Impact of the US-China Trade War on Vietnam's Labor Market

By

Pham Phuong Ngoc
Dainn Wie

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Pham Phuong Ngoc

Faculty of International Economics.

Diplomatic Academy of Vietnam,

69 Chua Lang Street, DongDa,

Hanoi, Vietnam

E-mail: phuongngoc-gvkkt@dav.edu.vn

Dainn Wie

National Graduate Institute for Policy Studies,

B902, 7-22-1 Roppongi, Minatoku,

Tokyo, Japan

Email: wie-dainn@grips.ac.jp

ABSTRACT

Trade can significantly reduce informality in developing countries by fostering economic growth and creating formal employment opportunities. A large proportion of workers in developing countries such as Vietnam work in the informal sector, making them vulnerable and less productive. This study examines the short-term impact of the US–China trade war as a positive demand shock on the informality of Vietnam's labor market, using nationally representative data from the Vietnam Labor Force Survey from 2017 to 2019. We create an industry-level measure based on variations in tariff increases applied to Chinese goods, representing the tariff advantages granted to Vietnamese firms. The estimation results show that workers in industries with higher tariff advantages are less likely to be employed as informal or uninsured workers. By applying Goldberg and Pavcnik's (2003) framework, we interpret these findings as indicating that Vietnamese firms perceived the US–China trade shock as a positive and permanent demand shock. To our knowledge, the empirical evidence presented in this study represents a rare investigation into the effects of the trade war on the labor market of a non-participating country. Additionally, the findings offer important implications for other developing countries by showing how Vietnam's labor market and informality improved as firms took advantage of the new trade opportunities created by trade diversion.

1. Introduction

Approximately 60% of the world's population is employed in the informal sector, most of them found in emerging and developing economies (Deléchat & Medina, 2021). Informal and uninsured workers, often termed precarious or temporary workers, hold short-term labor contracts, do not have social insurance, and can be fired without notice. They often work in inferior conditions with lower job quality, have fewer training opportunities, receive lower wages, suffer from job insecurity, and exhibit lower productivity than permanently employed workers (Booth et al., 2002; De Cuyper et al., 2008; Gollin, 2002; Nataraj, 2011; Porta & Shleifer, 2008; Tybout, 2000).

Although employment in the informal sector is often voluntary for people who value flexibility and short working hours, it is undesirable for several reasons. Precarious workers are the most vulnerable during economic downturns (Boeri, 2011) and easy victims of unemployment, suffering considerable welfare losses (Frey & Stutzer, 2002; Lucas, 2007). Low employment protection can also be costly for firms because of increased worker turnover and unemployment spells (Blanchard & Landier, 2002).

The existing literature focuses on the role of trade in the informality of economies. Goldberg and Pavcnik (2003) establish a seminal theoretical framework to reveal how trade shocks influence firms' decisions to employ formal and informal workers. Specifically, tariff reductions and increased foreign competition lead to lower output prices in domestic markets. Firms, anticipating these negative shocks as permanent, reallocate their workforce from formal to informal sectors to cope with the higher wages required for formal workers to prevent shirking. A positive and permanent demand shock leads to the opposite effect: an increase in the proportion of formal workers in the equilibrium.

The prediction has been empirically tested in the literature, with mixed results depending on the institutional context. This prediction was first partially supported in Colombia during a period with a more rigid labor market (Goldberg & Pavcnik, 2003). Bosch et al. (2012) report a modest impact of trade liberalization on the Brazilian labor market, while Dix-Carneiro and Kovak (2017) show that the long-run impacts (20 years after tariff changes) of such tariff cuts on labor reallocation could be much larger than that observed in the short run.

This study examines the impact of the US–China trade war on informality in Vietnam. This unique trade shock not only affected two massive economies but also influenced many non-participating countries through trade, supply chains, and capital flows across the global economy. The US implemented a series of import tariff increases against Chinese products, providing a new opportunity for Vietnam, which could now produce these and export them to the US with a relative advantage in tariffs (Ngoc & Wie, 2023). The relative advantage given to Vietnam is presumably exogenous, as tariffs increased during the trade war targeting either China or the United States, with no systematic relationship with Vietnam's industry or labor market conditions. However, as shown by Ngoc and Wie (2023), the war significantly expanded Vietnam's relative access to the US market and increased the price and volume of its exports to it.

Studying the impact of trade shocks on Vietnam's labor market is important for several reasons. Vietnam has emerged as a rapidly growing economy because of its active participation in global trade and supply chains. The value of its exports surged by nearly 15 times between 2000 and 2017,[1] reaching 76% of its GDP in 2017. Despite this growth, a substantial proportion of its jobs remained in the informal sector, leaving workers uninsured and exposed to income instability and uncertainty.

This study uses nationally representative data from the Vietnam Labor Force Survey (VLFS) from 2017 to 2019. The dataset provides comprehensive information on individuals and workers across all industries, including labor contracts, employment status, and social insurance coverage. To measure the positive trade shock for Vietnam, this study utilizes the US tariff differences between Chinese and Vietnamese products, which are weighted at the three-digit industry level based on the share of Chinese imports into the US prior to the US–China trade war. Note that this weighted tariff difference serves as a measure of Vietnam's relative gain in accessing the US market and is unrelated to the tariff rates for intermediate goods imported into Vietnam.

To preview the results, we first decompose the change in the share of informal and uninsured workers into two portions: between- and within-industry reallocations. The decomposition shows that, economy-wide, the change in the share of informal workers is

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[1] According to WITS (World Integrated Trade Solution), Vietnam's export volume was 14.48 billion USD and increased to 215.12 billion USD in 2017. Vietnam's GDP in 2017 was USD was 281.35 billion USD (World Bank). All figures are in current dollar value.

driven mainly by reallocation between industries, rather than within. However, when the agricultural sector is excluded, reallocation within industries is the primary source of the changes.

