Latin America Trade Literature Review

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The main focus of this literature review is the empirical literature. Therefore, while I do provide some theoretical background on potential causal channels, I do so only in passing. For each topic, I try to mention some of the most influential papers and then papers that use Latin American countries as case studies. Whenever I mention the use of Latin American data, I highlight the country in red.

1 Productivity Growth and Trade Reform

Theory and empirical evidence regarding aggregate growth rates *Most trade models have very little to say about growth. This might be surprising, since most economists and policymakers intuitively understand that (dynamically) openness to trade (i) gives access to more inputs, at cheaper costs and higher quality; (ii) puts a domestic manager in touch with foreign techniques and management practices, inducing idea diffusion; and (iii) increased foreign competition creates incentives for productivity growth. Empirically, there is a large body of evidence, of increasing quality, that links trade liberalization and growth.*

The fact that most canonical trade models abstract away from these topics stems from them typically being static in nature and assuming a fixed domestic technological distribution, regardless of trade. In the static framework, as shown by Arkolakis, Costinot, and Rodríguez-Clare (2012), a large class of static trade models summarizes all of the gains from trade by changes in terms of trade. A subset of papers in the trade literature developed the theoretical relationship between trade and growth. For instance, growth can stem from access to newer differentiated input varieties and increased potential profits due to market access (as in Gene M Grossman and Helpman 1994, Rivera-Batiz and P. M. Romer 1991b, and Rivera-Batiz and P. M. Romer 1991a). Alternatively, growth can come after knowledge diffusion through matches between quality-differentiated suppliers and users (as in Alvarez et al. 2013 and Buera and Oberfield 2020).

Empirically, many studies document the fact that trade levels are positively associated with income levels across-countries[1]. However, these earlier studies had a very simple IV identification strategy and were rightfully criticized because the exclusion restriction potentially failed, in particular by not including measures of institutional quality, which are correlated with trade openness (cf. Rodríguez and Rodrik 2000).

[1]See, for instance, Frankel and D. Romer 1999, who compile a long-run cross-country sample and regresses income levels on trade openness, after instrumenting trade openness with geographic characteristics that affect trade openness (as predicted by theory)

Later papers tried to improve on the earlier methodology. For instance, Dollar and Kraay (2004) relate the change in growth with the change in trade openness and find a substantial relationship, rather than the long-run levels. Wacziarg and Horn Welch (2008) compile a dataset of different trade liberalization events and calculates the average growth rate, across events, before and after the event. They conclude that growth rates are, on average, about 2pp higher after an event of trade liberalization. Noguer and Siscart (2005) take the omitted variable bias criticism seriously, directly control for measures of institutional quality and state '[t]rade raises income: a precise and robust result."

More recently, Estevadeordal and Taylor (2013) showed that the main mechanism connecting trade liberalization to growth is liberalizing tariffs on imported capital and intermediate goods. In particular, liberalization events led to an increase in growth, on average, of 1 percentage point per year —or a 15-20 percent average treatment effect after 20 years. Other relevant evidence can be found in the literature review by Irwin (2019).

Effects over plant- and firm-productivity *Researchers delved into more disaggregated data to have a more precise estimation of causal channels. There is substantial evidence that trade liberalization both in input and output markets can induce productivity gains, due to technological upgrading and the exit of low productivity firms, respectively.*

Some initial evidence by Clerides, Lach, and Tybout (1998) using plant-level data from Colombia, Morocco, and Mexico documented that exporting firms tend to be more productive even prior to opening up to trade. This suggested that the correlation between productivity and exporting could potentially be explained by self-selection. However, later evidence shed some light on the dynamic relationship at the plant- and firm-level.

Output market competition channel

In a seminal paper, Pavcnik (2002) studied plant level data in Chile, estimated plant-level total factor productivity, and showed "evidence of within plant productivity improvements that can be attributed to a liberalized trade for the plants in the import-competing sector." As predicted by the Melitz (2003) model of trade, her results are consistent with aggregate productivity gains being a consequence of reshuffling factors of production from less productive to more productive firms.

Ferreira and Rossi Jr. (2003) use industry-level variation in Brazil and show that those industries more exposed to trade liberalization in the output market experienced differential changes in output-per-worker and total factor productivity *growth rates*. Since they focus on output market tariffs, they argue that the main mechanisms are increased incentives for technological upgrading spurred by higher competition and the exit of the least productive firms. These are the same mechanisms highlighted by Fernandes (2007), who uses Colombian plant-level data and finds "a strong positive impact of tariff liberalization on plant productivity," after controlling for different sources of potential endogeneity. She shows that increased competition induced skill upgrade, foreign intermediate sourcing, capital investment, and output reallocation out of less productive plants.

