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Evidence from Latin American Countries

Martín González-Rozada
Hernán Ruffo

Inter-American Development Bank
Department of Research and Chief Economist

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Abstract

In this paper, we explore the role of trade in the evolution of labor share in Latin American countries. We use trade agreements with large economies (the United States, the European Union, and China) to capture the effect of sharp changes in trade. In the last two decades, labor share has displayed a negative trend among those countries that signed trade agreements, while in other countries labor share increased, widening the gap by 7 percentage points. We apply synthetic control methods to estimate the average causal impact of trade agreements on labor share. While effects are heterogeneous in our eight case studies, the average impact is negative between 2 to 4 percentage points of GDP four years after the entry into force of the trade agreements. This result is robust to the specification used and to the set of countries in the donor pool. We also find that, after trade agreements, exports of manufactured goods and the share of industry in GDP increase on average, most notably in the case studies where negative effects on labor share are significant. A decomposition shows that all the reduction in labor share is explained by a negative impact on real wages.

JEL classifications: C01, C1, F1, F16
Keywords: Labor share, Trade agreements, Synthetic control methods

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1 Introduction

The share of GDP going to labor has decreased since the early 1980s. This is a global trend, affecting both developed and developing countries (Dao et al. 2017), even within industries. The fall is as large as 5 percentage points in 35 years, with larger effects on mining, transport, manufacturing, and utilities (Karabarbounis and Neiman 2014).

Diverse mechanisms have been put forward to explain this trend. The increase in product market power, a reduction of bargaining power of labor, a reduction in the price of capital, increasing competition through trade, and technological change are all discussed in the literature (Elsby et al. 2013; Autor et al. 2020; Karabarbounis and Neiman 2014; Bergholt et al. 2021).[1]

A particularly important explanation is trade openness. For example, Pierce and Schott (2016) show that the elimination of potential tariff increases on Chinese imports caused a reduction in manufacturing employment in the US. Autor, Dorn, and Hanson (2016) also empirically analyze the effect of trade through local market exposure to Chinese imports. They show that the total labor income drop is explained by a reduction in both labor input and wages. A subtler influence of trade is through offshoring activities of the labor-intensive component of the supply chain (Elsby, Hobijn, and Sahin 2013). Additionally, price adjustment in input prices could lead to a decrease in labor share after trade liberalization (De Loecker et al. 2016; Kamal et al. 2019).

Latin America has also been partially affected by the fall in labor share. The labor share decreased in many countries in the region, as analyzed in the literature (Karabarbounis and Neiman 2014; Dao et al. 2017). In this paper, we document that the aggregate trend in Latin America is milder than the global one. Additionally, we emphasize that the aggregate evolution masks important heterogeneity between countries. For example, from 1994 to 2014 about half of the countries decreased the labor share and half increased it.

Of the many explanations for the evolution of the labor share in the region, one particularly important explanation is trade policy. Since the 1980s, openness has increased in the region, partly due to a strong change in import tariffs and because of trade agreements signed since the 1990s (Lederman et al. 2002; Hannan 2017). Under this general trend, however, important differences between countries arose over time. While some countries continued their liberalization, others decelerated it. This heterogeneity in trade policy can be related to the differential trend in labor share. In particular, we report that those countries that signed trade agreements with large economies experienced an important drop in labor share, while in the remaining countries the labor share increased markedly after the 2000s.

The purpose of this paper is to estimate the effect of Trade Agreements (TA) on labor share. The effects of trade are typically difficult to identify. There are possible endogeneity issues that should be considered. Our approach is to use the TA as a shock and analyze changes on labor share and other possible outcome variables. A main issue, though, is how to identify a counterfactual evolution, in the absence of TA, for each country.

In this paper, we consider trade agreements with big economies (the United States, the European Union and China) signed since the 1990s as case studies to evaluate the effects of trade agreements on labor share. Our case studies include Chile, Colombia, Guatemala, Mexico, Peru, Honduras, Nicaragua and Panama.[2] For each case study, we rely on the synthetic control method to identify

[1] Recently, the discussion includes the effects of methodological changes in the way software, R&D and other components of intellectual property products are measured (Koh et al. 2020), as well as changes in population growth and firm dynamics (Hopenhayn et al. 2018).

[2] Costa Rica, El Salvador, and Dominican Republic also signed trade agreements with these large economies, but we do not include them in our case studies because of the lack of adequate data for them (see Table 1 for the list of our case studies and intervention periods).

counterfactuals for the country that signs a trade agreement. Synthetic counterfactual methods have gained popularity in evaluating this type of policies, as these methods allow to identify the effect of a treatment using longitudinal data of few units, which is particularly relevant in our case. Importantly, the identification does nor rest on assuming an exogenous treatment, but on the idea that common factors could affect units in a similar way.

We concentrate on trade agreements with big economies under the assumption that they represent a stronger shock to LAC and would allow us to better identify any relevant effect. We, thus, exclude from the donor pool any country that had signed TA with big economies close to our case study. Nevertheless, other trade agreements, such as bilateral TA between two LAC, are not considered as treatment.

We find that, in most cases, TA has reduced labor share significantly. The median effect of trade agreement on labor share is close to -3 percentage points of GDP. We also apply the same model to all case studies and obtain a similar result: a reduction in labor share that is persistent and amplifies through time and reaches about three percentage points in the fourth post-intervention year. Importantly, these results are maintained when we change the definition of our outcome variables and when we expand the control units to include all countries. Additionally, when these models are applied to placebo units or placebo periods no aggregate effect is found.

While significant, our results are heterogeneous. Some countries are affected by a strong labor share decline, and some countries present no effect. This heterogeneity of the effects of TA is consistent with the results of the literature. Some papers have emphasized that the effects of trade on the labor market depend on initial conditions (Paz 2020) and on the trade-induced technological change (Zuleta and Pogorelova 2012). Empirical papers have echoed these observations by finding very heterogeneous effects, depending on regions, industries, skills, and formality of employment (Pavcnik et al. 2003; Gonzaga et al. 2006; Dix-Carneiro 2019). Aggregate results are context-specific (Pavcnik 2017), sometimes generating conflicting evidence (Goldberg and Pavcnik 2004). Additionally, the effects of trade shocks on the labor market, skill premiums and income inequality are also heterogeneous (Messina and Silva 2019). The results depend, among other things, on the relative abundance of labor of the counterpart.

Besides, a more recent literature proposes that the effects of a TA depend on the way particular provisions are included in it (Lee et al. 2019; Fernandes et al. 2021). In our case studies, we find that when anti-dumping and phytosanitary measures are explicitly considered in legally enforceable language, the effects are stronger.

To further explore the reasons for this heterogeneity of the effects and to analyze the possible mechanisms that could have affected labor share, we estimate the effects of TA on other relevant variables. We find low, but still significant, effects for exports and manufacturing exports. We also find a strong impact on the share of industry over GDP, suggesting important reallocation of production. We also find a very substantial increase in the relative price of investment goods, suggesting that the composition of investment changed after TA. Finally, while decomposing the TA effect on labor share, we find that the bulk of the effect is driven by the negative evolution of real average wages. We conclude that the competitive pressure due to the liberalization affected labor market through prices; policies such as minimum wage and those aiming at reducing labor costs could also partially explain the differential evolution of wages.

This paper relates to the growing literature that analyze the effects of trade agreements, trade unions, and monetary unions on several outcomes exploiting synthetic control methods. In particular, the paper by Hannan (2017) applies synthetic control to analyze 104 pairs of countries of the Americas that were involved in bilateral trade agreements in the period 1983-1995. The paper finds substantial effects on exports between the country pairs; exports to the other country in the agreement increase by about 80 percentage point over 10 years after the treatment (an average

of 3.8 percentage point effect annually). Many other papers used synthetic control to analyze the effects of agreements shocks on GDP and other aggregate measures. Other examples that analyze TA are Billmeier and Nannicini (2013), Hannan (2016), Adarov (2018), Kassa and Coulibaly (2019). Examples that use these methods to analyze other type of agreements are Campos, Coricelli, and Moretti (2014), Wassmann (2015), Ferrari and Picco (2016), Reynaerts and Vanschoonbeek (2016), and Saia (2017).

The paper also relates to the literature that analyzes the impact of trade liberalization on labor share, markups, and other related outcomes. A series of papers report that trade liberalization in developing countries induced an increase in markups, due to a reduction in input prices and an incomplete pass-through to output prices (De Loecker et al. 2016; Kamal et al. 2019).[3] This result is connected to our main objective, as an increase in markups entails a reduction in labor share (Karabarbounis and Neiman 2014; Autor et al. 2020).

The paper is organized as follows. Section 2 describes trade agreements in Latin America. We then describe the synthetic control methods. Next, we provide a description of the data and the evolution of labor share in Latin America in Section 4. We present our main results in Section 5. In Section 6 we explore the robustness of our results. We conclude in Section 7.

2 Trade Agreements in Latin America

Since the 1980s there has been a trend towards higher trade openness in Latin America. Exports from LAC increased at a higher pace than other regions. Most of this increase in openness has been driven by a change in trade policies, when protectionism was progressively abandoned. From the mid-1980s to the mid-2000s tariffs went down dramatically. In Argentina, for example, tariffs were around 51 percent in 1985, dropping to 15 percent after twenty years. Brazil also experienced an important tariff drop from 22 percent to 11 percent during the same period. Most of LAC experienced similar evolutions according to Rajagopal (2007), with few exceptions. Paraguay decreased already low tariffs only modestly; Chile dropped tariffs (5 percent in 2003) from an initial low level (11 percent in 1985). In all, the unweighted average of regional tariffs fell from 30 percent in the early 1980s to 10 percent in the end of the 1990s. Non-tariff barriers also fell in a similar proportion. In parallel, trade increased from 25% of GDP to about 35% during the same period (Lederman, Maloney, and Martin 2002).

Some of this reduction in tariffs involved unilateral liberalization of trade, both by LAC and developed countries. These reforms, however, were accompanied by a proliferation of trade agreements in the region. Bilateral and multilateral trade agreements within Latin American countries and with other economies had been increasingly important in explaining trade openness. The Central American Common Market (1961, 1993), the Andean Community (1993) and Mercosur (1991) reduced trade restrictions and tariffs within Latin America, while NAFTA (1994), including Canada, United States and Mexico, increased openness between a Latin American country and developed economies. Hannan (2017) finds a strong effect of trade agreements on bilateral export growth on all countries involved in the agreement.

More recently, trade agreements have targeted big economies, such as the United States or China, or large markets, such as the European Union. Because of the relevant economic size of the counterpart, these trade agreements have potentially important effects. This is all the more evident when the same country signs TAs with the three big economies successively. An example of this is Chile, which signed trade agreements with the European Union (2003), the United States

[3] Kamal, Lovely, and Mitra (2019) document that labor share decreased substantially after trade liberalization in China. At the same time, they estimate a positive effect of trade liberalization on labor share within Chinese firms.

Table 1: Trade Agreements between Latin American Countries and Large Economies

Country	European Union	United States	China
Chile	2003	2004	2006
Colombia	2013	2012	
Costa Rica	2013	2009	2011
El Salvador	2013	2006	
Guatemala	2013	2006	
Mexico	2000	1994	
Peru	2013	2009	2010
Dominican Rep.	2008	2007	
Honduras	2013	2006	
Nicaragua	2013	2006	
Panama	2013	2012	

Notes: The table shows all the trade agreements with big economies signed by Latin American countries. These are our case studies, with the exception of Costa Rica, El Salvador and Dominican Republic, due to lack of data on these countries. For each case study, the intervention period is the year in which the first trade agreement is implemented. We exclude Ecuador-European Union as a case study because the trade agreement has been in force only since 2017, beyond the time span of our paper.

(2004) and China (2005). Other relevant cases are Colombia, Mexico, Peru, and several Central American countries. All these are considered as potential case studies for our purpose, and they are summarized in Table 1.[4]

Trade agreements are typically very diverse. They can include goods, services, investment, cooperation, etc. Our case studies differ in the characteristics of the particular implementation of TAs. For example, the Chile-China TA followed a more gradual approach: first goods, then services, investment and, finally, a more comprehensive partnership agreement. More recently, the Peru-China TA was implemented as a relatively comprehensive and single packaged agreement (Zhang 2010).

While all the characteristics of each TA are difficult to summarize, we follow Hofmann et al. (2017) and define the depth of TAs as the count of total provisions included in the TA, with a maximum of 52. We define an index by dividing this sum by 52 and multiplying by 100. Using data from that paper we analyze the distribution of depth among all six thousand TA in force in 2015 and locate our case studies in this distribution.

Figure 1 reports the empirical cumulative distribution of the index in 2015. It shows that the median TA covers 60% of the provisions and that very few (5%) cover 80% of provisions. It also shows that, among our case studies, several cases are above the median depth, while all the cases are above the first quintile. Notably, those signed with the United States have lower depth, while those signed with the EU are in the highest quintile of the depth distribution; TAs signed with China are somewhat in the middle of these two groups.

Besides this general definition of depth, there are a few core provisions that are more relevant for the study of TAs (Hofmann et al. 2017). Our case studies include many of these core provisions, such as tariffs on industrial and agricultural products, technical barriers to trade harmonization standards, and customs administration in all cases. Sanitary and phytosanitary measures, anti-

[4]Appendix D presents a detailed description of TAs.

Table 2: Selected Provisions in TA

	Covered		Legally enforceable	
	Case studies	All TA	Case studies	All TA
Tariffs industrial	100%	100%	100%	99%
Tariffs agricultural	100%	100%	100%	98%
Customs Administration	100%	90%	94%	82%
Sanitary and PS measures	94%	67%	94%	53%
Technical Barriers to Trade measures	100%	70%	94%	54%
Anti-dumping	94%	76%	94%	68%
TRIMS measures	59%	57%	53%	55%
GATS (services)	94%	65%	94%	51%
TRIPS (harmonization of standards)	100%	57%	100%	55%
Competition policy	71%	75%	65%	66%
Intellectual property rights	94%	48%	94%	40%
Investment measures	94%	55%	82%	39%
Movement of capital	94%	54%	76%	50%

Notes: The table shows the coverage and legally enforceable language in each of the selected provisions. It compares our case studies with all TAs as reported by Hofmann et al. (2017).

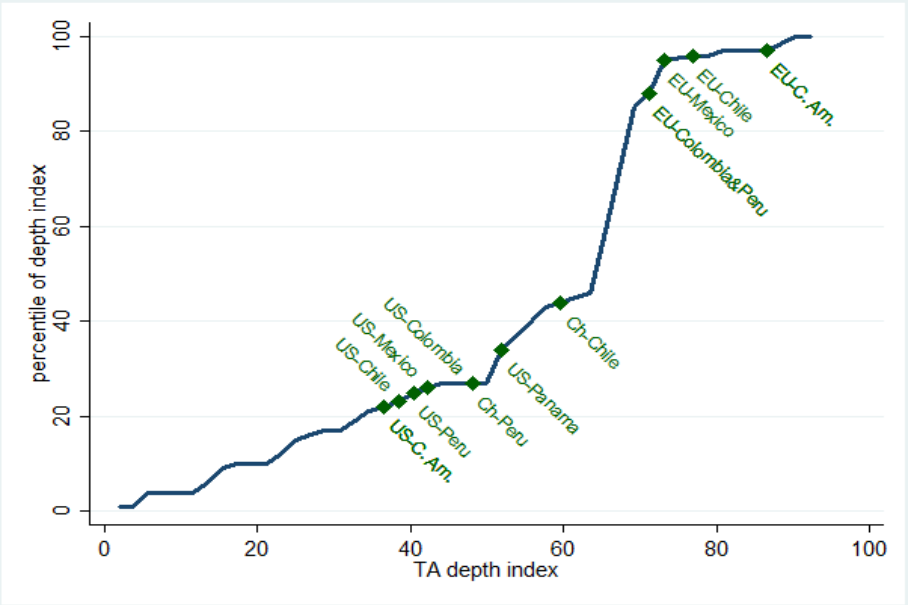
dumping, services, investment, movement of capital, and intellectual property rights are covered in all cases but one (China-Chile and China-Peru are the least comprehensive in these issues).

Table 2 lists selected policy areas and reports the proportion of case studies with the covered and legally enforceable language in these issues. The table also reports the proportion of global TAs covering the same provisions according to Hofmann et al. (2017). In general, our cases are more comprehensive than the average agreement.[5]

Besides this characterization, the level and evolution of tariffs and non-tariff barriers are also indicators of the trade policy. Panel (a) of Figure 2 reports the weighted average of tariffs in manufacturing imports, considering two groups: the LAC countries that compose our case studies and those that do not. We find that in all cases tariffs decreased in the region in such a way that at mid-2000 both groups had similar average tariffs. Nevertheless, after that period, the reduction in tariffs accelerated among our case studies. In a similar way, panel (b) of the Figure shows the number of anti-dumping measures in effect since 1994. We find that anti-dumping measures are clearly less frequent among our case studies, which suggests that these TAs are a signal of a more open trade policy and that lower tariffs are not compensated by more active anti-dumping measures (Silberberger and Stender 2018).

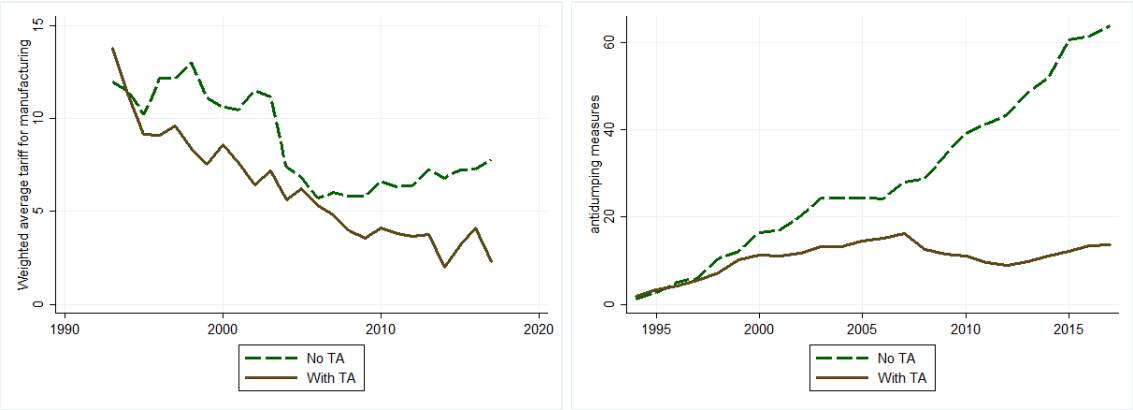
[5]Table C.6 in Appendix C provides more detailed information about these provisions for our case studies.

