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**TRADE AGREEMENTS, LABOR STANDARDS AND ECONOMIC  
DEVELOPMENT**

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*The Impact of Core Labor Rights on Wages and Employment in Developing Countries:  
the Rights to Freedom of Association and Collective Bargaining*

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# **The Impact of Core Labor Rights on Wages and Employment in Developing Countries: the Rights to Freedom of Association and Collective Bargaining**

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## 1. Introduction

Our understanding of the impact of core labor rights, specifically the rights to freedom of association and collective bargaining, on labor market outcomes in developing countries is limited. Due to a lack of empirical evidence, the promotion of such rights remains controversial. Proponents argue that such rights prevent a ‘race to the bottom’ in the face of global integration, growing competitive pressures, and limited international cooperation in setting standards. Critics counter that such rights raise labor costs excessively and limit employment growth. Although both sides adopt strong positions, there is a good deal of uncertainty about the actual impact of such rights on wages and employment.

This uncertainty arises, in large part, because of the difficulties in measuring labor rights at the country level and is compounded by limitations on comparable wage and employment data for many developing economies. In this report, we use existing data and indicators to examine the question: how do improvements in freedom of association and collective bargaining rights, in law and in practice, affect key labor market outcomes, such as real wages and employment? We are particularly interested in the impact of the rights to freedom of association and collective bargaining in low- and middle-income countries. However, by way of comparison, we also examine the impact of identical measurements of these rights in high-income countries.

How much we can say about the relationship between labor rights and labor market outcomes depends on the data and indicators we have at our disposal. Therefore, much of the discussion focuses on methodological and measurement issues. Nevertheless, the paper is not purely methodological, but also conducts a concrete assessment of the impact of labor rights on labor market outcomes across countries. By doing so, we are better able to raise critical questions, identify constraints, and point out future research directions. Since human rights, including core labor rights, are meant to be implemented at the national level and extend to the entire population, our focus is on economy-wide effects. This differs from other, closely related, areas of research – such as those that examine the impact of unionization on individual earnings or enterprises.

The report is organized as following. The next section reviews the literature on the measurement of the rights to freedom of association and collective bargaining and the impact of those rights on economic outcomes (e.g. trade or foreign direct investment). The review also examines closely related, but distinct, bodies of research, such as studies which document the impact of unionization on wages and employment. Following the

literature review, we turn to the methodological challenges of measuring core labor rights and labor market outcomes, with a focus on developing countries. Labor rights do not apply equally to all types of employment and this poses analytical difficulties in countries with widespread self-employment and informal employment. The fourth section of the report outlines the research strategy we pursue in addressing the core research question and describes the data and indicators employed. We then present the results of the analysis and reflect on their implications. The report concludes with a cautionary discussion of the limitations and caveats associated with the analysis. In so doing, we point towards future areas of research.

## 2. Literature review

One rationale for promoting freedom of association and collective bargaining rights is that such rights will affect labor market outcomes, such as earnings and employment, and thereby improve social welfare. These core rights allow employees to form unions and to bargain over employment conditions. Insofar as they strengthen bargaining capacity, such labor rights may lead to improvements in working conditions, including sustainable improvements in real wages. By affecting wages, and hence, labor costs, core labor standards may have subsequent impacts on other economic outcomes. The ‘labor cost channel’ is the primary conduit through which the rights of freedom and association and collective bargaining, as well as other labor standards, are expected to affect employment, investment, trade volume, and economic growth (Kucera, 2001; Rodrik 1996).

Despite the primacy given to wages in affecting other labor market outcomes, the impact of core labor standards on employment is not simple and unidirectional. Collective bargaining rights that lead to higher wages may also boost productivity (Martin and Maskus, 2001; Buchele and Christensen, 1995). The impact on labor costs is therefore ambiguous. Higher wages raise labor costs per worker, all things equal, but if average output per worker also grows, the cost per unit output could fall. If efficiency wage effects are present, higher wages can lead to greater job effort, lower turnover, and less conflictual industrial relationships – factors which lower production costs (Stiglitz, 2000; Altenburg and Straub, 1998). Many factors other than direct costs determine labor demand. For example, if better labor standards lead to improved market access – e.g. through ‘fair trade’ initiatives or bilateral trade agreements – growth in output could compensate for any reduction in labor demand caused by higher wages (Heintz, 2003). Similarly, improved labor standards may correspond to other social improvements (e.g. increased transparency, stronger democratic institutions) which encourage, rather than discourage, investment (Kucera, 2001).

It is also important to recognize that organized workers will take into account a variety of factors in their collective bargaining strategies. Arguments that organized labor only care about wage rates assume some level of irrationality or short-sightedness when trade-offs exist. Maintaining employment may be as important, if not more important, than wages since significant reductions in employment will undermine bargaining power over time. A more credible assumption is that workers take into account the current

economic climate (e.g. is the economy entering a recession?), their own assessment of the risks of job loss (e.g. due to competitive pressures or falling demand), and constraints imposed by the domestic legal framework when formulating a collective bargaining strategy. In this case, the extension of collective bargaining rights would lead to better social outcomes when trade-offs exist, since they would improve the likelihood that workers could prioritize labor market outcomes based on what is most important to them.

There are not a large number of empirical studies that specifically document the impact of core labor standards, specifically freedom of association and collective bargaining rights, on wages and employment. Instead, studies tend to focus on the relationship between wages and unionization (the union wage premium) and the relationship between wages and specific outcomes (investment, employment, FDI, and trade). However, unionization and higher wages are only potential outcomes of strengthening core labor standards, specifically the freedom of association and collective bargaining rights. These outcomes may not materialize in reality. A country could have high rates of reported unionization and circumscribed labor rights, particularly in countries where independent unions face repression. Guaranteeing the right to organize does not mean that organizing efforts will be successful. In addition, as pointed out above, basic labor rights and wages can affect other variables which influence employment and investment.

Kucera (2001) specifically examines the impact of freedom of association and collective bargaining rights on manufacturing wages and the manufacturing wage share in cross-country regressions. He develops an index of labor rights, focused on freedom and association and collective bargaining and based on 37 indicators (the methodology by which the index was constructed is discussed at greater length later in this report). He finds that better labor rights are positively associated with wages in manufacturing, but the results are generally not statistically significant if the sample is limited to developing countries.

Rama (2003) finds that the number of ILO conventions ratified and a set of collective bargaining indicators (unionization rates, coverage of collective bargaining agreements, and strike activity) have a negative impact on inequality – i.e. better labor rights are associated with a more equal distribution of income and/or consumption. Since low-income households tend to rely on employment earnings for most of their income, this could indicate that labor standards have a positive impact on total employment income, although such a conclusion is speculative since the dependent variable is total income/consumption inequality (not earnings inequality). When Rama controls for country-specific characteristics, he finds that only the number of ILO conventions ratified and the percentage of the salaried workforce covered by collective bargaining agreements still have statistically significant moderating influences on inequality. It is worth noting that the coverage of collective bargaining agreements only has a statistically significant impact on income/consumption shares for certain quintiles of the overall income distribution.

Rodrik (1996) examines the impact of the number of ILO conventions ratified, an index of civil liberties, and child labor practices on (a) manufacturing wages (measured in U.S. dollars, but controlling for productivity differentials), (b) the ratio of garments and textiles in total exports (which he argues is an indicator of comparative advantage in labor intensive sectors), and (c) foreign direct investment. He finds that ratification of ILO conventions and the civil liberties index has a positive impact on manufacturing wages, while child labor practices tend to be associated with lower average wages. Despite these impacts on manufacturing wages, he does not find significant negative impacts of the ILO conventions variable or the civil liberties index on foreign direct investment or the garment/textile share of total exports. Kucera (2001) similarly finds that his index of freedom of association and collective bargaining has no negative impact on foreign direct investment. Teitelbaum (2010) replicates Kucera's study using a modified index of freedom of association and collective bargaining rights and also finds no impact on foreign direct investment.

A World Bank publication examined the relationship between the presence of trade unions and broad indicators of economic performance by reviewing an impressive number of studies on the topic (Aidt and Tzannatos, 2002). The authors conclude that countries with stronger collective bargaining systems had lower unemployment on average, along with greater economic stability. In addition, countries with higher union density tended to have lower inflation and were able to recover more quickly from recessions.

For developing countries – most of which can be characterized as relatively small, open economies – the impact of labor standards on trade performance is of particular concern. Specifically, some argue that labor standards compromise the competitive position of those developing countries with an abundance of low-skill, low-wage labor (Bhagwati 1995, Corden and Vousden 2001). This loss of competitive advantage means fewer jobs and scarcer economic opportunities for low-paid workers with few skills. However, there are two sides to this relationship. Others take the position that growing global integration creates perverse incentives whereby the deterioration of basic standards is rewarded by increased competitiveness. In the absence of international cooperation, individual countries cannot raise labor standards without jeopardizing their competitive advantage. All countries are made worse off because they adopt lower standards than would be socially desirable. Under these conditions, international cooperation in the form of global standards could produce a better outcome (Sengenberger 1994).

The empirical evidence suggests that core labor standards do not have a significant impact on international trade. That is, in terms of basic labor rights, there is neither a significant sacrifice of employment opportunities nor a clear race to the bottom. For example, Kucera and Sarni (2004), in a series of cross-country regressions, find a positive relationship between stronger rights and higher manufacturing exports, although they note that their results say nothing about causality. In addition, this positive relationship does not consistently hold for labor-intensive exports, and appears to depend on how such exports are classified. In a meta-analysis of studies examining the links between labor standards and trade volume, Brown (2000) finds little evidence of a

connection. Similarly, Dehejia and Samy (2004) uncover no relationship between labor standards and comparative advantage. These research findings do not imply that labor costs are unimportant in trade dynamics – simply that there appears to be little evidence that core labor standards in themselves negatively impact trade outcomes – including basic rights such as freedom of association.

There is a substantial literature on the impact of unionization on wages, compared to research on the impacts of freedom of association and collective bargaining on labor market outcomes. It is worth reviewing these findings, since there is a close relationship between unionization and the rights to freedom of association and collective bargaining – although the relationship is far from perfect.

