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A Panel Study, 1980-2009

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Abstract

Do economic downturns in the Global North undermine worker safety in the Global South? Literature suggests that bilateral trade linkages lead to the diffusion of "good" labor standards from importing countries of the Global North to exporting countries of the Global South. The crucial mechanism is the ability and willingness of importing firms to deploy their market leverage and ask for improved labor standards from their overseas suppliers. Yet, cost-cutting pressures emanating from economic downturns might lead the same importing firms to give lower priority to worker safety in their overseas supply chains. When importing firms demand price reductions, overseas suppliers might respond by reducing wages, ignoring safety regulations, and working their labor force for longer hours. The observable implication is that worker safety in the Global South may deteriorate during economic downturns in their export markets located in the Global North. We evaluate our hypothesis using a panel of 83 developing countries for the period, 1980-2009, and find that economic downturns in developed country markets are associated with significant increases in non-fatal occupational injury rates in developing countries. The injury-increasing effect is more pronounced in developing countries with weak workers' rights protection.

Highlights

1. Trade links economies of trading partners in developed and developing countries.
2. Economic downturns compel firms to cut costs.
3. Importers in developed countries seek cost cuts abroad.
4. To remain competitive, developing country suppliers downgrade worker safety.
5. Domestic labor laws and unions can shield the safety of workers.

I. Introduction

Globalization is connecting different regions of the world in interesting ways. Economic and political developments in one country influence policies in far off countries through trade, foreign investment, capital flows, foreign aid, the internet, Twitter, to name a few. In this increasingly interconnected world, some suggest that the ability of countries to control their domestic policies is sometimes compromised (Keohane and Nye, 1977). We focus on the role of trade-based linkages in shaping domestic policies of exporting countries.

Dependency scholars note that trade connections facilitate the economic exploitation of developing countries by developed countries by forcing an inequitable international division of labor. In this structure, developing countries focus on lower value commodities and end up with unfavorable terms of trade for their exports (Singer, 1949; Prebisch,1950; Wallerstein, 1973; Cardoso and Faletto, 1979). Some suggest that trade and economic linkages also lead to exploitation of the labor force in exporting countries and the degradation of the environment (Nash and Fernandez-Kelly; 1983; Lebaron and Ayers, 2013). Others paint a more optimistic picture: for them, developing countries might benefit from trade because these linkages allow developed countries to diffuse their superior labor and environmental standards to developing countries (Vogel, 1995; Greenhill et al., 2009).

But trade linkages between exporting, developing countries and importing developed countries might have some additional implications for the former. Specifically, we offer the first systematic study of how economic downturns in the export markets of the Global North affect worker safety in the exporting countries in the Global South. Economic cycles represent structural conditions over which an individual firm has virtually no control (mega banks are perhaps exceptions). How might these structural pressures shape firms' incentives to promote or ignore worker safety in their overseas supply chains? We seek to answer this question by examining how trends in country-level occupational injuries (as reported to the International Labour Organization, ILO) in exporting, developing countries are influenced by economic downturns in importing, developed countries.[1]

Worker safety is perhaps the most important and widely recognized dimension of labor standards. The ILO has adopted more than 40 standards and Codes of Practices dealing specifically with workers' health and safety. Reducing workplace health and safety risks, especially the ones that are not immediately visible, is challenging. Every year 317 million

accidents occur in the workplace, and every day 6,300 people die as a result of occupational accidents or work-related diseases.[2] The literature emphasizes that appropriate assessment and mitigation of health and safety risks at workplace require technical expertise, management systems as well as a safety culture (Dejoy, 2005; Flin et al., 2000; O'Toole, 2002; Moss and Hwang 2010). The literature also notes that firms face incentives to cut corners on worker safety, especially in the context of developing countries where labor tends to be not organized, governmental regulations are poorly enforced, and penalties for accidents tend to be minor (Cesar 2005, Reinecke and Donaghey, 2015).[3] The tragic industrial accidents in Karachi, Pakistan in 2012 and in Rana Plaza, Bangladesh in 2013 revealed how factory owners disregarded basic regulatory requirements such as keeping the passage to fire exits clear (Taplin, 2014).

Trading relationships have been recognized as important mechanisms for the cross-country diffusion of regulatory standards, practices, and norms (Collinsworth et al., 1994; Frankel and Rose, 2005; Neumayer and De Soysa, 2011). In the area of labor standards, scholars find empirical support for bilateral trade-based upward diffusion; the so-called California Effect. This literature suggests that importing countries in the Global North use their market leverage to *ratchet up* labor standards in exporting countries in the Global South that typically have shown low respect for labor rights (Greenhill et al., 2009; Lim et al., 2015; but see Kollmeyer 2009; Mahutga 2014).

We introduce a new dimension to the trade-labor practices dynamics. Contrary to the optimistic predictions of trade-based upward diffusion, we explore the possibility that trade linkages with the North lead exporters to neglect worker safety. At the core of the upward diffusion of labor standards has been the willingness and capability of importing firms to demand improved labor conditions from their overseas suppliers. We focus on a scenario in which the same importing firms in the North face a different structural context – the context that reduces their willingness and capability to demonstrate worker safety abroad: economic downturns.

We suggest that during periods of economic downturns, cost cutting tends to become the mantra for firms' economic survival. Stock markets and the financial media celebrate CEOs who are prepared to cut costs by taking "tough" decisions such as laying off workers and demanding price reductions from suppliers. Firms want to demonstrate that they are focusing on "core" activities (read, profit enhancing) while dropping the "nonessential" ones (Bansal et al., 2015),

which might include the labor-related CSR activities in overseas supply chains. In addition to the pressure from the stock market, firms might feel that their customers are less likely to pay attention to their overseas labor practices and look more aggressively for a good price, special bargains, and promotions (Carrigan & Attalla, 2001; Desvaux et al., 2009; Bray et al., 2011; Öberseder et al., 2011). Facing cost pressures at home, importing firms can be expected to ask their suppliers, located at home and certainly the ones located abroad, to reduce prices (Lamming, 2000; Gulati et al., 2010). In return, they may not press these suppliers on labor standards; and in some cases, even turn a blind eye to unsafe working conditions. These suppliers may then squeeze their sub-suppliers, and a culture of cutting costs by ignoring workplace safety may spread across the economy. Even exporting country governments may back off from their minimal labor enforcement activities, lest their firms lose export markets and therefore accentuate unemployment problems at home (a dynamic that the Rana Plaza episode illustrated). In short, during economic downturns, importing firms' willingness and abilities to demand worker safety from overseas suppliers are significantly reduced, or even reversed. In such situations, bilateral trading relationships might diffuse "bad" norms and practices from importing, developed countries to exporting, developing countries.

We empirically test this logic using an unbalanced panel of 83 developing countries for the period, 1980-2009. We operationalize worker safety as occupational injury rate per 10,000 working-age population. We find support for the hypothesis that economic downturn in importing, developed countries is associated with a significant *increase* in occupational injury rate in exporting, developing countries. We also find that the injury-increasing effect is more pronounced in developing countries that offer weak protection for workers' right. Our finding is robust to different specifications of economic cycles in the importing countries of the Global North (unemployment rate as well as unemployment gap) and different measures of bilateral exports from the Global South (total exports, industrial goods exports, and manufacturing goods exports).

The rest of the paper is organized as follows. In Section II, we elaborate our main argument, outlining the mechanism by which economic downturns in importing, developed countries lead to increased occupational injury rates in exporting, developing countries. We also investigate how the domestic politics and macroeconomic performances of exporting countries might condition the above diffusion mechanism. In Section III, we introduce the variables and

model. In Section VI, we present our empirical findings from the main models and a series of robustness checks. We conclude in Section V.

II. Trade-based Diffusion of Labor Standards and Economic Cycles

Whether international trade hurts or helps labor rights, both in importing and exporting countries, has been extensively debated. The first-generation trade-regulation studies examined the effect of overall trade salience on exporting country's labor standards. While the intuition was that exposure to the global economy will influence domestic labor standards, the results of these studies were inconclusive (Collinsworth et al., 1994; Elliott and Freeman, 2003). Instead of focusing on *how much* a country trades, the second generation studies examine how the exporting country's labor standards were influenced by *with whom* it traded. Here the idea is that some importing countries might deploy their market leverage to project their regulatory and managerial preferences onto their suppliers abroad. Because these importing countries were located predominantly in the Global North, scholars suggest that bilateral trading relationship might actually lift labor standards in the exporting countries of the Global South (Greenhill et al., 2009; Lim et al., 2015) These diffusion dynamics cohere with the broader conception of stakeholder theory (Mitchell et al., 1997) and resource dependence theory (Pfeffer and Salanick, 2003; Hillman et al., 2009); firms respond to cues from actors in the external environment that have the ability to deny them critical resources required for their survival and growth.