Figure 1: Depth of TA Case Studies Compared to All TAs



Notes: The figure plots the empirical cdf of TA depth index using all 12 thousand TA in 2015, including the case studies of this paper. TA depth index is an indicator of the coverage of policy areas (Hofmann et al. 2017)

Figure 2: Evolution of Average Tariffs and Anti-Dumping Measures in Force



(a) Tariff

(b) Anti-dumping

Notes: The figure (a) is the simple average of tariffs (weighted mean, manufacturing products, from WDI). The figure (b) is the simple average of the number of anti-dumping measures in force (from WTO). LAC are divided between the case studies (those that signed TA with big economies) and the rest.

3 Methods

3.1 Synthetic Control Methods for Comparative Case studies

Trade agreements are a large and sharp shock after which changes in trade can be identified (Hannan 2017). To identify the causal effects of TAs we need a counterfactual that should represent the evolution of the treated country in the absence of treatment. For this purpose, we could use all other LAC countries, not affected by trade agreements. From all these comparable countries we would like to select those more similar to the treated country before the TA.

The synthetic control methods allow us to identify a limited set of countries that more closely relate to the treated country and that could better represent the evolution of that country in tje absence of treatment. This procedure has been described in Abadie, Diamond, and Hainmueller (2010) and extended in different dimensions. In what follows we will describe the method, the relevant extensions that we consider, and our particular application.

For each case study, let J be the number of countries that can be selected as controls, i.e.. the donor pool. Let Y_{it}^N be the outcome for the country i at period t when the country is not treated and let Y_{it}^I be the analogous outcome when the unit is treated. We will assume that in $t = T$ the treatment (the trade agreement) takes place and is maintained. This outcome depends on a set of explanatory variables, Z, in the following way:

$$Y_{it}^N = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it} \tag{1}$$

where δ_t are fixed effects by time, θ_t is a vector of parameters, λ_t are common factors, μ_i are factor loadings, and ε_{it} are unobserved transitory shocks for each country in each period with zero mean. Let $\alpha_{it} = Y_{1t}^I - Y_{1t}^N$ be the effect of interest where the unit 1 is the case study. The counterfactual Y_{it}^N is unobserved and has to be estimated. Consider a vector of weights W. Assume that a particular value of this vector, W^*, satisfies

$$Y_{1t} = \sum_{j=2}^{J+1} w_j^* Y_{jt} \tag{2}$$

$\forall t \leq T$ and

$$Z_1 = \sum_{j=2}^{J+1} w_j^* Z_j$$

where we set $i = 1$ for the treated country. Using these weights provides the following estimator of the treatment effect:

$$\widehat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$$

The intuition behind this result is that the weights in W^* select and combine countries of the donor pool that average to the explanatory variables Z_1 and the factor loading μ_1 of the country of interest. Thus, this combination is a representation of the treatment unit in the absence of treatment. Of course, in applications, the equality in equations (2) is not guaranteed and the synthetic control method provides tools to identify the weights that minimize the differences between the case study and the synthetic control.

In particular, the vector of weights is chosen to minimize

$$\left(\mathbf{X_1} - \mathbf{X_0}\mathbf{W}\right)' \mathbf{V} \left(\mathbf{X_1} - \mathbf{X_0}\mathbf{W}\right)$$

subject to $w_j \geq 0$ and $\sum_{j=2}^{J+1} w_j = 1$.[6] In the above equation, $\mathbf{X_1}$ is the $(K \times 1)$ vector of pre-intervention observables of the country of interest in the case study, including the variables in Z and some average of pre-treatment outcome levels $\bar{Y}^K$, $\mathbf{X_0}$ is the $(K \times J)$ matrix of the same observables of the J countries of the donor pool, $\mathbf{W}$ is the vector of weights with elements w_j, and finally, $\mathbf{V}$ is a diagonal matrix with non-negative elements that reflects the relative importance of each explanatory variable. The choice of the elements in $\mathbf{V}$ can be data driven in such a way that the resulting synthetic control approximates the trajectory of the outcome variable in the pre-intervention period, that is to say, minimizes the mean square error of the outcome variable

$$MSE = \frac{1}{T_T} \sum_{m=t_0}^{t_T} (Y_{1t} - Y_{0t}W^*)^2$$

The Root Mean Squared Prediction Error ($RMSPE = \sqrt{MSE}$) is the measure of the pre-treatment fit for a particular case study.

3.1.1 Inference

Inference is particularly challenging in these methods given that aggregate data are used and regression-based standard errors commonly reported in studies would provide zero values. Nevertheless, multiple sources of uncertainty remain. Crucially, there is uncertainty about the accuracy of the synthetic control to adequately reproduce the counterfactual of the country of interest. Thus, the literature typically uses exact inference through permutation tests for inference.

In these permutations, the synthetic control method is applied to every country in the donor pool and a set of effects α_t^P is collected. Then, the effect of the country of interest is compared in absolute magnitude to the estimations for the countries in the donor pool.

3.1.2 Aggregation of Effects and the Economic Mechanisms

The previous methods provide estimates of outcome gaps for each case study and each period. Additionally, they provide a set of placebo estimates of the same gap. To provide aggregation measures of the effects we implement regression methods.

Let $\hat{\alpha}_{itr}$ denote an outcome gap (computed using the synthetic control) for case i, in calendar year t, and event time r. To be clear, in the equation r is the number of years to treatment, so that $r = 0$ identifies the treatment period; i indexes all gaps, both case studies and permutations.

Consider the following regression equation:

$$\hat{\alpha}_{itr} = \beta_0 + \beta_1 D_i + \beta_2 T_r + \tau D_i \times T_r + \epsilon_{i,t} \tag{3}$$

where D_i is a dummy variable indicating if case i is a treated unit, and T_r is a dummy variable that indicates if period r is a post-intervention period. The coefficient τ captures the impact of the intervention (the TA) on the outcome variable after the intervention, including all post-intervention periods. While this equation is identical to a difference-in-differences model, the coefficient τ can be interpreted as a triple difference (DDD) because the dependent variable $\hat{\alpha}$ is already a difference between the outcome for the treated unit and its synthetic control. We use this method to report two sets of results: (i) regressions are estimated separately for each individual case study (including the case study and the permutations over the donor pool of this case study only), and (ii) all case studies and placebos are combined to produce a single estimate.

[6] Doudchenko and Imbens (2016) relax these restrictions, allowing for negative weights.

Additionally, we generate an aggregate estimate of the effect for each event time. For that purpose we first consider dividing the sample in two groups, g, those composed by case studies, $g = s$, and those by placebos, $g = P$. We run the following regression separately for these two groups,

$$\hat{\alpha}^g_{itr} = \delta + \sum_{j \neq -1} \mu^g_j \cdot \mathbf{I}[j = r] + X_{it}\pi^g + u_{it} \tag{4}$$

where we include a full set of event time dummies. We omit the event time $r = -1$, so that all μ^g_r coefficients correspond to the mean value of outcome gap at event time r in group g, relative to the year before intervention. When the regression is run on the treated countries, setting $g = s$, the μ^s_r coefficients aggregate post-intervention effects when $r \geq 1$ and possible anticipatory effects when $r < -1$. When the regression is applied to the sample of placebos, setting $g = P$, these coefficients should be close to zero. The equation includes a vector of other variables or controls X_{it}. We can here include fixed effects by unit. The stochastic error term is u_{it}.

The above is an event study regression and does not exploit both the case study and placebos in a joint estimation. In particular, using the results of both equations we can compute the effect by each event time by the simple difference of the coefficients in each regression, $\hat{\mu}^s_r - \hat{\mu}^P_r$. Alternatively, we can recover this effect by running a single regression. Consider the following regression equation

$$\hat{\alpha}_{itr} = \delta_0 + \delta_1 \cdot \mathbf{I}[D_i = 1] + \sum_{j \neq -1} \mu_{1j} \cdot \mathbf{I}[j = r] + \sum_{j \neq -1} \tau_j \cdot \mathbf{I}[j = r \times D_i = 1] + X_{it}\pi_1 + v_{it} \tag{5}$$

In this equation, the coefficients μ_{1r} represent the period r fixed effects where the omitted period is $r = -1$. The coefficients τ_r correspond to the mean difference of the outcome gap at event time r relative to the omitted period for the treatment group relative to the same difference in the control group. These coefficients thus capture the impact of the TA before and after the TA. For $r < -1$, they can provide evidence of possible anticipatory effects, while for $r \geq 1$ report the post-intervention effects. Importantly, standard errors of these coefficients would be based on the distribution of $\hat{\alpha}_r$ for both treated and placebos for each r. Again, we add a vector of other variables or controls X.

A potential concern when applying the synthetic control method is that some determinants of the outcome variable could change in the post-treatment period. A confounding variable arises if this determinant, an element in λ_t factors in equation (1), affects the treated unit differently compared to its synthetic control, for example because the corresponding factor loading μ_i is unbalanced. If this factor has an observable counterpart, a variable x_{it}, we can include this variable as a control in the previous equation. In particular, we regress Y_{itr} on fixed effects by unit and by event time, adding x as a covariate. In other words, we implement a version of equation (5) applied to the level of the outcome variable. To provide for the relevant synthetic counterfactual, we use the weights that arise from the synthetic control method. In this way, we are able to combine the control for covariates and the synthetic control method in a simple way.

In brief, equation (5) summarizes the effects of treatment on the outcome variable. The regression includes permutations and, thus, the standard errors (and p-values) of coefficients τ_j would increase whenever placebo cases present large post-treatment gaps. In other words, the intervals for the coefficients take into account the uncertainty about the method, the validity of counterfactuals and the variance of the idiosyncratic shock.[7] In estimating equation (3) we follow the literature. A first set of papers applies difference-in-differences (Wassmann 2015; Ferrari and Picco 2016; Campos, Coricelli, and Moretti 2014). Another paper, Reynaerts and Vanschoonbeek (2016), implements a DDD estimate similar to the one described here. In this paper we extend this idea to the event

[7] See Cavallo et al. (2013) for alternative computation of p-values while aggregating several case study effects.

study equations. The use of covariates in equation (5) is justified within the literature, for example in the extension by Powell (2021) or in Abadie (2021).

3.2 The Donor Pool of Countries for Case Studies

Our general strategy for the pool of donor countries is as follows. For each case study, we include in the donor pool all LAC that did not have a major trade agreement between 10 years before and five years after the intervention period.

We choose LAC because they are likely affected by the same regional economic shocks. Nevertheless, the use of LAC in the donor pool rise two concerns: (i) the number of donors is limited to a dozen countries and (ii) there could be spillover effects affecting our donor pool. To address these issues, we provide a robustness exercise where we widen our donor pool to all countries of the world. This type of robustness exercise is common in the literature (see Campos et al. 2014 and the references there).

3.3 Variables and Further Details

In addition to labor share, we also estimate the effects of TA on other important outcomes, such as imports, exports, openness, manufacturing, and relative price of investment. We then explore, with these results, the possible economic mechanisms by which TA could affect labor share.

In the vector of explanatory variables, we consider those that have been identified in the literature and that are available for all countries. Some of these relate to the level of development, human capital, the sectoral composition of output, and institutional settings. We describe these variables in the next section, while we now turn to discuss the particular procedure implemented.

Using the explanatory variables and the average of the outcome variable in a pre-treatment period we implement synthetic control methods and the nested algorithm to minimize the RMSPE in all pre-treatment periods. We also had to deal with several issues that are important in this type of applications: in particular, how to select the explanatory variables, how to proceed when pre-intervention fit is not perfect, and how to deal with incomplete information in variables.

The first issue is the selection of explanatory variables. We proceed here in two steps. In a first stance we consider a different model for each case study. In this case, we adopt the selection of variables that provides the best pre-treatment fit, and we report a different set of explanatory variables for each case study.

Next, to provide a single aggregate effect, we consider only one specification for all case studies. This is consistent with a model in which factor loadings could be different in each case study but where the set of factors affecting the outcome variable is the same. Thus, we select the same specification to estimate the effects in all case studies, as in Cavallo et al. (2013). We choose the combination of explanatory variables that minimizes the post-treatment RMSPE across all placebo cases. In this, we follow the suggestion by Ferman, Pinto, and Possebom (2020).

The second issue is how to proceed when the pre-treatment periods fit is imperfect. In the cases where we find this problem, we demean the outcome variables with the average of pre-treatment periods, applying the method for this transformed variable. This procedure is based in the work by Ferman and Pinto (2019). They point out that this transformation is equivalent to introduce an intercept parameter in the minimization problem to estimate the SC weights. Importantly, they show that the estimator with the demeaned data dominates difference-in-differences estimators under certain rather general conditions.

The third issue is how to deal with incomplete information. In both treatment cases and placebo estimations we impose some particular restrictions. First, the treated unit should have complete

information in the outcome variable in all relevant periods (at least five years before treatment and four years after treatment). Second, the unit should have information for all explanatory variables within the relevant periods. If this is not the case, the unit is dropped. Third, we eliminate from the donor pool any unit that does not have complete information within the relevant periods on the outcome variable or that does not have any information of explanatory variables within that period. Finally, we construct the average of explanatory variables using all pre-treatment periods with complete information for each variable, that is, considering only common periods within all units for each variable.

These set of restrictions intend to generate common periods of comparison for each variable, allowing for a more accurate comparison between the treated unit and its synthetic control. In any case, the inclusion of these restrictions seldom changes any result. Nevertheless, these types of restrictions eliminated El Salvador, Costa Rica, and Dominican Republic as case studies because the outcome variable for these countries is missing or imputed in relevant periods.

4 Data

We use the Penn World Tables (PWT) to analyze labor shares, as is frequent in the literature. Typically, labor share has been measured as total compensation of employees as a share of GDP. Nevertheless, this measure has been criticized, as it lacks the labor income component of all self-employment activities (Gollin 2002).

The PWT introduces some corrections to address this critique. In most of the LAC analyzed (80% of the observations), the labor share is measured including a proportion of the mixed income as suggested by Gollin (2002); in the remaining countries of the region, average wages are used to impute the labor income of the self-employed, and in a few cases labor share is corrected using the importance of agriculture in the economy (see Appendix A for a more detailed description of the corrections).

We use also Karabarbounis and Neiman (2014) as another source of labor share. These are measures of corporate and total labor share for a more restricted period and only for a subset of countries. We use thrdr data to complement the data in PWT.

For the synthetic control we use a set of explanatory variables that are linked to the literature that describes the determinants of labor share. These variables are GDP, per capita PPP, capital-output ratio, the share of manufacturing in the economy, average years of schooling, the share of government consumption, capital-output ratio, capital-labor ratio, and exports and imports as a share of the GDP, among other variables.[8] We report the mean of selected variables within our sample in Table 3, and we describe these variables in detail in the Appendix A. The table reports that the treated units have higher trade openness compared to other LAC, and this is both because of higher export and import levels. Treated countries have lower GDP per capita, schooling and capital-labor ratio, suggesting that, on average, these countries are less developed compared to the donors. We do not find substantial differences between these two groups in the share of industry in GDP. When compared to the rest of the world, the treated units show a similar GDP per capita or GDP composition, but they have lower openness and lower capital stock.

4.1 Labor Share in Latin America

Labor share trend has been documented extensively in the literature for OECD countries (Karabarbounis and Neiman 2014; Elsby et al. 2013; Autor et al. 2020). The analysis of developing countries

[8] We could not include some important variables such as union density or collective bargaining coverage because of the lack of data for many of the pre-intervention periods for a substantial number of countries.

Table 3: Descriptive Statistics

Variable	Source	*Treated*	*LA Donors*	*Rest*
Labor share	PWT	0.4684	0.5042	0.5198
Labor share	KN	0.3357	0.3636	0.4095
Corporate LS	KN	0.3739	0.3949	0.5094
Exports/GDP	WDI	0.3231	0.2494	0.4158
Imports/GDP	WDI	0.3934	0.2407	0.4795
Openness	WDI	0.7166	0.4902	0.8942
Log of GDP per capita PPP	WDI	8.9911	9.2014	9.0074
Avg years of schooling	PWT	6.8783	7.6636	7.2753
Industry (% GDP)	PWT	0.2795	0.2864	0.2660
Gvmt. cons. (% GDP)	PWT	0.1310	0.1564	0.2048
Capital output ratio	PWT	2.8214	3.1298	3.4502
Capital labor ratio	PWT	0.0600	0.0657	0.1237

Notes: The table reproduces the unweighted average of each variable including all periods between 1990 to 2016.

is less frequent.

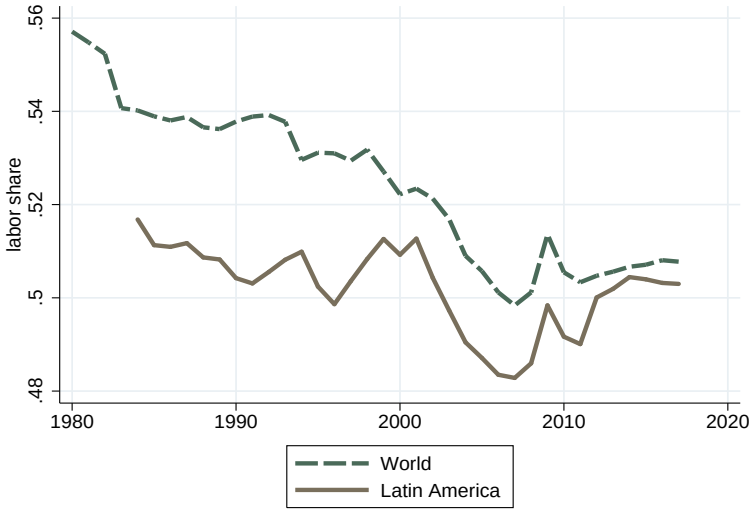
We now use our data to report labor share in LAC by plotting the year fixed effects from a least-squares regression of the labor share on country and year fixed effects. For this graph we use the PWT measure of labor share. We also add measures from Karabarbounis and Neiman (2014) for all countries available. In our regressions, these measures are included as if they were independent countries. The inclusion of fixed effects by time series correct for any difference in level that these series could have. Additionally, this type of regression is intended to correct for changes in the sample composition of countries.

