# Minimum Wage Compliance and Migration:

## The Labor Market Effects of Tanzania's Sectoral Minimum Wage Bill*

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**Abstract**

*To what extent do firms in developing countries comply with minimum wage laws, and how do they affect the location decision of workers? Tanzania enacted its first minimum wage law in 2010, which stipulated different levels for each industry. Using novel data from Tanzania's annual census of firms, I find evidence of partial firm compliance, with positive employment effects. To assess whether minimum wages are important to workers, I use a spatial equilibrium model which exploits variation in average minimum wages across space to determine their location choice. I find an elasticity of migration with respect to expected earnings of one half. This result is driven by changes in the minimum wage for which the direct effect on migration is 3.4 percent. This suggests that variable minimum wage laws can be used to reallocate labor into more productive sectors, even under partial compliance.*

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# 1 Introduction

To what extent do firms comply with minimum wage laws, and how do they affect the location decision of workers in developing countries? Cities in the developing world are growing rapidly, and this growth is compounded by immigration. 20-25% of individuals migrate out of rural areas as young adults (Young, 2013). Harris & Todaro (1970) hypothesized that migration to urban areas happens when their is a gap between rural and urban expected wages, implying that variation in local labor market conditions caused by minimum wage laws are likely to have a large impact on the spatial allocation of labor. In the absence of labor regulations, a share of the expanding labor force is bound to be exploited by employers. Minimum wages can offer some security to workers, and in recent years many countries in Sub-Saharan Africa have adopted minimum wage laws (Bhorat *et al.*, 2017). Yet recent empirical evidence points to low levels of compliance, suggesting that minimum wage laws are not enforced (Rani *et al.*, 2013; Bhorat *et al.*, 2017). However, even partial compliance may have a lighthouse effect that drives up all wages (Derenoncourt *et al.*, 2021). Hence, while minimum wages are intended to protect workers in the formal sector, they may also affect the migration decisions of workers.

Tanzania is an ideal setting to analyze the effects of minimum wages in a development context. The nations' first minimum wage law was instituted in 2010; it prescribed a specific level for 20 sectors and a national floor for all other sectors. Variation in sectoral composition across locations meant that the minimum wage law had a varying effect on average wages across space. In 2013, the minimum wage law was repealed and replaced. The new legislation changed the minimum wage in two ways. First, among the sectors that were covered in the original law, the minimum wage was not raised uniformly. This altered the relative cost of employing a worker at the minimum wage in these sectors. Second the number of sectors that had their own minimum wage was expanded.

In this paper, I make three contributions by assessing how Tanzania's minimum wage laws affected local labor market conditions and in-turn affected the location decision of workers. First, I estimate the rate of compliance as the change in the share of workers paid below the minimum wage before and after 2010. One-quarter of wage workers were paid below the minimum wage in 2007, the last

observed pre-policy year. The share fell to 13% in 2010, representing a 45% rate of compliance, which is consistent with the average rate of compliance in Sub-Saharan African countries (Bhorat *et al.*, 2017). The rate of non-compliance fell to below 7% in 2013, which likely reflects both an adjustment period and changes in nominal wages due to inflation.

I employ a similar approach to assess the extent to which minimum wages affected both wages and employment. Following Dustmann *et al.* (2020), I use the level of exposure to the minimum wage, estimated as the gap between the current wage bill in the firm and the level needed to bring all workers up to the minimum wage as an instrument for wages. I estimate positive elasticities for both wages and employment with respect to exposure to the minimum wage which suggests that firms have monopsony power. In the IV framework, I estimate a positive employment elasticity, consistent with the findings of Magruder (2013) in Indonesia. The positive employment elasticity is explained through the big push theory where in the minimum wage is high enough to cause a big push out of informal and into formal labor.

The second contribution of this paper is to estimate the elasticity of migration with respect to expected income under constant relative risk aversion preferences. I use a spatial equilibrium framework to disentangle the local labor market effects from amenities in migration decisions. I exploit plausibly exogenous variation in the average minimum wage across locations as an instrument for wages and estimate an elasticity of migration of 0.52. The results indicate that higher amenity locations have lower wages, consistent with the theoretical predictions of Roback (1982). One potential threat to identification is that migrants may not have accurate information about local labor market conditions (Baseler, 2021). I test this hypothesis by estimating the direct effect of the minimum wage on migration and find an elasticity of 3.3, suggesting that migrants are aware of the minimum wage.

The third contribution of this paper is the analysis of two novel Tanzanian datasets, the Integrated Labor Force Survey (ILFS) and the Employment and Earnings Survey (EES). The ILFS was conducted in 2006 and 2014 and surveyed 74,000 and 47,000 individuals in those years, respectively. The survey includes detailed information on unemployment, wage employment and self employment. The EES is an annual census of firms with at least fifty employees and a sample of those with less than fifty

firms. Each year approximately 9,000 firms are surveyed. To put this in context, the US establishment survey, JOLTS, surveys 16,000 firms each month (Davis *et al.*, 2013). In addition to data on wages and employment, the EES also reports the total number of current vacancies at each firm as well as the total number of hires during the previous year.

This paper contributes to the literature in three ways. First, this paper contributes to the literature on the effects of minimum wage laws. The lack of enforcement in developing countries has been demonstrated through the gap between *de jure* and *de facto* minimum wage levels (Rani *et al.*, 2013; Bhorat *et al.*, 2017; Mansoor & O'Neill, 2021). The employment effects vary from no disemployment effects (Almeida & Carneiro, 2012; Derenoncourt, 2021) to positive effects on formal employment (Magruder, 2013; Cengiz *et al.*, 2019). Studying Germany's 2015 minimum wage law that had a differential impact across space, Dustmann *et al.* (2020) and Holtemöller & Pohle (2020) find an increase in employment. This contrasts with Monras (2019) who finds that state-level variation in minimum wages in the US led to a decrease in low-skill employment and out-migration by low-skill workers from areas with high minimum wages. To the best of my knowledge, this paper is the first to study the employment effects of a minimum wage law in Sub-Saharan Africa. I find both positive effects of employment and migration into areas with higher minimum wages.

Second, this paper contributes to the literature on internal migration in developing countries. The persistence of the agricultural productivity gap, the misallocation of workers in less productive sectors, namely rural agricultural labor, is a puzzle (Gollin *et al.*, 2014). While some authors argue that workers are optimally located across space (Young, 2013; Hicks *et al.*, 2021), the agricultural productivity gap is often reconciled through high costs of migration (Lagakos *et al.*, 2020). Profitable migration may be deterred by risk in finding employment and near subsistence levels of consumption at origin (Bryan *et al.*, 2014) or village risk-sharing networks (Morten, 2019). However the main cost of migration is non-monetary (Lagakos *et al.*, 2018; Imbert & Papp, 2020; Bryan *et al.*, 2021). Indeed, reviewing the literature, Lagakos (2020) concludes that while early evidence pointed toward monetary costs as the primary constraint against migration, more recent evidence has determined that migration costs are largely non-monetary. This paper contributes to this literature by asking how do migrants choose their destination rather than what prevents them from migrating.

Third, this paper contributes to the spatial equilibrium literature. I model the location choice of workers using a spatial model that builds closely on Heblich *et al.* (2020) and Franklin *et al.* (2021). Amenities may be endogenous in the long-run (Diamond, 2016; Derenoncourt, 2021), or partially observed as in Gollin *et al.* (2021) who compare rural and urban areas in twenty Sub-Saharan African countries and conclude that the urban wage premium cannot be accounted for by differences in amenities. I treat them as fixed and estimate an income elasticity of migration around 0.5, which is a factor of ten smaller than the estimates for local commuting models (Monte *et al.*, 2018; Franklin *et al.*, 2021). This parameter governs the expected income elasticity of migration, and corroborates the finding, in the development context, that geographic variation in wages at the destination drives migration (Kennan & Walker, 2011; Monras, 2018).

# 2 Context & Motivating Facts

## 2.1 Minimum Wage Laws

The Labour Institutions Order of 2010 created Tanzania's first minimum wage laws. The law set forth sectoral specific minimum wages for 20 sectors and a national minimum wage for all other sectors.[1] In what follows, I refer to sectors with their own minimum wage as covered and to sectors that were subject to the 2010 national minimum wage as uncovered. The law remained in place until July 2013 when it was repealed and replaced with the Labour Institutions Wage Order, 2013. The new wage order had two effects on wages. First, the minimum wage was changed disproportionally across the covered sectors, with some sectors seeing declines in nominal values. While the national minimum wage was raised by 25%, sectoral changes varied from -38% to +65%. Second, sectoral minimum wages were created for eight additional sectors. This increased the cost of employing workers in these sectors by 75-400%.[2] This caused the relative cost of employing workers at the minimum wage across sectors to change.

