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Adopting green measures in exporting firms: What are the effects on labour market outcomes?

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Adopting green measures in exporting firms: What are the effects on labour market outcomes?

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Abstract

This study contributes to the literature on the relationship between trade, labour and environmental sustainability by providing empirical evidence at the firm level. For this purpose, it first explores whether exporting firms are more likely than non-exporting firms to adopt green measures. Second, it assesses how labour market outcomes such as productivity, wages, education level of workers, and training provided by firms may vary between green exporters and firms that do not engage in trade or undertake green measures. The study finds that exporting firms have a significantly higher probability of adopting green measures than do non-exporting firms. In addition, on average, among exporting firms, those that implement green measures tend to have higher levels of productivity, pay higher wages, offer more training and have a similar share of workers with a university degree in comparison with exporters that do not implement green measures. However, the gain in labour productivity associated with exporting and the adoption of green measures does not seem to translate into higher wages in lower-middle-income and upper-middle-income countries; it only does so in high-income countries.

About the authors

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▶ Introduction

The relationship between environmental sustainability and international trade has attracted much attention in academic and political arenas over the past few decades. Many have raised concerns about the impact of increased globalization on environmental degradation and climate change (see Grossman and Krueger 1991; Chintrakarn and Millimet 2006). It is argued that by fostering economic activity and production, trade leads to increased pollution and puts pressure on the exploitation of natural resources. The role of enterprises has particularly been underlined in this context: globalization has given firms the possibility of moving production and parts of production to environmentally less stringent countries (Cherniwchan, Copeland and Taylor 2016). On the positive side, it has been recognized that firms' participation in trade can accelerate the diffusion of technologies that are environmentally friendly. Exporting firms may also face more requirements to adopt green measures because they are more exposed to pressure from clients and regulations overseas (Khan et al. 2021; Galbreath 2019). For instance, international regulatory instruments that require companies to comply with environmental standards, such as the European Union (EU) Corporate Sustainability Due Diligence Directive or the EU Carbon Border Adjustment Mechanism, are likely to affect exporting firms disproportionately.

Many empirical studies have attempted to elucidate the link between trade and environment at the macro level (Chintrakarn and Millimet 2006; Managi, Hibiki and Tsurumi 2009; Zhang et al. 2021). However, the findings have been mixed, reflecting the competing channels put forward at the theoretical level that point to both positive and negative effects. In this context, firm-level analysis could be particularly valuable to explain the reasons for the inconclusive results at the aggregate level. This is especially relevant because important heterogeneities have been identified among firms in terms of their engagement in trade (see the literature based on Melitz 2003) and their environmental performance (Cherniwchan, Copeland and Taylor 2016), both across sectors and also within narrowly defined industries. However, firm-level studies, especially at the empirical level, are still scarce (Cherniwchan, Copeland and Taylor 2016; Siewers, Martínez-Zarzoso and Baghdadi 2024). More research on the link between exporting and investment in green measures is needed to understand how firms are adapting their behaviour to become cleaner and how policies, such as export-promoting policies (Banerjee, Roy and Yasar 2021), can encourage this.

Analysis of the link between trade and environmental sustainability is also important from a labour market perspective, since both trade and action to advance environmental sustainability have consequences for jobs, decent work and sustainable development (ILO 2023). Many studies, including various ILO reports, have analysed the effect of trade on the labour market (see ILO 2021 for references). Many studies have also analysed the effect of implementing greening measures on employment and decent work (see ILO 2018 for references). However, the possible interactions between the export and greening activities of firms and their implications for the labour market have not been jointly explored in the literature. Such interactions need to be studied to inform the design of coherent policies, across the trade, environmental and labour spheres, that will contribute to meaningful sustainability. Therefore, the paper supports the objective of policy coherence for a just transition and promotes social justice in response to the climate and environmental crisis (ILO 2015 and 2023).

The objective of this paper is two-fold. First, it explores whether exporting firms adopt more green measures, in order to better understand whether trading and greening activities can mutually reinforce each other (section 2). Following ILO (2022), the paper uses the term "green enterprises" to refer to enterprises that adopt green processes (technologies/innovation and investment)

as opposed to those that produce green outputs (environmental goods and services).[1] Second, the differences – in terms of labour market outcomes – between green exporters, on one hand, and firms that do not engage in trade or undertake green measures are explored to see whether the combination of these two characteristics are associated with better outcomes (section 3). These outcomes are represented by means of a set of labour market indicators available in the data set, comprising labour productivity, wages, workers' education level, and training provision by firms. The first two are examined jointly in order to understand whether the potential productivity gains associated with exporting and greening prove rewarding to workers via higher wages. It should be noted that this paper does not analyse the effects of the green transition on employment, since it builds on and complements the ILO report on *Greening Enterprises* (ILO 2022), which has already explored this aspect at the firm level using the same data set.

The paper uses data from a series of World Bank Enterprise Surveys (WBES) –conducted between 2018 and 2020 in collaboration with the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) – which include a green module. Empirical analysis undertaken using this database confirms earlier findings about the positive relationship between exporting and green innovation in firms. Regarding decent work, it shows that firms that combine export and greening activities tend to be associated with better working conditions. However, in lower-middle-income and upper-middle-income countries the gains in productivity associated with exporting and greening do not seem to translate into higher wages, meaning that these gains are not evenly shared between workers and firms in developing countries. This may suggest that there is a need to strengthen wage-setting mechanisms and institutions, such as collective bargaining and minimum wages, in these countries.

The paper also finds that green exporters tend to provide more training than other exporting firms and to employ a similar share of workers with a university degree. This may indicate that green transition can help to improve the training offer among exporting firms, and, in turn, lead to positive outcomes for both workers and firms. For workers, training can increase their productivity, motivation, job prospects and, consequently, their employability. For firms, the increase in productivity can translate into higher profits.

[1] Green outputs are "green products and services for consumption outside the producing unit" and green processes correspond to "the use of methods, procedures, practices or technologies that make the economic unit's production processes more environmentally sustainable. They include methods, procedures, practices or technologies that, for example, reduce or eliminate pollution, reduce consumption of water and energy, minimize waste or protect or restore ecosystems. They also include research, development, maintenance or use of technologies or practices to reduce the environmental impact of the economic unit, and the training of the unit's workers or contractors in these technologies or practices" (ILO 2022, 196).

▶ 1 Literature review

This literature review is divided into two sections in line with the double objective of the paper. First, it explores the literature on the relationship between trade and environment, focusing on exporting and green processes. Second, it reviews the studies on the labour market effects of exporting and greening at the firm level. Theoretical channels and empirical studies at both macro and micro levels are reviewed.

Linking exporting and greening

The relationship between international trade and environmental sustainability is complex. In a seminal paper Grossman and Krueger (1991) decompose the trade effects into three factors: scale (effects of increased economic activity), composition (redistribution of tasks across countries), technique effects (improvement in production techniques) (World Bank 2020). These channels point to both positive and negative interactions. For example, although trade can provide incentives to countries with less stringent environmental regulations to specialize in pollution-intensive activities (pollution haven hypothesis), it can also be a channel to diffuse cleaner technologies (WTO and UNEP 2018). Increased engagement in trade can also incentivize countries to adopt more stringent environmental standards as exporting sectors become more exposed to environmental regulation.[2]

In the empirical literature, studies have focused mainly at the macro level (Chintrakarn and Millimet 2006; Managi, Hibiki and Tsurumi 2009; Zhang et al. 2021) and, despite some evidence of a positive relationship, have been largely inconclusive (Siewers, Martínez-Zarzoso and Baghdadi 2024; Managi, Hibiki and Tsurumi 2009). It therefore seems well worth turning to the micro level and focusing on firms to gain a finer understanding of the mechanisms in play.

From a theoretical point of view, several channels could explain the link between the efforts of firms to green their processes and their participation in trade. Trade can facilitate the diffusion of green technologies through imports and exports (Rigo 2021; Keller 2010), but exporting firms also tend to have a higher absorptive capacity to benefit from such technologies (Vlačić et al. 2019). Moreover, exporting firms may have more resources to engage in greening because they are more productive (Girma, Hanley and Tintelnot 2008). External pressure may also be higher for exporting firms, since they are exposed to normative and regularity pressures beyond their borders (Khan et al. 2021; Galbreath 2019; Haller and Murphy 2012). Requirements can come from customers, including influential international buyers or non-governmental organizations (NGOs) from overseas, but also be imposed by government policies and regulations in importing countries.

The limited empirical literature at the firm level tends to confirm a positive relation between trading and green investment or innovation in firms, although some nuances exist. Haller and Murphy (2012) find that, in Ireland, exporting status is positively related to environmental expenditure and investment. Focusing again on Ireland and using a more recent database, Siedschlag and Yan (2021) find that firms that import and firms with supply chain linkages tend to invest more in environmental protection. However, exports do not seem to have any significant effect except

[2] https://www.oecd.org/trade/topics/trade-and-the-environment/

for firms that export to the UK, which could be a reflection of higher standards required in in this country. In another study, Galbreath (2019) finds that export intensity and the implementation of green innovations are positively associated in Australian firms. Siewers, Martínez-Zarzoso and Baghdadi (2024) use the Green Economy module of WBES, as the present study has done, and find a higher probability of adopting environmental processes among firms that join global value chains (defined as firms that start to import and export simultaneously).