Figure 3 shows the evolution of the labor share in all countries available and in LAC. We shifted the resulting evolution of labor share with the average labor share of the year 2000 for the relevant countries. Thus, the year 2000 reports the (unweighted) average from PWT for both groups. This plot shows the well-known fact that labor share has decreased globally about 5 percentage points in the last three decades, at least until the Great Recession.

In LAC, the labor share had been close to 50% until the beginning of the century, when it decreased about 3 percentage points. During the last years the trend seems to reverse. This evolution is the result of the aggregation of different trends, and it masks large heterogeneity in the region. Figure 4 shows this heterogeneity by reporting the trend of labor share between 1994 to 2014 for different countries of the region. In this period, eight countries had a negative trend, while six countries increased their labor share; two countries had almost no change. Part of this heterogeneity could be related to trade policies.

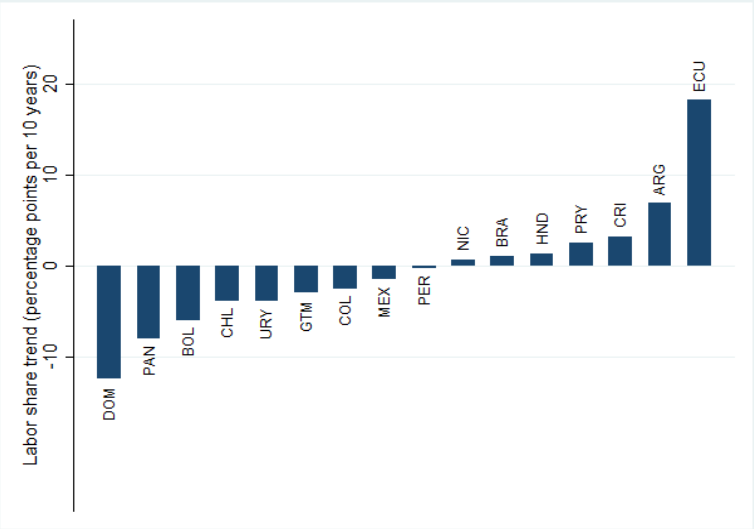
Figure 5 shows the evolution of the labor share in LAC, dividing countries between those that at some point in time signed a trade agreement with big economies and those that did not. There is a striking difference between the two groups after the 2000s. The countries without trade agreements increased the labor share by about 3 pp while the countries that are part of our case studies show a decreasing trend of about 4 pp. Of course, this does not directly link the fall of labor share with trade agreements. Nonetheless, the fact that most of the interventions begin during the mid-2000s

Figure 3: Declining Labor Shares



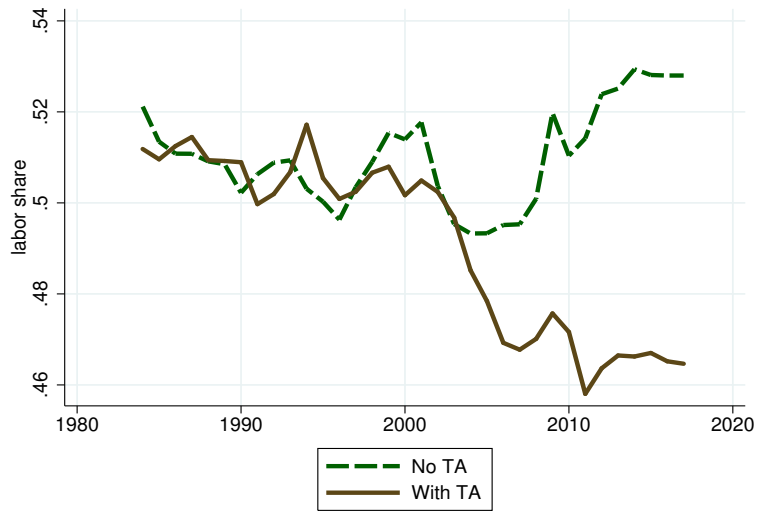
Notes: The figure is the result of plotting fixed effects by year from a regression of labor share on fixed effects by country and year. The resulting coefficients were rescaled to represent the average labor share of the group in the year 2000. Labor share includes the standard series of the PWT and the corporate and total labor share from Karabarbounis and Neiman (2014). For this figure we treat each source independently, as if it were representing a different country.

Figure 4: Trends in Labor Share by Country



Notes: The figure plots the trend coefficient multiplied by 10 of a regression of labor share on year, using data from 1994 to 2014.

Figure 5: Heterogeneous Evolution of the Labor Share in Latin America



Notes: The figure is the result of plotting fixed effects by year from a regression of labor share on fixed effects by country and year, as in Figure 3. LAC are divided between the case studies (those that signed TAs with big economies) and the rest.

is suggestive.

Figure 6 plots the coefficients of year fixed effect of a regression that includes also fixed effects by countries, considering only the countries that signed trade agreements. In this case we do not rescale the resulting coefficients. The period is not calendar year but years to the intervention, or event time. We find that there is a negative trend that becomes steeper immediately after the year of the intervention. This trend is very persistent, and after 10 years of the TA the fall in labor share reaches about 5 pp.

These plots suggest that trade agreements could affect labor share in LAC. Nevertheless, these graphs do not intend to represent any causal effect. To estimate the effect, we now turn to the implementation of the synthetic control methods.

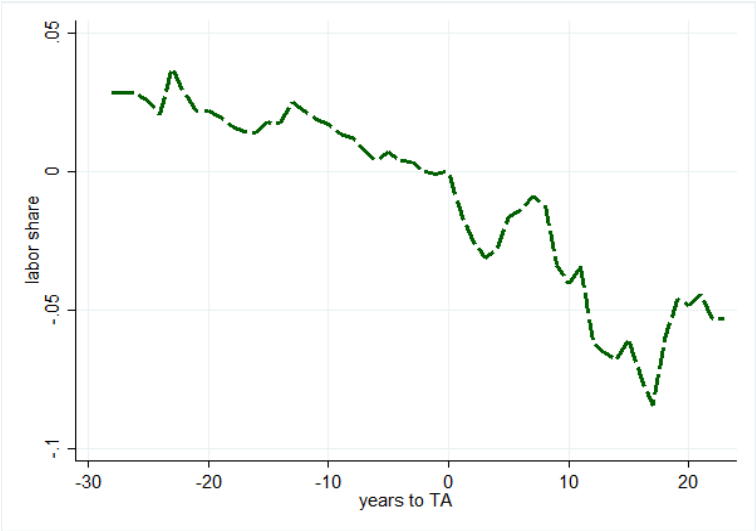
5 Case Studies Main Results

In this section we present the results of estimating the effects of trade agreements on labor share for each of our case studies. We discuss each case study and the heterogeneity of the impact between countries. Then we aggregate the results by using regressions. For these results we use LAC in the donor pool, and we use the labor share variable that combines PWT and KN, as described in Appendix A.1.3. In the next section we provide robustness to alternative definitions of the outcome variable, to the explanatory variables, and to the donor pool.

5.1 Individual Analysis

Figure 7 shows the impact of trade agreements on labor share for Chile (CHL), Colombia (COL), Guatemala (GTM), Honduras (HND), Mexico (MEX), Nicaragua (NIC), Panama (PAN) and Peru (PER). Each panel in the figure depicts the evolution of labor share before and after the trade

Figure 6: Evolution of Labor Share after Trade Agreements



Notes: The figure plots the fixed effects of the variable year since trade agreement that arise from a regression of labor share on fixed effects by time and by country. The sample is restricted to case studies. See notes from Figure 3.

agreement for each case study (continuous line) and their respective counterfactual (dashed line).[9] The year of the trade agreement is identified by a vertical line in each panel of the figure. The figure shows that the effects of TAs on the countries is negative for many of them. For example, panel (b) shows the case of Chile. After the trade agreement labor share decreases for Chile while it increases for the synthetic counterfactual. Mexico, in panel (e), is similar in this sense, with a strong reduction in labor share immediately after TAs. In Guatemala and Panama, even when labor share began to decrease before the TA, after the implementation of TAs labor share continues to decrease in the treated countries while it grows for the synthetic control.

In Honduras and Nicaragua, labor share increases slightly after TA with no clear trend. These countries do not show a strong effect of TA. Peru's labor share also remains fairly constant after TA, but its synthetic counterfactual experiences a sharp increase in labor share, suggesting a negative effect of TA.

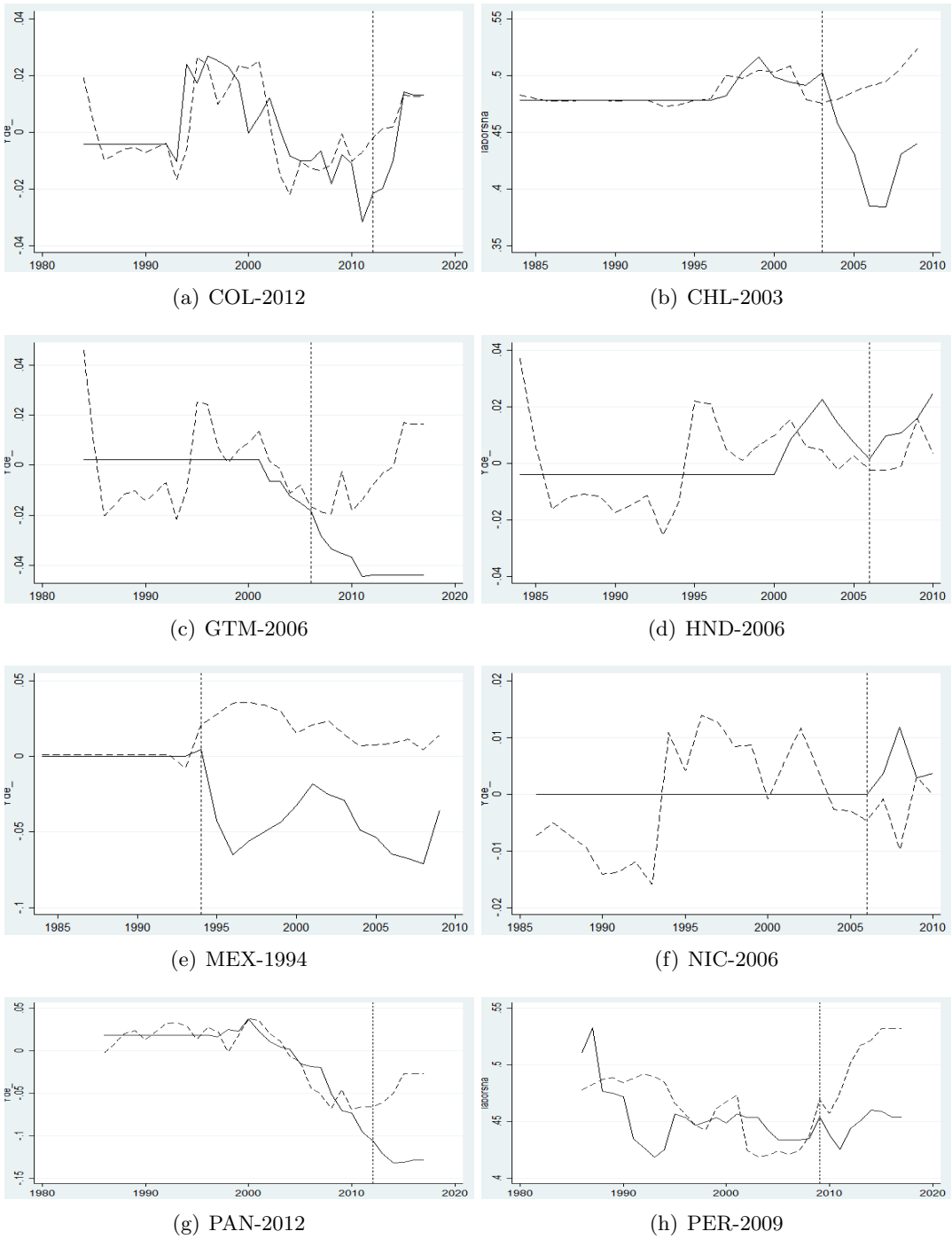
The only country with a substantial increase in labor share after TA is Colombia. In that country, labor share first recovers from a previous reduction and then increases, with a total change of 4 pp in the fourth post-intervention period. The synthetic counterfactual for Colombia also increases in a similar way, implying no TA effect for Colombia.

Overall, Figure 7 seems to suggest that trade agreements induced a decrease in labor share for Chile, Guatemala, Mexico, and Panama, both after the TA and also compared with their respective synthetic controls. These effects are quantitatively very important in some of these countries, particularly in Chile, where the gap reaches 10 pp. The remaining panels show a less clear picture.

To assess the statistical significance of these results we used permutations. We applied the synthetic control method to every country in each donor pool and collected the placebo effects for each donor pool country. We construct a panel for both case studies and placebos of labor share

[9] Counterfactual countries used in each synthetic control are listed in an appendix at the end of the paper (see Table C.3).

Figure 7: Labor Share: Treated Countries and Their Synthetic Controls



Notes: The figures show the treated unit (solid line) and synthetic control (dashed line) by year.

gaps, α_{itr}, and we regress these gaps implementing equation (3). The coefficient associated with the interaction between the indicator variable of the case study and the dummy variable that indicates the period after the intervention measures the impact of the trade agreement on the labor share. Table 4 shows these results. The estimated coefficient in the case of Chile, reported in column (2),

Table 4: DDD Estimates of Trade Agreement Effects on Labor Share for Each Case Study

	(1) COL	(2) CHL	(3) GTM	(4) HND	(5) MEX	(6) NIC	(7) PAN	(8) PER
TxD	0.0029	-0.0998***	-0.0582***	0.0124	-0.0870***	0.0145	-0.1096***	-0.0671***
	(0.0132)	(0.0242)	(0.0166)	(0.0153)	(0.0112)	(0.0225)	(0.0146)	(0.0215)
T	-0.0112	0.0403**	0.0241	-0.0025	0.0240**	-0.0070	0.0280***	0.0074
	(0.0124)	(0.0159)	(0.0149)	(0.0145)	(0.0098)	(0.0212)	(0.0100)	(0.0200)
D	-0.0000	-0.0019	0.0000	0.0000	-0.0000	0.0021	-0.0000	-0.0271***
	(0.0041)	(0.0038)	(0.0048)	(0.0045)	(0.0014)	(0.0036)	(0.0038)	(0.0088)
Cons	0.0000	0.0033	-0.0000	0.0000	0.0000	-0.0012	0.0000	0.0204***
	(0.0033)	(0.0031)	(0.0035)	(0.0025)	(0.0012)	(0.0028)	(0.0025)	(0.0070)
N	204	104	204	216	130	175	192	192

Notes: The table shows the results of estimating equation (3). The outcome variable is the labor share gap of each country, including both the treated country and its placebos (discards placebos with pre-intervention RMSPE five times higher than the treated country). Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parentheses.

is $\hat{\tau} = -0.1$ statistically significant, suggesting that the TA had, on average, a negative impact of 10 percentage points (pp) over the labor share. The results for Guatemala, Mexico, Panama, and Peru provide negative and statistically significant effects, ranging from -0.06 to -0.11 for Panama. Table 4 also shows an insignificant coefficient for Colombia, Honduras, and Nicaragua, indicating that in these countries the TA had no impact on labor share.

5.2 Aggregating Effects

We now present an alternative set of estimations of the impact of TA on the labor share for all case studies. First, instead of using a different model to define the synthetic control counterfactual for each case study, we restrict it to a single model for all case studies, selecting the set of explanatory variables that minimize the root mean squared prediction error (RMSPE) of post-intervention periods among placebos. These explanatory variables are: log of real GDP per capita PPP, capital-output ratio, the years of schooling of the working force, the TFP, and the average of outcome in the three periods pre-intervention (see Appendix B for details about the selected specification). For the model we use synthetic control of the demeaned outcome variable, applied to the treated countries and the donor pools described above, and analyze the results for four years after the intervention.

Column (1) of Table 5 shows the results of estimating equation (3) using all periods after the TA. In this case, the coefficient that measures the impact of the trade agreement on the labor share is negative and statistically significant suggesting that, on average, the TA in these cases reduced the labor share by about 3 pp. Column (2) presents the results for the same estimation but using calendar year and country fixed effects as controls. The $\hat{\tau}$ coefficient is larger in sign and magnitude than the one estimated in column (1), indicating a negative impact of the TA on the labor share. Column (3) in the table shows the estimated results eliminating the placebos with poor pre-intervention fit (with RMSPE higher than twice the highest among treated units), removing

Table 5: DDD Estimates of Trade Agreement Effects on Labor Share for All Case Studies Using LAC As Donors

	(1)	(2)	(3)	(4)
TxD	-0.0260***	-0.0444**	-0.0195***	-0.0270*
	(0.0077)	(0.0192)	(0.0067)	(0.0160)
T	0.0038	-0.0035	-0.0026	0.0005
	(0.0037)	(0.0057)	(0.0030)	(0.0047)
D	-0.0002		0.0002	
	(0.0013)		(0.0012)	
Cons	0.0002	0.0037	-0.0002	0.0020
	(0.0009)	(0.0053)	(0.0007)	(0.0048)
N	1879	1879	1769	1769
FE	NO	YES	NO	YES
LOW RMSPE	NO	NO	YES	YES

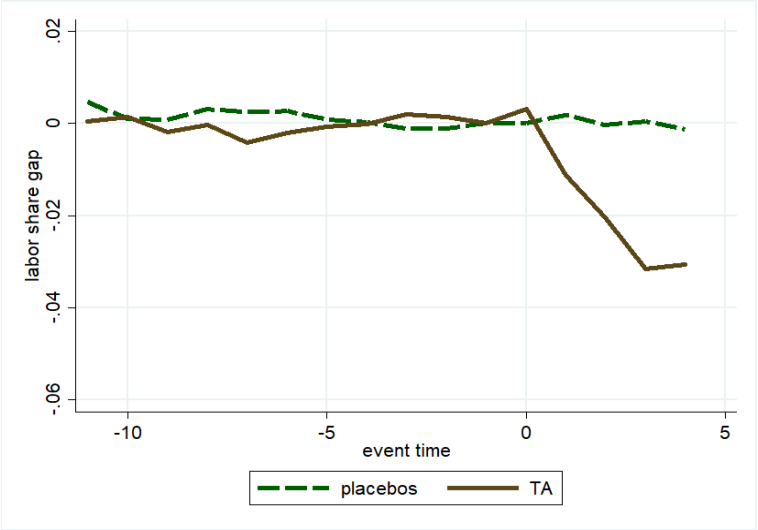
Notes: The table shows the results of estimating equation (3). The outcome variable is the labor share gap of each country, including treated countries and placebos (results in columns (3) and (4) discard placebos with pre-intervention RMSPE higher than twice the highest RMSPE among treated units). Only four post-intervention years are used for these results. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parentheses.

about two hundred observations. The estimated impact of the TA is negative and statistically significant. In this case the estimated impact is $\hat{\tau} = -0.02$. This result indicates that the TA induced a reduction, on average, of abut 2 pp of the labor share.