Using the Survey of Manufacturers microdata from Brazil, Muendler (2004) shows that firms that faced decreased tariffs in the output market had a lower probability of survival but, conditional on survival, experienced larger TFP growth. His finding is that product market competition was more important than input cost reduction for these gains. Using a different metric of productivity in a similar firm-level dataset, Lisboa, Menezes Filho, and Schor (2010) found that the input tariff liberalization was also important in Brazil.

Tybout and Westbrook (1995) used a similar survey of manufacturers from Mexico, estimated plant-level TFP, and showed that while importers had efficiency gains after

trade liberalization, the same is not true for exporters. Importantly, however, their sample does not include the *maquiladoras*, a manufacturing sector that expanded substantially during that period and that benefited disproportionately from trade openness.

Input liberalization and technological upgrading channels

Kasahara and Rodrigue (2008) use data plant-level TFP data from Chile but focus on the role of intermediate goods imports. They show that firms that became importers of foreign intermediates after the trade liberalization episode improved their productivity.

Another channel that can spur growth is technological upgrading in response to increased foreign competition. Bustos (2011) introduces a new model in which firms can choose to upgrade to new technology with higher fixed costs and lower variable costs. Changes in trade costs induce changes in incentives for technology adoption. She then uses the creation of Mercosur and the drastic reduction in tariff rates between Brazil and Argentina to assess the effect of trade liberalization on technological investment of Argentinian firms. The empirical exercise confirms her theoretical predictions.

Trade barriers prevent access to new imported varieties of intermediate inputs and act as a technological constraint. P. K. Goldberg et al. (2010) use India firm-level data and show that, after intermediate input liberalization, domestic firms more exposed to input liberalization not only increase their exports of existing varieties but also export new varieties. This suggests that trade liberalization can lead to product innovation or imitation, increasing the capability of domestic producers of producing new varieties.

2 Distributional Effects of Trade Liberalization

Theory and evidence *Trade shocks always induces winners and losers, but it is not theoretically clear whether their distributional effects increase or decrease inequality. Empirically, the impact of trade liberalization on the skill premium is modest; and there seems to be some trade-off between equity (inequality) and efficiency (gains from trade), with the latter more than compensating the former for most developing countries.*

While it is largely consensual among economists that opening up to trade leads to aggregate welfare gains[2], there is no reason to believe that trade liberalization is distributionally neutral. There are almost always winners and losers after a liberalization episode.

The classical Heckscher-Ohlin model predicts that countries will export products that are intensive in the factor that is abundant in that country. As a consequence, the relative factor income of the abundant factor increases. In the real world, the stylized prediction would be that trade increases labor income in poor countries and decreases it in rich countries, leading to decreased inequality in the former and increased inequality in the latter group.

Feenstra and G. H. Hanson (1995) offer one alternative explanation relating trade openness and inequality. They propose a model of outsourcing starting from skill-differentiated tasks. Low-skill tasks are outsourced to a low-income country. Trade openness increases the measure of tasks that are outsourced and decreases the relative wage of lower-skilled workers in developed countries. However, Gene M. Grossman and Rossi-Hansberg (2008) later have revisited this offshoring model and show that, under some assumptions, off-

[2]The University of Chicago's IGM Panel of top economists asked the following question on 13 March 2012: "Freer trade improves productive efficiency and offers consumers better choices, and in the long run these gains are much larger than any effects on employment." Between $85-96\%$ of respondents agreed with the statement, depending on weighing. Link here.

shoring can be Pareto improving: leading to real income gains for all factors (workers at all levels). Therefore, the relationship is ambiguous.

Dix-Carneiro and Kovak (2015) study the relationship between trade liberalization and the skill premium in a regional specific factors model. They then test their model's predictions using data from Brazil and find that trade liberalization has a statistically significant but statistically small effect on the skill premium.

Artuc, Porto, and Rijkers (2019) use a panel of 54 developing countries, including many Latin American countries, to study the aggregate welfare and distribution effects of trade liberalization. They find income gains from trade liberalization for most countries (45 out 54) in their sample. Additionally, most countries (45 out 54) face a trade-off between income gains and inequality costs. "The income gains typically more than offset the increase in inequality. In the majority of developing countries, the prevailing tariff structure thus induces sizable welfare losses."

Local labor market effects *The bulk of the evidence shows that higher relative exposure of a given local labor market to negative (positive) trade shocks implies negative (positive) labor market responses. However, all of these estimates are relative and aggregate effects cannot be directly implied from the relative effects —sometimes they can have opposite signs.*

After the seminal work by Autor, Dorn, and G. H. Hanson (2013), henceforth ADH, the empirical trade literature has increasingly focused on differential impacts of trade shocks on local labor markets. ADH use a measure of the local labor market exposure to Chinese import competition growth[3] and find that U.S. Commuting Zones (CZs) more exposed to Chinese competition fared relatively worse in terms of employment and wages for a persistent time. The economic reasoning behind that finding is that labor markets have more frictions than economic models previously assumed, and hence adjustment to a new equilibrium is very slow.