Exporting, greening and the labour market

Since literature on the labour market effects, at the firm level, of *combining* green measures and exporting is almost inexistent, this subsection provides a review of the existing studies of the separate impacts of green measures and exporting on employment, productivity, wages and skill requirements.

The literature on the impact of trade on labour is richer than that on the effects of greening, therefore only a brief overview will be provided here.[3] Most of the studies have explored the effects of trade on productivity, job creation and wage distribution and have found exporting firms to be, on average, more productive, to create more jobs and to offer better wages (Matthee, Rankin and Bezuidenhout 2017; Muendler 2014; Yeaple 2005). But not all firms and workers can benefit from trade to the same extent, and this has led to concerns about inequalities. While trade has created employment for workers in some sectors and firms, it has destroyed jobs in others (Corley-Coulibaly, Sekerler Richiardi and Ebert 2023). Moreover, jobs created for low-skilled workers have been mostly in low-paid occupations, whereas high-skilled workers have benefited from higher demand and better pay (Meschi, Taymaz and Vivarelli 2016; Goldberg and Pavcnik 2007; Attanasio, Goldberg and Pavcnik 2004; Sánchez-Páramo and Schady 2003). Studies have also shown that benefits from trade have not been evenly distributed between firms and workers, since gains in productivity have been higher than gains in wages (ILO 2021).

The effects of green measures on labour market outcomes at the firm level is less explored. Most of the existing studies focus on *employment*.[4] From a theoretical point of view, the effects on employment are unclear. Green processes that increase costs and improve productivity could potentially result in a decline in employment (Aldieri and Vinci 2018). However, if productivity gains are translated into lower prices, there may be a rise in demand and investment – and, consequently, in employment (Gagliardi, Marin and Miriello 2016). The rare empirical work at the firm level focuses on green innovations and seems to reach mixed conclusions, some finding negative (Aldieri and Vinci 2018; Cainelli, Mazzanti and Zoboli 2011) and others positive effects on employment (Horbach and Rammer 2020; Gagliardi, Marin and Miriello 2016). The literature also highlights that results depend greatly on the types of measures taken (Horbach and Rammer 2020) and the level of development of the country in which the enterprises in question operate. In this regard, the ILO (2022) finds a negative relationship between firms' adoption of green processes and employment growth in lower-middle-income countries, while no effect is observed in other income groups.

Some studies take another approach and investigate the impact of environmental policies on employment at the firm level – with again inconclusive results, depending on the sector, type of policy, and firms' characteristics. For instance, Dechezleprêtre, Nachtigall and Stadler (2020)

[3] For an overview of findings on trade and labour see ILO (2021).

[4] Although this paper will not be examining employment effects, the literature on this topic will be discussed in this section because such effects are one of the main labour market outcomes that will be affected by the implementation of green measures.

analyse the effects of environmental policy stringency and energy prices on employment in the manufacturing sector in Organisation for Economic Co-operation and Development (OECD) countries and find the effects to be negative but small. However, at the firm level, they identify positive employment effects for the firms that survive. This indicates a reallocation of employment between firms and sectors. Mohommad (2021) examines firm data over 15 years from 31 (mostly developed) countries worldwide and finds that stricter environmental policy tends to reduce labour demand in high-emission-intensity firms (in sectors such as fossil fuels), whereas the opposite trend is observed in low-emission-intensity firms (in services). This, too, indicates a reallocation of employment rather than a significant overall effect. Focusing on wastewater discharge standards imposed on textile printing and dyeing enterprises, Liu, Shadbegian and Zhang (2017) find heterogenous effects on enterprises. Whereas domestically owned private firms incur a decrease in labour demand, state- and foreign-owned firms do not experience job losses.

When it comes to labour *productivity*, several theoretical channels have again been identified in the literature. First, it is argued that green investments lead to the implementation of new technologies and activities that can improve resource efficiency and subsequently productivity.[5] Second, positive effects of adopting green measures on firms' reputation (Russo and Fouts 1997; Schwaiger 2004; Sen and Bhattacharya 2001), including consumers' willingness to pay more for the products of such firms, can lead to higher financial performance and higher productivity (McWilliams and Siegel 2000; Mohr Webb, and Harris 2001; Sen and Bhattacharya 2001). However, the implementation of green measures also requires significant investment which is likely to increase firms' costs (Rokhmawati 2021; EIB and EBRD 2022). Therefore, firm-level productivity growth may slow down, at least in the short term.

Echoing the theoretical analysis, empirical studies at the firm level obtain mixed results depending on the type of measure adopted. Cost-reducing green innovations that improve material and resource efficiency are found to contribute to productivity growth (Rexhäuser and Rammer 2014), while incremental innovations implemented to comply with regulations may harm productivity in the short run (Hojnik and Ruzzier 2016; Ghisetti and Rennings 2014). On the other hand, Xie, Hoang and Zhu (2022) find a non-linear relationship between green process innovation and financial performance: negative in the initial phases and then becoming progressively positive. Similarly, García-Pozo, Sánchez-Ollero and Marchante-Lara (2015) find that eco-innovative practices increase labour productivity in hotels in southern Spain, but argue that the investment required to put innovation in place can lead to an initial decline in productivity. A further paper argues that the improved employee commitment and interpersonal contacts produced by training are the channels by which environmental standards contribute to increased productivity in France (Delmas and Pekovic 2013).

Going beyond productivity and employment, one study investigates the impact of green investment in firms on *average wages* in Italy and finds a positive impact (Quatraro and Ricci 2023). Its authors offer as possible explanations the rent-sharing mechanisms and the skills premium. Another study examines the differences in wages between green and non-green sectors using the labour force surveys in Barbados and finds them to be slightly higher in the green sectors (Jackman and Moore 2021). However, the paper argues that the workers in green industries face more uncertain job prospects, and the wage premium observed could be seen as compensation for this uncertainty. Another study focusing on OECD countries argues that green-task jobs[6] offer

[5] The well-known Porter hypothesis puts forward the role of properly designed environmental policies (such as green taxes or tradable permits) to incentivize such measures (Porter and van der Linde 1995).

[6] "Green-task jobs" are defined as "jobs with tasks that contribute to the green transition" (OECD 2023, 34)

higher wages on average, which may be partly explained by higher education and experience levels required (OECD 2023).

Skill requirements and the provision of training by greening firms is a topic that has been attracting much attention, since the role of skills development in the green transition is recognized as crucial (ILO 2018). On the one hand, in line with the literature on the skilled-biased impact of innovation and the use of new technologies (Vivarelli 2014; Acemoglu and Autor 2011), green innovation is expected to benefit more high-skilled workers. Thus one study finds that higher-skilled workers are better represented in green-task jobs across the OECD countries and that regions with higher shares of such jobs tend to have higher shares of population with university degrees (OECD 2023). On the other hand, specific types of green jobs, especially those related to recycling or waste collection, tend to be held by low-skilled workers, not only in developing but also in developed countries (Bozkurt and Stowell 2016; Gregson et al. 2016; Circle Economy, ILO and World Bank 2023). In other sectors, such as construction, mid-level occupations such as carpenters, bricklayers and technicians could be in greater demand to implement energy efficiency measures (OECD 2023).

All in all, green transition is expected to create jobs for all skill levels, and new sets of skills will be needed for these jobs (OECD 2023). Thus there is a need to reskill and upskill workers to facilitate their transition to newly created jobs and to help low-skill workers move into higher-quality green jobs. Firms can indeed offer training to their workers to facilitate the adoption of green technologies and processes (ILO 2022). The ILO (2022) finds a positive correlation between the number of green measures implemented and the provision of formal training. Yet, the results seem to depend largely on the industry and on the size of the firm. Considering another angle, the OECD (2023) argues that workers in polluting jobs, such as jobs in the coal and gas extraction industries, tend to participate less in training even though this could be more beneficial for them because they face a higher risk of displacement.

The effects that are reviewed in this section do not consider the interactions between exporting and greening. Such an investigation is needed, however, to ascertain whether the combination of these two activities can promote decent work and to identify which policies can encourage such an outcome. It is also important to investigate the relationship between productivity and wage increases to see whether the potential gains from greening are shared evenly between labour and the owners of capital.

▶ 2 Data and main indicators

This study uses data from the World Bank Enterprise Surveys conducted between 2018 and 2020 in collaboration with the EBRD and the EIB. These surveys cover countries from Europe, Central Asia, the Middle East and North Africa and are representative of the firms in these countries. Following the standard methodology, firms are interviewed about a broad range of business environment topics, including access to finance, corruption, infrastructure, crime, competition, and performance measures.

The particularity of this wave of WBES is that, in addition to the core questions found in the standard surveys, it includes a Green Economy module with a set of questions on firms' behaviour in relation to the environment and climate change. This green module is subdivided into four sections that cover exposure to environmental impacts, management and the environment, environmental policy and regulation, and the environmental impact of the establishment.