The intellectual inspiration for the second-generation theories can be traced to the so-called California Effect: the ability of the importing destination to deploy its market leverage to diffuse its regulatory preferences to the exporting jurisdiction (Vogel, 1995). While Vogel made his case in the context of "product" standards, subsequent work has extended this logic to the realm of "process standards," including labor standards (Greenhill et al., 2009). Countries participating in the World Trade Organization (WTO) find it difficult to use trade sanctions (to deny access to their home markets) as a tool for promoting labor rights abroad. This is because the WTO constrains them from regulating imports using "process-based" rules; how firms use their labor force is interpreted as part of the production process. After all, free trade is predicated on the principle that countries should be free to exploit their "relative advantages." Some suggest that if a country has a relative advantage in labor (predominantly in the Global South), then it should be allowed to use this resource as it deems fit; capital rich countries (predominantly in the

Global North) should not be permitted to tell labor rich countries on how they should regulate their labor standards (Bhagwati, 2003). While WTO obligations restrict governments from restricting imports based on labor standards, they cannot restrict private actors from demanding that companies demonstrate labor safety in their overseas supply chains. What might be the mechanisms?

With the rise of ethical consumerism (Micheletti and Stolle, 2004. Harrison et l., 2005; Bartley et al.,2015), labor rights activists groups (Sparkes and Cowton, 2004) and, more recently, socially responsible investing (Sparkes and Cowton, 2004), firms in developed countries are increasingly scrutinized and criticized for outsourcing hazardous activities abroad and not monitoring labor practices of their overseas subsidiaries. Recognizing that consumption is a political act, some consumers are willing to judge a product not only based on its attributes but also *how* it is produced. By voting with their dollars, these consumers can influence firms' policies on social and regulatory issues such as labor standards (Micheletti and Stolle, 2004). Further, scrutiny of overseas supply chains by activists groups such as Fair Labor Association sends a clear message that importing firms will be held accountable for the labor practices of their overseas suppliers. The emergence of socially responsible investing, though still small in absolute level, also suggests that some investors are paying attention to worker safety issues in overseas supply chains. Firms are increasingly sensitive to these messages because they fear disapproval, if not punishment (Walters and James, 2009: 10) and seek to minimize the risk to their corporate and brand reputations (Spar 1998; Bartley et al., 2015).[4]

Labor standards including worker safety thus have increasingly been recognized as an important dimension in the discussions on corporate social responsibility (CSR) (Matten and Moon, 2008; Melia et al., 2008; Yu, 2009; Hart, 2010). Negative spotlights led famous brands and retailers such as NIKE, APPLE, and H&M to ask their suppliers to improve their worker safety standards and subject them to inspections by third-party or company auditors (Locke, 2013). Some brands such as Hewlett-Packard (HP) "preemptively" adopted codes of conduct to improve supply chain labor standards before they become the target of a negative spotlight. (Distelhorst et al., 2015). Commitments to labor standards are also explicitly incorporated in global-scale voluntary initiatives such as the United Nations Global Compact, which currently has over 9000 business members.

The development and spread of voluntary/private codes of conduct across the global supply chains have moved the second generation literature forward to investigate more nuanced mechanisms for *when and why* firms in the Global South comply with the private/voluntary labor standards advocated and promoted by the Northern stakeholders (Locke, 2013).[5] Some focus on the type of linkage and suggest that foreign direct investment is more effective in influencing the labor standards in host countries than subcontracting (Mosley, 2010). Others distinguish between the lower tier suppliers and the first tier suppliers within the global supply chain and suggest that private governance mechanisms have limited influence on the lower tier suppliers' labor practices (Nadvi and Raj-Reichert, 2015). Also important in shaping the compliance to labor standards is the degree of contractual as well as spatial fragmentation of the workforce in the global production networks. Because firms may work through their overseas contractors and do not directly oversee their labor practices, they may plead ignorance or deny responsibility if labor abuses were to take place (Barrientos, 2013; Weil, 2014). While private regulatory initiatives and corporates codes of conduct that cover supply chains can be helpful, studies suggest that the effectiveness of such initiatives is conditioned by the national context of the developing countries such as the stringency of domestic laws, unions capable of mobilizing to activate state institution, and strength of civil society organization and media freedom (Distelhorst et al., 2015; Toffel et al., 2015; Amengual and Chirot, 2016).

We contribute a new dimension to the trade-labor practices literature by investigating the structural context which influence the incentives of Northern firms themselves to demands superior labor practices from their overseas supply chains: economic downturns. First, economic downturns are likely to increase job and income insecurity, beyond the long-term, structural unemployment. Consequently, consumers will probably focus on getting bargains in the marketplace, instead of scrutinizing firms for their overseas labor practices. A growing body of literature suggests that consumers must have a certain level of wealth to consider company's social responsibility as a purchase criterion (Carrigan & Attalla, 2001; Öberseder et al., 2011; Bray et al., 2011). A survey of consumers across five EU countries during the 2008-2009 recession finds that financially stressed European consumers look more aggressively for a good price, special bargains, and promotions (Desvaux et al., 2009). This purchase behavior can be observed across product categories, and it is particularly prevalent in the case of apparel, with 66 percent of respondents ranking smarter shopping as their top criterion (Desvaux et al., 2009).

Second, even if NGOs and media shine the spotlight on labor safety in overseas supply chains, economic downturns diminish importing firms' willingness and capacity to promote labor safety overseas. For business leaders, macroeconomic downturns expose them to stock market pressures that they need to address (or show as addressing). Cost cutting and massive layoffs are now a commonplace occurrence. Companies seek to demonstrate that they are refocusing on their core activities; consequently, "nonessential activities, which can include socially responsible activities, might be dropped" (Bansal et al., 2015: 69). When Yahoo announced its plans to cut 2,000 jobs, or 14% of its 14,000 workforces, its CEO wrote to Yahoo employees:

> Today we are restructuring Yahoo! to give ourselves the opportunity to compete and win in our core business. The changes we're announcing today will put our customers first, allow us to move fast, and to get stuff done. The outcome of these changes will be a smaller, nimbler, more profitable Yahoo! better equipped to innovate as fast as our customers and our industry require.

Unfortunately, many firms do not consider CSR to be a core activity and undertake it only if "slack" (Bourgeois, 1981) resources are available. Economic downturns reduce the availability of such slack. Some CSR activities face higher risks of being abandoned than others. These are the so-called "tactical" activities that neither require firm-specific capabilities nor involve significant organizational structural adjustments (Bansal et al., 2015). We suggest that improving workplace safety in the overseas supply chain is a tactical activity that faces a higher risk of retrenchment, compared to the core CSR activities targeting the home country factories, employees, and consumers that are more likely to be sustained. Hughes (2012) reports that during recessions, major UK fashion retailers were more cautious about promoting ethical trade, especially if it directly involves increased costs. While the retailers may not abandon all existing ethical trading programs, they increasingly link these programs tightly to "strategies of corporate efficiency" (Hughes, 2012: 50).

Finally, the importing firms facing cost pressures at home may demand price reductions from their overseas suppliers (Helper and Sako, 1995). In return, the importing firms may informally back off on their insistence on labor safety and other measures. Suppliers would then be able to lower production costs by ignoring safety regulations, neglecting training of their workers, and squeezing them in terms of longer working hours and fewer breaks, all of which

would contribute to increasing occupational injury rate. Suppliers would probably squeeze their sub-suppliers as well, thereby contributing to an overall lax safety environment.

Suppliers may even find local governments serving as their willing partners in efforts to cut costs. For example, firms may ask governments to foster their "competitiveness" by reducing the already modest enforcement of safety regulations. Governments may agree because they are unlikely to take measures that lead to the firms closing down – or even threatening to close down. Suppliers located in countries with weak labor laws would find it especially easy to ignore worker safety. These suppliers may not only ignore the relevant regulations in place but also try to undermine them, all in the name of maintaining competitiveness. For instance, garment manufacturers in Sri Lanka have lobbied their government to *increase* working hours as competitive pressure from neighboring China has increased in textile manufacturing (Doane and Abasta-Vilaplana, 2005). If the government concerned about local firms' competiveness becomes more reluctant to enforce labor laws, the pernicious effect on worker's safety may spill over to the broader domestic economy, even to the non-exporting sectors. A recent study in China finds that even when the central government increasingly adopts political discourses that "set the tone for rigorously restraining unsafe or illegal practices in the production process", local governments under pressure to show economic growth often prioritize "speed and results" and provide local businesses with "a permissive space for various illegal practices". (Li, 2016: 192-194). Based on the above discussion we offer the following hypothesis:

Hypothesis 1: Economic downturns in importing developed countries undermine worker safety in exporting developing countries.

