Labor Clauses in Preferential Trade Agreements: How Do They Affect Informality?

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Abstract We study the effect of the labor clauses (LCs) in preferential trade agreements (PTAs) on the informal economy. Using a sample comprising 112 countries for the period 2000-2017, we show that PTAs increase informality in low- and middle-income economies (LMIEs), regardless of whether LCs are included or not. This result is confirmed when accounting for the heterogeneity of parties to the agreement. Finally, PTAs with LCs whose implementation relies on deep cooperation mechanisms decrease informality in LMIEs when their partners are high-income economies. The policy implication is that LMIEs should foster the integration of LCs enforced through deep cooperation mechanisms.

Keywords: Preferential Trade Agreements, Labor Clauses, Informal Economy

I. Introduction

Informality is a major issue in emerging and developing countries, where the informal economy represents one-third of output and employment on average (Elgin et al., 2021). It is also a concern in developed countries. For illustration, the informal economy absorbs one-fifth of the Gross Domestic Product in the European Union countries (Borlea et al., 2017). A broad definition of the informal economy includes all market-based and legal production of goods and services which are concealed from public authorities for monetary, regulatory, or institutional

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reasons (Buehn and Schneider, 2012a; Schneider et al., 2010).[1] Then, the informal economy refers to "all economic activities by workers and economic units that are—in law or practice—not covered or insufficiently covered by formal arrangements" (OECD and ILO, 2019, p. 155). Such economic activities could, for example, result from self-employment or undeclared employees, undeclared production of legal services and products (tax evasion) and undeclared employment benefits (tax avoidance). Since the existence of an informal economy may foster economic inefficiency, lower government revenues and conduct to biased official statistics on which governments establish their policies, this phenomenon has drawn the attention of policymakers and academics for two decades.

Several works attempted to study the impact of trade on informality and its capacity to mitigate the detrimental effects of informality. However, the existing literature in this field is far from conclusive, with the magnitude and the sign of the effect of trade on informality varying across theoretical and empirical frameworks. A new feature in the trade environment might have changed things over the last decade: the growing inclusion of labor clauses (LCs) in Preferential Trade Agreements (PTAs).[2]

The intense debate about including workers' rights standards in trade agreements preceded the establishment of the World Trade Organization (WTO) in 1995. However, developing countries argued that such provisions would act as new discriminatory trade barriers and negatively affect their competitiveness. Labor standards were ultimately excluded from the WTO's negotiations and were transferred, through the adoption of the Singapore Declaration in 1996, to the International Labour Organization as the competent body for managing them. Since then, LCs have gradually been incorporated into PTAs, especially when these agreements involve developed and developing countries. According to Raess and Sari (2020), while the share of PTAs with substantive LCs in the main text in the total number of PTAs signed in a given year averaged 9 percent in the 1990s, it reached 52 percent during the period of 2010-2017, depicting a clear strengthening trend. Furthermore, by 2017, the highest share of PTAs with any kind of LCs was signed between developed and developing countries. The motivation of developed countries is multiple. While competing with developing countries on a level-playing field in the international context, the fear of downward pressure on domestic standards (race to the bottom), and the promotion of fair working conditions (Ehrlich, 2018) are often cited, protectionism is an unstated motive that has been the subject of early debate

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1) Monetary reasons encompass the evasion of taxes and social security contributions, regulatory reasons include the circumvention of government bureaucracy or regulatory burdens, and institutional reasons include corruption, frequently associated with the substandard quality of political institutions and the ineffective rule of law.

2) Following a recent trend in international economics literature, we use the term "preferential trade agreement (PTA)" to make reference to various trade agreements that imply reciprocal privileges between trading partners. PTA does not refer to the non-reciprocal trade agreements put in place by the World Trade Organization under the Generalized System of Preferences.

in the political economy literature (Bhagwati, 1995). The common view is that developed countries seek to condition market access on labor standards in order to protect import-competing and labor intensive industries from competition from low-wage industries in developing countries. Empirical evidence for this protectionist motive is provided by Lechner (2016) and Raess et al. (2018). On their own side, developing countries are often reluctant to include social clauses in trade agreements because they fear hidden protectionism that would weaken their competitiveness by increasing labor costs. If the fear of developing countries is confirmed, one would expect that LCs would also affect informality. The objective of this work is to test this proposition and to examine if and how preferential trade agreements integrating labor clauses affect informality.

The analysis of the effect of LCs is part of a larger literature on non-trade issues (NTIs) within PTAs. Early studies examining the inclusion of non-trade issues in PTAs focus on human rights (Hafner-Burton, 2009; Meissner and McKenzie, 2019; Spilker and Böhmelt, 2013). Regarding other NTIs, Lechner (2016) focuses on civil and political rights, and environmental and labor clauses, while Lechner (2018) concentrates on environmental and labor clauses. In the specific case of labor clauses, until recently, the lack of detailed data about the design and the stringency of LCs has impeded researchers from conducting a precise assessment of their inclusion in PTAs. The few attempts are provided by Carrère et al. (2022), Jinji and Kamata (2020), Kamata (2016), Kim (2012), Postnikov and Bastiaens (2014), and Sari et al. (2016), but without paying attention to informality. We add to the emerging literature on PTAs and non-trade issues, as well as to the literature on trade and informality. To the best of our knowledge, the present study consists of a first attempt to evaluate the impact of trade liberalization on informality through the investigation of labor clauses' effect in preferential trade agreements.

Firstly, it investigates the impact of preferential trade agreements with labor clauses on the informal economy, depending on the income level of countries. Secondly, it takes a further step by examining whether the relationship between informality and PTAs with LCs varies across trading partners. Thirdly, this study expands its scope by differentiating the labor clauses depending on the kind of enforcement. Finally, we test the robustness of our results in two ways: by using an alternative measure of the dependent variable, and by addressing endogeneity between the dependent variable and some of the explanatory variables.

We recourse to the LCs mapped in the novel Deep Trade Agreements dataset of the World Bank (Raess and Sari, 2020) and to the recent database on the informal economy proposed by Medina and Schneider (2020). We estimate the impact of preferential trade agreements with LCs on the informal economy based on a panel dataset comprising 112 countries over the period 2000-2017.

Our results show that preferential trade agreements with labor clauses predominantly affect

low- and middle-income economies (LMIEs), where they are associated with an increase of the informality. When accounting for the heterogeneity of parties to the agreement, the effect of PTAs with LCs on informality varies among countries. PTAs with labor clauses do not affect informality when the PTA involves countries within the same income group. However, when the PTA includes both high-income countries (HIEs) and low- and middle-income economies, the effect of PTA with LCs becomes negative on high-income economies and positive on low- and middle-income ones, although smaller in magnitude compared to the effect of PTAs without labor clauses. PTAs that include LCs involving institutional and cooperation mechanisms seem to decrease informality for LMIEs. This result remains robust when using an alternative measure of the informal economy and when addressing endogeneity.

Our paper is structured as follows. Section 2 states the theoretical foundations. Section 3 presents the data. Section 4 describes the empirical strategy and presents the results. Section 5 checks the robustness of our results, and Section 6 concludes.

II. Literature Review

This paper relates to the literature on trade and informality. Whether trade helps reduce this market failure or at the opposite, boosts it, is a question of primary importance in evaluating the capacity of trade policy to foster growth. The concept of informality embraces different definitions, and in the literature studying the effect of trade on informality, it may encompass issues related to informal employment, the informal sector, or the informal economy.

While early studies investigate the effect of trade on informal employment based on various conceptual frameworks and considering different assumptions (Chandra and Khan, 1993; Gupta, 1993), a scarce strand of the literature focuses on the informal economy. This category of works attempts to emphasize the determinants of this kind of informality. Much of this literature stresses the institutional environment (Dreher et al., 2009; Elbahnasawy et al., 2016; Friedman et al., 2000). Another part of this literature highlights fiscal and regulatory factors that lead agents to participate in the informal activity (Blackburn et al., 2012; Schneider and Enste, 2000). Although regulatory factors do include trade barriers, there is a scant analysis of the separate effect of trade on the informal economy.

