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MINIMUM WAGES IN SUB-SAHARAN AFRICA: A PRIMER

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Abstract

Although the sectors and fraction of workers covered are small given the low rates of formality and urbanization in Sub-Saharan Africa (SSA), as the number of covered workers grows wage regulation will become increasingly significant. We find that higher minimum wage values are associated with higher GDP per capita. Importantly, however, we find that the minimum wage relative to the mean wage is higher in low income countries than in lower- and upper-middle income countries. Indeed, SSA as a whole reflects a bias towards a more aggressive minimum wage policy compared to the rest of the world. There is limited research on the employment effect of minimum wages in SSA, but the few findings are consistent with the broad summary of global research. By and large, introducing and raising the minimum wage has a small negative impact or no measurable negative impact. However, there is significant variation around this average finding – the employment elasticities are not constant nor linear. Where increases in a minimum wage are large and immediate, this can result in employment losses, but more modest increases usually have very little observably adverse effects and may have positive impacts on wages. The great variability in findings on employment could be due partly to the great variation in the detail of the minimum wage regimes and schedules country by country, but also by the variations in compliance. We find that higher Kaitz indices are associated with higher levels of non-compliance. The release of country-level earnings and employment data at regular intervals lies at the heart of a future country-focused minimum wage research agenda for Africa.

Keywords: Minimum Wages, Sub-Saharan Africa (SSA), employment elasticities, compliance

JEL codes: J01, J08, J20, J23, J38

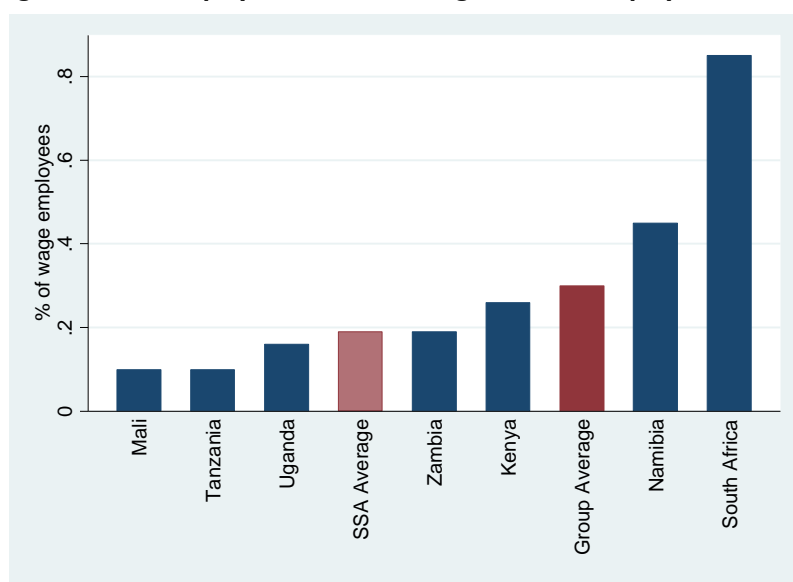
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Introduction

Legislated minimum wages apply to many millions of workers around the world. Over the latter half of the 20th century, almost all countries in Sub-Saharan Africa (SSA) introduced some form of minimum wage legislation. In many cases these laws apply to workers in specific industries or occupations and in instances where wage levels are not set by the state, collectively bargained agreements may fix wages for specific sectors or occupations. Broadly, however, the introduction of national laws governing wages is part of an observed regulatory revival in low- and middle-income countries, where a range of labour regulations aimed at protecting low-paid workers have gradually been introduced (Piore and Schrank, 2010). As will be documented in the paper, there has been widespread adoption of minimum wage legislation as a policy tool in SSA. And yet, there has been little work on the nature, scope and impact of such laws in Africa.

A key distinction must be made between the usually small formal, wage-earning sector and usually large informal, non-wage-earning sector in most African countries.¹ This has implications for minimum wage policy and research. It is well known that in the overwhelming majority of SSA economies, subsistence agriculture and, more recently, urban informal employment dominate the labour market. In many such countries wage-earning employees only make up a small portion of the labour force. As figure 1, below, indicates for a selection of SSA countries, it is only South Africa where formal salaried employees constitute the majority of the labour force. In the six other countries represented, salaried employees account for less than half of the labour force, whilst the regional average is close to 20 percent.

Figure 1: Paid Employees as a Percentage of Total Employment



Sources: South Africa, Labour Market Dynamics Study (2013); Kenya, Kenya Integrated Household Budget Survey (2005/06); Uganda, Uganda National Panel Survey (2012); Mali, Rani et al. (2013); Zambia, Living Conditions Monitoring Survey (2010); Tanzania, Integrated Labour Force Survey (2005/06); Namibia, Labour Force Survey (2012); Bhorat, Naidoo & Pillay (2015).

Minimum wages only apply to wage-earning employees, and in some cases only to formal sector wage earners. Wage regulations thus cover only a minority of the total workforce in most SSA economies. This may go some way to explaining the dearth of existing research. However, (i) as the urban and formal sector grows the experience of wage regulation in the currently covered areas will become significant, (ii) there can be spill over or “lighthouse” effects on uncovered sectors, and (iii) as we shall

see, minimum wage policy is particularly aggressive in the covered sectors in Sub-Saharan Africa. For these reasons we believe that an empirical overview of minimum wages in the region is important for the current policy and analytical discourse.

It is a stylized fact that a large gap exists between *de jure* and *de facto* labour regulation in most Low and Middle-Income (LMI) countries globally. Simply put, the levels of non-compliance with minimum wage laws are high. This has been shown in several studies (Bhorat et al. (2012), Rani et al. (2013); Almeida and Ronconi, 2012) and is supported by the evidence presented in this paper. While it could be argued that high levels of non-compliance make wage regulation irrelevant, the reasons for high levels of non-compliance are not yet adequately understood. A study of the enforcement of minimum wages is of interest in its own right, but can also contribute to a broader research agenda on rule of law questions.

There is a paucity of available household survey data for many SSA countries, and particularly the absence of reliable information on earnings. This makes rigorous study on the impact of minimum wages difficult, particularly because any attempts to measure minimum wage impacts require pre- and post-intervention data and this is almost always absent for SSA. The problem is brought into sharp relief when analysing the most extensive and centralised body of information on global minimum wages – the International Labour Organisation’s (ILO) TRAVAIL database and the ILO global wage database. While these databases contain detailed information on minimum wage frameworks, the method of setting wages in each of the ILO’s member states, and data on enforcement practices for almost every country, there is limited information on wages, coverage, or levels of compliance in Africa. This is because for many countries in the region, reliable data on wages either do not exist or are not accessible.

It is thus the purpose of this piece to provide a basic overview of minimum wage regimes in SSA where data are available, as well as some more detailed work for several countries using household survey data. We begin by providing a brief literature review of more recent minimum wage work, and build on Neumark and Wascher’s meta-review to provide an updated overview of the empirical wage-employment trade-off estimates, focused on LMI countries. We document the level of minimum wages in the region, and present simple Kaitz ratios and use this to make comparisons with wage levels and ratios elsewhere in the world. We then proceed to examine compliance levels in seven SSA countries using household survey data, and again compare the outcomes to estimates for a selection of non-SSA LMI countries. We end by reflecting on possible early lessons for wage-setting regimes in the region, and the research agenda to inform the policy makers on key trade-offs in minimum wage setting.

The Developing Country Literature: A Brief Overview

In most SSA countries minimum wage laws are used as a policy tool to achieve a number of objectives, and while there are large cross-country differences, the legislation reveals considerable overlap. The stated objectives usually focus on protecting vulnerable workers from extreme levels of low pay, addressing poverty by redistributing income from employers to low-wage employees, and encouraging labour productivity. It is well known that there are risks associated with instituting wage floors and in most cases country-level legislation recognises the possible trade-offs. The costs can include increased unemployment in certain settings, adjusted hours of work that disadvantage workers, and the movement of workers from formal to informal employment – where livelihoods are often more precarious. Rising wages as a result of minimum wage policy, while having positive effects through driving demand, may also have some impact on the cost of living in the medium term if firms’ cross-

price elasticity response to higher labour costs is to raise output prices. Beyond the various costs and benefits, which are the focus of a well-established body of literature for developed countries, the attendant issues of enforcement and compliance are central to any discussion of minimum wages in SSA. Indeed it is arguable that most of the impact of a minimum wage policy is contingent on enforcement and compliance in LMI country settings. We proceed to briefly analyse the minimum wage literature here.

The empirical work on minimum wages constitutes a large field that is now well known, with several recent books and papers dedicated to reviewing the main findings of this literature.² Studies in the United States were the first to suggest that the textbook wage-employment trade-offs do not always hold in practice; that an increase in the minimum wage will not always perfectly predict a decrease in employment.³ In addition to the potential employment effects, minimum wage laws have been shown to induce adjustments in hours of work and non-wage benefits, as well as having possible 'non-standard effects' such as influencing educational decisions and reservation wages.⁴ The limited but fast-growing body of work focused on LMI countries has emphasized that the impact of introducing, or increasing, a minimum wage can have mixed impacts that are often crucially contingent on a variety of factors, including the level at which the minimum wage is set, broader economic conditions, the nature of the minimum wage intervention, political economy factors, the enforcement regime, and so on. Studies provide evidence of negative employment effects in some cases, but also evidence of no employment declines in others, with a range of adjustments observed for hours of work, wages, and non-wage benefits.

