct and indirect impacts. We find that while exports result in decreased inactivity and an associated rise in total and female employment. Correspondingly, there is an observed increase in wages and income and decline in gender wage gap in provinces more exposed to exports. Most of these results are larger in magnitude and different in direction of impact when accounting for input-output production structure of the economy underscoring the contributions of non-traded industries to export markets.

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Annex

Table 1A: Description of province and province X industry premiums

Source	Partial SS	DF	MS	F-stat	Prob>F
Model	1.093e+12	1,770	6.174e+08	118.26	0.0000
Sector	2.378e+11	29	8.201e+09	1570.89	0.0000
Province	3.220e+09	62	51942419	9.95	0.0000
SectorProvince	1.606e+11	1,679	95648856	18.32	0.0000
Residual	7.052e+12	1,350,780	5220407		
Number of obs	1,352,551				
Root MSE	2284.82				
Adj R-squared	0.1330				