In Figure 1 I plot the monthly minimum wage in each sector relative to the national minimum

[1] See Appendix Tables 14 and 15 for descriptive statistics of each sector and its minimum wage level.
[2] See Appendix B for details of the Wage Orders.

wage in 2010 and 2013. The 45 degree line is displayed in black. To the left of the 45 degree line are sectors for which the percentage increase in the minimum wage was higher than that of the national minimum wage. As can be seen in the figure, the largest increases are primarily confined to the sectors that were newly covered in 2013.

## 2.2 Migration

As noted in Bryan & Morten (2019), the migration literature tends to focus on rural to urban moves. However, that type of migration is not of primary interest for this analysis for several reasons. First, the minimum wage orders were not designed as a policy to encourage rural to urban migration. Second, rural to urban migration accounts for less than half of the rural migration episodes in the data. In Table 1, I report the migration rates by starting location as well as the total inter-district and inter-region migration rates. Migration both to urban areas and across districts peaks in 2014, following the change in the minimum wage law. In that year, the migration rate from rural to urban districts was 3.3% while the total inter-district migration rate, which includes individuals starting in urban locations, was 8.6%.

Finally, the distribution of wages across districts is more relevant than the gap between urban and rural locations. In Figure, 2, I display the distribution of wages for urban and rural areas. As can be seen in the figure, rural wages are skewed to the right, but the divide between urban and rural does not capture the variation between districts.

## 2.3 Minimum Wages and Employment

In 2010, the sectoral minimum wage was between 65,000 to 3500,000 Tanzanian Shillings (TSH) per month, and between 40,000 to 400,000 in 2013. To assess the effect of the minimum wage, I plot the total number of vacancies and the total number of hires during the past twelve months per employee by minimum wage level in Figure 3. I classify sectors with a minimum wage above 150,000 TSH in 2010 and above 200,000 TSH in 2013 as high minimum-wage sectors. Construction, financial institutions, and international energy companies change from low to high minimum wage during the 2013 reform.

In 2010, the hire rate in high and low minimum wage sectors were equal. Because the initial minimum wage law was implemented in the month prior to the survey, this means that in the year prior to the original law, there was no difference in hiring. In 2011, the hire rate in the previous year fell substantially in high minimum wage sectors and remained below the hiring rate for the low minimum wage sectors. The hire rate in sectors that were upgraded in 2013 does not have a clear pattern between 2010 and 2013 which is likely due to it being a smaller set of employees. However, in 2014, it falls from the the low minimum wage rate to the high minimum wage rate.

One month after the minimum wage law was implemented in 2010, the vacancy rate in high minimum wage sectors was already substantially below that in low minimum wage sectors. The vacancy rate in the sectors that were upgraded in the 2013 reform was between the high and low minimum wage rates until 2013, when it was slightly above that for the low minimum wage sectors. In 2014, it fell below that of the high minimum wage sectors.

Because I do not have data on hiring and vacancies prior to the initial minimum wage law, I cannot assess the direct effect of the minimum wage law on hires and vacancies. However, when comparing sectors with high and low minimum wages, I find that sectors with high minimum wages saw a substantial and permanent decline in hiring and vacancies.

In figure 4, I plot the share of workers earning above and below 150,000 TSH. The EES sample does not include domestic servants, so the effective minimum wage in the sample in 2010 and 2013 is 70,000 and 100,000 TSH, respectively. The share of workers earning less than 150K prior to 2010 is more than 50% and in 2010 it falls to 40% before asymptoting around 20%. Without data for 2008 and 2009, we cannot rule out that wages are following a trend, however, the figure provides evidnce of compliance with the law.

# 3 Economic Framework

In this section, I build a model that allows me to assess the degree to which risk aversion plays a role in migration. Migrating to a new location will change the level of local amenities as well as the local labor market conditions for the migrant. Whether migrants respond more to wages or the probability

of employment in a location will depend upon their degree of risk aversion. Wages and the probability of employment were first identified as sources of the perpetual rural-urban wage gap by Harris & Todaro (1970). More recent work has shown that the degree of risk aversion plays an important role in determining the importance of these two factors. Bryan *et al.* (2014) show that even when seasonal migration is highly profitable, many people who would benefit from doing so, stay at home in their village because not finding a job would be catastrophic. Building on the work of Heblich *et al.* (2020) and Franklin *et al.* (2021), I develop a static spatial equilibrium framework to quantify the degree of risk aversion in migration.

The economy is composed of a measure of individuals indexed by $\omega \in \Omega$ and a discrete set of locations indexed by $o$ and $d \in L$. Individuals are endowed with a birth location $o$ and a vector of location amenity preferences $b_{od}(\omega)$. Individuals seek to maximize their expected utility by choosing a place to live. The expected utility of an individual who is born in origin location $o$ and migrates to destination $d$ is given by

$$E[U_{od}(\omega)] = E\Big[B_d\, b_{od}(\omega)\, \frac{C_{od}^{1-\rho} - 1}{1-\rho}\Big] \tag{1}$$

Where $B_d$ is the average amenity in $d$, and $C_{od}$ is consumption. Migration is both costly and risky. An individual who migrates from $o$ to $d$ pays a migration cost $\tau_{od} \leq 1$, with $\tau_{oo} = 1$. The income that an individual receives is determined by the wage in location $d$, $w_d$, the probability of finding a job, $e_d$, and the value of the outside option, $\bar{w}_d$.

The amenity shock is drawn from a Frechet distribution with probability density function $f(b) = \theta\, b^{-1-\theta}\, e^{-b^{-\theta}}$, where $\theta > 0$. Thus, the expected indirect utility of migrating from $o$ to $d$ can be expressed as

$$E[V_{od}] = B_d \tau_{od} \Big( e_d\, \frac{w_d^{1-\rho} - 1}{1-\rho} + (1 - e_d)\, \frac{\bar{w}_d^{1-\rho} - 1}{1-\rho} \Big)\, \Gamma\Big(1 - \frac{1}{\theta}\Big) \tag{2}$$

Where $\Gamma(\cdot)$ is the gamma function. Migration can be thought of as a two-step process. First the individual chooses whether or not to migrate, then conditional on the choice to migrate, the individual chooses a location. Hence, individuals may respond differently to changes in the wage at origin than to changes across all potential destinations. To incorporate this margin, I allow that the Frechet

dispersion parameter at origin may differ from that for migration.

$$E[V_{oo}] = B_o \left( e_o \frac{w_o^{1-\rho} - 1}{1-\rho} + (1 - e_o) \frac{\bar{w}_o^{1-\rho} - 1}{1-\rho} \right) \Gamma\left(1 - \frac{1}{\theta_o}\right) \tag{3}$$

The probability that an individual born in location $o$ migrates to location $d$, $\pi_{od}$, is equal to the probability that location $d$ yields the highest utility

$$\pi_{od} = \Pr\left(V_{od} \geq \max_{k \in L} V_{ok}\right) = \frac{V_{od}^{\theta}}{\sum_k V_{ok}^{\theta}} \tag{4}$$

Taking logs of (4) yields expressions for the probability of migration to from $o$ to $d$ as well as the probability of not migrating.

$$\ln \pi_{od} = \theta \ln B_d + \theta \ln \tau_{od} + \theta \ln \left( e_d \frac{w_d^{1-\rho} - 1}{1-\rho} + (1 - e_d) \frac{\bar{w}_d^{1-\rho} - 1}{1-\rho} \right) - \Phi_o \tag{5}$$

$$\ln \pi_{oo} = \theta_o \ln B_o + \theta \ln \left( e_o \frac{w_o^{1-\rho} - 1}{1-\rho} + (1 - e_o) \frac{\bar{w}_o^{1-\rho} - 1}{1-\rho} \right) - \Phi_o \tag{6}$$

Where $\Phi_o = \ln(V_{ok}^{\theta})$.