Figure 8 is the result of estimating equation (4), that is, of regressing labor share gaps on event time. The dashed line shows the fixed effects by event time for the placebos. The average labor share gap among these countries is close to zero for all periods analyzed. The solid line reports the same result for the treated units. The average gap in the pre-intervention periods are close to zero, suggesting no anticipatory effects. One year after TA there is a clear negative trend that reaches -2 pp for the second post-intervention year, and -3 pp in years 3 and 4 after TA. These last are highly significant in the regression and are maintained when we discard the units with the worst pre-intervention fit (see Table C.1 in Appendix C).

Table 6 shows the results of estimating equation (5), that is, of regressing the labor share gaps on fixed effects by years to intervention, and an interaction of these fixed effects with the dummy variable for treated country. Period T indicates the date of the implementation of the TA. Column (1) reports the coefficients τ_r of equation (5) when all case studies and placebos are included and shows that in the pre-intervention periods all coefficients are insignificant, suggesting no anticipatory effects. The first year after intervention the coefficients are negative, but only after the second year are they substantial (a reduction of about 2 pp in labor share). Effects are stronger and significant in period three, with an effect of -3 pp. Column (2) reports the results including calendar year and unit fixed effects. The results are now significant and higher in absolute value. Results in columns (3) and (4) restrict the placebos to those with less that twice the RMSPE of the highest in the treated case, eliminating about 100 observations. The effects are about 3 pp in column (3) and 4

Figure 8: TA Effects on Labor Share in Event Study Design for All Case Studies Using LAC as Donors



Notes: The figure plots the coefficients of labor share gaps on event time fixed effects, independently for case studies and placebos (considering only those with RMSPE lower than twice the highest among the case studies), as in equation (4).

pp in column (4) for the fourth post-intervention period.

Overall, the empirical evidence presented in Table 6 suggests that there were neither anticipatory effects nor an effect in the period of implementation of the TA. Impact of the trade agreement over the labor share first appears in the second year after the intervention. In the fourth year the effect is about 3 pp.

5.3 Heterogeneity and Economic Mechanisms

Our results in the previous sections consistently show a reduction in the labor share after TA of between 2 and 4 pp of GDP, with an effect that is persistent and tends to amplify over time. We now turn to explore the reasons behind the heterogeneity in these results and the possible economic mechanisms by which TA affects labor share.

5.3.1 Accounting for Heterogeneity

The effects of TA are heterogeneous among our case studies. Some of them present strong negative effects, while for others there are no significant effect. There could be many reasons behind these results. A main issue is the relative factor endowment, for example, capital-labor ratio, of both countries of the bilateral TA. Other initial conditions of the country, such as the composition of GDP, or institutions in the labor market, are also emphasized in the literature. The characteristics of the TA, the provisions covered and the details for the implementation of these provisions also seem crucial. We first explore the importance of these TA provisions.

When we analyze the characteristics of TA we find that anti-dumping (AD) measures and sanitary and phytosanitary (SPS) measures are crucial for our case studies. In particular, we identify those TAs with both SPS and AD measures with legally enforceable language and available

Table 6: Event Study Estimates of Trade Agreement Effects on Labor Share for All Case Studies Using LAC as donors

	(1)	(2)	(3)	(4)
$T-3$	0.0048	-0.0024	0.0030	0.0041
	(0.0094)	(0.0093)	(0.0092)	(0.0059)
$T-2$	0.0031	-0.0040	0.0023	0.0051
	(0.0097)	(0.0103)	(0.0095)	(0.0067)
T	0.0025	-0.0120	0.0030	0.0036
	(0.0133)	(0.0203)	(0.0170)	(0.0132)
$T+1$	-0.0138	-0.0294	-0.0132	-0.0133
	(0.0141)	(0.0186)	(0.0122)	(0.0137)
$T+2$	-0.0212	-0.0493**	-0.0201	-0.0320*
	(0.0180)	(0.0214)	(0.0165)	(0.0186)
$T+3$	-0.0333*	-0.0630***	-0.0320	-0.0422**
	(0.0179)	(0.0218)	(0.0213)	(0.0182)
$T+4$	-0.0301	-0.0617***	-0.0293	-0.0414**
	(0.0219)	(0.0235)	(0.0233)	(0.0211)
FE		YES		YES
Only low RMSPE			YES	YES
N	1879	1879	1769	1769

Notes: The table shows the results of estimating equation (5) on labor share gaps for case studies and placebos. Results in columns (2) and (4) include fixed effects by calendar year. Results in columns (3) and (4) discard case studies with pre-intervention RMSPE higher than a threshold (twice the highest pre-intervention RMSPE among treated units). Only four post-intervention years are used for these results. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parentheses.

Table 7: Event Study Estimates of TA Effects on Labor Share by TA Characteristics

	(1)	(2)	(3)	(4)
	Sanitary and Phytosanitary		Anti-dumping	
	No DSA	LE-DSA	No DSA	LE-DSA
$T-2$	0.0007	-0.0078	-0.0005	-0.0020
	(0.0059)	(0.0062)	(0.0038)	(0.0058)
T	-0.0115	0.0207	-0.0225***	0.0010
	(0.0085)	(0.0138)	(0.0057)	(0.0103)
$T+1$	-0.0163	-0.0247**	-0.0264***	-0.0175*
	(0.0110)	(0.0114)	(0.0063)	(0.0103)
$T+2$	-0.0167	-0.0496***	-0.0158**	-0.0279*
	(0.0176)	(0.0074)	(0.0070)	(0.0165)
$T+3$	-0.0250	-0.0710***	-0.0063	-0.0435**
	(0.0181)	(0.0220)	(0.0076)	(0.0186)
$T+4$	-0.0176	-0.0782***	-0.0047	-0.0400*
	(0.0196)	(0.0188)	(0.0081)	(0.0210)
N	1840	1713	1729	1824

Notes: Event study equations of the gap of the labor share in both treated and placebo units using LAC in the donor pool. Sanitary and phytosanitary measures and anti-dumping measures are analyzed. TA are divided according to whether the TA had legally enforceable language and available dispute settlement, in columns (2) and (4), or without dispute settlement, columns (1) and (3). Fixed effects by units are included. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parentheses.

dispute settlement.[10] We then apply equation (5) considering only these countries as treated and eliminate the remaining case studies.

Table 7 reports these results. Columns (1) and (2) divide the case studies according to the SPS measures. We find that in those TAs with SPS the effect is very strong, with a negative and significant effect that is larger than -7 pp in the fourth post-intervention period; the effect in the remaining countries is negative of about -2 pp, but not significant. Columns (3) and (4) divide case studies according to the AD measures. Interestingly, those with AD have a negative and persistent effect that goes to -4 pp in the fourth post-intervention year, while those without complete enforceable measures in AD have a negative effect in the initial periods, but these effects become very mild in the third and fourth post-intervention periods.

We thus conclude, in line with the literature, that it is possible that the characteristics of the TAs could be molding their effects. It has been found that TA often increase the anti-dumping and SPS measures between members, arguably to curb the effects of the TA on trade. The introduction of these type of measures could signal a more clear commitment to a more open trade policy, in particular with the TA counterpart or in general (Silberberger and Stender 2018).

[10] The selected TAs are EU-Chile and US-Mexico in the SPS, and all case studies with the exception of US-Panama and US-Colombia for the AD measures. We do not include additional provisions in the TA because many of the core provisions are invariant in all case studies. We do not use depth in the more general definition, such as the one described in the section 2 because some provisions proved to be more relevant to explain the effects of TA (Hofmann et al. 2017; Lee et al. 2019).

5.3.2 Effects of TA on Other Outcomes

The TA can have effects on very different variables besides thoses of the labor market. To understand other effects of TA we implement the same methods for other outcome variables. The selected variables are exports, imports and trade openness, the relative price of investment, investment level and the share of industry over GDP. For each outcome variable, we select the model that reports the minimum RMSPE among placebos for the post-intervention period. In all cases we demean the outcome variable and use LAC in the donor pool.

Table 8 summarizes the results of applying synthetic control methods using those explanatory variables. Columns (1) to (3) show that exports to GDP increased by about 2 to 4 pp after TA and that much of this effect is driven by manufacturing exports to GDP. Imports were not significantly affected.

Column (4) indicates that relative price of investment goods increased significantly and substantially. At the same time, investment did not increase after TA, as column (5) shows. These two results suggest that the mechanism emphasized by Karabarbounis and Neiman (2014) is not relevant in this case. Their argument for the declining trend in labor share is that the lower prices of investment goods induced a drop in labor demand and a subsequent fall in labor share given that the estimated elasticity of substitution between factors is above one. In our case, the price of investment goods rose due to TA. A possible explanation for this increase is that, after the TA, there are stronger incentives to import capital goods, and this change in the composition of investment can increase its average price. The fact that aggregate investment is not increasing does not rule out the possibility of investment towards imported or higher quality goods.

In part, some reallocation is observable in column (6), where the results highlight the increase in industry over GDP. This rise is at the expense of a reduction of services over GDP. In this sense, in countries affected by the TA tradable sector increased its importance, and the pre-trend in favor of the service sector was interrupted for several years.

Importantly, the expansion of exports, manufacturing exports, and industry all align with a reduction in labor share because of composition effects (manufacturing has lower labor share than services) and because of possible competitiveness concerns by firms and the government, consistent with a trade liberalization policy.

5.3.3 Assessing the Possible Mechanisms

The above results show that TAs have an impact on several relevant variables. We now consider to what extent these other effects can be related to the change in the labor share. In particular, we want to explore whether these variables account for some particular mechanism behind the fall in the labor share. For example, is the evolution in labor share related to the change in the importance of industry over GDP? If this compositional issue were the one behind the fall in labor share, then we would observe that labor share would fall more in those countries with larger increases in the proportion of industry over GDP.

To assess the relevance of those variables as possible economic mechanisms we introduce these variables in the regressions. In particular, we augment the regression analysis with some of these variables to analyze the possible mechanisms behind the fall in labor share and to control for post-treatment evolution of these labor share determinants. We implement this idea by using the weights for synthetic controls consistent with the results in Table 12 in a fixed effects weighted regression of the level of labor share on several variables, fixed effects by event time and interactions. In other words, we implement equation (5) with additional covariates and using the synthetic control weights for each country-year observation. As explained in Section 3, this idea relates to Powell (2021), and

Table 8: TA Effects on Several Variables Using All Case Studies and LAC As Donors

	(1) Exports	(2) Manuf.exp.	(3) Imports	(4) Invest.price	(5) log of inv.	(6) Industry
(A) DDD						
TxD	0.0196*	0.0219***	-0.0063	0.1160***	0.0076	0.0385***
	(0.0109)	(0.0051)	(0.0117)	(0.0311)	(0.0394)	(0.0069)
TxD	0.0282***	0.0224***	-0.0039	0.1172***	0.0394	0.0354***
w.FE	(0.0107)	(0.0046)	(0.0114)	(0.0313)	(0.0390)	(0.0068)
(B) Event study						
$T+4$	0.0482*	0.0107	0.0146	0.1783**	-0.2259**	0.0405**
	(0.0284)	(0.0133)	(0.0305)	(0.0811)	(0.1012)	(0.0180)
$T+4$	0.0418**	0.0246***	0.0093	0.1564***	-0.0205	0.0448***
w.FE	(0.0199)	(0.0089)	(0.0214)	(0.0582)	(0.0716)	(0.0129)

Notes: The table is the result of estimating a DDD equation, panel (A) and event study equation, panel (B) on gaps of the variables using both case studies and placebos. In the lines labeled "w.FE" we use calendar year and unit fixed effects, and we restrict the case studies to those with RMSPE lower than twice the highest among the treated. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Standard errors in parenthesis.

to Abadie (2021). In a generalized synthetic control, Powell (2021) proposes implementing a two-step procedure to account for the possible post-treatment evolution of relevant determinants. In this paper we use the simpler method that uses the weights of the synthetic control applied to one outcome and performs a regression adding covariates. Abadie (2021) proposes including the explanatory variables from the synthetic control in a regression analysis to account for possible differences between the case studies and their synthetic control in (2). This is particularly relevant in the aggregation of different case studies, when it is possible that some case studies could have a better fit than others.

Table 9 reports the results of these regressions. The first column reports a similar effect that the one in table 6. Column (2) adds the explanatory variables used in the synthetic control. We find that the coefficients slightly change with the inclusion of these variables. Effects are mitigated, suggesting that there could be some effects that could be driven through changes in these variables.

Columns (3) to (6) deal with the change in the sectoral composition of production and employment. We consider these variables as possible outcomes of the TA, and we intend to capture up to what extent can these variables explain TA effects on labor share. Column (3) uses the share of industry over GDP. The coefficient associated with this variable identifies that, if the share of industry increased 10 pp of GDP, then labor share would drop 3 pp. We find that this variable is a possible channel for the reduction of labor share, but that it does not explain all the effect of TA: the estimated effect is lower only in 0.7 pp compared to those in column (1). Results in columns (4) and (5) provide very similar results. Column (7) shows that using employment share by industry does not change the result.

Table 9: Event Study Estimates of TA Effects on Labor Share Including Covariates Using All Case Studies and Donors

	(1)	(2)	(3)	(4)	(5)	(6)
$T-2$	0.0035	0.0013	0.0014	0.0034	0.0019	0.0020
	(0.0054)	(0.0050)	(0.0058)	(0.0060)	(0.0057)	(0.0044)
T	0.0012	0.0037	0.0026	-0.0048	0.0023	-0.0005
	(0.0049)	(0.0053)	(0.0042)	(0.0056)	(0.0042)	(0.0062)
$T+1$	-0.0132	-0.0079	-0.0084	-0.0198**	-0.0097	-0.0148*
	(0.0082)	(0.0093)	(0.0077)	(0.0089)	(0.0075)	(0.0085)
$T+2$	-0.0229*	-0.0151	-0.0178	-0.0296**	-0.0196*	-0.0259*
	(0.0130)	(0.0151)	(0.0117)	(0.0118)	(0.0115)	(0.0134)
$T+3$	-0.0340*	-0.0255	-0.0252	-0.0398**	-0.0279*	-0.0380*
	(0.0184)	(0.0211)	(0.0155)	(0.0164)	(0.0148)	(0.0191)
$T+4$	-0.0330*	-0.0231	-0.0242	-0.0386**	-0.0275*	-0.0382*
	(0.0188)	(0.0221)	(0.0158)	(0.0176)	(0.0151)	(0.0194)
ln GDP pc PPP		-0.0976				
		(0.0785)				
K-Y ratio		-0.0491**				
		(0.0190)				
Yrs. schooling		-0.0002				
		(0.0174)				
TFP		-0.0046				
		(0.0901)				
Industry (%)			-0.2992*	0.1639	-0.2589*	
			(0.1529)	(0.2295)	(0.1411)	
Services (%)				0.0054***		
				(0.0018)		
Government (%)					0.1607	
					(0.1212)	
Industry (empl)						-0.3051
						(0.3496)
Services (empl)						-0.2604
						(0.4425)
N	521	503	521	521	521	500

Notes: Event study equations with weighted fixed effects by unit, using weights from the SC applied to labor share using LAC in the donor pool. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parentheses.

Table 10: Decomposition of Labor Share Gaps

	(1)	(2)	(3)	(4)	(5)
	$\ln LS$	$\ln L$	$\ln w_{PPP}$	$\ln RGDP_{NC}$	$\ln\left(\frac{I_{NC}}{PPP}\right)$
$T+4$	-0.0796*	0.0458*	-0.1944***	0.0097	-0.0787
	(0.0431)	(0.0249)	(0.0653)	(0.0321)	(0.0486)

Notes: Event study equations with weighted fixed effects by unit, using weights from the SC applied to labor share using LAC in the donor pool. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parenthesis.

5.3.4 Decompositions

We now turn to the analysis of the change of the labor share by using decompositions. In particular, we take the log of labor share to get the following decomposition:

$$\ln LS = \ln w_{PPP} + \ln L - \ln RGDP_{NC} - \ln\left(\frac{I_{NC}}{PPP}\right)$$

where LS is the labor share, w_{PPP} is labor income in real PPP, L is total labor, $RGDP_{NC}$ is real GDP in constant national currency, I_{NC} is GDP deflator, and PPP is the set of PPP prices. All variables are from PWT with the exception of w_{PPP}, which is computed as a residual from the above equation.

Table 10 is the result of implementing equation (5) on the level of each of the above variables, weighting each unit by the weights that arise from the SC (the same than for table 9). We find that labor share decreased about 8% in the fourth post-intervention period. This fall is consistent with the 3 pp reported in table 9. Both employment and real GDP increase more compared to the synthetic countries. The differences in employment are only marginally significant, while differences in real GDP are not. Real labor income goes down about 19% in the fourth year after TA. This difference is driven by a stagnation in real wages for the treated countries at the same time real wages were growing at a steady rate in control units.

The last term of the decomposition shows that the GDP deflator over PPP index goes down about 8% after TA. A similar fall would occur if we considered CPI instead of PPP. This means that the GDP deflator increases less than other price indexes. This result discards a mechanism for labor share drop after liberalization analyzed in the literature. In particular, a set of papers have found that trade liberalizations in developing countries can increase markups when marginal costs (input prices) decline more than output prices (De Loecker et al. 2016; Kamal et al. 2019). If this were the main mechanism for our result, the GDP deflator would in fact increase more than price indexes; we observe the converse. On the contrary, the fall in labor income seems to be at the core of our results and can explain the evolution of these relative prices.

Table 11 reports the labor income decomposition according to the source of labor income, considering employees and self-employed mixed income, where the sum of these two sources makes up total labor share. The main observation is that only employees are affected by the fall in labor share, while there is no effect on self-employed income.[11] These observations, along with the fact that the proportion of self-employment is not affected by TA, suggest that the effect of TA on labor share is mostly through real wages.

