

# Impacts of trade liberalization in the least developed countries: evidence from Lao PDR

著者	Kyophilavong Phouphet, Hayakawa Kazunobu
権利	Copyrights 2022 by author(s)
journal or publication title	IDE Discussion Paper
volume	863
year	2022-09
URL	<a href="http://hdl.handle.net/2344/00053489">http://hdl.handle.net/2344/00053489</a>

IDE Discussion Papers are preliminary materials circulated  
to stimulate discussions and critical comments

**IDE DISCUSSION PAPER No. 863**

**Impacts of Trade Liberalization in the  
Least Developed Countries: Evidence  
from Lao PDR**

Phouphet KYOPHILAVONG and Kazunobu  
HAYAKAWA\*

September 2022

*Abstract:* This study empirically investigates the effects of tariff reductions in a least developed country on its economy. Specifically, we focus on tariff reductions based on the ASEAN Free Trade Area (AFTA) in Laos. First, we analyze how the reduction of AFTA tariff rates in Laos affects Lao imports from AFTA member countries. Our main finding is that the reduction of AFTA tariffs in Laos does not significantly change Laos' imports. Second, we investigate their effects on plant-level employment. Consistent with the observation of a negligible change in Laos' imports, we find no significant changes in plant-level employment. In short, although Laos decreased its tariff rates against other AFTA members, imports from them did not significantly increase, and no significant changes occurred in employment. We discuss several possible reasons for these insignificant effects.

*Keywords:* LDC; Lao PDR; Tariffs

*JEL Classification:* F15; F53

---

\* Senior Research Fellow, Bangkok Research Center, IDE (kazunobu\_hayakawa@jetro.go.jp)

The Institute of Developing Economies (IDE) is a semigovernmental, nonpartisan, nonprofit research institute, founded in 1958. The Institute merged with the Japan External Trade Organization (JETRO) on July 1, 1998. The Institute conducts basic and comprehensive studies on economic and related affairs in all developing countries and regions, including Asia, the Middle East, Africa, Latin America, Oceania, and Eastern Europe.

---

The views expressed in this publication are those of the author(s). Publication does not imply endorsement by the Institute of Developing Economies of any of the views expressed within.

---

**INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO**  
**3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI**  
**CHIBA 261-8545, JAPAN**

©2022 by author(s)

No part of this publication may be reproduced without the prior permission of the author(s).

# Impacts of Trade Liberalization in the Least Developed Countries: Evidence from Lao PDR<sup>§</sup>

Phouphet KYOPHILAVONG  
National University of Laos, Lao PDR

Kazunobu HAYAKAWA<sup>#</sup>  
Bangkok Research Center, Institute of Developing  
Economies, Thailand

---

**Abstract:** This study empirically investigates the effects of tariff reductions in a least developed country on its economy. Specifically, we focus on tariff reductions based on the ASEAN Free Trade Area (AFTA) in Laos. First, we analyze how the reduction of AFTA tariff rates in Laos affects Lao imports from AFTA member countries. Our main finding is that the reduction of AFTA tariffs in Laos does not significantly change Laos' imports. Second, we investigate their effects on plant-level employment. Consistent with the observation of a negligible change in Laos' imports, we find no significant changes in plant-level employment. In short, although Laos decreased its tariff rates against other AFTA members, imports from them did not significantly increase, and no significant changes occurred in employment. We discuss several possible reasons for these insignificant effects.

**Keywords:** LDC; Lao PDR; Tariffs

**JEL Classification:** F15; F53

---

## 1. Introduction

The effects of tariff rates on the economy have attracted increasing public attention. The primary effect appears as an increase in imports, which yields various effects on the domestic economy. Due to tougher competition with imported goods, domestic producers in industries with tariff reductions may suffer from decreases in sales and employment. However, consumers enjoy some benefits from this tariff reduction. Consumer prices for imported goods may decrease. In addition, imported goods may include new varieties that are locally unavailable. These effects have been observed in many past trade liberalization episodes. Nevertheless, when negotiating new regional trade agreements (RTAs), negative effects (e.g., job destruction) have received much attention.

---

<sup>§</sup> We would like to thank Shujiro Urata, Kiyoyasu Tanaka, Kyoji Fukao, Satoru Kumagai, Keola Souknilanh, and the seminar participants in the Institute of Developing Economies for their invaluable comments. All remaining errors are ours.

<sup>#</sup> Corresponding author: Kazunobu Hayakawa; Address: Bangkok Research Center, Japan External Trade Organization, 16th Floor, Nantawan Building, 161 Rajadamri Road, Pathumwan, Bangkok 10330, Thailand; Tel: 66-2-253-6441; Fax: 66-2-254-1447; E-mail: [kazunobu\\_hayakawa@ide-gsm.org](mailto:kazunobu_hayakawa@ide-gsm.org).

Do the least-developed countries (LDCs) receive such negative effects when they reduce their tariff rates? In their RTAs with relatively developed countries, LDCs tend to reduce tariff rates several years after RTAs' entry into force. In addition, they may be exempt from the reduction or elimination of tariffs on many products. These exceptional treatments aim to mitigate potential adverse effects in LDCs. Indeed, the negative impacts of trade liberalization on LDCs may be minimal. In general, firms export their goods if the market size is sufficiently large compared with variable trade costs (e.g., transport costs or tariffs) and fixed trade costs (e.g., advertising costs or buyer search costs) (Melitz, 2003). In LDCs, market size is typically modest. The high fixed costs are also a result of the poor institutional quality. Thus, the reduction in tariffs may not be sufficient for foreign firms to begin exporting to LDCs. Although we have observed an increase in imports through trade liberalization in many countries, such an effect may not be significant in LDCs.

This study empirically investigates Laos's tariff reduction effects on the Lao economy. Laos has been categorized as an LDC. It joined the Association of Southeast Asian Nations (ASEAN) in 1997 and reduced its tariff rates against other ASEAN member states (AMSs) under the ASEAN Free Trade Area (AFTA). The AFTA was upgraded to the ASEAN Trade in Goods Agreement (ATIGA) in 2009, which pursues the goal of establishing a single market and production base with a free flow of goods within ASEAN. Based on this agreement, the six forerunners (i.e., Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand) completed their own tariff elimination for almost all products in 2010. Meanwhile, in the latecomer nations (i.e., Cambodia, Myanmar, Laos, and Vietnam), all scheduled tariff reductions or eliminations were completed in 2018. This study examines the effect of the AFTA/ATIGA tariff rates on Laos' imports from AMSs and employment.

Specifically, we first investigate how Laos' reduction of tariff rates changes Lao imports from AMSs. To do that, we link the Laos' import data with tariff data at a harmonized system (HS) six- or eight-digit levels. In addition, we investigate the effects of most favored nation (MFN) tariffs and ASEAN-China FTA (ACTFA) tariffs. Our research spans the years 2001 to 2019. Our main finding in this analysis is that the reduction of ATIGA tariffs in Laos does not significantly change Laos' imports from AMSs. Second, we examine plant-level employment in 2006 and 2013, using data derived from the Laos Economic Census. We link employment at plants with tariffs in their major industry, as defined by a four-digit International Standard Industrial Classification (ISIC) level. In this analysis, we find no significant changes in plant-level employment, which is consistent with the finding of an insignificant change in Laos' imports. In short, although Laos decreased its tariff rates against AMSs through ATIGA, imports from AMSs did not significantly increase, and there were no significant changes in employment.