This relates to the Harris & Todaro model in that they hypothesized that migration occurs when there is a gap between urban and rural expected wages. Under this hypothesis, agents are risk neutral. They do not consider migration costs, amenities, or an outside option. Under those assumptions, the probability of migrating from $o$ to $d$ is given by

$$\ln \pi_{od} = \theta \ln(e_d w_d) - \phi_o \tag{7}$$

Where $\theta$ by assumption would equal one. In Section 7, I compare the performance of this simplified model with the model that incorporates risk aversion and amenities.

# 4 Data

To empirically assess the model, I combine data from several sources and focus on the period 2005-2014. Migration flows are calculated using data from the Tanzanian National Panel Survey (NPS), which is a part of the World Bank's Living Standards Measurement Study (LSMS) surveys as well as the Tanzanian ILFS. Wages and employment are, unless otherwise noted, taken from the Tanzanian Employment and Earnings Survey (EES). Minimum wage values are extracted from Tanzanian gazette, a monthly bulletin that reports new laws. Although the LSMS is a nationally representative survey, the EES does not include the Zanzibar archipelago. In Figure, 5 I display the status of each district in the sample. The map shows the four largest cities in Tanzania as well. Although Zanzibar is not included, most of the migration into and out of the districts in the islands is confined to those islands. The orange districts were not sampled in every round of the LSMS, but every district was sampled in at least one round. Finally, I use the 2002 and 2012 censuses to estimate the size of the labor force in each district in each year.

**Migration** To construct migration flows, I combine data from the 2008, 2010, 2012, and 2014 Tanzanian LSMS surveys and the 2014 ILFS. Each survey includes information about the region and district that the individual lives in, the year in which they migrated there and the region and district that they lived in before that. For this analysis, I limit my attention to individuals aged 15-65 at the time of the survey who report any location history information. Due to the sampling design of the LSMS I calculate the migration rate between two locations by first taking the average rate across all LSMS surveys and then average that value with the rate in the ILFS.[3] To account for re-districting that happened during the sample, I construct time consistent districts which largely coincide with those on IPUMS international.

The reported year of migration may not be accurate if it happened far in the past due to recall bias.

[3]The first round of the LSMS includes 8,500 individuals while the second through fourth rounds include more than ten thousand individuals. 80% of the sample was tracked through 2012. In 2014, the sample was refreshed and the tracking sample fell to 19%. The fifth round in 2019 aimed to follow the sample that had been tracked through the first four rounds and was substantially smaller. The sampling frame was designed to produce accurate statistics for four strata of Tanzania: Dar es Salaam, Zanzibar, Mainland Rural and Mainland Urban, while this analysis is done at the district level. I exclude from the analysis the 2006 ILFS because it covers very little of the sample period. I also exclude the 2019 LSMS because it only covered the set of individuals who had been tracked through the first four rounds and is substantially smaller than the other survey rounds, as mentioned above.

Figure 6 displays the share of migrants in each sample that migrated in each year after 2005. Although migration rates are rising during the first period, migration seems to generally peak following the first law before falling and rising again after the reform. To limit the amount of bias introduced by recall, I focus on two migration periods, the five year window before the initial minimum wage law was passed (2005-2009) and the five years after the law was passed (2010-2014). Figure 7 plots the inverse hyperbolic sine of the change in immigration between these two periods. The map is overlaid with built-up areas from Africapolis shown in red. There is substantial heterogeneity across space. The largest increases are generally in districts with built-up areas, which likely reflects the higher employment there.

**Wages and Employment** Data on employment and earnings is taken from the Tanzanian EES. I construct the wage in each location as the average monthly wage among workers employed in the private sector. All wages are deflated using the Tanzanian CPI. I exclude public sector employees from the analysis because the wages received by private sector employees reflect more accurately the wages received by individuals in the LSMS. Figure 10 plots the average monthly wage by district in the LSMS against those in the EES in years when both surveys occurred. The figure on the left includes for all employees in the EES, while the figure on the right limits the sample to public firms. While the average wage is generally higher in the EES than in the LSMS, the private sector wages lie closer to the 45-degree line.

In Table 2 I report the mean and standard deviation of monthly wages and wages plus inkind payments in the EES. Panel B reports the statistics for private sector employees. Between 2005-2007, inkind payments increased the average monthly wage by around 90,000 TSH. This amount fell substantially beginning in 2010 to around 30,000 TSH. The bottom row of the table reports the average minimum wage faced by employees. The minimum wage is approximately one-third of the average wage, suggesting that the minimum wage will likely not be binding for many workers.

I estimate the wage in location $j$ as the mean monthly wage among employed workers. The share of individuals in wage employment is between 15-20 percent of the prime aged workers throughout the sample. The sample was not designed to provide accurate statistics at highly disaggregated levels, hence the median wage is less susceptible to noise caused by outliers than the mean wage and is likely

a more accurate representation of the wage that migrants may receive. In Table 2 I report the mean, standard deviation and median of monthly wages, wages plus inkind payment, and migrant wages. The standard deviation of each wage measure is large and the mean is much larger than the median. Surprisingly, across all rounds, migrant wages are weakly larger than those of the general population. This suggests that migrants, who are employed in wage work, may be more skilled than the general population. In Figure 9, I plot the distribution of the mean log wage and minimum wage (see below) across district by the wage law that was active at the time. The 2013 reform increased the variation in the average minimum wage across locations, yet the distribution of wages was similar over time.

**Minimum Wages** To analyze the effect of changes in the minimum wage by region, I construct a novel dataset of sector-specific minimum wages for 2010 and 2013 and match these with employment shares by location.[4] The minimum wages are extracted from the Tanzania National Gazette, a monthly bulletin that includes all new national regulations. I match the minimum wages with ISIC occupation codes of all employed workers in the NPS to construct a measure of the average minimum wage in each location. The average minimum wage in location $l$ is defined as

$$m_{lt} = \sum_{s} \frac{e_{slt}}{e_{lt}} m_{st} \tag{8}$$

Where $m_{st}$ is the minimum wage in occupation $s$ at time $t$, and $s_{slt}$ is employment in occupation $s$ in location $l$ at time $t$. The variation in sectoral composition across locations creates variation in the average minimum wage across space.

# 5 Compliance

The goal of this section is to show that there was compliance with the minimum wage laws. Using firm level data from the EES, I define the rate of Employment Non-Compliance (ENC) for firm $i$ in

[4]Links to the source documents held by the International Labor Organization online can be found here for 2010 and here for 2013.

sector $s$ in location $l$ in year $t$ to the minimum wage law as

$$ENC_{islt} = \frac{\sum_{r \in i} n_{rislt} \mathbf{1}\left[m_{is} - w_{rislt} > 0\right]}{\sum_{r \in i} n_{rislt}} \tag{9}$$

Where $r$ indexes the wage range and $n_{rislt}$ is the number of workers with wages in that range. $m_{is}$ is the applicable sectoral minimum wage and $w_{rislt}$ is the applicable wage for that range. Since the reported wage-range bands do not line-up exactly with the minimum wage, I construct three measures of the ENC. The preferred estimate assumes a uniform distribution of wages across each range to calculate the share of employees paid below the minimum wage. The lower-bound estimate counts only employees in ranges explicitly below the minimum wage and the upper-bound estimate includes all employees in a range that overlaps with the minimum wage. The term $ENC_{islt}$ multiplied by 100 is the percent of employees in the firm which are paid below the minimum wage. In 2007, 24.3% of employees were paid wages below the proposed minimum wage. In 2010, when the law was enacted, 13.3% of employees were still paid below the minimum wage. This represents a 45% rate of compliance with the new law among all employees. This is inline with the findings of Bhorat *et al.* (2017) for Sub-Saharan African countries, although Tanzania is an outlier with only 20% compliance in their study. At the firm level, I estimate the rate of non-compliance as an event study, limiting my attention to the period 2005-2013 to avoid changes caused by the reform.

$$ENC_{islt} = \beta_0 + \sum_{t \neq 2007} \delta_t + \boldsymbol{\mu}_s + \boldsymbol{\lambda}_l + \varepsilon_{islt} \tag{10}$$

Where $\boldsymbol{\mu}_s$ are sector fixed effects and $\boldsymbol{\lambda}_l$ are district fixed effects. The $\delta_t$ coefficients capture the share of employees in each year that are paid below the minimum wage relative to the pre-policy year. I plot the coefficients for each estimate in Figure 12. For the preferred estimate, the rate of non-compliance falls by 14% in 2010 and continues to trend down. The results for the lower-bound are similar. Conversely, there is no observed decline in non-compliance for the upper-bound. This likely reflects an increase of workers, who were previously paid below the minimum wage, now receiving wages just above. Finally, I display the results for the set of firms for which the reported

wage ranges match exactly the relative minimum wage. The results are very similar to those for the preferred estimate.