A. Trade and informality

Literature on the impact of trade on the informal economy is limited and controversial. On the one hand, trade liberalization is expected to increase the size of the informal economy. Considering heterogeneous countries and the conventional trade theory, since developing countries

are relatively well-endowed with labor and competitive in labor-intensive sectors, fiercer competition in these sectors may prompt domestic producers in developed countries to seek to lower their production costs through the use of informally produced and cheaper inputs. Similarly, increased competition in capital-intensive sectors can disadvantage developing countries and lead to an increase in informality in the latter. Trade liberalization between partners with different levels of development can thus expand informality in both developed and developing countries, depending on which comparative advantage dominates. Furthermore, in the current context of globalization, liberalization may also increase informality in developing countries characterized by low-skilled domestic labor. Import-dependent multinational firms take advantage of large informal economies and cheap unskilled labor in developing countries (Carr and Chen, 2002). Focusing on Central and East Europe and the former Soviet Union countries, Ghosh and Paul (2008) document a positive relationship between trade openness and the informal share of the gross domestic product. Considering the informal sector as residual and assuming that the informal share of GDP goes hand in hand with the informal share of total labor, the authors develop a theoretical model suggesting that the underlined positive relationship is more likely to happen if a country has fewer industries with a comparative advantage.

On the other hand, trade liberalization may be consistent with a decrease of informality. One argument is that the reduction of trade barriers alleviates the incentives of illicit trading activities and incites the migration from the informal sector to the formal one (Schneider and Enste, 2000). In fact, the empirical literature finds that greater trade restrictions promote smuggling (Buehn and Farzanegan, 2012; Mishkin, 2009). Furthermore, Melitz (2003) models suggest that increased exposure to trade forces the least productive firms to exit the market in both developed and developing countries. Since the literature largely documents lower productivity of informal firms (La Porta and Schleifer, 2008, 2014), trade openness might lead to a decrease in economic activities made under the regime of informality. For illustration, Cahn et al. (2021) explore the role of economic integration comprising inward foreign direct investment and trade openness and find a weak significant and negative relationship between trade openness and the shadow economy in a sample including 112 countries. Furthermore, both a short-run and a long-run negative effect of trade openness is reported. Cahn and Thanh (2020) suggest a non-linear impact of export diversification and export quality since, above a tipping point, these indicators are negatively associated with the shadow economy. Elbahnasawy et al. (2016) include the index of trade restrictions among various control variables and find a positive relationship between higher values of the index and the informal economy.

While an extensive literature examines the trade-informality linkage, focusing on trade liberalization as represented by trade openness or a country's trade barriers declining with all trading partners, only a few papers investigate the question on the basis of participation in trade agreements. Involving firms' heterogeneity à la Melitz (2003) and adopting a methodology

close to that of Goldberg and Pavcnik (2003), Aleman-Castilla (2006) shows, in the context of the North American Free Trade Agreement, differentiated effects of the reduction of Mexican import tariffs and U.S. import tariffs on informality and the share of informal employment in Mexico. In the context of the Bilateral Trade Agreement between Vietnam and the United States, using labor force data, McCaig and Pavcnik (2018) observe, in the short run, labor reallocation from the informal to formal manufacturing sector in Vietnam following the substantial drop in U.S. tariffs on Vietnamese exports.

B. Considering labor clauses

The present paper is related to three strands of the literature in relation to PTAs. The first strand links informal employment to trade agreements. The improvement of data regarding the inclusion of labor clauses in trade agreements allowed for the emergence of the second and third strands. Carrère et al. (2022) and Jinji and Kamata (2020) concentrate on the impact of LCs on trade flows, exploiting two new and closely related databases on LCs, namely Raess and Sari (2018) and Raess and Sari (2020), respectively. The third strand of the literature points to the effect of LCs on some labor market characteristics. While Kim (2012) and Postnikov and Bastiaens (2014) find some support for the labor standards LCs-led improvement hypothesis, Kamata (2016), analyzing the impact of LCs on working conditions in 136 countries, detects no significant effect. Sari et al. (2016) investigate the impact of LCs in PTAs on collective labor rights, with a particular focus on labor-related cooperation activities and the institutional framework. They find a positive influence of this kind of "soft" provisions on state compliance with collective labor rights. However, none of these works pays attention to informality.

Yet, we suggest that LCs might affect informality, either positively or negatively. As mentioned in the preceding section and recalled by Schneider and Enste (2000), the intensity of regulation, i.e. the number of regulations, including labor market regulations and trade regulations, has been identified as a major driver of the informal economy in both theoretical (Johnson et al., 1997) and empirical works (Buehn and Schneider, 2012b; Johnson et al., 1998). PTAs that suppress trade barriers might, therefore, be consistent with a reduction of the informal economy. However, this negative effect on the informal economy of the removal of trade barriers stemming from the PTA might be counterbalanced by the addition of labor clauses. While the opportunity cost of operating informally increases with the decline of trade barriers, it decreases with the addition of labor regulations. The global effect of PTAs with LCs remains an empirical issue, which we test in this study.

On the one hand, labor clauses might lead to an increase in informality. If we analyze this issue in a Melitz (2003) framework, the inclusion of labor clauses could result in fewer firms finding it more profitable to enter the formal sector rather than the informal one. This is

especially the case for firms in LMIEs where labor standards are low and compliance is costly. Considering the conventional trade theory and in the particular case of trade agreements between countries that are heterogenous in terms of labor standards, labor clauses may mitigate the comparative advantage of LMIEs in labor-intensive sectors and strengthen the recourse of exporting firms to cheaper inputs provided by the informal and generally non LCs-compliant sector in developing countries.

On the other hand, the inclusion of LCs may contribute to a reduction in the informal economy. Reconsidering trade-informality linkages and the conventional trade theory in an HIEs-LMIEs framework, LCs could limit the comparative disadvantage that developed countries face in labor-intensive sectors following trade liberalization, thereby reducing incentives to turn to the informal sector to acquire cheaper inputs.

In the same HIEs-LMIEs framework, an alternative argument relates to firm competitiveness. On the supply side, if labor clauses are effectively enforced and help improve workplace health and safety, it might affect workers' productivity and firms' competitiveness as well as export performance in developing countries, which, in turn, reduces informality. Schrank (2013) underscores a positive relationship between the increased number of labor inspections and competitiveness in the Dominican Republic after the Dominican Republic-Central America Free Trade Agreement (CAFTA-DR).

Furthermore, on the demand-side, consistently with fair trade considerations, compliance with labor clauses that ensure acceptable conditions of work could constitute a strong selling argument vis à vis consumers and firms in developed countries who are concerned with the labor conditions of workers. The resulting increase in demand might help developing countries overcome their loss of comparative advantage due to potential compliance costs. Hainmueller and Hiscox (2015) and Hiscox and Smyth (2011) provide evidence of consumers' sensitivity to items labeled with information about fair labor standards. This demand-side argument is even more likely to hold true in global supply chains, which play an increasingly important role in international trade. It is primarily the importing firms in developed countries that are concerned about the labor regulations compliance of their exporting suppliers in developing countries, in order to protect their reputation and avoid potential claims, often led by workers' rights associations. For example, Oka (2010) shows that, in the context of the US-Cambodia Textile Agreement, Cambodian factories producing for reputation-conscious buyers are more likely to comply better with labor standards. Distelhorst and Locke (2018) highlight that retailers in developed countries increase their purchases from trading partners adhering to higher labor standards in emerging countries. They also show that this result is due to the apparel industries, which have been the target of a number of anti-sweatshop activisms. A well-known example in the literature is Nike, which, following protests by activist groups against its footwear factories in Asian countries, first drew up its code of conduct in 1992, requiring its suppliers to comply with

a number of basic labor rights standards. Since then, the company has redoubled its efforts, for example by developing audit protocols for its subcontractors. The findings of Carrère et al. (2022) are consistent with this demand-side mechanism at the macro level, pointing out that labor provisions in PTAs generally increase trade flows from developing to developed countries.

