

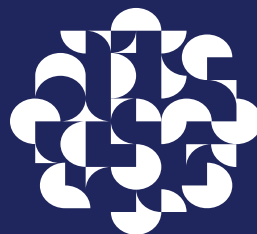


# Measuring Multidimensional Labour Law Violation with an Application to South Africa

By Haroon Bhorat, Ravi Kanbur, Benjamin Stanwix & Amy Thornton

DPRU Working Paper 202002

February 2020



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**MEASURING MULTIDIMENSIONAL  
LABOUR LAW VIOLATION WITH AN APPLICATION  
TO SOUTH AFRICA**

DEVELOPMENT POLICY RESEARCH UNIT

HAROON BHORAT

RAVI KANBUR

BENJAMIN STANWIX

AMY THORNTON

Working Paper 202002  
ISBN 978-1-920633-71-4

February 2020

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## **Abstract**

The rights of workers contained in labour law are multidimensional, yet analysts tend to concentrate on compliance one dimension at a time. How should we conceptualise and measure compliance with labour law in its totality? This paper draws on the multidimensional poverty literature to propose a measure of multidimensional labour law violation, which allows a quantification of the contribution of compliance along different dimensions. This index is applied to South Africa to illustrate its workings and the insights it can provide on the nature and granular structure of labour law compliance and worker vulnerability.

**Keywords:** multidimensional, labour law, violation, compliance, index of violation, South Africa, worker vulnerability

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### **Corresponding author**

Ms Amy Thornton  
DPRU Researcher  
c/o tel: +27 (0)21 650 5705  
email: [amy.thornton@uct.ac.za](mailto:amy.thornton@uct.ac.za)

### **Recommended citation**

Bhorat, H., Kanbur, R., Stanwix, B. and Thornton, A. (2020). Measuring Multidimensional Labour Law Violation With An Application To South Africa. Development Policy Research Unit Working Paper 202002. DPRU, University of Cape Town.

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# 1. Introduction

Labour legislation is a crucial but often contested area of government policy. On the one hand, stricter regulations are seen by some as a hindrance to economic growth and efficiency, negatively affecting what is often known as the 'ease of doing business' (Besley & Burgess, 2003; Botero et al., 2004; La Porta et al., 2008). On the other hand, labour laws are understood to protect the basic rights of workers, limiting the power of employers, and establishing a level playing field, or common legislative floor, across firms (Lee & McCann, 2011). On both sides of this debate, there is an underlying assumption that labour laws are effectively enforced. In other words, it is generally taken for granted that there is not much difference between *de jure* and *de facto* labour regulation. But an emerging body of literature suggests that the enforcement of labour legislation in developing countries is particularly weak, and that noncompliance is widespread. This has implications for how we understand the impacts of regulatory regimes. Further, work by Kanbur and Ronconi (2016) and Ronconi, Sidders and Stanwix (2016) shows that there exists a strong correlation between stricter labour laws and lower levels of compliance. What is important, therefore, is *de facto* rather than *de jure* regulation. And this requires accurate measurement of labour law compliance.

Initially, much of the literature on labour law compliance focused specifically on minimum wages (Bhorat, Kanbur & Mayet, 2012; Andalon & Pages, 2008; Strobl & Walsh, 2003; Lemos, 2009). Indeed, this is now perhaps the best-developed aspect of compliance measurement. Building on the early literature examining levels of minimum wage violation, Bhorat, Kanbur and Mayet (2012) proposed a measure that took into account the depth of violation and how much weight was given to the extent of the violation. The minimum wage compliance literature has continued to grow apace, with the greatly increased policy interest in minimum wage policy itself (for a recent review, see Bhorat, Kanbur & Stanwix, 2017).

However, the minimum wage is only one dimension of workers' employment rights that is addressed by labour law. There are many other dimensions, such as hours worked, mandated leave, unemployment insurance, having a written contract, and so on. Compliance in each of these dimensions is an issue for effective labour regulation, and specialised studies usually highlight violations in the single domain under consideration. But, how should we conceptualize and measure labour law compliance, or labour standards violations, in their totality? How should we aggregate and measure violations across the many measurable dimensions of labour law? Violation of labour rights is one lens on worker welfare and vulnerability, an important but complex and multidimensional concept in labour economics facing its own measurement challenges (Campbell & Price, 2016; Kalleberg & Hewison, 2013; Arnold & Bongiovi, 2013).

By locating violation as a form of individual vulnerability, this paper draws on developments in the measurement of multidimensional poverty to propose a measure of multidimensional labour law violation. The measure also allows a quantification of the contribution of compliance along different dimensions to the overall measure of violation and can be empirically identified using data from national household surveys. This index of multidimensional violation is then applied to South Africa to illustrate its workings, and the insights it can provide on the nature and granular structure of labour law compliance in a country. The paper also provides a preliminary assessment of the correlates of this multidimensional violation, to lay the groundwork for more in-depth analysis in the future.

The compilation of indices as a methodological tool is also a feature in a related branch of literature that focuses on comparing regulatory regimes across countries. Aleksynska and Cazes (2014) summarise some

of the most well-known indices in this field such as the World Economic Forum's Global Competitiveness Index and the World Bank's Employing Workers Index which often use executive opinion or firm survey data and sum across categorical indicators. Such indices are concerned with characterizing the nature of the regulatory regime, whereas our focus takes the regime as given, and is concerned with *de facto* compliance with that existing labour law. As such, we situate our work amongst other studies such as Kanbur et al. (2013) using household survey data to investigate compliance usually within a single country. We therefore lean towards the index methodology of the MPI as this literature has more in common with our underlying concern of individual vulnerability.

The structure of paper is as follows. In Section 2 we introduce the theory behind a multidimensional violation index (MVI) that combines compliance with various regulations into a single measure, inspired by the literature on multidimensional poverty measurement. Section 3 begins our application to South Africa with a brief overview of the core labour regulations and then, using labour force survey data, presents descriptive statistics on the extent to which a set of eight measurable regulations are adhered to by employers. Section 4 uses the MVI index to measure multidimensional labour violation in South Africa and to explore the contribution of violations in different dimensions to the overall measure of violation. Section 5 goes on to use the results from the index to present an initial exploration of some of the demographic, spatial, and firm-level characteristics of violation that emerge from the data. We end with a short conclusion and a view towards future work.

## 2. An Index of Multidimensional Labour Law Violation

Thus far, the literature has taken a disaggregated view of labour market violations by inspecting each legal specification on its own. However, this does not necessarily provide a comprehensive picture because there need be no consistent pattern across the various forms of labour violation. The question of how best to capture overall violation levels is thus left open.

Of course, similar issues occur in the poverty literature. Poverty is most commonly measured using income-based metrics, but the various contributors to a more comprehensive assessment of poverty can range from income to education, to social standing, where varying patterns of deprivation will be found across the different indicators. This makes poverty a multi-dimensional concept, which should be analysed as such. In an attempt to tackle the question of how to describe poverty in this more comprehensive manner, Alkire and Foster (2011) developed the now well-known Multi-Dimensional Poverty Index (MPI). The MPI captures the detail of deprivation along different dimensions into a single measure in order to capture some of the complexity of poverty, but obtain a relatively simple index that can say something about the various elements that contribute to an individual being 'poor'. In a similar way, in order to generate a more comprehensive picture of labour violations, we adopt Alkire and Foster's (2011) method and apply it to labour regulation.

The MPI includes several components (such as education, health, income) and each have their own internal cut-offs that delineate whether an individual is poor on that measure. These are then combined to form an index, and both intensity and incidence are taken into account. Although the MPI has no direct unit of interpretation, it can be used to rank countries, regions and other sub-categories; to track poverty over time; or to analyse the main contributors to poverty at a specific point in time. In South Africa, for example, Finn et al. (2013) present a measure of multidimensional poverty that shows a rapid decrease in poverty between 1993 and 2010 – a much greater decline than is evidenced by looking at income

poverty alone. While the role of the MPI is to aggregate a range of measures into a single measure, the index itself can be split into its constituent parts, and this is useful in showing how the components influence the overall outcomes. Finn et al. (2013) find that expansion in access to water, fuel, and electricity, as well as improved school enrolment, were some of the main drivers behind the fall in the MPI over the period.