The majority of studies on LDC trade have examined the effects of unilateral trade liberalization (e.g., generalized schemes for preference (GSP)) on LDCs' *exports*. For example, Frazer and Van Biesebroeck (2010), Herz and Wagner (2011), Gil-Pareja et al. (2014), and

Sytsma (2021) have studied the trade creation effect of GSP, although it remains controversial. Vanhnalat et al. (2015) also examined the effects of GSP and RTAs on Lao exports. Several studies have examined the utilization of GSP in LDCs' exports (e.g., Cadot et al., 2006; Manchin, 2006; Bureau et al., 2007; Cherkashin et al., 2015; Sytsma, 2021; Hayakawa, 2022). These studies have shown the role of the preference margin (i.e., the difference between MFN tariffs and GSP tariffs) and the rules of origin. LDCs' exports, rather than imports, have attracted much academic attention.

Nevertheless, some studies deal with LDCs' imports. First, several studies examined the trade creation effect of RTAs, including those covering LDCs, by estimating the gravity equation with dummy variables on the respective RTAs. For instance, the gravity analysis in Magge (2006) encompasses the Economic Community of West African States (ECOWAS) and the Common Market for Eastern and Southern Africa, both of which comprise a number of African LDCs. The estimation results do not necessarily demonstrate a significantly positive impact of these RTAs on intra-member trade. In addition, Baier et al. (2019) empirically demonstrated that the trade creation effect of RTAs is significantly greater when importers' economic size (GDP) or income (GDP per capita) is greater. Second, using the computable general equilibrium (CGE) model, the economic effects of RTAs that include LDCs as members are analyzed. Some studies, for instance, demonstrate the positive effects of the African Continental Free Trade Agreement on commerce (Abrego et al., 2019; Yannick et al., 2021). Similarly, Kyophilavong et al. (2016) and Oh and Kyophilavong (2014) demonstrate that the AFTA and ASEAN-South Korea FTA increased the trade deficit in Laos. Unlike these studies, our study conducts an ex post study on the trade creation effect of RTAs using tariff variables.

Our study is related to several strands of literature. First, there are some ex-post studies on the trade-tariff-nexus. For example, Disdier et al. (2015) estimated gravity equations for trade among emerging economies (excluding LDCs) and found negative coefficients for applied tariff rates. Debaere and Mostashari (2010) focus on the effects of U.S. tariffs on U.S. imports, whereas Xu et al. (2020) examine the effects of destination tariffs on China's exports. Second, our examination of plant-level employment is related to the studies on the effects of trade liberalization on firm performance. For example, Amiti and Konings (2007) explored the impact of tariffs on productivity in Indonesia, whereas Bustos (2011) investigated the effects of destination tariffs on innovation in Argentina. Third, while we examine the effects of trade liberalization on imports and employment, other studies examine the effects of trade liberalization on other economic variables. For example, Devlin et al. (2020), Utar (2018), Hakobyan and McLaren (2016), Autor et al. (2014), Hummels et al. (2014), and Fukase (2013) investigated individual wages. Meanwhile, Ludema and Yu (2016), Gorg et al. (2017), Fan et al. (2015), and Bas and Strauss-Kahn (2016) investigated the effects of export quality (2015).

The remainder of this paper is organized as follows. Section 2 provides an overview

of Laos' trade and tariff structures. Section 3 investigates the effects of Laos' tariff reduction on its imports, and Section 4 examines those on plant-level employment. Finally, we conclude the paper in Section 5.

## 2. Overview of Laos' Trade Structure

This section provides an overview of Laotian trade and tariff structures. We begin with the import penetration ratios in 2010 by industry to see how imports play an important role in the Lao economy. The ratios are computed as imports divided by "imports + total sales – exports." The data were obtained from input-output economic indicators provided by the Asian Development Bank (ADB)<sup>1</sup>. The ratios are reported by industry in Figure 1. Unlike standard figures such as those in developed countries, some industries have extremely high import penetration ratios. These ratios exceed 90% in five industries: coke, refined petroleum, nuclear fuel, basic metals and fabricated metal, machinery, electrical and optical equipment, and transport equipment. Trade liberalization in Laos may not have significant effects on domestic producers in these industries because of their already high presence in the Laos market. In most other industries, the import penetration ratios are below 20%.

=== Figure 1 ===

Figure 2 depicts the share of Laotian imports from ASEAN, China, and the rest of the world (ROW). While Thailand is the top importer of Laos's goods, China is the top importer among the non-ASEAN countries. We obtain trade data from CEPII.<sup>2</sup> This database is called the "BACI" database and is an updated version of the data provided by Gaulier and Zignago (2010). The figure shows that until 2010, most imports were sourced from ASEAN. ASEAN countries accounted for more than 70% of the total imports in Laos. In the 2010s, imports from China grew relatively, accounting for more than 20% of total imports. In all study years, approximately 90% of the total imports came from either ASEAN or China. Imports from the ROW account for approximately 10% of the total imports. In sum, the source countries of Laotian imports are concentrated in specific countries.

=== Figure 2 ===

We take a closer look at the share of ASEAN imports. Table 1 presents these proportions by industry for specific years. In 2009, leather products, precision metals, machinery, transport equipment, and precision machinery accounted for a comparatively

---

<sup>1</sup> <https://data.adb.org/dataset/lao-pdr-input-output-economic-indicators>

<sup>2</sup> [http://www.cepii.fr/CEPII/en/bdd\\_modele/presentation.asp?id=37](http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=37)

small proportion of ASEAN imports. Figure 1 surprisingly reveals that several of these industries have high import penetration ratios. Thus, the majority of ASEAN imports are concentrated in industries with low import penetration rates. In these sectors, the reduction of tariffs against ASEAN may have a greater effect on the Lao economy. Overall, agricultural industries have a high proportion of ASEAN imports.

=== Table 1 ===

Next, we examine the relative demand for Laos among ASEAN countries. Table 2 reports the number of HS six-digit codes according to the ascending ranking among ASEAN countries in terms of global import values in 2012. Laos had the highest number in the first rank, followed by Cambodia and Myanmar. The number of products where the smallest import value is recorded among ASEAN countries is the highest in Laos, that is, 3,148. In Laos, 85% of products are categorized as first-to third-ranked. These results suggest the smallest demand size in Laos among ASEAN countries. As discussed in the introductory section, owing to such small demand sizes, tariff reductions may not increase Laotian imports.

=== Table 2 ===

Finally, we provide an overview of tariffs in Laos. Figure 3 shows the changes in the average tariffs in Laos. The tariff data were obtained from the World Integrated Trade Solutions (WITS). Note that these data were not available for several years. We present three types of tariffs: MFN tariff rates, ATIGA rates, and ACFTA rates. Although the ACFTA tariff rates for 2013 are missing from the WITS, we show their average between 2007 and 2014 as those for 2013 in this figure. This shows that the ATIGA rates decreased, especially in the 2000s. After 2010, tariff reductions in ATIGA were mainly for sensitive/highly sensitive products. ACFTA rates decreased, especially in the first half of the 2010s. Their reduction was significant in 2014 and 2015. On average, both ATIGA and ACFTA rates have been almost zero since 2015. MFN rates were stable and decreased slightly in 2015 and 2016.