To sum up, we expect that labor clauses could affect informality under different arguments. Based on a Melitz framework, a positive effect of trade agreements with labor clauses on informality could be observed in both developed and developing countries. However, when we consider PTAs between developed and developing countries, the inclusion of labor clauses may help to limit the comparative disadvantage of developed countries in labor-intensive sectors. The expected effect would be less informality associated with PTAs with labor clauses in developed countries than with PTAs without labor clauses. Conversely, the inclusion of labor clauses could limit the comparative advantage of developing countries in labor-intensive industries, thereby strengthening the positive association between PTAs with labor clauses and informality for these countries. Thus, we would expect PTAs with labor clauses to be associated with more informality in developing countries than PTAs without labor clauses. However, this loss of comparative advantage could be compensated by an increase in the competitiveness of firms due to an improvement of labor conditions or an increase in demand from developed countries for compliant firms in developing countries. This would ultimately result in less informality being associated with PTAs with labor clauses compared to PTAs without labor clauses in developing countries, while the opposite would be observed in developed countries.

Alternatively, one can imagine that the inclusion of labor clauses in preferential trade agreements might affect informality even if these clauses do not actually improve labor standards. The protectionist motive behind the inclusion of labor clauses in trade agreements between HIEs and LMIEs countries is a channel through which these clauses can affect the informal economy without increasing labor standards. If labor clauses do not upgrade labor standards because the developing country party to the agreement does not comply with its obligations, and when LCs are enforceable through dispute settlement, the other party has the possibility to complain to the competent authorities, and if successful, can, in turn, impose repressive trade measures. This would annihilate the potential decreasing effect on informality of the initial reduction of trade barriers induced by the PTA. It should be noted, however, that this mechanism is less likely to occur due to the difficulty of enforcing labor clauses through dispute settlement, as illustrated by the 2017 CAFTA-DR dispute between the United States and Guatemala. This first labor enforcement case submitted to dispute settlement under a free trade agreement was lost by the United States because even though the US was able to demonstrate that the Guatemalan government failed to effectively enforce labor clauses, following denunciations by the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) and six Guatemalan worker organizations related to specific violations

of labor clauses observed in particular sites of employment, they did not succeed in showing that this affected trade.

Enforcement has been widely debated in academic and political arena (Lechner, 2016). Studies examining the impact of social clauses concur that enforcement is crucial in improving human rights or workers' conditions but do not lead to a consensus on the most effective enforcement mechanism. Labor clauses can rely on different enforcement mechanisms, in particular cooperation or strong enforcement. We find PTAs with legally binding and strongly enforceable commitments, such as the US-Jordan PTA of 2000, those with institutionalized cooperation mechanisms, such as the EC-Korea PTA of 2010, and those with both, such as the Canada-Colombia PTA of 2008. Hafner-Burton (2005) finds that strongly enforced clauses, often associated with sanctions, are more likely to be respected by countries. At the opposite, Kim (2012) shows that on account of anticipated fair trade concerns in US trade agreements, and in order to be attractive trade partners, US potential PTA partners improve their labor rights prior to negotiating and signing a PTA, even in the absence of *ex post* enforcement of LCs. On their side, focusing on EU trade agreements between 1980 and 2010, Postnikov and Bastiaens (2014) emphasize the *ex post* improvement of labor rights in EU PTA partners. The authors explain that the difference between their results and those found by Kim (2012) is attributed to the design and enforcement mechanisms in PTAs. Contrary to US PTAs, EU PTAs in the considered period do not generally rely on sanctions but on dialogue, which makes the effects of LCs more gradual. This distinction related to the enforcement of NTIs in US PTAs and EU PTAs has also been early highlighted by Grynberg and Calo (2006) and Horn et al. (2010), pointing to stricter provisions in US PTAs. However, some examples show that this divide needs to be qualified. For example, in 2008, the CARIFORUM-EC Economic Partnership Agreement included substantive commitments over the fundamental worker's rights that are strongly legally enforceable through binding state-to-state DSM. More recently, the design of labor clauses in EU PTAs has evolved, since a number of EU trade agreements rely on both cooperation and strong enforcement mechanisms (e.g., EU - Colombia and Peru of 2013). In addition, other non-EU and non-US PTAs may also rely on both mechanisms (e.g., most of the trade agreements signed by Canada. Carrère et al. (2022), considering mutually exclusive mechanisms of enforcement, emphasize the importance of institutionalized cooperation mechanisms that rely on technical assistance and/or capacity building programs and the involvement of third parties in improving labor standards. Furthermore, scholars stress that major power such as the EU and USA use trade policy instruments to promote NTIs in developing partner states. Bartels (2005) points that conditionality clauses related to human rights and enforced through dialogue are characteristic of EU trade agreements with developing countries but not of those with developed countries.

Indeed, another point in the literature is the market power of trading partners. The willingness of governments to enforce social clauses contained in their agreements with trading partners

may depend on the market power of those partners, as firms do not want to lose trade opportunities for non-compliance. This argument was first put in evidence by Vogel (1995) as the "California effect", referring to the diffusion of environmental standards from the strict state of California to the more lenient U.S. states. In our specific context, considering the demand-side mechanism, exporting firms are more likely to accept stricter labor standards and additional compliance costs if the pressure comes from a major trading partner.

Since these various mechanisms described above play in opposite direction, the global effect of trade liberalization through PTAs with LCs is an empirical issue, which we test in this study. This work adds to the scarce literature examining the effect of preferential trade agreements on informality. Since countries increasingly rely on this trade policy instrument, it seems convenient to examine whether the recourse to this instrument boosts or reduces the informal economy. More specifically, with the raising number of PTAs including labor clauses, it is worth exploring if this category of agreements has a distinct effect than those without labor clauses.

III. Data

A. Informality

The literature uses various expressions to refer to the informal economy, such as shadow, hidden, unofficial or unobserved economy. However, all these terms do not necessary correspond to the same definition. In the present work, we consider the informal economy as all market-based legal activities that should have been included in the official GDP of a country but are concealed from public authorities to avoid tax payment or labor market regulations and to escape certain administrative procedures (Buehn and Schneider, 2012a; OECD and ILO, 2019; Schneider et al., 2010).[3]

The literature proposes a plurality of direct and indirect methods to measure the informal economy.[4] We use the measure of the informal economy estimated by Medina and Schneider (2020) based on the Multiple Indicators Multiple Causes (MIMIC) model, which corresponds to the share of informal activities and income earned in total GDP. The MIMIC model is a particular type of structural equation model. In this approach, the size of the informal economy, treated as an unobserved variable, is determined by estimating a structural model that takes into consideration several of its "indicators" and "causes" (Bose et al., 2012). The MIMIC model presents two important features making it very useful. First, it explicitly takes into account

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3) This definition appeals to the terms informality, informal economy, or shadow economy, that will be used interchangeably in this paper.
4) See Elgin et al. (2021) for details about these methods.

multiple possible causes of informal activity and captures multiple outcome indicators of it. Second, it can deliver a panel of estimates of informal activity across countries and over time.[5] Even if this approach suffers from some limitations, Medina and Schneider (2020) is considered the most current reliable database about the informal economy and has the advantages of capturing both employment and productivity in the informal sector, in addition of reducing measurement errors and broadly covering countries and years. [6]

B. Preferential trade agreements and labor clauses

We exploit the recent Deep Trade Agreements dataset of the World Bank to extract data on PTAs (Mattoo et al., 2020) and on LCs (Raess and Sari, 2020). The database details various contents of PTAs increasingly covering non-trade issues such as environmental protection, labor markets regulations, intellectual property, among others.

The data about the labor market regulations content of PTAs are built by Raess and Sari (2020). Previous attempts to map labor clauses in PTAs can be found in Kamata (2014), Kamata (2016) and Hofmann et al. (2017). [7] The interest of these approaches relies on their coding which goes beyond a simple binary coding. However, these approaches fail to capture the broad scope of labor clauses or their degree of enforcement. These limits are overcome by Raess and Sari (2018) in the Labor Provisions in Trade Agreements (LABPTA) dataset. Using the list of agreements from the Design of Trade Agreements (DESTA) dataset (Dür et al., 2014) that groups WTO-notified and WTO-not notified agreements, Raess and Sari (2018) code labor provisions (LPs) against 140 distinct items grouped into six main categories. The authors further construct three variables to reflect the stringency of LPs. Raess and Sari (2020) build on Raess and Sari (2018) and map labor provisions of 271 WTO-notified preferential trade agreements entered into force between 1960 and 2017. The list of PTAs included in our sample is provided in Table A.1 in the online Appendix.

