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Wages and working conditions in and out of global supply chains: A comparative empirical review

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Preface

Global supply chains, where goods cross at least one international border as they flow downstream from raw materials extraction to final products, are not new and have been part of the global economy since the beginning of trade between the first city- and nation-States. Moreover, they exist in all countries, developed and developing, and flow in all directions: between and among both developed and developing countries.

Recent advances in technology and communications have accelerated the opportunity for networked production by allowing firms to specialize in areas where they have unique skills or competencies to produce intermediate products that can be integrated into final products anywhere in the world, enabling both enterprise growth and job creation and making global supply chains a central characteristic of the global economy.

However, the expansion of networked production to a growing number of developing countries initiated a fierce policy debate about wages and working conditions in those countries: were global supply chains taking advantage of workers in less developed countries or were they providing better jobs and wages than were otherwise available in those countries?

A key challenge in that debate is that most of the studies look at wages and working conditions in global supply chains in isolation and have not considered the national and developmental context in which they take place. More specifically, they have not compared wages and working conditions in global supply chains (e.g. export-oriented sectors) to alternative employment options in the domestic and informal economies in the same countries.

Most anecdotal evidence indicates that exporters have better compliance rates and provide higher wages than firms in the domestic economy, and markedly better when compared to those in the informal economy. So this research note examined existing academic literature to identify studies that compared wages and working conditions in and out of global supply chains, recognizing that global and domestic supply chains are both interwoven and overlapping in most countries.

This literature review is intended to contribute to the debate on global supply chains by providing evidence derived from existing studies and identifying areas where additional comparative research is needed. Comparative studies are particularly important as the vast majority of people in all countries work in the domestic economy, so understanding how wages and working conditions compare between domestic producers and exporters will be critical in determining policy priorities.

We were particularly pleased to have the expert assistance of Greg Distelhorst of the University of Oxford and Diana Fu of the University of Toronto to develop this research note, which we feel will be an important contribution to body of research in this area. We also thank Adam Greene, Senior Advisor of ILO Bureau for Employers' Activities, for his technical review and coordination of this work.

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Executive summary

This review of empirical evidence on working conditions seeks to determine whether wages and working conditions are better in or out of global supply chains. Understanding the relative wages and other working conditions in exporters compared to domestic producers can help authorities make better policies and laws that will support sustainable development and economic growth.

This review considers and compares evidence from firms that participate in global supply chains to those that do not. Although global – or cross border – supply chains exist in all countries, this analysis focuses on the manufacturing sector in developing countries, where concerns have been expressed about low wages and poor working conditions as potential consequences of participation in global supply chains.

Global supply chains and working conditions

The link between participation in global supply chains and working conditions has been the subject of considerable debate, which has been characterized by three main theories:

- *Exporting creates incentives for learning and upgrading*: This theory states that exporting can incentivize industrial upgrading and the production of higher-quality products. To be competitive in global markets, firms have to meet higher quality standards and may increase wages and improve human resource management to attract, develop and retain higher-skilled employees.
- *Alternatively, exporting creates price competition and weakens labour rights*: This theory argues that falling trade barriers have rendered export markets highly competitive, and participants in global supply chains must meet rising demands for productivity on narrower margins by driving down wages and eroding standards for working conditions to the bare minimum.
- *Or finally, consumer pressure leads to better working conditions in global supply chains*: This theory states that private compliance initiatives in certain industries have resulted in better compliance and higher labour standards in global supply chains than in domestic producers and firms in the informal economy, which are usually not subject to such initiatives.

Key Findings

This review of empirical research on wages and working conditions in and out of global supply chains seeks to determine which of these theories is supported by the evidence and resulted in four key findings:

Finding 1. There is limited research comparing firms in and out of global supply chains.

While research in international economics on exporter performance contains useful comparisons of wages and skills in global supply chains, there is limited comparative evidence on a variety of non-wage labour standards. Data collection is a challenge in emerging markets for both export behaviour and monitoring of compliance with labour standards. National manufacturing surveys often include data on wages, export activities and productivity, but they seldom contain information about occupational safety and health or labour code violations. Some global companies and multi-stakeholder initiatives monitor labour conditions and standards in supply chain participants, but they do not monitor non-exporters, which precludes within-country comparisons. Existing data sources offer useful evidence on wages, but further research is needed to generate conclusive findings on non-wage standards.

Finding 2. Export manufacturers in emerging markets generally pay higher wages.

Studies find that workers earn higher wages from export manufacturers than comparable non-export manufacturers and employers in alternative industries with similar workers. The wage premium ranges from a low of 10 per cent over wages for comparably skilled workers in non-exporter firms up to more than double the average wage in the informal sector. The appendix to this report summarizes evidence on the export wage premium from over twenty emerging markets. While the research has found that exporters have advantages in productivity and wages over non-exporters, it is unclear if those advantages were preconditions to entering the export market, or if participation in the export market spurred those improvements.

Finding 3. There are exceptions to the wage premium.

Exporters generally pay higher wages, but there are several exceptions to this general finding. First, the wage premium may vary depending on employee skill level, with markedly higher wages for non-production employees (administration and management) than for production workers. Second, export processing zones offer similar wages to comparable employment outside the zones, but export processing can differ from ordinary exporting. Despite the general advantage in wages among export manufacturers, a number of other factors also influence whether individual workers in a supply chain participant receive higher or lower wages relative to non-exporters, including skill level, the firm's basis for competitive advantage (cost or quality), and international economic trends.

Finding 4. There are limited and mixed findings on non-wage working conditions.

The available firm-level evidence suggests that exporters outperform non-exporters, but new and explicitly comparative research on non-wage working conditions is needed to better understand how non-wage working conditions in global supply chains compare to those in domestic supply chains or the informal economy. While some country-level studies link increased trade with labour abuses, others question those findings. And the available firm-level evidence suggests that export manufacturers have higher rates of unionization than non-exporters and that exporting was associated with improvements in safety and health. The evidence suggests that hours of work tend to be longer in global supply chains than in non-exporters, but to date such evidence is limited to a handful of countries. As for child labour, forced labour and employment discrimination, there is no empirical research directly comparing the prevalence of these practices in and out of supply chains.

Abbreviations

EIRIS	Experts in Responsible Investment Solutions
EPZ	export processing zone
FPRW	Fundamental Principles and Rights at Work (ILO)
ICN	India Committee of the Netherlands
ILO	International Labour Organization
IPEC	International Programme on the Elimination of Child Labour (ILO)
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OSH	occupational safety and health
SAP-FL	Special Action Programme to Combat Forced Labour (ILO)

Introduction

Global supply chains, in which goods cross at least one international border as they flow downstream from suppliers to end-users, are a key feature of contemporary globalization. Almost all national economies, including both developed and developing countries, are linked to one another through cross-border supply chains, but it is the links with developing countries that have generated a charged debate about the impact of participation in global supply chains on wages and working conditions in emerging economies.

On the one hand, advocates of globalization credit it with enabling developed economies to reallocate labour to more productive activities that pay higher wages while enabling industrial and social upgrading in developing countries. Country examples, including Japan and Germany after World War II, South Korea after the Korean War and more recently China and other emerging economies support this view. On the other hand, critics of globalization claim that highly competitive markets reward factories that offer the lowest costs, which may be achieved in part through poor terms of employment and lax observance of labour standards. These conflicting views inform a range of policies aimed at reducing unfair or hazardous working conditions in global supply chains.

This review provides a comparative empirical assessment of wages and working conditions in and out of global supply chains. Rather than comparing theoretical frameworks for understanding trade and working conditions or examining specific policy proposals, this review aims to establish a common empirical starting point for discussions of policy questions and seeks to answer the question: Are wages and working conditions in factories that produce for global supply chains better or worse than those that produce for domestic markets?

The answer to that question and useful empirical findings on wages and working conditions in and out of global supply chains may inform broader debates on the benefits and drawbacks for workers and labour standards when firms participate in global supply chains. It may also provide insight into the extent to which working conditions differ (either for better or for worse) in employment in export manufacturing compared to alternative employment options in domestic producers or informal economies.