At present, the literature on labour violation in South Africa has focused on wages much in the way that the poverty literature focused almost exclusively on income ten years ago. It is possible that a wider analysis of violation, through an application of the MPI-methodology, will yield important insights similar to the way that results of the work from the MPI literature have augmented our understanding of poverty.

The MVI follows the methodology of the MPI. We first specify the dimensions of labour law under consideration, and the standard for violation. On this basis, for every worker and every standard we can identify whether the worker is violated or not. For each worker and each dimension, a violation is given the score of 1, and non-violation a score of 0. Each dimension is then given a weight and the overall violation score for a worker is calculated as a weighted sum of violation scores on each dimension. How do we identify overall violation in the multidimensional setting? A critical cut off on the overall violation score is chosen. Denote this by  $k$ . If the overall violation score for a worker is greater than or equal to  $k$ , the worker is considered to be ‘overall violated’ and all the violation scores on each dimension are preserved. However, if the overall violation score for a worker is less than  $k$ , the worker is considered as not violated overall (even though there may a violation in some dimensions), and the overall violation score is set to zero for this worker. These combined scores are referred to as censored scores  $c_i(k)$ , and are the workhorse of the MVI.

The MVI is specified as simply the mean of the censored scores  $c_i(k)$ . If there are  $n$  workers overall and  $q$  of these workers are overall violated, then MVI can be written as:

$$\text{MVI} = H \times A$$

Where

$$H = \frac{q}{n} \quad (1)$$

$$A = \frac{\sum_{i=1}^n c_i(k)}{q} \quad (2)$$

Here  $H$  is the fraction of workers who are overall violated—the analogue to the headcount ratio in poverty measurement, and  $A$  is the average degree of violation among those who are overall violated—the analogue of the mean income of the poor in poverty indices.

The MVI also inherits the analytical advantages of the MPI. Given its linear additive structure, it is decomposable into population subgroups, where the MVI for the whole population is a weighted sum of the MVIs for sub-groups: the weights being the population shares of each subgroup. Further, the MVI can be decomposed to give the contribution of each dimension to the overall violation index. These properties prove extremely useful for depicting the nature and patterns of the different dimensions of labour law violation in a country. Before directly applying the MVI to South African data, and discussing the measure in more detail, we provide a basic overview of the literature on labour law violation and a



descriptive overview of violation levels in South Africa, which highlight the importance of turning to the MVI.

### 3. Labour Law Violation in South Africa

Whilst the theoretical work on understanding and measuring compliance with labour legislation is fairly advanced (for example see Basu, Chau & Kanbur, 2010), the empirical work remains underdeveloped. Focusing exclusively on minimum wages, several studies have begun to provide empirical evidence on wage noncompliance in developing countries, usually revealing that a large proportion of workers earn wages below the legal minimum. In South Africa, Bhorat, Kanbur and Mayet (2012) estimate that close to half of all covered workers earn sub-minimum wages, with significant sectoral variation within this. In Kenya, Andalón and Pagés (2008) report that, “24 percent of the salaried workers in agriculture and 17 percent of salaried workers in non-agricultural activities in urban areas” earn sub-minimum wages, but this rises to nearly 70 percent for workers in a range of skilled occupations in urban areas (p. 11). A range of other studies find variable but significant levels of noncompliance with minimum wages in developing countries such as Trinidad and Tobago (Strobl & Walsh, 2003), Brazil (Lemos, 2009), Chile (Kanbur, Ronconi & Wedenoja, 2013) and several other Latin American countries (Maloney & Mendez, 2004). Moving beyond an exclusive focus on minimum wages, there are several studies that examine compliance with labour regulations more broadly. Ronconi (2012), for example, shows that in Argentina, only half of the workforce receives legally mandated benefits, which include wages, capped working hours, and compensation for work-related injuries. Kanbur, Ronconi and Wedenoja (2013) present compliance data for six different labour regulations in Chile – including five non-wage regulations – and reveal high but variable levels of noncompliance across the different measures. While Ronconi, Sidders and Stanwix (2016) gather data on compliance levels for five regulations, across 40 countries, and suggest a relationship between high levels of noncompliance and more stringent labour laws.

Some context for the South African labour market is provided in Table 1. As an upper middle-income economy, South Africa is a global outlier in terms of high unemployment, income inequality, and poverty levels. In 2018, South Africa’s unemployment rate was 26.8 percent, which is more than four times higher than the average of comparator countries in the same income group. The broad unemployment rate is estimated at 36.6 percent in 2017 – expanding the narrow unemployment rate by almost ten percentage points (DPRU, 2018). This problem plagues the youth in particular: unemployment amongst 15-24 year olds is strikingly high at over 50 percent – several times higher than the average unemployment rate for the same age group in Sub-Saharan Africa and almost any other upper middle-income country. South Africa’s Gini coefficient has been exceedingly high for decades, reaching 0.69 in 2014 (Bhorat and Khan, 2018), where inequality in labour market income is the most important factor propping up overall income inequality (Leibbrandt et al., 2012). The inability of the economy to absorb job seekers is reflected in low labour force participation among the youth and large numbers of discouraged work seekers. Consequently, concern over worker vulnerability is high in a labour market context that, despite relatively progressive legislation, weakens worker bargaining power.

*Table 1: Global Context for the South African Labour Market*

Country Category	Labour Force Participation Rate							Unemployment Rate	
	Total	15-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65+ years	15+ years	15-24 yrs
Low Income	75.5	61.3	84.6	88.5	86.7	78.1	52.2	5.3	9.3
Lower Middle Income	56.2	34.6	67.7	72.7	70.9	57.6	27	4.7	12.7
Upper Middle Income	59.4	39.5	82.7	84.8	78.7	56.3	17.1	6.2	15.1
High Income	57.5	42.4	83.3	84.8	83.5	66.6	15.1	4.9	11
Sub-Saharan Africa	69.9	48.9	79.8	87.9	86.6	77.3	48.8	7.1	11.7
South Africa	53.7	22.4	74.3	80.6	73.5	43.6	4.3	26.8	53.5

Source: ILOSTAT, 2018. Labour force participation rates estimated for July 2017, Unemployment rates estimated for May 2018

In South Africa there are a relatively comprehensive set of laws governing workers' rights that are set out in different sections of legislation. In the first instance, Section 23 of the country's Constitution deals very broadly with labour relations and sets out the rights to fair labour practices that apply to all workers. This includes, for example, the right to organise and form a trade union. These broad rights are then given more substance and focus through the Labour Relations Act (LRA, 1995) and the Basic Conditions of Employment Act (BCEA, 1997). We do not dwell on the regulations contained within these Acts here, which have been written about at length (see for example, Benjamin, Borat & Cheadle, 2010). Importantly, arising from the BCEA, there are a set of Ministerial Determinations for specific sectors and occupations called Sectoral Determinations (SDs) within which the country's system of sectoral minimum wage laws took effect during the period under study. These SDs cover approximately five million workers (over 40 percent of all eligible employees) and define a range of employment-related conditions and non-wage benefits that exist alongside each minimum wage regulation. The SDs are, at present, the most comprehensive legislative protection offered to vulnerable workers in the South African labour market, and are thus the focus of our analysis here.

Labour regulations in South Africa are enforced by inspections, and penalties for violations. These inspections are carried out by labour inspectors employed in the Inspection and Enforcement Services (IES) unit within the Department of Labour (DoL). Despite a relatively comprehensive set of legislative frameworks to facilitate enforcement, general levels of noncompliance with minimum wages and other labour laws in South Africa is widespread – over 40 percent of workers covered by an SD minimum wage earn less than the mandated amount. The underlying drivers of noncompliance are not well understood, but it is clear that a series of issues that contribute to high levels of labour law violations include an undertrained and understaffed inspectorate, the low probability of being visited by an inspector, combined with limited penalties for violation. Together these create a situation in which enforcement procedures do not constitute a serious deterrent for noncompliant firms. In addition, Borat et al. (2013) show that noncompliance with minimum wages is higher in areas with higher unemployment. Together then, a relatively weak IES and high unemployment creates an environment that allows labour law violation to flourish.