The most influential piece of evidence from developing countries in this emergent literature is quite possibly Dix-Carneiro and Kovak (2017), who studied the late 1980s trade liberalization reforms in Brazil and developed an empirical strategy to estimate its differential impact on local labor markets. They show that Brazilian microrregions (conceptually similar to CZs) whose labor force specialized in sectors that faced a larger tariff liberalization fared relatively worse in terms of *formal employment* and wages. There was, however, no differential effect on *total employment*. They observed an increase in *informal employment* in response to the shock, suggesting that, in developing countries where the informal sector is relevant, the latter can act as a shock absorption mechanism. Furthermore, in this particular event, the regions that fared relatively worse were those that were initially richer and specialized in highly protected manufacturing goods, such that one cannot immediately infer that trade liberalization increased the level of inequality, only that there was a differential impact across regions.

In interpreting this kind of reduced form differential effect, it is important to bear in mind that the estimated average cross-sectional treatment effect capture only a *relative effect* —i.e., the effect of a region more exposed to the treatment relative to a region not-exposed to it. One can only extrapolate the relative effect to the aggregate effect under

[3] In particular, they use the following proxy of per capita import exposure for region i: $\Delta IPW_{it} = \frac{1}{L_{it}} \sum_j \frac{L_{ijt}}{L_{jt}} \Delta M_{jt}$, where L_{it} is total employment in region i, $\frac{L_{ijt}}{L_{jt}}$ is the share of region's i employment of industry j, and ΔM_{jt} is the increase of Chinese import competition in industry j. Since ΔM_{jt} is potentially endogenous, they instrument ΔIPW_{it} using ΔM_{jt}^{EU}, i.e., the change in sector's j Chinese imports to Europe

very strong assumptions, namely: that there are no spill-over effects between regions, and that causal channels that affect regions uniformly are unchanged. This is known in the literature as the "missing intercept problem" (cf Wolf 2021), which states that any general equilibrium effects are absorbed by the intercepts of the cross-sectional regressions.

An illustration of this fact is the analysis by Caliendo, Dvorkin, and Parro (2019), who use a general equilibrium model to estimate the aggregate quantitative impacts of the China Shock on the U.S. economy. One striking result is that their cross-sectional estimates are consistent with ADH (i.e., regions more exposed to Chinese import competition fared relatively worse), but their aggregate results reflect a positive welfare effect of the China shock, after accounting for the positive effect of cheaper inputs and final goods.

One should consider that the same event can lead to multiple causal channels. For instance, trade liberalization can induce both higher competition in the output market (with potentially detrimental labor market effects) and lower costs in the intermediate goods market (with potentially positive labor market effects). Kis-Katos and Sparrow (2015), for instance, show that trade liberalization in output and intermediate inputs had different local labor market effects across Indonesian regions.

Baldárrago and Salinas (2017) analyze the effects of the 2004-14 trade liberalization in Peru across different Peruvian regions. They find that lower regional tariffs are associated with higher unemployment, lower consumption, and higher poverty headcount levels. One of their conclusions is that, even in the presence of high intra-national mobility, there might be high adjustment costs.

In studying increased globalization in Mexico, G. H. Hanson (2005) shows that regions more exposed to globalization experienced a rightwards shift in their income distribution of nearly 10% relative to regions less exposed to globalization[4]. This effect is mediated primarily through the spread of *maquiladoras* manufacturing plants in the Northern states that share a border with the United States. This effect is consistent with the estimates by Chiquiar (2008), who shows that Mexican regions more exposed to NAFTA have exhibited an increase in wage levels and a decrease in the skill premium, relative to other regions of the country.

Individual or industry-level effects *There is a large displacement of workers after product market liberalization, due to increased competition – and their return to the labor force can be nontrivial. The effect of trade liberalization on inequality and the skill premium is modest and context-specific.*

As stated above, aggregation from regional estimates is a non-trivial exercise. Therefore, data on different levels of aggregation, such as individual- or industry-level, is of utmost importance to paint a clear picture of the distributional effects of trade. In some cases, those estimates will move in the same direction as the regional-data evidence, suggesting that spill-over effects would run in the same direction and bound aggregate effects from below. In others, however, estimates can have a different sign, and the researcher will have to use a different strategy to map relative to aggregate effects.

For instance, even before the influential work by Dix-Carneiro and Kovak (2017), Menezes-Filho and Muendler (2011) had used employer-employee matched administrative data and industry-wise differential exposure to trade liberalization in Brazil to estimate the probability of separation and matching of workers after a trade shock. They

[4]Regional exposure to globalization is defined as "the share of maquiladora value added in state GDP, the share of FDI in state GDP, and the share of imports in state GDP" over the 1993-99 period. The treatment group is the top tercile states and the control group the bottom tercile states.

show that workers more exposed to the industry-level goods market trade liberalization are more likely to be separated and less likely to find a new match, relative to less exposed workers. Additionally, they also show that input market trade liberalization has the exact opposite sign, suggesting that lowering marginal costs can boost total output and total labor. On aggregate, their results suggest that higher productivity firms are the ones more likely to survive after a goods market liberalization shock, and therefore they can absorb most (but not all) of the workers in the same sector, leaving a residual idleness gap in the labor market.