We then estimate a linear probability model to understand how weighted tariff differences affect individual workers' probabilities of being hired as informal or uninsured workers during a trade war. Our results show that workers in industries that experienced a greater advantage in tariffs relative to Chinese products were less likely to be hired as informal or uninsured workers. The estimated magnitudes imply that, for workers in the affected industry, the probability of being an informal worker, on average, declined by 0.519 percentage points (hereafter, pp), while that of being uninsured worker decreased by 0.57 pp. We conduct several robustness and falsification tests to ensure that the estimation results do not capture confounding effects or underlying time trends. Based on Goldberg and Pavcnik's (2003) theoretical predictions, these findings suggest that Vietnamese firms perceived the US-China trade conflict as a permanent rather than a temporary demand shock.

The study makes a significant contribution to the rapidly growing literature on the impact of trade conflict, especially that focused on the US–China trade war. While research provides extensive evidence of the negative effects of the trade war on both the USs and China (Bollen & Rojas-Romagosa, 2018; Fajgelbaum et al., 2020; Guo et al., 2019), there has been relatively little discussion about its implications for non-participating countries. To the best of our knowledge, the empirical evidence presented in this study represents one of the few investigations into the effects of the trade war on the labor market of a non-participating country.

Furthermore, we contribute to the literature on resource reallocation from the informal to the formal sector in developing countries. The existing body of research largely supports dual models of informality (La Porta & Shleifer, 2014), while government interventions for encouraging formalization have shown limited impact (de Andrade et al., 2016; de Mel et al., 2013). The empirical evidence aligns with the findings of McCaig and Pavcnik (2015), who highlighted the significant role of export expansion as a driving force behind Vietnam's rapid transition to the formal sector. Research shows that trade conflict functioned as a positive demand-side shock for Vietnam, resulting from the trade diversion. The findings are also closely related to McCaig and Pavcnik (2018)

5

who show that the 2001 US–Vietnam Bilateral Trade Agreement worked as a positive demand shock for Vietnam.

The paper proceeds as follows. Section 2 discusses the conceptual framework related to trade shocks and labor-market informality. Section 3 provides detailed definitions of informal and uninsured workers. Section 4 discusses the data and summarizes the statistics. Sections 5 and 6 present the empirical results and several robustness checks, and Section 7 concludes the paper.

2. Conceptual Framework

The conceptual framework is largely based on Goldberg and Pavcnik (2003) to hypothesize the US–China trade war and its impact on Vietnam's labor market informality. Saint-Paul (1996) and Goldberg and Pavcnik (2003) postulate that labor regulation and adjustment costs are the most distinctive differences between informal and formal workers. Firms find it difficult to dismiss formal workers because they need to provide justifications to meet the standards of unjust dismissal legislations. Difficulty in firing formal workers also leads to a higher cost of monitoring them than that of informal workers. According to Goldberg and Pavcnik's model (2003), profit-maximizing firms reallocate the share of formal and informal workers depending on the value of the price shock in the next period, pay efficiency wages to formal workers, and reservation wages to informal workers.

Goldberg and Pavcnik's (2003) framework provides important implications regarding the impact of temporary and permanent demand shocks on the hiring of formal and informal workers. When there is a temporary demand shock on price, firms hire or fire informal workers first because of the differences in adjustment costs. Such theoretical predictions are consistent with those of Houseman (2001) and later Ono and Sullivan (2006), who find that firms in the US use temporary workers to meet fluctuations in output.

Goldberg and Pavcnik (2002) point out that trade liberalization and relevant tariff cuts are permanent rather than temporary shocks; therefore, they should be incorporated into the model as changes in the distribution of prices. When a permanent shock occurs, the model provides a prediction that the firms will fire or hire formal workers in a new equilibrium. Intuitively, a negative and permanent demand shock, such as trade liberalization or increased domestic competition, increases the probability of formal

workers being fired, leading them to shirk even more and increasing hiring costs. Firms would then reduce their pool of formal workers, leading to a decrease in their share. The positive and permanent demand shock would result in the opposite outcome in equilibrium: an increase in the share of formal workers.

This prediction is largely supported by Acosta and Montes-Rojas (2014), who show an increase in informality following trade liberalization in Argentina. Arias et al. (2018) provide model-based predictions that tariff cuts in Mexico and Brazil would increase the share of informal workers. McCaig and Pavcnik (2018) report that Vietnam's access to the US market increased the number of workers in the formal sector.

Based on Goldberg and Pavcnik's (2003) predictions, we identify how Vietnamese firms perceived the US–China trade war in terms of price shocks. The trade war provided an opportunity for Vietnam to have relatively favorable access to the US market through trade diversion. Ngoc and Wie (2023) show that Vietnam increased the export of products targeted by the US–China trade war, and that a significant increase in export volume is driven by increased volume as well as an increase in unit prices.

We hypothesize that Vietnamese firms' hiring of formal and informal workers after the US–China trade war can tell us how firms recognized the price shock caused by the trade war. If firms understood the relative gain in the US market as a positive but temporary demand shock, we would be able to observe an increase in the share of temporary workers. However, if firms considered the trade war and new opportunities as price shocks equivalent to permanent and favorable demand shocks, they would have increased their hiring of formal workers. Using the conceptual framework, this study aims to understand not only the effects of the US–China trade war on Vietnam's labor market but also how Vietnamese firms perceived the shock, based on how they responded.

3. Definition of Informal Workers and Uninsured Workers

3.1 Definition of Informal Workers

The definitions of informal and formal workers vary by country and across literature. La Porta and Shleiffer (2008) characterize informal workers based on the formality of the company in which the employee worked, whereas Artuc et al. (2019) define formal status based on the nature of the employment. Vietnam's General Statistics

Office (GSO) identifies informal workers as those working for private, unregistered companies in the non-agricultural sector that make products and offer services for sale.