The specific regulations that we focus on in this paper, to mobilise the MVI, are guided by what is available in the labour force survey data – but they include many important components of any

employment relationship. They are as follows: minimum wages; various forms of leave (paid leave, sick leave and maternity or paternity leave); whether workers have a written contract; whether they are registered for Unemployment Insurance Fund (UIF) payments; and whether they work longer hours than legal stipulations allow (In South Africa there is currently no legal requirement of employers to make social security contributions, apart from contributing to the Unemployment Insurance Fund (UIF). Pensions and healthcare, for example, are provided by the state). In the next section we briefly describe the data we use, and then provide a set of descriptive estimates of noncompliance for the chosen measures.

### 3.1. Estimates of Noncompliance: A Descriptive Overview

The data used in this paper come from the Labour Market Dynamics Study (LMDS) of 2014. The LMDS is an annual compilation of the Quarterly Labour Force Survey (QLFS) run by Statistics South Africa, South Africa's national statistics bureau. The QLFS is a nationally representative, cross-sectional household survey run on a quarterly basis, surveying roughly 30 000 dwellings per quarter. Using a stratified, two-stage cluster sampling design, the survey identifies 3 080 Primary Sampling Units (PSUs) based on a subset of the Master Sample of Primary Sampling Units from the 2001 Census. Basic demographic household information is collected, as well as relatively detailed labour market information, usually only for those aged 15 and above. The data are self-reported to the enumerator, and in the case of an absent household member, the data are collected by proxy. We make use of both self-reported answers and those reported by a proxy since proxy-reported data makes up a substantial portion of the data. For our sample, 44 percent of the data on economic activity was proxy-reported. As noted above, our analysis is limited to the sample of workers to whom South Africa's labour law pertains most extensively – those workers covered by a SD. To be more specific, this sample comprises working age people who are employed full-time<sup>1</sup> in a minimum wage covered sector, and earning less than R99.86 an hour – a broad income cut-off below which many of the basic employment protections enforced by the state do not apply. This leaves roughly 5 million workers for our analysis out of the approximately 15 million employed people in South Africa in 2014, and all the analysis, which follows, makes use of this sample of individuals.

We begin then by providing a basic empirical overview of the selected labour regulations, and the extent to which workers enjoy the benefits of these laws. Respondents were asked whether they were entitled to each regulation in a 'yes/no' format, with a 'no' answer counting as violation of this regulation (e.g. "are you entitled to paid vacation leave?"). The exceptions are  $V_0$ ,  $V_1$ , and hours of work which have specific cut-off values, below which workers are considered violated in this dimension.  $V_0$  uses the Rand value of the sectoral minimum wages as the cut-offs in each sector, and workers are considered deprived in  $V_1$  if they earn less than the mean deprivation in their sector.<sup>2</sup> In terms of hours, those working more than the 50 hours per week allocated in the BCEA on average are considered violated. Table 2 reports the incidence of noncompliance across our chosen measures, for each of the SDs. As the data show, a total of 43 percent of the sample (almost two million workers) earn less than the lowest minimum wage in their sector ( $V_0$ ). We are also interested in the distance below the minimum wage of those earning sub-minimum wages, and therefore include a measure of the gap ( $V_1$ ), the gap squared ( $V_2$ ), and the average percentage shortfall of those earning sub-minimum wages ( $V_1/V_0$ ). The wage gap simply calculates the average distance below the minimum wage for all employed. Currently, this relative level of wage violation stands at 17 percent. The wage gap squared emphasises extreme violation and records the shortfall as 10 percent. Dividing the wage gap by the headcount of violation ( $V_1/V_0$ ) yields the average percentage shortfall for those earning sub-minimum wages, and is easier to interpret as a more direct

measure of the extent of violation. In South Africa, those being paid below the minimum wage were, on average, being paid 40 percent less than they should have been.

*Table 2. Prevalence of Labour Law Violations for Workers Covered by Sectoral Determination of the Minimum Wage in South Africa, 2014.*

	Wholesale & Retail	Agriculture	Forestry	Hospitality	Transport	Domestic Workers	Private Security	Contract Cleaning	Overall	Population ('000s)
<b>Wage Violation</b>										
Paid Below										
Minimum Wage ( $V_0$ )	31%	69%	74%	44%	36%	44%	28%	54%	43%	1 969
Wage Gap ( $V_1$ )	13%	25%	32%	17%	15%	17%	11%	24%	17%	791
Wage Gap Sq. ( $V_2$ )	8%	14%	18%	10%	9%	9%	7%	15%	10%	461
Shortfall of Violated ( $V_1/V_0$ )	43%	36%	43%	40%	41%	38%	40%	44%	40%	791
<b>Leave Violation</b>										
No Paid Leave	32%	52%	53%	42%	55%	73%	31%	34%	44%	2 027
No Sick Leave	26%	49%	50%	37%	50%	68%	24%	28%	39%	1 803
No Maternity/Paternity Leave	47%	74%	73%	53%	65%	87%	47%	46%	59%	2 744
<b>Non-Wage &amp; Non-Leave</b>										
Verbal Contract	14%	30%	25%	19%	43%	75%	6%	8%	27%	1 267
No UIF	20%	39%	41%	30%	49%	72%	20%	31%	36%	1 624
Overworked in Hours	21%	15%	15%	27%	48%	11%	49%	8%	22%	1 013
<b>Population ('000s)</b>	1 367	621	37	321	332	804	514	614	4 615	4 615

Source: Own calculations using LMDS 2014.

Notes:

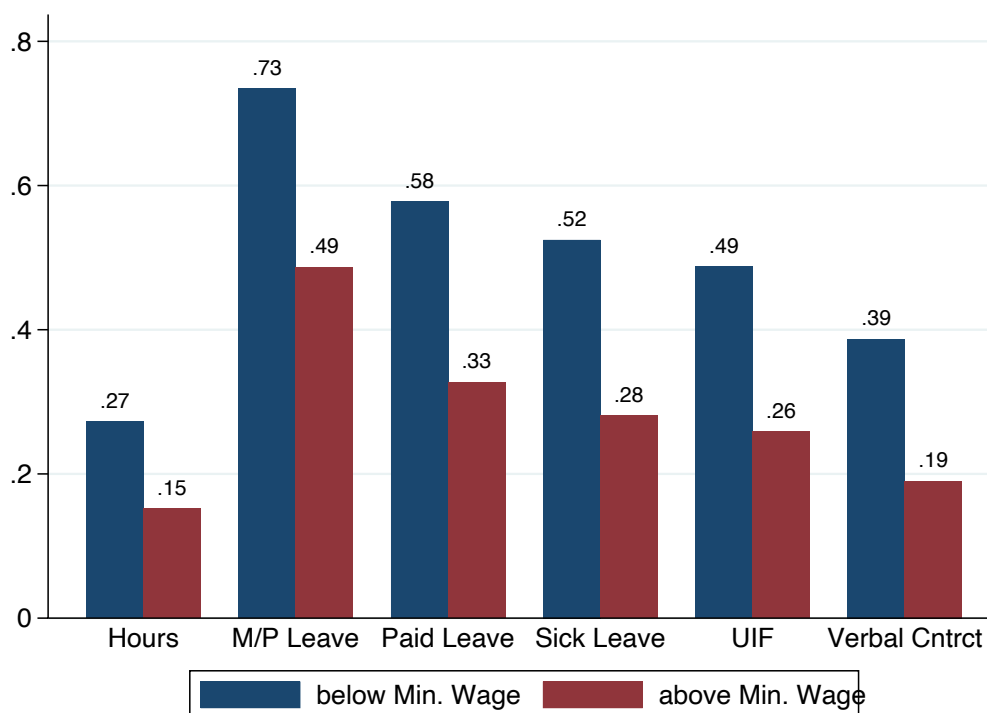
1. All estimates are adjusted using sampling weights.
2. Workers are overworked in hours if they work for more than 50 hours on average, including overtime.
3. The minimum wage is based on the sectoral minimum wage.
4. Sample consists of employees of working age in sectors covered by Sectoral Determinations.