An alternative approach that has been used in the literature is to define the proportional increase in a firm's wage bill that would be needed to bring all workers up to the minimum wage (Card & Krueger, 1994; Draca *et al.*, 2011; Dustmann *et al.*, 2020). The GAP measure is defined as

$$GAP_{islt} = \frac{\sum_{r \in i} n_{rislt} \min\{0, m_{is} - \bar{w}_{rislt}\}}{\sum_{r \in i} n_{rislt} \bar{w}_{rislt}} \tag{11}$$

Where $\bar{w}_{rislt}$ is the average wage of workers in wage range $r$ assuming a uniform distribution of wages in each range. $GAP_{islt}$ measures the percent by which a firm would need to raise its wages to be fully compliant with the minimum wage law. In Figure 13, I plot the event study results for the preferred ENC estimate against those for the GAP measure. Relative to the employment share, the wage share has a larger immediate drop and is constant.

While event studies show that the law did effect the wages of workers who were subject to the law, they are not informative about the absolute levels of compliance. In Figure 14, I plot the ENC and GAP levels. In 2010, the ENC was 13.3%, as noted above, and fell to 6.9% by 2013. Similarly, the GAP levels are 7.1 and 5.5% in 2010 and 2013, respectively. Together, this indicates that there were high levels of compliance with the minimum wage law.

# 6 Local Employment Elasticity

The goal of this section is to estimate the elasticity of employment with respect to wages in local labor markets. As seen in Table 2, the minimum wage is much less than the average wage, so its indirect effect on employment through wages may be small. However, any disemployment effects are likely to be strongest among less skilled workers (Neumark & Munguía Corella, 2021). To assess how the minimum wage laws affected employment in this context, I define the average pre-policy sectoral exposure measure as

$$\overline{GAP}_{sl} = \sum_{t=2005}^{2007} \sum_{i=1}^{N_{sl}} \frac{GAP_{islt}}{3N_{sl}} \tag{12}$$

The $\overline{GAP}_{sl}$ measures the percent by which an average firm in sector $s$ in location $l$ would need to raise its wages to be fully in compliance with the minimum wage. I then estimate the change in sectoral employment between 2007 and 2010 using the sectoral GAP measure (12) as an instrument for the change in average wages:

$$\Delta \log e_{slt} = \beta_0 + \beta_1 \Delta \log w_{slt} + \boldsymbol{\mu}_s + \boldsymbol{\lambda}_l + \Gamma \mathbf{X}_{islt} + \varepsilon_{slt} \tag{13}$$

$$\Delta \log w_{slt} = \alpha_0 + \alpha_1 \overline{GAP}_{slt} + \boldsymbol{\mu}_s + \boldsymbol{\lambda}_l + \kappa \mathbf{X}_{islt} + \nu_{slt} \tag{14}$$

Where $\log e_{islt}$ and $\log w_{islt}$ are log employment and average wages, respectively. $\boldsymbol{\mu}_s$ are sector fixed effects, $\boldsymbol{\lambda}_l$ are district fixed effects and $\mathbf{X}_{slt}$ is a vector of controls which includes the log Herfindahl-Hirschman index, log employment share in the largest sector, and log total number of firms.

I report the results of (13) in Table 3. In column (1) I report the first-stage results. The GAP estimate is 0.81 ($p < 0.01$). This should not be interpreted directly as an estimate of the compliance rate since the average wage covers all employees. Hence changes in the average wage may also reflect increases in pay to workers above the minimum wage. Instead, this coefficient captures the wage elasticity of the bite of the minimum wage (the share of the payroll that is affected by the minimum wage). Column (2) reports the reduced form results. Again, this should be interpreted as the employment elasticity of the bite of the minimum wage. I estimate an elasticity of 0.46 ($p < 0.05$), suggesting that firms have monopsony power. Column (4) reports the results of (13). The first-stage F-statistic is 49.9 and I estimate a positive employment elasticity of 0.57 ($p < 0.05$). This result is consistent with the findings of Magruder (2013) in Indonesia. He explains this result via a big push theory where the increases in the minimum wage is enough to cause a big push out of informal and into formal employment.

To assess whether the minimum wage law had any spillover effects, I re-estimate the local employment elasticity for casual workers, who are not covered by the law, in Table 4. The wage elasticity of the minimum wage bite in column (1) is comparable in magnitude to that of formal workers, though statistically insignificant. However, the employment effect is negative and the

instrumented employment elasticity is negative, although the F-stat is small. The lack of observed effect in this table should be interpreted with caution. More than half of the district-sector pairs do not have observed casual employment in one of the years. If a sector began using casual labor in response to the minimum wage law, then it would be omitted from the estimation. Indeed, 184 district-sector pairs had positive levels of casual employment in 2010 and no observed casual employment in 2007–double the number that had positive levels in both years. This suggests that the employment elasticities likely reflect lower bounds. An increase in casual labor could be explained by either an increase in labor supply or an increase in labor demand caused by firms substituting into casual labor in response to the minimum wage law.

# 7 Migration Elasticity Estimation

The goal of this section is to estimate the elasticity of migration with respect to expected income. I assume that the value of the outside option is one, and calibrate $\rho = 2$.[5] I estimate the model in two stages. In the first stage, I estimate the probability of not migrating out of the origin district. This yields an estimate for the origin risk aversion parameter. I first estimate the model as a cross section for the period following the minimum wage law

$$\ln \pi_{oo} = \theta_o \ln \left( \frac{e_o \left( w_o^{1-\rho} - 1 \right)}{1-\rho} \right) + \beta X_o + \varepsilon_o \tag{15}$$

Where $w_o$ is the average wage in district $o$ in the period 2010-2014, $e_o$ is the employment rate, and $X_o$ is a vector of controls including origin fixed effects as well as a control for log labor force size and the log stock of migrants out of the origin. $\varepsilon_o$ is the unobserved idiosyncratic component and captures $\theta \ln B_o$. To control for time-invariant location effects, I also estimate the model in first differences

$$\ln \left( \frac{\pi_{oot}}{\pi_{oot-1}} \right) = \theta_o \Big( \ln \left( \frac{e_{ot} \left( w_{ot}^{1-\rho} - 1 \right)}{1-\rho} \right) - \ln \left( \frac{e_{ot-1} \left( w_{ot-1}^{1-\rho} - 1 \right)}{1-\rho} \right) \Big) + \beta \Delta X_{ot} + \nu_{ot} \tag{16}$$

Where $\Delta X_{ot}$ are changes in the stock of out migrants, and the labor force size.

[5] In Appendix A, I compare the results for various values of $\rho$ and the results are unchanged.

I report the estimation results of (15) in Table **??**. Column (1) reports the direct effect of the minimum wage on non-migration. The results indicate that a 10% increase in the minimum wage reduces the rate of out migration by 2.1% $(p < 0.01)$. Conversely, column (2) reports the direct effect of the wage. There is no effect. This suggests that a spatial equilibrium model that does not account for the employment rate will fail to find any effect of wages on migration. Column (4) reports the results for the Harris & Todaro model. The coefficient is less than that of the model with amenities and risk aversion in column (4). This suggests that wages are negatively correlated with amenities. Indeed, when I instrument for wages using the minimum wage in column (5), the coefficient on migration is higher. These results indicate that a 10% increase in expected income at the origin reduces the rate of out migration by 0.4% $(p < 0.01)$. In Table **??**, I report the first-differences model results and find a slightly larger effect on expected income reducing out migration.