This review of empirical research focuses on micro-data at the worker or firm levels. Studies connect the export activities of firms to the various forms of compensation offered to workers. They attempt to isolate either workers employed in export industries or firms involved in export activities and compare them to other workers and/or firms in the same country that are not involved in exporting. This approach enables the comparison between working conditions in global supply chain and in alternative employment, and contrasts with the literature in international economics and international political economy that draws comparisons between national economies (e.g. Mosley, 2010), which sheds less light on the labour market choices of workers in developing countries.

The report is divided into three main sections: The first section defines global supply chains and describes the approach used for this comparative empirical review. The second section looks at wage-related issues and presents evidence that wages are generally higher in firms that participate in global supply chains compared to those that do not. The third section addresses evidence on non-wage working conditions, where comparative empirical evidence on these issues is both thinner and more mixed. The conclusion summarizes the main findings and identifies opportunities for future research, and the appendix provides firm-level evidence on exporting and wages organized by country.

1. Overview of the review

1.1 Background and Approach

Global supply chains is a term that emerged to characterize the complex economic relationships between production processes and firms separated by international borders.[1] A supply chain represents "the total flow of physical goods from suppliers to ultimate users" (OECD, 2013, p. 17), and "global" supply chains are those that cross at least one national border. This involves trade in raw materials or intermediate products that links firms in complex and heterogeneous ways (Gereffi et al., 2005). Some global supply chains are organized as competitive markets with large numbers of firms competing to supply homogeneous products to large numbers of buyers. In this case, buyers and suppliers may have transitory, arms-length economic relationships. In other cases, firms may have significant leverage over suppliers. In still other cases, it is the suppliers that may have leverage over their customers by providing unique products or services. The distribution of leverage between buyers and suppliers in global supply chains therefore depends on the products traded, industry concentration in the buyer and supplier markets, and the presence of unique capabilities in supplier firms.

In supply chains where buyers enjoy significant leverage over suppliers in developing countries, it has been argued that buyers' requirements can have a profound impact on the labour standards of suppliers (Worker Rights Consortium, 2013; Verité, 2014). A major critique of globalization is that firms use their market leverage to drive down producer prices. Declining profit margins in turn incentivize manufacturers to reduce production costs. The demand for lower costs can be met by raising productivity through investments in human and physical capital, but costs can also be cut by reducing wages and lowering non-wage standards. Some argue that price pressures in global supply chains incentivize exactly this behaviour, chasing standards downward and weakening labour rights (Chan, 2003; Anner et al., 2012; Barrientos, 2013; Lund-Thomsen and Lindgreen, 2014; Egels-Zandén, 2014).

In response to scandals and activist pressure, many firms in consumer-facing industries have developed internal private compliance initiatives to assess suppliers' compliance with codes of conduct. Indeed, private compliance initiatives have become the norm in the consumer goods industry (Bartley, 2007; Vogel, 2010). Private initiatives in supply chains typically involve voluntary action by firms to ensure that supply chain participants comply with minimum social and environmental standards. These private initiatives signify that some firms recognize their ability to improve working conditions in their supply chains. A body of empirical literature examines the efficacy and limitations of these private compliance initiatives (Barrientos and Smith, 2007; Egels-Zandén, 2007; Locke et al., 2007; Locke et al., 2013; Distelhorst et al., 2015).

Two key differences between supply chain integration and ordinary exporting are important to note. First, firms that participate in a global supply chain often depend on a foreign firm for a core element of the production process. In consumer goods such as apparel and electronics, firms headquartered in advanced economies, and thus closer to consumer markets and trends, may specialize in product development, design, marketing and retailing, while firms in emerging markets specialize in engineering

[1] Close terminological relatives of global supply chains are global commodity chains (Gereffi, 1999) and global value chains (Gereffi et al., 2005). For the purposes of this review, all refer to the same thing: a chain of purchasing and selling intermediate products between firms separated by international borders.

and manufacturing.[2] While some exporters in developing countries can perform all of these functions, in practice, exporters in emerging markets often depend on firms in advanced markets for the design and retail of the end product. However, it is important to note that global supply chain relationships also include trade in commodity intermediate components (e.g. screws) in which buyers exercise little control over the production process. As noted above, the leverage of buyers over their suppliers may vary with these different economic relationships.

Second, firms that are not exporters may also be participants in global supply chains. For example, a manufacturer of knit fabric in China may sell its output exclusively to Chinese garment factories. If those garment factories in turn export their output, the fabric supplier is also a participant in that global supply chain while simultaneously being a domestic producer. The recognition of these second- and third-tier suppliers (e.g. suppliers of yarn to the knit manufacturer) non-exporting factories as supply chain participants complicates comparisons between employers "in" and "out" of supply chains since they are actors in both domestic and global supply chains.

Comparative empirical research on trade and labour standards at the firm level has generally not attended to these distinctions. For instance, it has failed to distinguish pure exporting from participation in global supply chains. Furthermore, research has lacked the data necessary to include second- and lower-tier suppliers in comparisons of labour conditions. The national manufacturing surveys that underpin much empirical research on industrial wages lack the necessary information to draw such inferences (i.e. whether the customers of non-exporting firms are engaged in exports). Therefore this review pertains almost entirely to first-tier suppliers (i.e. exporters). The roles played by supply chain firms are explicitly explored in several studies—particularly the effects of private compliance initiatives—but many studies of wages focus only on export participation.

This review also focuses on labour standards in the manufacturing sector as opposed to the agricultural sector. This is because labour issues vary widely across these two economic activities. Industrial manufacturing is typically concentrated in factories with a significant number of employees. This means that there are more opportunities for organizing than in the agricultural sector. Manufacturing enterprises are also more likely to be in the formal economy and be registered with local government and visible to tax authorities, labour regulators and, potentially, trade unions. Export manufacturing is also of interest as a focal point of industrial policy in developing countries, as they attempt to engineer transitions to high value-added economic activity (Lederman and Maloney, 2012). Agricultural supply chains are a crucial topic; some of the most egregious forms of forced labour and child labour take place in agriculture (ILO and IPEC, 2013), and many agriculture workers live in extreme poverty. An empirical review of research comparing wages and working conditions in domestic and global agricultural supply chains would be a valuable complement to our review of manufacturing supply chains.

Finally, this review focuses on labour standards in global supply chain participants in developing countries. Global supply chains knit together a variety of national economies, including trade among advanced economies (North-North), among emerging economies (South-South) and between advanced and emerging markets (North-South). This review focuses exclusively on the latter. It does not consider how workers in advanced economies are affected by these global relationships. While worker welfare is an important issue in all economies, the highest concentration of poverty and the most severe abuses of

[2] These roles are not rigidly demarcated between firms in advanced and developing economies. Many emerging-market firms also engage in product design at varying levels of sophistication. In the electronics industry, original equipment manufacturers (OEMs) manufacture designs supplied by customers, whereas original design manufacturers (ODMs) begin with a product concept and both design and manufacture the actual product (Lüthje et al., 2014).

workers are found in developing countries, which may lack effective labour institutions, dispute resolution and workplace regulation. Thus, the experiences of workers in global supply chains in advanced economies will have limited relevance to workers in Brazil and Kenya.

1.2 Policies related to global supply chains

The ongoing debate about working conditions in global supply chains has produced a range of policy proposals that aim to reduce unfair or hazardous working conditions in global supply chains. Some proposals suggest that labour standards should be incorporated into international trade agreements (Compa, 1993; Charnovitz, 2001; Polaski, 2003). Others suggest the promotion of political change in developing countries, including the institutionalization of labour protection and ensuring effective trade unions that can facilitate collective bargaining (Caraway, 2006). Still other suggest that it may be possible to embed minimum labour standards in global markets with minimal government involvement, enforced through private codes, activist pressures and supply chain transparency (Fung et al., 2001; Elliott and Freeman, 2003; Vogel, 2008; Locke, 2013; Ruggie, 2013), however, some question the efficacy of private compliance systems (Griffin et al., 2003; Esbenshade, 2004; Seidman, 2007). Finally, some argue that economic development will improve working conditions, which will result from trade liberalization rather than mandated standards in emerging markets, which are seen as thinly veiled trade protectionism (Bhagwati, 1995; Basu, 1999).