What this simple descriptive overview makes clear, is the variation in violation levels across each measure. For example, while minimum wage violations appear significant, violation of leave allowances are the most substantial form of noncompliance – where 63 percent of the sample report that they do not have access to maternity or paternity leave. In addition to this, about half of all workers report having no access to paid leave, and 44 percent have no sick leave. Looking at working hours, one-fifth of the

workers in our sample report working more than the stipulated average of 50 hours per week, and this takes overtime into account. Finally, 31 percent of workers do not have a written contract. Overall then, violation levels across both wage and non-wage legislation as measured here, are clearly very high. But without a clear way of combining these various measures, it is unclear what the overall picture suggests, or how the various measures may be related.

The question about correlation is important if we are trying to understand noncompliance. If, for example, a worker is being underpaid, does that suggest an employer is also noncompliant in all areas of the law, or do we find many employers who comply with certain laws and violate others? In Figure 1 we examine whether minimum wage violation is a good predictor of other types of violation. To do this the sample is divided into those who were paid above and below the minimum wage, and we then calculate the extent of non-wage violations for each group. Two sided t-tests establish the prevalence rates between the two groups as significantly different in each case, at the 0.1% level.

Figure 1. Prevalence of Violation by Minimum Wage Violation



Source: LMDS (2014), own calculations.

Notes:

1. Adjusted using sampling weights.
2. Workers are overworked in hours if they work for more than 50 hours on average, including overtime.
3. The minimum wage is based on the sectoral hourly minimum wage.
4. Sample consists of employees of working-age in sectors covered by Sectoral Determinations.
5. M/P Leave is maternity or paternity leave.

The figure makes it clear that the sample of workers who earn less than the minimum wage also experience markedly higher violation levels in other areas, relative to those earning at the minimum wage or above. In all cases, except with respect to maternity and paternity leave, the chance of non-wage violation

virtually doubles if the employee falls into the group earning less than the minimum wage. Even amongst those earning above the minimum wage though, maternity and paternity leave violation is widespread. This suggests that employers' violation of one aspect of the law – here the stipulated minimum wage – is significantly associated with that employer also violating non-wage aspects of the labour code. Indeed, this association can be found for other violation types as well: those who have no paid leave are also significantly more likely to suffer from other violations, including being paid less than the minimum wage, compared to those with access to paid leave. What this points to in general, is a profile of employers who violate many labour laws, and a set of employees who are vulnerable and likely to be subject to extremely precarious employment conditions. The minimum wage is, in this case, an important window into the nexus of violation.

In general, the international literature on labour law violation has focused specifically on violations of the minimum wage, largely neglecting other forms of exploitation. The analysis above shows that, to a degree, this is justified. Minimum wage violation is amongst the most prevalent of labour violations and is also a good indicator of the presence of other violations. It could also be argued that wage violations are, on some level, the most normatively concerning, but this is not territory we intend to explore here. Nonetheless, an important observation from this section is that other violations, particularly violations of basic features of employment such as access to paid leave, are often more prevalent than minimum wage violation. As we have shown, 44 percent of workers in our sample do not get paid leave in their jobs. This proportion is 44.5 percent for those paid subminimum wages and goes up to almost 90 percent for employees in the informal sector, domestic work, or for those employed in contracts of unspecified duration. The importance of leave to the well-being of employees should not be understated, as a large body of literature suggests (See Klein, 2016; Goetzl et al., 2004; Johns, 2010; Stewart et al. 2003), where, for example, burnout can have serious negative implications for health and productivity (Eaker et al., 1992; Stewart et al., 2003). It is also worth emphasising that maternity and paternity leave stands out, with almost 60 percent of the sample lacking access to this type of leave in their jobs. And of course, there is a gender dimension here which one must keep in mind. The next section of this paper uses the MVI to collate the information provided above into a single, cohesive measure of labour violation in South Africa.

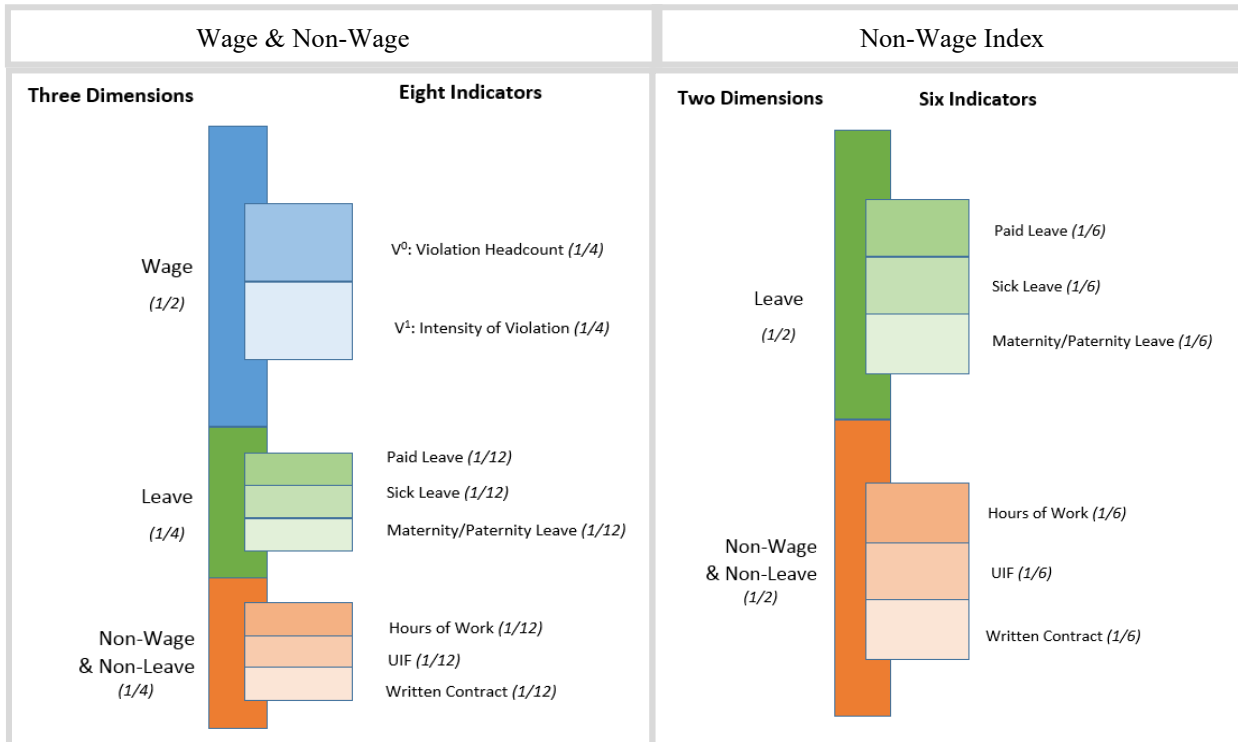
## 4. Multi-dimensional Labour Law Violation: Application of the MVI Approach

In the descriptive section above, we take a disaggregated view of labour market violations by inspecting each legal specification on its own. However, this does not necessarily provide a comprehensive picture because as we have shown, there is no consistent pattern across the various forms of labour violation. The complicated picture that emerges means it is difficult to characterise violation in South Africa as either serious (as in the case of leave for example) or mild (as in the case of written contracts). The question of how best to capture overall violation levels in South Africa, which is both a conceptual and a measurement question, is thus left open. In this section then, we apply the MVI index to the South African data.

As noted in the methodology described above, we first create an index (I) which groups our eight indicators into dimensions of labour violation, and weights them according to these dimensions. In this case, we actually create two indices – one which includes wage violation and one which does not. The indicators, dimensions and weighting are detailed in Figure 2. The three dimensions we use for these indices are Wages, Leave, and Non-Wage and Non-Leave, and the dimension weights sum to one, which allows us to

place more emphasis where we think is necessary. For example, we give wage violation more weight in the Wage & Non- Wage Index, so in this case the Wage dimension is weighted 0.5, while Leave and Non-Wage & Non- Leave are equally weighted at 0.25.<sup>3</sup> We believe this is justified given the importance of earnings to job satisfaction, especially in the case of low-paid work (Clark, 2015). On each of the indicators a worker scores one if they are violated, and zero otherwise. Using the index, we then calculate a violation score for each worker, that ranges between zero and one: and this is increasing in intensity of violation.