There is large body of evidence showing that unionization in industrialized countries increases wages, although the union wage premium varies significantly across industries, occupations, public and private sectors, age cohorts, regions, and countries (e.g. Lewis, 1963; Freeman and Medoff, 1984; Blanchflower and Freeman, 1992; Freeman, 1994; Blanchflower and Bryson, 2003; Hara and Kawaguchi, 2008). Estimates of the aggregate union wage premium in the U.S. typically range from 12 percent to 25 percent (Gittleman and Pierce, 2006; Hirsch, 2004; Blanchflower and Bryson, 2003). A union premium of 15 percent has often been used as a ‘rule of thumb.’

In the U.S., there is evidence that the private sector union wage premium has been declining (Blanchflower and Bryson, 2003; Bratsberg and Ragan, 2002). This trend is consistent with the drop in unionization rates which has occurred – we would expect weaker unions to have a more difficult time sustaining a wage premium. In addition, the wage premium appears to be counter-cyclical – unionized workers are better able to sustain their wages during a downturn than are non-unionized workers (Blanchflower and Bryson, 2003; Freeman and Medoff, 1984). There is also evidence that unions compress the wage distribution in the U.S. and other high-income countries – i.e. they reduce earnings inequalities by raising wages of low-paid workers more than high-paid workers (Gittleman and Pierce, 2006; Bratsberg and Ragan, 2002; Freeman, 1994). This is consistent with the observation Rama (2005) made that core labor standards and collective bargaining rights may reduce income inequalities.

The literature on union wage premiums is overwhelmingly focused on high-income, developed economies. Studies on union wage premiums for low-income and middle-income countries are far less common. Rama (2005) suggests that union wage premiums are significantly smaller for developing countries than for high-income countries, although exceptions exist. Rama states “... estimated wage premiums range from negligible in Senegal to small in Mexico” (p. 173).<sup>1</sup>

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<sup>1</sup> Aidt and Tzannatos (2002), in their World Bank study, report union wage premiums for developing countries that are significantly higher than premiums in industrialized countries – a finding that contradicts the discussion in Rama (2005). However, the studies surveyed by Toke and Tzannatos (2002) are older. Improvements to data make it possible to control for factors which raise wages and might be attributed to unions if left out of the analysis. For example, Blunch and Verner (2004) find that it is important to control for enterprise size in order to estimate the union wage premium and they find a significantly lower

A significant union wage premium has been documented for South Africa. Butcher and Rouse (2001) estimated that the wage premium was 10-13 percent for white workers and approximately 20 percent for black workers – comparable to the wage premiums estimated for the U.S. However, in other African countries for which estimates are available, the wage premium appears to be smaller.<sup>2</sup> Blunch and Verner (2004) examine union wage premiums in Ghana and find evidence of such premiums only for the bottom 10 percent of the wage distribution – and no evidence of an aggregate wage premium. These findings support the idea that unions in developing countries may act to reduce wage inequalities. Arbache (1999) estimates the union wage premium for Brazilian manufacturing at 4-6 percent – significantly lower than most estimates for developed economies. Interestingly, Arbache suggests that unions may contribute to wage inequality in Brazilian manufacturing, contrary to the findings in other countries that unionization tends to reduce earnings inequality. In contrast, Fairris (2003) finds that unions reduce earnings inequality in Mexico, although this effect has weakened over time. Park (1991) estimates a union wage premium in Korean manufacturing of 4.2 percent, although the analysis is restricted to male workers. Fields and Yoo (2000) estimate a Korean union wage premium (in 1993) of 5.8 percent.

Studies of the impact of unions on employment are much less common than studies of the impact of unions on wages. Most empirical studies of labor demand find a negative relationship between employment and wages, controlling for other factors which may influence labor demand (Hamermesh, 1993). However, this does not imply that unions will necessarily have a negative impact on employment, since unionization may affect a number of variables other than the average wage rate – productivity, turnover, skill levels, etc. At the macroeconomic level, higher average wages help support aggregate demand and employment, even though there may be a trade-off between employment and wages at a microeconomic level, controlling for the level of demand in the economy.

Empirical research on the relationship between unionization and employment is mixed (Blanchflower and Bryson, 2003). Some studies of high-income countries show a significant negative relationship between unions and plant-level employment growth (Leonard, 1992). Others suggest that unionization may contribute to plant closure (Bryson, 2001). In contrast, DiNardo and Lee (2004) found that unionization has no statistically significant impact on firm survival and, at most, a small impact on jobs.<sup>3</sup> Studies outside of the U.S. and Western Europe also yield mixed results. Kim (2005) uses macroeconomic data from Korea to argue that there is a long-run equilibrium relationship between unionization and unemployment, in which more unionization leads to greater unemployment, albeit over a period of time in which the economy and formal

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premium for Ghana than that reported in Aidt and Tzannatos (2002). Freeman (2009) also surveys the literature on union wage premiums in developing countries.

<sup>2</sup> Freeman (2009) cites some studies which find a negative union wage premium in some African countries, but this is likely because unions in these countries do not engage in standard collective bargaining activities.

<sup>3</sup> DiNardo and Lee's finding stem, in part, from their observation that new unionization in the U.S. has had a relatively small impact on wages at the firm level.



employment were growing at extremely rapid rates and, apart from the 1997 East Asian Crisis, unemployment was generally very low.<sup>4</sup> In contrast, using enterprise-level data from Brazil, Menezes-Filho, et al. (2008) find that unionization has a positive impact on employment, although these impacts decrease with the level of unionization.

Clearly, the literature on the impact of unions, unionization, and union density is much richer than the literature on the economic impacts of collective bargaining and freedom of association – particularly for high-income, industrialized countries. However, it is important to bear in mind that these core labor rights are distinct from the number of unions or the rate of unionization. Therefore, while the studies of the economic and labor market impacts of unionization are informative, they cannot be taken to necessarily reflect the effects of the rights to freedom of association and collective bargaining. This is partly because unions can exist without strong labor rights and labor rights can be in place without strong unions. Moreover, labor rights represent basic human rights that should apply to a country as a whole. While unionization may only exist in certain industries or occupations, freedom of association and collective bargaining rights are more broadly applicable. Certainly, enforcement of these rights varies from sector to sector (and we would expect that the ability to exercise these rights would be closely correlated with the rate of unionization). Nevertheless, core labor standards should be thought of as distinct from unionization.

Although the focus of this paper is on the core labor rights to freedom of association and collective bargaining, it is useful to consider other labor market interventions which attempt to improve the welfare of employees. The rights to freedom of association and collective bargaining represent labor standards which concern the processes by which wages and working conditions are determined. However, the ability to translate these rights into concrete labor market outcomes depends on the relative bargaining power of labor. The term ‘labor standards’ often encompasses a wide variety of rights and regulations – those that guarantee a specific labor market outcome (e.g. minimum wages) may have a bigger impact on costs than others (e.g. those guaranteeing a right to collective bargaining), depending on the ability of workers to take advantage of new rights. Therefore, it is useful to briefly consider the economic impact of standards which aim to guarantee a minimum outcome – i.e. the literature on minimum wage laws.

Critics of minimum wage policies argue that such policies create distortions which destroy jobs. However, the empirical evidence of a sizable trade-off between employment and minimum wages is not strong. In the U.S., Card and Krueger (1995) exploited a “natural experiment” to examine the impact of a higher state minimum wage in New Jersey. Theory would suggest that employers of low-wage workforces would reduce employment or raise prices significantly. Card and Krueger compared fast food restaurants along the New Jersey-Pennsylvania border and found that the New Jersey employers did not reduce employment or raise prices significantly. Other scholars have examined the impact of U.S. living wage ordinances which mandate higher wage rates for certain employees, usually at the municipal level. To date, the majority of living wage

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<sup>4</sup> Kim (2005) shows that the unemployment rate in Korea generally ranged between 2 and 5 percent from 1970 to 2002, except in 1998 and 1999 when it approached 7 percent.

impact studies find little or no evidence of reduced employment (Pollin, Brenner, Wicks-Lim and Luce 2008).

Studies in developing countries have found that minimum wages have a positive impact on poverty reduction (Saget, 2001; Lustig and McLeod 1997). While these latter studies do not examine employment effects directly, they do indicate that minimum wages have a net positive impact on the incomes of poor households. Therefore, in terms of economic inequalities, research into the impacts of minimum wage policies reaches similar general conclusions to studies on the impact of unionization: they tend to reduce poverty or income inequality. However, it is important to bear in mind that, in many developing countries, widespread informality and high levels of self-employment mean that minimum wages laws do not apply, either de jure or de facto, to many workers. Enforcement is often problematic (Rama, 2005). Therefore, not all of the ‘working poor’ benefit equally from minimum wage legislation.

### 3. Framework and Methodological Issues

#### 3.1 Conceptual Framework for the Research

In this report, we explore the impact of two core labor standards – the right of freedom of association and the right to collective bargaining – on wage and employment outcomes at the country level, with a specific focus on developing countries. We focus on country-level impacts, since core labor standards are typically adopted at the national level and issues around enforcement and de facto realization of labor rights have been measured at the country level.<sup>5</sup> This does not imply that research could not be conducted at the level of the firm or the workplace. However, lack of credible data at this level of disaggregation precludes undertaking a serious quantitative assessment at the enterprise level or among employers.<sup>6</sup> Therefore, the approach adopted here is a cross-country analysis of the impact of freedom of association and collective bargaining rights on wage and employment growth.

We expect that the extension of the rights to freedom and association and collective bargaining would impact wage outcomes since such rights allow workers some degree of influence over labor market outcomes, depending on their organizational strength, bargaining power, and other institutional and economic factors. Furthermore, as discussed in the literature review, we would expect organized workers to bargain over more than just wages – including the level of employment, benefits, and other aspects of the employment arrangement. Higher wages may adversely impact employment by bidding up labor costs and reducing labor demand. However, as discussed earlier, labor rights may also improve productivity, foster better industrial relations, reduce turnover, and contribute to dynamic efficiencies through skills acquisition. The impact of labor

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<sup>5</sup> Regional variations may exist within a particular country – in the U.S., collective bargaining rights vary by state. We do not focus on these sub-national differences here.

<sup>6</sup> As evident from the literature review, firm level studies of unionization have been undertaken. However, it is much easier to measure unionization at the firm level using survey data than it is to measure basic labor rights such as freedom of association and collective bargaining.

rights on employment is ambiguous – even if collective bargaining does result in higher real wages.