Many scholars have considered the extent to which participating in global supply chains provides an opportunity for employers in emerging markets to improve their working conditions, a process called "social upgrading" (Gereffi, 1999; Humphrey and Schmitz, 2002; Barrientos et al., 2011). There is a risk, however, that participation in global supply chains will have the opposite effect if suppliers respond to competitive pressures by minimizing labour costs and driving down standards, thus resulting in social downgrading (Hearson, 2008; Milberg and Winkler, 2011). This review includes studies that attempt to establish a causal link between export activities and labour conditions, and consider whether participation in supply chains is generally associated with social upgrading or downgrading.

1.3 Wages and non-wage working conditions

The section on wages presents evidence that wages are generally higher in firms that participate in global supply chains compared to those that do not. Employment in global supply chains frequently offers a significant upgrade in wages over industrial employment in the domestic economy. The exporter wage premium is documented across a variety of developing countries in firms ranging from tiny sole-proprietorships to large industrial enterprises. Moreover, if the alternative is employment in the agricultural or informal sector, this wage premium is even greater. Data sources on wages in and out of supply chains are organized by country in the Appendix.

It is important to note that exporters pay higher wages at all points in the wage distribution, and evidence suggests that exporting can increase wage inequality within enterprises through higher returns to skilled workers than to their less skilled counterparts even where all wages are increasing. Furthermore, a portion of the wage premium reflects long work hours and high intensity of work in global supply chain factories.

There are important exceptions to the wage premium. First, there is evidence that global supply chain processors in some countries—most notably, China—have specialized in low value-added manufacturing, exploiting their advantage in labour costs to compete on low prices and narrow margins. Such employers exhibit lower productivity and wages than domestic manufacturers. Second, the global supply chain wage premium depends on the health of the export sector. When buffeted by changing international economic

conditions (such as the expiration of the Multi-Fibre Arrangement regulating trade in textiles and garments), wages may fall below those in the broader economy, as might be expected in any ailing industry. Keeping these caveats in mind, the comparative evidence is broadly consistent with the claim that employment in global manufacturing supply chains offers superior wages to alternative employment opportunities across a range of developing countries.

Compared to data on wages, the data on working conditions are both thinner and more mixed. In freedom of association and collective bargaining, studies at the national level yield conflicting results. Some authors find that trade penetration increases respect for labour rights, while others find the opposite. At the firm level, a small number of studies making direct comparisons find higher unionization rates inside export processing zones (EPZs), but this is counterbalanced by evidence of anti-union actions among some supply chain employers. While there is little country-level comparative empirical analysis of the prevalence of child labour or forced labour in supply chain firms and other employers, these abuses are generally less prevalent in the manufacturing sector than in the agricultural and service sectors. The evidence on occupational health and safety and hours of work is even more limited. One study finds that exporting led to improved occupational safety and health practices in Myanmar (Tanaka, 2017), but the limited evidence on hours of work suggest that export factories have longer work hours than non-exporters.

The sections that follow discuss the findings on wages and non-wage working conditions in greater detail.

2. Findings on wages

The primary sources of data on wages include official surveys of the labour market and industrial sector conducted by governments in emerging markets. National statistical agencies such as the United States Bureau of Labor Statistics gather data on both the labour force and the performance of the industrial sector through surveys.[3] Researchers use data from these surveys on wages in exporting and non-exporting manufacturers, supplemented in some cases by original data collection on labour standards in emerging markets. The samples in supplemental data collection are markedly smaller, in part due to the high costs of surveying large numbers of enterprises in emerging markets.

Research on compensation and exporting has two main branches. The first branch focuses on the developmental and distributional consequences of economic globalization. These studies use empirical evidence to assess globalization's impact on labour standards and the human welfare consequences of global trade. The second branch focuses on an empirical puzzle that emerged in the United States in the 1990s that sought to explain the exceptional performance of export manufacturers in a variety of dimensions (Bernard et al., 1995). Studies of exporter performance in developing countries have documented similarly exceptional results. Exporters' exceptional performance could reflect self-selection into export markets (meaning that manufacturers with better records of labour production tend to produce for exporters) or it could be a direct consequence of export activities, such as learning by exporting. If the latter is true, exporting would be a vector for technological change and quality upgrading. These changes influence wage levels and also have important distributional consequences within factories. In the common model of skill-biased technological change, exporting raises the wages of skilled and non-production employees more than low-skilled production workers, increasing within-firm wage inequality.

[3] These surveys include the United States Current Population Survey (http://www.bls.gov/cps/) and the Annual Survey of Manufactures (http://www.census.gov/manufacturing/asm/).

2.1 Exporter wage premium and its causes

Economic theory and globalization advocates have suggested that participation in manufacturing supply chains represents an important opportunity for workers in poor countries to earn greater income under better working conditions than in the informal economy (Kristof, 2009), and studies consistently find higher wages among exporters in developing countries. An exporter wage premium is found in diverse emerging markets such as Egypt (Atkin et al., 2014), Mexico (Verhoogen, 2008; Caselli, 2014 Frias et al., 2012), Indonesia (Amiti and Davis, 2012), Kenya (Were and Kayizzi-Mugerwa, 2009), Myanmar (Tanaka, 2017), Colombia (Isgut, 2001), Chile (Kandilov, 2009), Thailand (Cole et al., 2010) and Turkey (Meschi et al., 2015).

There is a clear correlation between exporting and higher wages, but it is unclear whether exporting causes firms to pay higher wages or if more productive firms become exporters. The most credible evidence of causality are derived from randomized control trials. Atkin et al. (2014) introduce random variation in opportunities to export among rug workshops in Egypt. They find that exporting significantly increases firm profits and product quality. Because many firms in their study were sole proprietorships in which the owner was also the production worker, increased profits in this setting translated directly into increased wages. The causal relationship between opportunities to export higher quality products and increased firm profits and quality is conclusively established in this sample, yet similar effects might not occur in larger industrial enterprises.

In the absence of randomized trials, economists have attempted to measure the impact of exporting on firm performance through naturally occurring and plausibly exogenous variations in opportunities to export. These variations include currency devaluations (Verhoogen, 2008), exchange rate shocks in China (Park et al., 2010), changes in tariffs (Amiti and Davis, 2011; Tanaka, 2017), changes in the relative prices of equipment and machinery in Mexico (Caselli, 2014, proximity to international airports in Myanmar (Tanaka, 2017) and export subsidies in Chile (Kandilov, 2009). The results of these studies are consistent with the finding that export opportunities generate higher wages. It is worth noting that Caselli (2014) and Kandilov (2009) primarily find increases in the wages of skilled workers.

A large firm-level study with a relatively plausible counterfactual shows that exporters out-perform domestic producers in a variety of metrics, including wages. Park et al. (2010) use exchange rate shocks from the 1997 Asian Financial Crisis as a source of variation in Chinese firms' export markets. Prior to the crisis, Chinese firms that exported to destinations with currency devaluation also experienced a reduction in exports. Using this as an instrument for within-firm export growth, they find that export growth is associated with increased productivity, revenue and wages per worker. Consistent with this finding, Yang and Mallick (2010) use a matching procedure (Sekhon 2009) to reveal a productivity premium among exporters in China.

Parametric (regression) or non-parametric (matching) controls can be used to identify the causal effect and account for statistical confounders. Whereas the above research designs often exploit within-firm variation over time, these studies use cross-sectional data—a snapshot of firms at one moment in time—to estimate the impact of exporting on wages. The richest such observational studies include employer-employee matched datasets that permit controls for individual-level covariates such as age, gender and education. For example, Were and Kayizzi-Mugerwa (2009) show that exporters in Kenya pay more even after controlling for a variety of human capital features that may determine wages independent of export status. More common are studies that take the firm as the primary unit of analysis. Using regression to control for industry, region, year and total factory employment, Isgut (2001) finds that production wages in Colombia are 11 per cent higher among exporters and managerial wages are 25 per cent higher. Van Biesebroeck (2005) finds that, controlling for firm size, exporters across nine African countries on average pay 34 per cent higher wages. Meschi et al. (2015) find exporting in Turkey is associated with increased wages for both production and non-production workers after controlling for value-added, research and development activities, foreign ownership and investment in domestic and imported machinery.