So far we have focused on how cost pressures from importers affect worker safety throughout supply chain. Yet, the pressures on supply chain are likely to be moderated by the abilities of workers to protect their own interests. When overseas customers demand lower prices or other types of flexibility (Taplin, 2014), and suppliers seek to respond by compromising labor safety (say by insisting on longer working hours), they may face a push back from their workers and government authorities. This is more likely in countries with strong workers' rights protection. We thus propose the following hypothesis:

Hypothesis 2: Economic downturns in importing developed countries will diminish worker safety in exporting developing countries especially in exporting countries with *weak* workers' rights protection.

III. Research Design: Variables and Method

Dependent Variable

As Berliner et al. (2015) rightly emphasize, multiple possible indicators capture labor standards and working conditions in global supply chains, which requires one to be attentive to precisely what is measured and how it relates to the theoretical claim one makes. We operationalize our dependent variable as occupational injury rate. The variable captures the *de facto* (practice), rather than the *de jure* (legal), dimension of workplace safety protection. This choice corresponds well with our theoretical claim emphasizing the cyclical pressures from export markets on developing country producers. When producers' incentives to respect workplace safety decline, the *de facto* workplace safety performance is expected to deteriorate in a rather short time span. Such a change does not need to involve government action to loosen the workplace safety-related regulations (e.g., by lowering minimum wage or reducing the number of inspections).

The occupational injury data we use are from the ILO which defines it as "any personal injury, disease or death resulting from *an occupational accident*; an occupational injury is therefore distinct from *an occupational disease*, which is a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity [emphasis added]". In principle, the data published are temporally and cross-nationally comparable. Recognizing that "international guidelines on the measurement and classification of occupational injuries will promote the development of these statistics along sound lines and improve their international comparability," (ILO 1998), the ILO adopted the Code of practice on the recording and notification of occupational accidents and diseases (1994) and the Resolution concerning statistics of occupational injuries (1998). The Resolution states: "where data from different sources are used together, attempts should be made [by member states] to ensure that the concepts, definitions, coverage and classifications used by the different sources are consistent… efforts should be made to harmonize the statistics compiled from different sources and by

different bodies." (ILO 1998) For most countries, data are obtained from occupational accident reporting systems (e.g. to a labor inspectorate) or injury compensation schemes. A handful of countries also report data from surveys of establishments and of households.[6]

We focus on non-fatal injuries (i.e., injuries not leading to death), which account for nearly 99 percent of the injury cases reported by our sample developing countries between 1980 and 2009. We denominate injuries with 10,000 working-age population. We use working-age population instead of the employed (working) population as a denominator for two reasons. First, employment rate data are notoriously unreliable in the context of developing countries and are not even available for the early 1980s for most developing countries. Second and more importantly, the use of actual employed population as a denominator might lead to a denominator effect (i.e., lower employment resulting in a higher observed injury rate). This is especially plausible when the economic downturn in importing countries involves falling demand and, in turn, a lowered output in exporting countries. As our main theoretical mechanism centers on the developed country consumers and firms' incentives to monitor and enforce labor standards, we do not want our finding to be driven by such a denominator effect. Nonetheless, our robustness check reported in the Appendix assures that our main finding holds when we use the employed population-denominated injury rate as a dependent variable.

Independent Variables

The key independent variable of interest is economic downturns in importing countries located in the Global North that have high labor standards. We focus on 23 developed countries that were members of the OECD by the year 1980.[7] Based on this criterion, we do not include countries such as South Korea, Mexico, Chile, Hungary and Poland in this category of developed importing countries.[8]

Our primary indicator of an economic downturn is (1) the unemployment gap. The unemployment gap is measured by the difference between the actual unemployment rate and the estimated structural unemployment rate known as the NAIRU (the non-accelerating inflation rate of unemployment).[9] The indicator is often used as a proxy for cyclical labor market slack. As robustness checks, we employ two alternative measures of the economic cycle: (2) the actual unemployment rate that also includes structural unemployment and (3) the household final consumption expenditure growth rate.

We then create our key independent variable, *Bilateral Export Context (BEC): Unemployment Gap*, which is the export share-weighted average unemployment gap in developed export destinations:

$$\text{BEC} : \text{UnemploymentGap}_i \quad = \quad \sum_{1}^{j} (\text{UnemploymentGap}_j * \frac{\text{Export}_{ij}}{\text{TotalExport}_i})$$

$Export_{ij}$ represents the volume of bilateral exports from a developing country *i* to a developed country *j*. $UnemploymentGap_j$ refers to the unemployment gap in developed country *j*. $Total\ Exports_i$ represents the total volume of exports from country *i* to all 23 developed markets.[10] To illustrate, think of a developing country A which exports to two developed markets, B and C. Suppose B accounts for 20 percent of A's developed country exports, and C accounts for the remaining 80 percent. Now suppose that the unemployment gap for B is 0% and for C is 3%. The *BEC* variable for country A will take the value: (0.2*0) + (0.8 *3) = 2.4%.

By definition, the value of the *BEC* is determined by the 23 OECD countries' economic cycles and their respective shares in the export basket of a developing country exporter. To the extent that import demand is not independent of economic cycles, the *BEC* variable may over-represent those OECD countries experiencing economic booms (i.e., those countries with *low* unemployment gap). Such a potential overrepresentation of the boom economies makes the *BEC* a stricter, not a weaker, indicator of economic downturn in developed markets. So when would the *BEC* increase? By construction, the value of the *BEC* for a developing country increases when (1) the developed country buyers that are hit by economic downturn still import at similar levels or when (2) many developed country buyers are hit by an economic downturn in ways that while their overall import levels decrease, their relative import shares for a developing country stay similar. In the latter case, the process might also involve increased importance of non-OECD buyers, which will be further discussed later in this paper.

To capture the level of worker protection in developing countries, we use Workers' Rights Index from the Cingranelli-Richards Human Rights Data (CIRI) (Cingranelli et al., 2014).[11] The index is based on the description of government protection of workers' rights in the US State Department Reports (USSD). To test Hypothesis 2, we examine the effect of *BEC* on occupational injury rate separately in three subsamples: countries with strong, moderate, and weak labor rights protection, respectively. Further, we employ another measure of labor rights

protection to test Hypothesis 2. In light of the literature that emphasizes the workers' mobilizing ability on labor standards enforcement (Amengual and Chirot, 2016), we also report results by splitting the sample into two categories of collective worker's rights using Mosley and Uno's (2007) collective labor rights indicator[12].

For a developing country exporter, it is plausible that exports constitute only a small portion of its economy, or exports to developed countries constitute a small portion of the economy. Both these factors may pose difficulties in observing how our hypothesized mechanisms linking economic downturns in importing developed countries influence injury rates in exporting countries. We, therefore, control for *export salience* (% GDP) and *export to OECD* (% GDP). The data are from the Correlates of War (COW). For a robustness check, we also interact the *BEC* with *export to OECD*. This is to examine whether our finding is sensitive to the situation when economic downturns in the OECD coincide with an overall decrease in (and replacement of) exports to the OECD market.

We also control for the macroeconomic context of exporting countries themselves. We include *GDP growth rate* in all models, and in a robustness check specification, also control for *unemployment rate*. The data are from the World Bank[13]. On the one hand, an economic downturn in exporting countries can easily deteriorate worker safety, as labor surplus tends to weaken workers' voice (Rudra, 2002). On the other hand, economic downturns discourage workers from reporting their injuries, leading to a decrease in *reported* injury rate (Boone et al., 2011).

We also control for the level of *democracy* (polity2 index from Polity IV project) (Marshall et al. 2014)[14] and economic development (*GDP per capita* and its squared term; the data are from the World Bank), as they might independently affect the injury incidence, injury reporting, and record keeping. Finally, we control for the share of the industry (% GDP; the data are from the World Bank): arguably, occupational injuries are more likely in industrialized economies as opposed to agriculture or service-oriented economies.

Occupational injury data should be used with caution, especially in the cross-sectional, time series setting. The observed between-country variation in injury rate might be driven by the culture-specific tendencies of injured workers to report or hide their injuries and/or country-specific legal definitions of non-fatal injuries. We address this issue by including country fixed effects. Furthermore, there could be year specific shocks that influence injury levels across the

panel. For example, think of major industrial accident such as the Rana Plaza tragedy in 2013. Arguably, with this sort of an accident, factory owners across all developing countries might have led to higher levels of scrutiny from regulators, workers, and stakeholders, and influenced the reporting of the injury data. Of course, the shock value of such incidents probably wears off, and media may start focusing on some other "story." Thus, while we do not examine the long terms consequences of such major disasters, we recognize that they might influence occupation injury levels across the full panel in a given year. Therefore, to remain conservative in our estimates, we include year fixed effects.