[11] Only countries with complete data are considered, reducing the number of observations in Table 11.

Table 11: Decomposition of Labor Income Share by Source

	(1) total	(2) employees	(3) self-employed
$T-3$	0.0128	0.0099	0.0029
	(0.0112)	(0.0095)	(0.0046)
$T-2$	0.0037	0.0043	-0.0006
	(0.0108)	(0.0091)	(0.0029)
T	0.0000	-0.0038	0.0039
	(0.0065)	(0.0060)	(0.0042)
$T+1$	-0.0147	-0.0161*	0.0014
	(0.0093)	(0.0089)	(0.0028)
$T+2$	-0.0226	-0.0279*	0.0053
	(0.0144)	(0.0136)	(0.0036)
$T+3$	-0.0352	-0.0424**	0.0071
	(0.0226)	(0.0196)	(0.0054)
$T+4$	-0.0372	-0.0443**	0.0072
	(0.0238)	(0.0196)	(0.0065)
N	272	272	272

Notes: Event study equations with weighted fixed effects by unit, using weights from the SC applied to labor share using LAC in the donor pool. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parenthesis.

5.3.5 Other Mechanisms

Besides these variables we have evaluated other possible mechanisms, including informality, self-employment, and government policies.

Informality could be an important variable, given that it can be a determinant of labor share and, at the same time, affected by trade shocks. The literature has found that trade liberalization has negative effects on formal jobs (Dix-Carneiro and Kovak 2019) and induces informality in the intensive margin (the demand for informal employees in formal firms) (Cisneros-Acevedo 2020), but that these results are heterogeneous by skills (Mesquita Moreira and Li 2020; Sánchez-Navarro and Pierola 2020) or industries (Cruces, Porto, and Viollaz 2018). In our data there are no effects of TA on informality: there is no differential evolution of informality in treated countries when compared to synthetic controls. There are also no effects on the proportion of self-employed workers.

An additional mechanism could be the result of the changes in policies to increase competitiveness and reduce labor costs. This type of reforms could complement trade agreements and could lead to lower labor share. In our data we find that minimum wages tend to increase less in treated units on average compared to the control countries; these differences, however, are not statistically significant. We also find a larger increase in government consumption over GDP in these countries but, again, with no significant difference.

In all, we find that the increase in manufacturing exports and the share of industry in GDP suggest that treated countries increased their need for competitiveness, which possibly led to reallocation of factors and a reduction in real labor costs. Policies such as minimum wage could have accentuated this trend.

As we have emphasized, the effect of TA is concentrated in a subsample of treated countries. We have found that in these countries the increase in the share of industry have been highest. On the other hand, the fall in labor income is more generalized, with few exceptions.

6 Robustness

We now discuss different robustness exercises. Our intention is to show that our main result, the fall of labor share after trade agreement, is robust to alterations in the definition of the outcome variable, to modifications in the explanatory variables, and to changes in the donor pool. Additionally, we further provide evidence to discard anticipatory effects by backdating the treatment. We also show that the main mechanisms at play are maintained in these extensions.

6.1 Outcome Variable

Our first robustness check consists of changing the outcome variable. We reproduce our results using the log of the labor share from PWT only, without any adjustment from KN. By using the log transformation we allow for an interpretation of the results as proportional differences, and we check for the robustness of the results allowing for possible minor changes in the composition of the synthetic controls and a reduction in the number of available periods. We apply the same methods as before for this transformed variable. By selecting the combination of possible explanatory variables that minimize the RMSPE of placebos in post-treatment periods we finally implement a model similar to that for the original variable.[12] The estimates are closely consistent with our main results, suggesting a 6% reduction of labor share. As in our main specification, this effect is the result of a change in the treatment (case studies) after the intervention, with no average effects in

[12] We use the log of GDP per capita PPP, capital-output ration, years of schooling, and TFP, as well as the outcome variable in the three periods before intervention. We demean the outcome variable.

the placebos and no anticipatory effects in the treatment. Figure C.3 in Appendix C summarizes this result.

6.2 Donor Pool

Our analysis of individual case studies was based on a limited set of donors. The selection of LAC was justified by the similarities to the treated units in many respects. We now analyze whether our results change when we introduce all countries, without restrictions rather than not having a TA with the United States, the European Union, and China in a given time window.

A possible concern about our main results is that some case studies can be affected by idiosyncratic shocks after intervention. In particular, they could receive substantial shocks unrelated to the TA that could affect their labor share. We address this issue by including additional explanatory variables that incorporate the effects of these shocks on the synthetic control.

The case of Chile is particularly illustrative. After TA, the labor share dropped by about 10 pp in a few years. Also, from 2002 to 2007 there was an increase of about 350% in the price of copper, an important Chilean export commodity. The rise in terms of trade could reduce the labor share by increasing the GDP in nominal terms without the corresponding rise in wages and by changing the composition of GDP.[13] This increase in commodity prices, including soybean and oil, affected most of LAC (see Appendix A.2). Arguably, the effects of copper prices could be different from those of soybean prices. Thus, an important issue is whether this shock is affecting the results, and whether we can interpret the labor share gap after intervention as a causal effect of TA.

To address the possible impact of the increase in the price of copper, we implement the synthetic control method including as explanatory variables the relative price of exports in years 1998 and 2000 and mineral rents to GDP in 1990 and 2002, as well as other variables.[14] We chose these years to identify the price shock of copper as a possible factor affecting labor share. If synthetic counterfactual matches the evolution of these variables, then the exposition (the factor loadings) to price of copper (a possible relevant factor) should be similar. When we implement our synthetic control we identify Peru, Australia, and Bulgaria as components of the synthetic control. Peru and Australia are the second and third copper exporters; Bulgarian top exports include oil and copper.

Panel (a) of Figure 9 shows that labor share goes down for both Chile and its synthetic control after TA, but the reduction in Chile is far more drastic and persistent. For example, after ten years of the TA the labor share gap is about -8 pp. We also check the evolution of export prices for Chile and its synthetic control. The evolution is almost identical, both in pre-treatment and in post-treatment periods. When we do the same for mineral rents we find that, while the level of these rents is higher for Chile, the response is almost parallel. Importantly, the figures show several periods after TA, reporting that the fall in labor share in Chile is more persistent and is also large after the reduction in copper prices.

The example of Chile shows that focusing on pre-intervention explanatory variables in particular years can help to balance relevant factor loadings and reproduce the post-intervention evolution of relevant determinants of the outcome in the synthetic control.

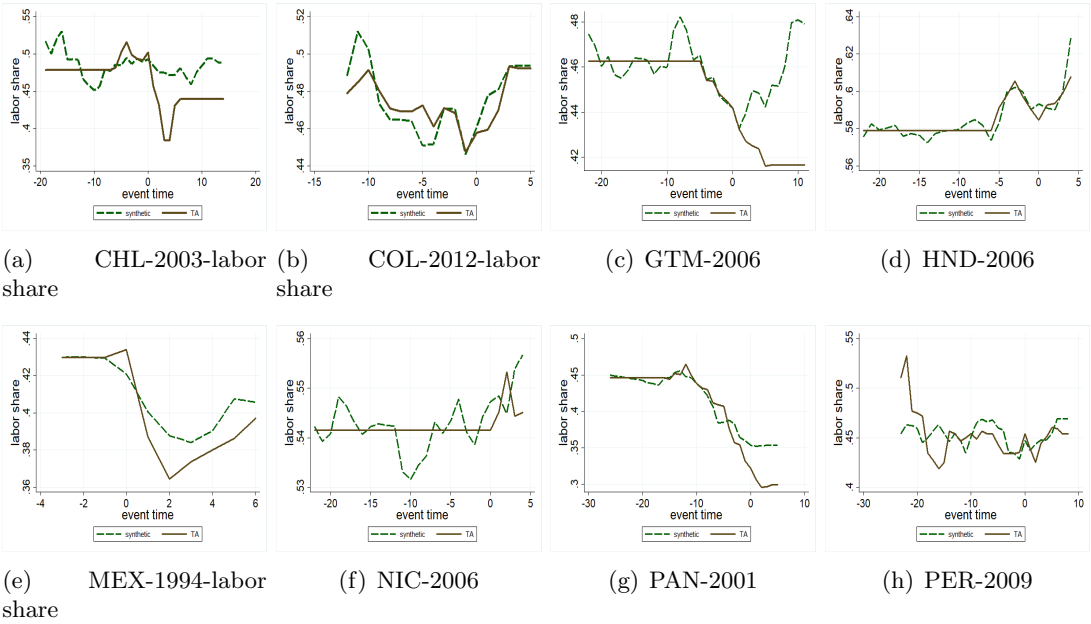
We now turn to apply this same idea to other countries. Panel (h) of Figure 9 shows the case of Peru. We maintain the specification above with few differences.[15] Bolivia, Botswana, and Ecuador

[13] The literature has analyzed the macroeconomic effects of commodity prices in developing economies (Tretvoll et al. 2021; Ayres et al. 2020; Dávila et al. 2021).

[14] Additional explanatory variables are the log of GDP per capita in PPP, manufacturing exports, openness, average years of schooling, the capital-labor ratio, and the labor share in the three years pre-intervention, in 1998, 1995 and 1990.

[15] We add mineral rents for 2008, eliminate manufacturing exports, and include the average of the three years before the intervention as explanatory. The synthetic control is applied to the demeaned outcome.

Figure 9: Labor Share for Individual Case Studies and Synthetic Controls Using All Countries in the Donor Pool



(a) CHL-2003-labor share (b) COL-2012-labor share (c) GTM-2006 (d) HND-2006

(e) MEX-1994-labor share (f) NIC-2006 (g) PAN-2001 (h) PER-2009

Notes: Labor share panels of the figure plot the labor share of case studies and their synthetic controls.

are the countries identified in this case (Chile is not part of the donor pool). The price of exports is closely followed for pre- and post-intervention periods, and mineral rents evolve in a similar way in the treated and the synthetic. We find that the labor share evolves similarly, and no substantial effect can be identified in this case study. Panel (b) of Figure 9 shows that the labor share of Colombia increased after TA. During these same periods, prices of export goods were dropping for that country, as well as the mineral rents. When we introduce these as explanatory variables we find that the increase in labor share of the synthetic control is very similar to the one in Colombia.[16] In all, there seems to be no effect of TA on labor share in this country.

For Panama we considered export prices in 1988, 1998 and 2000 as explanatory variables, among others.[17] We find that Panama faces an increase in export prices in the years after TA, but this increase is not as dramatic as in other countries. Its synthetic control, composed of Bolivia, Honduras and Sri Lanka, among others, also evolves similarly in this respect. Panel (g) reports the labor share in Panama that drops 3 pp after trade agreement, while the labor share in its synthetic control stays at about the same level in post-intervention periods.

For Guatemala, with a similar specification, we identify a synthetic control that mimics the evolution in the prices of exports of the treated unit. Panel (g) of Figure 9 reports that the labor share drop after TA is not followed by those in the synthetic control, implying a negative effect of TA.

In both Honduras and Nicaragua the labor share tends to increase slightly. Following a similar

[16]Explanatory variables include export prices in 1998, 2000 and 2011, and mineral rents in 1998 and 2011. These years are chosen to identify the effects of commodity prices changes. Other explanatory variables are the importance of services and agriculture on GDP, and the outcome variable in the three years previous to TA.

[17]Additional explanatory variables were log of GDP per capita PPP, years of schooling and openness, as well as the outcome variable in 1996, 1998 and 2000.

procedure we identify synthetic controls for these countries that match the evolution of export prices in the years close to treatment, and we find that the labor share evolves in a similar way for the treated units and for their counterfactuals.

The case of Mexico requires a particular approach. A deep recession can also change the labor share. This could be a concern for the case of Mexico. That country experienced a deep recession after the end of 1994, while the intervention is introduced at the beginning of 1994. It can be argued that the recession is unrelated to the TA; if it is not captured by the synthetic control and affects the labor share, it could be considered an important confounding factor.

To account for this we introduce a trade surplus in 1993 as explanatory variable. In the years previous to the deep recession there was a substantial current account deficit that was perceived as a driver of the crisis. Introducing this variable identifies other countries exposed to this same risk. When we implement the synthetic control and analyze the evolution of the weighted average of the GDP per capita we find that the evolution is remarkably close to the one for Mexico and shows a fall for the first post-intervention year. While the fall is milder, the first pre-intervention year and the third post-intervention year are almost exactly matched. Panel (e) of Figure 9 shows the evolution of the labor share for Mexico and its synthetic counterpart. The reduction after the TA is of about 6 pp in the two years after the intervention. Then, labor share partially recovers but it is still down 3 pp compared to the pre-intervention periods. The synthetic control shows a very close evolution but with a labor share gap of between 1 to 2 pp during all these periods, suggesting a substantial effect of TA on labor share.

We also find that manufacturing exports over GDP increased from 10% to 20% in Mexico in the second post-intervention year, reaching 30% in year 2017; its synthetic counterpart maintained the level of manufacturing exports. This change could be the mechanism behind the persistent drop in labor share in this country after TA.

Up to now, we have found similar results compared to Section 5.1, showing that our main results are robust to the extension of the donor pool and the inclusion of additional variables, and that they are not only driven by shocks such as changes in commodity prices or business cycle.

6.3 Aggregate Results

We now turn to the results of implementing a single set of explanatory variables for all case studies and placebos while extending the donor pool to all countries. Again, we select the combination of explanatory variables that minimized the RMSPE of post-intervention period among placebos.[18] GDP per capita PPP, years of schooling, real labor income per capita, capital-labor ratio, and export prices in 1988 and 1993, mineral rents in 1993, and trade surplus in 1993 constitute our explanatory variables. We demeaned the outcome variable and included this variable in the three years previous to the intervention in the vector of explanatory variables.

Figure 10 reports the result of implementing equation (4) on treated and placebo units and Table 12 reports the result of estimating equation (5). We find that TA implied a reduction in labor share of about 2 pp two years after the intervention and 4 pp four years after. These results are significantly different in the case studies compared to the placebos only after year three. Column (2) of Table 12 report similar but slightly higher effects when we implement a fixed effect regression. Column (3) shows that when we drop those placebos with poor pre-treatment fit the results are similar.

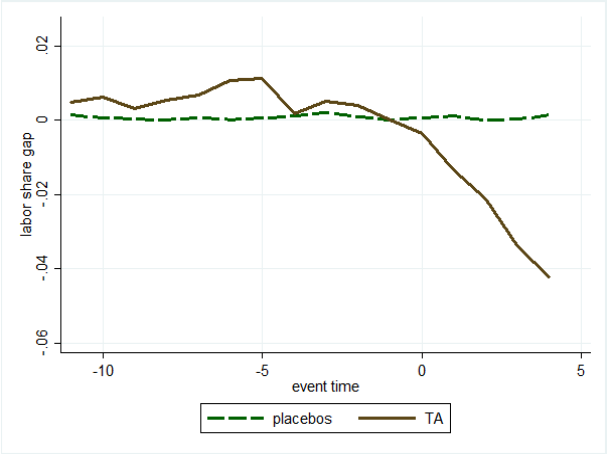
[18] For this model selection we use permutations assuming a placebo treatment in 2006 only.

Table 12: Event Study Estimates of TA Effects on Labor Share Using All Case Studies and All Countries as Donors

	(1)	(2)	(3)	(4)
$T-3$	0.0043	0.0006	0.0033	0.0005
	(0.0048)	(0.0021)	(0.0047)	(0.0020)
$T-2$	0.0034	-0.0003	0.0032	0.0005
	(0.0044)	(0.0026)	(0.0050)	(0.0024)
T	-0.0048	-0.0085	-0.0044	-0.0070
	(0.0078)	(0.0053)	(0.0073)	(0.0047)
$T+1$	-0.0153	-0.0191*	-0.0146	-0.0173*
	(0.0114)	(0.0098)	(0.0126)	(0.0102)
$T+2$	-0.0223	-0.0261**	-0.0214	-0.0241*
	(0.0136)	(0.0124)	(0.0141)	(0.0141)
$T+3$	-0.0355*	-0.0393**	-0.0346*	-0.0373**
	(0.0184)	(0.0164)	(0.0193)	(0.0179)
$T+4$	-0.0446***	-0.0484***	-0.0437***	-0.0464***
	(0.0156)	(0.0143)	(0.0154)	(0.0151)
FE	NO	YES	NO	YES
LOW RMSPE	NO	NO	YES	YES
N	6991	6991	6832	6832

Notes: The table shows the results of estimating event study equations on labor share gaps using case studies and placebos, where all countries of the world are considered in the donor pool, with the exceptions of those that signed a TA previous to $T+4$. Results in columns (3) and (4) restrict to cases with pre-intervention RMSPE lower than twice the highest RMSPE among treated units. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parenthesis.

Figure 10: TA Effects on Labor Share in Event Study Design for All Case Studies and All Countries As Donors



Notes: The figure is the result of implementing event study regressions independently of case studies and placebos (those with RMSPE lower than twice the highest among the treated), where we include all countries in the donor pool, except those that signed a TA with large economies prior to $T + 5$.

6.4 Backdating

As an additional robustness check we implemented a backdating exercise. In this placebo exercise the effects should be close to zero and not significant, given that there is no treatment in those periods. A negative estimate could be identifying an anticipation effect. For this backdating exercise we changed the treatment period for each case study, anticipating it by five years.[19] We maintained the same methods and variables as in the results presented in Table 12. The only exception is that we do not include the variables related to export prices, mineral rents and trade surplus because in this case they refer to post-intervention periods.

We find no significant effect for all post-treatment periods and estimates that are in absolute value always very low. Moreover, we find that after year 5 (thus, in the post-intervention periods) effects tend to be negative and reaches to a fall in 2.5 pp. This backdating robustness exercise is reassuring and shows that there are no anticipation effects and that the particular TA with big economies is being identified.

6.5 Decomposition

Table 13 reports the decomposition of the labor share change but including now all countries in the donor pool. Again, we implement a weighted fixed effects regression, using the weights from the synthetic control method. We find a similar and sharper conclusion from this table: the fall in the labor share is driven by the fall in labor income, while real productivity remains unchanged and there are not significant changes in prices.

[19] Because of few pre-intervention periods, in the case of Mexico we considered a treatment period in 1991 and we considered post-intervention periods only up to 1993. Due to lack of good post-intervention data, we excluded Nicaragua from these robustness results.