=== Figure 3 ===

As shown in Figure 3, ATIGA tariffs on some products were further reduced in the 2010s. We examine the extent to which these products were “sensitive.” To do so, we investigate Laos’ MFN tariffs in 2013 ( $MFN_{p2013}$ ). Specifically, we estimate the following equation:



$$100 \times MFN_{p2013} = \sum_t \alpha_t \times Zero(t)_p + \beta \times Excluded_p + \epsilon_p \quad (1)$$

If the MFN tariff is 10%,  $MFN_{p2013}$  takes a value of 0.10. Product  $p$  was defined at the HS eight-digit level. We focus on the relative magnitude of MFN tariffs in 2013 for products where ATIGA tariffs became zero after 2013.  $Zero(t)_p$  is a dummy variable that takes a value of 1 if the tariffs are reduced to zero in year  $t$  (and are positive rates in year  $t-1$ ). After 2013, tariff elimination was carried out in 2015, 2016, and 2018.  $Excluded$  indicates “excluded products” in ATIGA and is a dummy variable that takes a value of one if ATIGA tariff rates were still positive in 2018. The results of the ordinary least squares (OLS) method are presented in Table 3. MFN tariffs as of 2013 were significantly higher for products liberalized in later years, except in 2016. For example, in 2013, the MFN rates for products on which ATIGA tariffs were reduced to zero in 2015 were eight percentage points higher than those on which ATIGA tariffs were eliminated prior to 2014. In terms of MFN tariffs, the protection of later-liberalized goods is greater. Furthermore, excluded products were subject to 22 percentage point higher MFN tariffs.

=== Table 3 ===

### 3. Impacts on Imports

This section empirically investigates how the decrease in ATIGA tariffs changes Laos’ imports from AMSs. We first estimate the following equation at an HS six-digit level, denoted by  $p$ .

$$Import_{pt} = \exp(\alpha \ln(1 + MFN_{pt}) + \beta \ln(1 + ATIGA_{pt}) + u_p + u_t) \times \epsilon_{pt} \quad (2)$$

$Import_{pt}$  represents Laos’ total imports of product  $p$  from ASEAN in year  $t$ .  $ATIGA_{pt}$  is Laos’ ATIGA tariff rate, while  $MFN_{pt}$  indicates Laos’ MFN tariff. The negative coefficient for ATIGA tariffs implies that a decrease in ATIGA tariffs increases Laos’ imports from AMSs. We controlled for product fixed effects ( $u_p$ ) and year fixed effects ( $u_t$ ). While the former controls for the over-time average size of product-level demand in Laos in addition to the ex-ante protection level, as shown in Table 3, the latter captures macro shocks, such as the global financial crisis. The study period was from 2001 to 2019. We again obtained tariff data from the WITS and import data from the BACI in CEPII. Observations of zero-valued imports were also included. Thus, we estimate equation (2) using the Poisson pseudo maximum likelihood (PPML) method (Silva and Tenreyro, 2006).

Table 4 reports the estimation results. Standard errors clustered by HS six-digit codes

are reported. In column (I), we introduce only MFN tariffs, whereas only ATIGA tariffs are introduced in column (II). Column (III) includes both types of tariffs. In all three columns, neither type of tariff variable has a significant coefficient. Furthermore, the coefficients for ATIGA tariffs are positively estimated, indicating that the reduction in ATIGA tariffs decreases, rather than increases. Laos' imports from AMSs are insignificant. We also introduce the ACFTA tariffs in Laos in columns (IV) and (V). MFN tariffs have significantly negative coefficients. Thus, the results in columns (I)–(III) may suffer from omitted variable bias, which underestimates the coefficient of MFN tariffs. The results suggest that a one-percentage-point reduction in MFN tariffs increases Laotian imports from ASEAN by approximately 1.2%. Again, the coefficient for ATIGA tariffs is insignificant, although its sign changes to negative. ACFTA tariffs have significantly positive coefficients, implying that a reduction in ACFTA tariffs decreases imports from ASEAN. Specifically, a one-percentage-point reduction of ACFTA tariffs decreases imports by 2.3-2.4%. This result indicates a substitution effect on imports from ASEAN due to the increase in imports from China.

=== Table 4 ===

Next, we estimate the modified version of equation (2): We make two modifications. One is to restrict the study years to the period from 2013 to 2018. As shown in Table 3 and Figure 3, the focus of this period is to examine the effect on imports of sensitive products or protected products. The other modification is to change the HS digit in products from six to eight digits. This change makes our tariff variables more precise because we do not need to aggregate them. This level of analysis becomes possible by focusing on the period from 2013 to 2018 because both tariffs and imports are recorded under the HS 2012 version. Import data at an eight-digit level were drawn from the ASEAN Stats Data Portal<sup>3</sup>. The results are presented in Table 5. Standard errors clustered by HS eight-digit codes are reported. None of the tariffs changed the imports. While we find insignificant results in ATIGA tariffs for all products in Table 4, their effects again become insignificant for sensitive products.<sup>4</sup>

=== Table 5 ===

In sum, we found insignificant effects of ATIGA tariffs on Laotian imports from ASEAN. There are several possible reasons for these insignificant effects. First, Laos may introduce non-tariff measures (NTMs) to protect domestic industries instead of reducing

---

<sup>3</sup> <https://data.aseanstats.org/>

<sup>4</sup> We also estimate equation (2) by industries or export countries. No significantly negative coefficients for ATIGA tariffs are found in all industries. The estimation by export countries shows significantly negative coefficients for ATIGA tariffs when the export country is either Indonesia or the Philippines.

tariffs. However, according to the Integrated Trade Intelligence Portal developed by the World Trade Organization, we did not observe a significant increase in new NTMs in Laos during the study period. Second, the size of the Laos market may not be sufficient to encourage other AMSs to increase exports to Laos. This conjecture will be partially supported, as shown in Table 2. Lastly, ATIGA tariffs may not be utilized extensively in Laos exports. Table 6-6 of ERIA (2021) demonstrates that ATIGA utilization rates were low in 2018 for Lao imports from the majority of AMSs.<sup>5</sup> The low utilization of ATIGA tariffs suggests that AMS exports to Laos do not enjoy tariff reductions. Since the use of preferential tariffs requires exporters to incur additional fixed costs, this low utilization may also be a result of the diminutive size of the Laos market. Due to their small markets, trade liberalization in LDCs may not affect their imports.

#### 4. Impacts on Employment

This section investigates the effects of the ATIGA tariffs on employment at the plant level. To do so, we employ the Economic Census conducted by the National Statistics Bureau in Laos for 2006 and 2013. The Economic Census of 2006 was the first economic census in Laos, covering 96,040 establishments. This economic census covers every formal or informal business entity, including shops that operate any economic activities, and non-profit and non-governmental organizations. The second economic census was conducted in 2013 and had 124,873 establishments.

With these censuses, we estimate the following equation for plant  $f$  in industry  $i$  in year  $t$ :

$$\ln L_{ft} = \alpha \ln(1 + ATIGA_{it}) + \beta \ln(1 + MFN_{it}) + \mathbf{X}'\boldsymbol{\gamma} + u_i + u_t + \epsilon_{ft} \quad (3)$$

The dependent variable,  $L_{ft}$ , is the number of employees in plant  $f$  in year  $t$ . Tariff variables, including ATIGA tariffs and MFN tariffs, are linked based on the plant's major industry, which is identified at a four-digit level in ISIC Revision 4. We control for various plant characteristics ( $\mathbf{X}$ ), including the export dummy (*Export*) taking a value of one for exporters, logged plant age (*Age*), the foreign ownership dummy (*Foreign ownership*) taking a value of one if foreign capital is incorporated, the single plant dummy (*Single plant*) taking a value of one if the firm's plant does not have multiple plants/establishments, the computer use dummy (*Computer use*) takes a value of one if a plant uses computers in business, several dummy variables indicating the director's education level, and province fixed effects. We

---

<sup>5</sup> The utilization rates of ATIGA tariffs are almost zero for importing from Brunei, Cambodia, Myanmar, Singapore, and Vietnam. The rates are 10% on imports from Thailand, 11% on those from Malaysia, 19% on those from Indonesia, and 63% on those from the Philippines.

also control for industry- and year-fixed effects. We estimate this equation using the OLS method. The basic statistics are presented in Table 6.