Legislation protecting freedom of association and collective bargaining does not, in itself, guarantee that such rights will be realized on the ground. Workers may be unaware that such rights exist and may not know how to exercise their rights. Enforcement may be uneven or non-existent. This creates a gap between de jure and de facto enjoyment of basic labor rights. To the extent possible, given the indicators which exist, we attempt to take into account these distinctions – the legal framework governing freedom of association and collective bargaining and evidence as to the realization of these rights (including impediments to realizing them), even when legal protections exist. We discuss the methodological challenges of doing this in the next section of this paper.

An additional challenge in assessing the impact of core labor rights on labor market outcomes is the problem of causality. Improvements in freedom of association and collective bargaining may improve wages. However, factors which raise wages (e.g. economic growth) may also lead to improvements in labor rights. Given data limitations, it is hard to rigorously address these endogeneity problems through estimation techniques, such as instrumental variable analysis (i.e. it is extremely difficult to find a variable for which data is readily available which is correlated with labor rights but uncorrelated with wages or employment). Therefore, we focus on the impact of labor rights indicators at a particular moment in time on *subsequent* wage and employment *growth*. It is hard to argue that subsequent wage or employment growth would have impacted initial labor market institutions. In addition, we focus on growth of wages and employment in order to reduce the possibility that other country-specific factors, correlated with labor standards, determine the *level* of wages or employment.

In many respects, the impact of freedom of association and collective bargaining rights on employment and wages is an empirical question – it cannot be resolved by appealing to economic theory alone. The exercises presented later in this paper represent a concrete exploration of these issues based on existing data. However, because of data limitations, they are not meant to be definitive. In exploring these questions, we hope to provide insights into the methodological issues involved in conducting research along these lines.

## 3.2 Methodological and measurement issues

### 3.2.1 Freedom of Association and Collective Bargaining Rights

To evaluate the impact of freedom of association and collective bargaining rights on labor market outcomes using a cross-country analysis requires indicators of the existence of these rights and, ideally, the extent to which they are actually realized on the ground. However, developing reliable indicators of core labor rights – particularly freedom of association and collective bargaining rights – is challenging. For example, information sources are often incomplete (or not strictly comparable), certain indicators take on different meanings from one country setting to the next, and the distinction

between rights codified under law (de jure) and rights enjoyed in practice (de facto) is difficult to capture (Kucera, 2007; Teitelbaum, 2010).

Economists have sometimes used the number of ILO conventions which a country has ratified as an indicator of support for core labor rights (see Rodrik, 1996 and Rama, 2005 for examples). In terms of core labor rights, the ILO's eight fundamental conventions are frequently emphasized. The fundamental conventions fall under four broad headings: forced labor, discrimination, child labor, and freedom of association (including collective bargaining rights). The use of the number of fundamental conventions ratified has one practical advantage for cross-country studies: this indicator is readily available for a large number of countries. However, there are significant drawbacks. Ratification of an ILO convention has different implications for national labor laws in different countries. Ratification by no means implies that core labor rights are actually realized on the ground. Changes over time, apart from additional ratifications, are not captured. Once a convention is ratified, it generally remains ratified, although the actual environment with regard to civil and economic rights subsequently changes over time in ways that are not captured by simply counting ratifications.<sup>7</sup>

Some analysts have included indices of civil and political rights – such as the index produced by Freedom House – as an indicator.<sup>8</sup> The argument is that countries with stronger civil and political rights will also encourage the realization of basic labor rights. The Freedom House Index measures political and civil rights separately. Political rights are measured in three categories: electoral process, political pluralism and participation, and functioning of government. Civil rights are measured in four categories: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Within the category 'associational and organizational rights' there is a question pertaining to freedom of association and collective bargaining rights.

While the rights of freedom of association and collective bargaining are included in the Freedom House index, many other variables determine the overall rating. This raises questions as to which component of the index influences particular outcomes. For example, investors may respond positively to certain institutions that increase a country's ranking, such as secure property rights, while other aspects of civil and political rights included in the index, such as enhanced democratic accountability, may not always be in investors' best interest (Li and Resnick, 2003). A similar logic applies to core labor rights – a higher Freedom House ranking may encourage investment or employment growth for reasons other than improvements in labor rights. In addition, the Freedom House Index is constructed using expert assessments – with the experts being either Freedom House Staff or consultants hired for this purpose. One study finds that these expert assessments are subject to errors and that these deviations are correlated with extraneous characteristics of the countries being rated – i.e. the errors are non-random (Bollen and

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<sup>7</sup> In rare cases, a ratified convention will be subsequently denounced. However, such reversals have happened in only two countries: Malaysia and Singapore.

<sup>8</sup> Information on the 2010 Freedom House Index can be found at: <http://www.freedomhouse.org/>.

Paxton, 2000). This has led some to argue that such assessments are biased and reflect subjective opinions and perceptions unrelated to de facto enjoyment of civil liberties.

Another indicator which is used to capture labor rights, specifically freedom of association and collective bargaining, is the rate of unionization or union density. The argument here is that the rights to freedom of association and collective bargaining are meant to facilitate collective action on the part of working people. The extent of unionization is one outcome that could be linked to an enhanced capacity for collective action. However, as discussed earlier in the literature review, unionization rates may be imperfect measures of core labor rights, particularly in cases where independent unions do not exist or face harassment.

Kucera (2001, 2007) adopts the innovative approach of coding violations of labor rights to create a more nuanced measure of freedom of association and collective bargaining that takes into account both de jure and de facto aspects of the realization of these rights. Detailed discussion of this methodology can be found in Kucera (2007). Here we provide a brief summary. Kucera uses textual sources to document violations of trade union rights across 37 evaluation criteria. The focus is on violations of basic rights – good practices and exemplary conduct is not explicitly considered. The three textual sources are: (1) the *Annual Survey of the Violation of Trade Union Rights* of the International Trade Union Congress (ITUC)/International Confederation of Free Trade Unions (ICFTU)<sup>9</sup>; the *Country Reports on Human Rights Practices* from the U.S. State Department; and the ILO's *Report of the Committee on Freedom of Association*. To the extent possible, given the incomplete nature of the information available, violations of rights were coded for each of the 37 criteria and a composite index was then computed. Explicit coding rules were developed to minimize any bias introduced by subjective judgments on the part of the evaluator.

Examples of the 37 evaluation criteria include: the right to freely elect union representatives, general prohibitions on collective bargaining, the right to join unions, dissolution or suspension of unions, interference from employers, and exclusion of workers in particular sectors from freedom of association or collective bargaining. A full listing of the criteria used can be found in Kucera (2007). Two versions of the aggregate index were calculated: a weighted index and an unweighted index. The unweighted index treats all criteria equally. The weighted index assigns a weight to each criteria that aims to capture the severity of the violation. In Kucera's subsequent analysis, both weighted and unweighted indices are used in order to test the robustness of the methodology to assumptions about the relative severity of violations.

In terms of the limitations of the index, Kucera (2007) identifies information problems as the most significant weakness. Information on violations of trade union rights is not consistently available for all countries. Moreover, different regions of the

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<sup>9</sup> In 2006, the affiliates of the ICFTU were re-organized into the ITUC, along with the affiliates of the World Confederation of Labor (WCL) and other unions which had no previous international affiliation. *The Annual Survey of the Violation of Trade Union Rights* is now compiled by the ITUC. With the formation of the ITUC, the ICFTU was dissolved.

world tend to report violations with greater frequency which could lead to regional biases with important implications for cross-country work. In addition, Kucera raises some concern that the index may not consistently track changes over time, since there is some unevenness in reporting from year to year and the quality of information appears to evolve over time.<sup>10</sup> Finally, it is hard to interpret what it means for a country to report a violation relative to non-reporting by another country. Non-reporting does not necessarily indicate that problems do not exist.

This raises one important weakness of using reported violations to measure labor rights. Countries with strong labor movements may be more likely to report violations than countries in which unions or workers face repression. Teitelbaum (2010) suggests that countries with limited union activity – due to lack of industrial development or government violations of human rights – may receive better scores when the index is constructed using textual sources of labor rights violations. He further notes that this can create problematic comparisons between OECD countries and non-OECD developing countries. In addition, although general prohibitions on union activity are included in the index, such general prohibitions have significant implications for the measurement of other elements of the index. As Teitelbaum writes, “countries that enforce general prohibitions on all union activity will not experience violations of FACB [freedom of association and collective bargaining] rights because FACB rights are an irrelevant concept where unions cannot organize to exercise those rights” (p. 466). Re-coding elements of the index may improve the measurement of freedom of association and collective bargaining rights, but it does not resolve the conundrum of whether a general prohibition on union activity makes the concept of these labor rights meaningless.

Given the range of pros and cons associated with using any one of these approaches, in this report we employ a variety of existing indicators to examine whether there is any relationship between labor rights and labor market outcomes in terms of wages and employment. In doing so, we explore whether different indicators yield different results. Before turning to this analysis, we first discuss some methodological issues pertaining to the measurement of employment and wages.

### 3.2.2 Measuring employment and employment trends

Using international definitions, employment is often measured as work in any activity that would contribute to a country’s national product as measured by the system of national accounts (SNA). This includes, but is not restricted to, working for others as an employee, various forms of self-employment, unpaid work on a family enterprise, and household production of goods for own-use. In high-income, industrialized countries, we tend to assume that employment corresponds to paid work as an employee, since this remains the dominant form of employment. However, in developing countries, forms of self-employment may be as important if not more important than paid employees. In addition, a large share, often a majority of all employment is informal – i.e. not covered by basic social or legal protections (ILO, 2002; Chen et al., 2005).

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<sup>10</sup> Kucera’s (2001, 2007) index is not constructed as a time series. It uses information from 1993 to 1997, centered on the year 1995.

These distinctions are important to take into account when analyzing the impact of labor rights on employment. Rights to freedom of association and collective bargaining, as discussed in this paper, tend to be restricted to formal paid employees. Self-employed workers may form associations and, in some cases, may bargain collectively (albeit with suppliers, intermediaries, or municipal authorities). However, the rights to freedom of association and collective bargaining, as typically enshrined in law, generally only apply to workers in an employer-employee relationship. Informal paid employees, by definition, do not enjoy these rights, even if the legal protections exist. In this case, there is gap between de jure and de facto realization of rights – a gap which is often missed in the kinds of indicators discussed in the previous section.