Table 13: Decomposition of Labor Share Gaps

	(1)	(2)	(3)	(4)	(5)
	$\ln LS$	$\ln L$	$\ln w_{PPP}$	$\ln RGDP_{NC}$	$\ln\left(\frac{I_{NC}}{PPP}\right)$
$T+4$	-0.1030**	0.0110	-0.1475**	0.0109	-0.0444
	(0.0432)	(0.0216)	(0.0729)	(0.0285)	(0.0526)

Notes: Event study equations with weighted fixed effects by unit, using weights from the SC applied to labor share using all countries in the donor pool. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parenthesis.

6.6 Economic Mechanisms

Finally, we return to analyze possible economic mechanisms by using the weights of the synthetic controls to perform the weighted regression analysis, analogous to Table 9 but now with all countries in the donor pool.

Table 14 reports the results of these regressions. The first column reports the simple weighted regression without additional controls. Column (2) adds mineral rents as a covariate to control for this variable in the analysis of labor share. We find that mineral rents are very relevant for the determination of labor share. The coefficient suggests that an increase in 10 pp of mineral rents on GDP would induce a reduction labor share of about 4.4 pp. The comparison with the estimated effects in column (1) shows that mineral rents capture only part (about 0.7 pp) of the effects of TA. Column (3) provides an analogous control with the index of export prices. In this case, the introduction of this variable does not change the estimated effects, suggesting that synthetic controls have similar exposure to this variable as treated units.

Columns (4) to (7) deal with the change in the sectoral composition of production and employment. We consider these variables as possible outcomes of the TA, and we intend to capture to what extent these variables can explain TA effects on labor share. Column (4) uses the share of industry over GDP. The coefficient associated with this variable identifies that if the share of industry increased 10 pp of the GDP then labor share would drop 2 pp. We find that this variable is a possible channel for the reduction of labor share, but that it does not explain all the effect of TA: the estimated effect is lower by only 0.7 pp compared to those in column (1). Results in columns (5) and (6) provide very similar results. Column (7) shows that using employment share by industry does not change the result.

Table 14: Event Study Estimates of TA Effects on Labor Share Including Covariates Using All Case Studies and All Countries in the Donor Pool

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$T-2$	0.0041	0.0069	0.0044	0.0025	0.0023	0.0027	0.0013
	(0.0047)	(0.0046)	(0.0045)	(0.0051)	(0.0051)	(0.0050)	(0.0049)
T	-0.0037	-0.0012	-0.0029	0.0004	-0.0007	0.0003	-0.0033
	(0.0044)	(0.0054)	(0.0044)	(0.0041)	(0.0048)	(0.0040)	(0.0045)
$T+1$	-0.0134*	-0.0098	-0.0133*	-0.0077	-0.0091	-0.0083	-0.0113
	(0.0075)	(0.0072)	(0.0075)	(0.0074)	(0.0076)	(0.0073)	(0.0074)
$T+2$	-0.0212*	-0.0188*	-0.0212*	-0.0154	-0.0168	-0.0161	-0.0205*
	(0.0114)	(0.0104)	(0.0113)	(0.0107)	(0.0108)	(0.0105)	(0.0114)
$T+3$	-0.0342**	-0.0265**	-0.0339**	-0.0263*	-0.0278*	-0.0270*	-0.0352**
	(0.0167)	(0.0130)	(0.0154)	(0.0149)	(0.0150)	(0.0146)	(0.0166)
$T+4$	-0.0423**	-0.0346**	-0.0431**	-0.0352**	-0.0363**	-0.0360**	-0.0435**
	(0.0185)	(0.0151)	(0.0174)	(0.0166)	(0.0164)	(0.0165)	(0.0181)
mineral rents		-0.4393***					
		(0.1205)					
export pr.			-0.0241				
			(0.0212)				
industry (gdp)				-0.2009**	-0.1607	-0.1970**	
				(0.0795)	(0.1187)	(0.0762)	
services (gdp)					0.0006		
					(0.0012)		
gvmt. (gdp)						0.0601	
						(0.0589)	
industry (emp)							-0.4312**
							(0.1886)
services (emp)							0.1254
							(0.1858)
N	1981	1976	1967	1958	1942	1958	1925

Notes: Event study equations with weighted fixed effects by unit, using weights from the SC applied to labor share using all countries in the donor pool. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Robust standard errors in parentheses.

7 Conclusions

The long-term positive effect of trade on growth and development has been widely emphasized in the literature. It is also well understood that changes in trade policies can have important reallocation effects. Different sectors can be positively or negatively affected, and production factors require time to be reallocated into winning firms or industries. In the labor market reallocation can take time and induce large costs. These costs could be different according to skills and to the type of contract of the workers. In this sense, it is possible that a policy that is welfare-improving in the long run could have strong negative effects for some agents in the transition, or even face strong opposition from the public.

In this paper we analyzed the impact of trade agreements on labor share in LAC through a synthetic control methodology. For our individual case studies we found that TA reduced labor share in Chile, Guatemala, Mexico, and Panama. When aggregating all case studies we found a negative impact of TA on the labor share of between 2 and 4 percentage points. This result is robust to different specifications, different definitions of the labor share variable and different countries making up the synthetic control group. We also studied the channels through which TA may have impacted labor share and found that manufacturing exports and industry production increased. This composition effect explains only part of the fall in labor share. The stagnation of real labor income is by far the most important driver.

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Appendix

A Data

The data for this paper come from public sources. We mostly use information available for all countries with the same methodology, such as those from the Penn World Tables, The World Bank, or WTO. We complement these sources with information from national statistics (official information of each country) when needed. In what follows we will describe the variables in these datasets and their measurement of labor share.

A.1 Labor Share Measurement

A.1.1 Penn World Table

This database is used in many studies concerning labor share (see, for example, IMF 2017) and the labor share variable was constructed taking into consideration the concerns expressed in Gollin (2002) regarding the measurement of labor income of self-employed individuals. Here, labor income for the self-employed is imputed using alternative approaches (Feenstra, Inklaar, and Timmer 2015).

A first method takes into account the fact that in poorer countries self-employed workers mainly work in agriculture. Moreover, in these economies the agricultural sector uses very few fixed assets, and as a result, labor share in this sector accounts for more than 90% of its value added on average. This database adds all of value added in agriculture to labor compensation of employees in adjusted labor income. This adjustment has some problems, as it can overestimate the labor income in the agriculture sector (double-counting the labor income of employees and not taking into consideration capital and land income). On the other hand, it does not consider the labor income of the self-employed in other sectors.

A second approach to impute labor income for self-employed workers (based on one of the proposals by Gollin) is based on mixed income (where these data are available -only 60 of the 127 countries in the database), and assumes that self-employed workers use capital and work in the same proportion as the rest of the economy.

The other two approaches are as follows. In countries where data on mixed income are available it is also possible to assume that all income from the self-employed can be allocated to labor (this adjustment is also performed by Gollin (2002)). The last adjustment considered is what has been called a *naíve adjustment*, which simply assumes that the self-employed earn the same average wage as employees.

The method applied to each country varies according to its characteristics and data availability. In most Latin American countries the imputed labor income using a part of mixed income is the preferred option (for example in Argentina, Brazil, Chile, Paraguay, Peru, and Uruguay, among others). In Bolivia, the first method (based on the value added of agriculture) is still used.

This database includes data for most Latin American countries (with the exception of El Salvador and various islands of the Caribbean) from 1950 to 2017.

A.1.2 Karabarbounis and Neiman

The database constructed in "The Global Decline of the Labor Share" (2013) will also be analyzed. Their variable Total Labor Share is constructed dividing the compensation of employees by the GDP (Karabarbounis and Neiman 2014).

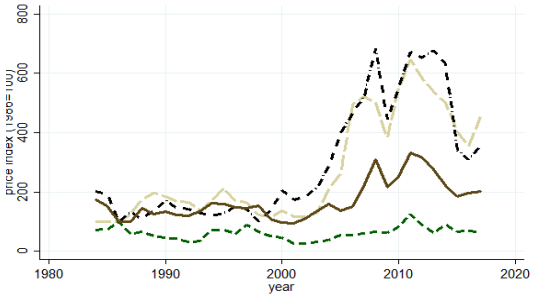
A.1.3 Labor Share Combining Sources

For our paper, we also use PWT labor share as defined above. Nevertheless, for several periods, the variable is not observed but interpolated or kept constant. In such a case, we also considered using the Karabarbounis and Neiman (KN) total labor share variable to replace these observations. For that purpose, we exploit the periods in which both series are observed, and we shift the KN variable by adding a constant value to chain both series.

A.2 Commodity Prices and Terms of Trade

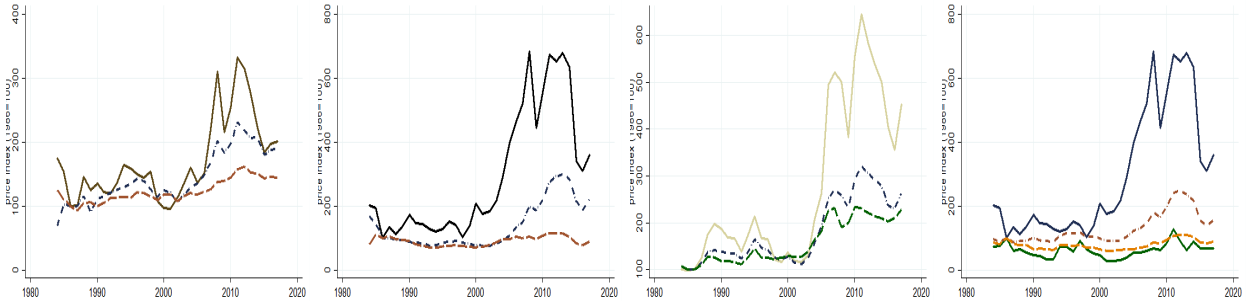
We use annual average of commodity prices of oil, copper, coffee, and soybean (we do not focus on other commodities because they are highly correlated with these prices; the correlation of corn and soybean prices, for example, is .95.). Figure A.1 shows the time series of the index of commodity prices of these selected goods. The cycle of high commodity prices, at least in the period 2005 to 2015, is apparent in the figure. During these years, the price of these commodities has increased sharply; the exception has been coffee. Correlation between these prices are above .8 for oil, copper, and soybean; correlation with coffee prices is higher than .4.

Figure A.1: Commodity Prices



Notes: price indexes of selected commodities.

Figure A.2: Commodity Prices and Trade Prices



(a) Argentina (b) Bolivia (c) Chile (d) Colombia

Notes: price indexes of selected commodities, of export implicit price and of terms of trade.

Panel (a) of figure A.2 shows the time series of soybean price and two price indexes: the price of exports and terms of trade. The correlation for this country is clear. Particularly related is the export prices from near 2000 up to 2017. A similar relationship can be observed in the case of

Bolivia (panel (b)) and Chile (panel (b)). A less clear relationship arises in Colombia, panel (d), where two prices seem relevant: oil and coffee.

Commodity prices and terms of trade are relevant for the determination of labor share. A fixed effect regression including all countries establish that a rise in export prices of 10% leads to a reduction in labor share of 1% (or about half a percentage point). Given the observed increments in export prices in LAC, the effect on labor share is substantial. Importantly, all countries in the region increased their export prices during the commodity supercycle period.

A.3 Other Variables

Other variables that are considered in the analysis can be found in the following databases:

PWT: besides data about labor share and its components, we used variables such as: total factor productivity, log of real GDP per capita, capital-output ratio, capital-labor ratio, years of schooling, log of total population, government consumption to GDP, relative price of exports, relative price of investment, and gross capital formation (investment).

WDI: from the World Development Indicators of the World Bank we used exports, imports, openness, log of GDP per capita PPP, mineral rents, industry VA to GDP, services VA to GDP, agriculture VA to GDP, share of employment in services, share of employment in agriculture, manufacturing exports (% of GDP), and price of exports.

SEDLAC/LABLAC: self-employment, and wages. Other variables, such as minimum wage, informality, and wages, were collected from other sources for LAC.

B Model and Model Selection

We considered combinations of the following explanatory variables to evaluate synthetic control performance:

- openness, exports, imports,
- total factor productivity, log of GDP per capita PPP, log of real GDP per capita, capital-output ratio, capital-labor ratio,
- years of schooling, log of total population,
- mineral rents, industry VA to GDP, services VA to GDP, agriculture VA to GDP, government consumption to GDP, share of employment in services, share of employment in agriculture,
- manufacturing exports (% of GDP),
- relative price of exports in terms of imports (terms of trade)
- relative price of exports of several years
- mineral rents in several years

The selected models include the following:
For individual case studies including LAC in donors (Figure 7):

- Chile: openness, log of real GDP per capita, capital-output ratio
- Colombia: openness, log of real GDP per capita, capital-output ratio
- Mexico: openness, log of real GDP per capita, capital-output ratio
- Peru: exports, imports, log of GDP per capita PPP, years of schooling
- Guatemala: openness, log of GDP per capita PPP, capital-output ratio, years of schooling, log of total population
- Honduras: log of GDP per capita PPP, capital-output ratio, years of schooling, industry VA to GDP
- Panama: log of GDP per capita PPP, capital-output ratio, years of schooling, industry VA to GDP, log of total population
- Nicaragua: exports, log of GDP per capita PPP, capital-output ratio, years of schooling, industry VA to GDP

For aggregate results including LAC in the donor pool (Figure 8 and Tables 5, 6 and others): log of GDP per capita PPP, capital-output ratio, years of schooling, TFP
For individual case studies using all countries in the donor pool (Figure 9):

- Chile: terms of trade (1998, 2000), mineral rents (1990, 2002), openness, log of GDP per capita PPP, industry VA to GDP, capital-labor ratio.
- Colombia: terms of trade (1998, 2000, 2011), mineral rents (1998, 2008,2011), services and agriculture VA to GDP

- Guatemala: terms of trade (1988, 1998, 2000), openness, log of GDP per capita PPP, years of schooling
- Mexico: trade surplus (1993, 1994) openness, capital-output ratio, years of schooling, capital-labor ratio.
- Peru: terms of trade (1998, 2000), mineral rents (1990, 2002,2008), openness, log of GDP per capita PPP, years of schooling, industry VA to GDP, capital-labor ratio.
- Honduras: terms of trade (1988, 1998, 2000), openness, log of GDP per capita PPP, years of schooling
- Nicaragua: terms of trade (1988, 1998, 2000), exports, imports, log of GDP per capita PPP, capital-output ratio, years of schooling, industry VA to GDP
- Panama: terms of trade (1988, 1998, 2000), log of GDP per capita PPP, capital-output ratio

For aggregate results using all countries in the donor pool (Table 12): log of GDP per capita PPP, capital-labor ratio, years of schooling, terms of trade in 1988, 1993, and mineral rents in 1993, trade surplus in 1993.

Other tables: Table C.1: log of GDP per capita PPP, capital-output ratio, years of schooling, TFP

C Tables and Figures

Table C.1: Pre- and Post-Intervention Labor Share Gap Averages Using LAC As Donors

	(1) TA	(2) Placebos	(3) TA	(4) Placebos
$T-3$	0.0018	-0.0033	0.0000	-0.0015
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
$T-2$	-0.0000	-0.0023	-0.0018	-0.0016
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
T	0.0009	0.0002	0.0027	0.0000
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
$T+1$	-0.0119	0.0017	-0.0142	0.0009
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
$T+2$	-0.0191*	0.0004	-0.0208*	-0.0010
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
$T+3$	-0.0295***	0.0019	-0.0339***	-0.0002
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
$T+4$	-0.0318***	-0.0003	-0.0395***	-0.0022
	(0.0103)	(0.0073)	(0.0105)	(0.0060)
N	127	1081	95	954
LOW RMSPE	NO	NO	YES	YES

Notes: The table shows the results of regressing labor share gaps on fixed effects by event time (years to Trade Agreement). Results in columns (1) and (3) restrict the sample to treated units; columns (2) and (4) restrict the sample to placebo cases. Results in columns (3) and (4) discard case studies with pre-intervention RMSPE higher than a threshold (the 75 percentile of RMSPE among treated units for column (3) and twice this threshold for column (4)). Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parentheses.

Table C.2: Pre- and Post-Intervention Labor Share Gap Averages Using All Case Studies and All Countries As Donors

	(1) TA	(2) Placebos	(3) TA	(4) Placebos
$T-3$	0.0052	0.0010	0.0049	0.0020*
	(0.0050)	(0.0013)	(0.0055)	(0.0011)
$T-2$	0.0041	0.0007	0.0053	0.0009
	(0.0048)	(0.0013)	(0.0059)	(0.0010)
T	-0.0037	0.0011	-0.0032	0.0006
	(0.0074)	(0.0016)	(0.0081)	(0.0013)
$T+1$	-0.0134	0.0019	-0.0145	0.0012
	(0.0125)	(0.0019)	(0.0123)	(0.0016)
$T+2$	-0.0212	0.0011	-0.0209	0.0001
	(0.0143)	(0.0020)	(0.0167)	(0.0017)
$T+3$	-0.0342*	0.0013	-0.0365*	0.0005
	(0.0184)	(0.0023)	(0.0197)	(0.0022)
$T+4$	-0.0423***	0.0023	-0.0472***	0.0016
	(0.0136)	(0.0026)	(0.0162)	(0.0023)
N	127	1081	95	954
LOW RMSPE	NO	NO	YES	YES

Notes: The table shows the results of regressing labor share gaps on fixed effects by event time (years to Trade Agreement). Results in columns (1) and (3) restrict the sample to treated units; columns (2) and (4) restrict the sample to placebo cases. Results in columns (3) and (4) discard case studies with pre-intervention RMSPE higher than a threshold (the 75 percentile of RMSPE among treated units for column (3) and twice this threshold for column (4)). Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. Bootstrapped standard errors in parentheses.