Pierce and Schott (2016) provide industry-level evidence that the elimination of potential tariff increases that followed China's accession to the WTO decreased employment in manufacturing. They show that "industries where the threat of tariff hikes declines the most experience more severe employment losses along with larger increases in the value of imports from China and the number of firms engaged in China-U.S. trade." This points in the same direction as ADH's regional evidence of the China trade shock.

Beyer, Rojas, and Vergara (1999) used cointegration techniques to estimate the long-run relationship between trade, skill premium and product prices using Chilean data. They argue that trade openness is linked to a higher skilled-unskilled labor wage gap. Similarly, Dix-Carneiro and Kovak (2015) showed, using data from Brazilian regions, that trade liberalization increases the skill premium, but only modestly. In the same paper, they also have a specific factors model that show that regional labor markets cross-sectional regressions, using those assumptions, can be used to estimate the aggregate effect. This is also consistent with results of moderately higher wage inequality after trade reform in Mexico documented by Harrison and G. Hanson (1999), but contradicts earlier evidence suggesting no relationship between trade reform and the labor skill premium in Brazil (Pavcnik et al. 2004).

Gender inequality *The bulk of the evidence suggests that trade liberalization decreases gender inequality. This happens because of sectoral shifts towards industries and tasks that are more female intensive; and due to negative income effects, which induce females to supply labor.*

Across different developing countries, trade liberalization is linked to increased gender equity. Gaddis and Pieters (2012) use Brazilian data and show that, following trade liberalization, there was a relative increase in female labor force participation and a relative decrease in female unemployment in more exposed states compared to less exposed states. The two forces that contributed to this increased female participation in the labor market were: (a) large reallocations both within and between sectors, particularly an increased shift of the total labor force from manufacturing to services, in line with the idea that structural transformation increases female participation; and (b) income effects, for those households whose male worker transitioned into unemployment or the informal sector after trade liberalization.

In a related finding, Kis-Katos, Pieters, and Sparrow (2018) study Indonesia and show that "female work participation increased and participation in domestic duties declined in regions that were more exposed to input tariff reductions," but not to output markets liberalization. Juhn, Ujhelyi, and Villegas-Sanchez (2013) reach a similar conclusion using U.S. data to analyze the effects of NAFTA on gender inequality. They argue that tariff reduction induces technological upgrading to less physically demanding tasks, which explains the increase in the relative female wage in blue-collar but not in white-collar tasks. They find similar effects and mechanisms using firm-level data from Mexico in another work (Juhn, Ujhelyi, and Villegas-Sanchez 2014). Finally, Ben Yahmed and Bom-

barda (2020) study labor markets in Mexico using individual survey data and show that "tariff cuts increase the probability of working formally for both men and women within four-digit manufacturing industries" and finds no differential impact across genders.

Informality *The informal sector can act as an adjustment mechanism after a trade shock to local labor markets. In settings with a high informal labor market, product market trade liberalization can (but not necessarily will) displace formal workers to the informal labor market temporarily. This also implies that in developing countries unemployment typically increases less than it would otherwise after the shock if the informal labor market was not present.*

Trade can potentially have an impact on informality rates. If labor market regulations create high frictions, the path of adjustment following a negative shock leads to job separations, who do not immediately find work in formal labor markets. Informal labor markets, by its turn, have less frictions and absorb such excess labor supply[5]. Evidence for this effect, however, is mixed. Koujianou Goldberg and Pavcnik (2003) study trade liberalization episodes in Colombia and Brazil and find little evidence of increased informality in response to trade shocks. They find some weak evidence in the early years for Colombia, but only in the years before the labor reform, emphasizing the importance of labor market institutions in mediating these effects. The literature review by Fugazza and Fiess 2010 reaches a similar conclusion, highlighting that the evidence is mixed and particularly weak using more desegregated data.

However, more recent evidence does detect some negative impact of trade liberalization on informality rates. Ponczek and Ulyssea (2017) use data from Brazilian regions and show that regions relatively more exposed to trade shocks and with relatively more strict labor regulatory enforcement face higher increases in informality rates. Cisneros-Acevedo (2022) uses data from Peru and finds that negative trade shocks affect informality rates through two different channels, an *extensive* margin (unregistered firms exit the market and decrease informal labor demand) and an *intensive* margin (registered firm switch labor demand from formal workers to informal workers), with a net effect being an increase in informality.