These complexities need to be taken into account when we pose questions like: what is the impact of freedom of association and collective bargaining on employment outcomes? The impact may be quite different depending on the type of employment under consideration. As discussed in the literature review, labor rights are generally assumed to affect employment by changing labor costs. We have already pointed out that this simple line of reasoning may not hold when core labor rights affect productivity, labor relations, or other factors of importance. Nevertheless, even taken at its face value, labor rights will directly affect employment through the labor cost channel only when those rights actually apply to the specific employment arrangement in question. We would not expect the same direct impact on self-employment or forms of informal employment.

In fact, the impact of better labor standards on informal employment and atypical forms of employment may be positive, depending on the response of employers to stronger rights. Standard dualist models of informal employment argue that factors which raise wages above a market-clearing level, including collective bargaining institutions, will lead to rationing of formal job opportunities. Those that cannot work in the formal economy are absorbed into informal employment, where social and regulatory protections do not apply (Fields, 1975). As we have discussed in the literature review, the evidence that labor rights negatively affect employment outcomes in this way is weak. Nevertheless, to the extent that labor rights have an impact on formal employment, the result may be a shift from formal to informal employment, leaving total employment relatively unaffected. Perhaps more common are employer responses that try to evade labor regulations. For example, employer strategies to hire workers as independent contractors rather than paid employees affect workers' access to legal protections (e.g. Carré, 2004). The composition of employment affects the degree to which the rights to freedom of association and collective bargaining apply to the employed workforce.

Shifts in employment from formal to informal forms (or from standard to atypical forms) may not affect total employment numbers and, therefore, leave labor market indicators like the unemployment rate largely unchanged. However, *underemployment* is commonplace in most forms of informal employment. Similarly, a shift from full-time to part-time work represents a reduction in total labor demand, even through the aggregate employment numbers may remain constant.

If we are concerned about the impact of labor rights on employment in developing countries, it does not necessarily make sense to examine trends in aggregate employment. Instead, as an initial step, we would want to focus on how core rights are associated with changes in particular categories of employment. One possibility would be to begin with formal and informal employment, distinguishing between paid employees and self-employed workers. However, detailed, and consistent, statistics on formal and informal employment over time are generally not available for a large number of countries, although better data is becoming available.

For the purposes of the preliminary analysis presented in this paper, we chose to focus on the impact of labor standards on changes in manufacturing employment. There are several reasons for this choice. First, data on manufacturing employment over time is available for a large number of countries. Second, outside of the public sector and agriculture, collective bargaining has been concentrated in industrial sectors (manufacturing, mining, etc.). Third, manufacturing sectors represent tradable sectors whose output is either exported or subject to competition from imports. We would expect employment in tradable sectors to be particularly sensitive to changes in labor costs.

Given these considerations, we expect the response of manufacturing employment to be particularly sensitive to freedom of association and collective bargaining dynamics – to the extent that such a relationship exists. Therefore, examining the relationship between labor market outcomes in manufacturing and core labor standards provides one indication of the broader impact on wages and employment.

### 3.2.3 Measuring wages and wage trends

Measuring trends in real wages presents many of the same challenges as measuring trends in employment. Income from employment may be in the form of wages paid to employees, but it also may represent gross income from self-employment. Some forms of employment (e.g. workers on family enterprises) may receive no individual payments, although the family enterprise generates income for the household. When we speak of collective bargaining over wages, we generally are referring to paid employment in formal firms. However, as already pointed out, these jobs may constitute a minority of total employment in developing countries.

For the reasons discussed above, we restrict our attention to the wages of paid employees in the manufacturing sector. Furthermore, we focus on average wages for all paid employees. That is, we do not differentiate by occupation. As discussed in the literature review, the union wage premium varies along a number of dimensions, one of which is occupation. Therefore, we expect the rights to freedom of association and collective bargaining to affect workers differently across occupations. Professional and managerial workers will have different wage dynamics than production workers. In addition, the literature review showed that one impact that unions have had in many countries is to compress the wage distribution – i.e. reduce earnings inequality. Again – this suggests that core labor rights will affect groups of workers differently.



In the analysis which follows, we put these complications aside. The reasons for doing so are practical. We are interested in examining how freedom of association and collective bargaining rights affect changes in employment and wages over time. In addition, our research strategy involves examining these relationships across countries. The availability of comparable time series data on wages and employment, particularly for developing countries, is limited. Therefore, we aim to keep the analysis simple and focused. In the future, as indicators and sources of information improve, researchers will be able to explore more complex questions.

### 3.2.4 Methodological issues: policy correlations

Changes in labor rights are frequently associated with other policy changes which impact employment and wages. For example, bilateral free trade agreements – such as those between the U.S. and a developing country – may contain provisions aimed at improving core labor rights. This could cause a country to improve labor standards at the same time that they gain better access to external markets. In situations like this, it may be difficult to isolate the impact of labor standards on from other policy changes. Similarly, changes to labor regulations may be included as part of a country's broader development strategy. If policies are jointly implemented, it would be misleading to attribute observed changes in employment and earnings to labor reforms alone without taking into account the effect stemming from other policy changes. Evaluating labor standards within the context of trade agreements and development policy is beyond the scope of this paper. However, these issues should be kept in mind when interpreting the findings of this report.

## 4. Data and analytical strategy

### 4.1 The impact of freedom of association and collective bargaining rights on employment and wages: core variables and indicators

This paper presents some preliminary analysis of the relationship between the rights of freedom of association and collective bargaining on employment and wage outcomes. As discussed above, we focus on the impact on manufacturing wages and employment. Data on manufacturing wages, employment, and output were taken from the UNIDO (United Nations Industrial Development Organization) database: INDSTAT2 2009, Rev. 3. Data on hours of work are not available, so wages are measured as average wages paid per worker. Wages and output are expressed in national currency units and adjusted for domestic inflation using each country's GDP price deflator. Price deflators were taken from the World Bank's World Development Indicators database. We used national currencies and domestic deflators to avoid problems associated with exchange rate volatility and global purchasing power parity indicators. This is only an issue because the real wage and output variables will be expressed in different units for different countries. However, our analysis focuses on the unit-less measure of real wage and real output growth, so the use of national currency units is not a constraint.

We examine four indicators of freedom of association and collective bargaining rights:

- Kucera's index of freedom of association and collective bargaining rights (based on reported violations from textual sources)<sup>11</sup>
- The Freedom House index of civil liberties (based on expert assessment, but not restricted to labor rights)
- Union membership as a percent of the labor force<sup>12</sup>
- Number of fundamental ILO conventions ratified (as reported by the ILO)

As has been mentioned, our analysis involves examining the degree to which the rights to freedom of association and collective bargaining at a given moment in time affect subsequent labor market outcomes in terms of employment and wages. Kucera's index is constructed using data from the mid-1990s, centering the estimates to the best extent possible on the year 1995. To keep the analysis comparable across other indicators, we also focus on the values of those indicators in the mid-1990s. For the Freedom House index of civil liberties, we follow Kucera in using the annual average of this index from 1993 to 1997. In the database we used, union density rates were available as five-year averages. We used the average for the period 1990-94 unless there were no observations for a particular country during this period, in which case the average from 1995-1999 was used. Finally, we used the number of ILO fundamental conventions ratified in 1995. Convention 182 (on the Worst Forms of Child Labor) was only adopted by the ILO in 1999, so we did not include it as one of the eight fundamental conventions, since no country could have ratified it in 1995.<sup>13</sup>

The general empirical model which we estimate is of the general form:

$$w_i = \alpha + \beta r_i^{facb} + \gamma x_i \dots \text{or} \dots e_i = \alpha + \beta r_i^{facb} + \gamma x_i$$

In which 'w' represents average real wage growth from 1996 to 2006, 'e' average employment growth from 1996 to 2006, 'r<sup>facb</sup>' the relevant indicator of freedom of association and collective bargaining rights (circa 1995), and 'x' the average growth rate

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<sup>11</sup> David Kucera provided the data for the indices he constructed and used in his 2001 paper. We thank him for this assistance. In the analysis which follows, we use the weighted version of Kucera's index. The unweighted version yields similar results, but occasionally with a lower level of statistical significance.

<sup>12</sup> Union density rates for OECD countries are readily available, but equivalent indicators for many developing countries are harder to come by. Martín Rama provided estimates of union membership as a percent of the labor force. He had assembled a set of labor market indicators with Raquel Artecona in a 2002 World Bank report "A Database of Labor Market Indicators Across Countries". These indicators included unionization rates for both developed and developing countries, expressed as averages over 5 year periods. Unionization rates were only calculated for countries with available data. We thank Martín Rama for making these indicators available.

<sup>13</sup> The other 7 fundamental conventions include: No. 29 Forced Labor Convention, No. 87 Freedom of Association and the Right to Organize, No. 98 Right to Organize and Collective Bargaining, No. 100 Equal Remuneration Convention, No. 105 Abolition of Forced Labor, No. 111 Discrimination Convention, and No. 138 Minimum Age Convention.

of real output from 1996 to 2006.<sup>14</sup> Estimates were generated using standard cross-country regressions.

Our analytical exercise involves assessing whether the rights to freedom of association and collective bargaining, in the mid-1990s, impacted manufacturing employment or wage growth from 1996 to 2006 *for a given growth rate in output*. Wages and employment tend to rise with faster growth. However, many factors other than labor rights effect the growth of output. Simply correlating the level of labor rights with subsequent employment or wage growth could lead to misleading conclusions (if, for example, growth happened to be faster in countries with weaker rights due to factors other than the labor rights in question). Therefore, we control for the growth of output when assessing the impact of the rights to freedom of association and collective bargaining.

Some studies within the broad literature on union wage premiums and labor rights suggest that the relationship between unionization and/or labor rights may be non-linear. For example, in the literature review we discussed a Brazilian study by Menezes-Filho, et al. (2008) that finds that unionization has a positive impact on employment, although these impacts decrease with the level of unionization. The nature of collective bargaining may also change with the level of unionization. For example, high rates of unionization may be associated with more centralized bargaining, while lower or mid-range rates of unionization may be associated with firm- or employer-level bargaining. These institutional changes also introduce non-linearities into the relationship. To allow for non-linearities with regard to freedom of association and collective bargaining rights, we introduce a squared value of the indicator in some of the regressions presented later in this report.