There might be additional biases in the reporting of injuries. Fixed effects cannot account for the systematic reporting bias in injury rate; for instance, the reporting behaviors that are potentially endogenous to the changes in political and/or economic conditions in a country. Empirical studies in the context of advanced economies suggest that the reported injury rate in a given year is influenced by workers' perceptions of their employment security. Boone et al. (2011)'s study on Austrian workers, for instance, finds that when injured employees face a greater risk of getting fired, they choose to hide moderate injuries. Because the risk of unemployment tends to increase during the economic downturn, the reported injury rates in Austria show pro-cyclical fluctuations (Boone et al., 2011). Similar reporting bias might also drive injury rate fluctuations in developing countries. The tendency of workers in developing countries to under-report injuries during their economies' downturns might be even stronger than that of Austrian workers as the legal employment protection in most developing countries is much weaker than Austria. Controlling for indicators of economic downturns and levels of workers' rights protection in exporting developing countries help alleviating such biases related to under-reporting:

Our dynamic (lagged dependent variable) model equation is as follows:

$$\text{InjuryRate}_{it} = \boldsymbol{\beta_0}\text{InjuryRate}_{i,t-1} + \boldsymbol{\beta_1}\left(\frac{\sum_{k=0}^{2}\text{BEC}:\text{UnemploymentGap}_{i,t-k}}{3}\right) + \mathbf{X}_{i,t}\boldsymbol{\gamma} + \alpha_i + \tau_t + \varepsilon_{it}$$

where our key variable of interest, *BEC: Unemployment Gap,* is entered into the equation as a three-year historical moving average. β_1 is its coefficient estimate. We hypothesize that the estimate of β_1 is positive (i.e., injury-increasing) and statistically significant. In the robustness

check section, we also provide results from employing a contemporaneous term of *BEC* and a lagged term of *BEC*, instead of taking the 3-year-moving-average. X is a matrix of all other covariates and γ is a vector of coefficient estimates for them. α and τ are country and year fixed effects respectively. ε is the error term. To make sure the moving averaged indicator is not biasing our findings, in the appendix we report results from employing one and two year lagged terms of *BEC*. To address potential concerns of endogeneity and Nickell bias, we also report in the appendix the results from the system Generalized Method of Moments (System GMM) estimation.

IV. Findings and Robustness Checks

Main Findings

Table 1 summarizes our findings. Model 1 is the baseline model to test the claim made in the literature about the trade-based *upward* diffusion of labor standards from the importing, high labor standard countries to the exporting, low labor standard countries (Greenhill et al., 2009). Consistent with the literature, the coefficient estimate of *export to OECD* is negative (i.e., injury-reducing in developing countries). The estimate, however, is not statistically significant at conventional levels. The weak finding is broadly consistent with Greenhill et al. (2009) who (using the Mosley-Uno labor rights dataset) report a stronger effect on bilateral trade pressures on *de jure* labor rights and a much weaker effect on *de factor* labor practices. These de facto, on the ground practices manifest in ways such as worker safety.

[Table 1 here]

Also, the lack of significant effect of *export to OECD* is not surprising given the empirical works that propose more nuanced mechanisms for trade-based standards diffusion (some of which are reviewed in Section II). The Global Value Chain (GVC) literature suggests that the asymmetric bargaining power between the Northern leading firms and Southern suppliers creates competitive downward pressures on price and working conditions among the suppliers (Heintz, 2006; Kollmeyer, 2009; Baldwin, 2012; Mahutga, 2014). Viewed from this perspective, the upward pressures on labor rights exerted by the individual firms, consumers and

NGO (i.e., the California Effect dynamics) might be offset by the downward pressures attributable to the structural imbalance.

Model 2 introduces our key variable of interest, *BEC*. We find that *BEC* has a positive association with injury rates, meaning that worsening of the economic situation in developed importing countries *increases* occupational injury rates in exporting developing countries. In a model including a lagged dependent variable, the effect of a coefficient estimate can be seen in two aspects: the instantaneous effect and the long-run effect. Our primary interest is how safety conditions in exporting countries of the Global South are influenced in the short-term by economic fluctuations in developed markets. Therefore, we illustrate our findings mainly in terms of the instantaneous effects. The instantaneous marginal effect of *BEC* is 3.76 (as reflected in the coefficient estimate). A one-unit (i.e., a one percentage point) increase in *BEC* leads to 3.76 more injury cases per 10,000 workers. This is of substantive importance given that the median level of injury rate per 10,000 workers in our sample country-year observations is 14.6 (See Descriptive Statistics in Appendix 1). If the shift in *BEC* were to be permanent, the long run marginal effect distributed over future periods of time is: $3.76/(1-0.87)\approx29$.[15] Figure 1 visualizes the expected first differences in injury rate resulting from a standard deviation (0.66) increase in *BEC*. The light blue shaded areas represent 90% confidence intervals. In all, the results support H1.

[Figure 1 here]

Recall, Hypothesis 2 suggests that the effect of economic cycles in importing countries on worker safety in exporting countries is conditioned by worker's rights protection in the latter. In Model 3, we include an interaction term of *BEC* and *workers' rights* to examine how the level of workers' rights protection in exporting developing countries might condition the effect of *BEC*. In light of Hypothesis 2, we focus on whether the effect of *BEC* is more (/less) pronounced in countries with weak (/strong) workers' rights protection. We find that while the coefficient estimate of the lower order term *BEC* is positive, the interaction term coefficient estimate, the critical coefficient for testing Hypothesis 2, is negative. This result indicates that the injury-increasing effect of *BEC* is mitigated at high levels of *workers' rights*.

We calculate the marginal effect of *BEC* at various *fixed* levels of workers' rights protection. When the CIRI index is set at the lowest value (=0, for severely restricted), the marginal effect of *BEC* on injury rates is 4.99. When the CIRI index set at the highest value (=2, for fully protected), the effect is reduced down to 2.96, a decline of almost 40%. We also visualize the simulated first differences in injury rate, resulting from a standard deviation (0.66) increase in *BEC* at low and high levels of workers' rights protection respectively (see Figure 2.) The figure on the left is when workers' rights protection is low (=0); the figure on the right is when workers' rights are strongly protected (=2).

[Figure 2 here]

In Models 4-6, we split the sample into three categories: countries with weak (Model 4), moderate (Model 5), and strong (Model 6) workers' rights protection. Doing so allows the coefficient estimates of all other independent and control variables to vary as well. The coefficient estimates of *BEC* in all three models are positive (i.e., injury-increasing), but the size varies. Consistent with Hypothesis 2, the injury-increasing effect is smallest when workers' rights are strongly protected (1.70 in Model 4); and is largest where workers' rights are weakest (6.95 in Model 6). In light of the literature that emphasizes the workers' mobilizing ability on labor standards enforcement (Amengual and Chirot 2016), we also split the sample into two categories based on Mosly and Uno (2007)'s collective labor rights index. Given that the sample median and mean of the index are 25.5 and 23.5, we split the sample at the value of 24.5. Results from countries with stronger (>=24.5) and weaker (<24.5) collective labor rights protection are reported in Model 7 and Model 8, respectively. Consistent with the findings using CIRI index, the injury-increasing effect of *BEC* is much weaker when workers' collective labor rights are stronger. The coefficient estimate of *BEC* is 2.57 and not significant in Model 7, while the estimate size if larger (6.44) and significant in Model 8.

Robustness checks

Table 2 summarizes the results from a series of robustness checks. Models 9 and 10 employ different *BEC* measures that are based on alternative indicators of economic cycles. The *BEC* variable in Model 9 is based on unemployment rate, which reflects both structural and cyclical

rate of unemployment. The *BEC* variable in Model 10 is based on household final consumption expenditure growth rate. As an increase in the household consumption expenditure captures economic improvement, we expect the *BEC* variable in Model 8 to have a *negative* coefficient estimate. The signs of coefficient estimates of both *BEC* variables are consistent with our expectation, although the estimate of *BEC: Consumption* is not statistically significant at the conventional levels.

[Table 2 here]

Models 11 and 12 use subcategories of exports to calculate *BEC: Unemployment Gap.* Instead of total exports, Model 11 focuses on exports in industrial goods (i.e., excluding any service export) and Model 12 on exports in manufacturing goods. The later include sectors that are more directly linked to global supply chains. For these alternative *BEC* measures, we use the OECD's STAN Bilateral Trade Database by Industry and End Use (BTDIxE).[16] The industry classification is based on Revisions 4 of the International Standard Industrial Classification (ISIC). Note that these models have shorter time coverage (1990-2009) and include a smaller number of countries due to data availability. Our findings with regard to the *BEC* effect holds. The size of the *BEC* coefficient estimate in Model 12 (6.68) is larger compared to earlier models (i.e., those from Models 2, 3, and 11), suggesting that the workers' safety in manufacturing industries is more vulnerable to export markets' economic cycles than exports in other sectors.