Adjustment policies *After a trade shock, the market adjustment does not happen instantaneously. Rather, as highlighted by the evidence above, adjustment can be quite sluggish. This happens due to wedges and market failures, implying that policy intervention could potentially increase welfare. Evidence for the effectiveness of policies depends on program design.*

Dix-Carneiro (2014) uses a general equilibrium model with occupation selection to evaluate the counterfactual use of two different adjustment policies in Brazil: retraining programs and moving subsidies. He finds that moving subsidies are more effective in compensating losers from trade shocks. While the retraining program only compensates $1-10\%$ of total losses, moving subsidies compensate between $40-85\%$ of total losses. The reason for this difference is that workers might select to move occupations but stay in the same labor market, depressing wages for workers who had previously had that occupation locally.

It is important to underline, however, that while retraining programs are generically found to be rather inefficient in relocating workers to better occupations, their efficiency depends critically on program design. For instance, O'Connell et al. (2017) study a retraining program in Brazil that incorporates information about the local demand for skills

[5]See Dix-Carneiro, Pinelopi K. Goldberg, et al. (2021) for a complete theoretical discussion

– i.e., the government surveys employers who state which skills they need for their firms and adjusts the supply of retraining courses accordingly. In this context, they find a large causal effect of program participation on employment rates.

Bearing that in mind, in a work with co-authors (Góes et al. 2019), we propose a design for active labor market policies that could ease the adjustment process for negatively impacted workers. First, we built a general equilibrium model with labor mobility across regions and sectors in Brazil to anticipate the regions whose labor forces are expected to expand or contract after unilateral trade liberalization in Brazil. We then argue that such information, combined with information on local demand for skills, can help policymakers know in advance which regions and industries must be the focus of active labor market policies.

3 Human Capital and Skill Upgrading Effects of Trade

Different mechanisms *Trade shocks can impact long-run human capital acquisition. This can happen through "positive" channels, such as capital-labor complementarities through access to newer technology that induces firms to retrain workers. But it can also happen through "negative" channels, such as when negative shocks to labor markets reduce the opportunity cost of schooling, increasing overall schooling.*

One way through which trade affects human capital acquisition is through inducing a higher degree of capital-labor complementarities. For instance, having access to higher-quality inputs can induce higher demand for high-skill labor. Also, since it is an established fact that exporters tend to be larger and more productive firms, if their technological inputs are complementary to high-skill labor, an increase in exports due to increased market access will create higher demand for skilled labor. Additionally, if final goods are differentiated in quality, it is plausible to theorize that higher quality varieties will demand higher skill labor inputs. Both offshoring and increased market access can then lead to higher demand for high-skill labor.

Another way in which trade affects human capital accumulation is by changing the relative return to different skill-intensive tasks as well as the opportunity cost of schooling. These channels highlight how the effects of trade shocks are multifaceted: the same shock can have simultaneous "positive" and "negative" consequences, depending on the local context. For instance, a negative trade shock that negatively affects the income of low-skilled workers and increases the skill premium might induce young adults to stay in school and induce human capital accumulation.

Direct Effects *There is some robust evidence for quality-upgrading after positive trade shocks. This can happen both due to the introduction of higher-quality varieties by exporting firms or by capital-labor complementarities and firm retraining of their workers.*

Verhoogen (2008) wrote a very influential study on quality-upgrading. He first proposed a model with heterogeneous plants and quality differentiation, in which more productive plants produce higher-quality goods and pay higher wages to maintain a higher-quality workforce. As in many trade models, the most productive plants enter the export market. In this model, the exporters produce higher-quality goods to appeal to foreign markets. After a foreign demand shock, demand for high-skilled labor increases, and that induces within-industry wage dispersion. He then shows evidence consistent with the results of the model using Mexican plant-level data.

Bastos, J. Silva, and Proença (2016) also provide evidence of quality-upgrading, this time using within-firm training data. They use firm-level Brazilian data and differential industry-specific exchange rate shocks to test the hypothesis that exports can lead to skill-upgrading. They show that firms that have exogenous increases in exports offer more on-the-job training to their employees. Furthermore, this effect is concentrated on those workers who initially have lower skill levels, indicating the need for skill upgrading.

Brambilla et al. (2010) wrote a comprehensive study including data on *5 million workers* from 16 Latin American countries. Their primary focus is how exports are related to the skill-premium and returns to schooling. Their findings show that growth in sectoral exports is related to sectoral skill premiums: sectors with higher exports pay higher wages for high-skilled workers. This evidence supports recent trade theories linking exports to wages and to skills.

Park et al. (2010) provide evidence that firms can upgrade the quality of their exports in response to foreign demand shocks. They use Chinese firms' data and construct firm-specific foreign-exchange shocks, which are presumably unanticipated. They then show that those shocks induced exogenous export growth, which in turn caused higher productivity. Besides, productivity gains were larger for those firms whose export changes were larger to high-income markets, which is consistent with firms "learning-by-exporting" either through the demand for higher quality goods or exposure to better technological quality from their clients.