#### 4.2. Principal components analysis

The four indicators of freedom of association and collective bargaining rights are not perfect. Each has its limitations. These methodological issues were discussed in previous sections of the report. We do not expect any single indicator to fully capture the underlying labor rights of interest. Some indicators may perform better than others in regression analysis and some may have more severe drawbacks, but no single one of them is completely satisfying. However, each indicator provides us with an incomplete glimpse into some aspect of the rights of freedom of association and collective bargaining.

Given this situation, we use the four indicators to construct a composite index of the underlying rights. Imagine that an unobserved variable exists which accurately

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<sup>14</sup> A ten year period was chosen for two reasons. First, we expect the impact of institutional changes – such as better labor rights – to be long-run, rather than short-run, in nature. Ideally, we would trace these dynamics over time, but the lack of time series data prevents us from doing so. Second, real wages and employment, particularly in developing countries, can be highly volatile (e.g. due to exchange rate swings, sudden price increases, and exogenous supply- and demand-shocks). Averaging over significantly long period of time helps to smooth out this ‘noise’. The downside is that it becomes difficult to control for other factors that may change over the longer time period and for which reliable data do not exist.

reflects freedom of association and collective bargaining rights. We cannot observe this variable directly. However, we have observations on the four indicators described above that provide information on the underlying variable. The four indicator variables are not perfect – the observations they provide contain errors which cause the indicators to deviate from the underlying variable. If we accept this way of thinking about the indicators, we can combine the information which they contain to produce a single index which is our ‘best guess’ of the unobserved underlying variable.

‘Principal components’ analysis does just that. A technical summary of the technique is provided in the appendix. Intuitively, the composite index is estimated by minimizing the squared deviations (‘least squares’) between the indicators and the hypothetical underlying variable. The values of the underlying variable which best fit the information contained in the four indicator variables then become our estimates of the unobserved variable (in this case, a composite index of the rights to freedom of association and collective bargaining).<sup>15</sup> To calculate the principal components, all variables must be standardized (i.e. adjusted so that the mean is equal to zero and the standard deviation equal to one). The principal components will likewise have a mean of zero and a standard deviation of one. To make the composite index similar in scale to the other indices examined here, we make one additional adjustment after calculating the principal components – we re-scale the indicator variable to take on values between 0 and 10 (with 0 representing the lowest level of labor rights and 10 the highest).<sup>16</sup> This becomes our index of freedom of association and collective bargaining rights.

Because all four indicators must be used to derive the principal components, we will only have index values for countries for which there is a complete set of observations. Unfortunately, the data on union density rates is less complete than the other three indicators. Therefore, we also construct an index of labor rights using only three of the four variables (excluding union density). This increases the number of observations in the regression analysis. Finally, we note that the correlation between the number of ILO conventions ratified and the other indicators is relatively weak. Therefore, we also use the principal components technique to construct an index only using Kucera’s indicator and the Freedom House index.

A table with the full set of indicators, including the indices constructed from the principal components, is contained in the appendix.

## 5. Results

In presenting the results of the regression analysis, we begin with the estimates based on each of the four indicators: Kucera’s index, the Freedom House index, union density (union members as a percentage of the total labor force), and the number of ILO

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<sup>15</sup> In terms of the technique described in the appendix, the first principal component is taken as the estimate of the ‘best fit’ – the one that minimizes the squared deviations.

<sup>16</sup> Because we include a squared term to capture non-linearities, the presence of negative values associated with the principal components (which have a mean of zero) distorts the values for the squared term. Rescaling the variable over a range of 0 to 10 solves this problem.

Fundamental Conventions ratified. We examine the impact of these indicators on subsequent employment and real wage growth for two groups of countries: low- and middle-income countries (i.e. ‘developing’) and high-income countries (i.e. ‘developed’).<sup>17</sup> Afterwards, we discuss the regression results using the principal components based index of labor rights.

Note that non-linear relationships are captured by adding a squared term for the relevant labor rights variable. The results from non-linear estimates are only presented for a subset of the regressions. When the non-linear term is not statistically significant in the regressions for the three sets of countries (i.e. all countries, low- and middle-income countries, and high-income countries), the squared variable is not used in the regression and only the results from the simple linear specification are reported in the tables.

Tables 1.1 to 1.3 present the estimates of the impact of the four indicators on subsequent employment growth. Table 1.1 uses the full set of countries for which data is available from the sources used. Table 1.2 presents results for low- and middle-income countries only, and Table 1.3 presents results for high-income countries. In all cases, standard errors are shown in parentheses. Those results which are statistically significant at the 10 percent level or lower are exhibited in bold type.

In Table 1.1, the only indicator of freedom of association and collective bargaining that has a statistically significant impact on future employment growth is Kucera’s index. Note that the relationship is non-linear. Better labor rights raises the rate of employment growth, but this effect eventually declines as labor rights become stronger.<sup>18</sup> None of the other three indicators has a statistically significant impact on employment growth. In all four cases, higher growth of output is associated with more rapid employment growth, although employment will grow at a proportionately lower rate than output.

Table 1.2 presents the same set of estimates, but limits the analysis to low- and middle-income countries. Now both Kucera’s index and the Freedom House index show statistically significant and positive impacts on employment growth. Again, the effect is positive, but declines as the rights to freedom of association and collective bargaining improve.<sup>19</sup> Union density and ratified conventions do not have the same statistically

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<sup>17</sup> The country groupings ‘low income,’ ‘middle-income,’ and ‘high income’ were developed by the World Bank and are used to classify countries in the World Development Indicators Database. In 2006, high-income countries were defined as those having a gross national income (GNI) of \$11,116 or higher. Low- and middle-income countries, conversely, had per capita incomes (measured by the GNI) of less than \$11,116. We re-classified one country – Trinidad and Tobago – which was considered a high-income country in 2006 as middle-income country, since it fell into this group throughout much of the time period under consideration. We did not treat low-income countries separately from middle-income countries because of the lack of observations.

<sup>18</sup> The coefficient values in Table 1.1 suggest that the impact on employment growth is maximized when Kucera’s index reaches 5.1. The impact on employment growth would become negative if the index exceeds 10.3 – however, since the maximum value is 10, the impact on employment growth is positive throughout the range of the index.

<sup>19</sup> In these estimates, the impact on employment growth is maximized at a value of 4.5 for Kucera’s index and 4.7 for the Freedom House Index. The impact becomes negative when Kucera’s index exceeds 8.9 and

significant impact on employment growth. In all cases, employment growth expands along with output growth.

Table 1.3 presents regression estimates for the set of high income countries in the sample.<sup>20</sup> For these countries, none of the indicators of freedom of association and collective bargaining have a significant impact on employment growth. The growth of real output is the only variable with a statistically significant, and consistently positive, impact on employment.

1.1 Employment. All countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	<b>1.2216*</b> (0.6425)	1.0628 (0.7217)	0.0091 (0.0185)	-0.0043 (0.2603)
FACB <sup>2</sup>	<b>-0.1191**</b> (0.0578)	-0.0938 (0.0591)	---	---
Output	<b>0.4066**</b> (0.1452)	<b>0.3614**</b> (0.1561)	<b>0.3954**</b> (0.1307)	<b>0.3402**</b> (0.1496)
Constant	<b>-2.928*</b> (1.678)	-3.149 (2.2305)	-1.0913 (0.7976)	-0.8867 (1.5509)
N	72	74	59	75
R <sup>2</sup> -adj.	0.117	0.071	0.117	0.043

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

1.2 Employment. Low and middle income countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	<b>2.1237**</b> (0.9005)	<b>2.2916*</b> (1.1477)	-0.0249 (0.0343)	-0.0277 (0.3868)
FACB <sup>2</sup>	<b>-0.2382**</b> (0.0932)	<b>-0.2422**</b> (0.1155)	---	---
Output	<b>0.3780*</b> (0.1993)	<b>0.4236**</b> (0.2045)	<b>0.3778*</b> (0.1966)	0.3161 (0.2037)
Constant	<b>-3.6152*</b> (2.1112)	<b>-5.0598*</b> (2.9706)	-0.8733 (1.2677)	-0.6386 (2.1914)
N	45	48	33	49
R <sup>2</sup> -adj.	0.131	0.085	0.062	0.100

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

the Freedom House index exceeds 9.5. Almost no low- and middle-income countries have index values that exceed these thresholds – i.e. the impact is positive over the relevant range.

<sup>20</sup> All the regressions for the subset of high-income countries have a limited number of observations. The number of observations could potentially be increased by combining labor market data from multiple sources. We avoided this option in order to minimize problems of comparability. As discussed later in the report, the number of observations could also be increased by developing consistent measurements of labor rights over time.

1.3 Employment. High income countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	-0.7262 (1.3076)	-0.7169 (0.9634)	0.0024 (0.0126)	0.0776 (0.1577)
FACB <sup>2</sup>	0.0589 (0.0921)	0.0476 (0.0669)	---	---
Output	<b>0.5719**</b> <b>(0.1428)</b>	<b>0.4217**</b> <b>(0.1520)</b>	<b>0.5820**</b> <b>(0.1337)</b>	<b>0.4517**</b> <b>(0.1322)</b>
Constant	0.2190 (0.0432)	1.2835 (3.3527)	<b>-1.6274**</b> <b>(0.6053)</b>	-1.6654 (0.9745)
N	27	26	26	26
R <sup>2</sup> -adj.	0.401	0.263	0.405	0.285

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

Tables 2.1 to 2.3 present the estimates of the impact of the four indicators on subsequent real wage growth. Once again, Table 2.1 uses the full set of countries for which data is available from the sources used; Table 2.2 includes only low- and middle-income countries; and Table 2.3 shows results for high-income countries.