To determine whether two countries have a common PTA with or without labor clauses, we match the information (entry in force, partners of the agreement) about bilateral trade agreements from Mattoo et al. (2020) to the mapping of the labor market regulations conducted by Raess and Sari (2020).[8] We consider that a PTA contains LCs if it includes at least one aspirational labor clause (i.e., mentioned in the agreement's preambles and objectives), one substance-related clause (related to fundamental rights at work, conditions of work, relevant

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5) More details about the MIMIC procedure can be found in Elgin et al. (2021).
6) See Ohnsorge and Yu (2022) for a review of measurement issues.
7) See Raess and Sari (2018) for a detailed review of the attempts of mapping LCs in the literature.
8) The dataset used in this paper is a country-level panel data. This allows us to control for the market power of trading partners, as well as for the income level of PTAs partners. Then, in the case of plurilateral agreements, we use agreements disaggregated by country.

international instruments, and domestic law-related commitments such as non-derogation and effective enforcement), one investment-related clause (commitments to protect labor rights in the context of investment), one cooperation-related clause (commitments in relation to clauses on labor-related cooperation), or one institution-related labor clause (clauses that make reference to an institutional framework likely to affect the monitoring and implementation of labor clauses).

In Figure 1 below, we take a first look at the relationship between PTAs and informality by kind of PTAs (with LCs and without LCs). We distinguish between country pairs (HIE-HIE, LMIE-LMIE, HIE-LMIE, and LMIE-HIE) based on the income level of the partner, building on the literature that suggests a differentiated effect of labor clauses in PTAs depending on the income level of PTA partners. Figure 1 first confirms the general idea that LMIE countries present a higher level of informality compared to HIEs, regardless of whether PTAs include LCs or not. Comparing the distribution of countries' level informal economy by kind of PTAs in the different subgroups, Figure 1 shows a similar distribution for the different subgroups, except for the LMIE-HIE subgroup, where the distribution of informality lies slightly to the right when PTAs include LCs. This suggests at first glance that including labor clauses in PTAs mainly affects LMIEs, particularly when PTAs involved HIEs partners, which is consistent with the theoretical arguments developed in Section 2, and that LMIEs seem to have higher levels of the informal economy when PTAs include LCs.

Figure 1. Distribution of informal economy by kind of PTAs and partner income group (over the period 2000-2017)
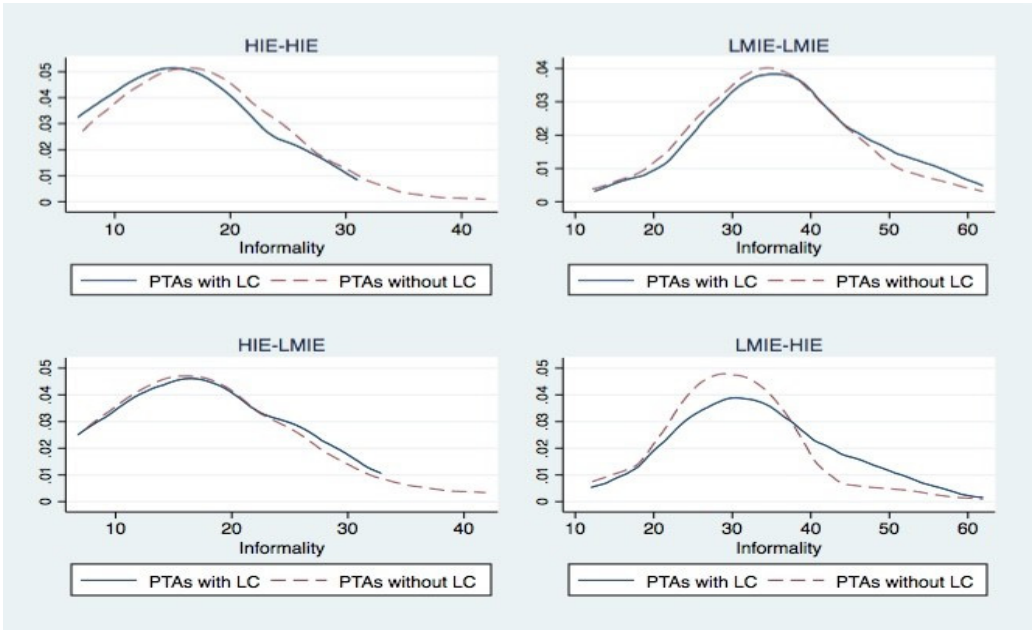
(Source) authors' elaboration on Medina and Schneider (2020) informal economy dataset and the World Bank Deep Trade Agreements dataset (Mattoo et al., 2020 and Raess and Sari, 2020).

C. Control variables

Remaining control variables are considered in accordance with the literature. Economic conditions are controlled for by the logarithm of official GDP per capita. A lower income level might give the incentives to operate underground. In fact, the size of the informal economy would be smaller with an economic prosperity due to greater opportunities in the formal economy with better economic conditions (Alm and Embaye, 2013; Autio and Fu, 2015; Gërxhani, 2004). To account for labor market characteristics, we include the proportion of a country's population that is employed. A higher employment ratio implies lower pressure on urban labor markets to absorb new entrants, reducing incentives to work in the informal economy. The informal economy is also partly due to "excessive" taxes and to the complexity of tax system (Neck et al., 2012). To control for this aspect, we use the share of taxes on income, profits and capital gains as a percentage of official GDP. Furthermore, literature often argues that more labor market regulations are associated with a larger informal economy (Friedman et al., 2000; Johnson et al., 1998). Regulations generally lead to a significant rise in labor costs in the official economy, providing an incentive to work in the informal economy where these costs can be avoided. Labor market regulations are represented by the labor market regulation index from Economic Freedom of the World 2021. Incentives to operate in the informal sector are also affected by institutional quality (Cahn et al., 2021; Dreher et al., 2009; Goel and Nelson, 2016). More specifically, the prevalence of democracy might reduce the informal economy as greater democracy is linked to greater transparency and freedom of association. This aspect is controlled by the voice and accountability variable from the World Governance Indicators.[9] A higher voice and accountability level may result in business-friendly policies and practices that expand the formal economy (Friedman, 2014; Goel and Nelson, 2016). Finally, as highlighted in Section 2, trade openness is an important factor explaining informality. To control for trade openness, we use the sum of exports and imports as a percentage of GDP.

Data definitions and sources are provided in the online Appendix (Table A.2), while summary statistics and the correlation matrix are presented in Tables A.3 and A.4, respectively. Due to data limitations regarding labor regulations that start in 2000, and those of the shadow economy, ending in 2017, our study is limited to the 2000-2017 period.

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9) Voice and accountability variable measures the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and a free media.

IV. Empirical analysis

A. Model specification

We aim to explore whether labor clauses in PTAs affect the informal economy of the PTA signatory country. Besides the traditional determinants of informal economy, our empirical model includes indicators of preferential trade agreements, where we distinguish between agreements with and agreements without labor clauses. We investigate this relationship using a panel estimation strategy and estimating the following equation:

$$Informal_{it} = \alpha + \beta_1 PTA_{it}^{LC} + \beta_2 PTA_{it}^{NLC} + X_{it}\gamma + \mu_i + T_t\delta + \epsilon_{it} \qquad (1)$$

where $Informal_{it}$ is the measure of informal economy in country i at year t, PTA_{it}^{LC} and PTA_{it}^{NLC} represent a country i's sum of weighted PTAs with partner countries signed with and without labor clauses at time t, respectively (the construction of PTA_{it}^{LC} and PTA_{it}^{NLC} will be described in details below). X_{it} is the vector of control variables for country i in year t that includes: the natural logarithms of GDP per capita, employment ratio, taxes, labor market regulations, voice and accountability and openness. μ_i is an unobservable time-invariant country-specific effect which captures important heterogeneity across countries, and T_t denotes time-specific dummies that control for factors common to all countries. Finally, ϵ_{it} is the independent and identically distributed error term. μ_i is assumed to be orthogonal to ϵ_{it} and to the regressors.