A similar rationale can apply to the effect of imports rather than exports on skills. MacGarvie (2006) shows that importers' innovations are more likely to be influenced by foreign technology relative to non-importers. Therefore, technology can diffuse through imports which could lead to quality- or product innovation.

This, in turn, can lead to higher demand for skilled labor due to production complementarities. Giovannetti et al. (2006) use matched employer-employee data from Brazil and shows that trade liberalization in inputs made it easier for firms to acquire technologically-advanced inputs from abroad. This, in turn, raised the demand for skilled labor. They show that input tariffs have a negative effect on skill-upgrading, particularly for inputs that are complements to skilled labor.

Indirect effects *One perhaps unexpected effect of trade liberalization on human capital acquisition is that negative trade shocks can induce workers to build up their human capital stock. The evidence is quite robust showing that negative local labor market shocks decrease the opportunity cost of schooling and increase graduation rates and overall schooling.*

Atkin (2016) studied the effect of trade liberalization in Mexico and showed that, as trade liberalization increased employment opportunities for low-skill workers, that increased the opportunity cost of schooling, leading to a lower human capital over the long run. In that context, higher job creation led to more school drop-out rates. Also in the context of a developing country, Ahsan and Chatterjee (2017) shows trade liberalization induced human capital formation and social mobility in India. In a case that was almost the mirror image of the previous study, sons whose parents lived in a district more exposed to trade liberalization were more likely to stay longer in school and to have more skill-intensive professions. In this case, import competition, which is typically thought of as a potentially negative shock, likely increased the returns to schooling and induced human capital accumulation and mobility over a longer horizon.

The sign of these results is also consistent with additional evidence from developing countries. Utar (2018) uses high-quality employer-employee matched Danish data and

show that import competition shocks displace workers in more exposed industries, but due to human capital specificity, such a displacement induces human capital acquisition: they tend to go back to school for retooling, particularly those who want to move to the nontradable sector. Greenland and Lopresti (2016) use the standard ADH China trade shock to study the effect of increased Chinese import competition over human capital acquisition across labor markets. They document large increases in high school graduation rates in response to increased import competition. Once again, this effect can be rationalized by a change in net earnings across skill types induced by the trade shock: since the China shock disproportionately affected blue-collar jobs in the U.S., the relative returns to schooling become higher.

4 Empirical Outcomes of Trade Agreements and Trade Reform

This section outlines the empirical outcomes of reciprocal trade agreements (RTAs), which are presumably conducive to more trade and to the consequences outlined in other sections. However, as outlined by Rodrik (2018), trade agreements increasingly include provisions that are not directly related to trade, including anti-trust, labor, environmental, investment, financial, and IP regulations. This moves the main goal of RTAs from basic trade liberalization towards international policy coordination in a broader sense has been called "deep integration" (Maggi and Ossa 2021). This means that RTAs could potentially impact outcomes other than trade and that these additional provisions could differentially affect trade. By the same token, increasing trade is no longer sufficient to judge the effectiveness of a modern RTA. While this topic is quite broad, I try to underscore some of the key effects below.

Trade Creation vs Trade Diversion *The bulk of the evidence shows that RTAs are effective in creating trade, particularly in capital goods and intermediate inputs. However, treatment effects are very heterogeneous and depend on the initial characteristics of each country pair.*

Most of the empirical literature on the impacts of trade agreements on trade resort to augmented gravity models that include dummy variables denoting the RTA entry into force to the gravity equation. These denote the correlation between bilateral trade flows and RTAs, conditional on other covariates known to be important determinants of bilateral trade, such as distance; source and destination income; language; and common institutions. Most modern trade models deliver a gravity-like relationship, which implies that this empirical strategy is grounded on economic theory[6].

In a meta-analysis, Cipollina and Salvatici (2010) show that this class of studies tends to show a statistically significant effect of RTAs on trade volumes and values, but the variance of estimates is large. They argue that the large variance is related to failure to address different endogeneity biases with gravity equation estimation, some of which have extensively been documented in Baldwin and Taglioni (2006).

[6]This is true of essentially all modern trade models. Albeit different in motivation, versions of the Armington (1969), Krugman (1980), Eaton and Kortum (2002), and Melitz (2003) can all deliver a gravity relationship. In short, a gravity model is a way to decompose trade flows from a given source s to a given destination d into a source-specific component, a destination specific component, and trade costs: $\ln X_{sd} = \delta_d + \xi_s - \theta \cdot \ln \tau$, where δ_d,ξ_s are destination and source fixed effects, τ is some measure of trade costs, and X_{sd} is the trade flow from s to d. The goal is then to consistently estimate the trade elasticity θ.

In the context of Latin American countries, Carrillo-Tudela and Li (2004) use the gravity framework to analyze the effects of the Andean Community and Mercosur on intraregional trade. They first classify groups into three categories: homogeneous goods (which follow a single world price); reference price goods (varieties of a larger marketplace that have some average reference price); and differentiated goods (with lower international competition and differentiated prices). They find that both RTAs had an impact on a subset of traded goods. In both cases, capital-intensive goods used as inputs to production were more robustly affected by these RTAs.