2.1 Wages. All countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	-0.1455 (0.5467)	0.0667 (0.1693)	0.0200 (0.0142)	0.2019 (0.2366)
FACB <sup>2</sup>	0.0253 (0.0484)	---	---	---
Output	<b>0.2789**</b> <b>(0.1241)</b>	<b>0.3549**</b> <b>(0.1404)</b>	0.1470 (0.1098)	<b>0.3720**</b> <b>(0.1345)</b>
Constant	-0.0467 (1.3817)	-0.1786 (1.3616)	0.3985 (0.6203)	-0.7872 (1.3894)
N	67	69	56	70
R <sup>2</sup> -adj.	0.0460	0.061	0.028	0.080

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

2.2 Wages. Low and middle income countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	-0.7192 (0.7704)	0.0968 (0.2960)	0.0409 (0.0254)	0.3646 (0.3558)
FACB <sup>2</sup>	0.0978 (0.0777)	---	---	---
Output	<b>0.3228*</b> <b>(0.1757)</b>	<b>0.3594*</b> <b>(0.1881)</b>	0.1169 (0.1621)	0.3893** (0.1812)
Constant	0.4644 (1.7414)	-0.1749 (1.8993)	0.4606 (0.9550)	-1.4503 (1.9821)
N	42	45	31	46
R <sup>2</sup> -adj.	0.075	0.039	0.041	0.070

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

2.3 Wages. High income countries. Standard errors in parentheses.

	(1) Kucera	(2) Freedom House	(3) Union Density	(4) ILO Fund. Conventions
FACB	<b>2.7298**</b> (1.1458)	<b>0.2503*</b> (0.1341)	0.0107 (0.0116)	-0.0297 (0.1495)
FACB <sup>2</sup>	<b>-0.1888**</b> (0.0809)	---	---	---
Output	-0.0069 (0.1210)	<b>0.2692*</b> (0.1311)	0.0351 (0.1227)	0.1587 (0.1261)
Constant	<b>-8.1191**</b> (3.7468)	-1.9622 (1.3396)	0.4212 (0.5565)	0.6268 (0.9246)
N	25	24	25	24
R <sup>2</sup> -adj.	0.106	0.126	-0.047	-0.017

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

The results presented in Table 2.1 are generally weak – none of the labor rights indicators has a significant impact on future wage growth. Output growth only has an impact on wage growth in two of the equations – the equations with Kucera’s index and the Freedom House index. The results for low- and middle income countries in Table 2.2 are basically the same – no impact of freedom of association and collective bargaining on wage growth.

The results for high-income countries, however, are quite different. Both Kucera’s index and the Freedom House index have a positive impact on wage growth. Non-linearities are apparent in the impact of Kucera’s measurement – the positive impact on wages eventually decreases as labor rights become stronger. The impact of output growth on wage growth is relatively weak in these regressions (it is only statistically significant in the regression utilizing the Freedom House index).

Comparing Tables 1.1 to 1.3 and Tables 2.1 to 2.3, we make a number of observations. First, neither the union density variable nor the convention ratification variable has a statistically significant impact on wage growth or employment growth. We cannot tell from these simple regressions whether this result is due to measurement (e.g. the indicators do a poor job at capturing freedom of association and collective bargaining rights) or due to the absence of any empirical relationship (i.e. no connection exists between unionization and aggregate wage and employment outcomes). Second, analyzing high-income countries separately from low- and middle-income countries is critical. Specifically, freedom and association and collective bargaining rights appear to impact employment outcomes in low- and middle-income countries, but wage outcomes in high-income countries.

To explore these possibilities further, we now look at the results using the principal components (PC) based index of labor rights. Tables 3.1 to 3.3 examine the impact on employment growth. Three different PC indices are investigated: (1) one based



on all four labor rights indicators; (2) one based on three indicators – excluding union density; and (3) one based on Kucera’s index and the Freedom House index.

Table 3.1 reports results using the full set of countries – combining high-, middle- and low-income countries. The results are mixed. The PC index using all four indicators (Equation 1 in Table 3.1) is not statistically significant.<sup>21</sup> However, the regression estimates that include the 3-indicator PC index and the 2-indicator index show a statistically significant impact on future employment growth (Equation 2 in Table 3.1). As with the estimates from Tables 1.1 and 1.2, there is a non-linear relationship. The impact on employment growth eventually decreases as labor rights improve. In all equations, faster output growth is associated with faster employment growth.

3.1 Employment. Principal component analysis. All countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	1.2965 (0.7970)	<b>1.5721*</b> <b>(0.9352)</b>	<b>1.3324*</b> <b>(0.7356)</b>
PC <sup>2</sup>	-0.1155 (0.0710)	<b>-0.1361*</b> <b>(0.0737)</b>	<b>-0.1244**</b> <b>(0.0621)</b>
Output	<b>0.4129**</b> <b>(0.1391)</b>	<b>0.4281**</b> <b>(0.1580)</b>	<b>0.3944**</b> <b>(0.1541)</b>
Constant	<b>-4.2953*</b> <b>(2.1804)</b>	-4.5798 (2.9732)	-3.3661 (2.1699)
N	57	70	70
R <sup>2</sup> -adj.	0.114	0.103	0.110

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

3.2 Employment. Principal component analysis. Low and Middle Income Countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	<b>3.4791**</b> <b>(1.3692)</b>	<b>3.3021**</b> <b>(1.4384)</b>	<b>2.6934**</b> <b>(1.1024)</b>
PC <sup>2</sup>	<b>-0.4064**</b> <b>(0.1520)</b>	<b>-0.3384**</b> <b>(0.1374)</b>	<b>-0.2975**</b> <b>(0.1135)</b>
Output	<b>0.5332**</b> <b>(0.1946)</b>	<b>0.5125**</b> <b>(0.2133)</b>	<b>0.4586**</b> <b>(0.2046)</b>
Constant	<b>-7.9395**</b> <b>(3.1487)</b>	<b>-7.7022*</b> <b>(3.9935)</b>	<b>-5.3282*</b> <b>(2.8081)</b>
N	32	44	44
R <sup>2</sup> -adj.	0.210	0.133	0.146

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

<sup>21</sup> It can be noted that the statistical significance of the coefficients on the PC index in Equation 1 in Table 3.1 is very close to 10%.

3.3 Employment. Principal component analysis. High Income Countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	-0.2239 (0.8716)	-0.7575 (1.4317)	<b>-1.9487*</b> <b>(1.1383)</b>
PC <sup>2</sup>	0.0179 (0.0660)	0.0529 (0.0967)	<b>0.1325*</b> <b>(0.0771)</b>
Output	<b>0.4193**</b> <b>(0.1389)</b>	<b>0.4397**</b> <b>(0.1384)</b>	<b>0.4371**</b> <b>(0.1296)</b>
Constant	-0.4549 (2.8506)	1.2669 (5.1003)	5.4479 (4.0818)
N	25	26	26
R <sup>2</sup> -adj.	0.238	0.255	0.334

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

Table 3.2 shows estimates for low- and middle-income countries. These results are significantly stronger. In all cases, improvements in labor rights, as measured by the various PC indices, are associated with faster employment growth. The coefficients are all statistically significant. The same non-linear pattern is evident in these estimates. Finally, output growth maintains its statistically significant impact on employment growth.

Table 3.3 presents the estimates for high-income countries. The contrast with Table 3.2 is striking. For the 4-indicator PC index and the 3-indicator PC index, there is no statistically significant impact on employment growth. For the 2-indicator PC index, there is a statistically significant impact, but the effect is *the opposite* of what it is in low- and middle-income countries. Higher index values (i.e. strong rights) reduce the growth rate of employment, although this negative effect becomes weaker as labor rights improve.

Tables 4.1 to 4.3 present similar estimates, but with wage growth as the dependent variable. In Table 4.1, the only statistically significant relationship is between output growth and real wage growth. None of the PC indices of labor rights has a significant impact on wage growth. The results in Table 4.2 are even weaker – none of the variables is statistically significant. Neither output growth nor labor rights appear to explain wage growth in developing countries. The contrast to the results on employment growth (Table 3.2) is notable.

Table 4.3 shows the results for high-income countries. In this case, all the variables are statistically significant. The various PC-indices all have a positive impact on wage growth – although the non-linearities persist. Again – the contrast with the employment results (Table 3.3) is notable. Freedom of association and collective bargaining rights appear to improve employment growth in low- and middle-income countries, but have little impact on wages. In high-income countries, these labor rights appear to have the biggest impact on wages with little impact on employment. There is

some evidence that, in high income countries, improved labor rights are associated with higher wage growth, but slower employment growth. However, the negative effect on employment is not evident in all the regressions.

In the wage regressions for low- and middle-income countries, there is some ambiguity as to whether to include the squared labor rights term (i.e. make the relationship non-linear) or not. In some cases, the linear model yields better results in terms of statistical significance. Table 5.1 presents estimates which parallel those in Table 4.2, but specifically exclude the squared PC-index. In the first equation of Table 5.1 – the one which uses the 4-indicator PC index – the impact of this indicator is statistically significant and positive – i.e. strong labor rights appear to improve the growth rate of wages. However, this result does not carry through to the regressions using other PC indices. Moreover, this is the only regression estimate for low- and middle-income countries which shows a significant, positive impact of labor rights on wage growth – i.e. the finding is not robust to the inclusion of alternative measurements or alternative specifications (i.e. non-linear).