Figure 2. Two Indices for Multi-Dimensional Violation



Notes: 1. Weights for dimensions and indicators in parentheses.

Several useful statistics can be extracted from the index: a headcount (H), a measure of intensity of violation (A), and the overall MVI score. But in order to calculate these statistics we need to set a cut-off score for the index which divides workers into violated and non-violated. This cut-off is denoted  $k$  as discussed in the previous section. For our violation indices we set  $k=2$ , meaning if an individual is violated in two or more indicators they are counted as being multi- dimensionally violated. In the case of the Wage & Non-Wage index this is a score of 0.1666667 ( $2 \times 1/12$ ); in the case of the Non-Wage Index,  $k=0.333333$  ( $2 \times 1/6$ ). Note that the setting of  $k$ , which indicators to include, and how to weight dimensions, are all value-judgements imposed on the data within the approach contained in Alkire and Foster (2011).<sup>4</sup> Having set  $k$ , we divide workers into those who are violated and those who are not, and extract the headcount (H) and the depth of violation (A).

#### 4.1. Multi-Dimensional Labour Violation in South Africa: An Index

In this section, we present the two main sets of results from the MVI. First, the indices created using the weighting system in Figure 3: the Wage & Non-Wage Index, and the Non-Wage Index. Secondly, the three critical statistics that are extracted from these indices: the headcount ratio (H), the violation depth measure (A); and the combined measure of the MVI.

Figure 3, below, presents our first set of results – the distribution of two indices measuring multiple labour regulation violations in South Africa. Both vary over the interval [0;1] and increase with levels of violation, meaning scores closer to one imply more violation. The cut-off,  $k$ , is represented by the red vertical line, showing that  $k$  is set at two or more violations for Panels A and B. The line gives a visual indication of what to expect from the headcount ratio. The broad result here is that there are many more people who are violated in some way (i.e. have a positive index score) than are not violated in any way at all (i.e. have a zero score). There is also a substantial group of employees who have a low score (below two violations), and then a smaller group of employees who are severely violated and who represent the most exploited in our labour market, on the far right of the distribution.

Figure 3. Distribution of Two Indices of Multi-Dimensional Violation



Source: LMDS (2014), own calculations.

Notes:

1. Cut-off  $k$  represented in red.
2. Adjusted using sampling weights.
3. Sample consists of employees of working age in sectors covered by Sectoral Determinations.

In general, including wage violation increases the level of violation – this is to be expected since we are adding an additional dimension in which people can be violated. The share of workers with zero violations reduces from just over a quarter in the case of the Non-Wage Index, to just less than 20 percent when wages are considered. The effect of weighting and different dimensions is clearly illustrated by the difference in the number of bins for the two different indices.

Figure 4 presents the average values for  $H$ ,  $A$ , and the MVI for the two different indices.  $H$  is the headcount ratio, measuring all employees who have two or more violations.  $A$  is the average violation score for employees with two or more violations. The headcount ratio is higher for the Wage & Non-Wage index at 0.60 compared to 0.54 for the Non-Wage Index. However, intensity of violation is higher for the Non-Wage index with a depth of violation score of 0.66, compared to 0.52 for the Wage & Non-Wage Index. It appears more likely that minimum wages will be violated than non-wage stipulations in general; however, when firms do violate non-wage entitlements, they do so more intensely. The discrepancy between the indices is a very clear illustration of the effect of weighting choices, where we have privileged wage violations to some extent. Figure 4, as a snapshot of violation in South Africa, illustrates the danger of overemphasising one domain of noncompliance. We also note that the



aggregate Wage & Non-Wage MVI is lower than the Non-Wage MVI. What these results suggest then, is that an exclusive focus on the wage dimensions of violation and vulnerability, may mask a significant (and in some cases higher) degree of non-wage violations of the law.

Figure 4. Violation Headcount (H); Violation Intensity (A); and the MVI (H\*A) for Different Indices of Violations, 2014



Source: Own calculations using LMDS 2014.

Notes:

1. Adjusted using sampling weights.
2. Sample consists of employees of working age in sectors covered by Sectoral Determinations.

#### 4.2. Decomposing Multi-Dimensional Violation

One of the advantages of the MVI-methodology is that it can be decomposed in a number of useful ways to analyse the internal dynamics of violation. In particular, it can be broken down by sub- groups, by indicators, and by dimensions. The decompositions by indicator and dimension offer insight into which indicators and dimensions are driving violation. The formula below details the contribution of an indicator to the MVI.

$$\text{Contribution of indicator } i \text{ to MVI} = \frac{w_i CH_i}{MVI} * 100 \quad (3)$$

where  $w_i$  is the weight assigned to the indicator  $i$  in the MVI index, and  $CH_i$  is the censored headcount for indicator  $i$ . If the contribution of an indicator is high relative to its assigned weight, then this is a sign of a driver of violation. The results of the decomposition are presented in Table 3. The wage ( $V_0$ ) and all three leave indicators stand out as having a contribution exceeding their index weight. This is reiterated by *Leave* being the only dimension exceeding its weight. Ultimately then, this shows that leave and minimum wage violation are the main forces behind violation in South Africa.

*Table 3. Decomposition of Indicators and Dimensions in the Wage & Non-Wage Index.*

Dimensions	Indicators	Censored Headcount	Indicator		Dimension	
			Weight	Contribution	Weight	Contribution
<b>Wage</b>	V <sub>0</sub>	0.425	0.250	0.319	0.500	0.463
	V <sub>1</sub>	0.192	0.250	0.144		
<b>Leave</b>	Paid Leave	0.432	0.083	0.108	0.250	0.338
	Sick Leave	0.389	0.083	0.097		
	Mat/Pat Leave	0.530	0.083	0.133		
<b>Non-Wage &amp; Non- Leave</b>	Hours	0.182	0.083	0.045	0.250	0.198
	UIF	0.338	0.083	0.084		
	Contract	0.271	0.083	0.068		

Source: Own calculations using LMDS 2014.

## 5. Correlates of Multi-dimensional Labour Law Violation in South Africa

As a final empirical exercise, we regress the two indices presented above on a range of covariates relevant to violation. The covariates are drawn mostly from Bhorat et al. (2012) who use the labour force surveys to investigate the determinants of minimum wage violation, where the authors find sectoral, spatial and firm-level characteristics to be the most important correlates. This analysis replicates that approach using the constructed MVIs. Since the indices are continuous, we use a simple Ordinary Least Squares (OLS) approach. The dependent variables all fall into a [0; 1] interval, implying that coefficients can be interpreted as the change in points within this weighted index. Individual characteristics controlled for include: race, gender, age and age squared, occupation, and education level. Spatial variables are included to differentiate between urban formal, urban informal, so-called 'tribal' areas, and rural formal areas. The local unemployment rate is included and calculated at the district council level. For firm-specific variables we include firm size, union membership, tenure (how long an employee has been working for a firm), and contract type. We also include sector dummies and the Kaitz Ratio – which is the ratio of the minimum wage to the mean wage in that sector and province (understood as a measure of the strictness of the minimum wage).<sup>5</sup>

In Table 4 below, we provide descriptive statistics for these explanatory variables, with the exception of the sectoral variables which have been described in earlier tables. The average sample member is 37.4 years of age, living in a formal urban area, and slightly more likely to be male than female. Education levels are low in the sample: just less than two thirds have less than high school education and about a third have graduated from high school. This is indicative of the most vulnerable section of the labour force. The local unemployment level is high at 32 percent, which is a reflection of structural unemployment in the country. Most people in the sample are working at firms that are classified as either small (38 percent) or large (29 percent), with lower shares working in medium and medium-large

firms. About a fifth of the sample is unionized and just over half have a permanent contract, followed by just less than a third having contracts of unspecified duration. The Kaitz ratio is calculated at the sectoral-provincial level and had an average of 1.32 which can be interpreted as meaning that in most cases the legal minimum wage is above what is usually paid in that province and sector.