## 7.1 Conditional Migration

In the second stage, I estimate the probability of migrating to $d$ conditional on migrating. Due to the large number of district pairs with zero observed migration flows, I estimate the model via Poisson.[6] I again assume that the value of the outside option is one and estimate the probability of migrating from $o$ to $d$ via Poisson two-step GMM as

$$n_{odt} = N_{o,t-1} \exp\left(\theta \ln\left(e_{dt} \frac{w_{dt}^{1-\rho} - 1}{1-\rho}\right) + \kappa \ln \tau_{od} + \beta X_{odt}\right) + \varepsilon_{odt} \tag{18}$$

[6] Let $\tilde{\pi}_{od}$ be the probability of migrating from $o$ to $d$ conditional on migrating. Applying Bayes rule yields

$$\begin{aligned}
\tilde{\pi}_{od} =& \Pr\left(V_{od} \geq \max_{k \in L \setminus o} V_{ok} | V_{od} > V_{oo}\right) = \frac{\Pr\left(V_{od} \geq \max_{k \in L \setminus o} V_{ok}\right)}{1 - \pi_{oo}} \\
\ln \tilde{\pi}_{od} =& \theta \ln B_d + \theta \ln \tau_{od} + \theta \ln\left(e_d \frac{w_d^{1-\rho} - 1}{1-\rho} + (1 - e_d) \frac{\bar{w}_d^{1-\rho} - 1}{1-\rho}\right) - \hat{\Phi}_o - \ln(1 - \pi_{oo})
\end{aligned} \tag{17}$$

Where $\hat{\Phi}_o = \Phi_o - V_{oo}^{\theta}$. Putting the last term in Equation (17) on the left hand side yields

$$\ln \tilde{\pi}_{od} + \ln(1 - \pi_{oo}) = \ln\left(\frac{n_{od}}{N_{o,t-1} - n_{oo}} \times \frac{N_{o,t-1} - n_{oo}}{N_{o,t-1}}\right) = \ln \pi_{od}$$

Where $\ln \tau_{od}$ is the log distance between the centroids of $o$ and $d$ and captures the variable cost of migration. $X_{odt}$ is a vector of controls that includes origin fixed effects as well as controls for log population at the origin and destination and the stock of migrants from $o$ in $d$. The large number of zero observed flows that make the Poisson model desirable, also make estimation of first-differences intractable. For estimation by first-differences to eliminate the time-invariant components of the model, namely the fixed cost of migration, the zero observed flows would need to be recoded as positive values.

In Table 7 I report the results for the migration model. The direct effect of the minimum wage is large. A 1% increase in the minimum wage increases migration to the destination by 3.4% $(p < 0.01)$. The Harris & Todaro model performs well. The coefficient on expected income is assumed to be one in their model and that value falls within the 95% confidence interval of the estimate. The Poisson income elasticity is smaller than the value that I find when I instrument for wages, 0.37 vs. 0.52 $(p < 0.01)$, respectively. This confirms that wages are negatively correlated with amenities. This result contradicts the findings of Gollin *et al.* (2021) that amenities are at least as high in urban areas as rural areas. This is a puzzle and an area for future research.

To put these results in context, I estimate the variable cost of migration by the log distance between the origin and destination. A one percent increase in distance reduces migration by 0.58% $(p < 0.01)$. This is slightly larger than the coefficient on expected income and may partially reflect information frictions; migrants from further away may have less information about local labor market conditions at the destination. The origin non-migration elasticity is an order of magnitude smaller than the conditional migration elasticity. This suggests that the fixed costs of migration are large and is consistent with empirical evidence across a number of countries (Lagakos *et al.*, 2018; Morten, 2019; Imbert & Papp, 2020; Lagakos, 2020).

## 7.2 Gender Differences

Figure 15 plots the rate of non-compliance separately for men and women. The rate of compliance is only marginally higher for men and both follow the same trend. Given that wages are typically lower

for women than for men, the minimum wage law may have a differential affect across genders.

To assess whether migrants internalize the difference differential effect on wages, in tables 8 and 9, I report the migration results for males and females separately. As expected, the direct effect of the minimum wage is much larger for females than males, 4.6 vs. 3.4 $(p < 0.01)$, respectively. However, the income elasticity in column (5) is slightly smaller for women than men, indicating that women are less responsive to changes in wages than men, holding employment fixed.. This may reflect the fact that if women do not gain formal employment they are less likely to be employed in self-employment (Gindling & Newhouse, 2014).

# 8 Conclusion

The use of minimum wage laws in developing countries, particularly in Sub-Saharan Africa, is on the rise. As populations becomes increasingly urbanized, understanding the effects of minimum wage laws is critical. In 2010, Tanzania enacted a complex minimum wage law that dictates specific levels for more than 20 sectors, as well as a national floor. I find evidence of partial compliance that led to both higher average wages and increased formal employment. The law also affected the location decision of workers. I estimate a migration elasticity of expected income of one-half, which suggests that employment is more important than wages in choosing a destination and that urban guaranteed employment programs such as that in Addis Ababa (see Franklin *et al.* (2021)) are more likely to promote urbanization that policies than increase local wages. This finding is driven by variation in the average minimum wage across locations.

I combine novel data from Tanzania's annual census of firms, two separate migration datasets, and minimum wage data to perform this analysis. These results contribute to the minimum wage literature by showing that even when enforcement may be low, minimum wages do have an effect on labor market conditions. These results also inform the migration literature by assessing the extent to which expected income influences the destination choice, and provide evidence that individuals are aware of minimum wages when choosing their destination.

Together, these results suggest that variable minimum wage laws can be used to reallocate labor

into more productive sectors even under partial compliance. However, this does not inform what effect a uniform minimum wage law may have. Ideally, one would like to observe the wages paid to each worker in the same firm over time. Data limitations prevent me from performing this type of analysis. Hence, this paper should be seen as a first step in understanding the full effects of minimum wage laws in developing countries.

# References

Almeida, Rita, & Carneiro, Pedro. 2012. Enforcement of labor regulation and informality. *American Economic Journal: Applied Economics*, **4**(3), 64–89.

Baseler, Travis. 2021. *Hidden Income and the Perceived Returns to Migration: Experimental Evidence from Kenya*.

Bhorat, Haroon, Kanbur, Ravi, & Stanwix, Benjamin. 2017. Minimum wages in sub-saharan Africa: A primer. *World Bank Research Observer*, **32**(1), 21–74.

Bryan, Gharad, & Morten, Melanie. 2019. The Aggregate Productivity Effects of Internal Migration: Evidence from Indonesia. *Journal of political economy*, **127**(5), 2229–2268.

Bryan, Gharad, Chowdhury, Shyamal, & Mobarak, Ahmed Mushfiq. 2014. Under-investment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh. *Econometrica*, **82**(5), 1671–1748.

Bryan, Gharad, Chowdhury, Shyamal, Mobarak, Ahmed Mushfiq, Morten, Melanie, & Smits, Joeri. 2021. *Encouragement and distortionary effects of conditional cash transfers*. Discussion Papers 1085. Economic Growth Center at EliScholar – A Digital Platform for Scholarly Publishing at Yale.

Card, David, & Krueger, Alan. 1994. Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American economic review*, **84**, 772–784.

Cengiz, Doruk, Dube, Arindrajit, Lindner, Attila, & Zipperer, Ben. 2019. The Effect of Minimum Wages on Low-Wage Jobs. *Quarterly Journal of Economics*, **134**(3), 1405–1454.

Davis, Steven J, Faberman, R Jason, & Haltiwanger, John C. 2013. The establishment-level behavior of vacancies and hiring. *Quarterly journal of economics*, **128**(2), 581–622.

Derenoncourt, Ellora. 2021. *Can you move to opportunity? Evidence from the Great Migration*. Mimeo.

Derenoncourt, Ellora, Noelke, Clemens, & Weil, David. 2021. *Spillover effects from voluntary employer minimum wages*. Mimeo.

Diamond, Rebecca. 2016. The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill : 1980-2000. *American Economic Review*, **106**(3), 479–524.

Draca, Mirko, Machin, Stephen, & Van Reenen, John. 2011. Minimum Wages and Firm Profitability. *American economic journal: Applied economics*, **3**(1), 129–151.

Dustmann, Christian, Lindner, Attila, Schönberg, Uta, Umkehrer, Matthias, & vom Berge, Philipp. 2020. *Reallocation Effects of the Minimum Wage*. Discussion Paper CDP 07/20. Centre for Research and Analysis of Migration.

Employment and Labour Relations Act. 2004. United Republic of Tanzania.

Franklin, Simon, Imbert, Clement, Abebe, Girum, & Mejia-Mantilla, Carolina. 2021. *Urban Public Works in Spatial Equilibrium: Experimental Evidence from Ethiopia*. Mimeo.