Some studies also report firm-level wage differences without attempting to control for differences between exporters and non-exporters. For example, Alvarez and Görg (2009) report that wages for exporters in Chile are 15 per cent higher for production workers and 30 per cent higher for non-production workers. Cole et al. (2010) find that wages among exporters in Thailand are 34 per cent higher than among non-exporters. Kabeer and Mahmud (2004) conducted a labour market survey among women in Bangladesh and found that garment workers in an EPZ earn 24 per cent more than garment workers outside the zone and self-employed workers. Workers in other forms of wage work were even more poorly remunerated.

In summary, methods including randomized variation in opportunities to export, plausibly exogenous variation in opportunities to export, statistical controls to account for confounders of the effect of exporting, or unadjusted averages of wages, all find that exporting firms pay higher wages across a variety of developing countries.

2.2 Measuring wage premiums and penalties

When firm-level data on export activities are unavailable, scholars analyse data from labour force surveys against the export intensity of national industries. This enables them to measure employee wages in and out of global supply chains. Robertson et al. (2009a) compute inter-industry wage differentials in Indonesia, comparing export-intensive textile, apparel and leather goods manufacturing to other industries. Wages in export-exposed industries initially appeared to be lower than in domestically-focused industries. However, controlling for employee age, gender, geographic location and education revealed a significant wage premium in export intensive industries. The exporter wage premium also holds for textiles and apparel industries in Honduras (Marcouiller and Robertson, 2009) and the garment industry in Cambodia (Neak and Robertson, 2009).

Although the evidence suggests that exporters generally pay higher wages, some studies find either small positive gains, no difference in wages, or wage penalties in export industries. For example, industry analyses indicate only a small wage differential in the apparel industry in El Salvador (Robertson and Trigueros-Argüello, 2009) and a negative wage differential for the export processing Zone Franche in Madagascar in 2006 (Cling et al., 2009; more on the Zone Franche below). In addition many exporters in China specialize in low-skill, low-value-added manufacturing and tend to pay lower wages than domestically oriented firms (Dai et al., 2011). Using evidence from the Taiwanese electronics industry, Liu et al. (1999) concluded, "Exporters are larger, pay higher wages, and have higher labour productivity and total-factor-productivity growth than non-exporters." However, a follow-up study by the same authors finds that the wage premium was limited to skilled workers and that low-skilled workers earned less in export manufacturing (Tsou et al. 2006). In Costa Rica, Lederman et al. (2003) also find lower wages among exporters. Hiep and Ohta (2009) detect no statistical difference between wages in and out of global supply chains in Viet Nam. Milner and Tandrayen (2007) offer evidence from five African countries in the 1990s that wage premiums may vary by export destination. Whereas exporters to other African economies had superior wages, exporters to economies outside Africa paid the same or lower wages, suggesting a specialization in low value-added products. Finally, Banga (2005) finds no relationship between exporting and wages across Indian industries.

The empirical evidence, on average, shows higher wages in the export sector than in comparable non-export employment, yet there are important exceptions to the exporter wage premium. The conditions that accompany an export wage penalty are discussed in the following section.

Export processing

Many supply chain participants are engaged in export processing rather than ordinary exporting. Export processing falls under particular tax and other policies intended to encourage exporting and foreign investment. These policies may include exemption from export taxes, reduction of import duties on inputs and machinery and free profit repatriation (Milberg and Amengual, 2008).

Export processing has been a focal point for scholars on both sides of the globalization debate. Globalization optimists view processing regimes as a promising recipe that allows poor countries to participate in global trade and pursue export-led industrialization, without remaking an entire country's regulatory policies and infrastructure (Aggarwal, 2006). Globalization pessimists see export processing as a privileged system of taxes for foreign-oriented enterprises and a pretext for curtailing labour rights (Madani, 1999).

These perspectives offer opposing predictions for wages in export processing. On the one hand, exporters competing for quality-sensitive foreign markets may need to hire and retain high-quality employees to meet these standard, thus incentivizing them to give a wage premium to workers. On the other hand, if EPZs undermine freedom of association, it is expected that labour rights could be diminished and workers' ability to negotiate for higher wages to be decreased accordingly.

Much of the empirical literature on wages in export processing has supported the more optimistic account. Workers in EPZs are paid the same or more than those working outside these zones (Romero, 1995; Madami, 1999). In their survey of Bangladeshi households in and around Dhaka, Kabeer and Mahmud (2004) find that women working in the export processing garment industry earn the highest wages and enjoy a range of benefits that are unavailable to garment employees and other wage workers outside of these zones. Glick and Roubaud (2006) found that export processing employment in the Zone Franche area in Madagascar offered significantly higher wages for women who might otherwise have been employed in the informal sector. Other evidence of wage parity or a wage premium in export processing comes from Costa Rica (Jenkins, 2005) and India (Aggarwal, 2007).

However, findings of higher wages in export processing are not universal. Cross-sectional comparisons of exporters and non-exporters in China show that exceptional exporter performance is not the case for all exporters. In fact, exporters in China on average exhibit lower productivity (Lu et al., 2010) and lower skilled labour demand (Fajnzylber and Fernandez, 2009) than non-exporters, thus employees of non-exporters may fare better than those in the export industry. Recent evidence suggests this perplexing pattern in China is explained by differences between ordinary exporters and export processors. When export processing is accounted for separately, the superiority of (ordinary) exporters in wages and productivity re-emerges (Dai et al., 2011). This has been interpreted as a specialization among export processing firms in low-skill, labour-intensive industries (Fajnzylber and Fernandez, 2009). In other words, there remains an export premium in China, but it is primarily among ordinary exporters who do not enjoy preferential customs and tax regimes. The finding that export processors in China specialize in low value-added, labour-intensive production echoes earlier research showing that China's integration into the global economy was shallow, with limited engagement in more lucrative, high value-added activities (Steinfeld, 2004).

Both Kusago and Tzannatos (1998) and Romero (1995) present a mixed picture with export processing wages higher in some countries but lower in others. Moreover, the total dependence of export processors on foreign markets can lead to dramatic changes in fortune. Following up on the Zone Franche in Madagascar a few years after their initial study, scholars revealed a reversal in the export wage premium. With the phase-out of the Multi-Fibre Arrangement in 2005, international competition intensified, curtailing the employment growth of Madagascar's export industry. By 2006, firms in the EPZ offered lower wages than those outside it, although they maintained higher non-wage standards and superior working conditions compared to the informal economy (Cling et al., 2009).

In summary, the evidence of a wage premium in export processing is less clear than that observed for ordinary exporters. Balancing evidence of high wages in processing zones, there is also evidence that processors in some countries specialize in low value-added activities and offer poorer remuneration to production workers.

2.3 Mechanisms linking wages and export activity

Some of the literature on wages and exporting seeks to explain the link between the two. Researchers have attempted to determine if exporting causes firms to become more productive and pay higher wages, or if it is the highest performing (and highest paying) manufacturers that self-select into the export market. The answer to this question carries important implications for trade policy. If exporting causes employers to offer higher wages, then fostering exporting industries will lead to an overall increase in worker wages. If, however, the wage premium is a characteristic of firms that self-select into exporting, then increasing exporting will have uncertain consequences for worker wages.

It may be that exporting creates opportunities for learning that enable manufacturers to improve productivity and wages, resulting in the exporter wage premium. For example, both Robertson (2004) and Verhoogen (2008) find that Mexican exporters are more likely to invest in continued training of their employees than non-exporters. As discussed above, studies use either randomization or instrumental variables to investigate the possibility that export activities cause improved productivity and wages. Under certain conditions, increased productivity can have a positive spill over effect and result in increased worker wages (Kandilov, 2009; Amiti and Davis, 2012; Park et al., 2010; Tanaka, 2017; Caselli, 2014; Van Biesebroeck, 2005).

It may also be that higher wage manufacturers self-select into export activities, in part because consumers in advanced economies demand higher-quality goods. To produce high-quality goods, manufacturers must pay higher wages to retain quality workers. Consistent with the argument for self-selection, Verhoogen (2008) shows that initially more productive, higher-wage manufacturers in Mexico were more likely to take advantage of a currency devaluation to increase exports. In addition, exporting enabled these firms to increase overall wages. Cole et al., 2010 find that Thai exporters exhibit greater productivity, size and average wages prior to the decision to export. Similarly, Isgut (2001) shows, based on an annual manufacturing survey in Colombia, that exporters had higher wages and productivity prior to the initiation of exports.