Table C.3: Unit Weights for Synthetic Controls, Individual Case Studies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	CHL	COL	GTM	MEX	PER	HND	NIC	PAN
1	0.00			0.73		0.00	0.79	
3								
4								
5								
6								
8								
12	0.31	0.00	0.00	0.00	0.53	0.00	0.00	0.00
13	0.03	0.15	0.34	0.00	0.36	0.28	0.11	0.88
14	0.25	0.57	0.66	0.18	0.12	0.65	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.07	0.10	0.00
16	0.41	0.00	0.00	0.08	0.00	0.00	0.00	0.00
17	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.12
RMSPE	0.0071	0.0122	0.0162	0.0026	0.0320	0.0157	0.0095	0.0178

Notes: The table complements Figure 7 and Table 4 and reports the weights to construct the synthetic controls for each case study. The last line reports the pre-intervention RMSPE. Country codes: 1: COL; 3: CRI; 4: DOM; 5: GTM; 6: HND; 8: NIC; 12: ARG; 13: BOL; 14: BRA; 15: ECU; 16: PRY; 17: URY

Table C.4: Unit Weights for Synthetic Controls and Balance, for Aggregate Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	CHL	COL	GTM	MEX	PER	HND	NIC	PAN
1	0.00			0.00		0.60	0.62	0.00
3								0.08
4								0.00
5								0.62
6								0.00
8								0.00
12	0.29	0.00	0.35	0.21	0.22	0.00	0.00	0.02
13	0.00	0.21	0.05	0.00	0.54	0.20	0.22	0.00
14	0.28	0.61	0.39	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.25	0.00	0.17	0.00
16	0.28	0.00	0.22	0.00	0.00	0.20	0.00	0.00
17	0.16	0.18	0.00	0.79	0.00	0.00	0.00	0.28
RMSPE	0.0070	0.0126	0.0068	0.0000	0.0265	0.0141	0.0113	0.0024
Predictor balance								
Variable	Treat|Synth	Treat|Synth	Treat|Synth	Treat|Synth	Treat|Synth	Treat|Synth	Treat|Synth	Treat|Synth
log of real GDP pc	9.40 | 9.29	9.10 | 9.18	8.65 | 9.28	9.54 | 9.29	8.78 | 8.77	8.09 | 8.89	8.0 | 8.8	9.14 | 8.88
capital-output ratio	2.52 | 3.90	3.51 | 3.94	3.01 | 3.73	3.38 | 4.31	2.76 | 3.1	3.33 | 3.37	4.44 | 3.66	2.4 | 3.38
years of schooling	8.64 | 6.37	6.02 | 6.21	3.29 | 6.38	6.20 | 7.18	7.51 | 7.40	4.62 | 5.99	4.52 | 6.2	7.39 | 4.71
tfp	.623 | .630	.578 | .578	.800 | .610	.852 | .661	.448 | .49	.545 | .545	.540 | .533	.87 | .782
labor share (demeaned, 3 years)	.009 | .009	.017 | -.00	-.01 | -.01	0.00 | 0.00	-.02 | -.00	.014 | -.00	.000 | .006	.008 | .007

Notes: The table complements Tables 5 and 6. The table reports the weights to construct the synthetic controls for each case study. It also reports the pre-intervention RMSPE. The bottom panel reports the balance of explanatory variables comparing case study and the synthetic control.

Table C.5: Unit Weights for Synthetic Controls, All Countries

	(1)	(2)	(3)	(4)	(5)	(6)
Country	CHL	COL	GTM	MEX	PER	HND
PER	0.000	0.000	0.000	0.000	0.000	0.038
ARG	0.000	0.080	0.000	0.000	0.000	0.000
BOL	0.000	0.020	0.000	0.000	0.000	0.000
BRA	0.000	0.003	0.000	0.000	0.000	0.000
ECU	0.000	0.005	0.000	0.000	0.257	0.000
PRY	0.000	0.089	0.000	0.000	0.000	0.000
URY	0.000	0.008	0.000	0.000	0.000	0.000
VEN	0.000	0.049	0.000	0.000	0.276	0.000
BEN	0.000	0.009	0.000	0.000	0.000	0.000
BFA	0.000	0.002	0.163	0.000	0.000	0.000
BWA	0.000	0.003	0.000	0.000	0.000	0.000
CMR	0.000	0.002	0.000	0.000	0.000	0.000
GAB	0.110	0.186	0.000	0.000	0.000	0.000
KEN	0.000	0.020	0.000	0.000	0.000	0.000
MOZ	0.000	0.003	0.000	0.000	0.000	0.000
MRT	0.000	0.000	0.000	0.000	0.319	0.000
MUS	0.000	0.007	0.000	0.000	0.000	0.000
NGA	0.000	0.008	0.252	0.000	0.000	0.250
RWA	0.000	0.002	0.000	0.000	0.000	0.202
SEN	0.000	0.002	0.000	0.000	0.000	0.000
SLE	0.046	0.004	0.000	0.000	0.000	0.000
SWZ	0.000	0.052	0.002	0.000	0.000	0.061
TGO	0.000	0.003	0.000	0.000	0.000	0.069
ZAF	0.000	0.002	0.000	0.000	0.000	0.000
ZWE	0.152	0.000	0.000	0.000	0.000	0.000
EGY	0.000	0.006	0.000	0.293	0.000	0.000
MAR	0.000	0.006	0.000	0.000	0.000	0.000
SDN	0.000	0.093	0.000	0.000	0.000	0.000
TUN	0.000	0.003	0.000	0.000	0.000	0.000
AUS	0.000	0.001	0.000	0.000	0.000	0.000
AUT	0.000	0.002	0.000	0.000	0.000	0.000
Algeria	0.000	0.001	0.000	0.000	0.000	0.000
BGD	0.351	0.003	0.000	0.295	0.000	0.092
BTN	0.000	0.002	0.000	0.000	0.000	0.000
CZE	0.000	0.002	0.000	0.000	0.000	0.000
DEU	0.000	0.002	0.000	0.000	0.000	0.000
FJI	0.000	0.002	0.000	0.000	0.000	0.000
FSM	0.000	0.002	0.000	0.000	0.000	0.000
GIB	0.000	0.001	0.000	0.000	0.000	0.000
IMN	0.000	0.002	0.000	0.000	0.000	0.000
IRL	0.000	0.003	0.173	0.047	0.000	0.000
IRQ	0.000	0.002	0.000	0.000	0.000	0.000
ISL	0.000	0.002	0.000	0.000	0.000	0.000
ISR	0.000	0.001	0.000	0.000	0.000	0.000
JAP	0.000	0.245	0.251	0.000	0.058	0.189
JOR	0.000	0.002	0.000	0.000	0.000	0.000
KIR	0.000	0.003	0.000	0.000	0.000	0.000
LIE	0.000	0.002	0.000	0.032	0.000	0.098
LTU	0.000	0.001	0.000	0.000	0.000	0.000
LVA	0.000	0.011	0.000	0.039	0.000	0.000
MNP	0.000	0.003	0.000	0.000	0.000	0.000
NCL	0.000	0.002	0.000	0.000	0.000	0.000
NLD	0.066	0.002	0.000	0.000	0.000	0.000
NRU	0.275	0.006	0.000	0.000	0.000	0.000
PAK	0.000	0.002	0.000	0.000	0.090	0.000
PRK	0.000	0.002	0.159	0.000	0.000	0.000
SAU	0.000	0.002	0.000	0.000	0.000	0.000
SVN	0.000	0.002	0.000	0.000	0.000	0.000

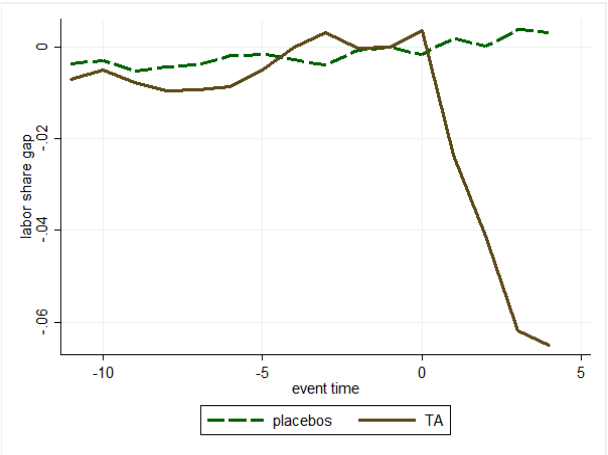
Notes: The table provides weights for every case study.

Table C.6: Description of Trade Agreements, Case Studies

	EU - Colombia	US - Colombia	EC-Chile	US-Chile	China-Chile	EU-Central Am.	US-Central Am.	EC-Mexico	US-Mexico	US - Panama	EU - Peru	US-Peru	China-Peru
Tariffs industrial	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
Tariffs agricultural	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
Customs Administration	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
Sanitary and PS measures	LE, DSA	LE	LE, DSA	LE	Not cov.	LE	LE	LE	LE, DSA	LE	LE, DSA	LE	LE, DSA
Technical Barriers measures	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
Anti-dumping	LE	Not cov.	LE, DSA	LE, DSA	LE, DSA	LE	LE, DSA	LE	LE, DSA	LE	LE	LE, DSA	LE, DSA
TRIMS measures	Not cov.	LE, DSA	Not cov.	LE, DSA	Not LE	Not cov.	LE, DSA	Not cov.	LE, DSA	LE, DSA	Not cov.	LE, DSA	LE, DSA
GATS (services)	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not cov.	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
TRIPS (harmonization)	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA
Competition policy	LE	LE	LE	LE	Not cov.	LE	Not cov.	LE, DSA	LE	Not cov.	LE	LE	Not LE
Intellectual property rights	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE	LE, DSA	LE, DSA	LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not cov.
Investment measures	Not LE	LE, DSA	LE, DSA	LE, DSA	LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not LE	LE, DSA	Not cov.
Movement of capital	LE, DSA	LE, DSA	LE, DSA	LE, DSA	Not cov.	Not LE	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA	LE, DSA

Notes: The table presents the case studies characteristics, according to the classification in Hofmann et al. (2017). Selected provisions. Not cov.: provision not covered by the TA; Not LE: covered but imprecise or not legally enforceable language; LE: Legally enforceable language, dispute settlement not available; LE,DSA: Legally enforceable language, dispute settlement available. Central American TAs include Guatemala, Honduras, and Nicaragua.

Figure C.3: Event Study Results for Log of Labor Share



Notes: The figure is the result of implementing event study regressions independently to case studies and placebos where we include LAC in the donor pool.

D Trade agreements in Latin America

D.1 Chile-China

The free trade agreement between Chile and China was signed in November 2005. The agreement entered into force in October 2006. Its intention was not only to eliminate tariffs for 97% of products in a 10-year period, but also to strengthen cooperation in other areas such as environmental protection, education and science.

During its first phase the agreement focused on goods. The FTA provided immediate duty-free entry for 92 percent of Chile's exports to China. In particular, this included not only copper but also the most important agro exports such as apples, grapes, plums, chicken products, cheese, and cherries. As for Chile's imports, 50% of the products imported from China immediately obtained duty-free access. However, some products such as wheat, flour, sugar and some textiles were not included in the agreement.

Moreover, in April 2008 both countries signed the Supplementary Agreement on Service Trade, which was implemented in 2010. According to the agreement, 23 sectors of the Chinese economy, including services in sectors such as management and consulting, real estate, mining, environment, sports and air transport, and 37 sectors from Chile's economy, including construction and architecture, engineering, computer, R&D, real estate, advertisement, management and consulting, mining, manufacturing, leasing, distribution, education, environment, tourism, sports and air transport, opened up to each other under WTO commitments. This commitment gives services from the other party the same conditions as those given to national services.

In September 2012, both countries signed the Supplementary Agreement on Investment, which entered into force in 2014. With this agreement, the investments in the territory of the other party became protected according to each country's law.

In 2015, both parties agreed to sign the Memorandum of Understanding for Upgrading the FTA. By that time, China was already Chile's largest trade partner, as Chile became China's third-largest trade partner in Latin America. The negotiations for upgrading the FTA concluded in November 2017.

The new Agreement covers areas such as trade in goods, trade in services, economic and technological cooperation, e-commerce, environment, competition and government procurement. It finally came into force in March 2019.

Some of the sectors that experienced changes are the wood sector, in which China plans to gradually cancel some tariffs within three years, while Chile immediately abolished tariffs on textiles, clothing, home appliances and sugar products. As a result, the percentage of products with zero tariff from both sides has reached 98%. This also enhanced the agreement on services: Chile committed to opening up more than 40 sectors such as transportation and construction, while China will give preferential treatment to 20 others including commercial legal services, entertainment services and distribution.

D.2 Chile-European Union

Commercial cooperation between the EU and Chile began in 1990 when both parties signed the first cooperation agreement. From then on, both parties engaged in further cooperation, in 1996 signing a new agreement that entered into force in 1999 and set the basis for more collaboration in different sectors: environmental, political, free trade, among others.

Between 1999 and 2002 both countries focused on developing several technical reports in order to prepare for future negotiations. Finally, in November 2002 the Association Agreement was signed

between the EU and its member states and Chile. The agreement entered into force in February 2003.

The agreement not only included commercial aspects (regarding trade of goods and services) but also the establishment of investments, regulatory matters, intellectual property, commercial defense, and animal welfare, among other areas.

Since 2003, trade between both parties has doubled its volume. Reaching 19,771 million dollars in 2018, the EU had become Chile's third most important commercial partner (with 15% of its trade). By 2013, 10 years after the agreement began, tariff relief had been completed.

Chilean exports to the EU are diversified and include sectors such as fruit, wine and cellulose. Fish exports have additionally experienced growth, in particular in salmon, trout, and seafood. However, the relative weight of copper and other mineral products remains important. As for the destination of these exports, nine EU countries represent 92% of Chile's trade with the EU. Italy, Spain and France are the most relevant. Moreover, between 2004 and 2012, the demand from the EU for Chilean services grew 94%.

As for the EU's exports to Chile, they are mainly from the industrial sector. They particularly include durable goods such as cars and capital goods. Although agricultural imports have also grown, they do not have a relevant impact on national production.

The agreement does not include a chapter on investment. This is because at the time there already existed promotion agreements between several EU countries and Chile. Nonetheless, European countries remain the first source of foreign investment in Chile (Furche and Contreras 2014). Foreign investment from the EU is particularly relevant in the service sector as well as in mining.

Furche and Contreras (2014) also emphasize the important role of this agreement in terms of regulations of agriculture and the food industry. This is particularly relevant for traceability, safety, and animal and plant health. This has not only eased access to European markets but has also helped to establish Chile as a reliable provider in global markets.

The agreement was additionally important for the wine sector. The inclusion of certain rules regarding tagging and production methods resulted in improvements in the industry and a better positioning in foreign markets.

In November 2017, the parties agreed to upgrade the agreement. To date, three rounds of negotiations have concluded.

D.3 Chile-United States

The free trade agreement between Chile and the United States of America was signed in June 2003 and entered into force in January 2004. Since then, 7,675 products (representing 97.1% of Chile's exports to the United States) from Chile enjoy full relief and, since 2015, all bilateral trade has been free of tariffs. Sensitive sectors, such as agriculture, were given 12 years to adapt to the new competitive pressure whereas others, like industry, were liberalized in two years. As a consequence of the FTA, Chile's luxury tax (which discriminated against U.S. cars) has been phased out.[20]

In addition to the elimination of tariffs, the FTA provides other benefits for Chilean exports, such as a quick treatment in customs, fewer transaction costs, and less uncertainty. As a result, Chilean exports became more attractive in comparison to products from other countries.

Service trade has also benefited from the agreement. It gives enterprises from the other part national treatment to provide services. The FTA includes transparency rules to ensure that service regulators operate fairly. This is particularly relevant for sectors such as banks, insurance companies, telecommunications companies, securities firms, and express delivery companies, among others. By 2012, the stock of U.S. foreign direct investment in Chile grew by 400% since the agreement had

[20] subrei.gob.cl, retrieved September 2020.

entered into force. The agreement also provides Chilean enterprises the possibility of selling to federal or state governments in the United States.

The FTA also includes chapters regarding environmental, labor issues and capital flows. This last issue became particularly controversial, as it defied Chile's Central Bank regulations in terms of minimum reserves.

As a result, in 2016 Chile's exports to the US were 68% higher than before the FTA. In 2017, trade between both countries was more than twice that of 2004.

In 2018, exports from Chile to the United States experienced a new record. This was partly explained by manufacturing exports (that had an annual growth of 11% and represented 49% of total exports). Salmon and other processed foods represented an important part of these exports. This sector was followed by mining exports, especially copper.

On the other hand, top U.S. exports to Chile are mineral fuel, machinery, vehicles, electrical machinery, and aircraft. In 2018, these imports were 23% more than the year before.

D.4 Central America-European Union

The association agreement between the European Union and countries from Central America was signed in June 2012 and approved by the European Parliament in December 2012. The FTA entered into force between the EU, Honduras, Panama and Nicaragua in August 2013. As for the other countries involved, it entered into force in October for Costa Rica and El Salvador and in December for Guatemala.

The agreement's first chapter deals with tariff relief. For Central American countries it is important to determine if the products are harmonized or not. In the first case, when all countries originally applied the same tariff, the relief applies as usual. In the second situation, the reduction starts first for the country that applies the highest tariff, and the other countries start their reduction once the first country has reached its level.

Central American countries gave immediate tax relief to 47.9% of imports from the EU. Another 7.4% will receive relief in a 5 to 7 year period, while 36.3% of products will have zero tariff 10 years after the agreement first entered into force.

As for the EU, the tax relief was immediate for 91.7% of the tariff universe, and an additional 3.7% will receive zero taxation between years 3 and 7. Other exports will not receive any tax relief.

The FTA also promotes foreign direct investment in Central American countries and promotes the regions as an attractive one for European investment.

In 2011, the most important exports from Central American countries to the EU were green coffee, pineapple, shrimp, prawns, banana, ethyl alcohol, tuna, syringes, needles, catheters, cannulas and computer parts and accessories.

As for their imports, they were diverse and included medicines; light oils; automobiles; urea; ammonium sulphate; food preparations; reagents; knitwear; parts of integrated circuits; and whiskey, among others.

According to EUROSTAT data, the trade flow between the EU and Central America was around EUR 12 billion in 2019, and it represented around 0.3% of European trade. However, according to CEPAL (2018) exports to the EU represent around 12% of Central American exports (behind Latin American countries and the United States). Zabalo Arena et al. (2019) point out that there is not clear growth in Central American exports to the EU after the agreement.

The principal destination of European exports in 2018 was Panama (42%), followed by Costa Rica (17%) and Guatemala (16%), according to Eurostat.

In terms of foreign direct investment, CEPAL (2018) also points out that European countries are not the principal source of capital in Central America. Furthermore, FDI tends to go to Panama

and Costa Rica, leaving other countries behind.

D.5 Central America-United States-Dominican Republic

The Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR FTA) was signed in May 2004 and entered into force for the United States, El Salvador, Guatemala, Honduras, and Nicaragua in 2006, for the Dominican Republic in 2007, and for Costa Rica in 2009.