Gindling, T. H., & Newhouse, David. 2014. Self-Employment in the Developing World. *World development*, **56**, 313–331.

Gollin, Douglas, Lagakos, David, & Waugh, Michael E. 2014. The Agricultural Productivity Gap. *Quarterly Journal of Economics*, **129**(2), 939–993.

Gollin, Douglas, Kirchberger, Martina, & Lagakos, David. 2021. Do urban wage premia reflect lower amenities? Evidence from Africa. *Journal of Urban Economics*, **121**.

Harris, John R, & Todaro, Michael P. 1970. Migration, Unemployment and Developmnent: A Two-Sector Analysis. *The American Economic Review*, **60**(1), 126–142.

Heblich, Stephan, Redding, Stephen J., & Sturm, Daniel M. 2020. The making of the modern metropolis: Evidence from London. *Quarterly Journal of Economics*, **135**(4), 2059–2133.

Hicks, Joan Hamory, Kleemans, Marieke, Li, Nicholas Y., & Miguel, Edward. 2021. Reevaluating Agricultural Productivity Gaps with Longitudinal Microdata. *Journal of the European Economic Association*, **19**(3), 1522–1555.

Holtemöller, Oliver, & Pohle, Felix. 2020. Employment effects of introducing a minimum wage: The case of Germany. *Economic Modelling*, **89**, 108–121.

Imbert, Clément, & Papp, John. 2020. Costs and Benefits of Rural-Urban Migration: Evidence from India. *Journal of Development Economics*, **146**, 1–17.

Kennan, John, & Walker, James R. 2011. The Effect of Expected Income on Individual Migration Decisions. *Econometrica*, **79**(1), 211–251.

Kleibergen, Frank, & Paap, Richard. 2006. Generalized reduced rank tests using the singular value decomposition. *Journal of econometrics*, **133**(1), 97–126.

Lagakos, David. 2020. Urban-Rural Gaps in the Developing World: Does Internal Migration Offer Opportunities? *Journal of Economic Perspectives*, **34**(3), 174–192.

Lagakos, David, Mobarak, Ahmed Mushfiq, & Waugh, Michael. 2018. *The Welfare Effects of Encouraging Rural-Urban Migration*. Working Paper 24193. NBER.

Lagakos, David, Marshall, Samuel, Mobarak, Ahmed Mushfiq, Vernot, Corey, & Waugh, Michael E. 2020. Migration costs and observational returns to migration in the developing world. *Journal of Monetary Economics*, **113**, 138–154.

Magruder, Jeremy R. 2013. Can minimum wages cause a big push? Evidence from Indonesia. *Journal of Development Economics*, **100**(1), 48–62.

Mansoor, Kashif, & O'Neill, Donal. 2021. Minimum wage compliance and household welfare: An analysis of over 1500 minimum wages in India. *World development*, **147**, 1–19.

Monras, Joan. 2018. *Economic Shocks and Internal Migration*. Discussion Paper No. DP12977. CEPR.

Monras, Joan. 2019. Minimum wages and spatial equilibrium: Theory and evidence. *Journal of labor economics*, **37**(3), 853–904.

Monte, Ferdinando, Redding, Stephen J., & Rossi-Hansberg, Esteban. 2018. Commuting, migration, and local employment elasticities. *American economic review*, **108**(12), 3855–3890.

Morten, Melanie. 2019. Temporary migration and endogenous risk sharing in village India. *Journal of Political Economy*, **127**(1), 1–46.

Neumark, David, & Munguía Corella, Luis Felipe. 2021. Do minimum wages reduce employment in developing countries? A survey and exploration of conflicting evidence. *World Development*, **137**, 1–23.

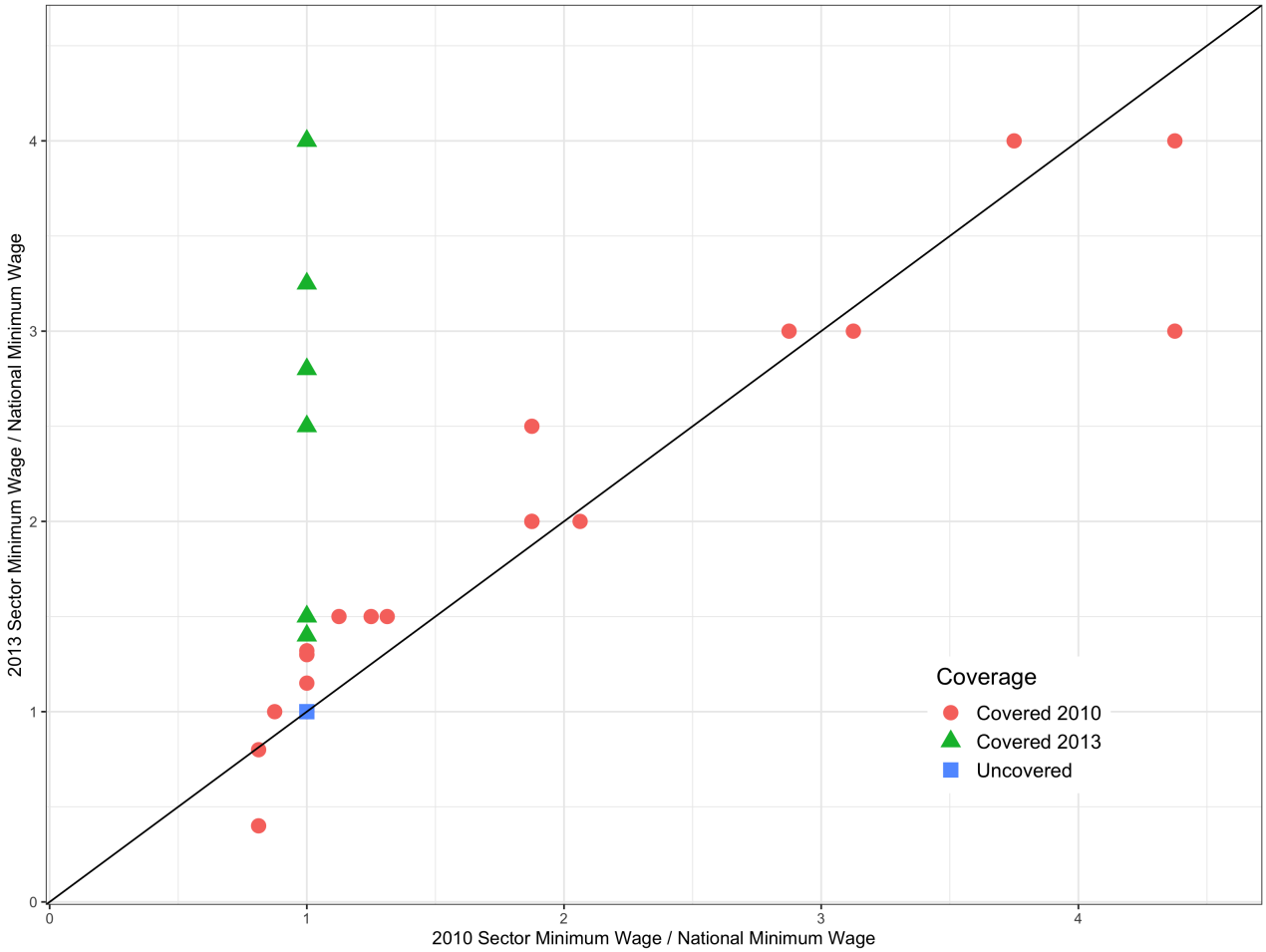
Rani, Uma, Belser, Patrick, & Oelz, Martin. 2013. Minimum wage coverage and compliance in developing countries. *International labour review*, **152**(3), 381–410.

Roback, Jennifer. 1982. Wages, Rents, and the Quality of Life. *Journal of political economy*, **90**(6), 1257–1278.

Young, Alwyn. 2013. Inequality, the Urban-Rural Gap, and Migration. *The Quarterly Journal of Economics*, **128**(4), 1727–1785.