PTA_{it}^{LC} and PTA_{it}^{NLC} in equation (1) correspond to the sum of a country i's PTA dummies (including or not including labor clauses, respectively) with country j, weighted by the share of trade between country i and country j in the total trade of country i. The use of these variables has been inspired from the work of Kamata (2016). The objective is to distinguish PTAs signed with a major trade partner, that are assumed to be more effective, from those signed with minor trade partners.[10] PTA_{it}^{LC} and PTA_{it}^{NLC} are computed as following:

$$PTA_{it}^{LC} = \Sigma_j^N \left(PTA_{ijt}^{LC} \times Tradeshare_{ij,1999} \right) \text{ for } i \neq j \qquad (2)$$

$$PTA_{it}^{NLC} = \Sigma_j^N \left(PTA_{ijt}^{NLC} \times Tradeshare_{ij,1999} \right) \text{ for } i \neq j \qquad (3)$$

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10) Häberli et al. (2012) also use the same methodology but without differentiating between PTAs with and without labor clauses.

PTA_{ijt}^{LC} and PTA_{ijt}^{NLC} are dummy variables that indicate the presence of common PTAs (with and without labor clauses, respectively), between countries i and j in year t. Both dummies take the value zero when the two countries have not signed any common PTA as of year t, which constitutes the reference group. $Tradeshare_{ij,1999}$ is the share of trade between country i and j on the total trade of country i as of year 1999, measured as follows:

$$Tradeshare_{ij,1999} = \frac{X_{ij,1999} + M_{ij,1999}}{X_{i,1999} + M_{i,1999}} \tag{4}$$

where X_{ij}, M_{ij}, X_i and M_i are respectively the amounts of exports between country i and j, of imports between i and j, of total exports of i and of total imports of i. All these variables are measured for the reference year of 1999 and for the manufacturing goods. As emphasized by Kamata (2016), the initial fixed trade share of each partner (trade share of 1999 in our case) is used to avoid any influence or effect of post PTA trade increases on PTA_{it}^{LC} and PTA_{it}^{NLC} indexes and to capture as strictly as possible only the significance of the partners of a PTA. PTA_{it}^{LC} and PTA_{it}^{NLC} indicators are theoretically constrained between zero and one, with higher values assigned when the country signs a PTA (with or without labor clauses) with larger trade partner(s) and/or with more trade partners.

B. Empirical Results

1. Baseline estimations

We present in Table 1 the results of estimating equation (1) using the ordinary least squares (OLS) method with a fixed effects panel model. We first give the results obtained on the whole sample (columns 1 and 2). Then, we distinguish countries based on their income group, aligning with our theoretical background pointing out that specific mechanisms at play depend on the income level of signatory countries. This is consistent with Temkin and Veizaga (2010) who find that the impact of globalization on informality depends on the country's level of economic development.

We divide the sample into two subsamples following the definition of the World Bank on income level groups, i.e., high-income economies (HIEs) and low- and middle-Income economies (LMIEs).[11] The list of countries included in each income group is provided in Table A.5 in the online Appendix. The estimation results are reported in columns (3-4) for HIEs and in columns (5-6) for LMIEs. In Table 1, columns (1), (3) and (5) present the estimation

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11) The limited number of low-income economies does not enable us to conduct a separate estimation on this group.

results of the benchmark specification where we study the effect of all PTAs, while columns (2), (4) and (6) differentiate between PTAs with labor clauses and PTAs without labor clauses.[12]

Table 1. *Estimation Results by Income Group*

Variables	Whole Sample		HIEs		LMIEs	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(GDPpc)	-9.452***	-9.458***	-7.984***	-8.007***	-8.122***	-8.185***
	(-20.79)	(-20.27)	(-13.73)	(-13.75)	(-12.42)	(-12.15)
Employment ratio	-0.058***	-0.057***	-0.041**	-0.041**	-0.099***	-0.097***
	(-2.86)	(-2.81)	(-2.02)	(-2.00)	(-2.97)	(-2.89)
Taxes	-0.055***	-0.055***	-0.002	-0.002	-0.047***	-0.047***
	(-6.56)	(-6.56)	(-0.21)	(-0.22)	(-4.01)	(-3.99)
Labor market regulations	0.168**	0.169**	-0.166**	-0.162**	0.151	0.158
	(2.10)	(2.09)	(-2.58)	(-2.50)	(1.09)	(1.13)
Voice and accountability	-1.332***	-1.332***	-0.922**	-0.900**	-1.699***	-1.696***
	(-5.33)	(-5.32)	(-2.40)	(-2.33)	(-5.43)	(-5.41)
Openness	-0.010***	-0.010***	-0.012***	-0.011***	-0.025***	-0.025***
	(-3.19)	(-3.16)	(-4.24)	(-4.11)	(-4.94)	(-4.92)
PTA	0.692***		-0.200		1.993***	
	(3.05)		(-0.91)		(5.88)	
PTA^{LC}		0.686***		-0.303		1.936***
		(2.78)		(-1.15)		(5.26)
PTA^{NLC}		0.714		0.440		2.166***
		(1.59)		(0.48)		(3.88)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,542	1,542	656	656	886	886
R-squared	0.727	0.727	0.840	0.840	0.744	0.744

Note: t-statistics are displayed in parentheses under the coefficient estimates; *** denotes significant at the 1% level, **denotes significant at the 5% level, * denotes significant at the 10% level. All models are significant at the 1% level.

The results obtained for the entire sample (columns (1) and (2)) show that the coefficient of *PTA* is positive and statistically significant at the 1% level. Considering labor clauses in PTAs, the results in column (2) indicate that the positive effect of PTAs is closely related to the category of PTAs with labor clauses, while no evidence is observed for a significant effect of the category of PTAs without labor clauses.

However, looking at the results obtained for HIEs, we can see that PTAs do not exhibit a significant impact on the informal economy, whether they include LCs or not. The results are quite different for LMIEs. The coefficients on *PTA*, *PTA^LC^* and *PTA^NLC^* are all positive and significant at the 1% level. This result implies that PTAs increase the size of the informal economy

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12) PTA variable is constructed using the same methodology as PTA_{it}^{LC} and PTA_{it}^{NLC} and was calculated as following:
$PTA_{it} = \sum_{j}^{N} (PTA_{ijt} \times Tradeshare_{ij,1999})$ for $i \neq j$.

when they include LCs and when they do not. It suggests that the rise of the informal economy in developing countries could be a consequence of the fiercer international competition following trade liberalization, which deteriorates their competitiveness and comparative advantage. Domestic producers in LMIEs seek to reduce their production costs to compete with foreign counterparts. They increase their demand for informally produced and cheaper inputs, boosting thus the informal economy. We should note that the effect of PTAs with LCs is slightly smaller than the one obtained for PTAs without LCs. However, it remains positive, providing less support to the effectiveness of labor clauses in counterbalancing the positive effect of PTAs on informality.

As for the control variables, findings are globally in line with previous studies on the topic. First, a higher trade openness contributes to reduce the informal economy. The impact of trade openness on informality is opposite to the effect of PTAs. This result can be explained by the fact that they are different indicators for the two aspects of trade liberalization. Indeed, trade flows measure *de facto* trade opening, while trade barriers and reforms through PTAs measure *de jure* trade opening aspect. Generally, they are highly related, but in a dynamic way. In principle, PTAs may take time before increasing trade flows as reallocation across sector needs time (Bacchetta and Bustamante, 2009). Then, PTAs are harmful for formal firms, which is reflected in our estimates by increasing informality. However, greater trade flows, reflecting a successful transition process, strengthen the formal sector by generating new opportunities for competitive informal firms which move to the formal economy and by harming less competitive ones which exit from the unofficial market. Consequently, an increase in a country's openness (i.e., the sum of exports and imports relative to GDP) is related to a reduction in the informal economy.

Regarding the effect of real GDP per capita, results show that a higher income level corresponds to a smaller informal economy. The significant and negative influence of the employment rate on the size of the informal economy also makes sense: a higher employment rate implies lower pressure on the labor market, consistent with a lower prevalence of informality.

As for labor market regulations variable, results reveal a positive and significant coefficient (at the 5% level) for the whole sample. Comparing the results obtained for HIEs and LMIEs, we can see that labor market regulations have a negative and significant effect on the informal economy in HIEs, but it seems not to affect informality in LMIEs.