Note, however, that due to the discriminatory nature of RTAs, they can lead both to trade creation – due to decreased absolute trade costs – and to trade diversion – due to changes in relative trade costs. Urata and Okabe (2014) try to tease out these two mechanisms. They use different gravity regressions and argue that deeper RTAs, such as customs unions, have larger trade creation effects as opposed to pure free-trade areas. Additionally, plurilateral RTAs have a larger trade-creation effect compared to bilateral RTAs.

Baier, Bergstrand, and Feng (2014) show results that confirm the importance of *deeper* trade agreements, showing that different types of agreements can have different effects. They study the effects along different margins of trade and show that deeper RTAs have larger effects over both the intensive and the extensive margins. Additionally, there is a differential "timing" of the two margins, with the intensive margin reacting sooner.

In more recent work, Baier, Bergstrand, and Clance (2018) dissect further heterogeneity in the effects of trade agreements, meaning that their economic effects can vary depending on the characteristics of the contracting country pairs. Using the similar framework of gravity equations, but allowing for heterogeneous treatment effects for each RTA pair, they show both that the average treatment effect of RTAs can be very heterogeneous, and that the characteristics of country pairs explain most of the variance of this effect, being larger among developing country pairs. This result underscores the importance of context-specific factors for prospective effects of trade agreements.

One important aspect of deep trade agreements is that they can minimize or even potentially overcome the trade diversion vs trade creation trade-off. Mattoo, Mulabdic, and Ruta (2017) show that deeper trade agreements lead to more trade creation and less trade diversion than shallow agreements. More recently, Lee, Mulabdic, and Ruta (2019) show that deep trade agreements can have positive spillovers on third-party countries, as they make the regulatory environment of countries more similar. They use firm-level data from Costa Rica and show that this spillover is indeed a consequence of deep trade agreements.

Foreign Direct Investment *There is some evidence showing that RTAs and bilateral trade agreements tend to increase foreign direct investment, but this evidence is less robust than their effect on trade.*

As mentioned in the initial paragraph of this section, RTAs have increasingly introduced sections that relate not only to trade but also to investment. For that reason, part of the literature has tried to estimate the effect of RTAs on foreign direct investment (FDI). The evidence tying up FDI and RTAs has been mixed, both in Latin America and outside it.

Egger and Pfaffermayr (2004) show that bilateral investment treaties, which are often a part of RTAs, increase the bilateral flow of FDI, while Egger and Merlo (2007) show that the full effect happens with a lag. Additionally, Neumayer and Spess (2005) show

that the same result holds for developing countries. Büthe and Milner (2008) use panel data to show that developing countries that belong to the WTO and participate in more preferential trade agreements are more likely to receive higher FDI flows, after controlling for important covariates.

As with early gravity regressions, however, many biases plague these estimates. Recently, Reed et al. (2016) have argued that, after adopting several corrections for biases, the effect of RTAs on FDIs is negligible or even negative. Therefore, one should be cautious when interpreting the quality of the evidence on this topic and evaluate methodological robustness.

Regarding Latin America, Bengoa, Sanchez-Robles, and Shachmurove (2020) study the effect of bilateral investment treaties, Mercosur and ALADI over FDI in the region. They conclude that deeper trade agreements, such as Mercosur, has a significantly higher effect over FDIs than bilateral investment treaties or free trade areas. This result underscore a similar heterogeneity in treatment effects as observed in the effect of trade aggrements on trade volumes. Quality and depth of agreements matter of the effect. Similarly, Cuevas, Messmacher, and Werner 2005 uses panel data to regress FDI on membership in free trade agreements and find a positive correlation. They then use these results to analyze the effects of NAFTA on Mexico. They conclude that NAFTA induced 60% higher FDI flows into Mexico, from their baseline estimates.

Conversely, some studies find a null effect of trade agreements on FDI in Latin America. Gallagher and Birch (2009) analyzes the effect of bilateral trade agreements between the United States and Latin American countries between 1980 and 2003. He concludes that "there is no evidence that signing such an agreement with the United States will bring increased investment."

Trade Policy Uncertainty *Uncertainty in trade policy makes firms more reluctant to pay fixed costs needed to enter export markets. Recent evidence suggests that RTA can help lock in expectations and decrease trade policy uncertainty.*

A growing literature has been considering the theoretical and empirical effects of uncertainty on economic activity, particularly in macroeconomics[7]. Some recent papers have extended this literature to evaluate the impact of **trade** policy uncertainty over firms' decisions.

Handley and Limão (2022) review of the literature on trade policy uncertainty. In short, the theoretical mechanism is that, under trade policy uncertainty, fewer firms enter the market for a given level of expected future profits, since they have the option value of waiting for better conditions to then pay the fixed cost and enjoy higher net profits. In other words, high trade policy uncertainty in trade policy prevents firms from entering both the domestic and export markets and reduces the mass of firms in the economy at any given moment.