*Table 4. Descriptive Statistics of Explanatory Variables used in OLS and Quantile Regression.*

	Mean	SD	Unweighted N	Weighted N
<b>Demographic</b>				
Age	37.40	10.62	26 090	4 615 066
Male	53%	50%	13 071	2 446 853
Less than High School Education	62%	48%	16 999	2 869 337
High School Graduate	31%	46%	7 503	1 423 729
Tertiary Educated	5%	23%	1 241	252 886
<b>Spatial</b>				
Urban Formal	60%	49%	15 112	2 771 535
Urban Informal	12%	32%	2 518	553 741
Tribal Areas	19%	39%	5 691	867 264
Rural Formal	9%	29%	2 769	422 525
Local Unemployment	32%	9%	26 090	4 615 066
<b>Firm</b>				
Small Firms (<10)	38%	49%	9 753	1 677 206
Medium Firms (10-19)	16%	36%	3 866	692 021
Medium Large (20-49)	17%	38%	4 234	756 705
Large Firms (>50)	29%	45%	6 974	1 265 427
Tenure (years)	8.34	6.68	26 089	4 614 987
Unionised	19%	39%	4 904	847 166
Permanent Contract	55%	50%	14 214	2 527 782
Limited Duration Contract	14%	35%	3 879	662 920
Unspecified Duration Contract	31%	46%	7 997	1 424 364
Kaitz Ratio	1.32	0.13	26 090	4 615 066

	Mean	SD	Unweighted N	Weighted N
<b>Occupations</b>				
Managers	3%	17%	731	141
Professionals	0%	7%	120	497
Technicians	2%	14%	467	22 063
Clerks	8%	28%	2 183	91 661
Service Workers	23%	42%	5 652	386
Skilled Agricultural and Fishery	1%	9%	204	898
Crafters and Traders	6%	23%	1 418	262
Plant and Machine Operators	8%	27%	1 972	553
Elementary Occupations	34%	47%	9 296	366
Domestic Workers	15%	35%	4 046	211
				1 556 196
				674
				373

Source: Own calculations using LMDS 2014.

Notes:

1. **Kaitz Index** calculated for sector-province groups.
2. **Tenure** is the number of years an employee has worked for their current company.
3. **Local unemployment** calculated by District Council, of which there are 52 in South Africa.

## 5.1. Local Unemployment

Bhorat et al. (2012) found that the local unemployment rate was a primary driver of minimum wage violation, a finding similar to those in the 'wage curve' literature. A possible interpretation here is that in areas with higher unemployment, workers have less bargaining power – making them more vulnerable to wage exploitation. In our data, the local unemployment rate ranges from 13 percent to 68 percent, with a mean of 33 percent. We then expand this to labour violation more broadly, by plotting the local unemployment rate against the district level average of our combined Index and the Non-Wage Index, in Figure 5 below. Again, there is a clear positive relation between violation level and local unemployment for both indices. This leads us to expect strong results for local unemployment in the regression results.

Figure 5. Local Unemployment Rate and Violation



Source: Own calculations using LMDS 2014.

Notes: 1. Sample consists of employees of working age in sectors covered by Sectoral Determinations.

## 5.2. Regression Results

We present the regression results for the two different violation indices introduced above, where coefficients represent changes in the points on the index. A large proportion of the covariates are statistically significant, but in many cases the magnitudes are small – the largest being at the spatial and firm level. Consequently, we focus on these coefficients. Specifically, we find that the local unemployment rate, firm size, and contract type emerge as important predictors of multi-dimensional violation.

Table 5. OLS Regression Output of the Correlates of Labour Market Violation.

Depvar: Index [0;1]		Wage & Non-Wage	Non-Wage
<b>Spatial</b>	Urban formal (base)	0.00 (.)	0.00 (.)
	Urban informal	-0.01 (0.00)	-0.01* (0.00)
	Tribal areas	0.08*** (0.00)	0.04*** (0.00)
	Rural formal	-0.03*** (0.01)	-0.05*** (0.01)
	Local Unemployment	0.33*** (0.02)	0.21*** (0.02)
	Kaitz Index		-0.02 (0.01)
	<b>Firm-Level</b>	Small Firm (base)	0.00 (.)
Medium Firm		-0.09*** (0.00)	-0.12*** (0.00)
Medium-Large Firm		-0.11*** (0.00)	-0.16*** (0.00)
Large Firm		-0.12*** (0.00)	-0.16*** (0.00)
Union member		-0.06*** (0.00)	-0.08*** (0.00)
Tenure		-0.00*** (0.00)	-0.00*** (0.00)
Limited duration contract		0.12*** (0.00)	0.19*** (0.00)
Permanent contract (base)		0.00 (.)	0.00 (.)
Unspecified duration contract		0.25*** (0.00)	0.35*** (0.00)
N		24 110	24 110
r <sup>2</sup>	0.44	0.58	

Source: Own calculations using LMDS 2014.

Notes:

1. Standard Errors in parenthesis.
2. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001
3. Standard errors adjusted for clustering and sample weights.
4. **Kaitz Index** calculated for sector-province groups.
5. Excluded from specifications with wage violation in the dependent variable for reasons of endogeneity.
6. **Tenure** is the number of years an employee has worked for their current company.
7. **Firm Size**: Small Firms: less than 10 employees; Medium Firm: 10 – 19 employees; Med Lrg Firm: 20 – 49 employees; Large Firm: 50 or more employees.
8. **Local unemployment** calculated by District Council, of which there are 52 in South Africa.

The local unemployment rate reveals large, positive and highly significant coefficients. Indeed, these coefficients are some of the largest in the results. A 1 percent increase in the local unemployment rate is associated with an increase of between 0.21 and 0.33 points on the violation indices, *ceteris paribus*. This suggests that workers may be willing to accept lower wages and more limited non-wage entitlements in order to secure a job where there is an oversupply of labour.

Firm size also appears to have strong links to the level of labour law violations. Those employed by small firms are substantially more likely to face labour law violations, and the level of violation decreases as firm size rises. Working for a medium-sized firm reduces the Non-Wage index by 0.16 points on average compared to working for a small firm; and working for a large firm also reduces the Non-Wage index by 0.16 points. This is also consistent with findings by Borat et al. (2012) who suggest that small and medium-sized firms are less likely to pay the minimum wage. Larger firms, often also incorporating foreign multi-national firms, could be more likely to comply for a variety of reasons that include ability to pay, brand protection, or their likelihood of being visited by a labour inspector.

Contract type also turns out to matter for labour law violation, which makes sense since contracts are where specific terms of employment are agreed upon and set out in writing. Limited contracts and those of unspecified length are associated with having higher scores on all the indices, compared to permanent contracts. Indeed, compared to a permanent contract, on the Non-Wage index a limited contract is 0.19 points higher on average, and a contract of unspecified duration 0.35 points higher. Limited contracts are associated with 0.12 points more on the Wage & Non-Wage Index than a permanent contract, and a contract of unspecified duration is 0.25 points higher. These coefficients stand out in size compared to the rest of the coefficients in the overall output.

In summary then, we find a set of key factors that appear to substantially influence violation levels in South Africa. Specifically, firm size, the local unemployment rate, and the duration of workers' contracts appear to matter most. As expected, higher levels of unemployment in an area, smaller firms, and more limited contract duration are all associated with increased multidimensional noncompliance. Perhaps most fundamental of these is the relationship between noncompliance and unemployment. This goes to the heart of the wage-employment debate in South Africa, where the results here suggest that there are trade-offs occurring outside of the law to deal with regulatory costs. In relation to minimum wage relative to non-minimum wage violations, there does not seem to be a substantially different picture emerging with respect to the conditional effects presented here.

### 5.3. Quantile Regression

Our final empirical exercise is to run a quantile regression on the Wage & Non-Wage index and the Non-Wage index. With the multi-dimensional approach to violation comes the idea that not all violations are equally exploitative, and that violations can compound each other. The first notion is built into the indices via the weighting of the dimensions. The latter idea relates to the how the same violation can exploit workers to varying degrees depending on whether it is their only violation or their fifth violation, for example. This speaks to how violations can be more than a sum of their parts by weakening the overall capabilities of workers to protect themselves. Here, a quantile regression is of particular relevance to the concept of the MVI, and the results reported in Table 6 are striking. We report selected coefficients for workers at the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> percentile. These coefficients are also graphed across the full spectrum of the indices in Figure 6.

Table 6. Quantile Regression Output for the Spatial and Firm-Level Coefficients.