Because some scholars (Locke, 2013) note that increased demand (via economic booms, seasonal effects, or fashion shifts) in importing countries may also lead to workplace safety violations in overseas suppliers (who struggle to meet the increased demand), we also test for a potential non-linear effect of the Global North's economic cycles (i.e., the effect of an economic boom as well as a downturn compared to normal times) on occupation injuries in the exporting countries of the Global South. If increased demand in overseas markets during their economic upturns also undermines worker safety, the relationship between labor safety in exporting countries and the *BEC: Unemployment Gap* will be U-shaped. That is, an increase of *BEC: Unemployment Gap* from a very low level (economic boom) to a normal level is associated with a reduction in injury rate, and then an increase of *BEC* from the normal level to a very high level (economic downturn) is associated with an increase in injury rate. To test this argument, in

Model 13, we include a squared term of the *BEC: Unemployment Gap* in our regression. If there were indeed a U-shaped relationship between the *BEC: Unemployment Gap* and the injury rate, the lower order term would be negative and the squared term would be positive. We do not find such an effect. The lower order *BEC: Unemployment Gap* variable is associated with an increase in injury rate while its squared term is not significant.

Might the injury-increasing effect of *BEC* be driven by economic conditions in exporting developing countries? While our earlier models already control for *GDP growth rate,* in Model 14, we add an additional indicator of economic conditions in developing countries: the unemployment rate. We did not include this variable in earlier models, as we lose a substantial amount of observations due to missing data. The injury-increasing effect of the *BEC: Unemployment Gap* is robust in Model 14. Note that the coefficient estimate of *unemployment rate* is *negative* and significant at the 5% level. This is consistent with the existing studies' finding of pro-cyclical fluctuations in *reported* injury rate (Boone et al., 2011), which is attributable to the reporting bias: workers facing high risks of job loss tend to hide moderate injuries.

While it is reasonable to assume that the 23 original OECD member countries have superior labor standards than most exporting developing countries, there might be meaningful variation among the 23 countries in the stringency of domestic labor laws. In Model 15, we seek to control for such heterogeneity among the importing OECD countries by including an additional indicator, *BEC: Employment Protection*. The indicator captures bilateral trade-weighted average of employment protection of the OECD export markets. Because the global level indicators of workers' protection such as the CIRI index show very limited variation in the OECD context, we employ OECD's own synthetic index of the strictness of regulation on individual and collective dismissals.[17] Our finding concerning the *BEC: Unemployment Gap* holds, and the newly added *BEC: Employment Protection* has an injury-reducing effect consistent with our theoretical expectation. That is, trading with the OECD countries that are more protective of their own workers have a worker-safety improving effect in developing countries, which is independent of the effect of economic cycles. We, however, do not find any significant interaction effect between the two *BEC* measures.

While our analysis includes over 80 developing countries, one might suggest that relatively few countries host much of the world's supply chain factories. We thus explore

whether our result holds when we exclude some of the world's largest developing economies. In Model 17, we exclude China, and our results hold. Our findings also hold when we exclude China and Mexico, and even when we exclude all the BRIC countries.

The BRIC countries are not only big exporters but are increasingly important importers. As we discussed when introducing the *BEC: Unemployment Gap* indicator, the increase in the *BEC* variable may involve the relative rise of other export markets with much inferior labor standards and little concern for worker safety. When the increase of *BEC* is combined with and in part driven by the relative decline of the OECD's imports, the adverse outcome on worker safety may be stronger than when the salience of the OECD markets is sustained. Regarding the potential impact of the growing Chinese market, Adolph et al. (2017) explore the "Shanghai Effect" whereby African countries begin to reflect the lower labor standards of China, which has emerged as a major destination for their exports. They find a modest Shanghai Effect in a handful of African countries where exports to China have increased dramatically and displaced exports to the high standards Western countries. In Model 18, we thus add an interaction term of *BEC* and *export to OECD*. As we control for the size of total export, decline (/increase) in *export to OECD* captures relative increase (/decrease) in the salience of the non-OECD markets. If the Shanghai Effect argument holds in our sample (Adolph et al., 2017), we might find the interaction term coefficient to be negative and significant. Contrary to the expectation, we do not find any strong confounding effect attributable to the change in the salience of OECD markets. While we do not further investigate to what extent the OECD markets were displaced by China during the former's economic downturn in each developing country, we believe investigating such dynamics can be an important area for future research.

Last but not least, we explore whether and how the effect of *BEC* might vary over time. While our analysis covers the period between 1980 and 2009, we so far estimated a single coefficient to capture the common or average effect of *BEC*. On the one hand, the structural changes we outline above might make the *BEC* more prominent driver of safety deterioration. For instance, the low-standard Southern buyers might *magnify* the safety-undermining effect of the *BEC* in the recent years compared to the 1990s. On the other hand, internalization of CSR by global brands might strengthen their normative (as opposed to solely instrumental) commitment to supply chain labor standards. This would *weaken* the *BEC*'s safety-undermining effect, as the

cyclical resource constraints would no longer threaten labor-related CSR programs (see Flammer and Ioannou 2015).

To explore these possibilities, we estimated a series of moving-window regressions based on the main model specification (Model 2). The first regression includes the 11-year period between 1980-1990, and the last includes the 11-year period between 1999-2009. Total 20 regressions are estimated. We find that the *BEC* effect increased over time and peaked in the regression including the period between1990 and 2000, but then has gradually declined. While this can be seen as supporting evidence for the internalization of CSR, future research should further investigate other mechanisms that might weaken/strengthen the *BEC* effect.

[Figure 3 here]

V. Conclusion

This paper speaks to how structural dependence in trading relationships shapes domestic policy. Its empirical findings suggest that actors with least power, namely unorganized workers in developing countries, might be forced to bear a disproportionate burden of adjustment costs inflicted by business cycles in the Global North. Arguably, when faced with cost pressures, importing firms focus less on monitoring labor conditions of their overseas suppliers and even squeeze their suppliers who, in turn, unload cost-cutting on their workers. Larger suppliers also squeeze their subcontractors, and the cost-cutting pressures tend to spread all through the economy. Even developing country governments may become a party to such attempts to "save jobs." To ensure that their firms retain their markets abroad, governments tacitly look the other way as firms disregard labor standards and worker safety. Thus, workers in the supply chain bear the burden of policies that they neither initiated nor were responsible for; a story that has become notoriously familiar in recent years.

Our argument is not limited to how economic downturns in developed markets influence working conditions abroad. One might argue that a similar dynamic could probably be observed whenever there is a sudden shift in demand (within an existing product category) in markets. For example, some scholars blame the Rana Plaza tragedy to fashion shifts in importing countries which forced importing firms (retailers and apparel firms) to demand "flexibility" from their subcontractors (Taplin, 2014). This flexibility came at a huge price: to satisfy seasonal demands

at a very short notice, suppliers forced their labor force to work long hours, ignored cracks in their factory buildings so that work would not stop, and abused workers in all sorts of way. Lack of organized labor and a tacit agreement with the government to look the other way to labor and safety violations contributed to this tragedy. Without a counter-wailing force, it is difficult to see how workers in the overseas supply chain can protect themselves from such exogenous shocks in importing economies. Future research should examine whether labor and citizen groups in the importing countries might be able act as this countervailing force simply because they anticipate the incentives firms face during economic downturns and proactively begin to lobby firms, putting them on notice in this regard.

While we have presented a quantitative, aggregate country-level analysis, future work, especially detailed case studies, can provide greater confidence about the mechanisms we outline. Future research should examine industry-level trends. Arguably, the transmission of such cost pressures is likely to vary across different types of value or commodity chains (Gereffi and Frederick, 2010), and across firms even within a given industry (Distelhorst et al. 2016). For example, this transmission might be more likely when buyers and customers are linked via short-term contracts (e.g., textile industries) instead of longer-term contracts (e.g., heavy manufacturing). Further, when buyers can choose from multiple suppliers, or can easily move their orders from one to another, supply chain contractors are at a disadvantage and have to respond to cost-cutting pressures from their buyers. If buyer-supply chain relationships vary across industries, we can expect to see that some industries are more/less insulated from such cost-cutting pressures than others.