The coefficient on the taxes variable is significant and negative for the whole sample and the LMIEs subsample and not significant for HIEs. For the first two groups, the higher the taxes on income, profits and capital gains as a percentage of official GDP, the larger the official market, and consequently, the smaller the size of the informal economy.

Finally, we see that greater democracy reduces informal economy across all specifications. A democratic framework results in business-friendly policies and practices, strengthens individuals' positive governance perceptions, making individuals act rationally, and consequently,

expands the formal economy (Cahn et al., 2021; Goel and Nelson, 2016).

2. Estimations according to the income level of the PTA partners

Previous results require further investigation. Theoretical arguments developed in Section 2, as well as empirical literature (Carrère et al., 2022; Kamata, 2016) suggest that the effect of LCs in PTAs may be heterogeneous depending on the income level of PTA partners. Especially, labor clauses may be more effective in LMIEs when the latter sign a PTA with high-income partners who usually apply higher labor standards. On the other hand, LCs might not be very effective when the PTA involves countries within the same income group with comparable (high or low) labor standards. To test this hypothesis, we consider four subgroups of country pairs: HIEs-HIEs, LMIEs-LMIEs, HIEs-LMIEs and LMIEs-HIEs.[13]

Table 2 presents estimations of equation (1) conducted on the different subsamples, respectively. For instance, columns (1) and (2) refer to the results obtained for the group of high-income countries when signing a PTA with partners of the same income level. In the following, since control variables 'estimates are globally similar to those obtained for HIEs and LMIEs in Table 1 in terms of signs and significance, we focus the interpretation on our variables of interest (PTA^{LC} and PTA^{NLC}) in columns (2), (4), (6), (8). Columns (1), (3), (5), (7) are kept as benchmark estimations.

Results indicate that PTAs with labor clauses do not affect informality when they involve partners from the same income group (HIEs with HIEs or LMIEs with LMIEs), while the effect of PTAs without labor clauses remains positive.

However, when a PTA involves both low- and middle income and high-income countries (columns (5) to (8)), the results are different. The effect of PTA^{LC} becomes significant at the 1% level, confirming the theoretical predictions stating that the effect of LCs is more likely to occur when involved parties in PTAs belong to different income groups. In the HIEs-LMIEs subsample, we observe negative and significant estimated coefficients on either PTA, PTA^{LC} and PTA^{NLC}. These findings emphasize the comparative advantage of developed countries. In high-income countries, the decline of trade barriers with a low- and middle-income country increases the opportunity cost of operating informally, consistent with a decrease of the informal sector. Furthermore, the smaller coefficient on PTA^{LC} suggests that in high-income economies, labor standards are already strong enough to enhance productivity and benefit formal firms

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13) PTA, PTA^{LC} and PTA^{NLC} are constructed by adding a dummy indicating the income level of the partner country to their respective calculation formulas, as follows:

$PTA_{it} = \sum_{j}^{N} \left(PTA_{ijt} \times Tradeshare_{ij,1999} \times I_{j}^{g} \right)$ for $i \neq j$

$PTA_{it}^{LC} = \sum_{j}^{N} \left(PTA_{ijt}^{LC} \times Tradeshare_{ij,1999} \times I_{j}^{g} \right)$ for $i \neq j$

$PTA_{it}^{NLC} = \sum_{j}^{N} \left(PTA_{ijt}^{NLC} \times Tradeshare_{ij,1999} \times I_{j}^{g} \right)$ for $i \neq j$

Where the I_{j}^{g} dummy indicates the income group (high or low-middle) of the PTA partner(s) for each country i.

that can bear the potential additional costs generated by new LCs, unlike least productive and informal firms that find it more profitable to stay in the informal sector.

Table 2. *Estimation Results by Partners Income-Group*

Variables	HIEs-HIEs		LMIEs-LMIEs		HIEs-LMIEs		LMIEs-HIEs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(GDPpc)	-8.593***	-8.868***	-8.088***	-8.146***	-7.666***	-7.581***	-7.826***	-7.907***
	(-14.84)	(-15.42)	(-12.05)	(-11.99)	(-14.03)	(-13.80)	(-11.95)	(-11.90)
Employment ratio	-0.036*	-0.032	-0.097***	-0.095***	-0.041**	-0.042**	-0.104***	-0.102***
	(-1.77)	(-1.61)	(-2.86)	(-2.76)	(-2.06)	(-2.11)	(-3.09)	(-3.03)
Taxes	-0.127E-3	0.001	-0.049***	-0.048***	-0.007	-0.007	-0.046***	-0.046***
	(-0.01)	(0.09)	(-4.10)	(-4.03)	(-0.79)	(-0.75)	(-3.95)	(-3.94)
Labor market regulations	-0.178***	-0.136**	0.181	0.177	-0.144**	-0.141**	0.056	0.062
	(-2.77)	(-2.13)	(1.27)	(1.24)	(-2.27)	(-2.22)	(0.40)	(0.45)
Voice and accountability	-0.768**	-0.634*	-1.632***	-1.641***	-0.954**	-1.000***	-1.632***	-1.600***
	(-2.00)	(-1.67)	(-5.11)	(-5.13)	(-2.54)	(-2.65)	(-5.21)	(-5.06)
Openness	-0.013***	-0.010***	-0.025***	-0.024***	-0.010***	-0.010***	-0.023***	-0.023***
	(-4.82)	(-3.76)	(-4.68)	(-4.57)	(-3.70)	(-3.57)	(-4.50)	(-4.40)
PTA	0.638**		0.921		-1.856***		2.212***	
	(2.09)		(1.63)		(-4.59)		(5.62)	
PTA^{LC}		0.393		0.330		-1.559***		2.140***
		(1.28)		(0.28)		(-3.39)		(5.27)
PTA^{NLC}		6.733***		1.075*		-3.373***		2.898***
		(4.49)		(1.72)		(-2.85)		(2.87)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	656	656	886	886	656	656	886	886
R-squared	0.841	0.845	0.734	0.734	0.845	0.846	0.743	0.743

Note: t-statistics are displayed in parentheses under the coefficient estimates; *** denotes significant at the 1% level, **denotes significant at the 5% level, * denotes significant at the 10% level. All models are significant at the 1% level.

Looking at the results of LMIEs-HIEs agreements, we observe that the global result obtained in Table 1 for LMIEs, indicating an increase of the informal economy associated with an increase of PTAs, whether they include or not LCs, is rather generated by the specific agreements signed with HIEs. This result confirms the effect of fiercer competition with more competitive firms from high-income countries. We note that the positive effect of PTA is smaller when LCs are included, evoking a potential supply-side or demand-side effect that would mitigate the comparative disadvantage.

3. Estimation by LCs mechanism of enforcement

In this section, we exploit the richness of our database and go further into analysis through the distinction of LCs based on their mechanism of enforcement. We highlight in the theoretical background that the effect of LCs in PTAs may depend on the enforcement mechanisms of LCs. The motive behind this strategy is twofold. Firstly, LCs enforceability is at the heart

of a growing debate. While US PTAs historically adopt a sanction model, whereas EU PTAs are commonly based on cooperation mechanisms, starting from 2010, the so-called new generation EU PTAs increasingly provide for dispute settlement mechanisms. For example, in June 2022, the EU Commission expressed its will to extend state-to-state dispute settlement mechanisms in trade agreements to sustainable development chapters, emphasizing a new approach focused on implementation and compliance. Second, the literature exploring which mechanisms of enforcement in PTAs are effective is mixed. Hafner-Burton (2005) emphasizes the role of strongly enforced clauses. Kim (2012) points to the improvement in domestic labor rights even in the absence of *ex post* enforcement mechanisms, while Postnikov and Bastiaens (2014) highlight the *ex post* role of enforcement mechanisms based on dialogue and Carrère et al. (2022) those relying on institutional mechanisms.

Building on Carrère et al. (2022), we create four mutually exclusive dummy variables, namely PTA^{LCweak}, PTA^{LCenf}, PTA^{LCcoop} and $PTA^{LCenfcoop}$, coded respectively 1 if, for a common PTA signed between country i and j at year t: i) at least one LC is mentioned in the PTA but no one is strongly enforced (binding with state-to-state or private dispute settlement) nor deeply enforced (through cooperation and institution mechanisms); ii) at least one LC is mentioned in the PTA and is strongly enforced, but without cooperation and institution mechanisms; iii) the agreement relies on deep cooperation mechanisms, i.e. it includes reference to cooperation over labor provisions and provides for an institution overseeing labor commitments but without strong enforcement; iv) at least one LC is strongly enforced and the agreement includes reference to cooperation over labor provisions and provides for an institution overseeing labor commitments.