=== Table 6 ===

This dataset contains three noteworthy points. First, we could not panelize our dataset according to plants because of the lack of common identification codes for plants across years. Even if such codes were available, half of all plants in the 2013 census entered the market after the 2006 census. Thus, if we use panel data according to the plants, half of the plants will have to be dropped from our study. Consequently, we did not control for plant-fixed effects. Second, the 2006 economic census did not include continuous information on sales. Thus, we cannot include sales-related variables in this study. Third, we do not examine the effect of ACFTA tariffs because (i) the data on ACFTA tariffs in Laos are not available for 2013 and (ii) ACFTA tariffs decrease mainly outside our study period, as shown in Figure 3.

Table 7 reports the estimation results for equation (3). In column (I), we introduce only MFN tariffs, whereas only ATIGA tariffs are introduced in column (II). Column (III) includes both types of tariffs. As in our analysis of imports from ASEAN, the tariff variables have insignificant coefficients. The reduction in tariffs, including both MFN tariffs and ATIGA tariffs, does not significantly change the employment of plants. Furthermore, although insignificant, the coefficients for tariff variables are negatively estimated, indicating that the reduction of tariffs in Laos increases the employment of plants. In contrast, the plant characteristic variables had significant coefficients. Their results indicate that employment is larger in exporting plants, older plants, multi-plant firms, foreign plants, and plants using information technology facilities. These results on plant characteristics are consistent with those found in previous studies (see, for example, Bernard, 2012).

=== Table 7 ===

We conduct two types of robustness checks on the aforementioned results. First, we exclude the 2013 plants that were excluded from the 2006 Economic Census. As stated previously, it is impossible to introduce plant-fixed effects. Utilizing industry fixed effects, our empirical identification is based on the changes in tariffs in each industry over a two-year period. Examining a different set of plants in each of the two years may result in some bias. Since the 2013 Economic Census includes a question about whether or not a plant responded to the 2006 Economic Census, we exclude plants that did not respond. Second, we exclude plants from industries with exceptionally high import penetration rates. In Table 1 and Figure 1, we observed a high proportion of ASEAN imports in sectors with low import penetration ratios. In these sectors, the reduction of tariffs against ASEAN may have a

greater effect on the Lao economy. Specifically, we exclude the five industries where import penetration ratios are greater than 90%. These robustness tests are reflected in Table 8 and again demonstrate the insignificance of tariff variable results. Such negligible effects of ATIGA tariffs on employment would be driven by the negligible increase in imports from AMSs as described in the preceding section.

=== Table 8 ===

Finally, we extend the model specified in equation (3) by introducing two types of interaction terms with tariff variables. First is the interaction of the export dummy. Since the main market for exporters in Laos is not the Laos market, exporters compete less with imported goods. Thus, by examining the interaction term with the export dummy, we investigate whether exporters receive different effects of tariff reductions than non-exporters. Table 9 presents the results in columns (I) through (III). In column (III), the coefficient for the interaction term between ATIGA tariffs and the export dummy is significantly positive. Laos's ATIGA liberalization increases exporter employment. The second interaction term is the dummy for foreign ownership. Foreign-owned factories may sell high-quality goods in Laos and face less competition from imported goods as a result. The estimation results are shown in columns (IV)–(VI) in Table 9 and indicate no significant results for the tariff-related variables.

=== Table 9 ===

Why did exporters increase employment? There are at least two possible explanations for this. First, exporters do not compete for imported goods in the Laos market. If the government subsidizes domestic producers in industries with greater tariff reduction, exporters can expand their business by free-riding on subsidies. Although there is no evidence of such a direct subsidy for exporters, the government does provide exporters with low interest rates. The second possibility is that if ATIGA tariffs in Laos are positively correlated with those in Laos' export destination, then exporters increase both employment and their exports to ASEAN. Throughout the period of our study, Thailand has been the leading importer of Laos' goods. China's presence is also growing gradually (see Figure A1 in the Appendix). Indeed, we find a significantly positive correlation between Laos' ATIGA tariffs, Thailand's ATIGA tariffs, and China's tariffs (see Table A1 in the Appendix). Thus, a decrease in major partners' tariffs against Laos appears to significantly increase exporters' employment.

## 5. Concluding Remarks

This study empirically investigates the effects of tariff reductions through RTAs on the economy of an LDC. Specifically, we examined the impact of the AFTA's tariff reduction on the Lao economy. We first investigated its impact on Lao imports from AFTA member nations and found an insignificant result. Second, we examined the effects on plant-level employment and again obtained insignificant changes in plant-level employment. The first result suggests that RTAs can improve the trade balance in LDCs if they benefit from an increase in exports, despite the fact that consumers miss out on experiencing new product varieties. Moreover, the latter result indicates that RTAs do not negatively impact employment at LDC firms. In fact, exporters in industries benefiting from tariff reductions increase employment. In conclusion, RTAs may be advantageous for LDCs in terms of trade balance and employment. We conjecture that these results are due to the small economic size of LDCs, which do not induce RTA partner countries to export to LDCs. Therefore, RTAs may enhance economic growth in LDCs, at least until their economic size reaches a certain level.

## References

- Abrego, Lisandro, Tunc Gursoy, Hector Perez-Saiz, Maria Alejandra Amado, and Garth P. Nicholls**, 2019, The African Continental Free Trade Agreement: Welfare Gains Estimates from a General Equilibrium Model, IMF Working Papers 2019/124, International Monetary Fund.
- Amiti, Mary and Jozef Konings**, 2007, Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia, *American Economic Review*, 97(5), 1611-1638.
- Autor, David H., David Dorn, Gordon H. Hanson, and Jae Song**, 2014, Trade Adjustment: Worker-Level Evidence, *Quarterly Journal of Economics*, 129(4): 1799-1860.
- Baier, Scott L., Yoto V. Yotov, and Thomas Zylkin**, 2019, On the Widely Differing Effects of Free Trade Agreements: Lessons from Twenty Years of Trade Integration, *Journal of International Economics*, 116: 206-226.
- Bas, Maria and Vanessa Strauss-Kahn**, 2015, Input-trade Liberalization, Export Prices and Quality Upgrading, *Journal of International Economics*, 95(2), 250-262.
- Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott**, 2012, The Empirics of Firm Heterogeneity and International Trade, *Annual Review of Economics*, 4(1): 283-313.
- Bureau, Jean-Christophe, Raja Chakir, and Jacques Gallezot**, 2007, The Utilisation of Trade Preferences for Developing Countries in the Agri-food Sector, *Journal of Agricultural Economics*, 58(2): 175-198.
- Bustos, Paula**, 2011, Trade Liberalization, Exports, and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinian Firms, *American Economic Review*, 101(1), 304-340.
- Cadot, Olivier, Celine Carrere, Jaime De Melo, and Bolormaa Tumurchudur**, 2006, Product-specific Rules of Origin in EU and US Preferential Trading Arrangements: An Assessment, *World Trade Review*, 5(2): 199-224.
- Cherkashin, Ivan, Svetlana Demidova, Hiau Looi Kee, and Kala Krishna**, 2015, Firm Heterogeneity and Costly Trade: A New Estimation Strategy and Policy Experiments, *Journal of International Economics*, 96(1): 18-36.
- Debaere, Peter and Shalah Mostashari**, 2010, Do Tariffs Matter for the Extensive Margin of International Trade? An Empirical Analysis, *Journal of International Economics*, 81: 163-169.
- Demidova, Svetlana and Kala Krishna**, 2008, Firm Heterogeneity and Firm Behavior with Conditional Policies, *Economics Letters*, 98(2): 122-128.
- Devlin, Allison, Brian K. Kovak, and Peter Morrow**, 2020, The Long-Run Labour Market Effects of the Canada-U.S. Free Trade Agreement, Mimeograph.