Although the GSO's definition of informal workers provides a uniform foundation for measuring and analyzing the informal sector across different waves of data, it possesses several caveats. First, the definition of informal workers excludes a large number of workers in the agricultural sector, which accounts for the majority of employees in Vietnam. In addition, beginning in 2015, all household businesses, whose workers were classified as informal workers by McCaig and Pavcnik (2018), were required to register their businesses with the People's Committee at the district level, classifying all employees as formal workers. The regulation was applied to all household businesses to impose a tax registration code (Decree No. 78/2015/ND-CP on business registration); only street vendors and other low-income businesses were exempt.

This study adopts the International Labor Organization (ILO, 2016) definition of informal workers in the Vietnamese context. According to this definition, informal workers are those whose contracts are (i) less than three months or (ii) not under compulsory social insurance. Thus, unpaid family workers and self-employed/casual workers in the agricultural sector are also categorized as informal workers if their contracts meet one of the two conditions, and so are workers in registered companies if they are under short-term labor contracts or not under mandatory social insurance.

3.2 Definition of Uninsured Workers

We examine uninsured workers who do not have social insurance to assess how the trade war affected their level of social protection. Vietnam has two types of social security system: compulsory and voluntary. Both insurance systems are managed by the Vietnam Social Insurance Agency (VSIA) and provide coverage for illness, maternity, occupational diseases, accidents, retirement, and death. In this study, based on VLFS data, we identify uninsured workers as those who do not subscribe to any social insurance.

Until 2018, employed workers with contracts longer than three months were supposed to be covered by compulsory social insurance under the 2006 Law on Social Insurance. This was replaced by the 2014 Law of Social Insurance, which came into effect in January 2018. Under the new regulations, workers with labor contracts longer than one month are required to participate in the compulsory social insurance system. However,

enforcing compulsory social insurance faces a challenge due to its high insurance premiums that increased from 22% in 2006 to 32.5% in 2016.[2] According to VLFS, around 12% of those who had more than three months of labor contracts in 2017 were not covered by compulsory social insurance; the number decreased only slightly to 11.75% in 2019. Workers ineligible for compulsory social insurance can choose to participate in a voluntary social insurance system, under which the insurance premium is 22%, to be paid entirely from the employee's salary. In sum, even informal workers with temporary contracts could be insured workers, while uninsured workers would be considered informal, according to the definitions used in this study.

4. Data and Summary Statistics

4.1 Construction of Weighted Tariff Differences

During the US–China trade war in 2018 and 2019, the US imposed increased tariffs on Chinese products, causing sharp wedges between the tariffs applied to Chinese and Vietnamese products imported into the US (Ngoc & Wie, 2023). To quantify the impact of the trade war on the Vietnamese labor market, we employ the same industry-level tariff measure as Ngoc and Wie (2023) constructed. Using concordance between the 6-digit Harmonized System (HS) and the three-digit ISIC (International Standard Industrial Classification of All Economic Activities) code, a measure of the weighted tariff in industry j in year t is defined as:

$$\tau_{jt} = \sum_{k \in j} \Delta tariff_{kt} \times \omega_{jk}, \tag{1}$$

where $\Delta tariff_{kt}$ is annual differences in tariffs on products k imported from China and Vietnam to the US. For the pre-trade war period and non-targeted goods, $\Delta tariff_{kt}$ is set as zero. Then, each tariff line is weighted by ω_{jk} , defined as the import share of product k from China to the US before the trade war to reflect the importance of product in the US market as well as created opportunities for non-participating countries that can produce and export close substitutes to the US. Finally, the weighted tariff was summed for all products in each three-digit industry code to match each worker's industry.

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[2] The rate is higher than that in most East Asian countries (Schmillen & Packard, 2016). In theory, both employers (22%) and employees (10.5%) pay social contributions, but firms bear the total labor cost. Therefore, around one-third of small and medium firms with less than 100 employees did not participate in the social system in 2017, according to the Vietnam Enterprise Survey 2017.

As argued by Ngoc and Wie (2023), large increases in tariffs on Chinese goods imported into the US are driven by conflicts between the two countries and hardly have any relationship with Vietnam's labor market. Table A1 (in Online Appendix) shows the number of products and means of weighted tariff differences constructed in Equation (1) by broad sectors: agriculture, manufacturing, and tradable. This indicates that many industries in the manufacturing and tradable sectors were affected by the trade war and experienced much larger changes in tariff differences between 2018 and 2019.

4.2 Vietnam Labor Force Survey

To observe the labor market, we use three VLFS waves collected in 2017, 2018, and 2019. VLFS has been conducted annually since 2007 by the GSO through face-to-face interviews with household heads. It provides demographic information on education, occupation, and other employment variables. This study focuses on employed individuals[3] aged 20–64 years and their main job status.[4] Table A2 (in Online Appendix) presents comprehensive summary statistics for all variables for a sample of more than a million workers.

The main variables of interest are constructed as dummy variables for informal and uninsured workers. Informal workers are identified as those who have (i) less than a three-month labor contract or (ii) no compulsory social insurance. Uninsured workers are those without compulsory social or voluntary insurance, as discussed in Section 3.

To match the weighted tariff measure in equation (1) for each industry, we convert the industry code reported in the VLFS to the three-digit ISIC. VLFS reports the four-digit Vietnam Standard Industrial Classification (VSIC),[5] which matches the three-digit ISIC in most industries. The final sample of workers, matched with weighted tariff measures, covers 237 three-digit industries, 90 of which are tradable.

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[3] Employed individuals include those who are working as employees, family workers (paid or unpaid), and the self-employed. Those unemployed or out of the labor force are very infrequent in this dataset. For instance, in 2019, among individuals aged 20–64 years, 87.01% reported working, while only 12.99% reported being unable to find a job or out of the labor force.