Table 1 provides the list of the 37 countries covered in the sample studied, as well as the number of observations and some descriptive statistics, including the share of micro, small, medium and large enterprises, the share of exporters and the average age and size of the firms. The sample includes 13 high-income countries, 18 upper-middle-income countries and 6 lower-middle-income countries. The share of exporters varies from 2.2 per cent in the Russian Federation to 55.7 per cent in Slovenia. Across the sample, the average size of the enterprises is 34 employees and the average age of the firms is 19 years.

▶ **Table 1. Economies covered by the World Bank Enterprise Surveys, grouped by income per capita**

Income group	Country	Number of observations	1–9 employees (%)	10–49 employees (%)	50–249 employees (%)	250 employees or more (%)	Share of exporters (%)	Mean age of firms (years)	Mean size of firms
High income	Poland	1369	59.2	36.7	3.7	0.4	8.9	21	15
	Estonia	360	46.0	42.6	10.5	0.9	40.3	17	24
	Hungary	805	47.6	44.3	7.4	0.7	22.6	20	23
	Latvia	359	47.4	41.6	10.0	1.0	32.1	21	24
	Lithuania	358	48.1	44.4	6.7	0.9	25.8	17	22
	Slovakia	429	46.8	41.4	9.1	2.8	17.5	17	44
	Slovenia	409	36.0	54.3	8.2	1.5	55.7	23	38
	Croatia	404	36.8	48.4	12.3	2.5	23.6	21	38
	Greece	600	43.3	51.7	4.5	0.5	20.5	20	18
	Portugal	1062	47.1	45.8	5.7	1.4	12.3	25	26
	Cyprus	240	48.0	43.8	7.2	1.0	8.7	28	24
	Italy	760	45.2	46.2	8.2	0.5	12.8	24	21
	Malta	242	23.9	59.6	13.4	3.2	22.8	33	40

Upper-middle income	Jordan	601	30.3	51.4	15.6	2.7	24.5	26	44
	Albania	377	44.5	39.8	14.3	1.4	19.9	14	29
	Belarus	600	40.2	40.9	14.3	4.5	25.3	18	67
	Georgia	581	31.1	53.2	12.9	2.9	15.5	11	44
	Türkiye	1663	45.9	45.3	7.9	0.9	10.7	21	28
	Russian Federation	1323	40.7	50.7	7.4	1.2	2.2	13	37
	Romania	814	43.6	48.2	7.2	1.0	12.7	18	26
	Serbia	361	33.7	52.8	11.7	1.9	43.6	20	36
	Kazakhstan	1446	45.4	47.1	6.4	1.1	5.3	13	27
	Republic of Moldova	360	46.8	39.6	10.4	3.2	14.2	18	37
	Bosnia and Herzegovina	362	31.5	46.6	18.0	3.9	37.0	21	47
	Azerbaijan	225	28.9	45.8	22.0	3.3	11.0	16	56
	North Macedonia	360	38.5	49.8	10.7	1.1	21.9	20	28
	Armenia	546	38.6	39.3	18.3	3.8	16.0	16	56
	Kosovo*	270	31.3	59.3	9.0	0.5	24.8	20	22
	Bulgaria	772	37.1	53.9	7.8	1.2	23.7	15	27
	Montenegro	150	56.9	30.2	12.2	0.8	6.8	18	26
	Lebanon	532	41.6	47.5	10.4	0.6	24.5	26	25
Lower-middle income	Tajikistan	352	38.0	50.9	9.8	1.4	4.3	19	27
	Ukraine	1337	33.0	49.6	14.6	2.8	12.4	23	69
	Uzbekistan	1239	40.7	51.4	6.6	1.3	5.9	13	27
	Kyrgyzstan	360	28.0	53.0	15.0	4.0	12.7	18	51
	Mongolia	360	44.4	42.2	12.5	1.0	4.6	16	27
	Egypt	3075	45.4	45.9	7.3	1.5	6.6	21	26

* As defined in UN Security Council resolution 1244 of 1999.

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

This paper aims, first, to explore whether exporting firms are more likely to adopt green processes than are their non-exporting counterparts and, second, to assess how working conditions such as productivity, wages, education and training may vary between green exporters and firms that neither engage in trade nor undertake green measures. These objectives require the creation of a number of variables. These variables correspond to the greening and exporting status of enterprises, labour productivity, average wages, training provided by the enterprise, and the education level of the workers.

Greening enterprises

Several options are available to enterprises to reduce their impact on the natural environment. One option is to produce environmental goods and services for consumption outside the producing unit (greening of outputs). Another option is to adopt green production processes – for example, by using renewable energy and/or sustainable raw materials, relying on technology that produces more outputs with the same level of inputs (resource efficiency) – and to manage

waste more efficiently (greening of processes) (ILO 2022). Owing to data availability, this paper focuses solely on the adoption of green processes. The greening variable identifies whether a firm is implementing measures to green its processes. Building on the methodology used in the ILO report on Greening Enterprises (2022), two questions from the management and the environment section of the green module are used to identify greening enterprises. The first question enquires whether the firm has implemented any of the following ten measures over the last three years (yes/no):

- heating and cooling improvements
- more climate-friendly energy generation on-site
- machinery and equipment upgrades
- energy management
- waste minimization, recycling and waste management
- air pollution control measures
- water management
- upgrades of vehicles
- improvements to lighting systems
- other pollution control measures

If the firm reports that it has implemented any of these measures, it is considered "greening". If not, then a second question is asked to find out whether the firm has adopted any other measures to enhance energy efficiency (yes/no). If the response to this second question is positive, the firm is regarded as having implemented a greening process.

Combining the responses from these two questions, two binary variables are created: one relating to the greening status of the firm and the second to the number of greening activities the firm has adopted. The first identifies whether or not a firm has adopted greening processes; the second determines whether it is "greener" than the average. An establishment is considered "greening" if it has implemented at least one of the processes listed above. It is considered "greener" if it has implemented more than the average number of green processes – that is, three processes or more.

Exporting enterprises

The question used to identify exporting enterprises is "What percentage of the establishment's sales were national sales, indirect export or direct export?" Enterprises are considered exporting if they report that they directly export at least 1 per cent of their sales. Although other cut-off points are sometimes used in the literature to determine whether a firm is an exporter,[7] in accordance with a long line of studies beginning with Bernard, Jensen and Lawrence (1995) this paper takes into consideration all export activities regardless of the intensity of exports in the main calculations. The percentage of exporting firms that export less than 10 per cent of their sales is very low in the WBES, in line with the findings of Bernard, Jensen and Lawrence (1995), which suggests that adopting 10 per cent as a cut-off would not greatly affect the results. However, in

[7] As an example, the EIB and EBRD (2022) use 10 per cent as a cut-off.

order to give some insight into the effects of export intensity, the present paper distinguishes, in its descriptive statistics, firms that export less than or more than 50 per cent of their sales.

Labour productivity

Labour productivity is calculated by dividing the total annual sales by the total number of full-time equivalent employees, which comprises both permanent and temporary workers. Temporary workers are weighted according to the average length of their employment in months (Friesen and Wacker 2013). Annual sales, which are reported in national currencies in the database, were converted into 2019 US dollars using exchange rates and consumer price indices from the World Bank Indicators. Finally, the ratios of annual sales per worker were log normalized.

Average wages

Average wages at the firm level are estimated using a proxy indicator based on labour costs. This is calculated by dividing the total annual labour cost by the total number of full-time equivalent employees (again comprising both permanent and temporary workers). The total annual cost of labour is captured by the following question: "From this establishment's Income Statement for fiscal year please provide total annual cost of labour including wages, salaries, bonuses, social security payments."[8]

In order to correct for outliers in the labour cost variable, this paper follows the methodology used by Gelb, Meyer and Ramachandran (2013). First, the ratios of labour cost per worker were log normalized. Then, to deal with outliers, all observations more than three standard deviations away from the geometric mean of the log-normalized values in each country were dropped. In this way, 59 missing values were generated for the labour cost per worker variable.

Sample weights are rescaled to sum up to 1 for each economy in order to give each country equal consideration.[9]

Training and education level

The variable created for training uses the response to the question "Over fiscal year, did this establishment have formal training programs for its permanent, full-time employees?" The variable takes the value of 1 if the enterprise provides training to its employees, 0 otherwise. The variable for education level corresponds to the share of permanent full-time employees with a university degree in the firm.

[8] This measure of average wage is a proxy that includes bonuses and social protection. This methodology follows Duda-Nyczak and Viegelahn (2018).
[9] Similar to what has been used by the EIB and EBRD (2022).