In Neumark and Wascher's (2007) meta-review they include 15 studies focused on eight developing countries over the period 1992 to 2006 (Brazil, Chile, Colombia, Costa Rica, Indonesia, Mexico, Puerto Rico, and Trinidad and Tobago). The authors caution that studying minimum wage effects in developing countries⁵ is complicated, partly due to issues we have already mentioned above, that relate to data availability and quality, but also because the results are often not easily generalizable across countries or sectors. The majority of findings reviewed by the authors reveal either no effects or small negative employment effects of minimum wages in LMI country settings. In Brazil, for example, dis-employment effects and reduced work hours are seen to be minor or non-existent overall, but more pronounced for individuals with low-skills and lower wages (Fajnzylber, 2001; Lemos, 2004, 2006, 2007; and Neumark, Cunningham & Siga, 2006). In Chile, increases in the minimum wage had negative employment effects for youth and unskilled workers, but led to an increase in the employment of women (Montenegro & Pagés, 2004). In Colombia dis-employment effects found and these are higher for low-skilled workers (Bell, 1997; Maloney & Nuñez Mendez, 2004). In Costa Rica, increases in minimum wages also decreased employment and reduced hours worked by employees in covered sectors, especially those in the lower half of the skill distribution (Gindling & Terrell, 2004 and 2007). Similar results are found in Indonesia, and Trinidad & Tobago (Alatas & Cameron, 2003; Rama, 2001; Suryahadi, Widyanti, Perwira, & Sumarto, 2003; Harrison & Stillman, 2005; Comola & De Mello, 2011, Strobl & Walsh, 2003).

In the years following the publication of Neumark and Wascher's (2007) review paper a growing body of research focuses on minimum wage effects in LMI countries. In East Asia a number of papers provide new evidence on minimum wage impacts for Thailand (Del Carpio, Messina and Sanz-de-Galdeano, 2014), Vietnam (Del Carpio and Liang, 2013; Nguyen, 2010), The Phillipines (Lanzona, 2012; Del Carpio, Margolis and Okamura, 2013), and Indonesia (Magruder, 2013; Comola and De Mello 2011; Harrison and Scorse, 2010). In China, Wang and Gunderson (2011) and Fang and Lin (2013) provide some of the first estimates of minimum wage effects, while in Latin America several new papers build

on existing work and provide new results (Ham, 2013; Gindling, 2013, 2014; Khamis, 2013). The literature on SSA, however, remains rather limited with published work existing only for four countries, namely Ghana (Jones, 1997), Kenya (Andalon and Pages, 2008), Malawi (Livingstone, 1995) and South Africa (Hertz, 2005; Dinkelman and Ranchhod, 2013; Borat et al., 2013, 2014; Borat et al., 2014; Natrass and Seekings, 2014). The most comprehensive literature in the SSA region exists for South Africa and shows that while the introduction of minimum wages had a negative impact on employment in Agriculture, and to some extent in the Clothing sector, but in all other covered sectors no employment decreases were evident (Dinkelman and Ranchhod, 2013; Borat et al., 2013, Natrass, 2014).

In Figure 2a and 2b, below, we construct a graph of employment elasticities estimated in the minimum wage literature to date. This includes the 98 papers reviewed in Neumark and Wascher's (2007) work and 17 more recent studies focused on LMI countries not included in Neumark and Wascher (2007). The results report aggregate impacts for all workers, but also include the employment impacts for specific demographic groups, geographic locations, and sectors. Put differently, where a study produced elasticity estimates for more than one cohort of workers, we include each estimate separately. Unlike in the Neumark and Wascher (2007) review, we have only included those estimates that were statistically significant, and it is worth noting that 55 percent of reported elasticity estimates reviewed were not statistically significant.

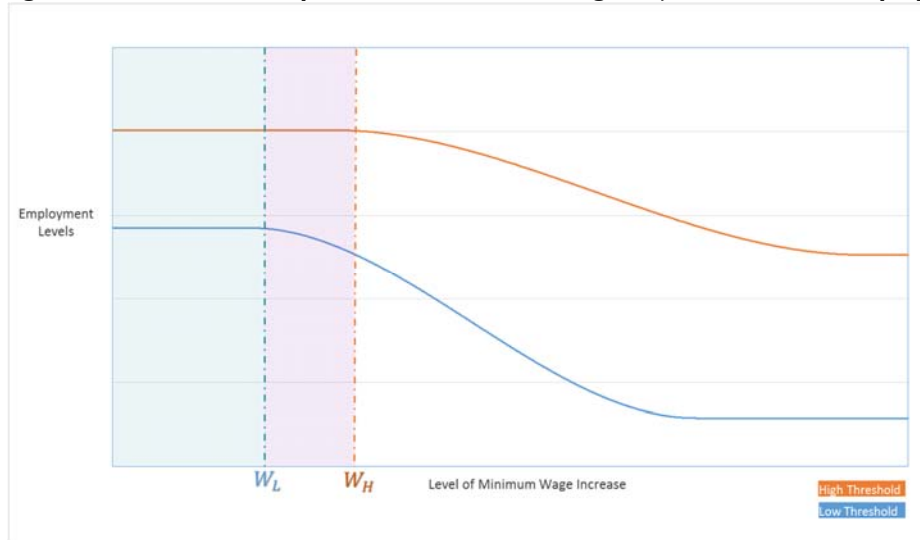
In figure 2a the median elasticity is -0.08, represented by the upper dotted line on the figure, while the mean is -0.11, shown as the lower dotted line. In figure 2b the averages are slightly higher and the upper dotted line represents a median elasticity of -0.225, while the mean for UI countries is 0.37, shown as the lower dotted line. Overall estimated employment elasticities range from 2.17 (Katz & Kreuger, 1992) to -4.6 (Abowd, Kramarz, & Margolis, 1999) in both samples. The mean and median elasticities suggest that on average, the impacts of a minimum wage hike in the countries under review have been marginally negative. It is important to note that the values of these coefficients on average, are very small. This would suggest that in general, the minimum wage will have benign employment effects. In total then, our analytical overview here suggests that from the sample of 59 developed and 32 developing country estimates, 81 percent of the elasticities were negative, while 19 percent were greater than zero.

These figures underscore the fact that there is a considerable range of potential impacts of minimum wages on employment, but that in most cases these impacts are very small. The overall heterogeneity of outcomes, in LMI countries in particular, suggests that there are, as noted above, a variety of context-specific factors which also interact with the minimum wage, to ensure ultimately that on average, we are likely to have small and negative disemployment effects. In most cases however, particularly at the country level, the question of impact is one which requires careful empirical investigation.

The available empirical evidence for LMI countries suggests that in most cases introducing and raising the minimum wage has a small negative impact or no measurable negative impact at all, with the exception of a few cases such as the agricultural sector in South Africa (Bhorat et al., 2014). These estimated impacts, however, depend on a range of factors which could include: the level of the minimum wage relative to average wages, the size of the minimum wage increase, the sector under consideration (for example whether it is a tradable or non-tradable sector), the timing of wage changes, the change post-law in the level of worker productivity, the enforcement regime, and the extent of compliance. While past increases in minimum wages have generally not negatively affected employment, it is not the case that such positive outcomes will persist regardless of the level to which a minimum wages is raised. There is a level beyond which a minimum wage will begin to negatively affect employment, and this level may differ across geographic regions, sectors, and firms.

Figure 3, below, visually represents this idea in a very basic theoretical construct, by presenting two different impact scenarios. Each of the two lines can be considered to be labour demand functions representing the employment response to increases in the minimum wage. Here, we present the level of employment on the y-axis and the level of a minimum wage increase on the x-axis. It is clear that in the case of the red line, the minimum wage can be raised to W_H (the high wage threshold) without any impact on employment. Beyond W_H , however, any increase in the hypothetical minimum wage will begin to result in job losses, stipulated here by a decline in employment levels. In the second case, the broad relationship between the minimum wage and employment stays the same, but crucially employment is more sensitive to changes in the minimum wage, and the blue line shows that wages can only be raised to W_L (the low wage threshold) before they begin to impact negatively on employment.

Figure 3: The Relationship between Minimum Wage Adjustments And Employment



We could interpret the upper red line for example, as representing a non-tradable sector which may be able to absorb wage increases more robustly, while the lower blue would represent a sector more sensitive to changes in input costs, and perhaps with a greater degree of capital/labour replacement possibilities. These elements, together with the list of abovementioned factors that influence wage-employment trade-offs, would all play a role in determining where the wage threshold lies for a given set of firms, workers, or sectors.

The functions above also provide a key insight into estimated wage-employment elasticities: Namely that they are not constant nor linear. Put differently, if a 50 percent increase in the minimum wage results in a 10 percent drop in employment (where the wage-employment elasticity is thus -0.2) it is not the case that a 100 percent increase will result in a 20 percent drop in employment – the elasticity will not remain at -0.2. The literature suggests that where increases in a minimum wage are large and immediate this can result in employment losses, especially for unskilled workers, but that more modest increases usually have very little observably adverse effects and may have large positive impacts on wages. The wage impacts appear to hold even in situations of weak enforcement (Bhorat et al., forthcoming).