Furthermore, research should also examine the extent to which different sections of the labor force are affected by such pressures. The unskilled workers probably have to bear most of the "adjustment cost" because, from firms' perspective, they are the most dispensable. Similarly, given the gender inequities in the labor force, we suspect women might bear a disproportionate burden of such cost cutting as well (Paul-Majumder and Begum, 2000). While workers can get some cushion if they are organized, the safety of unorganized workers remains at the mercy of global supply chains, as the grim tragedy in Rana Plaza reminds us.

Our paper reminds of the inequities in the world of trade globalization. It shows how powerless actors in far-flung regions of the world have to pay with their bodies and limbs to bail out rich economies that are suffering economic downturns (or fashion changes). We do not

suggest that globalization cannot work to the advantage of the supply chain workers; it can as authors have documented (Greenhill et al. 2009; Lim et al., 2015). Our paper offers an important corrective by showing that same bilateral trading relationships where developed countries constitute the major export markets can at times impose a harsh burden on workers in developing countries.

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[1] The data can be accessed at: www.ilo.org/ilostat. Information on the series are also available at http://www.ilo.org/global/statistics-and-databases/statistics-overview-and-topics/safety-and-health/lang--en/index.htm (Last Accessed on Nov 16th 2016.) We discuss the details about the indicator are in Section III.

[2] http://www.ilo.org/global/standards/subjects-covered-by-international-labour-standards/occupational-safety-and-health/lang--en/index.htm (last access on Nov 16th 2016.)

[3] For example, Foxconn's operations in China have been subjected to this criticism (Frost and Burnett, 2007).

[4] Improving the labor safety of the supply chain might also serve as part of a long-term cost control strategy of the importing firms. While the broad debate whether CSR helps or hurts profitability is inconclusive (Aupperle et al., 1985; McWilliams et al., 2006), reduction of accidents and damage, improvements to workers' health and moral, reduced employee turnover, and reduced compensation payments may lead to higher production and operational efficiency throughout the supply chain (Smallman and John, 2001).

[5] Also See *The Boston Review*'s Forum (May/June 2013) on "Can Global Brands Create Just Supply Chains?"

[6] When a country changes the data source or the reporting agency, we merge the series together to extend the temporal coverage. In doing so, we went through each series to check the temporal comparability within a country and did not merge those series that show dramatic discontinuity (Philippines and Venezuela). Five countries switched from reporting *reported* counts to *compensated* counts or vice versa (Cyprus, El Salvador, Nicaragua, Slovakia, and Tunisia). As there is a potential for introducing bias in merging such series, in the appendix we report a robustness check specification without merging them (and only including the longer series of the two). See Model 24 in Appendix 3. Our main finding holds.

[7] They are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Unites States. (http://www.oecd.org/about/membersandpartners/list-oecd-member-countries.htm)

[8] While these newly industrialized economies are included in our sample of developing countries, our main findings hold when we drop these countries. Our findings also hold when we entirely exclude all high-income countries (even non OECD –e.g., Singapore) from our analysis.

[9] Both unemployment rate and NAIRU data are from the OECD: http://stats.oecd.org/Index.aspx?QueryId=48230 (last access on March 9th). The unemployment gap would be negative when actual unemployment rate is lower than the NAIRU. This reflects a tight labor

market resulting from excessive aggregate demand. We take such periods as a proxy of cyclical economic booms.

[10] The bilateral export data are from the Correlated of War (COW) project's Bilateral Trade database version 3.0 (Barbieri et al. 2016): http://correlatesofwar.org/data-sets/bilateral-trade (last access on March 9).

[11] http://www.humanrightsdata.com/p/data-documentation.html (last access on March 9).

[12] http://www.unc.edu/~lmosley/mosleyuno.htm (last access on March 9).

[13] http://data.worldbank.org/ (last access on March 9).

[14] http://www.systemicpeace.org/polityproject.html (last access on March 9).

[15] The formula for the long run effect (LRE) coefficient is $\beta_1/(1- \beta_0)$. The correct standard errors for the LREs can be calculated using the delta method.

[16] https://stats.oecd.org/Index.aspx?DataSetCode=BTDIXE (last accessed on March 11).

[17] https://stats.oecd.org/Index.aspx?DataSetCode=EPL_OV (lasted access on March 14).

	DV: Non Fatal Injury Rate (per 10,000 Working Age Population)							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
	Null	Main	BEC X Workers' Rights	Splited Sample by Workers' Rights			Splited Sample by Collective Labor Rights	
				Strong	Moderate	Weak	Stronger	Weaker
BEC		3.755***	4.992***	1.699*	4.893**	6.951**	2.569	6.442***
		(1.221)	(1.463)	(0.978)	(1.958)	(2.751)	(2.374)	(1.303)
Workers' Rights			0.250					
			(0.628)					
BEC X Workers' Rights			−1.017*					
			(0.562)					
Export	0.010	0.010	0.010	0.030	−0.087	0.152*	0.087	−0.055
	(0.053)	(0.053)	(0.045)	(0.064)	(0.075)	(0.088)	(0.057)	(0.056)
Export to OECD	−0.065	−0.069	−0.074	−0.081	−0.253	−0.003	−0.079	−0.055
	(0.072)	(0.072)	(0.076)	(0.067)	(0.197)	(0.161)	(0.086)	(0.085)
GDP growth rate	0.323***	0.311***	0.310***	0.157*	0.326***	0.395***	0.122	0.564***
	(0.076)	(0.075)	(0.073)	(0.084)	(0.110)	(0.112)	(0.091)	(0.070)
GDP per capita	−0.422	−0.334	−0.515	−0.230	0.614	−2.700*	2.586**	−1.491
	(0.616)	(0.618)	(0.570)	(1.639)	(1.382)	(1.423)	(1.014)	(1.414)
GDP per capita^2	0.021	0.019	0.023	0.012	−0.002	0.059*	−0.075***	0.022
	(0.016)	(0.016)	(0.015)	(0.051)	(0.035)	(0.036)	(0.023)	(0.040)
Industry	0.053	0.072	0.063	0.358***	0.021	0.136	0.055	0.351***
	(0.073)	(0.071)	(0.077)	(0.117)	(0.180)	(0.132)	(0.080)	(0.090)
Democracy	0.307*	0.335**	0.358*	0.479	0.644	0.069	0.053	0.443**
	(0.169)	(0.167)	(0.188)	(0.548)	(0.414)	(0.214)	(0.247)	(0.206)
Lagged DV	0.875***	0.871***	0.874***	0.816***	0.874***	0.928***	0.480***	0.847***
	(0.045)	(0.045)	(0.047)	(0.044)	(0.069)	(0.038)	(0.055)	(0.089)
Observations (Countries)	1112(83)	1112 (83)	1080 (81)	246 (57)	518 (75)	316 (56)	377 (66)	323 (53)
R-squared	0.823	0.824	0.830	0.869	0.799	0.797	0.565	0.793
Adj. R-squared	0.802	0.803	0.809	0.792	0.744	0.713	0.428	0.720

*p < .1; **p < .05; ***p < .01

In parentheses are the standard errors from nonparametric robust covariance matrix estimators *a la Driscoll and Kraay*; Country and year fixed effects are estimated but not reported due to space constraint.