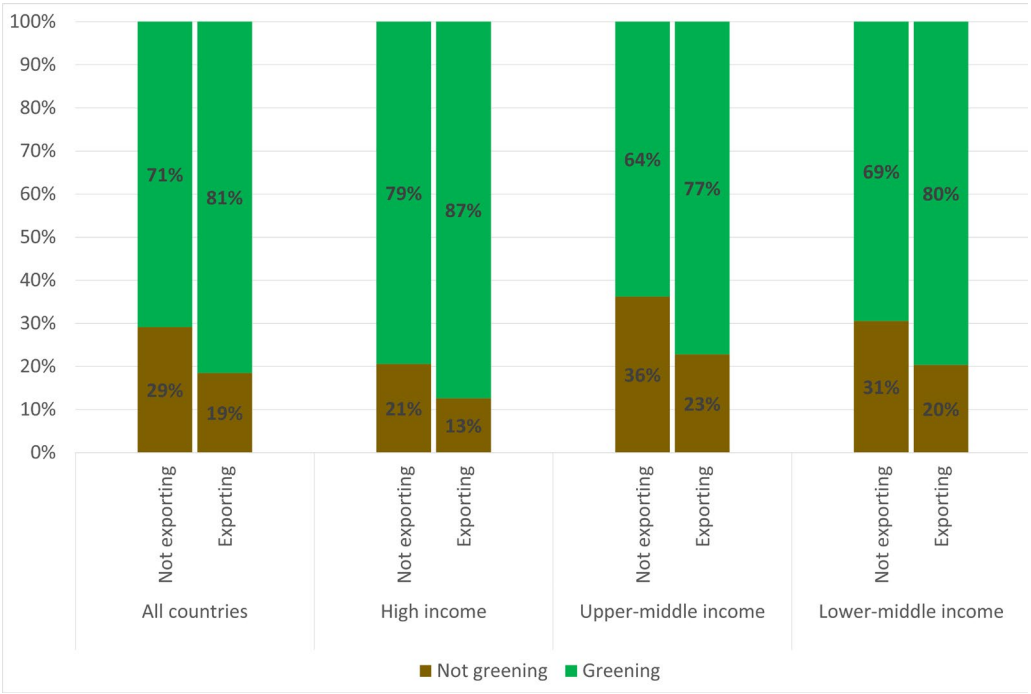
▶ 3 Exporting firms and green measures

This section explores the relationship between exporting and greening strategies at the firm level. In particular, the analysis seeks to understand whether exporting firms are more likely to undertake green measures, and also to examine whether exporting firms are implementing more green measures than are non-exporting firms. The first subsection provides descriptive statistics that do not control for firms' characteristics; the second subsection provides results from two probit models that take into account a set of control variables.

Descriptive analysis

In line with the literature, the descriptive statistics show that the share of enterprises implementing at least one green measure is higher among firms that export than among those that do not. On average across all countries, 81 per cent of exporting firms are implementing at least one green measure; among non-exporting firms the share is equivalent to 71 per cent. This trend is observable across all country income groups (see Figure 1). At the country level, only in four countries out of the 37 under study is the share of enterprises implementing green measures higher among firms that do not export.[10]

▶ **Figure 1. Shares of exporting and non-exporting firms implementing at least one green measure, by country income group**

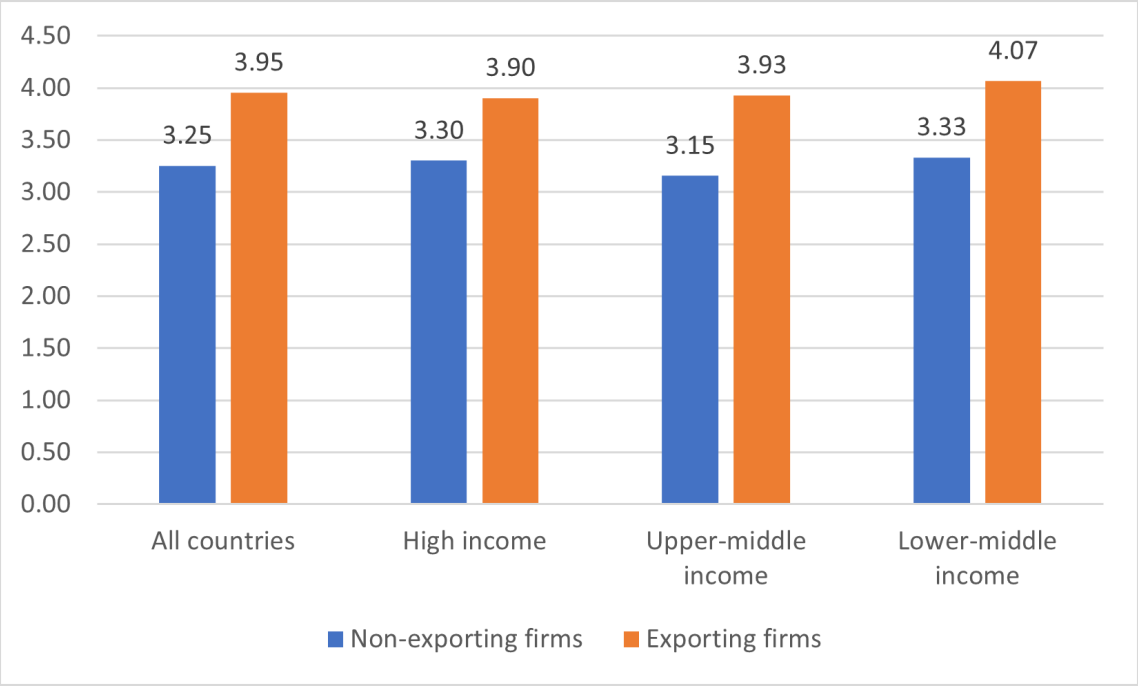


Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

[10] These four countries are Kazakhstan, Lithuania, Bosnia and Herzegovina, and Malta.

It should be noted that the firms implementing at least one green measure are not all engaged to the same extent. Whereas some have adopted only one measure, others have introduced multiple measures simultaneously. In addition to being more likely to engage in green transition than are non-exporting firms, exporting firms seem also to have a higher level of commitment to the transition: Figure 2 shows that exporting firms tend to implement a larger number of green measures. Across all countries, among firms that have adopted green measures, exporters are implementing on average around 4 measures whereas firms that do not export are implementing on average 3.25 measures.

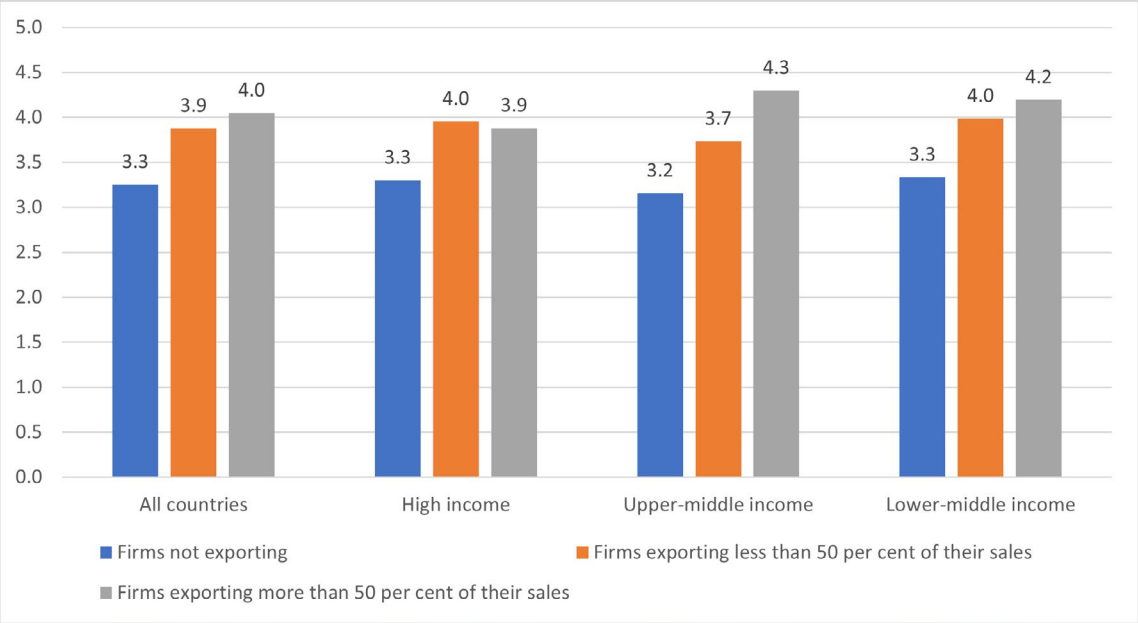
▶ **Figure 2. Average number of green measures implemented among exporting and non-exporting firms, by country income group**



Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

The average number of green measures also seems to vary according to different levels of export intensity. Figure 3 shows that, in lower-middle-income and upper-middle-income countries, firms exporting a higher share of their sales tend to implement, on average, a larger number of green measures. For example, among firms implementing green measures in upper-middle-income countries, firms exporting more than 50 per cent of their sales implement on average 4.3 green measures whereas firms exporting less than 50 per cent of their sales implement on average 3.7 green measures. However, the average difference between these two levels of export intensity remains low.

▶ **Figure 3. Average number of green measures implemented, by export intensity and country income group**



Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

The statistics above describe the relationship between exporting and the implementation of green measures, without considering firms' characteristics. However, firms that export tend to have certain characteristics – notably in terms of size, sector, and investment in research and development – that may affect their decision to implement green measures. It is therefore essential to control for these characteristics using an adequate econometric model when assessing the effects of exporting on greening strategies. The following subsection provides such an econometric model.

Econometric analysis

As mentioned above, specific characteristics of firms may explain both their engagement in exporting and their commitment to implementing green measures. To identify whether the positive relationship observed in the descriptive statistics between greening and exporting still holds when firms' characteristics are controlled for, an econometric analysis is conducted.