[4] Among employees aged 20–64 years in VLFS 2019, only 15.7% reported working more than one job. Among them, the average hours worked per week was 27.42 hours and 14.96 hours in their primary and others jobs, respectively, as compared to 40.08 hours for workers who reported working only one job.

[5] The survey in 2017 and 2018 classified industries using Vietnam Standard Industry Code 2007 (VSIC 2007), while Vietnam Standard Industry Code 2018 (VSIC 2018) is used in VLFS 2019.

4.3 Aggregate Trends of Informal and Uninsured Employment in Vietnam

Table 1 presents an overview of the share of informal and insured workers in Vietnam's workforce across the sectors. Panel A of Table 1 shows dominant share of workers in informal sector, highlighting 78% of the total employment in 2017. The proportion of informal workers had declined to 74% in 2019. When agricultural sector was excluded, the share of informal workers slightly declines from 64% to 62%. However, the share of informal workers sharply declines from 82% to 75% over three years in tradable sector. Figure B1 (in the Online Appendix) shows a large share of informal workers in agriculture, construction, retail, transportation, and food and beverage services. The trends and distribution of uninsured workers in Panel B of Table 1 and Figure B2 are similar to those of informal workers.

[Table 1 here]

Table A3 (in the Online Appendix) provides a comparison of job characteristics across employment types. Panel A of the table shows that, on average, informal workers have a lower education level, work fewer hours, earn fewer hourly wages, and are more likely to have a second job than formal workers. These observations are consistent with the literature on informality and earnings (Goldberg & Pavcnick 2003; Marcouiller et al., 1997). Panel B of Table 3 reveals the differences between insured and uninsured employees. This simple comparison effectively demonstrates that informal and uninsured workers earn less, are partially employed, and often need to take on secondary jobs to supplement their income. They also have less social protection, making them vulnerable.

5. Empirical Results: Impacts of the US–China Trade War on Vietnam's Labor Market

5.1 Decomposition of the Changes in Informality

We first test how within-industry and between-industry changes in the type of workers contributed to the overall change in the composition of workers immediately after the US–China trade war. The total change in the share of informal workers (uninsured workers) between 2017 and 2019, denoted as ΔH_t , can be written as sum of two components: within- and between-industry shifts:

$$\Delta H_t = H_t - H_{t-1} = \sum_j \Delta h_{jt} s_j + \sum_j \Delta s_{jt} h_j, \qquad (2)$$

where h_{jt} is the share of informal (uninsured) workers in each three-digit industry j in year t. s_{jt} is the share of industry j's employment out of the total employment in year t and s_j and h_j are simple averages between the two years. Therefore, the first term in Equation (2) represents the reallocation of workers across informal and formal employment within an industry, whereas the second term represents workers' reallocation across industries with different levels of informality.

Panel A of Table 2 shows that the overall decline in the share of informal workers, which was mainly driven by between-industry reallocation (64.86%), rather than within-industry reallocation. However, when workers in agriculture and fishing industries are excluded, the contribution of the within-industry reallocation of workers increases to 80%. Similarly, when sample of workers is restricted to those in tradable sector, within-industry reallocation explains 78% of the overall changes in the formality of workers. Panel B confirms that within-industry reallocation plays a major role in workers getting insured in sectors other than agriculture and aquaculture.

[Table 2 here]

5.2 Impact of the US–China Trade War on Workers

The findings from the simple decomposition provide us with the following empirical strategy to examine the impact of the trade war on the reallocation of workers from informal to formal status and from uninsured to insured employment within each three-digit industry. To estimate the likelihood of each worker being an informal (uninsured) worker when exposed to different levels of trade war depending on the industry, we use the following equation:

$$H_{ijt} = \alpha + \beta\,\tau_{jt} + X_{ijt}\,\delta + \gamma_p + \theta_t + \mu_j + \varepsilon_{ijt} \quad (3)$$

H_{ijt} is the main outcome variable, indicating that worker i in industry j in year t is an informal (or uninsured) worker. X_{ijt} is a vector of worker characteristics, including experience, experience squared, gender, and education, and is an indicator of whether a person lives in an urban area. We are interested in the coefficient of τ_{jt}, constructed as Equation (1) to capture the favorable access to the US market due to the trade war with China across three-digit industries in Vietnam. The specification includes province γ_p,

industry μ_j , and time θ_t fixed effects. Standard errors are clustered within the three-digit industry to account for heteroscedasticity and serial correlations in the error terms.

[Table 3 here]

Panel A in Table 3 presents the regression results across all three sectors, excluding agriculture and fishing, and the tradable sector. All coefficients are negative and statistically significant. To understand the magnitude of the coefficient, we provide the mean of the weighted tariff differences for each sector. Column (1) shows that the impact of average trade war was a decline in the likelihood of being an informal worker by 0.519 pp (=0.706*0.735). The equivalent estimated impacts are 1.13 pp (=0.672*1.68) and 0.804 pp (=0.804*0.72) in non-agricultural sector and tradable sectors, respectively.

Panel B of Table 4 provides the estimates from Equation (3) using uninsured workers as an outcome variable. When estimated using workers in all sectors, Column (1) shows that trade war on average decreased the probability of a worker being an uninsured employee by 1.22 (=0.780*0.735) % points. When the sample is restricted to workers in non-agricultural sectors and tradable sectors, the magnitudes of the impact are 1.22 (=0.724*1.68) and 0.66 (=0.923*0.72) % points, respectively.

Though the effects are moderate, our estimates reflect short-run responses in the labor market to the trade war; hence, the results could be underestimated compared with the trade war's long-term effects on informal workers (or uninsured workers) in Vietnam.