Depvar: Index [0;1]	Wage & Non-Wage			Non-Wage		
	0.25	0.5	0.75	0.25	0.5	0.75
<b>SPATIAL</b>						
<i>Urban formal (base)</i>	0.000 [.]	0.000 [.]	0.000 [.]	0 [.]	0 [.]	0 [.]
<i>Urban informal</i>	-0.002*** [0.000]	-0.003*** [0.000]	-0.025*** [0.000]	0 [0.000]	0.000*** [0.000]	-0.011*** [0.000]
<i>Tribal areas</i>	0.057*** [0.000]	0.104*** [0.000]	0.103*** [0.000]	0 [0.000]	0.022*** [0.000]	0.022*** [0.000]
<i>Rural formal</i>	-0.024*** [0.000]	-0.017*** [0.000]	-0.025*** [0.000]	0 [0.000]	-0.031*** [0.000]	-0.043*** [0.000]
<i>Local Unemployment</i>	0.178*** [0.000]	0.309*** [0.000]	0.408*** [0.000]	0 [0.000]	0.166*** [0.000]	0.268*** [0.000]
<b>FIRM-LEVEL</b>						
<i>Small Firm (base)</i>	0.000 [.]	0.000 [.]	0.000 [.]	0 [.]	0 [.]	0 [.]
<i>Medium Firm</i>	-0.050*** [0.000]	-0.093*** [0.000]	-0.112*** [0.000]	-0.167*** [0.000]	-0.119*** [0.000]	-0.125*** [0.000]
<i>Medium-Large Firm</i>	-0.060*** [0.000]	-0.110*** [0.000]	-0.142*** [0.000]	-0.167*** [0.000]	-0.158*** [0.000]	-0.1987*** [0.000]
<i>Large Firm</i>	-0.064*** [0.000]	-0.112*** [0.000]	-0.143*** [0.000]	-0.167*** [0.000]	-0.164*** [0.000]	-0.183*** [0.000]
<i>Union Member</i>	-0.021*** [0.000]	-0.054*** [0.000]	-0.073*** [0.000]	0 [0.000]	-0.058*** [0.000]	-0.130*** [0.000]
<i>Tenure</i>	-0.001*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	0 [0.000]	-0.001*** [0.000]	-0.001*** [0.000]
<i>Permanent Contract (base)</i>	0.000 [.]	0.000 [.]	0.000 [.]	0 [.]	0 [.]	0 [.]
<i>Limited Duration Contract</i>	0.133*** [0.000]	0.150*** [0.000]	0.166*** [0.000]	0.167*** [0.000]	0.277*** [0.000]	0.266*** [0.000]
<i>Unspecified Duration Contract</i>	0.269*** [0.000]	0.2981*** [0.000]	0.300*** [0.000]	0.500*** [0.000]	0.492*** [0.000]	0.388*** [0.000]
<b>N</b>	24110	24110	24110	24110	24110	24110

Source: Own calculations using LMDS 2014.

Notes:

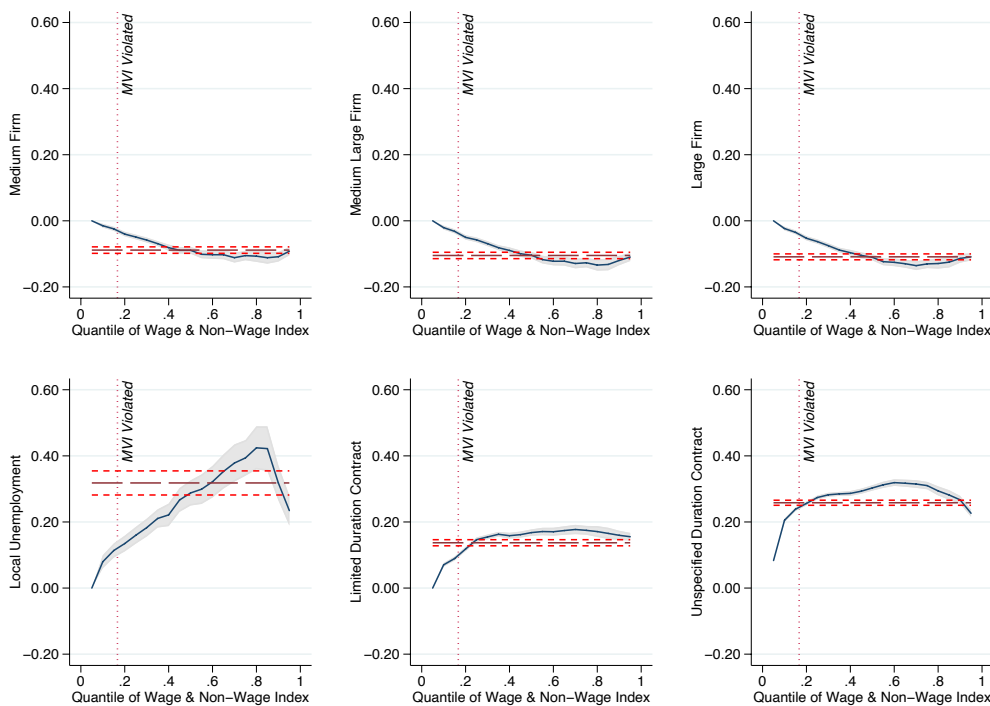
1. Standard Errors in Parenthesis.
2. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.
3. Standard errors adjusted for clustering and sample weights.
4. Kaitz Index calculated for sector-province group
5. Excluded from specifications with wage violation in the dependent variable for reasons of endogeneity.
6. Tenure is the number of years an employee has worked for their current company.
7. Firm Size: Small Firms: less than 10 employees; Medium Firm: 10 – 19 employees; Med Lrg Firm: 20 – 49 employees; Large Firm: 50 or more employees.
8. Local unemployment calculated by District Council, of which there are 52 in South Africa.



The local unemployment rate again stands out and here for the Wage & Non-Wage index in particular. For this index, workers with low scores (at the 25<sup>th</sup> percentile) experienced an increase in their violation scores of 0.178 when the local unemployment rate increased by a percentage point. Those with the highest scores in this output (in the 75<sup>th</sup> percentile) experienced a much higher increase of 0.408 points when the local unemployment rate increased by a percentage point. A salient feature of the Non-Wage index is that for those scoring at the 25<sup>th</sup> percentile, a percentage increase in the local unemployment rate has no statistical effect on their violation score. The magnitude of the coefficients for the Wage & Non-Wage index are substantially larger than those for the local unemployment rate for the Non-Wage index, suggesting that the wage is a primary channel through which the unemployment at the local level affects violation.

The size of the coefficients for firm size and contract type increase in absolute value as workers report higher levels of violation. This confirms the idea described above, that violations compound each other as opposed to simply being the sum of discrete parts. Figure 6 illustrates this point well for the Wage & Non-Wage index. In Figure 6, we report the OLS and quantile regression coefficients of selected variables for the Wage & Non-Wage index: firm size, the local unemployment rate, and contract duration. Recall that the firm size dummies are relative to a base of small firm size and the contract duration dummies relative to a base of having a permanent contract.

Figure 6. Selected Quantile and OLS Regression Coefficients for the Wage & Non-Wage Index with 95% Confidence Intervals



Source: Own calculations using LMDS 2014.

Notes:

1. Sample consists of employees of working age in sectors covered by Sectoral Determinations.
2. Base category for firm size is small firms.
3. Base category for contract duration is permanent contract.

The quantile regression coefficients vary greatly in comparison to the OLS coefficients and across the quantiles of the index. The marginal effects are the least imposing for those with low levels of violation (to the left of the dotted “MVI Violated” line). To the right of this line – where workers count as multi-dimensionally violated – coefficients become increasingly damaging. Working in a small firm is associated with the highest level of violation, therefore working in larger firms reduces the chance of violation, resulting in negative coefficients. What the firm size figures show is that for a vulnerable (highly violated) worker compared to a less vulnerable worker, a move from a small firm to a larger firm constitutes a much greater improvement in their violation level. The greatest effect by far, is that of local unemployment which varies considerably from the OLS coefficient and ranges between an almost zero effect for those with little or no violation to a marginal effect over 0.40.