Minimum Wages in Sub-Saharan Africa

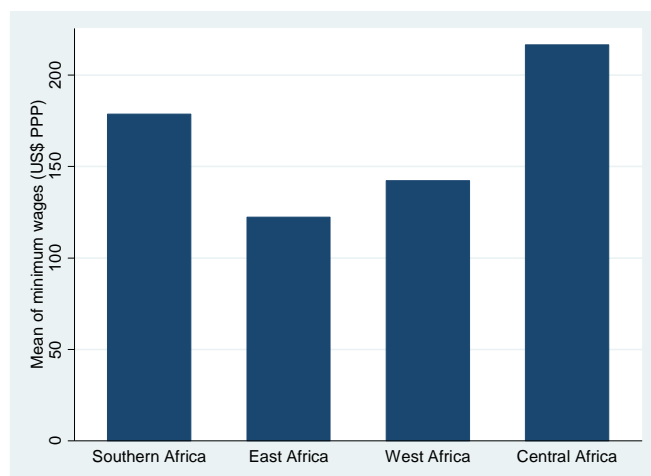
Minimum wage systems in SSA, as elsewhere in the world, can be helpfully classified into three broad categories: National, Sectoral (Occupational), and Hybrid (some combination of the two). Needless to say, a national minimum wage system is a single wage rate that applies to all workers; a sectoral system is one in which there are separated determinations for workers in particular sectors and/or occupations; and a combination or hybrid system can exist when the body that decides on minimum wage levels also decides to whom the wage applies and when this should change. Table A1 groups selected African countries into these three categories. The table serves to show the variety of systems that exist in the region. In a report by the ILO (2013), all the minimum wage frameworks on the continent are categorised in a similar manner, revealing that a majority of countries in Africa have adopted some form of sectoral or occupational minimum wage structure with multiple wage rates rather than a single national minimum wage – approximately 30 percent versus 61 percent, respectively. Indeed the African average of multiple minimum wage systems is higher than any of the other world

regions.⁶ A comprehensive account of wage-setting systems around the world can be found in Eyraud and Saget (2005).

Beyond the diverse regulatory frameworks across legislated minimum wages, the level at which the wage is set also varies substantially, both by geographical region and by the income group that a country falls into. We show this in two ways. First, we group countries in SSA into Southern, Eastern, Central and Western blocks, and plot average wage levels across these regions. Secondly, we group SSA countries into Low-income (LI), Lower-middle-income (LMI), and Upper-middle-income (UMI) categories. In this second instance, we compare 37 SSA countries in these three groups to a comparable set of 67 non-SSA countries.

Figure 4, below, presents the regional comparison of average monthly minimum wage levels in SSA. The data show significant regional variation where minimum wages in Central African countries (the highest average wage level), such as the Congo, Gabon, Chad and Cameroon, are set relatively high compared to wage levels in East African countries (the lowest average wage level) such as Kenya, Ethiopia, Burundi and Tanzania.

Figure 4: Monthly Minimum Wage Levels, By African Sub-Region (US\$ PPP)

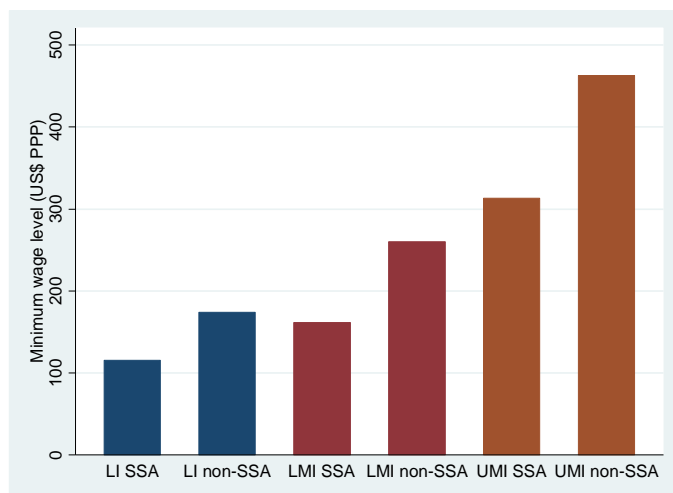


Sources: ILO global wage database, World Bank WDI

Note: Sample based on 35 economies, where the latest available data for each country was utilised.

However, there are of course a variety of underlying factors that may be driving the observed differences. One such driver may be a country's level aggregate income. Whilst we are interested in how minimum wage levels differ by country income across SSA, it would be important to determine how these levels compare with non-SSA countries in the same income group. Figure 5, below, presents average minimum wage levels by income group, for both SSA and non-SSA countries.

Figure 5: Monthly Minimum Wage Levels By Country Income Group, SSA & Non-SSA Countries (US\$ PPP)



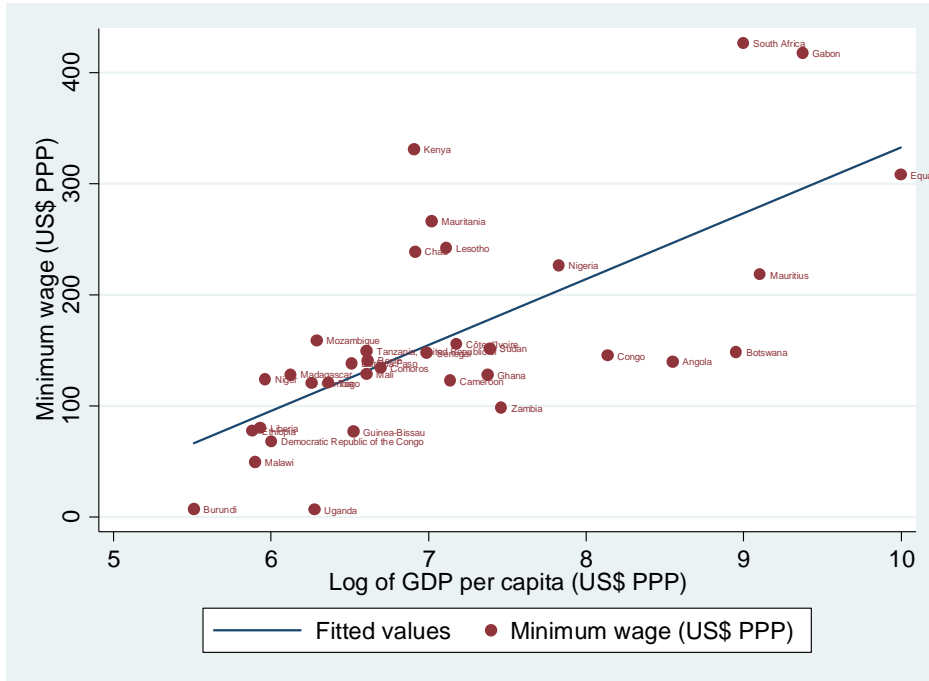
Sources: ILO global wage database, World Bank WDI

Notes: LI-Low Income, LMI-Lower Middle Income, UMI-Upper Middle Income

The figure reveals substantial differences both across the three country income groups within SSA, and within each income group compared to non-SSA countries. As expected, minimum wage levels are positively correlated with GNI per capita levels. In particular for LICs in Africa with a GNI per capita of US\$ 1,045 and below, mean minimum wages stood at \$119. This increases by 19 percent to \$142 for lower middle income economies, and then further by 218 percent to \$366 for upper middle income African economies. Hence higher income economies, report higher average minimum wage levels in US dollar PPP terms. This relationship is explored in further detail below. In addition though, our results suggest that minimum wage levels in SSA are, on average, lower than elsewhere in the world for countries in the same income group. However, it must be noted that in the LI group, our sample of non-SSA countries is limited to four economies, while in the UMI group, our sample of SSA countries is limited to five countries. In the LMI category, the difference in minimum wage levels is large and significant at the 5 percent level.

In order to advance this notion of the potential relationship between country income levels and minimum wage levels, we produce two more figures (6a and 6b), below. The figures plot levels of GDP per capita against the level of minimum wages, for the same group of SSA and non-SSA countries used above.

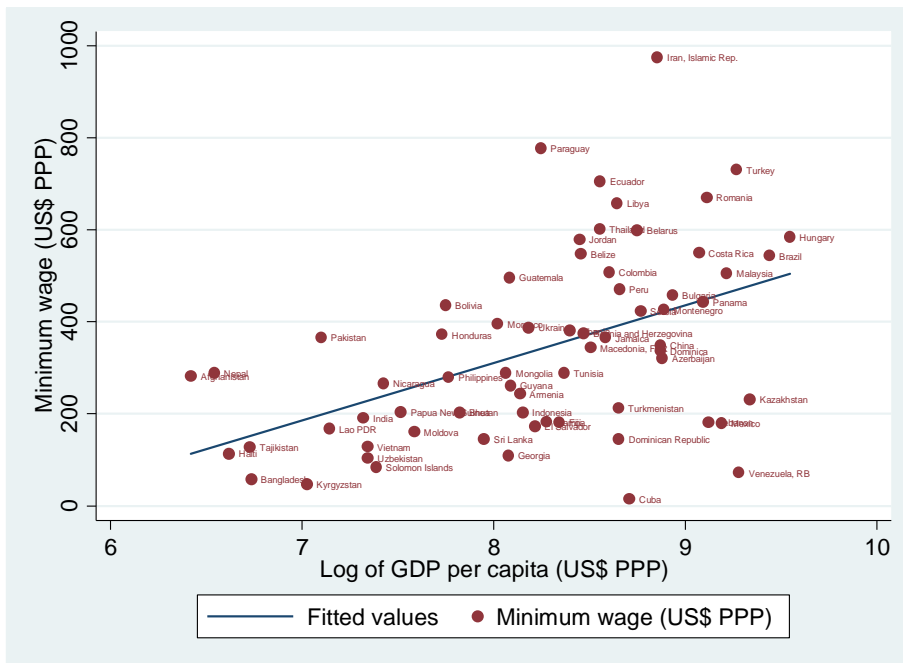
Figure 6a: Monthly Minimum Wages and GDP Per Capita (US\$ PPP),Africa



Sources: ILO global wage database, World Bank WDI

Note: Sample based on 37 African economies, where the latest available data for each country was utilised.