Central American countries had been after an agreement with the United States for several years, as the latter represents one of their most important trade partners. According to Pacheco and Valerio (2007), more than half of the region's exports go to the United States. In terms of absolute trade, Costa Rica represents the most important exporter to the United States. However, exports to the United States are relatively more important for El Salvador and Honduras.

The United States is also the biggest investor in Central America. By the time the agreement entered into force, 67.5% of foreign direct investment in Costa Rica was made by American companies (they also represented 32.6% in El Salvador and 60.1% in Honduras).

The FTA includes four chapters. The third chapter analyzes the legal reforms that Central American countries and Dominican Republic should go through (or had already gone through) in order to prepare for the entry into force of the agreement.

As a result of the FTA, 100 percent of U.S. consumer and industrial goods exports to the CAFTA-DR countries are no longer subject to tariffs. Duties on more than half of U.S. agricultural exports were eliminated upon the agreement's entry into force, and tariffs on nearly all the rest of U.S. agricultural products were to be phased out by 2020.

Products excluded from the tariff relief are sugar for the United States, potatoes and onions for Costa Rica, and white corn for El Salvador, Guatemala, Honduras and Nicaragua.

Under the agreement, the parties are significantly liberalizing trade in goods and services. The FTA also includes important issues relating to customs administration and trade facilitation, technical barriers to trade, government procurement, investment, telecommunications, e-commerce, intellectual property rights, transparency, and labor and environmental protection.

For investment, the FTA establishes national treatment for investors from the other parties. It also includes rules on expropriation and compensation if expropriation were to happen.

D.6 Costa Rica-China

Costa Rica is China's second-largest trading partner in Central America, while China is the second-largest trading partner of Costa Rica.[21] The FTA between China and Costa Rica was signed in April 2010 and entered into force in August 2011. It includes chapters regarding tariffs, sanitary measures, obstacles to trade, commercial defense, investment, intellectual property, among others.

Tariff relief was achieved in different phases. Both parties agreed to eliminate taxes immediately for most products (which represented around 60% of total bilateral trade), and in five, 10 or 15 years for others (an additional 30% of products), and some products are excluded from the FTA.

China's main exports that benefit from the FTA include textiles, machines, electric appliances, vegetables, fruits, automobiles, chemical products, raw fur and leather. At the same time, products of coffee, beef, pork, fruit juices and jam from Costa Rica are also able to enter the Chinese market at lower prices thanks to the tariff cuts. Moreover, both countries agreed to phase out subsidies to agriculture in bilateral trade.

[21] Ministerio de Comercio Exterior de Costa Rica. "Tratado de libre comercio Costa Rica - China". http://www.comex.go.cr/media/2676/doc_explicativo_china.pdf, retrieved September 2020.

In addition to tariff-free entry for products, the two countries have agreed to open service sectors to each other for bilateral free trades and mutual investments. Costa Rica will allow free service trades in 45 sectors including telecommunications, business services, construction, real estate, distribution, education, environment services, information technology services and tourism, while China will open seven sectors, including IT services, real estate, market research, translation and sports.

According to China's Ministry of Commerce, six years after the agreement entered into force 24,945 certificates of origin were granted. This gave Costa Rican exports customs exemptions for about 33 million dollars in Shenzen alone. Additionally, 3,767 certificates were signed in Xiamen, totaling 122 million dollars in exports.

At the moment, China is Costa Rica's second largest trade partner. China's principal exports to Costa Rica include appliances and electrical products, transportation equipment, cotton textiles and plastics. China's imports include electrical products and household appliances, electrical technology, integrated circuits and micro-electrical devices, computer and telecommunications technology, and electrical spare parts, among others.

Chinese foreign investment in Costa Rica has also grown. While the United States is the major source country for FDI in Costa Rica, China has recently emerged as a new investment partner. According to OECD (2012) for the period 2007-2009 China accounted for 30-40% of total FDI in Costa Rica in terms of capital expenditure. However, Chinese FDI in Costa Rica seems to have a limited effect on employment generation: China accounts for only about 1-2% of total FDI-related job creation in 2007 and 2009.

D.7 Colombia-United States

The United States-Colombia Trade Promotion Agreement (TPA) entered into force on May 15, 2012, eight years after the beginning of negotiations. The TPA includes not only commitments in terms of trade of goods and services but also in investment, cooperation flows and the protection of intellectual property and biodiversity.

The United States is Colombia's leading trading partner. In 2005, one year after the beginning of negotiations, 39% of Colombia's exports went to the United States, and 29% of Colombia's imports were supplied by the United States. Other significant trade partners such as Venezuela, Germany, Mexico or Brazil do not account for more than 10% of exports each. The United States is also the most important country for Colombia in terms of FDI.

Colombia's exports to the United States are dominated by crude oil, coal, other petroleum oils, precious and semi-precious stones, coffee, tea, and flowers and plants. As for the imports, they include chemicals, plastics, electrical equipment, excavating machinery, telecommunications equipment, computers and computer accessories, industrial engines, and drilling equipment.

During the first three years of entry into force, sectors such as medicines, automobiles, construction materials, foods and sugar have experienced the most benefits from the TPA in terms of lower tariff and non-tariff barriers. During those years, 434 new products were exported to the United States for the first time, and 1,908 companies became exporters to the US in sectors other than mining.

As for FDI, in the five years that followed the TPA's entry into force, 137 projects were undertaken thanks to U.S. investment. Of these projects, 112 were new (the rest being expansions of existing projects). Most of those projects were not focused on mining, instead including software and professional services, IT, industrial machinery, finance, and telecommunications, among other sectors. As for their location, more than half the projects were in BogotÃ¡. Moreover, during those years, 36 new hotels financed by U.S. capital opened in Colombia.

The agreement eliminated duties on 80% of U.S. exports of consumer and industrial products to Colombia. An additional 7% of U.S. exports received duty-free treatment within five years of implementation. Remaining tariffs would be eliminated 10 years after implementation.

In sensitive sectors sectors (mainly agriculture) long periods for tariff phase-out were established. For instance, rice had an initial quota of 79,000 tons/per year with a 5% increased per year. Rice imports above that amount were subject to an 80% tariff. This tariff will be phased out in a 19-year period (after a six-year grace period).

The TPA also gives benefits to services: professionals such as architects and engineers can receive temporary licences to work in various American States. Similar agreements are expected for health professionals.

D.8 Mexico-European Union

The first free trade agreement between Mexico and the European Union was signed in 1997. The part that regulates trade of goods entered into force in 2000, while the chapters regarding trade of services did so in 2001. In 2018 the agreement was replaced by a new one that included more openness between the parts.

The content of the FTA is wide and includes progressive and reciprocal liberalization of trade of goods and services (with the exception of some sensitive agriculture products). The agreement additionally involves liberalization for investment, which makes Mexico more attractive for foreign direct investment. Openness in public purchases is also included in the agreement, which establishes provisions to guarantee the access of Mexican and European operators to each bidding market, provided that the value exceeds certain pre-established thresholds. Mexico provides European companies with accesses similar to those granted to its partners in the North American Free Trade Agreement (NAFTA) and, in exchange for this, the EU rewards Mexico with the same benefits that it gives to its partners in the public procurement agreement under World Trade Organization rules. The FTA also covers intellectual property rights, such as patents, trademarks and copyrights. They are protected based on the highest international standards. In addition, a special Committee was created to address issues related to the effective protection of these rights.

The agreement (usually identified as TLCUEM) covers all manufacturing products and a considerable part of the agriculture and fish products exported by Mexico. By 2000, industrial products represented 90% of the trade in goods between them, and tariff relief was divided in four categories. The first implied immediate relief (since July 2000); 82% of Mexico's industrial exports and 47% of the EU exports were included in this category. Products such as cosmetics, photographic equipment, oils, soaps and pharmaceutical products were also included here.

As for agriculture products, after a 10-year period 62% of agricultural trade between both parts will be completely tariff-free. This includes wines, alcoholic beverages, and olive oil, among other European exports, and tropical fruits and vegetables for Mexico. Moreover, Mexican products (such as orange juice, avocados, honey, among others) gain preferential access to European markets. Live animals, meat, dairy products, flowers, cereals, jam and certain vegetables and fruits are left outside the agreement.

The agreement additionally covers services, including finance, telecommunications, tourism, energy, and distribution, among others. The agreement further establishes that both parts will not add further regulations.

As for the evolution in trend patterns, the European Commission states that the trend in bilateral exports follows the trend in overall exports of both partners. It is, however, possible to observe a small increase in the importance of both partners in each other's trade flows over time: the EU's share of Mexican exports was 3.8 percent in 1999 and 4.9 percent in 2013, whereas Mexico's

share of EU exports increased from 0.5 to 0.7 percent. Bilateral trade is concentrated in a limited number of sectors, and, while there is an increase in diversification of EU exports to Mexico, for Mexican exports to the EU there is more concentration. A significant increase in bilateral trade flows of trade in services is observed, but these changes are in line with developments in overall services trade. FDI flows between the two partners show a fluctuating pattern, not deviating much from the general trends in FDI flows.

D.9 Mexico-United States

The North American Free Trade Agreement (NAFTA) was signed in December 1992 and entered into force in January 1994. In November 2018 signed the new United States-Mexico-Canada Agreement (USMCA), that includes modifications in terms of environment, intellectual property, digital trade, and financial services (this new agreement has not yet entered into force).

The implementation of NAFTA brought the immediate elimination of tariffs on more than one-half of Mexico's exports to the United States and more than one-third of U.S. exports to Mexico. Moreover, NAFTA covered not only merchandise trade but also issues related to investment, labor markets, and environmental policies.

Before NAFTA, tariffs of 30 percent or higher on export goods to Mexico were common. Additionally, Mexican tariffs on US-made products were, on average, 250 percent higher than U.S. duties on Mexican products. With the agreement, 50% of the tariffs were abolished immediately, while others were phased out in a 15-year period. The agreement further included the elimination of non-tariff barriers by 2008.

Some sensitive sectors, however, were still protected under NAFTA. For agriculture, one of those sectors, two different bilateral agreements were signed. Strict rules of origin were also part of NAFTA.

NAFTA additionally covered other aspects of economic flows such as investment, financial services, and government purchases, among others, eliminating investment barriers, for example, and including measures to protect investors.

According to Kose, Towe, and Meredith (2004), "The agreement represented a watershed in global trade policy, not just because of the size of the free trade area it created, but also with regard to the comprehensiveness of the agreement, which covered not just merchandise trade but also issues related to investment, labor markets, and environmental policies. Perhaps the most significant aspect of the agreement, however, was the fact that it was between a developing country and highly developed economies. The result has been to spur a dramatic increase in trade and financial flows among the NAFTA partners and to contribute to making North America one of the most economically integrated regions in the world."

Kose, Towe, and Meredith (2004) assesses NAFTA's effects on Mexico's economy. Their findings show that, after the agreement entered into force, Mexico's output variability declined, the growth rate of investment increased, exports and investment increased their contribution to GDP growth,and TFP increased, among other effects.

In terms of trade flow, Kose, Towe, and Meredith (2004) further shows the evolution of exports with NAFTA partners: Mexico's exports to the United States and Canada more than doubled in dollar terms between 1993 and 2002. Mexico's trade with NAFTA partners rose from 25 percent of its GDP in 1993 to 51 percent in 2000. The authors additionally point out that growth in Mexico's exports was stronger than that of several emerging market economies during the post-NAFTA period.

It is important to notice, however, that sectors in which exports to the United States grew more rapidly also registered growth in exports to the rest of the world. Krueger (1999) interprets

this result as an indication that NAFTA was not a trade-diverting agreement. Nonetheless, after the inception of NAFTA, Mexico's exports shifted towards manufactured goods, especially from maquiladora firms. Intra-industry and intra-firm trade grew as well. Other sectors that grew were paper, motor cars and engines.

D.10 Peru-Colombia-EU[22]

After several rounds of negotiations the commercial agreement between the European Union, Colombia and Peru was signed in June 2012 and entered into force in March 2013.

This FTA gives Peru preferential access for 99.3% of its agricultural products and 100% for industrial products. Products such as asparagus, avocados, coffee, capsicum fruits, and artichokes, among others, enter the European market free of tariffs since the entry into force of the Agreement.

As for Colombia, 99.9% of industrial exports (including fishing) have become tariff-free since the entry into force of the agreement. The agreement additionally EU tariffs for some of Colombia's most important exports such as bananas, sugar and coffee.

The agreement further provides for the flexibilization of rules of origin for fish products, and it gives Peruvian and Colombian companies the ability to participate in the EU public procurement market at all levels of government (local, regional and national) in the 28 member states of the economic bloc. Furthermore, it highlights the importance of the participation of small and medium enterprises in these public procurement processes.

The EU is one of the principal destinations of Peruvian exports. In 2011 (the year before the agreement was signed) it represented 18% of the exports and the first place in terms of FDI. Furthermore, the EU has helped Peru in social inclusion and in efforts to fight drug trafficking from 2007 to 2013.

The value of goods exported from the EU to Colombia in 2017 was EUR 5,986 million. This represents an increase of 8.6% on the year prior to the entry into force of the Agreement (EUR 5 534 million in 2012), and an increase of 10.5% in comparison with 2016. Since the agreement was established, imports in Colombia have shown a downwards trend, except in 2014 and 2017 when annual growth was 7% and 3.2%, respectively.

The EU is one of Colombia's largest trading partners. Over the course of the period that the Agreement has been in force, 15.4% of exports from Colombia went to the EU, making it the second-ranked destination for Colombian exports after the United States. As for Colombian imports, the EU ranked third in the period 2013-2017, with a share of 14.1% of total imports.

In 2017, the countries that provided the greatest share of EU exports to Colombia were Germany (27.7%), Spain (16.3%), Italy (9.9%), the United Kingdom (8.7%) and France (8.4%). Regarding data on imports, the main buyers of Colombian products were the Netherlands, with 22.3% of the total share, Spain (17.5%), Italy (11.2%), Belgium (10%) and the United Kingdom (9.7%).

In 2017, exports from Peru to the EU were 2.4% less than in 2012. As for Peruvian imports, they have grown since the entry into force of the agreement. However, trade with the EU and other partners shows a positive trend: while Peruvian trade fell in the 2012-2017 period, trade with the EU did not.

By 2017, Spain represented the most important buyer for Peruvian products among the EU with more than 35% of the total. As for the principal exports, mineral and agricultural products represented around 70% of Peru's exports to the EU in 2017. Among them, copper and its concentrates, liquefied natural gas, zinc and its concentrates, avocados, fresh or dry, unroasted or decaffeinated coffee, fresh asparagus, fresh or dried guavas, mangoes and mangosteens and fresh

[22] This description closely follows EP (2018).

grapes were the main exports. Imports came mainly from Germany, Italy and the Netherlands and were concentrated in machinery, chemical products and transportation materials.

The sum of foreign direct investment (FDI) to Colombia, despite a recent slowdown in flows, increased by 400% between 2000 and 2016. This FDI trend was even more pronounced in Peru (more than 700%) in this period (UNCTAD 2017).

As for foreign direct investment from the EU in Peru, in 2016 it grew 171% compared to 2015. These investments came mainly from Spain, United Kingdom and the Netherlands. Furthermore, bilateral investment agreements were signed between Peru and several European countries such as Germany, Belgium, Luxembourg, Denmark, Spain, Finland, France, Holland, Italy, Portugal, United Kingdom, Czech Republic, Romania, and Sweden.

As for services, exports from Peru did not grow in the 2010-2016 period. On the other hand, service imports grew a 50% in the same period (tourism, transportation and insurance were the most important sectors). In 2016, EU exports of services to Colombia was 1.8% higher than that of 2012, the year prior to the entry into force of the FTA. As for service exports, by 2016 they were 6.7% less than those of 2012.

D.11 Peru-United States

The Trade Promotion Agreement (TPA) between Peru and the United States was signed in April 2006 and entered into force in February 2009.

Peru's most important exports to the United States are minerals/metals, textile products, fish, oil, coffee, cocoa, crafts, paprika, grapes, tangerine, mango, artichoke, and asparagus. As for the U.S., its principal exports to Peru are manufacturing products and wheat.

Before the TPA Peru benefited from the Andean Trade Promotion and Drug Eradication Act (ATPDEA) that gave Peru's exports tariff-free entry to the U.S unilaterally.[23] The idea of this measure was the creation of labor options outside the coca leaf sector to facilitate the eradication of drug trafficking. However, the act did not include tariff relief for all sectors, and it maintained quantitative restrictions. The TPA kept all the benefits from the ATPDEA and widened the tariff relief for the rest of Peruvian exports. Some sectors, such as shoes and tuna, have a 10-year linear reduction in tariffs.

As a for the United States, the TPA resulted in 80 percent of U.S. consumer and industrial goods exports to Peru no longer being subject to tariffs. Tariffs on the rest of those products were phased out in 2019. For agricultural products, tariffs have been eliminated on almost 90% of U.S. exports, and the remaining tariffs will be phased out by 2026.

The TPA additionally provides favorable access for U.S. service suppliers, as well as guarantees of protection to U.S. investors and U.S. copyrights, trademarks, and patents registered in Peru. In addition, Peru has opened up significant government procurement to U.S. bidders.

During the 11 years that the agreement has been active, the value of Peruvian exports to the United State has fallen at a -0.1% annual rate. For traditional sectors, exports fell 7%, while non-traditional sectors grew 7.1%. During this period, 45.4% of exports were from non-traditional sectors. Agricultural and textile products were the most prominent among them. During 2019, exports fell by 28.7% (in comparison to 2018), with a decrease of 58.5% in traditional sectors.

As for Peru's imports from the United States, during the last 11 years they grew at a rate of 4.5% per year. Purchases of consumer goods grew at an annual rate of 6.3%, while imports of raw materials and intermediate products grew at an average annual rate of 6.4%. As for capital goods and construction materials, they fell at a 0.6% per year. In 2019, U.S. exports to Peru fell

[23] Ministerio de Comercio Exterior y Turismo de PerÃº, http://www.acuerdoscomerciales.gob.pe Retrieved September 2020.

3.9% in comparison to 2008. Peru's imports were concentrated in fuels, lubricants and related products (43% share); raw materials and intermediate products for industry (26%); and capital goods for manufacturing (13%). In addition, purchases of transportation equipment increased (+ 24% compared 2018); and construction materials (+ 22%).

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