We estimate equation (1) where we decompose PTA^{LC} into the four dummies described above.[14] We only focus on the subsample of agreements between low- and middle-income economies and high-income economies. As emphasized in the theoretical section and confirmed by the results of Table 2, the effect of labor clauses is more likely to occur when countries belong to different income groups. The literature further suggests that in this case, enforcement mechanisms probably play a crucial role in low- and middle-income countries. Another argument is that most of the variation in PTAs mechanisms occurs in the sample of agreements involving LMIEs and HIEs (Carrère et al., 2022). Finally, investigating how different mechanisms of enforcement can affect informality in LMIEs is of primary interest since informality is considered as a main issue in these countries.

The results are displayed in Table 3. We observe a positive and significant effect on informality of PTAs with weakly enforced labor clauses and PTAs with labor clauses implemented through both strong enforcement mechanisms and deep cooperation mechanisms, suggesting that the positive effect of PTAs with labor clauses in LMIEs-HIEs subsample mostly stems from these two types

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14) The dummy variables were computed using the same methodology as the one used to compute PTA^{LC} and PTA^{NLC} in equation (1).

of PTAs. The effect of PTAs with strongly enforced labor clauses is not significant at conventional levels, while PTAs with deep labor clauses are associated with a decrease of informality.

Table 3. *Estimation Results by Mechanisms of Enforcement*

Variables	LMIEs-HIEs
Ln(GDPpc)	-7.346***
	(-10.84)
Employment ratio	-0.075**
	(-2.20)
Taxes	-0.045***
	(-3.93)
Labor market regulations	0.089
	(0.63)
Voice and accountability	-1.542***
	(-4.90)
Openness	-0.021***
	(-4.25)
PTA^{LCweak}	0.023***
	(4.11)
PTA^{Lcenf}	0.010
	(0.83)
PTA^{LCcoop}	-0.888***
	(-3.61)
$PTA^{LCenfcoop}$	0.025***
	(4.48)
PTA^{NLC}	2.917***
	(2.90)
Time fixed effects	Yes
Observations	886
R-squared	0.747

Note: t-statistics are displayed in parentheses under the coefficient estimates; *** denotes significant at the 1% level, **denotes significant at the 5% level, * denotes significant at the 10% level. All models are significant at the 1% level.

As described above, in view of the importance of the enforcement of LCs highlighted in the literature, it is not surprising that PTAs with "weak" labor clauses display the same positive effect than the one depicted by PTAs without labor clauses. Results of both categories are consistent with those of Table 2 suggesting an increase of informality in LMIEs following fiercer competition faced by domestic firms when confronted with firms from HIEs. Strong enforcement mechanisms do not seem to have much of an impact. This might be explained by the limited number of observations related to PTAs that are only binding with state-to-state or private dispute settlement.

Interesting is the significant and negative impact on informality of the PTAs based on deep cooperation measures. Several studies have emphasized the importance of such mechanisms

and the potential they may have, particularly for the developing countries. One explanation is related to the demand-side mechanism and fair trade considerations. Deep cooperation mechanisms involving third parties such as social partners and civil society and implying assistance to LMIEs and capacity building programs, amongst other tools, send a positive and credible signal that makes consumers and firms in high-income countries increase their demand for products originating from low- and middle-income countries. This helps LMIEs face the pressure stemming from the competition of high-income countries and reduces their comparative disadvantage. Another argument relates to the supply-side mechanism and reconciles two stands of the literature that on the one hand emphasize the effectiveness of deep cooperation mechanisms in upgrading labor standards through enhanced expertise (Carrère et al., 2022; Sari et al., 2016), and on the other hand link improvement of working environments to worker motivation, labor productivity and ultimately firms' competitiveness (Brown et al., 2013; Schrank, 2013). To sum up, whether through the demand-side mechanism or the supply-side mechanism, deep cooperation mechanisms sending a positive signal to consumers and firms of HIEs or increasing labor standards in LMIEs, boost LMIEs competitiveness and decrease informality. However, when PTAs associate these deep cooperation mechanisms with strong enforcement measures, the effect on informality turns positive. This might be due to higher compliance costs stemming from strong enforcement mechanisms (i.e., controls and procedure costs, complaint and dispute settlement costs) that would counterbalance the competitive gains of softer mechanisms and eventually lead to an increase in the informal sector. As an example, the Canada-Colombia trade agreement that incorporates an obligation for each of the parties to conduct an annual human rights impact assessment (HRIA) and provide for third party inclusion in the monitoring and implementation of labor provisions has been criticized for its limited scope and effectiveness.

V. Robustness Checks

A. An alternative measure of informal economy

To assess the sensitivity of our results, we start the robustness analysis by running additional estimations using an alternative measure of the informal economy. While Medina and Schneider (2020) is one of the most comprehensive database on the informal economy in terms of observations and time period, some concerns arise about its reliability. MIMIC estimates on which the measure of informality is based may, in fact, be sensitive to the variation in the sample size and to the model specification (Bose et al., 2012). In addition, as emphasized by Elbahnasawy et al. (2016), the MIMIC measure is based on ad-hoc econometric specifications with strong simplifying assumptions. Thus, we use an alternative measure of the informal

economy based on a dynamic general equilibrium (DGE) model that has been suggested by Elgin and Oztunali (2012) and has the advantage of overcoming the MIMIC measurement issues.

Since informality is a major concern in LMIEs, and building on the results of Table 1, which indicate that the effect of LCs is more likely to occur for this group, and on those of Table 2 pointing out that it is only significant when the partner is a high-income economy, we summarize in columns (1) and (2) of Table 4, the results for the LMIEs subsample, in columns (3) and (4) the results for the LMIEs-HIEs subsample, and finally in column (5) the results related to the LCs mechanisms of enforcement in the same latter subsample.

Table 4. *Robustness Check with an Alternative Measure of the Informal Economy*

Variables	LMIEs		LMIEs-HIEs		LMIEs-HIEs
	(1)	(2)	(3)	(4)	(5)
ln(GDPpc)	-3.723***	-3.628***	-3.624***	-3.703***	-3.330***
	(-9.15)	(-8.66)	(-8.94)	(-9.01)	(-8.03)
Employment ratio	0.038*	0.035*	0.036*	0.038*	0.064***
	(1.81)	(1.67)	(1.73)	(1.81)	(3.07)
Taxes	-0.046***	-0.046***	-0.045***	-0.045***	-0.043***
	(-6.26)	(-6.29)	(-6.22)	(-6.19)	(-5.99)
Labor market regulations	-0.314***	-0.325***	-0.351***	-0.345***	-0.325***
	(-3.66)	(-3.75)	(-4.08)	(-4.01)	(-3.75)
Voice and accountability	0.316	0.312	0.332*	0.363*	0.433**
	(1.62)	(1.60)	(1.71)	(1.86)	(2.24)
Openness	-0.017***	-0.017***	-0.016***	-0.016***	-0.016***
	(-5.33)	(-5.37)	(-5.14)	(-4.99)	(-5.00)
PTA	0.569***		0.884***		
	(2.70)		(3.63)		
PTA^{LC}		0.655***		0.814***	
		(2.86)		(3.24)	
PTA^{NLC}		0.305		1.550**	1.476**
		(0.88)		(2.48)	(2.39)
PTA^{LCweak}					0.010***
					(2.89)
PTA^{Lcenf}					0.016**
					(2.05)
PTA^{LCcoop}					-0.800***
					(-5.32)
PTA^{LCenfcoop}					0.007**
					(2.17)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	883	883	883	883	883
R-squared	0.692	0.692	0.694	0.695	0.706

Note: t-statistics are displayed in parentheses under the coefficient estimates; *** denotes significant at the 1% level, **denotes significant at the 5% level, * denotes significant at the 10% level. All models are significant at the 1% level.