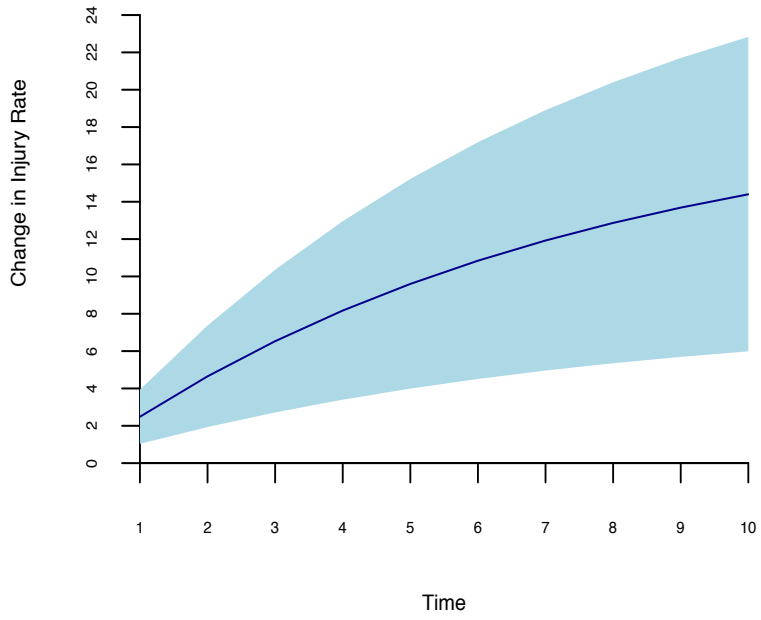
[Table 1] Determinants of Worker Safety

	DV: Non Fatal Injury Rate (per 10,000 Working Age Population)								
	Model 9	**Model 10**	**Model 11**	**Model 12**	**Model 13**	**Model 14**	**Model 15**	**Model 16**	**Model 17**
	Alternative BEC Construction								
BEC (original)					3.129**	5.330***	4.574***	3.847***	3.720**
					(1.226)	(1.446)	(1.424)	(1.259)	(1.512)
BEC:Unemployment	1.162***								
	(0.400)								
BEC:Consumption		−0.654							
		(0.707)							
BEC:Goods Export			5.036***						
			(1.390)						
BEC:Manufacturing Export				6.677***					
				(1.946)					
BEC^2					1.027				
					(1.067)				
BEC:Employee Protection							−4.043*		
							(2.091)		
Export	0.021	0.014	0.019	0.007	0.014	0.035	0.020	0.011	0.011
	(0.045)	(0.046)	(0.044)	(0.045)	(0.045)	(0.041)	(0.050)	(0.045)	(0.045)
Export to OECD	−0.079	−0.073			−0.072	0.073	−0.050	−0.067	−0.067
	(0.077)	(0.077)			(0.076)	(0.059)	(0.074)	(0.076)	(0.076)
Goods Export to OECD			0.016						
			(0.073)						
Manufacturing Export to OECD				0.041					
				(0.088)					
GDP growth rate	0.280***	0.326***	0.245***	0.220***	0.313***	0.211***	0.333***	0.311***	0.309***
	(0.071)	(0.074)	(0.066)	(0.059)	(0.073)	(0.062)	(0.082)	(0.073)	(0.073)
GDP per capita	−0.493	−0.581	−0.373	−0.555	−0.437	−0.489	−0.383	−0.499	−0.487
	(0.565)	(0.573)	(0.454)	(0.460)	(0.583)	(0.515)	(0.782)	(0.573)	(0.590)
GDP per $capita^2$	0.022	0.024*	0.016	0.020*	0.021	0.018	0.023	0.023	0.023
	(0.015)	(0.015)	(0.011)	(0.012)	(0.015)	(0.012)	(0.019)	(0.015)	(0.015)
Industry	0.067	0.035	−0.014	−0.001	0.061	−0.106	0.064	0.058	0.058
	(0.077)	(0.078)	(0.075)	(0.075)	(0.076)	(0.066)	(0.075)	(0.076)	(0.076)
Democracy	0.347*	0.302	−0.044	−0.020	0.358*	−0.066	0.561**	0.347*	0.346*
	(0.191)	(0.189)	(0.167)	(0.172)	(0.186)	(0.149)	(0.249)	(0.187)	(0.186)
Workers' Rights	−0.176	−0.109	0.317	0.366	−0.107	0.370	0.032	−0.076	−0.076
	(0.606)	(0.596)	(0.624)	(0.630)	(0.598)	(0.630)	(0.647)	(0.603)	(0.600)
Unemployment						−0.244**			
						(0.122)			
BEC X Export to OECD									0.006
									(0.045)
Lagged DV	0.879***	0.880***	0.916***	0.914***	0.876***	0.904***	0.865***	0.876***	0.876***
	(0.047)	(0.047)	(0.073)	(0.071)	(0.047)	(0.075)	(0.054)	(0.047)	(0.047)
Observations (Countries)	1080 (81)	1080 (81)	753 (66)	753 (66)	1080 (81)	758 (69)	971 (80)	1071 (80)	1080 (81)
R-squared	0.830	0.829	0.860	0.864	0.830	0.864	0.816	0.830	0.830
Adj. R-squared	0.809	0.808	0.840	0.844	0.809	0.844	0.792	0.809	0.809

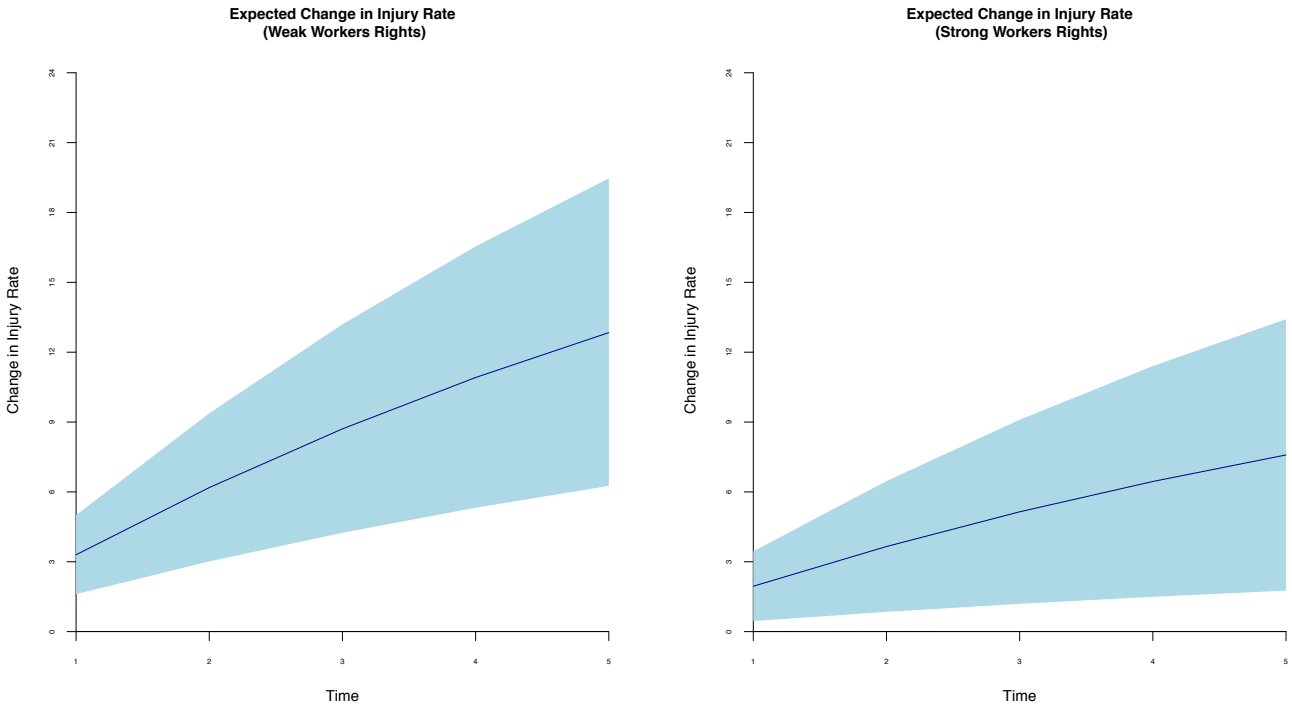
***p < .01; **p < .05; *p < .1

In parentheses are the standard errors from nonparametric robust covariance matrix estimators *a la Driscoll and Kraay*; Country and year fixed effects are estimated but not reported due to space constraint.

[Table 2] Determinants of Injury Rates: Robustness Checks



[Figure 1] Effect of BEC (Model 2)