Model

Two probit equations are estimated to analyse the link between greening and exporting:

$$Greendummy1 = \pi + Exportdummyy + X\beta + \partial + \epsilon + u \quad (1)$$

$$Greendummy2 = \pi + Exportdummyy + X\beta + \partial + \epsilon + u \quad (2)$$

Whereas the first equation seeks to capture the relationship between exports and the probability of engaging in green transition, the second equation analyses whether exporting firms are implementing more green measures than the average. In the first equation, Greendummy1 is a dummy variable taking the value of 1 if a firm is implementing at least one green measure and 0 if a firm reports that it has taken no action to green its processes. In the second equation,

Greendummy2 is a dummy variable taking the value of 1 if a firm is taking more than three green measures simultaneously and 0 otherwise. Across the 37 countries, establishments are implementing an average of 2.5 greening measures simultaneously. A firm is therefore considered to be "greener" if it has implemented more than this average number of greening processes – that is, three processes or more.

In both models, X corresponds to a set of control variables relating to the firm's characteristics. It includes three categorical variables controlling for the size of the enterprise, its age and its revenue[11] (based on the quintile distribution of total annual sales by country), as well as three binary variables indicating whether there has been any investment in research and development, whether the firm is owned by a group and whether it has received public support (in the form of a grant). These last two variables are included to account for additional resources that firms may possess to invest in environmentally sustainable practices.

Finally, both models control for country and industry fixed effects. ∂ represents a set of dummy variables for each country, and ϵ represents a set of dummy variables for each industry which is based on the International Standard Classification of Economic Activities (ISIC) Rev. 3.1.[12]

Although the standard model presented above shows a correlation between exports and greening measures, it may not be appropriate to identify any causal relationship. While exports may impact on the adoption of green measures through, for instance, increased resources and capacity, the adoption of green measures can also give firms opportunities to expand their international exports.

Results

Results from the two models are presented in Table 2. The first row shows the coefficients corresponding to the effects of exporting calculated using equation (1) and the second row those obtained using equation (2). In both cases a positive relationship between exporting and the adoption of green measures is identified, which confirms the findings from the descriptive statistics and the literature. Indeed, the first row shows that across all countries, and all other characteristics being equal, exporting firms have a significantly higher probability of engaging in green transition than have non-exporting firms. The second row of Table 2 confirms that exporting firms have also a significantly higher probability of implementing more green measures than the average firm in the sample. This suggests that, on average, exporting firms are more engaged in green transition than are non-exporting firms. Although such findings are particularly clear in high-income and upper-middle-income countries, they appear not to be significant in lower-middle-income countries.[13]

[11] In each country, we classified enterprises in quintiles based on their total annual sales to avoid comparing monetary values across countries in different income groups.

[12] Industries are classified according to ISIC Rev. 3.1 as follows: (1) Manufacturing (C); (2) Construction (F); (3) Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods (G); (4) Hotels and restaurants (H); (5) Transport, storage and communications (I); (6) Real estate, renting and business activities (K).

[13] To test the robustness of the results, various specifications were estimated, including different sets of control variables and different cut-off values to define "exporting firms", namely 10 and 20 per cent. These led to similar results. Using export as a continuous variable, a Heckman selection model was used to control for selection bias. Results also show, on average, a positive relationship between the adoption of green measures and exporting. Finally, the correlation between the explanatory variables was tested to avoid collinearity.

▶ **Table 2. Effect of exporting on the firm's probability of (1) taking at least one green measure and (2) taking at least three green measures (results from two probit models), by country income group**

Variable	All countries	High-income countries	Upper-middle-income countries	Lower-middle-income countries
(1) Effect of exporting on the probability of implementing at least one green measure	0.17***	0.19**	0.17**	0.10
(2) Effect of exporting on the probability of implementing at least three green measures	0.13***	0.12*	0.17**	-0.05

Note: Controls include size, age, revenue, whether the firm belongs to a group, whether it received public support, whether the firm has invested in R&D, as well as industry and country fixed effects.

*** p < 0.01, ** p < 0.05, * p < 0.1.

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

A range of factors influence enterprises' decisions to take environmental action. These factors can be classified into internal and external factors. Among the internal factors the business case for greening production processes and cost reduction strategies is a major determinant. Moreover, green finances together with culture and norms play an important role in shaping the strategy adopted by entrepreneurs with respect to the green transition. Among the external factors are the government's broad regulatory and policy frameworks and requirements of international buyers and institutions (ILO 2022).

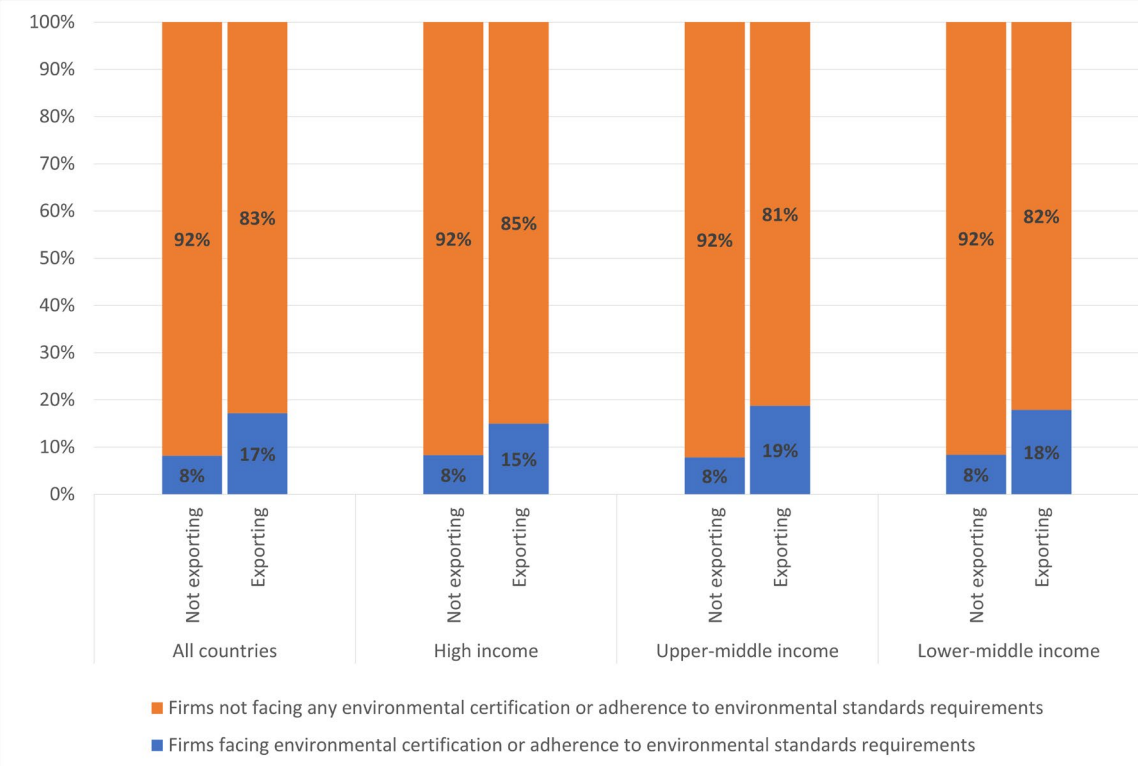
The data available in the WBES allow one to explore the extent to which two of these factors are relevant to explaining the results highlighted in Table 2. It is possible to analyse, first, whether exporting firms are more likely than non-exporting firms to face environmental requirements of clients and customers and, second, whether exporting firms are more likely than non-exporting firms to be subject to environmental regulations such as energy taxes or energy performance standards.

To explore the role of the requirements of clients and customers, this study used answers to the question "Did any of the establishment's customers require environmental certifications or adherence to certain environmental standards as a condition to do business with this establishment?" Figure 4 shows that exporting firms are indeed more likely than non-exporting firms to face environmental requirements from their customers. Whereas an average of only 8 per cent of non-exporting firms face environmental requirements from their customers, the percentage is 15 per cent among exporting firms. Environmental requirements of clients and customers may be driven by more stringent environmental regulations that have been adopted in importing countries or/and at the international level, such as the EU Corporate Sustainability Due Diligence Directive and the EU Carbon Border Adjustment Mechanism. Linking these findings with data on the destination countries would allow the confirmation of this hypothesis; however, such information is unavailable in the survey.

These results confirm one of the findings of the ILO Greening Enterprises report (2022): that pressure from buyers and customers along the supply chain can drive a firm's decisions to adopt a green business model. Indeed, firms have been increasingly adopting voluntary certifications in order to meet their clients' requirements. There are a wide variety of environmental certifications and standards, but the most prominent and widely adopted international standards on environmental practices are the ISO 14000 series, a family of environmental management standards

developed by the International Organization for Standardisation (ISO). In particular, ISO 14001 is an internationally recognized environmental management standard that defines the exact requirements of an environmental management system. Any company that seeks significant improvement in its environmental performance can apply for this certification, regardless of the firm's size or industry. There is evidence that an increasing number of firms require their suppliers to adhere to ISO 14001 (Chen 2005; Mas-Machuca and Marimon 2019). According to the ISO Survey of Management System Standard Certifications, between 2018 and 2022 the number of ISO 14001 certification rose from 307,059 to 528,903 globally.[14] Liston-Heyes and Heyes (2021) have conducted a meta-analysis of 20 years of published studies and conclude that exporting incentivizes the adoption of the ISO 14001. These authors find the main determinant of this impact to be the firm's response to pressures exerted by stakeholders, including customers, suppliers, employees, local communities, NGOs, investors and regulators. Another study shows that holding an ISO 14001 increases the likelihood of becoming an exporter and that this effect is concentrated among large firms (Blyde 2021).