Figure 6b: Minimum Wages and GDP per capita (US\$ PPP), Non-SSA Developing Countries



Sources: ILO global wage database, World Bank WDI

Note: Sample based on 67 non-SSA developing economies, where the latest available data for each country was utilised.

We find a relationship between GDP and the level of the minimum wage that is not dissimilar to what has been found for the relation between the poverty line and levels of consumption by Ravallion et al. (2009). The latter of course have noted that based on cross-country evidence, the value of the national poverty line rises as average consumption levels rise across economies. Levels of economic

development are thus positively related to the country-based poverty line. This relationship appears to hold for minimum wage levels. As we illustrate then for both a sample of African economies, and non-African developing countries, minimum wage levels are adjusted upwards along with the increases in GDP per capita.

Specifically, in Figure 6a, the coefficient for the underlying relationship between the log of GDP per capita and the minimum wage level in SSA is 59.42 (where the level of the minimum wage is on the y-axis). This relationship is similar but larger for the 67 non-SSA countries, presented in figure 6b, below, where the coefficient is 125.14. This suggests that across countries minimum wage levels in non-SSA countries are not only higher relative to levels of GDP compared to minimum wage levels in SSA countries, but also more responsive to increases in GDP relative to SSA countries.

In attempting to disaggregate minimum wage trends within SSA in greater detail, Table I below presents country-level data for 21 SSA countries. We focus on the average level of the minimum wage, the mean wage, and the Kaitz ratio (minimum-to-mean wage). The latter measure – the Kaitz ratio – gives an indication of how high the minimum wage is set relative to average wages.⁷ Table I reports the most recently available minimum wage rates, grouped according to country incomes. We convert all the data into current US\$ (PPP) for the sake of comparison. The first column of minimum wage rates again makes it clear that despite substantial variation across individual economies, there is a clear trend showing that minimum wage levels co-vary positively with country income group. The group mean and median for UMI countries is thus more than double those of LI countries. For example then, UMI economies such as Algeria, Gabon and South Africa, have legislated average minimum wage levels in excess of \$400 per month. Low income countries on the other hand, have promulgated minimum wage levels at \$6 and \$7 per month (Uganda and Burundi).⁸ The country GDP and minimum wage correlation though, it must be emphasised, is an average effect. In economies such as Chad and Kenya, both low income countries, the minimum wage is 45 and 62 percent respectively, of the minimum wage in Algeria – the highest in the sample.

Table I: Monthly Minimum Wage Estimates: Sub-Saharan Africa

Country	Minimum wage (US\$ PPP)	Mean wage (US\$ PPP)	Kaitz Ratio
Low-income economies			
Burkina Faso	138	210	0.66
Burundi	7	256	0.03
Chad	239	371	0.64
Congo, Dem. Rep	68	53	1.27
Ethiopia	77	175	0.44
Kenya	331	979	0.34
Madagascar	128	183	0.7
Malawi	49	368	0.13
Tanzania	149	624	0.24
Uganda	6	464	0.01
<i>Group mean</i>	<i>119</i>	<i>368</i>	<i>0.45</i>
<i>Group median</i>	<i>103</i>	<i>312</i>	<i>0.39</i>
Lower-middle-income economies			
Congo, Rep.	145	526	0.28
Ghana	128	469	0.27
Lesotho	242	377	0.64
Senegal	148	983	0.15
Swaziland	94	815	0.12
Zambia	98	252	0.39
<i>Group mean</i>	<i>142</i>	<i>570</i>	<i>0.31</i>
<i>Group median</i>	<i>136</i>	<i>497</i>	<i>0.28</i>
Upper-middle-income economies			
Algeria	531	1003	0.53
Botswana	148	1287	0.12
Gabon	418	2356	0.18
Mauritius	218	1424	0.15
South Africa	517	1251	0.41
<i>Group mean</i>	<i>366</i>	<i>1464</i>	<i>0.28</i>
<i>Group median</i>	<i>418</i>	<i>1287</i>	<i>0.18</i>
Total mean	184	657	0.58
Total median	146	467	0.31

Sources: ILO Global Wage database, World Bank WDI

Note: Sample based on 21 economies, where the latest available data for each country was utilised. Wages are monthly and shown in current US\$ PPP.

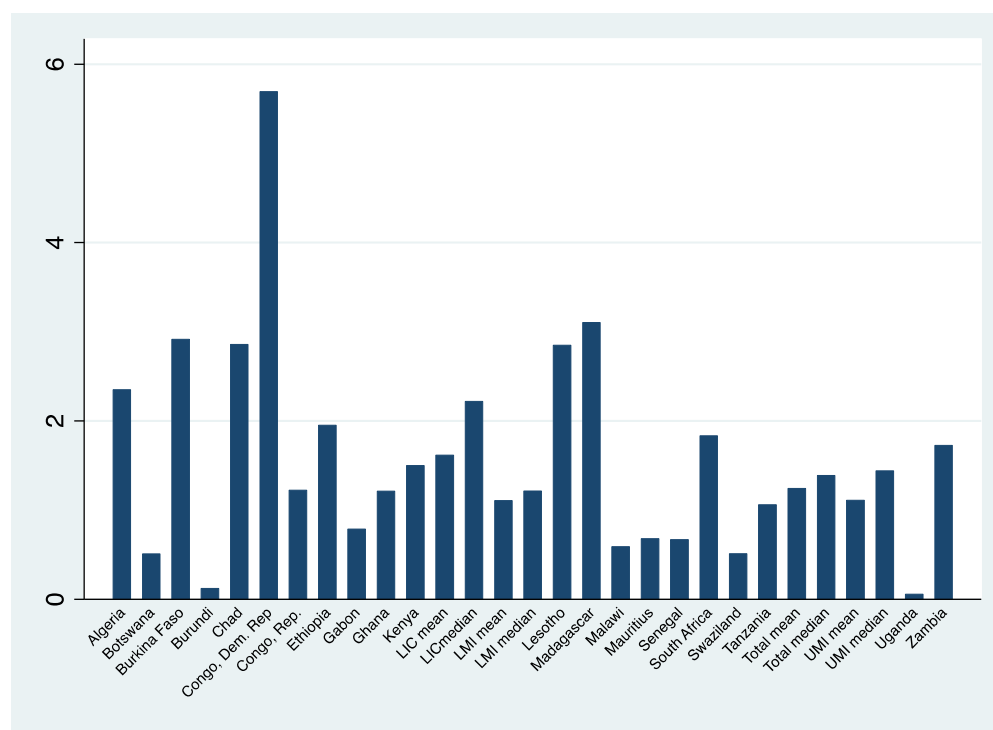
The mean wage figures in column two again reveal the important cross country differences, even within the country groups. Hence, we see as expected, a variance in the mean wages by country – which is broadly consistent with the GNI per capita of the country under scrutiny. There remains within this data however, an interesting manner in which to measure the tendency of an economy, in a comparative sense, toward setting a higher minimum wage relative to other economies. One can think of this notion in the following manner: If the ratio of the minimum wage in country *i* to the highest minimum wage country, country *max*, is higher than the ratio of the mean wage in country *i* to the

highest mean wage country, country *max* – then this would reflect a relatively pro minimum wage policy environment, relative to other countries. Simply put we are measuring:

$$Wp = \left[\frac{\frac{W_i^m}{W_{max}^m}}{\frac{W_i^\mu}{W_{max}^\mu}} \right]$$

where if W_p is >1 it reflects a relatively pro minimum wage policy environment compared to other economies, whereas for $W_p < 1$, we suggest a minimum wage policy environment which is relatively benign. An example from the data: Chad's minimum wage mean is 45 percent of the region's maximum minimum wage. Yet, its mean wage nationally, is only 16 percent of the region's maximum mean wage. This suggests a relatively aggressive minimum wage policy in Chad, when compared with its mean regional wage differential. Put differently, Chad's W_p value is 2.85. In the diagram below then, we provide estimates of W_p for our sample of African economies. The variance in the degree to which economies across the continent are either aggressive or benign minimum wage setters, is notable.

Figure 7: Degree of Relative Minimum Wage Policy Bias, By Country



Sources: ILO Global Wage database, World Bank WDI

- Notes: 1. Sample based on 21 economies, where the latest available data for each country was utilised.
 2. Mozambique is excluded from our sample here.

The data suggest on average that in Africa, there is a tendency toward a more aggressive minimum wage policy, as W_p is on average 1.6, whilst it stands at 1.2 at the median. Put differently, the ratio of minimum wages in Africa to the maximum minimum wage on the continent, is greater than the similar ratio in relation to mean wages. Most notably, the LIC mean and median values are higher for both

the LMI and UMI sample of countries. This would suggest that despite absolute minimum wage levels increasing with GNI per capita, low income African economies are relatively more aggressive in their minimum wage policy setting, when compared with their mean relative wages on the continent.

Reverting back to Table 1, we provide the more common measure in column three of the in-country measure of the extent to which the minimum wage has ‘bite’ – namely the Kaitz ratio. The ratio is simply that of the minimum wage to the mean wage.