Learning-by-exporting and self-selection into exporting are not mutually exclusive. Some studies find evidence of both mechanisms occurring simultaneously. Van Biesebroeck (2005) finds that firms in sub-Saharan Africa improved their productivity after becoming exporters, but they were larger and paid higher wages prior to exporting as well.

A final possibility is that pressures for responsible business conduct from consumer markets influence wage levels in supply chain participants. The research is limited, but evidence from Indonesia suggests that activist pressures for higher wages can be transmitted through the supply chain to employers in developing countries. Harrison and Scorse (2010) examine industrial employers in Indonesia and exploit variation in sectors (textiles, footwear and apparel, versus others) and export destination (buyers targeted by campaigns versus others). They estimate that campaigns led to double-digit percentage increases in wages in the targeted factories. The campaigns did not have a negative effect on employment, but they did reduce profits and deter investment. Tanaka (2017) finds that exporting in Myanmar more than triples the probability of receiving a compliance audit, and audits of factory labour practices may play a role in improved working conditions in global supply chain participants.

2.4 Exporting and wage inequality

Wage premiums in export manufacturing do not necessarily translate into equal gains across the entire distribution of employees of export producers. Higher average wages may result from all employees doing better in exporters, but they could also result from certain employees enjoying much larger gains than others. Under models attributing wage differences to skill-biased technological change, the exporter wage premium is expected to favour skilled labour over unskilled labour.

From the perspective of low-skilled workers in developing countries, the underlying causes of wage premiums are less important than the wages and employment opportunities available to them. In some cases, exporting increases wages primarily for highly-skilled and non-production employees. However, even when wages for low-skilled workers in the export sector do not increase, the increase in manufacturing employment can enable workers to transition from the informal economy into formal wage work. Thus, there may still be benefits for low-skilled workers even without an exporter wage premium. For example, Cling et al. (2009) find that an export processing wage premium was transformed into a processing wage penalty in the Zone Franche in Madagascar. However, they also point out that the alternative employment opportunities for those workers were primarily in the informal sector, which had even lower wages.

Several empirical studies suggest that the wage gap between exporters and non-exporters is largest among skilled and non-production employees and smallest among low-skilled workers. For example, Verhoogen (2008) shows exporting enabled firms in Mexico to increase overall wages of workers, but also the relative wage of non-production workers. Frias et al. (2012) document higher wages among exporters in Mexico across the wage distribution, but the effect is largest among the highest earners. Caselli (2014) also finds increased wages of skilled workers in Mexico, linking it to the availability of cheaper equipment imports. Alvarez and Görg (2005) find a larger wage premium for skilled workers in Chile, although unskilled workers also benefit. Isgut (2001) finds that in Columbia, while all workers do better in exporters, non-production workers see the largest gains. Tsou et al. (2006) find a slight wage penalty for export production workers in Taiwan, whereas non-production workers enjoy a premium. Recent studies in Turkey also show that exporting activity increases the skill premium and wage gap between skilled and unskilled workers (Meschi et al., 2015). Fajnzylber and Fernandes (2009) also show that Brazilian firms that export have higher skilled labour demand, whereas Chinese firms do not. This is consistent with the findings above on Chinese export processers specializing in low-skill, labour-intensive manufacturing. On balance, the empirical evidence suggests that skilled workers receive a larger share of the benefits of participation in global supply chains.[4]

3. Findings on non-wage working conditions

In contrast to the large body of scholarship on wages in exporting and non-exporting firms, comparative research on non-wage working conditions is more limited and more mixed. Non-wage working conditions span a broad range of employment issues, including freedom of association, forced labour, child labour, employment discrimination, workplace harassment and occupational safety and health.

[4] By contrast, Hashim and Banga (2009) find productivity gains primarily in low-skilled rather than skilled workers in India.

A variety of labour abuses in global supply chains persist despite considerable media attention over the past decade (Chan et al., 2013; Worker Rights Consortium, 2013; Verité, 2014; SOMO and ICN, 2014), yet it is less clear how working conditions in these supply chains compare to alternative employment in the same labour market. This review considered comparative evidence on non-wage standards, yet the findings are less conclusive than the findings on wages. This section presents evidence on freedom of association, child labour and forced labour, occupational safety and health, employment discrimination, and hours of work. The available firm-level evidence suggests that exporters outperform non-exporters, but additional research is clearly needed to yield robust conclusions about the relationship between supply chain participation and non-wage working conditions.

3.1 Freedom of association

The evidence on freedom of association and global supply chains remains inconclusive. The available firm-level research suggests that exporting firms are more likely to have trade unions, possibly because of their higher visibility to regulators and union organizers. However, studies of private compliance initiatives in supply chains found that private codes do not substitute for state protection of freedom of association, and some evidence from national economies suggests that trade openness undermines collective labour rights.

There are two opposing views on the relationship between global supply chains and freedom of association. One theory holds that trade competition weakens freedom of association and other collective labour rights (Mosley and Uno, 2007; Mosley, 2010). An opposing theory argues that participation in global supply chains strengthens freedom of association in developing countries. In their study of international activist networks, Keck and Sikkink (1998) argue that activists can leverage such networks to pressure domestic governments and state actors to uphold human rights standards. Similarly, social pressures from consumers and non-governmental organizations (NGOs) may be transmitted through private codes of conduct, inducing supply chain participants to recognize collective labour rights (Fung et al., 2001; Elliott and Freeman, 2003). This mechanism relies on international pressures for responsible business conduct, which may only apply to a limited number of firms in the country.

Another possible factor leading from supply chain participation to strengthened freedom of association comes from the fact that exporters are more likely to be in the formal economy. Compared to the informal economy, formal workplaces are more visible to local regulators and trade unions. This may result in higher rates of union membership among supply chain producers (at least, among first-tier suppliers) than factories oriented towards domestic markets.

Evidence on freedom of association

Empirical evidence on supply chain participation and freedom of association comes from three types of research. First, country-level studies attempt to link participation in global production networks to variation in collective labour rights. Second, studies of private compliance initiatives have attempted to measure the impact of codes of conduct on collective labour rights. Third, a limited number of firm-level studies compare respect for freedom of association in exporters and non-exporters.

Country-level (as opposed to firm-level) research in international political economy document a negative relationship between exports and collective labour rights. In a pioneering study, Mosley and Uno (2007) construct an original panel dataset on collective labour rights covering 90 developing countries between 1986 and 2002. Drawing on definitions from Kucera (2002), they cite violations of collective labour rights documented by the United States Department of State, the ILO and the International Confederation of Free Trade Unions. Analysing the relationship between labour rights and trade and investment flows,

they conclude that high levels of export trade are inversely correlated to freedom of association (Mosley and Uno, 2007; Mosley, 2010). Consistent with these results, Ronconi (2012) finds that trade openness depresses labour rights enforcement activities in Latin America, while foreign direct investment has a slight positive effect. Thus, foreign direct investment is associated with improved labour rights while trade pressure can weaken labour rights.

However, not all country-level evidence on exporting and collective labour rights shows weakened labour rights. Revisiting the Mosley and Uno dataset, Vadlamannati (2015) shows that the effects of trade on freedom of association and collective bargaining are sensitive to model specification decisions, raising questions about the causal relationship initially posited between exporting and weakened labour rights. Kucera and Sarna (2004) find no relationship between labour-intensive export manufacturing and freedom of association rights, and they find a positive relationship between overall manufacturing exports and collective labour rights.

Firm-level research provides evidence that codes of conduct and private compliance initiatives have minimal impact on freedom of association, particularly in settings where freedom of association is not protected by the State. Some firm-level microdata from developing countries suggest that exporters tend to have higher union density than non-exporters, even in relatively challenging settings. But there is no evidence that private codes can substitute for state protection of freedom of association.