4.1 Wages. Principal component analysis. All countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	0.8266 (0.7261)	0.4033 (0.9260)	-0.0472 (0.6542)
PC <sup>2</sup>	-0.0579 (0.0633)	-0.0110 (0.0713)	0.0182 (0.0543)
Output	<b>0.1926*</b> <b>(0.1137)</b>	<b>0.3102**</b> <b>(0.1294)</b>	<b>0.3046**</b> <b>(0.1309)</b>
Constant	-1.7646 (1.9133)	-2.1267 (2.8388)	-0.5381 (1.8626)
N	54	65	65
R <sup>2</sup> -adj.	0.0332	0.062	0.046

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

4.2 Wages. Principal component analysis. Low and Middle Income Countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	-0.5107 (1.3334)	-1.1049 (1.4790)	-0.7089 (0.9932)
PC <sup>2</sup>	0.1230 (0.1403)	0.1472 (0.1337)	0.0978 (0.0989)
Output	0.1036 (0.1610)	0.2914 (0.1758)	0.2969 (0.1805)
Constant	0.8056 (2.9541)	1.0778 (4.001)	0.5684 (2.4702)
N	30	41	41
R <sup>2</sup> -adj.	0.089	0.084	0.042

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

4.3 Wages. Principal component analysis. High Income Countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	<b>1.6018**</b> (0.7532)	<b>3.5214**</b> (1.1076)	<b>3.5390**</b> (0.7932)
PC <sup>2</sup>	<b>-0.1089*</b> (0.0570)	<b>-0.2284**</b> (0.0748)	<b>-0.2257**</b> (0.0538)
Output	<b>0.2400*</b> (0.1189)	<b>0.2367**</b> (0.1065)	<b>0.2143**</b> (0.0900)
Constant	<b>-5.2185**</b> (2.4566)	<b>-12.4754**</b> (3.9392)	<b>-12.8292**</b> (2.8388)
N	24	24	24
R <sup>2</sup> -adj.	0.174	0.310	0.497

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

Another interesting result from Table 4.2 is that output growth has no impact on real wage growth in these regressions for low- and middle-income countries. The fact that none of the variables in Table 4.2 explain wage growth raises the question – what drives wage growth in developing countries? One of the most important variables for explaining wage differentials between rich and poor countries is the level of productivity (Rodrik, 1996). Therefore, we expect that productivity growth could explain wage growth in our collection of low- and middle-income countries. Table 5.2 presents the same regressions as in Table 5.1, but replaces output growth by productivity growth. In this case, productivity growth is measured as the average growth rate in real output per worker from 1996 to 2006. The results in Table 5.2 are clear – faster productivity growth is associated with higher growth rates of real wages. When productivity growth is added to the regression, the statistical significance of the PC indices weakens.

5.1 Wages. Principal component analysis. Low and middle income countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	<b>0.6270**</b> (0.3051)	0.4831 (0.3288)	0.2308 (0.2879)
Output	0.1097 (0.1601)	<b>0.3035*</b> (0.1759)	0.2998 (0.1804)
Constant	-1.4273 (1.4902)	-2.7362 (2.0066)	-1.2228 (1.6785)
N	30	41	41
R <sup>2</sup> -adj.	0.097	0.079	0.043

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

5.2 Wages. Principal component analysis. Low and Middle Income Countries. Standard errors in parentheses.

	(1) All four indicators	(2) Three indicators	(3) Two indicators
PC	0.3433 (0.2441)	0.2294 (0.2547)	0.0071 (0.2210)
Productivity	<b>0.4844<sup>**</sup></b> <b>(0.1107)</b>	<b>0.6016<sup>**</sup></b> <b>(0.1051)</b>	<b>0.6192<sup>**</sup></b> <b>(0.1068)</b>
Constant	-1.3042 (1.1080)	-1.9472 (1.4724)	-0.7517 (1.2178)
N	30	41	41
R <sup>2</sup> -adj.	0.463	0.467	0.455

\* Statistically significant at 10% level. \*\* Statistically significant at 10% level.

## 6. Discussion and implications

The results presented in the previous section represent an effort to use existing indicators to examine the effects freedom of association and collective bargaining rights have on labor market outcomes – specifically, employment and real wage growth. From these findings, we can make a number of observations, keeping in mind the methodological challenges of conducting such exercises.

- The impact of freedom of association and collective bargaining rights appears to be different for developing (low- and middle-income) countries compared to high-income countries. These groups of countries should be analyzed separately – combining countries at different levels of economic development into one large dataset could lead to misleading inferences.
- The results of the analysis are sensitive to the indicator used. In our estimates, union density and number of ILO conventions ratified did not yield statistically significant results, while other indicators did. This could suggest that the poorly performing indicators did not accurately capture the strength of labor rights. Alternative, union density and ILO conventions may capture other aspects of the labor rights environment which have a weaker (or negligible) impact on labor market outcomes.
- It appears that non-linearities are important to take into account. The impact of freedom of association and collective bargaining rights may not be uniform across the entire range of the indices used to quantify the strength of these rights.
- Techniques such as principal components analysis may prove useful for combining information from multiple indicators of labor rights.

The results of the analysis suggest that freedom of association and collective bargaining rights improve the growth rate of manufacturing employment in low- and middle-income countries, but have little impact on the growth rate of average wages in manufacturing. The results presented here do not support the argument that labor rights undermine employment opportunities in developing countries. The results are quite

distinct for high-income countries: freedom of association and collective bargaining rights appear to have a direct impact on future wage growth. There is some evidence that stronger labor rights may negatively affect employment growth, but this finding is neither robust nor conclusive.

Why might we observe a different impact of the rights to freedom of association and collective bargaining in developing countries when compared to high-income economies? One possibility is that the institutions that enable workers to exercise these rights in the workplace are less well developed in lower-income countries relative to high-income countries. In high-income countries, well-established collective bargaining institutions allow organized labor to negotiate more effectively over contracts and wage rates. In developing countries, such institutions are not as strong (or limited to specific firms or workplaces). At the same time, basic labor rights could have indirect positive effects that increase the rate of employment growth for a given growth rate in output. For example, better industrial relations, reduced turnover, and skills development may reduce non-wage costs of labor and encourage firms to employ more workers – i.e. production tends to be more labor intensive in an environment of better and more predictable labor relations. Since we do not have consistent data on changes in hours of work over time, an alternative explanation is that stronger labor rights limit pressures to lengthen the workday and thereby increase the growth rate of employment for a given growth rate of output.<sup>22</sup> Our analysis does not shed light on the specific factors that would cause the observed difference between developed and developing countries, so the explanations given here for the positive employment effects are speculative.

Institutional differences could explain, at least in part, the non-linearities observed with regard to freedom of association and collective bargaining rights. For example, in high-income countries, we expect that collective bargaining institutions will change as the indices of labor rights improve. In countries with very high scores, more centralized systems of collective bargaining are often present. In these cases, aggregate labor market outcomes (e.g. economy-wide employment) may be taken into account – e.g. wage demands may be moderated as a way of protecting fuller levels of employment. This could explain the decline in the effect on wages of the indices of collective bargaining and freedom of association in some of the regression results.

Linking the quantitative analysis of labor rights indices to specific institutional changes is beyond the scope of the paper, and would involve more qualitative assessments of the institutions which help support the realization of the rights to freedom

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<sup>22</sup> As Freeman (2009) notes, if labor rights have positive employment effects, this could imply that labor rights have a negative impact on labor productivity. This observation is applicable to the estimates presented here which show that labor rights have a positive employment effect for a given rate of output growth in low- and middle-income countries, particularly if we assume that labor rights have no impact on hours worked per individual employee. The estimates presented here (e.g. in Table 3.2) also show that a 1 percent increase in output growth is associated with about a 0.5 percent increase in employment – i.e. approximately half the growth in output is achieved through higher productivity, not employing more workers. Therefore, if better labor rights create a more stable economic environment which also raises output growth (i.e. by encouraging investment), this could compensate for the slower growth of productivity suggested by our results.

of association and collective bargaining. Nevertheless, it is an important area for future work.

In terms of policy implications, the analysis presented here does not support the argument that stronger labor rights will undermine employment opportunities – particularly in manufacturing and other tradable sectors. For low- and middle-income countries, the evidence suggests a positive relationship between labor rights and employment growth. For high-income countries, stronger labor rights appear to impact wage growth, but the effect on employment is ambiguous. This could be because productivity rises with higher wages – mitigating or eliminating any potential effect from labor costs. As mentioned above, the results which suggest that the marginal wage effect declines as freedom of association and collective bargaining rights get stronger may indicate that collective bargaining strategies take into account a broader range of issues when labor rights are strengthened. The analysis presented here does not allow us to cast any judgment as to whether these, or other, explanations are the correct ones. However, these findings provide little support to the argument that basic labor rights may undermine employment opportunities, particularly in developing countries.

## 7. Limitations, caveats, and future directions

The analysis presented here is preliminary in the sense that data improvements will facilitate additional research that should allow us to draw firmer, more definitive conclusions. There are a number of caveats that should be kept in mind when interpreting the results presented in this report and when attempting to draw out broader lessons. Perhaps most important – there are data limitations, particularly in developing countries, that apply to all the variables considered here – labor rights, wages, and employment. These limitations have been discussed at some length earlier in the report. However, they bear repeating. Quantitative indices of labor rights – including those of freedom of association and collective bargaining – are challenging to assemble, due to incomplete data, different institutional settings, *de facto* v. *de jure* distinctions, and the problem of actually observing labor rights in practice. Employment can be a murky concept in contexts of widespread informality, self-employment, and underemployment. Labor rights, traditionally defined, do not apply equally to all forms of employment. Accurate data on wages and earnings over time is difficult to assemble. Averages hide distinctions due to occupation or skills.

We tried to minimize these limitations by focusing on one category of employment – manufacturing – and by exploring multiple indicators of labor rights. Manufacturing employment and wages may provide a relatively good indication of the impact of labor standards on labor market outcomes. However, it is important to keep in mind that such employment represents a fraction of the total labor market – and in developing countries, often a relatively small fraction of total employment. So we must exercise caution in trying to draw out generalities from this analysis.

Ideally, we would like to look at the impact of labor rights over time. That is, are changes in the rights to freedom of association and collective bargaining associated with

specific changes in labor market outcomes? Unfortunately, at the current time, the indicators of labor rights used in our analysis are not consistently available over time for a large number of countries – specifically, low- and middle-income countries. In this report, we looked at whether labor rights – as they exist at a particular moment in time – impact subsequent employment or wage growth. However, in the future it would be helpful to construct panel data (cross-country and over time) in order to broaden the analysis. For example, the short-run effects of changes in labor rights could be compared to longer-run impacts based on the overall levels of such rights.

As with much analysis along these lines, there are potential problems of endogeneity – does employment growth lead to better rights or does the causality run in the reverse direction? In the analysis presented in this report, we tried to limit problems of endogeneity by looking at initial conditions with regard to rights and subsequent labor market outcomes. It is difficult to argue that future growth of employment or wages could have caused labor rights in the past. But, putting the specific analysis presented here aside, clearly more work is needed on multi-directional causality.