The Kaitz ratio values range of 0.01 in Uganda to a value over 5 in Mozambique. The African mean is instructive and of use in and of itself: Hence for the African region, minimum wages are 58 percent of mean wages and 31 percent of the median wage. This ratio though, varies by income classification. Hence, whilst the Kaitz is 0.28 at the mean for UMI African economies, it is 0.31 for LMI economies, and 0.87 for LICs. Hence, we observe substantially higher ratios for LI countries, where the group median is 0.16 points above the median for LMI countries in the region, and 0.26 points above the UMI median. Importantly, this result holds, at lower ratios though, even when Mozambique is excluded. Simply put – low income African countries are setting higher minimum wages relative to their domestic mean wages, compared with both UMI and LMI economies in the region.

Ultimately then, the cross-country evidence on minimum wages in Sub-Saharan Africa indicates firstly, that given the heterogeneous nature of minimum wage regimes adopted by African economies, East African economies, on average, set the lowest minimum wages, whilst Central African economies have the highest mean minimum wage levels. Secondly, minimum wage levels in Sub-Saharan Africa are in general lower than those in the rest of the developing world, when controlling for income level. Thirdly, the evidence illustrates a positive and linear relationship between GDP per capita and the level at which the minimum wage is set. Consistent with the positive country poverty line – GDP relationship, and in keeping with other developing countries then – African economies reveal an upward adjustment in the value of the minimum wage as the economies in the region grow and develop. Fourthly, when assessing the extent to which African governments may be more aggressive in setting minimum wages, our cross-country evidence indicates that there is a tendency towards aggressive minimum wage policy in Africa, with this being driven by low income economies. Finally, it is clear again, that when examining the Kaitz index, whilst African economies overall are setting minimum wages at just over half the mean wage, higher ratios are existent for low income countries on the continent.

Variations in African Minimum Wage Schedules: A Country-Level Overview

For the purposes of a cross-country and regional comparison, the above estimates have essentially aggregated across the different minimum wage schedules which may indeed exist within the respective economies. There is, however, much granularity and nuance which can and will be overlooked when presenting average minimum wage estimates by country. We return here then to a more detailed consideration of minimum wage schedules in Africa, focusing on seven economies, for which we have appropriate micro-data.

We have alluded to fact that many minimum wage systems in the region include a range of sectoral and occupational schedules, and it is these complex schedules that make a single figure appear blunt, as it masks substantial heterogeneity at a country level. As an example, the case of Kenya's minimum wage regime is instructive in terms of the potential complexity in minimum wage setting processes in Africa: Kenya has had an active minimum wage policy since it achieved independence in 1964. Minimum wages are set by Ministerial order following recommendations by a tripartite council and public

consultation (ILO, 2014). The wage schedule that is produced is complex. Wages are set at different rates for agricultural and non-agricultural occupations, and within these categories there are geographical and occupational distinctions, each with a unique set of wages. Table A1 presents daily minimum wage rates for the agricultural sector, which is broken down into 10 categories according to the specific type of employee.⁹ Within the agricultural sector then, daily wages can range from 203 Kenyan Shillings for a general worker to 370 Kenyan Shillings for a lorry or car driver. Table A2 details monthly minimum wages for the non-agricultural sector, which is firstly disaggregated by geographic region into three categories: cities, municipalities and town councils, and other areas. Within each of these three geographical areas, then, wages are further delineated across 15 different employee types. Monthly minimum wages for non-agricultural workers range from 5,217-22,070 Kenyan Shillings. In total, Kenya has 55 separate minimum wage rates.

It is clear how the complexity of Kenya's wage determination system makes obtaining accurate aggregate estimates difficult. But it must be emphasised that Kenya is not an exception in this regard. South Africa's minimum wage schedule, for example, is even more complex for certain sectors and in total the country currently has 124 different minimum wage rates. In Table 2, below, we provide a brief overview of the number of minimum wage schedules for 12 countries in SSA. The data shows that seven of the 12 countries in the sample yield 10 or more wage schedules, with South Africa an outlier in this sample. A differentiated, or complex wage schedule is potentially useful in that it can account for variations across worker skill levels, geographical regions, and sectors. This can be relevant in an unequal labour market such as South Africa's. Yet increasing levels of complexity also make wage-setting, as well as enforcement and compliance, more difficult. The ILO (2014) suggests that in general, the complexity of a wage schedule should be commensurate with the country's resource availability, where simpler wage schedules are more suitable if the resources dedicated to minimum wage systems are few. A complex schedule such as Kenya's certainly creates a more challenging set of rates to establish each year and enforce. Labour market regulations in several SSA countries would probably benefit from a re-assessment of current minimum wage systems in this regard, with a view toward greater simplification.

Table 2: Number Minimum Wage Schedules, By African Country

Country	Number of Wage Schedules
Uganda	1
Mali	1
Ghana	1
Malawi	1
Nigeria	2
Botswana	10
Zambia	10
Tanzania	29
Namibia	32
Kenya	55
Ethiopia (public sector)	57
South Africa	124
Average	27

Source: ILO TRAVAIL Database

Given the complexity of schedules it is useful to look beyond cross-country aggregates which, while useful, cannot provide a detailed picture or give any indication toward levels of compliance with the

minimum wage laws. In order to look beyond the aggregates then, we make use of household survey data for seven SSA countries (South Africa, Uganda, Kenya, Zambia, Tanzania, Mali, and Namibia).

As Tables 2, A1 and A2 indicate, however, that there remain significant complexities within several of these country minimum wage systems. To deal with this for the countries with more than one minimum wage, we select and focus on two key sectors. The first, which we call the 'Lower Floor' is a low-paid, unskilled sector covered by a specific minimum wage (usually agriculture or 'general workers'), while the second is a higher-paid, medium-skilled sector (such as Retail trade or working as a Clerk) and we call this the 'Upper Floor'.¹⁰ This allows us to present the granularity of minimum wage schedules to some extent, while at the same time enabling us to estimate more accurate Kaitz ratios (for specific sectors) as well as exploring levels of compliance (see Section 3).

To begin we use kernel densities to provide a basic picture of where the minimum wages are set relative to the wage distributions in each country.¹¹ Here we include all employed wage-earners in the sample, regardless of occupation, sector, or whether they are covered by a minimum wage or not. The figures can be found in the Appendix. The figures show that in most cases the Upper (wage) Floor is set relatively high in the distribution, and usually in the upper half of the wage distribution.

Figure 7a: Distribution of Wages, Zambia (2010) **Figure 7b: Distribution of Wages, Tanzania (2011)**