Another set of papers underscores the role of trade agreements in decreasing trade policy uncertainty. Limão (2016) argues that one of the reasons why modern trade agreements are so intricate and complex is that they are trying to reduce policy uncertainty. Carballo, Handley, and Limão (2018) takes that argument to the data by studying the trade collapse in the 2008 crisis. They show that firms who were more exposed to RTAs were less likely to exit the market and that "U.S. exports to non-preferential markets

[7]See Bloom (2014) for a theoretical review; Baker, Bloom, and Davis (2016) for attempts to measure economic uncertainty; and Bloom (2009) for an empirical assessment of the impact of uncertainty over the economy.

would have been 6.5% higher under an agreement—equivalent to an 8% foreign GDP increase."

Finally, while international regimes help to ground future expectations and reduce uncertainties, they can also help foster cooperation. For instance, Nicita, Olarreaga, and P. Silva (2018) estimate that the collapse of the WTO trade agreements and the move of the international trade system from cooperative to noncooperative would increase global tariffs, on average, by over 30 percentage points.

Non-Tariff Measures *Non-tariff barriers to trade have become increasingly important in the past 20 years. The empirical literature that estimates the effects of trade agreements on non-tariff measures liberalization is limited. There is a wide range of estimates regarding ad-valorem equivalents of non-tariff measures (from 9-57pp). There is empirical evidence that trade agreements promote trade by decreasing non-tariff trade barriers. Eliminating non-tariff measures would asymmetrically benefit LAC countries.*

As countries liberalized tariff protection during the 1980-2000s, non-tariff measures have become an increasingly important policy instrument for international trade. In fact, according to estimates by Niu et al. (2018), while average tariff protection decreased from 12pp to 5pp between 1997 and 2015, the ad-valorem equivalent of non-tariff measures increases from 20pp to 57pp. This change explains why RTAs have become "deeper" in scope: as tariffs became less relevant, the main policy instrument through which RTAs can affect trade flows is non-tariff measures harmonization.

Hoekman and Nicita (2011) show that non-tariff measures are detrimental to bilateral trade flows, particularly for developing countries. Using gravity regressions, they show that, despite preferential access programs, both tariffs and non-tariff measures continue to be a significant source of trade restrictiveness. They also show that decreasing non-tariff trade barriers can boost exports of developing countries.

The empirical literature that estimates the effects of trade agreements on non-tariff measures liberalization is limited. One approach is to augment gravity regressions to account for FTA depth. This is the path taken by Gruebler and Reiter (2021), who show that FTA depth is associated with higher bilateral trade flows, conditional on the existence of a FTA. Similarly, Cadot and Gourdon (2016) use a new dataset to show that (a) ad valorem equivalents of non-tariff measures are much smaller than the previous estimates (8.8pp); and (b) deep trade agreements have a positive effect on bilateral trade flows by decreasing non-tariff measures.

A regional report by ECLAC (Dolabella and Durán Lima 2021) provides estimates of non-tariff measures ad valorem equivalents (AVEs) for Latin America and the Caribbean. On average, imports to LAC face a 3.58pp AVE while exports from LAC face a 9.38pp AVE. Thus, eliminating non-tariff measures would asymmetrically benefit LAC countries. Using a CGE model, the same report estimates that the combined effect of eliminating non-tariff measures and creating a free trade zone in LAC would generate static welfare gains of 0.72pp (0.31pp due to non-tariff measures).

Trade Facilitation Reforms *Infrastructure and bureaucracy can decrease trade flows by increasing effective trade costs. The evidence shows that trade facilitation quality indices are associated with higher trade flows, even after controlling standard gravity regressands.*

Trade facilitation refers to cutting down bureaucratic delays and infrastructure bottlenecks that affect trade flows. The topic increased in popularity over the past decades,

culminating in the entry into force of the WTO's Trade Facilitation Agreement (TFA). The TFA "contains provisions for expediting the movement, release, and clearance of goods, including goods in transit."

There is some empirical evidence that links trade facilitation to increased trade flows. Wilson, Mann, and Otsuki (2005) study the impact of four measures of trade facilitation, namely: port infrastructure (air and maritime); customs environment; regulatory environments; and e-business infrastructure. Their results show that improvements along all of those dimensions increase bilateral trade. According to their estimates, bringing below-average members halfway up to the global average would increase trade flows by 9.7%, primarily due to boosted exports of developing countries. Latin America and the Caribbean countries would benefit most from improvements in port infrastructure.

Engman (2005) reviews the literature on trade facilitation. It concludes that: (a) improved and simplified customs procedures would have a significant positive impact on trade flows; (b) for developing countries, customs reform can boost tax capacity; and (c) facilitating the cross-border movement of goods would have a positive effect on the ability of a country to attract foreign direct investment.

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