- Disdier, Anne-Célia, Lionel Fontagné, and Mondher Mimouni**, 2015, Tariff Liberalization and Trade Integration of Emerging Countries, *Review of International Economics*, 23(5): 946–971.
- ERIA**, 2021, *Impact of the ASEAN Trade in Goods Agreements (ATIGA) on Intra-ASEAN Trade*, Economic Research Institute for ASEAN and East Asia (ERIA), <https://www.eria.org/publications/impact-of-the-asean-trade-in-goods-agreements-atiga-on-intra-asean-trade/>.
- Fan, Haichao, Yao Amber Li, and Stephen R. Yeaple**, 2015, Trade Liberalization, Quality, and Export Prices, *Review of Economics and Statistics*, 97(5), 1033-1051.
- Frazer, Garth and Johannes Van Biesebroeck**, 2010, Trade Growth under the African Growth and Opportunity Act, *Review of Economics and Statistics*, 92(1): 128-144.
- Fukase, Emiko**, 2013, Export Liberalization, Job Creation, and the Skill Premium: Evidence from the U.S.–Vietnam Bilateral Trade Agreement (BTA), *World Development*, 41: 317-337.
- Gaulier, Guillaume and Soledad Zignago**, 2010, BACI: International Trade Database at the Product-Level. The 1994-2007 Version, CEPII Working Paper, N°2010-23.
- Gil-Pareja, Salvador, Rafael Llorca-Vivero, and José Martínez-Serrano**, 2014, Do Nonreciprocal Preferential Trade Agreements Increase Beneficiaries' Exports?, *Journal of Development Economics*, 107(C): 291-304.
- Görg, Holger, László Halpern, and Balázs Muraközy**, 2017, Why Do within Firm-product Export Prices Differ across Markets?, *The World Economy*, 40(6), 1233-1246.
- Hakobyan, Shushanik**, 2015, Accounting for Underutilization of Trade Preference Programs: U.S. Generalized System of Preferences, *Canadian Journal of Economics*, 48(2): 408-436.
- Hakobyan, Shushanik and John McLaren**, 2016, Looking for Local Labor Market Effects of NAFTA, *Review of Economics and Statistics*, 98(4): 728-741.
- Hayakawa, Kazunobu**, 2022, Multiple Preference Regimes and Rules of Origin, Forthcoming in the *Review of World Economics*.
- Herz, Bernhard and Marco Wagner**, 2011, The Dark Side of the Generalized System of Preferences, *Review of International Economics*, 19: 763–775.
- Hummels, David, Rasmus Jorgensen, Jakob Munch, and Chong Xiang**, 2014, The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data, *American Economic Review*, 104(6): 1597-1629.
- Kyophilavong, Phouphet, Richard Record, Shinya Takamatsu, Konesawang Nghardsaysone, and Inpaeng Sayvaya**, 2016, Effects of AFTA on Poverty: Evidence from Laos, *Journal of Economic Integration*, 31(2): 353-376.
- Lathapipat, Dilaka and Cecilia Poggi**, 2016, From Many to One: Minimum Wage Effects in Thailand, PIER Discussion Paper no. 41.
- Ludema, Rodney D. and Zhi Yu**, 2016, Tariff Pass-Through, Firm Heterogeneity and



- Product Quality, *Journal of International Economics*, 103, 234-249.
- Magee, Christopher S.P.**, 2008, New Measures of Trade Creation and Trade Diversion, *Journal of International Economics*, 75: 349–362.
- Manchin, Miriam**, 2006, Preference Utilisation and Tariff Reduction in EU Imports from ACP Countries, *The World Economy*, 29(9): 1243-1266.
- Melitz, Marc. J.**, 2003, The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, *Econometrica*, 71(6): 1695–1725.
- Oh, Jeong-Soo and Phouphet Kyophilavong**, 2014, Does ASEAN-Korea FTA Reduce Poverty in Laos? The Roles of FDI and Trade Facilitation, *Journal of Social and Development Sciences*, 5(2): 50-57.
- Silva, J. M. C. Santos and Silvana Teneyro**, 2006, The Log of Gravity, *Review of Economics and Statistics*, 88(4): 641–658.
- Sytsma, Tobias**, 2021a, Improving Preferential Market Access through Rules of Origin: Firm-Level Evidence from Bangladesh, Forthcoming in the *American Economic Journal: Economic Policy*.
- Sytsma, Tobias**, 2021b, Rules of Origin and Trade Preference Utilization Among Least Developed Countries, Forthcoming in the *Contemporary Economic Policy*.
- Utar, Hale**, 2018, Workers beneath the Floodgates: Low-Wage Import Competition and Workers' Adjustment, *Review of Economics and Statistics*, 100(4): 631-647.
- Vanhnalat, Bounlert, Phouphet Kyophilavong, Alay Phonvisay, and Bouason Sengsourivong**, 2015, Assessment the Effect of Free Trade Agreements on Exports of Lao PDR, *International Journal of Economics and Financial Issues*, 5(2): 365-376.
- Yannick, Simon, Fouda Ekobena, Adama Ekberg Coulibaly, Mama Keita, and Antonio Pedro**, 2021, Potentials of the African Continental Free Trade Area: A Combined Partial and General Equilibrium Modeling Assessment for Central Africa, *African Development Review*, 33(3): 452-465.
- Xu, Tongsheng, Weiwei Li, Yulian Jiang, and Ya Chen**, 2020, The Impact of Destination Tariffs on China's Exports: Country, Firm, and Product Perspectives, *Journal of Asian Economics*, 71: 101246.

Table 1. The Share of Imports from ASEAN by Sector (%)

	1999	2004	2009	2014	2019
Live animals	98	94	98	89	93
Vegetable products	44	73	86	56	84
Animal/vegetable fats and oils	30	100	100	94	93
Food products	96	94	95	87	89
Mineral products	93	98	95	98	96
Chemical products	83	78	82	75	69
Plastics and rubber	87	83	84	80	63
Leather products	82	89	42	82	70
Wood products	54	71	94	84	90
Paper products	43	58	75	71	54
Textiles	59	81	70	59	49
Footwear	84	94	76	35	85
Plastic or glass products	95	73	95	86	68
Precision metals	14	0.0	35	63	36
Base Metal	79	74	73	71	41
Machinery	57	47	47	29	42
Transport equipment	91	58	55	57	63
Precision machinery	35	40	26	55	55
Miscellaneous	47	56	52	62	49

Sources: BACI from the CEPII

Table 2. The Track Rank of Imports from the World in 2012 at an HS Six-digit Level

	1	2	3	4	5	6	7	8	9	10
Brunei	1,809	556	789	1,013	440	244	138	94	56	37
Cambodia	2,692	758	747	489	192	111	73	51	32	31
Indonesia	342	27	65	153	299	597	855	934	972	932
Lao PDR	3,148	721	546	364	147	102	56	41	31	20
Malaysia	377	5	32	93	278	587	946	1,017	1,058	783
Myanmar	1,871	569	922	960	355	194	129	77	65	34
Philippines	755	58	179	516	1,560	864	501	332	222	189
Singapore	380	19	51	110	351	618	585	672	928	1,462
Thailand	181	10	44	98	243	447	741	1,091	1,201	1,120
Viet Nam	411	50	120	310	650	963	861	696	547	568

Source: ASEAN Stats Data Portal

Table 3. OLS Regression of MFN Tariffs in 2013

	Coef.	S.D.
Zero2015	8.366***	[0.401]
Zero2016	1.688***	[0.065]
Zero2018	14.910***	[0.488]
Excluded	22.196***	[0.691]
Number of observations	9,341	
Adjusted R-squared	0.34	

*Notes:* Robust standard errors are reported. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively. OLS = ordinary least squares; MFN = most favored nation.