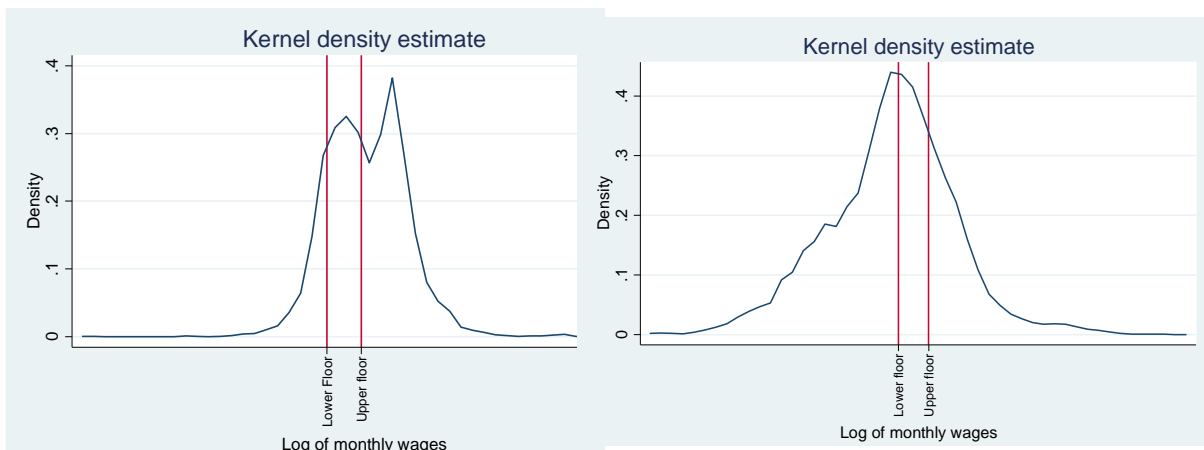


Figure 7c: Distribution of Wages, South Africa

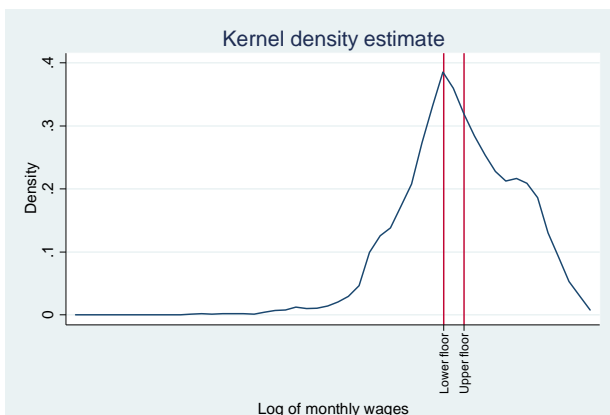


Figure 7d: Distribution of Wages, Kenya

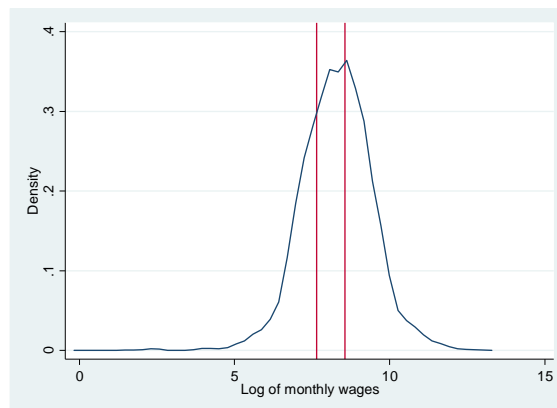


Figure 7e: Distribution of Wages, Uganda

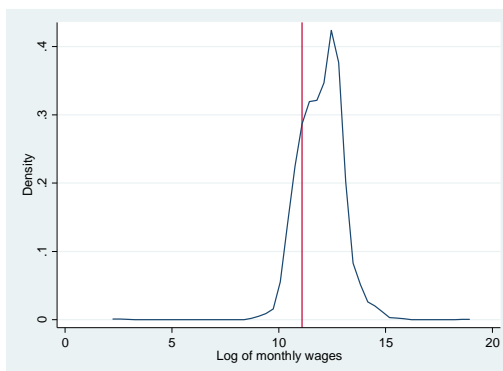
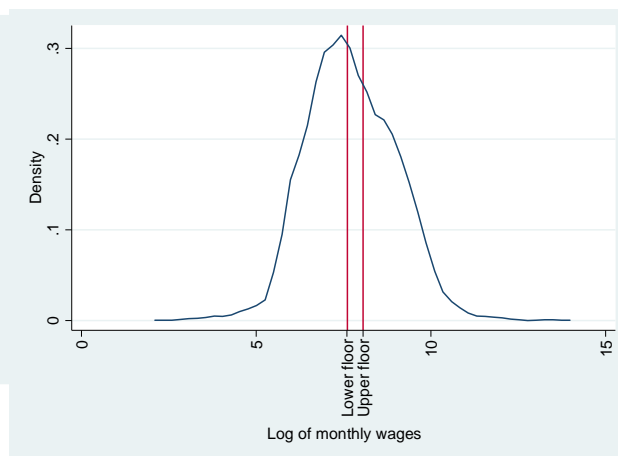


Figure 7f: Distribution of Wages, Namibia



Source: South Africa, Labour Market Dynamics Study (2013); Kenya, Kenya Integrated Household Budget Survey (2005/06); Uganda, Uganda National Panel Survey (2012); Mali, Rani et al. (2013); Zambia, Living Conditions Monitoring Survey (2010); Tanzania, Integrated Labour Force Survey (2005/06); Namibia, Labour Force Survey (2012).

In all cases the distributional graphs indicate the lack of a 'spike' at either of the minimum wage schedules. This is interesting in two respects: Firstly, that unlike most of the developed country literature, this six-country sample of African economies shows no evidence of a spike in the wage distribution relevant to the level of the minimum. Secondly though, this lack of a spike is also consistent with fairly fat tails to the left of both minimum wage schedules. Put differently, there is a significant share of earners not adhering to the minimum wage. This incidence and deficit of non-compliance is taken up in the next section. Ultimately though, the notion of a subset of African economies displaying relatively high minimum wage levels which in turn co-exist with a fair degree of independence from the country's self-same wage distribution, is a key result.

Table 3, below, in turn provides more detailed information on minimum wages for the six SSA countries in the figures above, as well as for Mali. In two of the seven countries in the table, there are single national minimum wages (Mali and Uganda), while in the other five there are detailed sectoral and occupational wage schedules. As noted above, for each of these five countries we select a lower and upper wage floor and identify the employees covered by these sectoral wage levels. For the two countries with a single national minimum wage, we simply include all workers classified as wage-earning employees in our analysis. The table provides an overview of wage levels, minimum wage levels, coverage, and we also draw attention to the difference between the level of the lower and upper floor, where applicable. What emerges firstly and most obviously, is the within-country variation in minimum wage levels.

Among the seven countries profiled in Table 3, and across the lower and upper floors in the same country, large variations are apparent both in the level of legislated minimum wages as well in mean and median earnings. Column five shows that minimum wage levels differ substantially across the lower and upper floor categories within the same country, with wages for workers in Lower Floor, or unskilled categories, set at 54 percent of wage levels for Upper Floor categories, on average. While the heterogeneity in minimum wage levels makes for a complex wage schedule, it also appears to be reflective of the substantial inter-sectoral wage inequality, which is evident in the differences in average wages for the same country. It is also worth noting the large difference between the mean and median earnings across any one category of workers, who are assigned here to a lower or upper floor. These estimates are suggestive of high levels of intra-sector wage inequality – where mean wages are significantly larger than median wages. On average across the group of countries mean wages (US\$457) are 55 percent higher than median wages (US\$251).

Table 3: Monthly Minimum Wages (US\$ PPP) In Seven African Economies

Countries	Sector	% of total employees	Minimum Wage (US\$ PPP)	Lower /Upper floor	Mean Wage	Median Wage
South Africa (2013)	Lower Floor	4%	441	0.65	558	329
	Upper Floor	13%	680			
Kenya (2005)	Lower Floor	7%	116	0.44	146	96
	Upper Floor	2%	264			
Zambia (2010)	Lower Floor	-	69	0.38	124	78
	Upper Floor	7%	185			
Tanzania (2007)	Lower Floor	61%	162	0.59	100	52
	Upper Floor	2%	274			
Namibia (2012)	Lower Floor		388	0.63	257	174
	Upper Floor	4%	615			
Uganda (2012)	National	100%	65	n/a	227	107
Mali (2013)***	National	100%	132	n/a	-	-
<i>Mean</i>		<i>0.3</i>	<i>283</i>	<i>0.54</i>	<i>457</i>	<i>251</i>

Sources: South Africa, Labour Market Dynamics Study (2013); Kenya, Kenya Integrated Household Budget Survey (2005/06); Uganda, Uganda National Panel Survey (2012); Mali, Rani et al. (2013); Zambia, Living Conditions Monitoring Survey (2010); Tanzania, Integrated Labour Force Survey (2005/06); Namibia, Labour Force Survey (2012).

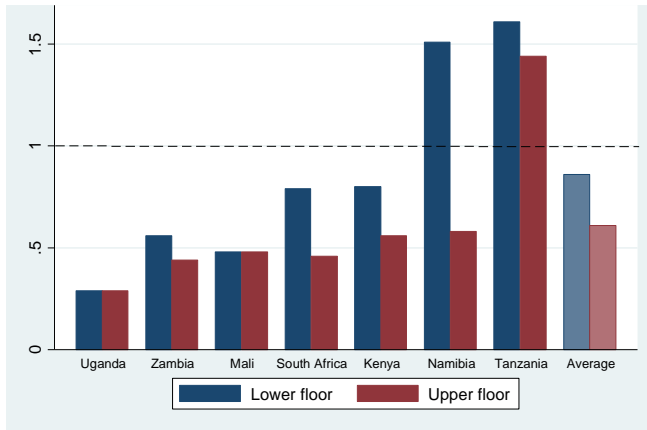
Notes: 1. Figures only include those classified in household surveys as being wage-earning employees.
2. The Ugandan minimum wage has not been updated since 1984, thus we take the 1984 rate and adjust for inflation to obtain a comparable 2012 figure.
3. The data from Mali is taken from Rani et al. (2013) and we are unable to calculate mean or median wages.
4. Wages are in current monthly US\$ PPP.

Importantly though, the data reveals an important characteristic of minimum wage setting in Africa – namely that in general these sectoral wages, given their specific targeting – will not cover a large share of workers. Apart from Uganda and Mali, where a national minimum wage exists then, coverage of most sectoral minimum wages is fairly low. In the pursuit of higher wages for vulnerable workers then, it is possible that many African economies do not end up covering a large share of the wage employed.

To go beyond focusing on the variation in wages and wage levels, we examine the Kaitz ratios using both mean and median wages, for workers in the Lower and Upper Floor categories. These ratios give an indication of how high minimum wages are set relative to average wages within in each category, and also provide suggestive evidence regarding compliance, which we take up in more detail shortly.

Figure 8, below, presents the Kaitz ratios for mean wages across categories and for each country. The ratios vary widely across countries, as well as across the Lower and Upper categories. In Namibia, for example, for workers in the Lower Floor category ('general workers'), the minimum wage is set at 1.5 times the mean wage, while in Zambia this figure is 0.5.

Figure 8: Ratio of Minimum to Mean Wages, Seven African Economies

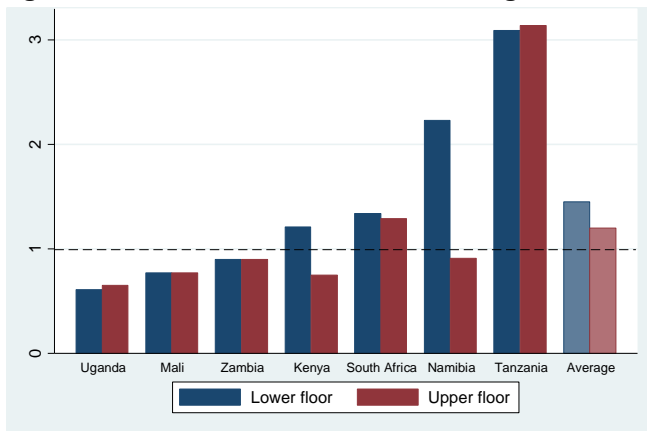


Source: Authors' calculations.

Overall, however, the average ratio is 0.93 among lower floor workers and 0.63 among upper floor workers. As a point of comparison the average levels of minimum-to-mean wages for nine LMI countries outside of SSA¹² presented in Rani et al. (2014), were 54 percent.

Figure 9 presents the Kaitz ratio using median instead of mean wages, and the different results are stark, as Table 3 suggested. The ratios are significantly higher, with the average figures above 1 and the black dotted line makes this clear. Again comparing these estimates against the sample of non-SSA countries from Rani et al. (2013), where the average ratio is 0.76, shows that indeed the figures are high.