▶ **Figure 4. Shares of exporting and non-exporting firms facing requirements from their customers for environmental certifications or adherence to environmental standards, by country income group**



Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

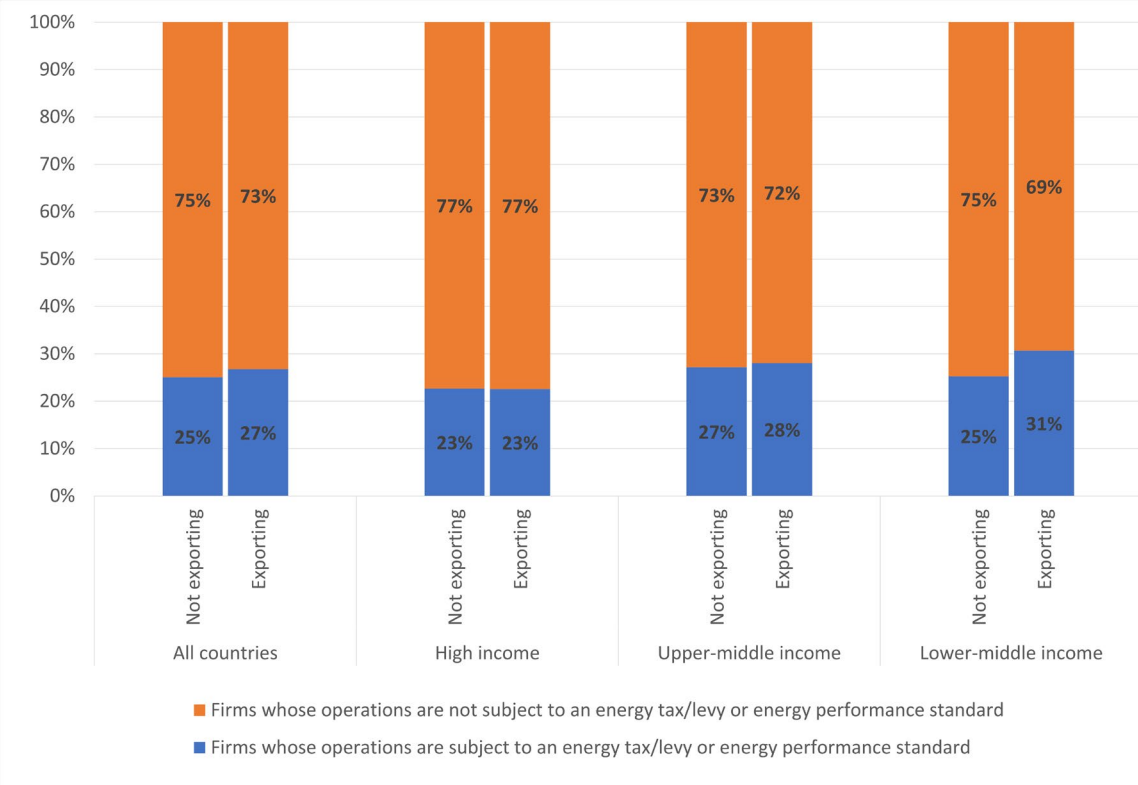
In order to assess whether exporting firms are more likely to be subject to environmental regulations, answers to two questions relating to energy taxes, levies and energy performance standards are combined.[15] Figure 5 shows that exporting firms' operations are only slightly more likely to be subject to energy taxes, levies or energy performance standards. This implies not that

[14] https://www.iso.org/committee/54998.html?t=KomURwikWDLiuB1P1c7SjLMLEAgXOA7emZHKGWyn8f3KQUTU3m287NxnpA3DIuxm&view=documents#section-isodocuments-top.

[15] The two questions are as follows: (1) "In the last fiscal year, was this establishment subject to an energy tax or levy?" and (2) "In the last fiscal year, was this establishment subject to an energy performance standard in its operations?"

environmental regulations have no impact but rather that domestic regulations are likely to apply to a similar extent to exporting and non-exporting firms.

▶ Figure 5. Shares of exporting and non-exporting firms whose operations are subject to an energy tax/levy or energy performance standard, by country income group



Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

▶ 4 Exporting firms, green measures and decent work

While the last section shows that exporting firms are generally more likely to engage in green transition, this section seeks to understand whether combining export and greening strategies at the firm level can contribute to better working conditions. Both export and greening activities have implications for various aspects of decent work. However, their combined effect has been less studied and so is less understood. Given the available data and the relevance of particular indicators to the labour market, the dimensions of decent work studied in this section comprise labour productivity, wages, training provided by firms, and workers' education level.

Model

The model used for this analysis sets the relevant labour market outcomes – namely, labour productivity, average wages, training provided by firms, and workers' education level – as the dependant variable. In each regression the variable of interest is a categorical variable that distinguishes four types of enterprises according to their greening and exporting status. Finally, each regression includes a set of variables to control for firms' characteristics. The final model can be described as follows:

$$LMO = \pi + Exportgreen\gamma + X\beta + \partial + \epsilon + u$$

LMO refers to, respectively, the logarithm of labour productivity, the logarithm of average wages, a binary variable equal to 1 if the enterprise provides training to its employees, and the share of employees in the firm with a university degree. The first two dimensions are examined together in this paper in order to gain a better understanding of the distribution of possible productivity gains.

Exportgreen represents the variable of interest and refers to a categorical variable that distinguishes the following categories:

- firms that are not exporting and not greening (omitted category)
- firms that are not exporting and are greening
- firms that are exporting and not greening
- firms that are exporting and greening

where "greening" refers to firms that are implementing at least one green measure and "exporting refers" to firms that export at least 1 per cent of their sales.[16]

As in the previous models, X corresponds to a set of control variables relating to firms' characteristics. Each regression includes categorical variables controlling for the enterprise's size and age as well as three binary variables indicating whether there has been any investment in research and development, whether the firm is owned by a group and whether it has received public support (in the form of a grant). The share of workers with a university degree is also included in

[16] In the sensitivity analysis, different cut-off values were used to define "exporting firms" (10 or 20 per cent of sales) and "greening enterprises" (adopting three measures or more).

the regressions for labour productivity, wages and training. A categorical variable based on the distribution of revenue is also included in the regression concerning skills.

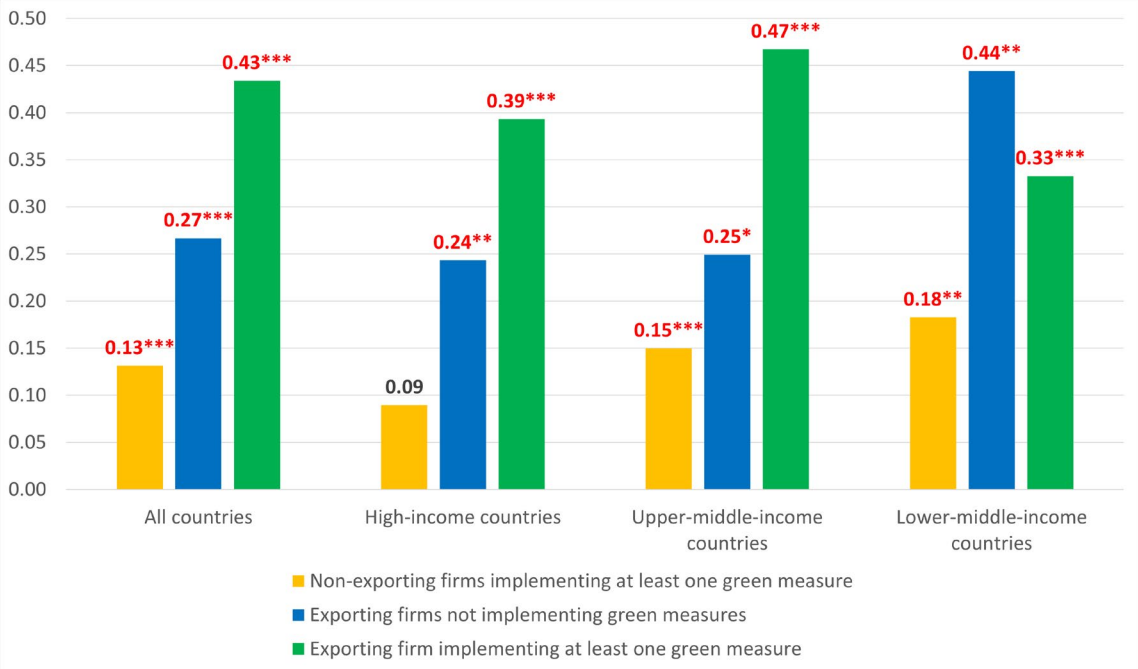
Finally, ∂ represents a set of dummy variables for each country, and ∈ represents a set of dummy variables for each industry.Ordinary least squares (OLS) regressions are run to estimate the effects on labour productivity, average wages, and share of workers with a university degree, while a probit model is used in the case of training because the dependent variable is dichotomous.