# Figures & Tables

Figure 1: Changes in Sectoral Minimum Wages Relative to the National Minimum Wage



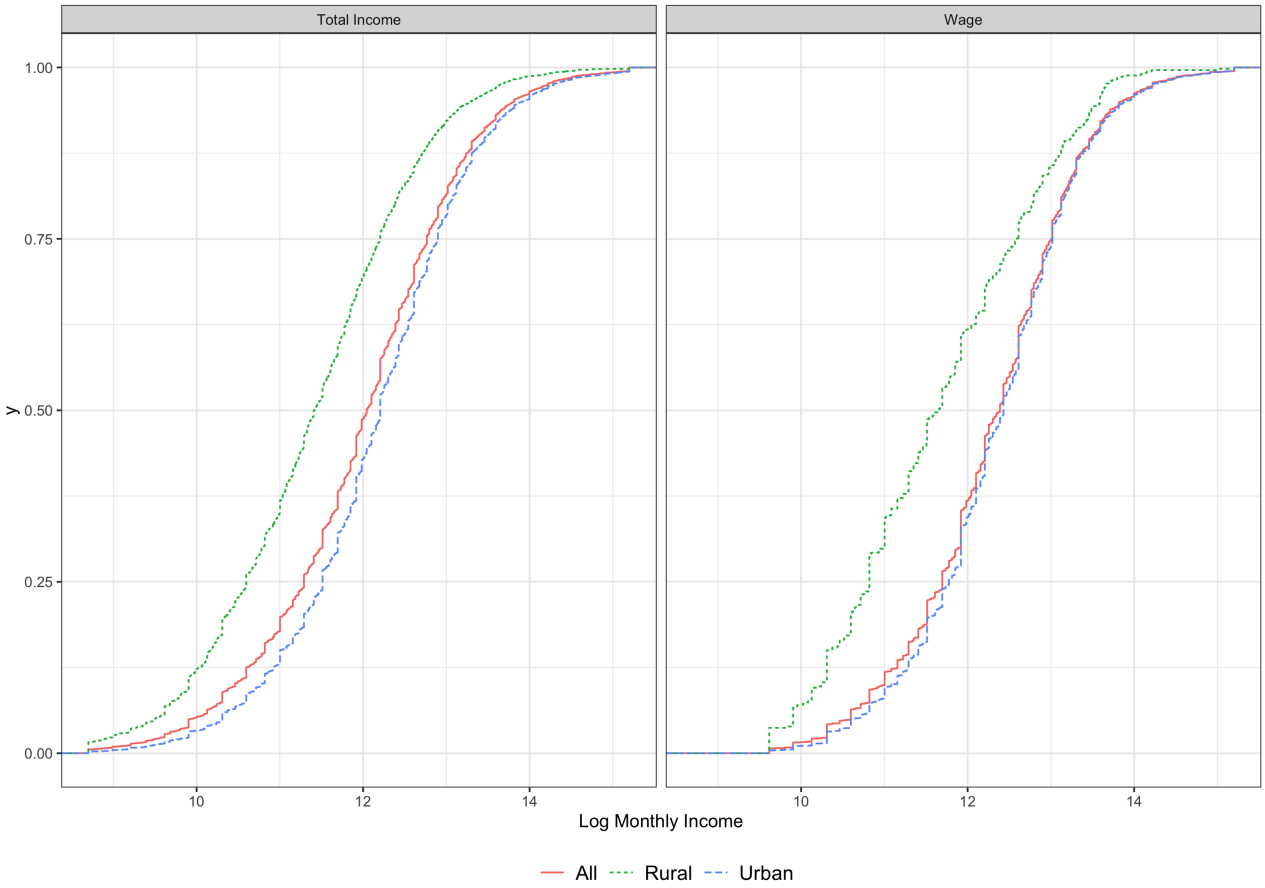

*Notes:* Plotting the federal minimum wage in each sector that was ever covered relative to the national minimum wage at that time. The black line is the 45 degree line. Circles correspond to sectors that were covered in the original 2010 law and triangles correspond to the sectors that were added in the 2013 revision.

Table 1: Two-Year Migration Rates by Type

| Sample | Year | Rural to | | | Urban to | | | District Migration | Region Migration |
|---|---|---|---|---|---|---|---|---|---|
| | | Rural (1) | Urban (2) | All (3) | Rural (4) | Urban (5) | All (6) | (7) | (8) |
| LSMS | 2008 | 2.27 | 1.68 | 3.96 | 1.73 | 2.95 | 4.68 | 4.24 | 2.67 |
| LSMS | 2010 | 3.21 | 1.75 | 4.96 | 2.62 | 4.04 | 6.65 | 5.40 | 3.61 |
| LSMS | 2012 | 4.20 | 2.03 | 6.23 | 4.12 | 4.26 | 8.37 | 6.72 | 4.43 |
| LSMS | 2014 | 4.30 | 3.32 | 7.63 | 3.84 | 7.56 | 11.40 | 8.55 | 5.42 |
| ILFS | 2014 | 2.78 | 2.43 | 5.21 | 1.82 | 2.92 | 4.74 | 5.24 | 3.68 |
| LSMS | 2019 | 2.83 | 0.81 | 3.64 | 3.68 | 7.14 | 10.82 | 5.61 | 3.30 |

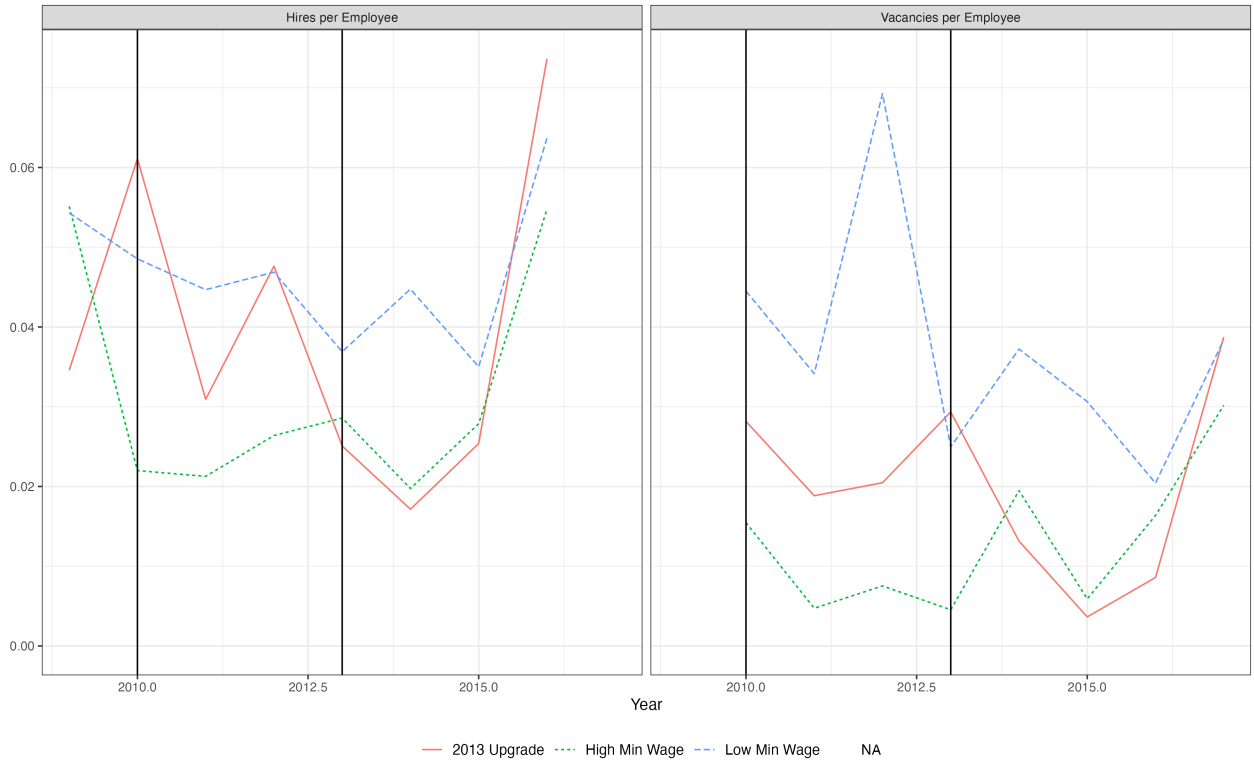
*Notes:* Reporting two-year migration rates in percent for each sample. Rural and urban migration episodes exclude migration within the district. All values are weighted by the respective sample's survey weights. Urban districts are defined as those for which at least half of the population was living in an urban area.