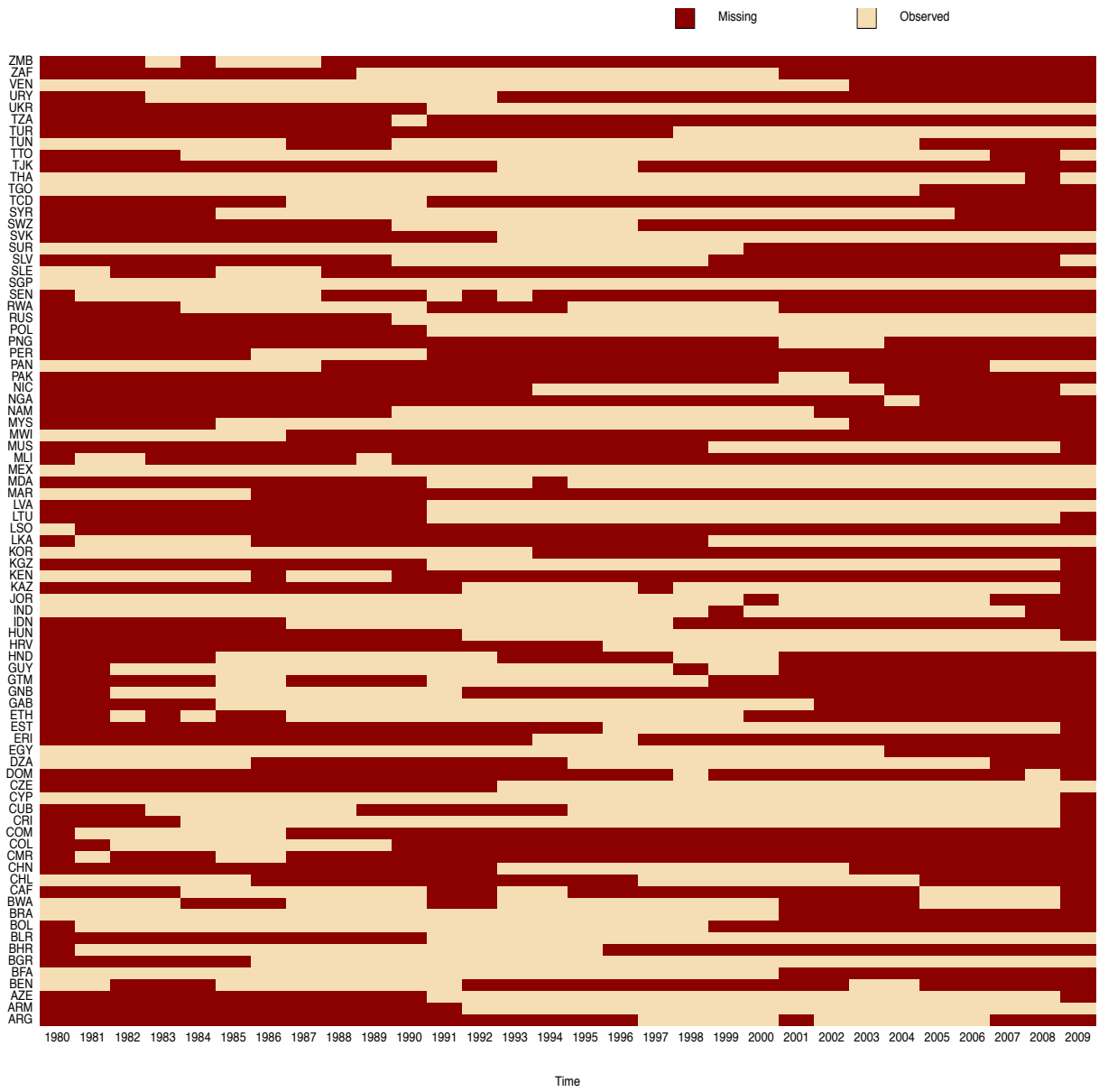


[Figure 2] Effect of BEC Conditioned by the Level of Workers' Rights Protection (Model 3)

[Figure 3] Moving Window Regression Estimates of the BEC Effect

Appendix 1: Panel Structure

Median 14 years



Appendix 2: Descriptive Statistics and Correlation Matrix

	Min	Median	Mean	Max
Injury Rate (per 10000 working age population)	0.0148	14.6174	45.8363	772.6925
BEC: Unemployment Gap	-1.3155	0.2244	0.2766	2.1967
Export (% GDP)	3.188	34.401	40.664	230.269
Export to OECD (% GDP)	0.000	14.045	17.984	133.554
GDP growth rate	-32.119	4.303	3.465	34.500
GDP per capita	0.1139	2.7333	4.3121	32.9830
Industry (% GDP)	7.18	31.38	32.22	69.92
Democracy(polity2)	-10.000	5.000	1.922	10.000
Workers' Rights (CIRI)*	0.0000	1.0000	0.9352	2.0000
Collective Labor Rights (Mosley-Uno)**	1.185	25.500	23.555	37.000
BEC: Unemployment Rate***	-1.3155	0.2244	0.2748	2.1967
BEC: Consumption Expenditure Growth Rate^{+}	-0.3102	2.5201	2.5058	4.9546
BEC (Industrial Goods):Unemployment Gap$^{!}$	-1.3723	0.0619	0.1154	2.1923
Export to OECD (% GDP), Industrial Goods Only$^{!}$	0.3332	15.3605	18.6814	97.5415
BEC (Manufacturing Goods):Unemployment Gap$^{!!}$	-1.61146	0.07284	0.10422	2.17213
Export to OECD (% GDP), Manufacturing Goods Only$^{!!}$	0.1066	9.6257	13.6740	68.8193
Unemployment Rate^{++}	0.600	7.950	9.459	35.900
BEC: Employment Protection^{+++}	0.4097	2.0785	1.9625	3.9513

*based on Model 3; ** based on Models 7 and 8; *** based on Model 9; $^{+}$ based on Model 10; $^{++}$ based on Model 11; $^{+++}$ based on Model 12; $^{!}$ based on Model 14; $^{!!}$ based on Model 15

Based on Model 2

	Injury Rate	BEC	Export	Export to OECD	GDP growth rate	GDP per capita	GDP per capita^2	Industry	Democracy	Injury Rate lagged
Injury Rate										
BEC	0.027	1.000								
Export	0.020	-0.111	1.000							
Export to OECD	0.190	-0.105	0.541	1.000						
GDP growth rate	0.010	-0.033	0.086	0.113	1.000					
GDP per capita	0.078	-0.147	0.635	0.282	0.086	1.000				
GDP per capita^2	-0.003	-0.121	0.662	0.206	0.077	0.911	1.000			
Industry	-0.003	-0.068	0.248	0.229	0.058	0.175	0.025	1.000		
Democracy	0.170	-0.199	-0.009	0.117	-0.025	0.250	0.092	0.112	1.000	
Injury Rate, Lagged	0.991	0.029	0.020	0.196	-0.009	0.080	-0.005	-0.001	0.166	1.000
VIF$^{1/(2*df)}$		2.376	4.315	2.898	1.254	10.738	6.191	2.587	3.022	3.386

Appendix 3: Additional Robustness Checks

	DV: Non Fatal Injury Rate						
	Model 18	**Model 19**	**Model 20**	**Model 21**	**Model 22**	**Model 23**	**Model 24**
		Lags of BEC			System GMM		
BEC	5.615***			3.926**	5.564**	6.478***	3.622***
	(1.463)			(1.999)	(2.342)	(2.342)	(1.269)
BEC (t-1)		3.159***					
		(1.029)					
BEC (t-2)			2.280**				
			(0.931)				
Export	0.040	−0.002	−0.001	−0.037	0.012	0.054	0.015
	(0.043)	(0.045)	(0.049)	(0.056)	(0.064)	(0.064)	(0.046)
Export to OECD	0.077	−0.107	−0.094		−0.022	−0.129	−0.075
	(0.061)	(0.084)	(0.085)		(0.169)	(0.169)	(0.077)
OECD Share Export				−0.007			
				(0.026)			
GDP growth rate	0.198***	0.305***	0.321***	0.298***	0.289**	0.315***	0.318***
	(0.064)	(0.074)	(0.076)	(0.075)	(0.114)	(0.114)	(0.075)
GDP per capita	−0.293	−0.483	−0.515	−0.582	−0.457	−0.196	−0.474
	(0.464)	(0.565)	(0.596)	(0.562)	(0.296)	(0.296)	(0.580)
GDP per capita^2	0.012	0.022	0.022	0.028*	0.017	0.002	0.021
	(0.011)	(0.014)	(0.015)	(0.015)	(0.014)	(0.014)	(0.015)
Industry	−0.109	0.064	0.044	0.053	0.005	−0.006	0.059
	(0.070)	(0.077)	(0.077)	(0.073)	(0.042)	(0.042)	(0.077)
Democracy	−0.005	0.326*	0.371*	0.333*	0.152	0.234	0.343*
	(0.146)	(0.188)	(0.193)	(0.189)	(0.167)	(0.167)	(0.188)
Worker	0.172	−0.262	−0.339	−0.252	0.302	0.189	-0.022
	(0.667)	(0.629)	(0.636)	(0.625)	(0.571)	(0.571)	(0.603)
BEC x OECD Share Export				−0.00005			
				(0.028)			
Lagged DV	0.875***	0.883***	0.883***	0.884***	0.984***	0.964***	0.876*
	(0.077)	(0.048)	(0.050)	(0.048)	(0.021)	(0.021)	(0.047)
Observations (Countries)	722 (68)	1070 (81)	1046 (81)	1070 (81)	1018 (81)	1018 (81)	1062(81)
R-squared	0.836	0.832	0.827	0.832			0.829
Adj. R-squared	0.811	0.811	0.805	0.811			0.808
Sargan Test					chisq(63) = 65.81	chisq(90)=73.39	
(p value)					(0.379)	(0.899)	
AR(2) test					normal = −0.84	normal = −0.84	
(p value)					(0.404)	(0.396)	
GMM Instruments					DV	DV	
(collapsed)					BEC	BEC	
						Export to OECD	

***p < .01; **p < .05; *p < .1

In parentheses are the standard errors from nonparametric robust covariance matrix estimators *a la Driscoll and Kraay* (Models 1 to 4 and 7),*a la White* (Models 5 and 6) Country and year fixed effects are estimated but not reported due to space constraint.