Results

Labour productivity and average wages

The results show that firms that engage in both greening and exporting are more productive than those only exporting or only greening (Figure 6). They are also more productive than the non-exporting and non-greening firms that have been used as a control group in the study. This indicates that, at the firm level, the combination of exporting and green measures is associated with higher labour productivity. Since the analysis does not suggest any causality, this relationship may have occur because productive firms are more likely to engage in exporting and in green measures and/or because combining export and greening initiatives may allow firms to achieve higher levels of productivity. The results hold for both upper-middle-income and high-income countries, whereas in lower-middle-income countries firms that are only exporting seem to be more productive than those that combine greening and exporting or those only greening. Despite this slight difference, the results suggest that in all country income groups exporting and green measures are associated with higher labour productivity.

▶ **Figure 6. Regression results for labour productivity, by country income group**



Note: The figure reports the coefficients of log labour productivity resulting from an OLS regression (weighted). The omitted category is firms that do not export and do not implement green measures. Controls include size, age, whether the firm belongs

to a group, whether it is publicly owned, the share of employees with a university degree, whether the firm has invested in R&D, as well as industry and country fixed effects.

*** p < 0.01, ** p < 0.05, * p < 0.1.

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

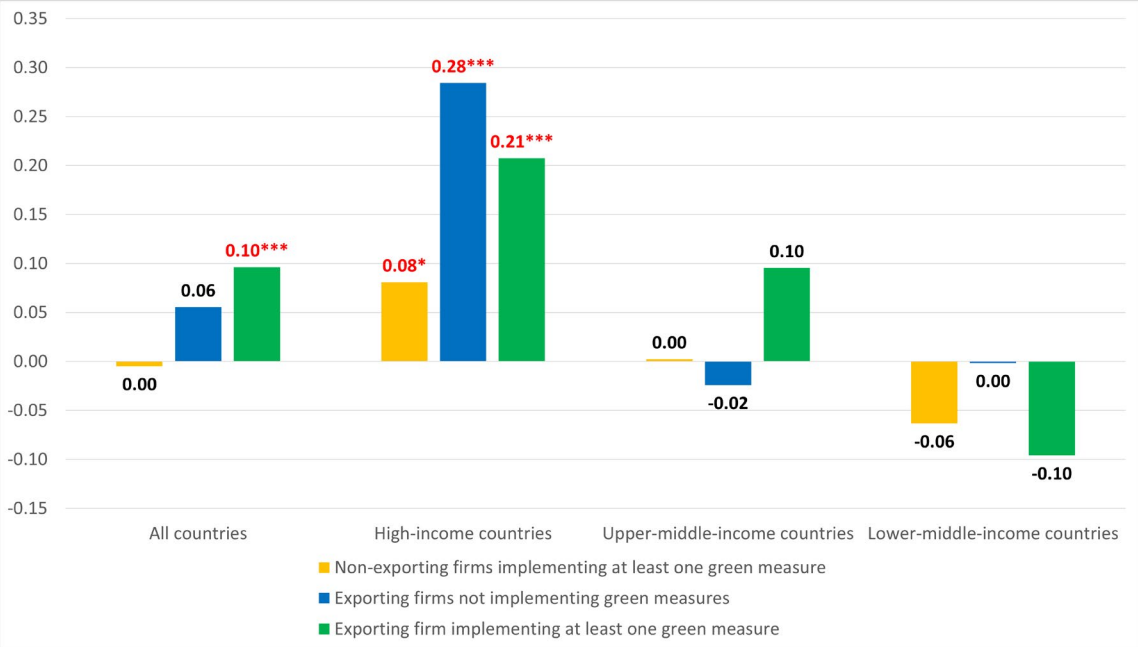
In order to explore whether these productivity gains are translated into higher wages, Figure 7 shows the results of a similar regression using the average wage of the firm as dependent variable. Results for the whole sample suggest that, on average, green exporters pay higher wages than other firms. However, this finding does not hold for lower-middle-income and upper-middle-income countries. Moreover, in high-income countries, exporting firms that have not taken green measures are paying higher wages than green exporters.

When these findings are compared with the results for productivity (Figure 7), it appears that the increased productivity translates into higher wages only in high-income countries. In the samples of lower-middle-income and upper-middle-income countries, no significant increase in wages has been found. This suggests that workers in these countries may not benefit from the productivity gains brought by export and greening activities, a situation that could exacerbate inequalities.

Results for lower-middle-income and upper-middle-income countries nuance the idea that exporting firms pay on average higher wages. However, the findings for upper-middle-income countries hide important heterogeneities within this group. When the regressions to individual countries were applied separately, it was found that, though the results are not significant in ten countries, in six of them exporting firms that implement green measures pay wages significantly higher than those paid by firms that are neither exporting nor implementing green measures. In two of the countries, green exporters pay significantly lower wages. In lower-middle-income countries, findings from country-level regressions are consistent across countries and show that exporting firms that are implementing green measures do not pay wages significantly different from those offered by firms that are neither exporting nor implementing green measures.

The relatively high proportions of unemployment and informality in lower-middle-income and upper-middle-income countries could be one of the reasons for this finding. In such conditions, employers tend to have stronger bargaining power, which may contribute to the decoupling between productivity and wages observed in these countries. Weaker wage-setting institutions may also contribute to lower productivity–wage pass-through in certain middle-income countries. In high-income countries the presence of stronger labour institutions, such as collective bargaining and minimum wages, can help keep wage levels on par with productivity improvement.

▶ **Figure 7. Regression results for average wages, by country income group**



Note: The figure reports the coefficients of log average wages resulting from an OLS regression (weighted). The omitted category is firms that do not export and do not implement green measures. Controls include size, age, whether the firm belongs to a group, whether it is publicly owned, the share of employees with a university degree, whether the firm has invested in R&D, as well as industry and country fixed effects.

*** p < 0.01, ** p < 0.05, * p < 0.1

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

Training provided by firms and education level of workers

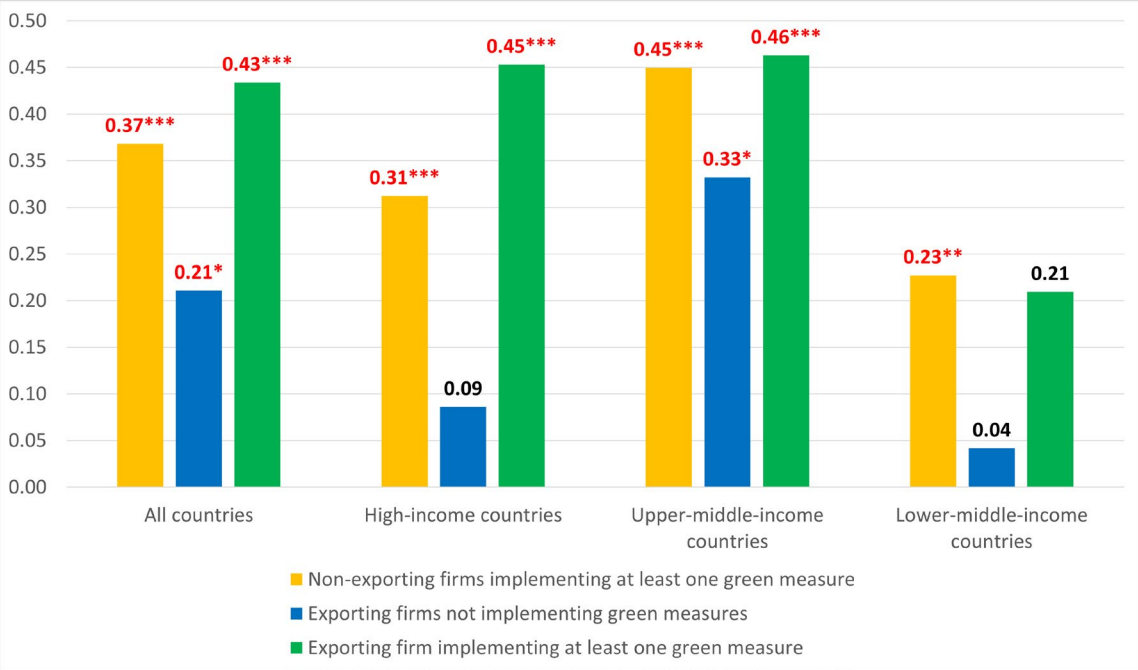
The analysis shows that firms that combine exporting and greening are more likely to provide formal training than are firms in other categories. This finding seems to be driven by greening activities rather than by exporting. Indeed, firms that only implement green measures tend to offer more training than those that only export. It can also be seen that the effect of exporting is not significant for lower-middle-income and high-income countries (Figure 8). A possible explanation of why greening enterprises are more likely to offer training to their employees relates to the types of skills needed to implement some green processes. For instance, putting in place waste-reducing measures may require workers to obtain more knowledge about recycling that can be provided through specific learning activities at the firm level. Previous research also finds a positive relationship between such process innovations and formal training (ILO 2017). Some studies also argue that it could be the training that increases firms' probability of engaging in green innovation (Xie and Zhu 2020; Barba-Aragón and Jiménez-Jiménez 2023).[17]

Interestingly, combining export and greening activities seems to make the link with training stronger.[18] In this regard, the case of firms in high-income countries is worth highlighting. Although there is no significant effect with exporting alone, the combination of the two characteristics substantially increases the probability of firms offering training.