Scholars have explored how labour unions interact with private codes of conduct in global supply chains. The findings are mixed. On the one hand, both trade unions and private codes of conduct support compliance with labour laws and the protection of the basic rights of workers. On the other, private initiatives and reliance on local managers for enforcement is at odds with a model of industrial relations governed by the state in which workers and employers negotiate working conditions. Riisgaard's (2009) research on East African cut-flower industries highlights the ambivalence of union members to such initiatives. Some view private codes established by foreign firms as a competitor to the process of upholding labour standards through collective bargaining. However, other union members view codes as creating new opportunities for workers to pursue their rights. Similarly, Ararat and Bayazit (2009) suggest that codes can marginalize labour unions, although they may enable constructive engagement between unions, management and regulators.

Research on private compliance initiatives shows the difficulty of identifying violations of freedom of association in supply chains. Egels-Zandén and Lindholm (2014) show that audits conducted by the independent NGO Fair Wear Foundation failed to detect violations of freedom of association rights. Similarly, Anner (2012) argues that the Fair Labor Association audits are ill-suited to detect and remediate such violations. Distelhorst et al. (2015) show that nominal compliance with HP's freedom of association standard in China had little substantive significance in factories.

Finally, there is limited firm-level evidence on exporting and unionization. The available research suggests higher rates of union penetration in emerging market exporters than among firms producing for domestic markets. Kabeer and Mahmud's (2004) labour market survey around Dhaka, Bangladesh finds that union presence is higher in the EPZ than for workers employed outside the zone. Similarly, Glick and Roubaud (2006) find that employees in the export processing Zone Franche in Madagascar are markedly more likely to report the presence of unions in their workplace than those employed in private enterprises outside the zone. They also find that union presence in the informal sector is effectively zero. Finally, recent research by Sungmin Rho (2015) shows global supply chains may interact with local political institutions in ways that facilitate rather than hamper collective action by workers. For example, the Government of China responded to collective labour protests at foreign-invested enterprises with relative leniency compared to protests at domestic firms.

In summary, the evidence on collective labour rights in global supply chains remains inconclusive. Country-level research presents mixed findings on the impact of export activities on collective labour rights. And at the firm level, there is a consensus that private codes of conduct have little impact on collective labour rights. However, there is also evidence that exporters have higher unionization rates than non-exporters, potentially due to their high visibility to regulators and trade unions. Additional firm-level research on participation in supply chains and freedom of association is needed to resolve these conflicting initial findings.

3.2 Forced labour and child labour

Evidence on the prevalence of forced labour and child labour in and out of supply chains remains limited. Comparative empirical evidence shows that formal employment in industrial manufacturing represents a relatively small share of all forced labour and child labour.

Although literature has developed around both child labour and forced labour, few sources directly compare those conditions in and out of global supply chains. The relative prevalence of forced labour and child labour in and out of supply chains is not known, but global estimates of child labour and forced labour suggest they are far more prevalent in the informal economy. The dominance of formal sector firms among first-tier suppliers in global supply chains make them less likely sites for these abuses. Much less is known about second- and lower-tier suppliers, which are not directly transacting with foreign buyers, are more likely to be informal and may be simultaneously participating in domestic supply chains.

Child labour is less common in the export manufacturing sector than in the agricultural and service sectors. While child labour in factories attracts wide attention, "abhorrent images of children chained in factories…stand out for their relative rarity. Most working children are at home, helping their family by assisting in the family business or farm and with domestic work" (Edmonds and Pavcnik, 2005). Estimates from 2000 indicate that only 5 per cent of child labourers worked in the formal economy and export-related jobs (ILO, 2002, para. 67). A more recent review found that 7 per cent of child labourers work in the industrial sector (manufacturing, construction, and mining), while 59 per cent work in agriculture and 32 per cent in services (ILO and IPEC, 2013). In all cases, child labourers are found primarily in informal enterprises.

Although empirical comparisons between supply chain participants and non-participants are lacking, some research finds that global supply chains increase the risk of forced labour and child labour (Phillips and Sakamoto, 2012; Phillips, 2013, Phillips et al., 2014; Phillips, 2015). This body of research focuses on the leverage of buyers to control prices and extract value, and argues that global production networks create the conditions for exploitation because manufacturing is often outsourced to remote locations with minimal regulation of labour standards. In addition, firms that entrust employee hiring to third-party recruiters can avoid the social compliance demands of foreign buyers (Phillips, 2015, pp. 274–5).

While these studies lack comparative empirical evidence on the prevalence of forced labour and child labour in and out of global supply chains, they concur that the risks of these abuses appear to be highest among lower-tier suppliers in global supply chains, which also operate in the domestic and informal economies. In their study of the garment industry in India, Phillips and Mieres (2015) find that although activist campaigns have reduced child labour in formal enterprises engaged in global supply chains, there remain high incidences of unpaid child labour in small workshops in lower tiers of the supply chain where it is difficult to assess compliance with labour standards (Verité, 2015), and the lack of transparency regarding lower-tier suppliers makes it hard to link factories with global brands (EIRIS, 2009; Phillips et al., 2014). It may be unclear whether small manufacturers are producing for the domestic or export

markets, or both (SOMO and ICN, 2014). Private compliance initiatives may be ill suited to tackling the problem of forced labour in global supply chains because they focus on primary suppliers, rather than on smaller producers further upstream where the use of forced labour may be more prevalent (Phillips, 2015).

While these analyses highlight the difficulty of estimating the prevalence of child labour and forced labour in supply chains, they also offer a helpful heuristic for identifying where the risks are greatest, namely in the small, informal workshops to which larger domestic firms may subcontract production of parts and supplies (Phillips and Sakamoto, 2012; Bang, 2013; SOMO and ICN, 2014; Verité, 2015; Phillips, 2015) and where global and domestic supply chains are interwoven and overlapping.

Several authors acknowledge that activist campaigns have successfully reduced the prevalence of forced labour and child labor. Multinational enterprises, with the help of NGOs that expose these issues (Verité, 2014; 2015), are expected to reduce the prevalence of forced labour and child labour in their supply chains (Busse and Braun, 2003). However, efforts to eradicate child labour in global supply chains may have perverse results. If children are prevented from working in export manufacturing they may transition into employment in the informal sector, where wages and working conditions may be even worse. Basu (1999) uses formal modelling to illustrate that a ban on child labour in export industries alone is likely to drive children into more dangerous forms of employment. His analysis suggests that while economy-wide interventions to mitigate child labour may be effective, interventions that target only the export sector may do more harm than good. Consistent with this claim, child labourers in Brazil who were forced out of employment with large export manufacturers began working in the smaller factories of domestic manufacturers for lower wages and with greater vulnerability to workplace hazards (French and Wokutch, 2005, pp. 633–5).

The employment of young people does not always meet the definition of child labour (ILO and IPEC, 2013), yet exploitation can be a concern. For example, the widespread use of student interns in China, particularly the recruitment and remuneration of these students, has closer resemblance to a labour dispatch service than to an educational internship experience (Chan et al., 2013). While such internships may be legal under Chinese labour laws, provided they offer sufficient educational content and restrict work intensity, reports by NGOs and the press have led major electronics buyers like Apple, HP and Dell to focus their efforts on the issue of student labour.[5] But as with most private compliance initiatives, these efforts have no impact on the use of student interns in the (much larger) domestic economy.

There remains considerable uncertainty about the relative prevalence of child labour and forced labour in global supply chain firms versus domestically focused enterprises. Child labour and forced labour appear to be more prevalent in the informal economy than in the formal enterprises directly engaged in exporting, however, much less is known about practices in lower-tier suppliers, which are embedded in the domestic economy. In addition, there is no consensus on the most effective approach for private sector firms to mitigate child labour and forced labour.

3.3 Occupational safety and health

Occupational safety and health risks in global supply chains have yet to yield robust empirical study, and few studies directly compare OSH outcomes in and out of global supply chains. The newest evidence

[5] "HP and Dell suspend use of interns in Chinese factories" *The Guardian*. 6 Oct. 2015. Available at: http://www.theguardian.com/sustainable-business/2015/oct/06/hp-and-dell-suspend-use-of-interns-in-chinese-factories. For an overview of Apple's programmes on student labour in the supply chain, see "Labour and Human Rights" Available at: http://www.apple.com/uk/supplier-responsibility/labor-and-human-rights/ [28 Jan. 2016].

from Myanmar suggests that opportunities to export are associated with some improved health and safety practices in factories, but much remains to be done in this space.