6. Robustness tests

6.1 Placebo Test Using Pre-Trade War Data

We perform a falsification test using data from the pre-trade war period to investigate whether there was a similar correlation between tariff increases and workers' likelihood of being hired as informal or uninsured workers. A similar relationship between later tariff increases and workers' employment implies that our main findings reported in Section 5 are likely driven by pre-existing industry-specific trends in the employment of informal and uninsured workers. We perform this test using the VLFS data for 2014,[6] 2016, and 2017. As a measure of weighted tariff differences, we assign

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[6] We use the 2014 data for the placebo test, instead of the 2015 data, because our weighted tariff differences were constructed by using the 2015 US trade data (which included Vietnamese exports to the US in 2015)

zero for the 2014 data, and the measure of weighted tariff differences constructed for 2018 and 2019 as those for the 2016 and 2017 data. We then re-estimate Equation (3) using the newly constructed data for the placebo test and report the results in Table 4. Table 4 presents the estimates using the replication of Table 3 with the placebo data and shows that all coefficients are statistically insignificant. This implies that the underlying industry-specific trends do not account for the causal relationships presented in Table 3.

[Table 4 here]

6.2 Robustness Tests using Firm-level Microdata

Survey data suffer from various biases such as recollection and prestige bias. Respondents may not correctly remember their contracts or present themselves as socially desirable. We corroborate the main findings using firm-level microdata to test their robustness, even though these too might suffer from bias and measurement errors. For this purpose, we employ data from the Vietnam Enterprise Survey (VES),[7] which surveys a population of state-owned companies, FDI companies, and registered companies with more than 100 employees. VES also includes a representative sample of smaller firms with fewer than 100 employees selected based on several levels of stratification. Overall, the survey provides detailed information on more than 500,000 firms annually. Using the VES data, the following model is estimated:

$$s_{kt} = \alpha + \beta\,\tau_{jt} + \gamma_p + \theta_t + \mu_j + \vartheta_k + \varepsilon_{jkt}\,, \qquad (4)$$

where s_{kt} is the share of uninsured workers among the total workers in firm k in year t. We are interested in β, the coefficient of the same weighted tariff (τ_{jt}) employed in Equation (3). The specification also includes province γ_p, industry μ_j, firm ϑ_k, and time θ_t fixed effects. Standard errors are clustered within each three-digit industry code.

Columns (1)– (3) in Table 5 provide the results of estimating Equation (4) using the sample of firms categorized into columns (1)–(3) in Table 3. Interestingly, the coefficients of weighted tariff differences are insignificant for all industries and non-agricultural sectors. Overall, there is no evidence of any change in firms' share of uninsured workers in response to the changes in tariffs. However, the coefficient of the

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as the weight. Moreover, whether an industry is in a trading or non-trading sector is classified based on the 2015 Vietnamese export data. Thus, using the 2015 data may yield biased estimations.

[7] VES data provide only information about a firm's total employees and total insured employees and do not provide the number of informal workers. Thus, in this research, we can examine only the impact of the US-China trade war on the share of uninsured workers at the firm level.

weighted tariff difference is negative and significant for the trading sector, meaning that the share of uninsured workers decreased due to the trade war, and workers in the trading sector benefited more directly from the increase in US import tariffs on Chinese products.

We then restrict the sample to firms with more than 100 employees, as shown in Columns (4)–(6). The estimated coefficients are statistically significant and negative across all regressions, showing the robust reduction impact of the trade war on the share of uninsured workers in Vietnam. Specifically, Column (4) shows an average effect of weighted tariff differences on firms across all industries in Vietnam, that is, −0.447. The mean of weighted tariff differences for firms with more than 100 workers is 1.72 pp, which implies that the trade war induced an average 0.77-pp reduction in the share of uninsured workers. The magnitude of the impact is moderate compared to the estimated impact (1.22 pp) in regression (4) in Table 3. Overall, the main findings reported in Table 3 are confirmed when we use firm-level microdata, supporting the reducing impacts of the US–China trade war on workers' informality in Vietnam.

[Table 5 here]

7. Conclusion

This study utilized a unique shock to Vietnam's trade environment caused by the 2018 US–China trade war to understand the impact of favorable trade conditions on workers' formalization. Using the heterogeneity of tariff increases against Chinese products as a differential shock across Vietnamese industries, we investigated how trade diversion affected the allocation of Vietnamese workers to the formal and informal sectors. We found that employees working in an industry with a greater advantage in tariffs related to Chinese products tend to have a lower probability of being informal or uninsured than employees in industries with fewer or no tariff advantages. According to Goldberg and Pavcnik's (2003) framework, the findings suggest that Vietnamese firms recognized the US–China trade shock as a positive and permanent demand shock.

The study has a few limitations. First, the VLFS does not provide a unique individual identifier; therefore, we cannot utilize a panel structure to further understand how reallocation between formal and informal sectors actually occurred at the individual level. Second, our estimates only show the short-run responses of the labor market because we chose 2017–2019 as the sample period to avoid confounding effects from the Covid-19 pandemic. However, the evolution of the impacts on the Vietnamese labor

15

market could differ because a trade war and its impacts develop over time. Adjustments in the labor market too take time and require careful examination. Finally, the US–China trade war's general equilibrium effects through the global supply chain would be much more complicated but could lead to different results in the long run. Some of the negative effects that the US and China have on each other's economies may indirectly affect Vietnam through various channels and mechanisms.

Nevertheless, this study adds to our understanding of the US–China trade war and its effect on the labor markets of non-participating countries through trade diversion. Knowing how firms in such non-participating countries recognized the US–China trade war in the short run would enable policymakers to understand and manage uncertainties related to trade conflicts and maximize potential gains.