One limitation of doing the kind of cross-country analysis presented here is that the relationship between labor rights and labor market outcomes may be spurious or indirect. For example, suppose unobserved factors existed which were correlated with both labor rights and subsequent employment growth. Since these factors are not observed, it is difficult to control for them in cross-country regressions. However, they could result in finding a robust link between labor rights and employment, when the real relationship is between the unobserved variables and employment. This is one of the limitations of cross-country regressions. These problems can be addressed, at least to some extent, by using panel datasets that include observations on labor rights over time. If such data exist, fixed effects analysis, or another error components technique, could be used in an attempt to control for unobservable country-specific factors. As discussed above, we lack data on changes in labor rights over time for a large number of countries and therefore did not use these estimation techniques. Cross-country regressions have been used extensively for economic analysis (e.g. in empirical growth models) and such analysis can shed light on a number of interesting relationships. Nevertheless, the results cannot be taken as definitive, merely suggestive, for the reasons given here.

From these observations, it is clear that one of the biggest limitations encountered in examining the relationship between labor rights (especially those of freedom of association and collective bargaining) and labor market outcomes is a lack of consistent and reliable information over time that captures both de jure and de facto aspects of labor rights. For these reasons, efforts to improve the quality of information and to develop time series estimates of labor rights will make better research possible.

Our review of methods for measuring labor rights suggests that multiple approaches may be needed to capture the various aspects of the rights to freedom of association and collective bargaining (e.g. the laws in place, the violations of rights on the ground, outcome indicators – such as union density, and expert assessments). Each method has its positive sides and its limitations. As described in this report, statistical



techniques can be used to attempt to extract information and minimize errors, thereby producing composite measurements of labor rights. However, such composite indices can only be produced if the component indicators are available. Once again, we return to the critical issue of improving the availability of reliable and consistent information as the most important step for opening doors to better research in the future.

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## Appendix

### Principal components: technical description

The technique of principal components can be used to reduce the dimensionality of a matrix of observations ( $X$ ) on a common underlying phenomenon – in this case, the rights to freedom of association and collective bargaining. The columns of  $X$  represent the 'n' observations on each of 't' variables (i.e.  $X$  is an  $n \times t$  matrix). For the index of labor rights used in the analysis, the first principal component was selected from which to construct the index. The first principal component,  $p_1$ , minimizes  $\text{tr}(X - p_1 v_1)'(X - p_1 v_1)$  in which  $v_1$  is the eigenvector of the  $X'X$  matrix associated with the largest eigenvalue. The first principal component, therefore, reflects the 'best' linear summary of the component variables in the sense of minimizing the sum of squared deviations and maximizing the captured variation of the component variables. Because it minimizes squared deviations, the principal component is distinct from other linear combinations of variables which may be used to combine different indicators (e.g. averaging the variables).

To calculate the principal components, each column of  $X$  must be transformed into a standardized variable by subtracting the mean from the individual values in each column and dividing by the standard deviation of the elements of the same column – i.e. the values in each column will have a mean of zero and a standard deviation of one. Once the variables have been standardized, a covariance matrix is calculated (the covariance of each of the variables in  $X$  with itself and the other variables). The covariance matrix is then used to calculate a matrix of eigenvectors and an associated vector of eigenvalues. As noted above, the eigenvector with the largest eigenvalue is used to compute the first principal component. This first principal component accounts for the largest share of the variance of the variables in matrix  $X$ .

In the analysis conducted in the report, three indices were estimated using this technique. The first used all four indicator variables discussed in Section 4.1 and, in this case, the first principal component accounted for 60 percent of the variance in the component variables. The second index excluded the union density variable. In this second case, the first principal component accounted for 63 percent of the variance of the component variables. The third index used the first principal component associated with Kucera's FACB index and the Freedom House Index of Civil Liberties. In this third case, the first principal component accounted for 85 percent of the variance.

Table A1. Indicators of Freedom of Association and Collective Bargaining Rights

	Kucera	Freedom House	Union density	ILO conv.	PC1	PC2	PC3
	(scale 0-10)	(scale 0-10)	(percent)	(scale 0-7)	(scale 0-10)	(scale 0-10)	(scale 0-10)
	mid 1990s	mid1990s	1990s	1995			
Albania	5.5	5.0		4.0		5.3	5.2
Azerbaijan	9.1	2.1		6.0		6.3	5.4
Argentina	2.6	6.7	21.5	6.0	4.5	5.6	4.7
Australia	7.4	10.0	41.7	6.0	7.6	8.8	8.8
Austria	10.0	10.0	45.9	6.0	8.5	9.8	10.0
Armenia		5.0		2.0			
Belgium	9.1	9.6	57.9	7.0	8.8	9.7	9.4
Bolivia	1.4	6.3	16.4	5.0	3.6	4.6	3.9
Botswana	7.4	7.5	8.6	0.0	4.0	5.4	7.5
Brazil	3.8	5.0	24.8	5.0	4.1	5.0	4.4
Bulgaria	6.2	7.9	59.7	6.0	7.2	7.5	7.1
Cameroon	3.1	3.3		6.0		4.5	3.2
Canada	8.6	10.0	28.1	4.0	6.9	8.5	9.4
Sri Lanka	6.1	3.3	17.4	4.0	3.7	4.8	4.7
Chile	5.9	8.3	13.1	3.0	4.8	6.3	7.1
China	0.0	0.0	15.5	1.0	0.0	0.0	0.0
Colombia	0.0	5.0	7.0	6.0	2.7	4.0	2.6
Costa Rica	2.6	8.3	15.0	7.0	5.1	6.7	5.6
Croatia	6.8	5.0		6.0		6.6	5.8
Cyprus	8.6	10.0	52.7	6.0	8.3	9.3	9.4
Denmark	8.2	10.0	71.1	6.0	8.9	9.1	9.1
Ecuador	2.8	6.3	13.5	6.0	4.2	5.5	4.6
Fiji	5.2	6.7		3.0		5.4	6.0
Finland	9.5	10.0	77.9	7.0	9.7	10.0	9.8
France	8.9	8.3	7.6	7.0	6.6	9.1	8.6
Greece	9.1	6.7	11.6	7.0	6.3	8.5	7.8
Guatemala	2.5	3.8	4.4	7.0	3.2	4.8	3.1
Hong Kong	5.0		19.8				
Hungary	6.8	8.3	78.7	6.0	8.2	7.9	7.6
Iceland	9.1	10.0		6.0		9.4	9.6
India	5.3	5.0	5.6	3.0	3.3	4.8	5.2
Indonesia	1.0	2.1	2.8	3.0	1.1	2.0	1.6
Iran	0.0	0.0		4.0		1.2	0.0

Table A1. Indicators of Freedom of Association and Collective Bargaining Rights, cont.

	Kucera	Freedom House	Union density	ILO conv.	PC1	PC2	PC3
Ireland	10.0	9.2	34.2	6.0	7.8	9.4	9.6
Israel	6.7	6.7	20.1	7.0	5.9	7.6	6.7
Italy	9.5	7.9	41.9	7.0	7.8	9.2	8.7
Jamaica	8.5	6.7	16.3	6.0	6.0	7.9	7.5
Japan	6.4	8.3	19.9	4.0	5.5	6.9	7.4
Jordan	6.7	5.0		5.0		6.1	5.8
Korea	2.9	8.3	7.5	0.0	2.9	4.0	5.7
Kuwait	3.5	3.3	3.2	4.0	2.5	3.9	3.4
Kyrgyzstan		5.8		6.0			
Latvia	9.1	7.9		5.0		8.2	8.5
Lithuania	6.8	7.5		6.0		7.6	7.2
Luxembourg	9.5	10.0	59.4	6.0	8.8	9.6	9.8
Malawi	5.0	5.8		3.0		5.0	5.5
Malaysia	2.2	3.3	9.6	2.0	1.8	2.6	2.8
Malta	9.5	10.0	57.9	7.0	9.1	10.0	9.8
Mauritius	6.4	8.3	17.5	4.0	5.4	6.9	7.4
Moldova		4.6		1.0			
Morocco	3.7	3.3	6.4	5.0	2.9	4.3	3.5
Netherlands	9.5	10.0	25.6	7.0	8.0	10.0	9.8
New Zealand	9.1	10.0	43.4	4.0	7.6	8.6	9.6
Norway	8.6	10.0	55.4	7.0	8.7	9.7	9.4
Panama	5.2	6.7	14.2	6.0	5.0	6.6	6.0
Peru	2.0	5.0	12.9	6.0	3.5	4.8	3.6
Philippines	2.0	5.4	11.4	5.0	3.3	4.5	3.8
Poland	8.2	8.3	43.0	7.0	7.6	8.8	8.3
Portugal	10.0	10.0	35.0	6.0	8.1	9.8	10.0
Qatar	0.0	1.7		1.0		0.7	0.9
Romania	4.3	6.3	43.1	6.0	5.6	6.1	5.3
Russia	4.0	5.0	95.5	6.0	6.9	5.5	4.5
Senegal	5.9	3.8	2.2	6.0	3.9	5.7	4.8
Singapore	8.2	3.3	14.0	2.0	3.6	4.8	5.7
Slovenia	8.0	8.3		6.0		8.4	8.2
South Africa	5.5	7.1	18.8	0.0	3.6	4.5	6.3
Spain	8.0	8.3	10.1	7.0	6.5	8.8	8.2
Suriname	9.5	6.7		3.0		7.1	8.0
Sweden	9.5	10.0	85.3	7.0	10.0	10.0	9.8
Syria	0.0	0.0	5.0	6.0	1.1	2.0	0.0

Table A1. Indicators of Freedom of Association and Collective Bargaining Rights, cont.

	Kucera	Freedom House	Union density	ILO conv.	PC1	PC2	PC3
Trinidad/ Tobago	9.5	8.8	22.0	5.0	6.9	8.7	9.1
Tunisia	6.5	3.3	10.0	7.0	4.4	6.2	4.9
Turkey	0.7	3.8	8.8	5.0	2.3	3.3	2.3
Ukraine	5.0			6.0			
Macedonia (FYR)		6.7	55.3	6.0			
Egypt	4.6	5.0	24.0	6.0	4.6	5.7	4.8
UK	4.1	8.3	33.9	5.0	5.6	6.5	6.3
USA	4.7	10.0	13.7	1.0	4.5	5.8	7.5
Uruguay	8.6	8.3	16.3	7.0	6.9	9.0	8.5
Yemen	5.0	2.1		6.0		4.7	3.5

Source: See text.