## 6. Conclusion

Debates about the impact of labour regulations are often contested, but in most cases, an underlying assumption is that the regulations in question are enforced. In South Africa, and many other developing countries, this is not the case. Violations of the minimum wage, for example, are widespread, as an emerging body of literature now makes clear. But noncompliance extends beyond minimum wages to other employment regulations that are also important for workers. These include: registration for legally mandated employment insurance (such as UIF in South Africa), access to various forms of paid leave (including maternity leave and sick leave), the possession of a written employment contract, and limits to the maximum hours of work per week.

In this paper, we argue that discussions about the structure and impact of labour regulations, which are crucial, must take account of such labour violations of the labour code, and in particular should be careful to look beyond minimum wages. Using a set of measurable labour codes we show that non-wage indicators yield non-zero levels of violation that are substantial, with lack of access to maternity and paternity leave being particularly prevalent. These non-wage indicators are, in turn, positively correlated with minimum wage violation in level terms – there is a higher probability of non-wage violation if an employer is paying sub-minimum wages. Yet, firms that are not violating the minimum wage are still significantly violating non-wage labour laws.

We set up an index of minimum wage and non-minimum wage violation, for the first time, which allows us to analyse combined violations of the labour code using multiple indicators. Results show, for example, that amongst the sample of employers who violate the law, non-wage violations are more prevalent than minimum wage violations. Indeed, the highest overall incidence of violation is for the various forms of paid leave, as highlighted by a decomposition of indices. But, there is evidence of a strong relationship between components of violation, where, for example, minimum wage violation by an employer is a good indicator of other kinds violation. Using this index as the dependent variable in a multivariate regression, we find a set of useful correlates that conform to expectations. Small firms are more likely to be violating aspects of the labour code compared to larger firms, while union members and workers with a permanent contract face much lower rates of wage and non-wage violation. Of particular interest is the district level unemployment rate, which produces the some of the largest coefficients. Here we find that districts with higher levels of unemployment also have far higher levels of violation. This finding takes us into the heart of the debate going forward around South Africa’s search for jobs, where the wage-employment trade-off seems in part to be working through the medium of violation of wage and

non-wage conditions of employment. Quantile regression results underscore the multi-dimensionality of violation: as violations stack up on an individual, the effects are compounded, so that those at the upper end of the violation spectrum are considerably more vulnerable than those at the bottom end.

One of the limitations of this paper is that the application of the MVI is bounded in time and case – we only apply the index to one country for a single year. We therefore do not carry out any analyses investigating whether the MVI is able to predict non-wage violations across time in South Africa, or what multi-dimensional labour law violation looks like in other countries. These are exciting prospects for future application of the index.

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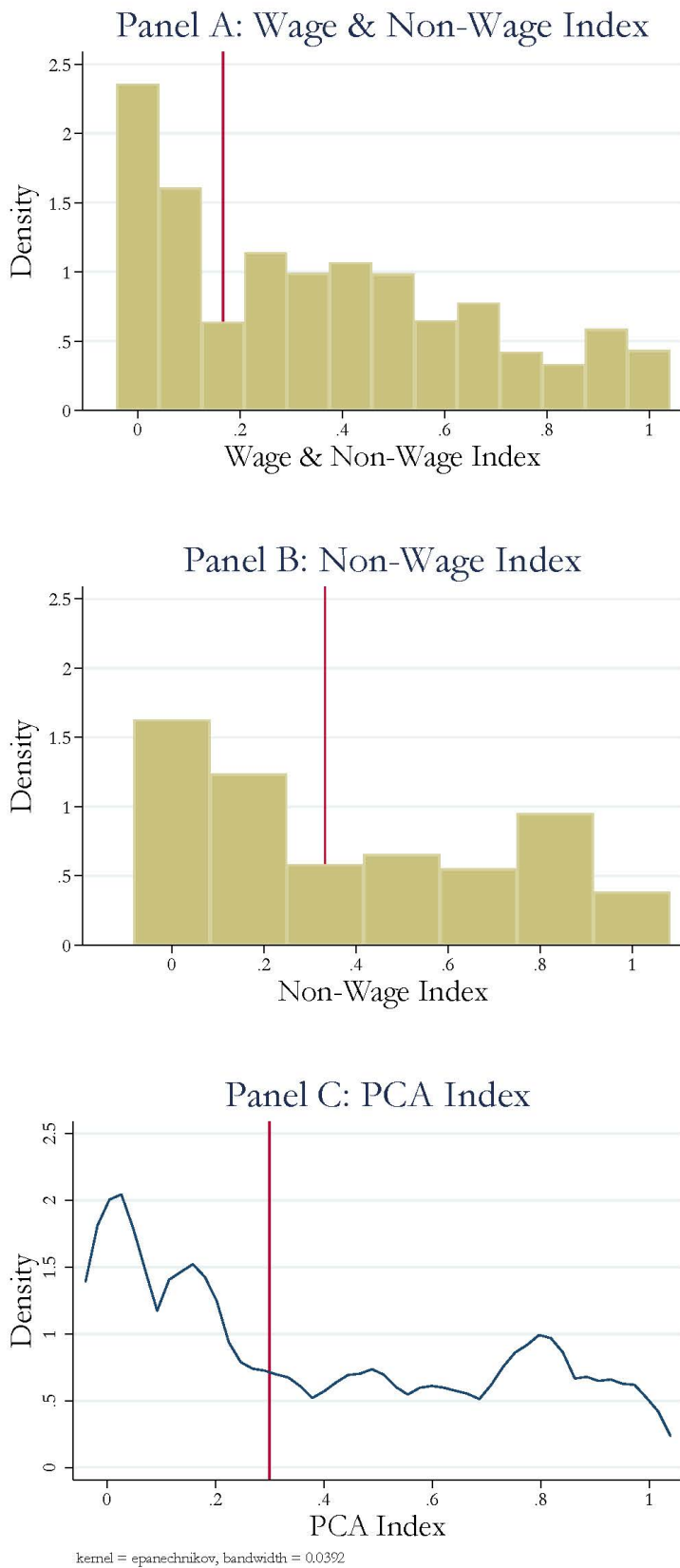
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## Appendix 1

The PCA index includes all the same elements as the Wage & Non-Wage index and we set  $k = (1/3)$ , following Alkire and Foster (2011). Note that Figure A1 plots the density and not the fraction on the Y-axis, like that reported in the text in Figure 3. This is because the fractions were more useful to discuss in the text, but the density graph is more appropriate for the continuous nature of the PCA index making it more useful choice for our comparative purposes here.

Figure A1: Comparing the Densities of Explicitly Compared to Implicitly Weighted Indices



Source: Own calculations using LMDS 2014.



## Appendix 2

*Table A1: Sensitivity of Output to Changes in the Cut-off for being Multi-Dimensionally Violated (k)*

Indicator	Wage & Non-Wage			Non-Wage		
	1/12	1/3	1/2	1/6	1/3	1/2
<b>k</b>						
<b>H</b>	0.604	0.506	0.252	0.523	0.523	0.313
<b>A</b>	0.535	0.590	0.766	0.661	0.661	0.821
<b>MVI</b>	0.323	0.298	0.193	0.346	0.346	0.257

*Source: Own calculations using LMDS 2014.*

## Endnotes

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<sup>1</sup> The full time criteria captures most of the employed: 93 percent of the employed work full time, and 90 percent of workers covered by a minimum wage work full time.

<sup>2</sup> For sectors where there are multiple minimum wages we simply select the lowest wage as the applicable minimum.

<sup>3</sup> Since the weighting of dimensions is subjective, we also generate an index using principal component analysis and report the results in Figure A1 Appendix 1. These results show that the principal component analysis index yields very similar results to the indices we have constructed with explicit weights.

<sup>4</sup> We supply Table A1 in Appendix 2 that reports how the statistics H, A, and MVI change when  $k$  takes on different values.

<sup>5</sup> The Kaitz Ratio is excluded from specifications with the minimum wage as the dependent variable.



Development Policy Research Unit  
University of Cape Town  
Private Bag, Rondebosch 7701  
Cape Town, South Africa  
Tel: +27 21 650 5701  
[www.dpru.uct.ac.za](http://www.dpru.uct.ac.za)