Table 4. PPML Regression of Imports from ASEAN on Tariffs in Laos: An HS Six-digit Level

	(I)	(II)	(III)	(IV)	(V)
ln (1+MFN)	-0.375 [0.537]		-0.721 [0.534]	-1.233** [0.577]	-1.204** [0.585]
ln (1+ATIGA)		0.647 [1.196]	1.143 [1.224]		-0.287 [1.026]
ln (1+ACFTA)				2.262** [1.064]	2.411*** [0.910]
Number of observations	50,932	50,932	50,932	46,421	46,421
Pseudo R-squared	0.924	0.924	0.924	0.925	0.925

*Notes:* The study years are from 2001 to 2019. Standard errors clustered by harmonized system (HS) six-digit codes are reported. We controlled for HS six-digit fixed effects and year-fixed effects. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively. PPML = Poisson pseudo maximum likelihood; MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement; ACFTA = ASEAN–China Trade in Goods Agreement.

Table 5. PPML Regression of Imports from ASEAN on Tariffs in Laos: An HS Eight-digit Level

	(I)	(II)	(III)	(IV)	(V)
ln (1+MFN)	0.177 [1.851]		0.228 [2.298]	1.506 [2.443]	1.47 [2.600]
ln (1+ATIGA)		0.575 [5.690]	0.334 [7.009]		0.999 [7.242]
ln (1+ACFTA)				-3.275 [2.756]	-3.381 [2.707]
Number of observations	38,424	38,264	38,264	30,695	30,695
Pseudo R-squared	0.851	0.849	0.849	0.867	0.867

*Notes:* The study period is from 2013 to 2018. Standard errors clustered by harmonized system (HS) eight-digit codes are reported. We controlled for HS eight-digit fixed effects and year-fixed effects. PPML = Poisson pseudo maximum likelihood; MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement; ACFTA = ASEAN–China Free Trade Area.

Table 6. Basic Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
$\ln L$	32,670	0.753	0.916	0	8.394
$\ln (1+MFN)$	32,670	0.119	0.085	0.049	0.336
$\ln (1+ATIGA)$	32,670	0.040	0.055	0	0.336
$\ln (1+MFN) * \text{Export}$	32,670	0.004	0.030	0	0.336
$\ln (1+ATIGA) * \text{Export}$	32,670	0.001	0.008	0	0.336
$\ln (1+MFN) * \text{Foreign}$	32,670	0.003	0.022	0	0.336
$\ln (1+ATIGA) * \text{Foreign}$	32,670	0.001	0.009	0	0.336
Export	32,670	0.026	0.159	0	1
$\ln \text{Age}$	32,670	1.785	0.726	0	4.682
Single plant	32,670	0.990	0.102	0	1
Foreign ownership	32,670	0.017	0.130	0	1
Computer use	32,670	0.044	0.206	0	1

Source: Authors' compilation. MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement.

Table 7. OLS Regression of Plant-level Employment on Tariffs in Laos

	(I)	(II)	(III)
ln (1+MFN)	-2.273 [2.783]		-2.384 [2.704]
ln (1+ATIGA)		-0.6 [0.610]	-0.603 [0.613]
Export	0.857*** [0.126]	0.857*** [0.126]	0.857*** [0.126]
ln Age	0.065*** [0.023]	0.065*** [0.023]	0.064*** [0.023]
Single plant	-0.304*** [0.067]	-0.304*** [0.067]	-0.304*** [0.067]
Foreign ownership	0.482*** [0.069]	0.481*** [0.069]	0.481*** [0.069]
Computer use	1.279*** [0.076]	1.280*** [0.076]	1.280*** [0.076]
Number of observations	32,670	32,670	32,670
Adjusted R-squared	0.511	0.511	0.511

*Notes:* Standard errors clustered by the International Standard Industrial Classification (ISIC) four-digit codes are reported. We omit the results for the manager's education level, province fixed effects, ISIC four-digit fixed effects, and year fixed effects. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively. OLS = ordinary least squares; MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement.



Table 8. Robustness Checks

	Excluding new plants			Low penetration industries		
	(I)	(II)	(III)	(IV)	(V)	(VI)
ln (1+MFN)	-1.473 [3.265]		-1.494 [3.206]	-2.15 [2.948]		-2.24 [2.872]
ln (1+ATIGA)		-0.258 [0.486]	-0.259 [0.487]		-0.649 [0.631]	-0.651 [0.633]
Export	0.895*** [0.160]	0.896*** [0.160]	0.896*** [0.160]	0.877*** [0.132]	0.877*** [0.132]	0.877*** [0.132]
ln Age	0.063** [0.028]	0.063** [0.028]	0.063** [0.028]	0.065*** [0.024]	0.065*** [0.024]	0.065*** [0.024]
Single plant	-0.378*** [0.079]	-0.377*** [0.079]	-0.378*** [0.079]	-0.302*** [0.069]	-0.302*** [0.068]	-0.302*** [0.068]
Foreign ownership	0.518*** [0.081]	0.518*** [0.081]	0.518*** [0.081]	0.455*** [0.073]	0.455*** [0.073]	0.455*** [0.073]
Computer use	1.298*** [0.097]	1.298*** [0.097]	1.298*** [0.097]	1.266*** [0.081]	1.267*** [0.081]	1.267*** [0.081]
Number of observations	27,392	27,392	27,392	31,567	31,567	31,567
Adjusted R-squared	0.507	0.507	0.507	0.504	0.504	0.504