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Tables

Table 1. Share of Informal and Uninsured Workers in Vietnam

	All Sectors	Excluding agriculture and fishing	Tradable
Panel A: Informal Workers			
2017	0.78	0.64	0.82
2018	0.77	0.64	0.80
2019	0.74	0.62	0.75
Panel B: Uninsured workers			
2017	0.77	0.63	0.81
2018	0.76	0.63	0.79
2019	0.72	0.60	0.74

Note. The dummy variable for the informal worker variable takes the value of one if an individual has less than a three-month labor contract or does not have compulsory insurance. Furthermore, the dummy variable for the uninsured worker takes the value of one if the individual does not have social insurance (compulsory or voluntary insurance). The above estimation is based on the VLFS 2017, 2018, and 2019 for workers aged 20–64 years. Survey sampling weights were also included.

Table 2. Decomposition of Changes in Employment Type from 2017 to 2019

	All	Excluding agriculture and fishing	Trading
Panel A: Informal Workers			
Within industry	-0.013	-0.020	-0.014
Between industry	-0.024	-0.005	-0.051
Total	-0.037	-0.025	-0.065
Panel B: Uninsured workers			
Within industry	-0.017	-0.026	-0.017
Between industry	-0.025	-0.006	-0.053
Total	-0.042	-0.032	-0.070

Note. See the note under Table 1.

Table 3. Impact of Trade War on Workers in Vietnam

Sectors	All	Excluding agriculture and fishing	Trading
Mean of weighted tariff difference	0.00735	0.0168	0.0072
A: Dependent var: Informal worker			
	(1)	(2)	(3)
The weighted tariff difference	-0.706***	-0.672***	-0.804***
	(0.155)	(0.155)	(0.138)
Observations	1,251,550	785,021	656,814
R-squared	0.609	0.557	0.610
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
B: Dependent var: Uninsured worker			
	(4)	(5)	(6)
The weighted tariff difference	-0.780***	-0.724***	-0.923***
	(0.130)	(0.128)	(0.145)
Observations	1,254,915	788,264	657,706
R-squared	0.618	0.564	0.628
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes

Note. The above estimation was based on the VLFS 2017, 2018, and 2019. The sample was restricted to workers aged between 20 and 64 years at the time of the survey. Column 1 includes all industries, column 2 excludes agriculture and fishing, and column 3 includes all traded industries (using Vietnamese export data from the 2015 UN Comtrade Database; the industry has export activities). Survey sampling weights were also considered. The control variables were the workers' years of education, gender indicators, experience and its squared term, and an urban area indicator. All regressions include year-, three-digit industry-, and province-fixed effects. Standard errors were clustered at the three-digit industry level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4. Placebo Test Using Pre-Trade War Periods

	(1) All	(2) Excluding agriculture and fishing	(3) Trading
	Panel A: Informal Workers		
The weighted tariff difference	-0.566	-0.516	-0.546
	(0.354)	(0.363)	(0.392)
Observations	1,208,383	724,679	650,561
R-squared	0.607	0.556	0.578
	Panel B: Uninsured Workers		
The weighted tariff difference	-0.454	-0.411	-0.402
	(0.300)	(0.303)	(0.317)
Observations	1,213,930	730,200	652,032
R-squared	0.612	0.561	0.590

Note. The above estimation was based on the 2014, 2016, and 2017 VLFS. The sample was restricted to workers aged between 20 and 64 years at the time of the survey. The tariff difference data for 2018 and 2019 were matched with observations in 2016 and 2017. Column 1 includes all industries, column 2 excludes agriculture and fishing, and column 3 includes all traded industries (using Vietnamese export data from the 2015 UN Comtrade Database; the industry has export activities). All regressions include the usual controls for worker characteristics and province-, industry-, and year-fixed effects, as shown in Tables 6 and 7. Survey sampling weights were also included. Standard errors were clustered at the three-digit industry level. All regressions include year-, three-digit industry-, and province-fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5. Impact of Trade War on the Share of Uninsured Workers - Firm-level Analysis

	(1)	(2) All firms	(3)	(4)	(5) Firms with more than 100 employees	(6)
	All	Excluding agriculture and fishing	Trading	All	Excluding agriculture and fishing	Trading
Weighted tariff difference	0.033	0.062	-0.460**	-0.447***	-0.436***	-0.452**
	(0.162)	(0.160)	(0.202)	(0.142)	(0.143)	(0.177)
Constant	0.671***	0.668***	0.610***	0.309***	0.309***	0.209***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
Observations	1,143,737	1,119,177	235,260	42,422	41,570	23,754
R-squared	0.743	0.743	0.779	0.866	0.865	0.799
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes

Note. The above estimation was based on the VES in 2017, 2018, and 2019. Columns 1 and 4 include all industries, Columns 2 and 5 exclude agriculture and fishing, and Columns 3 and 6 include all traded industries (using Vietnamese export data from the UN Comtrade Database in 2015; the industry has export activities). Columns 1–3 include all firms in the VES, whereas Columns 4–6 restrict the sample to firms with more than 100 employees. Standard errors were clustered at the three-digit industry level. All regressions include year, three-digit industry, province, and firm-fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A1. US Import Tariff Difference against China and Vietnam

Sector	No. of industries	No. of targeted industries	Weighted differences in tariffs			
			mean	Standard deviation	Min	Max
Panel A: Year 2018						
All	235	78	0.0014	0.004	0	0.043
Agriculture	13	7	0.0004	0.0007	0	0.0026
Manufacturing	70	61	0.0046	0.0064	0	0.043
Tradable	89	77	0.0037	0.006	0	0.043
Panel B: Year 2019						
All	233	91	0.0085	0.018	0	0.101
Agriculture	12	7	0.003	0.0057	0	0.020
Manufacturing	71	68	0.0259	0.0247	0	0.101
Tradable	89	86	0.0219	0.0236	0	0.101

Note. The tariff difference is the weighted US import tariff difference between Vietnam and China due to the trade war in the three-digit industry code. For each poverty-line tariff difference, its weight is the share of the HS imported product from China in the total US imported products in the three-digit industry code, based on 2015 US imports. In 2017, the import tariff difference was equal to zero because this was before the trade war, and there was no difference between the US import tariffs for Vietnam and China in 2017. Six industries that do not belong to the traded sectors were affected by the trade war, manufacturing of weapons and ammunition, military fighting vehicles, postal activities, motion pictures, video and television programming activities and other personal services.