Comparative empirical evidence on health and safety risks in supply chain factories versus domestic producers is scarce. The limited evidence available suggests that health and safety conditions tend to be better in exporting factories than in non-exporters. Verhoogen's (2008) study of Mexico reports that exporters had lower accident rates than non-exporters, but the difference was not statistically significant. More persuasively, a new empirical study in Myanmar shows broad changes in health and safety practices resulting from exporting (Tanaka, 2017). The study draws on three waves of factory surveys over 2013–15, measuring factory maintenance of injury records, presence of health clinics, fire drill practices and the presence of nurses or doctors in factories. Using instrumental variables to enhance causal credibility, the study shows that exporting is associated with major improvements in factory safety and health practices; it also shows that exporting brings practices in domestic firms up to the standards observed in foreign-invested firms. One possible explanation for this effect is increased social compliance auditing by foreign buyers; exporting firms were roughly three times as likely to have experienced an audit as non-exporters.

While Tanaka (2017) offers persuasive evidence that exporting led factories in Myanmar to improve health and safety practices, the study did not cover issues such as machine guarding, personal protective equipment or infrastructure risks. More research is needed in other countries and further research is needed in Myanmar to cover other risks.

3.4 Employment discrimination

Comparative empirical evidence on employment discrimination is limited relative to the evidence on wages. However, a number of macro-level patterns merit discussion. First, increased trade often leads to increased female labour force participation (Gaddis and Pieters 2012; Bussmann 2009; Kabeer and Mahmud 2004). Export-oriented light manufactures in developing countries often employ large numbers of women. Some assembly lines in labour-intensive factories, whether producing clothing or electronics, are staffed almost entirely by women. Where export manufacturing firms enable women to transition from informal or agricultural work to the formal economy, the expansion of global supply chains may have a positive impact on gender equality.

Increased and more lucrative employment opportunities notwithstanding, employment discrimination is an important issue. Light manufacturers in global supply chains continue to employ disproportionately large numbers of women in major emerging markets, such as China and Bangladesh (Chen et al., 2012; Kabeer and Mahmud, 2004). Segregation by industry is also widespread in some countries. In India, female employment is highly concentrated in just a few industries (Chattopadhyay et al., 2013). Women employed in export manufacturing may encounter barriers to advancement into more highly skilled production and supervisory positions (Paul-Majumder and Begum, 2000). In addition to such discrimination, sexual harassment may impact women working in export industries, while traditional expectations place the responsibility for caregiving and homemaking on women regardless of full-time employment (Raworth, 2004).

There is also evidence of a gender wage gap in some supply chain exporters, although it is contested whether this is attributable to wage discrimination or to variation in productivity (Razavi, 2011). Chen et al. (2012) compare exporting to non-exporting firms in China. Despite identifying a gender wage gap in all enterprises, they detect evidence of wage discrimination only in domestically focused producers. The extensive employment of women in supply chain factories may also represent a reaction to labour market inefficiencies introduced by labour market discrimination against women. Siegel et al. (2014) suggest that

multinationals in the Republic of Korea responded to labour market discrimination against women by aggressively hiring female managers who lacked opportunities elsewhere, turning local discrimination into an opportunity for competitive advantage.

3.5 Hours of Work

Hours of work in emerging market exporters commonly violate domestic legislation (Milberg and Amengual, 2008). In extreme cases, long hours have been blamed for worker exhaustion and even death. The available comparative evidence—from Bangladesh, Cambodia, India, and Madagascar—suggests that workers in export manufacturing work longer hours than firms focused on the domestic economy.

Several studies compare working conditions in and outside of EPZs. Kabeer and Mahmud (2004) show that 28 per cent of workers in the Dhaka EPZ and 72 per cent outside the EPZ work over 10 hours per day. These are markedly higher hours than in the informal sector, but they suggest that lower hours outside the export garment industry may be due to the prevalence of casual and uncertain wage work, rather than an expression of worker preferences. Glick and Roubaud (2006) show that workers in Zone Franche in Madagascar worked higher hours than private formal enterprises and informal enterprises outside the zone, a finding that persists in a follow-up study (Cling et al., 2009). Examining the garment industry in Bangladesh, Paul-Majumdar and Begum (2000) find that in the early 1990s, employees in garment export firms worked 12–13 hours per day and 28–29 days per month, compared to 9 hours per day over 26 days per month in other export industries. Meanwhile, employees worked 8–9 hours per day for 23–24 days per month in non-exporters. Computing inter-industry differences in hours worked, Neak and Robertson (2009) offer evidence that export industries are associated with more hours worked in Cambodia. In contrast, Aggarwal (2007) finds that the distribution of hours of work does not vary greatly across the boundaries of an EPZ in India, with slightly higher numbers of workers logging high overtime outside the zone.

The evidence that export employment is associated with longer work hours should balance the observation that exporters generally pay higher wages. Future research may refine our understanding of the exporter wage premium by comparing hourly wage rates rather than total wages per worker. New data resources, such as cross-national data on hours worked (Bick et al., 2016), may aid these new research efforts.

4. Conclusion

This review of empirical research compared wages and working conditions in global manufacturing supply chains to those in domestically-focused employers and several key findings emerged.

First, available research comparing firms in and out of supply chains is limited. While research in international economics on exporter performance contains useful comparisons of wages and skills in global supply chains, there is limited comparative evidence on a variety of non-wage labour standards.

Second, the preponderance of evidence suggests that export manufacturers in emerging markets generally pay higher wages than non-export manufacturers. The exporter advantage in wages is even greater when alternative employment is in the informal sector. The appendix summarizes evidence on the export wage premium from over twenty emerging markets. This compensation advantage is counterbalanced to some extent by longer hours worked in export manufacturing, and evidence on wages in export processing is more mixed than evidence from ordinary exporters.

Third, while exporters generally pay higher wages, there are several exceptions to this general finding. Skill level, the basis for competitive advantage (cost or quality), and international economic trends also influence whether individual workers in a supply chain participant receive higher or lower wages relative to non-exporters.

And fourth, comparative empirical research on non-wage working conditions is more limited and the evidence is less conclusive. In freedom of association, country-level studies suggesting that increased levels of exports are negatively correlated with labour rights is balanced by firm-level evidence suggesting the unionization rates are higher among emerging market exporters than non-exporters. In occupational safety and health, exporting is associated with improvements in health and safety management at the firm level. The evidence suggests that hours of work tend to be longer in global supply chains than in non-exporters, but to date such evidence is limited to a handful of countries. As for child labour, forced labour and employment discrimination, there is no empirical research directly comparing the prevalence of these practices in and out of supply chains.

Directions for future research

Despite relatively consistent findings that exporters pay higher wages, important questions remain. One purpose of this analysis was to compare wages and working conditions in global supply chains to those in alternative employment in the domestic economy. Yet the issue of alternative employment opportunities for workers in supply chains is itself an empirical question: What are the alternative employment opportunities available to these workers?

Uncertainty surrounding non-wage working conditions implies opportunities for new empirical research comparing supply chain factories to other employers. The industrial surveys used in much of the research on wages may offer promising opportunities. As illustrated by the data on wages, these surveys are conducted across many developing countries and some contain detailed information about the workforce. It seems likely that comparative research on industrial accidents and work hours could emerge from these data and national labour force surveys.

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Appendix: Firm-level evidence on exporting and wages

The following table summarizes research on employee compensation in exporting firms across a variety of developing countries and summarizes studies using micro-data at level of firms or individual earners, occasionally drawing on national or industry-level data. There is evidence across a variety of countries that employment in the export sector is better compensated than employment for non-exporters. If the reference group is informal or agricultural employment, the advantage of industrial export manufacturing employment is particularly pronounced. However, the literature also highlights questions that remain about the processing trade and the fact that skilled, non-production employees appear to benefit more from exporting than less-skilled production workers. Exporters tend in addition to be more skill-intensive than non-exporters (with exceptions for processing trade).