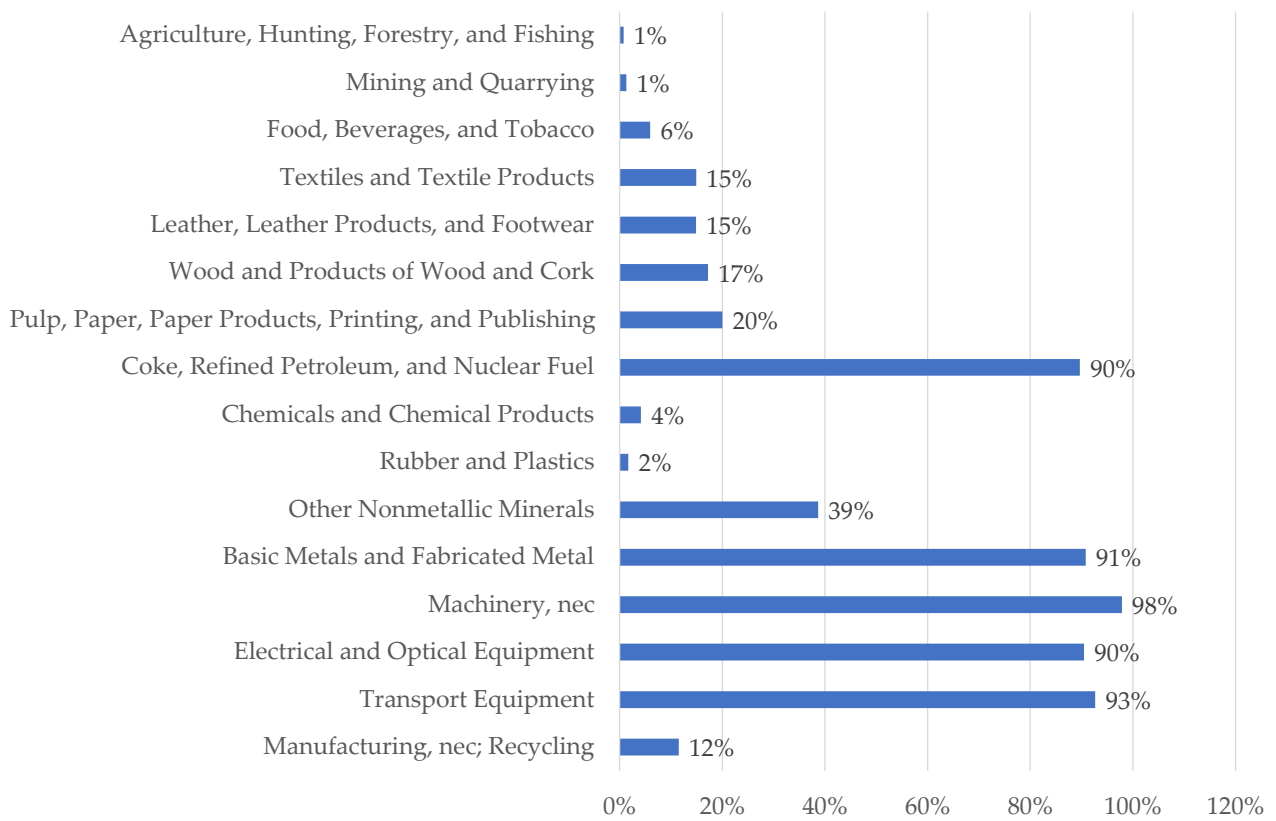
*Notes:* Standard errors clustered by the International Standard Industrial Classification (ISIC) four-digit codes are reported. We omit the results for the manager's education level, province fixed effects, ISIC four-digit fixed effects, and year fixed effects. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively. MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement.

Table 9. Extension: Interaction with Export or Foreign Dummy

	(I)	(II)	(III)	(IV)	(V)	(VI)
ln (1+MFN)		-2.288	-2.144		-2.26	-2.369
		[2.792]	[2.669]		[2.786]	[2.706]
ln (1+MFN) * Export		0.652	1.314			
		[1.387]	[1.391]			
ln (1+MFN) * Foreign					-0.651	-0.474
					[0.875]	[1.010]
ln (1+ATIGA)	-0.589		-0.566	-0.59		-0.597
	[0.599]		[0.588]	[0.599]		[0.605]
ln (1+ATIGA) * Export	-1.778		-2.859**			
	[1.343]		[1.218]			
ln (1+ATIGA) * Foreign				-0.996		-0.548
				[1.261]		[1.429]
Export	0.912***	0.748**	0.726**	0.859***	0.861***	0.860***
	[0.145]	[0.309]	[0.309]	[0.126]	[0.128]	[0.128]
ln Age	0.065***	0.065***	0.065***	0.064***	0.065***	0.064***
	[0.023]	[0.023]	[0.023]	[0.023]	[0.023]	[0.022]
Single plant	-0.312***	-0.306***	-0.321***	-0.306***	-0.303***	-0.305***
	[0.067]	[0.066]	[0.064]	[0.067]	[0.066]	[0.066]
Foreign ownership	0.490***	0.481***	0.496***	0.520***	0.577***	0.572***
	[0.071]	[0.070]	[0.070]	[0.094]	[0.154]	[0.153]
Computer use	1.275***	1.279***	1.271***	1.278***	1.278***	1.278***
	[0.075]	[0.077]	[0.077]	[0.075]	[0.075]	[0.075]
Number of observations	32,670	32,670	32,670	32,670	32,670	32,670
Adjusted R-squared	0.511	0.511	0.511	0.511	0.511	0.511

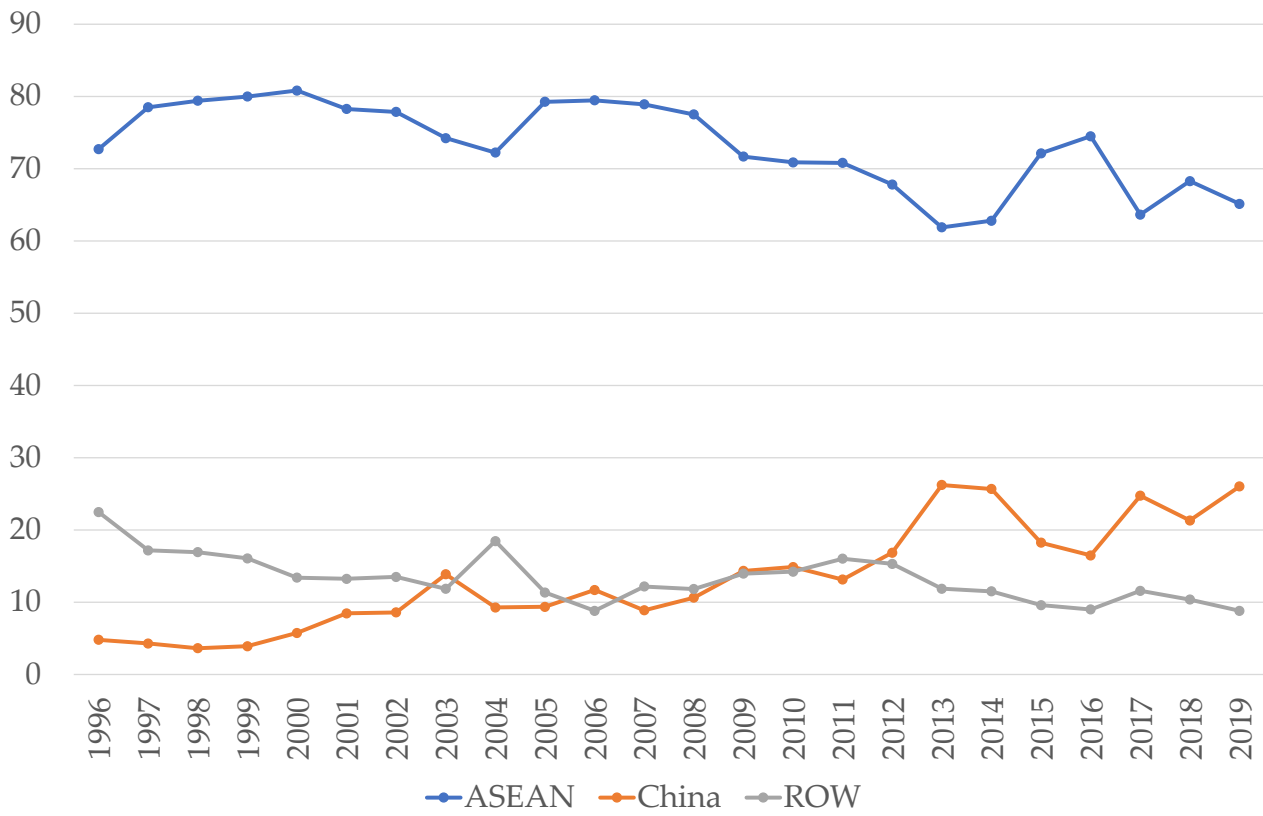
Notes: Standard errors clustered by the International Standard Industrial Classification (ISIC) four-digit codes are reported. We omit the results for the manager's education level, province fixed effects, ISIC four-digit fixed effects, and year fixed effects. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively. MFN = most favored nation; ATIGA = ASEAN Trade in Goods Agreement.