Table A2. Summary Statistics

Variable	All		Before Trade War		After Trade War	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Informal worker (=1 if yes)	0.76	0.43	0.78	0.41	0.75	0.43
Worker without insurance (=1 if yes)	0.75	0.43	0.77	0.42	0.74	0.44
Age	40.23	11.52	40.3	11.59	40.19	11.48
Year of experience	25.64	13.45	25.88	13.49	25.52	13.43
(Year of experience)^2 /100	8.38	7.36	8.52	7.41	8.32	7.33
Female (=1 if yes)	0.48	0.50	0.48	0.50	0.47	0.50
Year of education	8.58	4.65	8.42	4.68	8.67	4.63
Urban (=1 if yes)	0.33	0.47	0.33	0.47	0.33	0.47
Agriculture, forestry and aquaculture (=1 if yes)	0.35	0.48	0.38	0.49	0.34	0.47
Non-Agriculture (=1 if yes)	0.65	0.48	0.62	0.49	0.66	0.47
Weekly working hours (main job)	40.76	14.05	40.9	13.23	40.68	14.44
Working for more than one job (=1 if yes)	0.18	0.39	0.21	0.4	0.17	0.38
Logarithm of hourly income	3.14	0.70	3.11	0.71	3.17	0.70
Number of observations	1,254,954	1,254,954	423,351	423,351	831,603	831,603

Note. The sample consisted of all employed individuals in the LFS 2017, 2018, and 2019 who worked and were 20–64 years old at the time of the survey. Survey sampling weights were used to calculate all the statistics presented in this table. For convenience, the experience squares are divided into 100 squares.

Table A3. Comparison of Job Characteristics across Types of Employment

Panel A: Formal vs. Informal	All		Excluding agriculture and fishing		Trading	
	Formal	Informal	Formal	Informal	Formal	Informal
Number of working hours per week in main job	45.24	39.34	45.27	45.96	48.40	34.47
Number of working hours per week in all jobs	45.82	42.37	45.84	47.52	48.73	38.58
Number of schooling year	12.39	7.38	12.42	8.42	10.22	6.62
Hourly income in main job (VND)[8]	35,473	22,474	35,578	27,746	30,888	18,319
Share with more than one job	0.05	0.23	0.05	0.12	0.03	0.3

Panel B: Insured vs. Uninsured	All		Excluding agriculture and fishing		Trading	
	Insured	Uninsured	Insured	Uninsured	Insured	Uninsured
Number of working hours per week in main job	45.35	39.22	45.39	45.90	48.41	34.28
Number of working hours per week in all jobs	45.94	42.28	45.97	47.49	48.77	38.44
Number of schooling year	12.37	7.31	12.4	8.34	10.26	6.57
Hourly income in main job (VND)	35,840	22,382	35,970	27,691	31,121	18,239
Share with more than one job	0.05	0.23	0.05	0.12	0.04	0.31

Note. The dummy variable for the informal worker variable takes the value of one if an individual has less than a three-month labor contract or does not have compulsory insurance. Furthermore, the dummy variable for the uninsured worker takes the value of one if the individual does not have social insurance (compulsory or voluntary insurance). The above estimation is based on the LFS 2017, 2018, and 2019 for workers aged 20–64 years. Survey sampling weights were also included.

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[8] The USD–VND exchange rate was 22,602 in 2018. In 2018, in the main jobs, formal workers received an average hourly income of 35,778 VND, equivalent to 1.58 USD, while the informal workers received 22,035 VND or 0.97 USD.
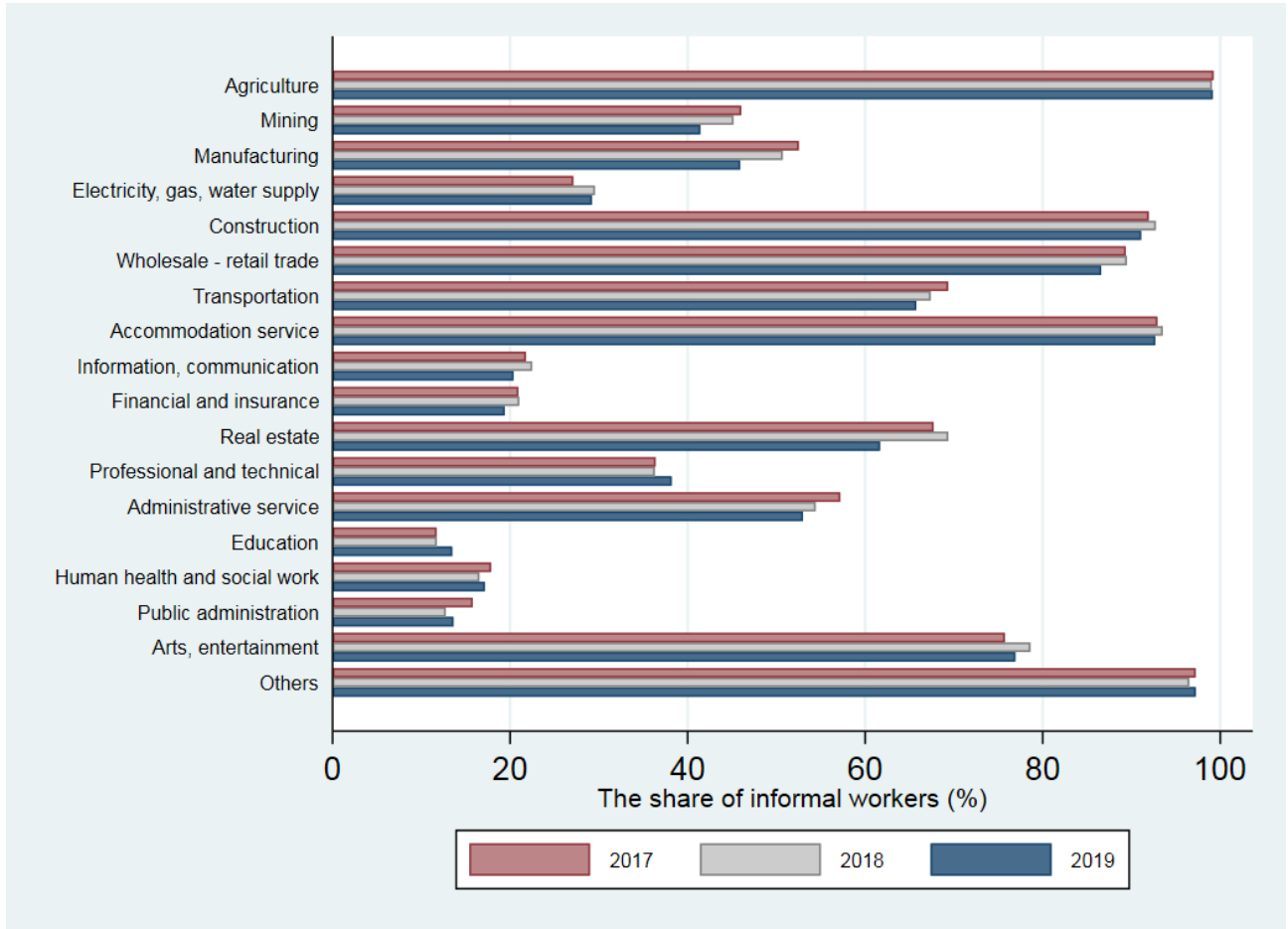
B. Figures