Figure 9: Ratio of Minimum to Median Wages, Seven African Economies



Source: Authors' calculations.

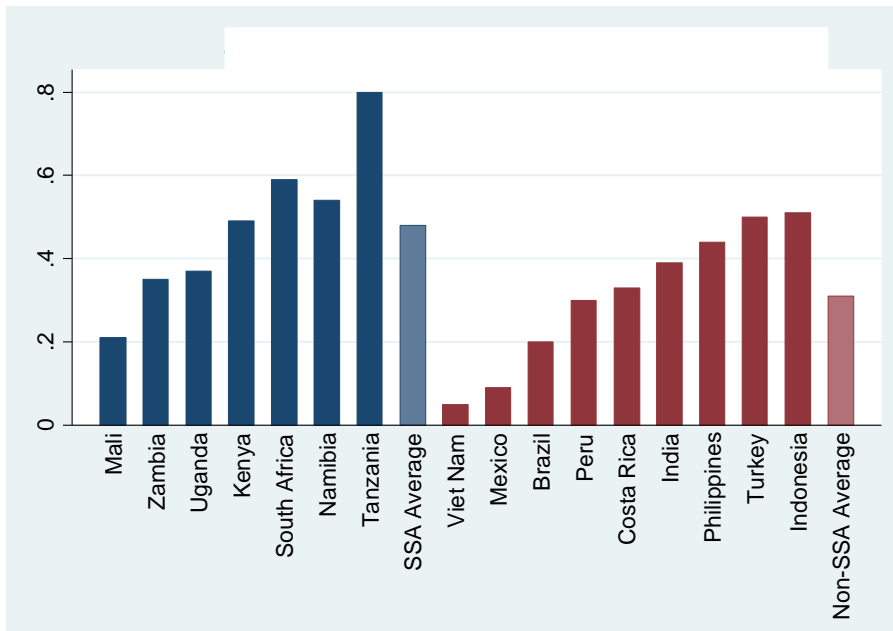
Overall then, the Kaitz estimates for the SSA region highlight two main aspects of minimum wages: Firstly, the country-specific nature of minimum wage frameworks, mean that the level at which wages are set, and the relation of this level to average wages for that covered group is relevant. Secondly, given that we are only focusing on covered workers in the two figures above, the data show that minimum wages are set high relative to average wages, and are suggestive of significant non-compliance. This leads us to explore levels of non-compliance in more detail.

Minimum wage compliance in Sub-Saharan Africa

While the Kaitz ratios presented above are indicative of widespread non-compliance with minimum wage laws, a more robust method is required to investigate further. We apply an Index of Violation¹³ from Borat, Kanbur and Mayet (2012) to calculate the level and depth of non-compliance, which provides a more comprehensive picture. To do this we combine the Lower and Upper Floor categories presented above where applicable, and we compare the resulting estimates with those of Rani et al. (2013). The Index of Violation allows us to calculate the level of non-compliance, or V^0 , which is simply the percentage of workers who earn below the minimum wage that applies to them. It also allows us to go beyond this to calculate the depth of this non-compliance, or V^1 , which measures how far below the minimum wage these workers earn, on average.

The data in Figure 10 clearly show that for most countries in the SSA region, for the sectors we include, non-compliance is widespread. On average, 58 percent of workers earn below the minimum wage legislated for them. This is compared to an average of 30 percent for the non-SSA countries in the figure. This relationship holds for the mean and median, despite outlier economies such as Tanzania. The figure also highlights the cross-country differences in levels of non-compliance. In Zambia, approximately 36 percent of workers earn sub-minimum wages, while this rises to 80 percent in Tanzania. These numbers reinforce the picture provided by the Kaitz ratios above, where minimum wage rates were shown to be set high relative to average wages.

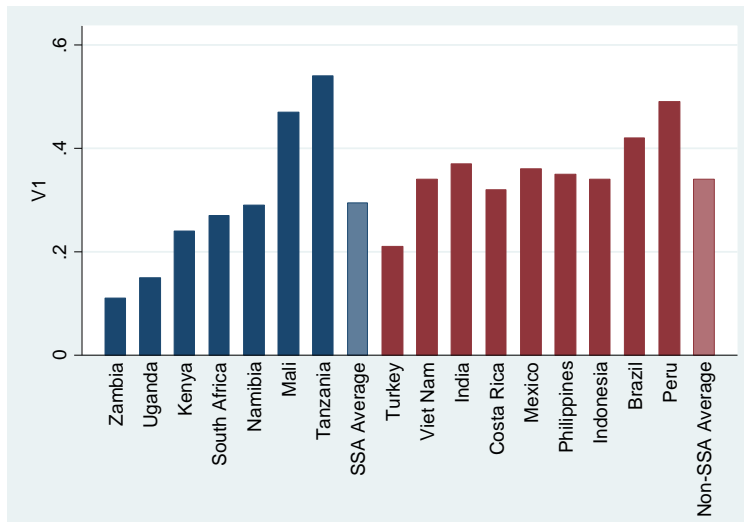
Figure 10: Average Compliance Rates (V^0), African and Developing Country Comparison



Source: Authors' calculations, and Rani et al. (2013)

Figure 11 moves beyond the level of compliance to explore how far below the minimum wage workers are, on average. This gives a more nuanced picture of non-compliance and how severe non-compliance levels are, when examining the average distance below the minimum wage that workers are earning.

Figure 11: Average Depth Of Non-Compliance (V^1), African And Developing Country Comparison

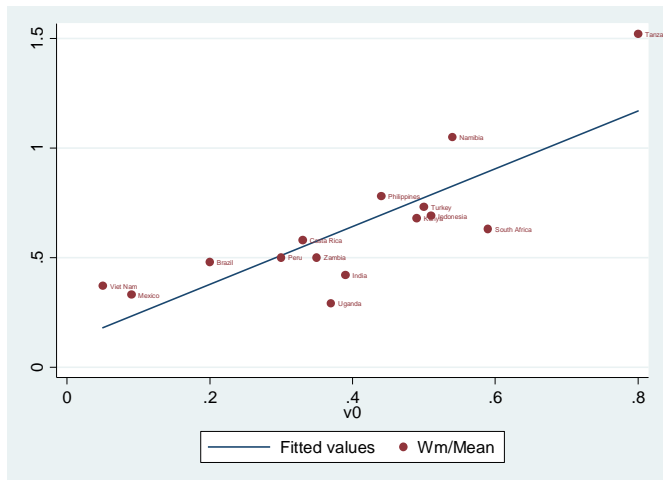


Source: Authors' calculations, and Rani et al. (2013)

The results suggest an interesting switch: whilst non-compliance levels were higher in the African sample of economies, relative levels of non-compliance are in fact higher in the non-African sample. Hence, our estimates show that the SSA regional average V^1 estimate stands at 0.30, whilst the corresponding figure for the non-SSA countries is 0.35. This suggests, at least on the basis of this sub-sample of developing countries, that whilst Africa yields to higher levels of non-compliance than other developing countries – there is a greater disadvantage in non-African economies for workers who are earning below the minimum wage. Put simply, absolute levels of non-compliance are higher in Africa, whilst relative levels of non-compliance are higher in non-African developing countries.

The literature on minimum wage compliance does suggest that one of the factors significant in determining levels of absolute and relative compliance, is the extent to which the minimum wage may be set at a value which employers find difficult to comply with. Hence, should the Kaitz index rise, employers may be more likely, *ceteris paribus*, to violate the law. Indeed, employees may be willing to collude in this decision, as will the authorities be more likely to turn a blind eye. Ultimately though, this relationship can be tested, through examining the correlation between our violation indices, V^0 and V^1 , and the Kaitz index.

Figure 12: Kaitz Ratio (Minimum-to-Mean) and V_0



Source: Authors' calculations, and Rani et al. (2013)

Figure 12 above, makes it plain that for the sample of African and developing countries, V_0 and the Kaitz index are positively correlated: Higher levels of a minimum wage relative to the country mean will indeed be associated with higher levels of non-compliance. When the sample is confined to African countries only – too small here to be visually striking – the correlation coefficient is equally compelling at 0.77. This relationship in addition is replicated for V_I – relative non-compliance. Here, the African and non-African samples reveal divergent results. For the non-African sample, the relationship between the Kaitz ratio and V_I is negative, suggesting that higher levels of a minimum wage relative to mean wages are correlated with a small compliance gap. For countries in the African sample, this is not that case and the coefficient or correlation between the Kaitz ratio and V_I is 0.88.

Conclusion

Most countries in Sub-Saharan Africa (SSA) have adopted minimum wage regulation. Although the sectors and fraction of workers covered are small, given the low rates of formality and urbanization in SSA, (i) as the number of covered workers grows, wage regulation will become increasingly significant for the economy as a whole, (ii) there can be spill over effects on to uncovered sectors, and (iii) as we show in the paper, wage regulation is particularly aggressive in SSA. Thus, current experience with minimum wages in SSA is relevant for analysts and policy makers as we look forward to possible redesign of regulation in the future.

Examining the variety of minimum wage frameworks in the region, it is clear that the typology of minimum wage schedules, as well as the levels at which these minima are set, varies considerably across countries in Africa. Higher minimum wage values are associated with higher GDP per capita. Importantly however, we find that minimum wages in low income countries are set at values, relative to the country mean wage, and higher than those in lower- and upper-middle income countries in Africa. Indeed, SSA as a whole reflects a bias towards a more aggressive minimum wage policy compared to the rest of the world – with low income economies again driving this trend.