Source	Country	Exporters have…	Compared to…	Notes	Data source
Lederman et al., 2003	Argentina	**Higher wages**	Industries less exposed to foreign trade.	Sectoral analysis, adjusting for skill level.	World Bank
Kabeer and Mahmud, 2004	Bangladesh	**Higher wages**	Alternative employment	Jobs in EPZ have highest wages, followed by ordinary garment exporters, followed by alternative wage employment.	Neighbourhood survey of women workers in Dhaka and a nearby EPZ (2001)
Fajnzylber and Fernandes, 2009	Brazil	**Higher skill**	Non-exporters	They find that exporters on average employ higher-skilled employees. However, firms that export more than half their output have a reduced share of skilled employees	Enterprise Survey of Manufacturing Establishments, The World Bank (2003)
Lederman et al., 2003	Brazil	**Higher wages**	Industries less exposed to foreign trade.	Sectoral analysis, adjusting for skill level. Small advantage of the most export-exposed industries over non-tradables.	World Bank
Neak and Robertson, 2009	Cambodia	**Higher wages**	Industries less exposed to foreign trade.	Estimates garment industry employees earn 67% more than the average wage.	Cambodia Socio-Economic Survey, Cambodian National Institute of Statistics (2003–2004)
Fajnzylber and Fernandes, 2009	China	*Lower skill*	Non-exporters	Hypothesized to reflect the specialization of exporters in labour-intensive goods.	Enterprise Survey of Manufacturing Establishments, The World Bank (2001)

Source	Country	Exporters have…	Compared to…	Notes	Data source
Dai et al., 2012	China (pure export processing)	*Lower wages*	Non-exporters	Pure export processing firms are also less profitable and productive than non-exporters.	China Manufacturing Survey, National Bureau of Statistics and China General Administration of Customs (2000–2005)
Dai et al., 2012	China (ordinary exporters and mixed)	**Higher wages**	Non-exporters	Ordinary exporters and mixed ordinary/processing are also more productive than non-exporters.	China Manufacturing Survey, National Bureau of Statistics and China General Administration of Customs (2000–2005)
Park et al., 2010	China	**Higher wages**	Non-exporters	Uses Asian Financial Crisis as the source of exogenous change in exports.	China Industrial Census (1995) and China Industry Enterprise Survey (1998, 2000), National Bureau of Statistics.
Alvarez and Görg, 2009	Chile	**Higher wages**	Non-exporters	Higher wages hold for both production workers (+15%) and nonproduction workers (+30%).	Annual National Industrial Survey (ENIA), National Institute of Statistics of Chile (1990–1996)
Kandilov, 2009	Chile	**Higher wages**	Non-exporters	Higher wages to both white collar and blue collar workers in exporters, although the causal effect of exporting on wages is mixed.	Annual National Industrial Survey (ENIA), National Institute of Statistics of Chile (1979–1996)
Isgut, 2001	Colombia	**Higher wages**	Non-exporters	Large wage premium for managers (+30–40%), smaller for blue collar workers (+9%–16%)	Colombian Annual Manufacturing Survey (1981–1991)
Lederman et al., 2003	Costa Rica	*Lower wages*	Industries less exposed to foreign trade.	Sectoral analysis, adjusting for skill level.	World Bank
Lederman et al., 2003	Dominican Republic	**Higher wages**	Industries less exposed to foreign trade.	Sectoral analysis, adjusting for skill level.	World Bank
Marcouiller and Robertson, 2009	Honduras	**Higher wages**	Industries less exposed to foreign trade.	Estimates garment industry employees earn 21% above the average wage.	Multiuse Permanent Household Survey, Guatemala National Institute of Statistics (2001–2004)

Source	Country	Exporters have…	Compared to…	Notes	Data source
Banga, 2005	India	Same wages	Non-exporters	Finds that exporting increases employment but not wages	Annual Survey of industries, National Sample Survey Organization of India and Prowess, Centre for Monitoring Indian Economy (1991–1998)
Kumar and Mishra, 2008	India	**Higher wages**	Industries under higher levels of trade protection	Finds that falling trade barriers associated with increased wage premiums by industry.	Annual Survey of Industries, National Sample Survey Organization of India (1980–2000)
Amiti and Davis, 2012	Indonesia	**Higher wages**	Same-industry non-exporters	Controlling for industry fixed effects, the share of non-production workers, and total employment: higher wages for exporters (+8%) and firms that both import and export (+25%).	Manufacturing Industry Survey, Statistics Indonesia (1991–2000)
Robertson et al., 2009a	Indonesia	Mixed	Alternative employment	Finds that wages in apparel manufacturing were near industry average in 1991, but significantly above average in 2004.	National Labour Force Survey, Statistics Indonesia (1989–2004)
Were and Kayizzi-Mugerwa, 2009	Kenya	**Higher wages**	Same-industry non-exporters	The wage premium in 2003 disappears after controlling for output-per-worker, capital intensity, and location.	Regional Program on Enterprise Development Survey, World Bank (1995, 2003)
Glick and Roubaud, 2006	Madagascar	**Higher wages**	Alternative employment	Wages in export processing (1995–2002) higher than informal sector. For women, processing wages are also greater than employment in private formal sector.	Annual Labour Force Survey, National Statistical Office of Madagascar (1995–2002)
Cling et al., 2009	Madagascar	Mixed	Alternative employment	Wages in export processing (2006) now lower than other industrial employment. Processing wages still higher than informal employment in local labour market.	Annual Labour Force Survey, National Statistical Office of Madagascar (1995–2006)

Source	Country	Exporters have…	Compared to…	Notes	Data source
Verhoogen, 2008	Mexico	**Higher wages**	Non-exporters	Unadjusted comparison of between exporters and non-exporters (Table 1). Also finds initially more productive plants selected into exporting and raised white- and blue-collar wages.	Annual Industrial Survey, Mexico National Institute of Statistics, Geography, and Information (1993–2001)
Frias et al., 2012	Mexico	**Higher wages**	Non-exporters	Exporters pay more in cross section (Table 1), but the effect of within-firm changes in export behaviour is primarily on the high end of the within-plant wage distribution.	Annual Industrial Survey, Mexico National Institute of Statistics, Geography, and Information (1993–2001)
Lederman et al., 2003	Mexico	**Higher wages**	Industries less exposed to foreign trade.	Sectoral analysis, adjusting for skill level.	World Bank
Tanaka, 2017	Myanmar	**Higher wages**	Non-exporters	Uses instrumental variables strategy to attempt to estimate causal effect of exporting on wages and other workplace outcomes.	Original three-wave survey of domestic manufacturers.
Tsou et al., 2006	Taiwan	Mixed	Non-exporters	Higher wages for non-production workers, but lower wages for production workers	Manufacturing Sample Surveys, Statistical Bureau of Taiwan (1991, 1996)
Cole et al., 2010	Thailand	**Higher wages**	Non-exporters	Larger export wage premium among domestic firms than among foreign-invested firms.	Annual Survey of Manufacturing Industries, Thailand Office of Industrial Economics (2001–2004)
Meschi et al., 2015	Turkey	**Higher wages**	Non-exporters	Unadjusted comparison in Table 2 and estimation of export wage premium in Table 4.	Annual Manufacturing Industry Survey, Turkish Statistical Institute (1992–2001)
Hiep and Ohta, 2009	Viet Nam	Same wages	Non-exporters	The point estimate is higher for exporters, but the difference in average wage is not statistically significant.	Productivity and Investment Climate Enterprise Survey of Vietnam, World Bank (2002–2004)

Source	Country	Exporters have…	Compared to…	Notes	Data source
Van Biesebroeck, 2005	Ethiopia, Tanzania, Burundi, Zambia, Kenya, Ghana, Cote d'Ivoire, Cameroon, Zimbabwe	**Higher wages**	Non-exporters	Finds that exporters pay higher wages prior to export activity, but no gain in wages after exporting.	Survey of manufacturers, Regional Program on Enterprise Development, World Bank
Milner and Tandrayen, 2007	Cameroon, Kenya, Tanzania, Zambia, Zimbabwe	Mixed	Non-exporters	Higher wages among within-Africa exporters. Exporters to other competitive markets show no premium or negative premiums	Survey of manufacturers, Regional Program on Enterprise Development, World Bank (1993–1995)

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