Figure B1. Share of Informal Workers in Vietnam by Industry. Source: Authors'
calculations from Vietnam Labor Force Survey

Note. Informal workers are individuals who have less than a three-month labor contract or do not have
compulsory insurance. The above estimates are based on the 2017, 2018, and 2019 LFS for workers aged
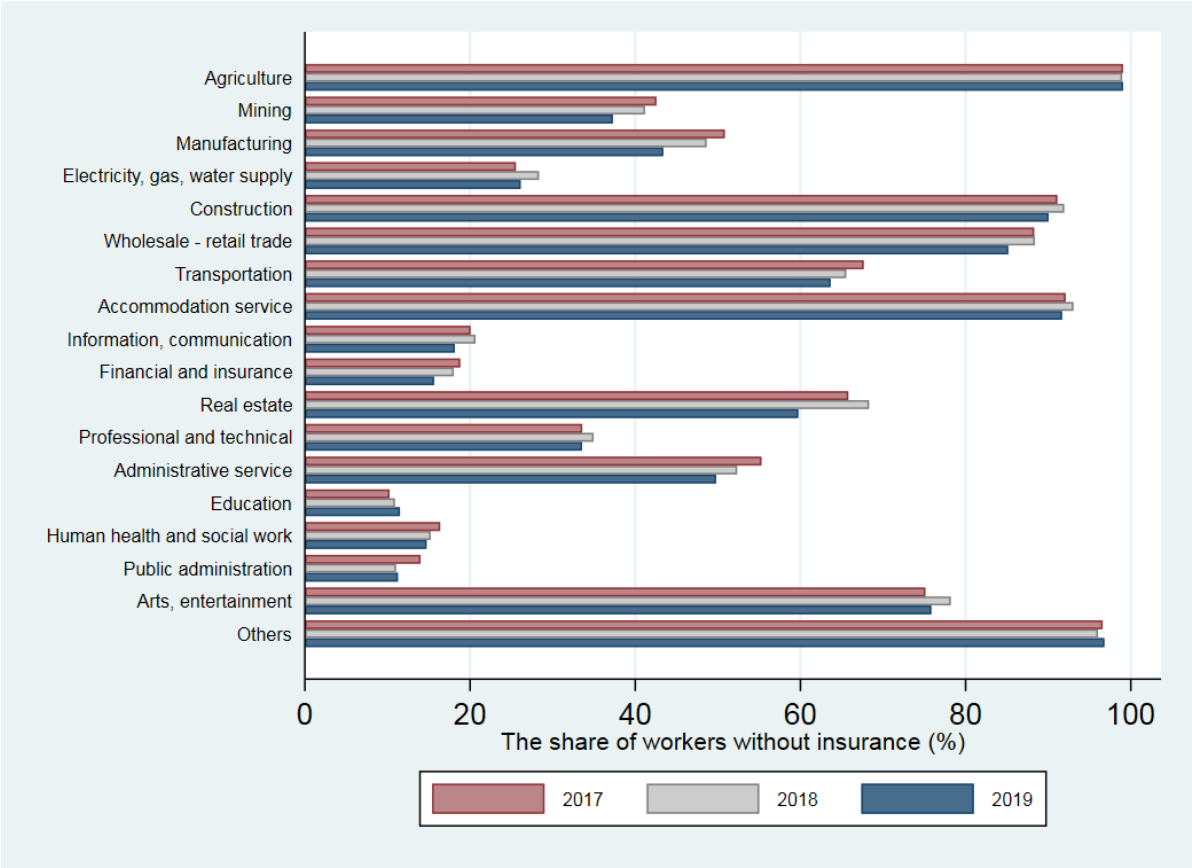20–64 years. Survey sampling weights were included.

Figure B2. Share of Workers without Insurance in Vietnam by Industry. Source:
Authors' calculations from Vietnam Labor Force Survey

Note. The above estimates are based on the 2017, 2018, and 2019 LFS for workers aged 20–64 years.
Survey sampling weights were included.