We observe that the results with respect to the different categories of PTAs are globally not sensitive to the measure of the dependent variable. In columns (1) to (4), all categories of PTAs remain positively associated with the informal economy across specifications, with the exception of PTA^{NLC} in column (2). Regarding the mechanisms of enforcement, results in column (5) confirm that labor clauses relying on deep cooperation measures are the only category that decreases informality. Finally, compared to the results of Table 3, there is more evidence of the positive effect of strongly enforced measures on informality.

B. Addressing endogeneity

Some control variables such as income, trade flows, trade agreements and labor market regulations may be affected by the informal economy. Countries with higher levels of informality are generally those with lower income, are less open to trade and show weaker regulations (Schneider and Enste, 2000). Consequently, a larger informality may increase the demand for labor clauses in trade agreements particularly when the partner has lower labor market standards.

To address these endogeneity concerns, we use the dynamic panel data model which is the most appropriate in our case as it allows for endogeneity of all explanatory variables. In addition, it enables dealing with omitted-variable bias (Elbahnasawy et al., 2016). Thus, we estimate the following equation:

$$Informal_{it} = \lambda Informal_{it-1} + \beta_1 PTA_{it}^{LC} + \beta_2 PTA_{it}^{NLC} + X_{it}\gamma + \mu_i + T_t\delta + \epsilon_{it} \qquad (5)$$

where $Informal_{it-1}$ is the lagged informal economy for country i, PTA_{it}^{LC}, PTA_{it}^{NLC}, X_{it}, μ_i, T_t and ϵ_{it} are the same as in equation (1).

Moreover, we use the two-step system generalized method of moments (GMM) estimator developed by Blundell and Bond (1998) to estimate equation (5). Compared to the Arellano and Bond (1991) difference GMM estimator, the two-step system GMM estimator improves efficiency by using lagged variables as instruments both in the levels equation and differenced equation. This technique adequately deals with suspected endogeneity of explanatory variables and with fixed effects (Roodman, 2009). To ovoid model over-identification, we further use lags with three and longer for the differenced equation and only two lags for the levels equation for all regressors. We also collapse the instrument matrix in order to reduce the number of instruments (Roodman, 2009).

The results are presented in Table 5 for the same subsamples as in Table 4. Additionally, we report the p-values of the Arellano-Bond test for second-order serial correlation in the disturbances, the Hansen test of over-identifying restrictions, and the difference-in-Hansen test for exogeneity of the instruments. All these tests check for the validity of GMM estimators and instruments.

Table 5. *Two-Step System GMM Estimates*

Variables	LMIEs		LMIEs-HIEs		LMIEs-HIEs
	(1)	(2)	(3)	(4)	(5)
Informality (lag1)	0.900***	0.906***	0.894***	0.879***	0.956***
	(14.12)	(15.96)	(14.15)	(15.29)	(19.69)
ln(GDPpc)	0.976*	1.001**	0.188	0.247	0.351
	(1.77)	(2.03)	(0.31)	(0.43)	(0.70)
Employment ratio	0.055**	0.060***	0.052***	0.054***	0.048***
	(2.43)	(2.83)	(2.77)	(2.72)	(2.80)
Taxes	-0.085***	-0.086***	-0.097***	-0.089***	-0.073***
	(-3.66)	(-3.82)	(-4.34)	(-4.68)	(-3.58)
Labor market regulations	-0.151	-0.148	-0.192	-0.254	0.186
	(-0.65)	(-0.59)	(-0.82)	(-1.20)	(0.90)
Voice and accountability	-0.867*	-0.482	-0.836**	-0.944**	-0.565*
	(-1.88)	(-1.12)	(-2.11)	(-2.27)	(-1.77)
Openness	-0.004	-0.002	-0.001	0.002	-0.010
	(-0.35)	(-0.20)	(-0.12)	(0.15)	(-1.04)
PTA	2.886***		2.122***		
	(2.82)		(3.47)		
PTA^{LC}		2.955***		2.354***	
		(2.79)		(3.89)	
PTA^{NLC}		1.874*		1.387	2.169**
		(1.73)		(1.38)	(2.55)
PTA^{LCweak}					0.010
					(1.51)
PTA^{Lcenf}					-0.003
					(-0.36)
PTA^{LCcoop}					-0.707**
					(-2.62)
$PTAL^{Cenfcoop}$					0.032***
					(5.90)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Arellano-Bond test AR(2), p-value	0.113	0.120	0.105	0.100	0.105
Hansen test of overid, p-value	0.283	0.224	0.175	0.247	0.318
Difference-in-Hansen tests, p-value	0.980	0.977	0.641	0.773	0.899
Observations	886	886	886	886	886

Note: *** denotes significant at the 1% level, **denotes significant at the 5% level, * denotes significant at the 10% level. All models are significant at the 1% level. The null hypothesis in Arellano-Bond test for second-order serial correlation is that there is no second-order serial correlation in the disturbances, in differences. The null hypothesis in the Hansen test of over-identifying restrictions is that all instruments are valid. The null hypothesis in the difference-in-Hansen tests of exogeneity of the full set of GMM instruments for the levels equation is that instruments are exogenous.

Tests statistics in Table 5 confirm, for each specification, the absence of a second-order serial correlation and prove the validity of all the instruments. Furthermore, the coefficients on the variables of interest are globally consistent with those found before and especially confirm

that PTAs, PTAs with LCs and PTAs without LCs have a significant and positive effect on informality in LMIEs. Also, PTAs only relying on deep cooperation mechanisms remain negatively associated with informality, while those with both enforcement and deep cooperation mechanisms increase informality. The two main differences with previous results are related to PTAs without labor clauses in column (4) and PTAs with weakly enforced labor clauses in column (5), since their coefficients lose significance.

VI. Conclusion

Preferential trade agreements constitute a core instrument of the trade policy of several countries. In recent years, these agreements are evolving, increasingly integrating provisions that are non-trade related. Among them, labor clauses are included to ensure a certain level of labor standards in signatory countries. However, it is often argued that labor clauses might consist of hidden protectionism that does not play in favor of developing countries. Our objective in this work is to determine how these clauses affect informality. Exploiting recent databases on informality and labor clauses and based on a panel sample comprising 112 countries for the period 2000-2017, we find that preferential trade agreements with labor clauses and those without labor clauses do not affect informality in high-income economies, while they are globally associated with an increase in the informal economy in low- and middle-income economies. The investigation at a more disaggregated level provides some explanations. When we consider PTAs signed between HIEs on one hand and LMIEs on another hand, these effects are differentiated among countries: they turn negative on the informality of HIEs and remain positive on the informality of LMIEs. Moreover, for LMIEs, it seems that relying on deep cooperation mechanisms for the enforcement of LCs in PTAs signed with HIEs may help reduce informality. Deep labor cooperation mechanisms under PTAs consist of various measures, i.e., organizing seminars and training courses for labor inspectors, providing legal expertise to strengthen labor law and assistance to trade unions, or building programs to support the introduction of social protection systems, contributing to improving conditions of work and ultimately leading to more efficiency. In addition, such institutionalized and cooperative activities could contribute to sharing the costs of improving labor market conditions in a way that is consonant with fair trade objectives. At the opposite, strong enforcement mechanisms that may lead to an increase of procedure or dispute settlement costs annihilate these efficiency gains.

Delivering policymakers with new evidence about the impact of PTAs with labor clauses on informality and the effectiveness of mechanisms of enforcement could provide them valuable support for ongoing or future trade negotiations. Our results draw attention to the current trend followed by trade agreements, particularly those of the European Union, where compliance

with sustainable development objectives is called upon to be accompanied by sanctions in case of non-compliance. Our findings suggest that countries should at the same time carry on fostering the integration of institutional and cooperation mechanisms. Thus, these measures reconcile the fair trade objectives of developed countries and those of fighting informality in developing ones. Informality not only affects the quality of public services and contributes to the increased vulnerability of workers and the maintenance of poor working conditions, but it is also an obstacle to the development of countries. More specifically, this market failure leads to low productivity, which in turn leads to low growth. If they help to reduce informality, preferential trade agreements with labor clauses can result in an increase in aggregate output through an increase in productivity, thus helping developing countries to achieve development and promoting inclusive growth. As many developing countries aim to attain these goals through the integration of global value chains, investigating the effect of labor clauses in this framework is an avenue for future research.

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