[17] It should be noted that although studies have focused on the effect of green training, the WBES database does not provide information about whether the training has pertained to environmental issues.

[18] On average. In lower-middle-income countries, there is no significant effect.

▶ Figure 8. Regression results for training, by country income group



Note: The figure reports the effects on the probability of offering training by firms resulting from a probit regression (weighted). The omitted category is firms that do not export and do not implement green measures. Controls include size, age, quintiles based on total annual sales (by country), whether the firm belongs to a group, whether it is publicly owned, as well as industry and country fixed effects.

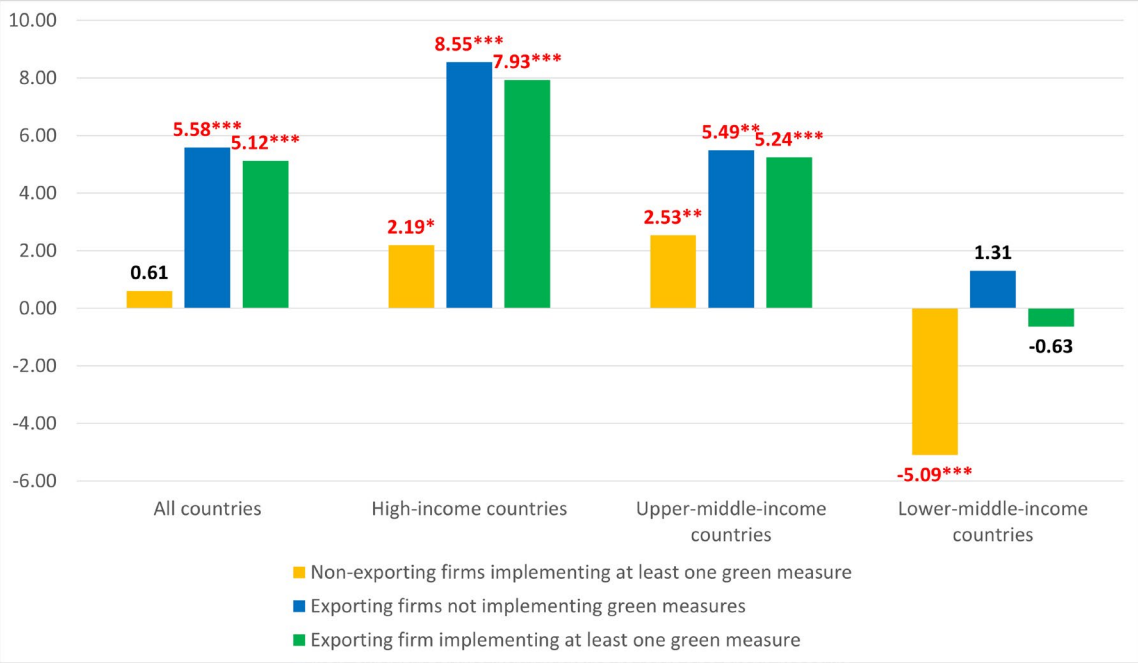
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

The results also show that firms that combine greening and exporting tend to employ more workers with a university degree than those engaged in neither greening nor exporting (Figure 9). However, these results are stronger for firms that are only exporting than for those that are only greening. The positive link between the share of workers with a university degree and direct exporting has been well established in the literature.[19] On the other hand, some process innovations may not require workers to have a university degree (for instance, recycling, as mentioned above). The relationship between greening activities and tertiary education is even negative in the case of lower-middle-income countries. This could indicate that the types of green measures implemented in these countries and the types of activities undertaken by the firms tend to require lower- and mid-level qualifications.

[19] See ILO (2021) for references.

▶ **Figure 9. Regression results for the share of employees with a university degree, by country income group**



Note: The figure reports the coefficients of the share of employees with a university degree resulting from an OLS regression (weighted). The omitted category is firms that do not export and do not implement green measures. Controls include size, age, quintiles based on total annual sales (by country), whether the firm belongs to a group, whether it is publicly owned, as well as industry and country fixed effects.

*** p < 0.01, ** p < 0.05, * p < 0.1

Source: World Bank Enterprise Surveys, http://www.enterprisesurveys.org; ILO calculations.

Finally, although greening firms tend to offer more training, and exporting firms tend to hire more workers with a university degree, it can be observed that firms that combine the two characteristics both have more educated workers and offer more training. This finding is important because it shows that the combined effect of exporting and greening on the training provided by firms and the education level of workers appears to be stronger than the effect associated with adopting only one of these two areas of activity. The fact that exporting-only firms offer less training than firms that combine exporting and greening also suggests that there is scope for more training to be provided in exporting firms. Given its strong relationship with greening activities, training can help firms to meet their environmental goals. Learning activities can also enable workers to improve their skills and productivity, which in turn will benefit their firms.

▶ Conclusions

Given the urgency of addressing environmental degradation and climate change, there is an urgent need for transition towards green economies and societies. Firms have a particular role to play in this transition, since they can modify their production and trading patterns to improve their environmental impact. In this regard, the contribution of exporting firms to environmental change has been highlighted. Exporting firms can amplify environmental degradation because they contribute to increased production through activities that are spread over multiple countries, but they can also be better positioned to implement green measures, since they are more productive and more exposed to new technologies.

It is also well established in the literature that firms that engage in direct export tend to have better outcomes, on average, in various aspects of decent work, including productivity, employment, skills and wages. However, the implementation of green measures can have consequences for these outcomes, owing to changes in production, consumption and trading patterns. It is therefore crucial to better understand these effects to ensure that the green transition will contribute to better working conditions. Yet, research on this topic has remained limited.

This study contributes to the literature on the relationship between trade, labour and environmental sustainability by providing empirical evidence at the firm level. Using the green module of the WBES surveys, it first explores the relationship between exporting and greening and finds that, on average, exporting firms have a significantly higher probability of engaging in the green transition than non-exporting firms. These firms are also significantly more likely to implement a larger number of green measures – meaning three or more – than their non-exporting counterparts. Although many factors could explain this finding, the database allows two of them to be verified. First, the data suggest that exporting firms are almost twice as likely as non-exporting firms to face environmental requirements from clients and customers, which can, in part, be driven by the more stringent environmental regulations adopted in importing countries or at the international level, such as the EU Corporate Sustainability Due Diligence Directive or the EU Carbon Border Adjustment Mechanism. Second, however, exporting firms do not seem more likely than non-exporting firms to be subject to environmental regulations such as energy taxes or energy performance standards, which suggests that domestic regulations are likely to apply to a similar extent to exporting and non-exporting firms.

Having established the relationship between exporting and greening, the paper analyses whether firms that combine exports with the adoption of green measures are associated with better labour market outcomes compared with other firms. Looking at the whole sample of countries, it finds that exporting firms that are implementing green measures tend to have higher levels of productivity, pay higher wages, provide more training than exporting firms that do not implement green measures, and they have a similar share of workers with a university degree. This suggests that implementing green measures can contribute to better working conditions in exporting firms, in addition to the environmental benefits.

However, the gain in labour productivity associated with the adoption of green measures and exporting does not seem to translate into higher wages in lower-middle-income and upper-middle-income countries. Measures to strengthen wage-setting mechanisms and labour market institutions, such as collective bargaining and minimum wages, could help keep wage levels on par with productivity improvement in these countries.

The study also found that, among exporting firms, those implementing green measures tend to provide more training. This suggests that the green transition can provide opportunities for exporting firms to improve their training offer, which could have positive implications for both workers and firms. Training could help workers increase their productivity, motivation, job prospects and, consequently, their employability. Firms benefit from the increased productivity. While green transition can contribute to the improvement of training provided by exporting firms, green training is an essential ingredient of the greening of enterprises. Therefore, adequate measures to promote training should be a priority for policymakers.

However, the study has some limitations. First, the green indicator used in the paper relies on the responses provided by firms regarding their green activities. Given that firms might overstate or not correctly evaluate their green commitments, the use of a more objective measure would be desirable in future work. Another shortcoming is that the WBES data do not allow the value added in firms to be calculated, because of the high number of missing observations in costs variables. Information on these variables would be useful to provide a more accurate estimation of productivity and thereby a better picture of wage–productivity relationships. Data on destination countries, which the database lacks, would also be needed to understand better the effects of regulations in importing countries on firms' decisions to adopt green measures.

This study provides a first and novel analysis of the complex relationship between exporting, greening and labour market outcomes at the firm level. Since it covers various aspects of the labour market as well as four different categories of firms, based on their greening and export activities, it does not examine the direction of causality between the variables of interest. Future research focused on more specific aspects of this relationship could use impact assessment techniques, such as instrumental variables, to account for reverse causality.

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