Figure 1. Import Penetration Ratios in Laos in 2010



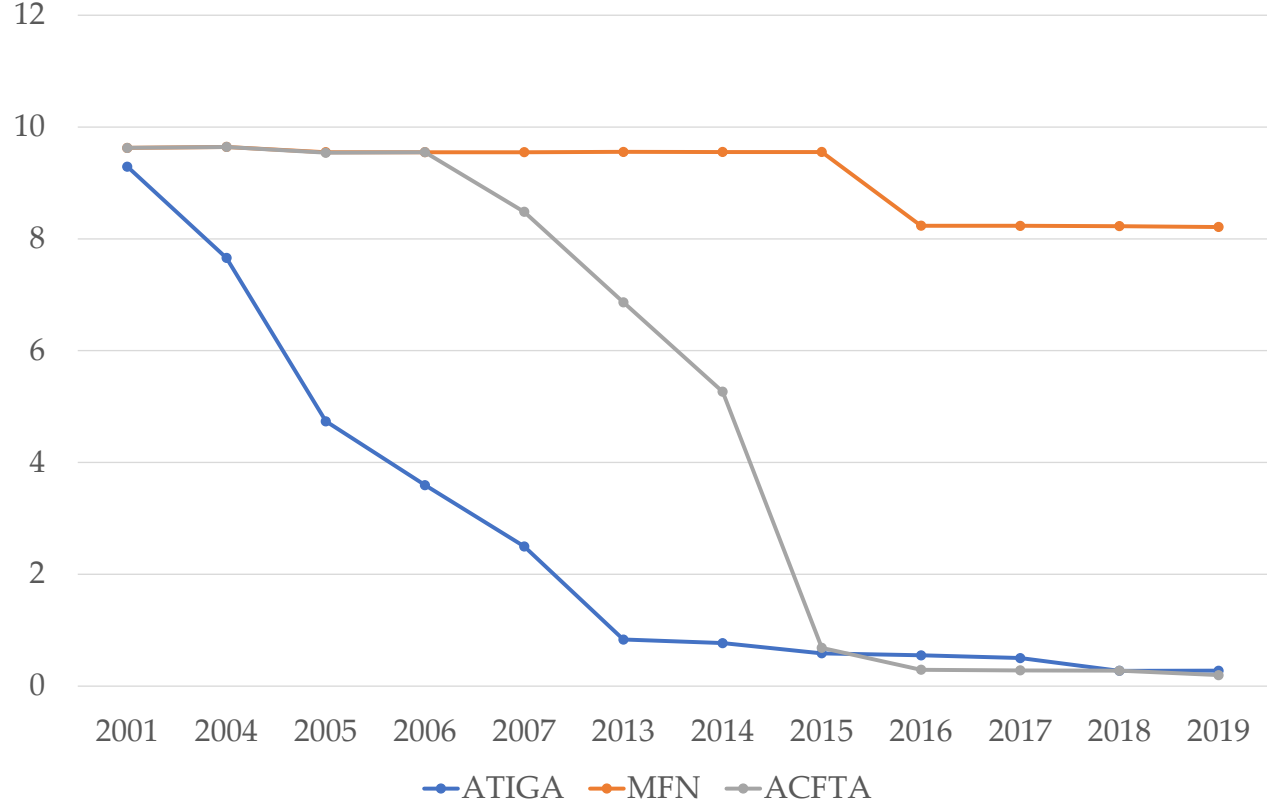
Source: ADB

Figure 2. The Shares of Imports from ASEAN and China (%)



Sources: BACI from the CEPII

Figure 3. Changes in the Average Tariffs of Laos (%)



Source: WITS

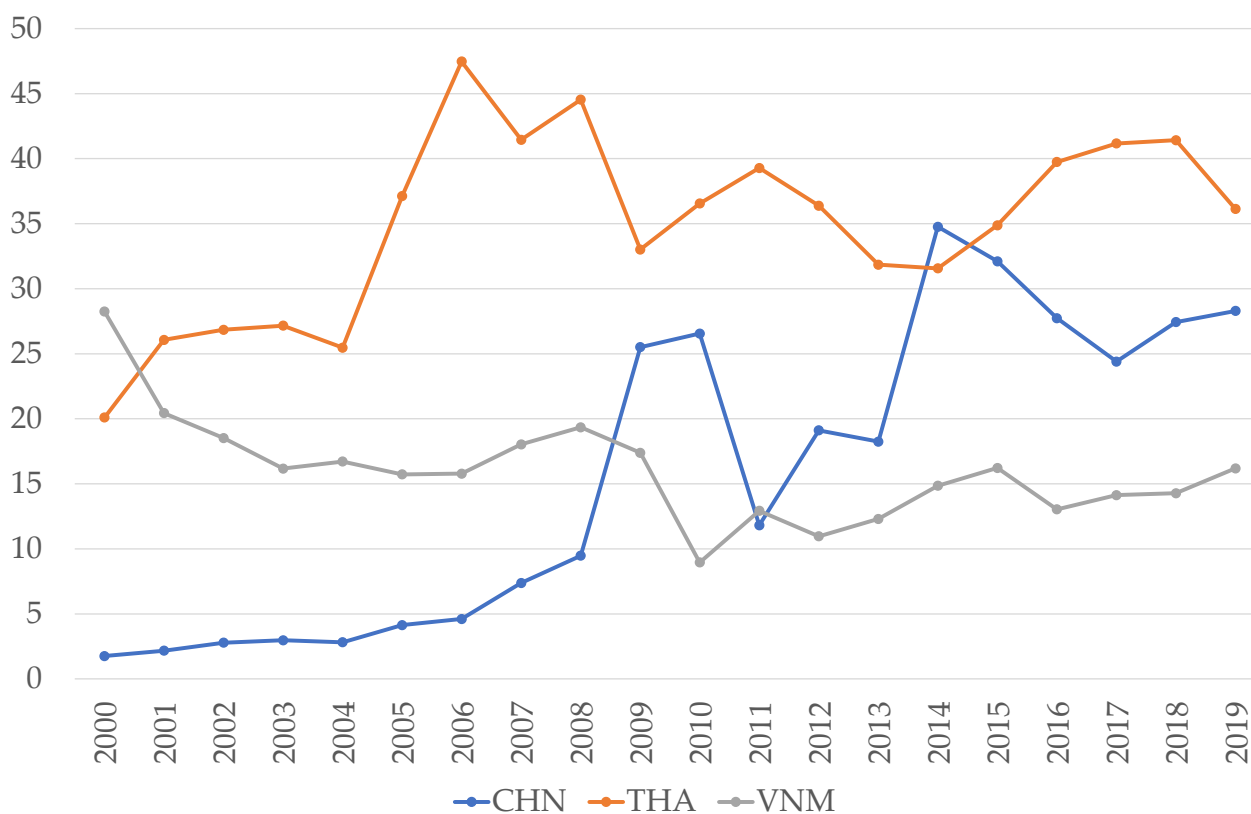
## Appendix. Other Tables and Figures

Table A1. Correlation of Laos' ATIGA Tariffs with Other Tariffs

Level	Thailand		China	
	(I) HS6	(II) ISIC4	(III) HS6	(IV) ISIC4
ln (1+LAO's ATIGA)	0.085*** [0.010]	0.130*** [0.045]	0.098*** [0.030]	0.484** [0.194]
Number of observations	23,766	725	18,869	580
Adjusted R-squared	0.641	0.707	0.742	0.827

Notes: Standard errors clustered by harmonized system (HS) six-digit/International Standard Industrial Classification (ISIC) four-digit codes are reported. We control for HS six-digit/ISIC four-digit fixed effects and year-fixed effects. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % levels, respectively.

Figure A1. The Share of Laos' Exports (%)



Sources: BACI from the CEPII