There is limited research on the employment effect of minimum wages in SSA, but the findings for the four countries (Ghana, Kenya, Malawi and South Africa) are consistent with the broad summary of global research. By and large, introducing and raising the minimum wage has a small negative impact, or no measurable negative impact. However, there is significant variation around this average finding.

The employment elasticities are not constant nor linear. Where increases in a minimum wage are large and immediate, this can result in employment losses, but more modest increases usually have very little observably adverse effects, and may have positive impacts on wages.

The great variability in findings on employment can be explained partly by the great variation in the detail of the minimum wage regimes and schedules country by country, but also by the variations in compliance. Our data on minimum wage compliance in Africa illustrates that the continent has higher levels of absolute non-compliance when compared with other developing countries, but lower levels of relative non-compliance. However, there is considerable variation across countries. We find that higher Kaitz indices are associated with higher levels of non-compliance, but more detailed explanation of non-compliance is an important item on the research agenda.

This paper has provided an empirical overview of minimum wages in Sub-Saharan Africa. It is evident that research in this area is still at a very early stage, with this paper in essence attempting to craft the broad contours of the nature and extent of minimum wage setting on the continent. Whilst work on minimum wages is fairly mature in many OECD countries, our understanding of minimum wage policy and its impact in SSA is not. This is in large part due to a severe lack of necessary data. The release of country-level earnings and employment data at regular intervals lies at the heart of a future, country-focused minimum wage research agenda for Africa.

Funding

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Acknowledgements

Appendix

Table AI. Minimum wage system classification for selected African countries

National	Sectoral/Occupational	Hybrid
Algeria	Botswana	Burkina Faso
Cameroon	Kenya	Angola
Cote d'Ivoire	Malawi	
Egypt	Mozambique	
Ghana	Rwanda	
Mali	South Africa	
Uganda	Tanzania	

Source: ILO TRAVAIL database

Table A2: Agricultural minimum wages, Kenya, 2013

Type of employee	Monthly Wage (Shillings)
Unskilled employees	4854.35
Stockman herdsman and watchman	5606.05
House servant or cook	5541.55
Farm foreman	8757.20
Farm clerk	8757.20
Section foreman	5669.20
Farm artisan	5802.05
Tractor driver	6152.70
Combined harvester driver	6778.10
Lorry driver or car driver	7113.25

Source: Ministry of Labour Social, Security and Service, 2013

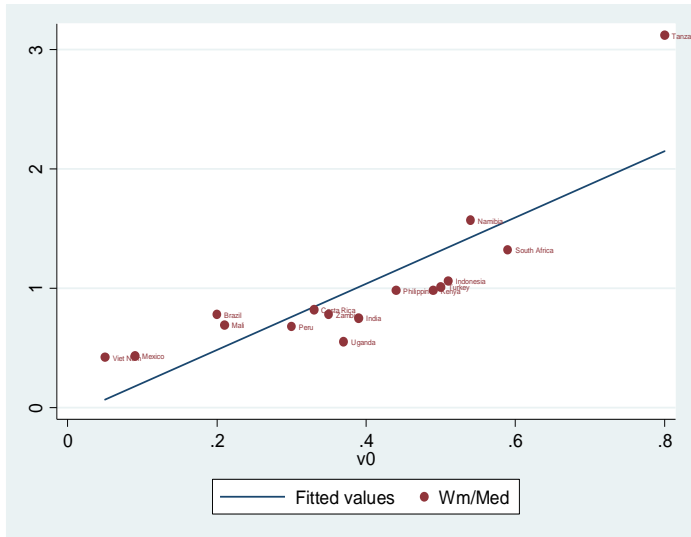
Table A3: Non-agricultural monthly minimum wages, Kenyan Shillings, Kenya, 2013

Type of employee	Non-agricultural industry in cities (Nairobi, Mombasa and Kisumu)	Non-agricultural industry at all municipalities and town councils	Non-agricultural industry at all other areas
[A]	9780.95	9024.10	5217.95
[B]	10563.60	9372.20	6028.95
[C]	10911.70	10116.15	6223.65
[D]	11085.70	10316.00	8361.35
[E]	12654.90	11838.70	9679.05
[F]	13201.55	12184.25	10071.05
[G]	15064.65	13772.75	11743.30
[H]	16602.85	15259.35	13606.40
[I]	18329.25	17101.80	15434.70
[J]	20283.90	18940.40	17644.60
[K]	22070.95	20769.95	19474.20
[L]	13201.55	12184.25	10071.05
[M]	16602.85	15259.35	13580.60
[N]	17932.15	17101.55	15434.70
[O]	22070.95	20769.95	19474.20

Notes:

- [A]: General labour, including cleaner, sweeper, gardener, children's ayah, house servant, day watchman, messenger
- [B]: Miner, stone cutter, turn boy, waiter, cook, logger line cutter
- [C]: Night watchman
- [D]: Machine attendant, sawmill sawyer, machine assistant, mass production machinist, shoe cutter, bakery worker, bakery assistant, tailor's assistant
- [E]: Machinist (made-to-measure), shoe upper preparer, chaplis maker, vehicle service worker (petrol and service stations), bakery plant hand, laundry operator, junior clerk, wheeled tractor driver (light)
- [F]: Printing machine operator, bakery machine operator, plywood machine operator, sawmill dresser, shop assistant, machine tool operator, dough maker, table hand baker or confectioner, copy-typist, driver (cars and light vans)
- [G]: Pattern designer (draughts-man), garment and dress cutter, single hand oven man, charge-hand baker, general clerk, telephone operator, receptionist, storekeeper
- [H]: Tailor, driver (medium-sized vehicle)
- [I]: Dyer, crawler tractor driver, salesman
- [J]: Saw doctor, caretaker (buildings)
- [K]: Cashier, driver (heavy commercial vehicle), salesman-driver
- [L]: Ungraded artisan
- [M]: Artisan Grade III
- [N]: Artisan Grade II
- [O]: Artisan Grade I

Figure A4: Kaitz Ratio (Minimum-to-Median) and V_0



Source: Authors' calculations, and Rani et al. (2013)

Endnotes

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1. In Sub-Saharan Africa, data indicates that approximately 19% of the labour force are in wage employment, whilst 74% are in agricultural or non-farm self-employment (Bhorat, Naidoo & Pillay, 2015). In West Africa, for example, the informal sector accounts for approximately 50% of national output, over 80% of employment, and 90% of new jobs (Benjamin, Golub and Mbaye, 2015).
2. Belman and Wolfson (2014), Neumark, Salas and Wascher (2014), Schmitt (2013), Neumark and Wascher (2007, 2008).
3. The seminal paper in the new minimum wage literature being Card & Krueger (1994).
4. See, for example, Agell and Lommerud (1997), or for a discussion of the possible impacts of minimum wages from a behavioural perspective, see Falk, Fehr and Zehnder (2006).
5. Neumark and Wascher (2007) use the term 'developing country' to describe what we have referred to as Low and Middle-Income countries.
6. The table below shows the percentage split across world regions between setting a national minimum wage versus some form of regional, sectoral or occupational minimum wage. The percentages do not add up to 100% given that not all countries in a region have minimum wages.

Region	National	Sectoral or Regional
Africa	30%	61%
Asia & Pacific	48%	48%
Europe & CIS	64%	33%
Americas & Caribbean	59%	38%
Middle East	40%	20%

Source: ILO (2013)

7. Ideally we would present median wages and use the median wage to calculate the Kaitz ratio, unfortunately, data on median wages for countries in SSA is rare and would limit our sample so as to make it nearly useless.
8. It should be noted that in the case of Uganda, the minimum wage has not been updated since 1984 and still stands at 6,000 Ugandan Shillings.
9. Unskilled employee, Stockman herdsman and watchman, Skilled and semi-skilled employees, House servant or cook, Farm foreman, Farm clerk, Section foreman, Farm artisan, Tractor driver, Combined harvester driver, Lorry driver or car driver.

10. The specific sectors for each country are as follows:

South Africa	Lower floor – Agriculture Upper floor – Wholesale and Retail
Kenya	Lower floor – Agriculture Upper floor – Employee Type [G], see table A2
Zambia	Lower floor – General worker Upper floor – Clerks
Tanzania	Lower floor – Agriculture Upper floor – Hospitality

Namibia (wages set by collective bargaining)	Lower floor – General workers Upper floor – Clerks
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11. We only do this for six countries as the data for Mali are taken from Rani, U., Belser, P., Oelz, M., & Ranjbar, S. (2013). "Minimum wage coverage and compliance in developing countries", *International Labour Review*, 152(3-4), 381-410.
12. Brazil, Costa Rica, India, Indonesia, Mexico, Philippines, Peru, Turkey, Viet Nam.
13. If we consider a distribution of wages $F(w)$, where the density function is $f(w)$ and the minimum wage is W^m , then an Index of Violation can be calculated as follows:

$$V(\alpha) = \int_0^{W^m} \left[\frac{W^m - W_i}{W^m} \right]^\alpha f(w),$$

where W_i are individual wages and α is the 'violation aversion' parameter such that when: $\alpha = 0$, $V(\alpha)$ measures the percentage of workers below the minimum; when $\alpha = 1$, $V(\alpha)$ measures the average gap between W^m ; and when $\alpha = 2$, $V(\alpha)$ is the squared violation gap. This index allows us to calculate a family of measures which capture both absolute (V_0) and relative (V_1, V_2) levels of non-compliance.

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