Figure 2: Cumulative Distribution of Wages at the District Level



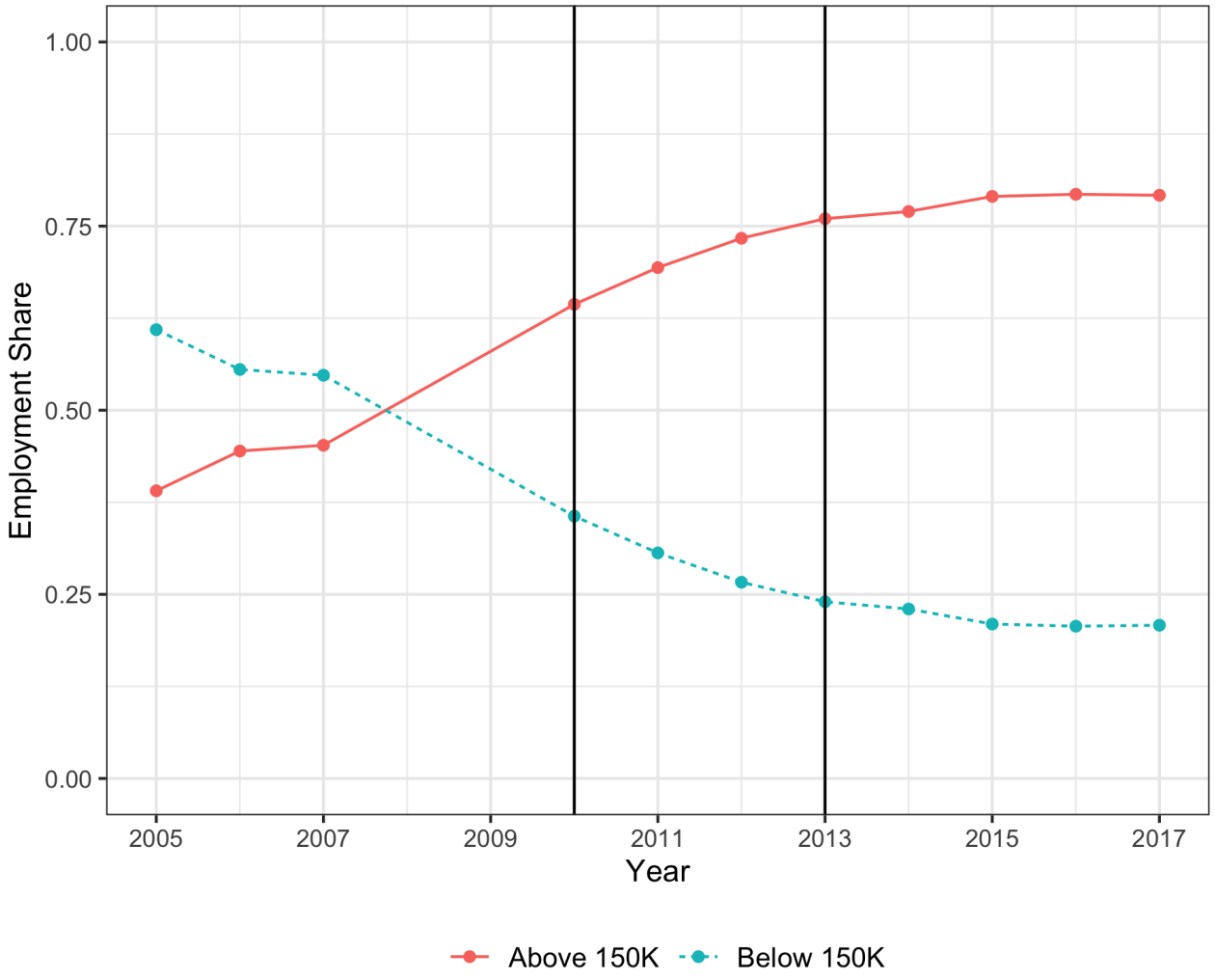

*Notes:* Displaying the CDF of log average monthly wages and income in the 2014 ILFS. Urban rural status is designated by whether the individual reports living in a rural or urban area. All values are weighted by survey weights.

Figure 3: Hires and Vacancies per Employee by Sectoral Minimum Wage



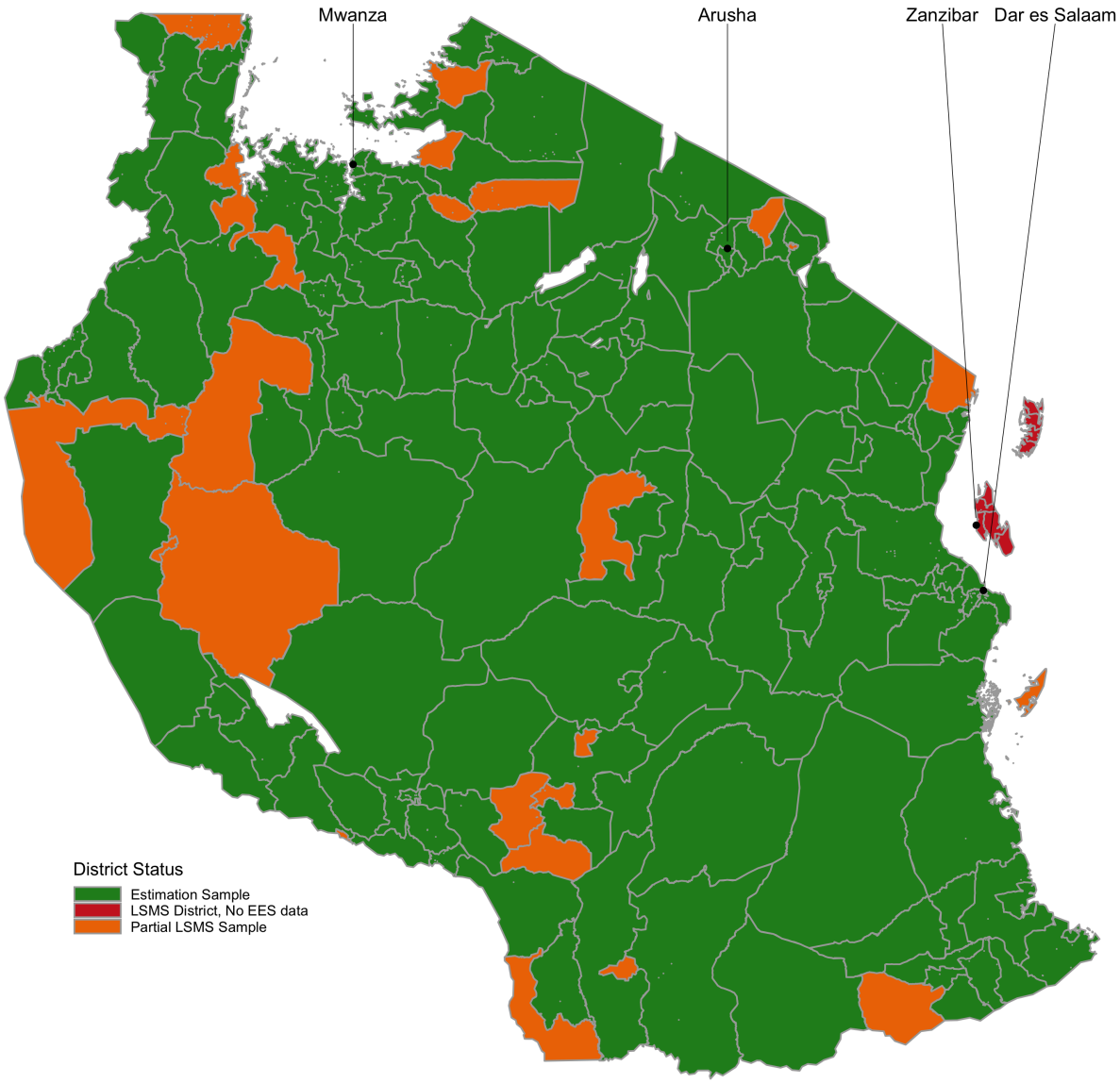

*Notes:* Displaying the total number of hires in the current year over total employment and the total number of vacancies during June of the current year over total employment. Sectors with a minimum wage above 150,000 TSH in 2010 and above 200,000 TSH in 2013 are defined as high wage sectors. 2013 upgrade refers to the sectors that changed from low to high minimum wage in the 2013 reform. The black lines indicates the date when the minimum wage laws were enacted.

Figure 4: Employment Share by Wage Band



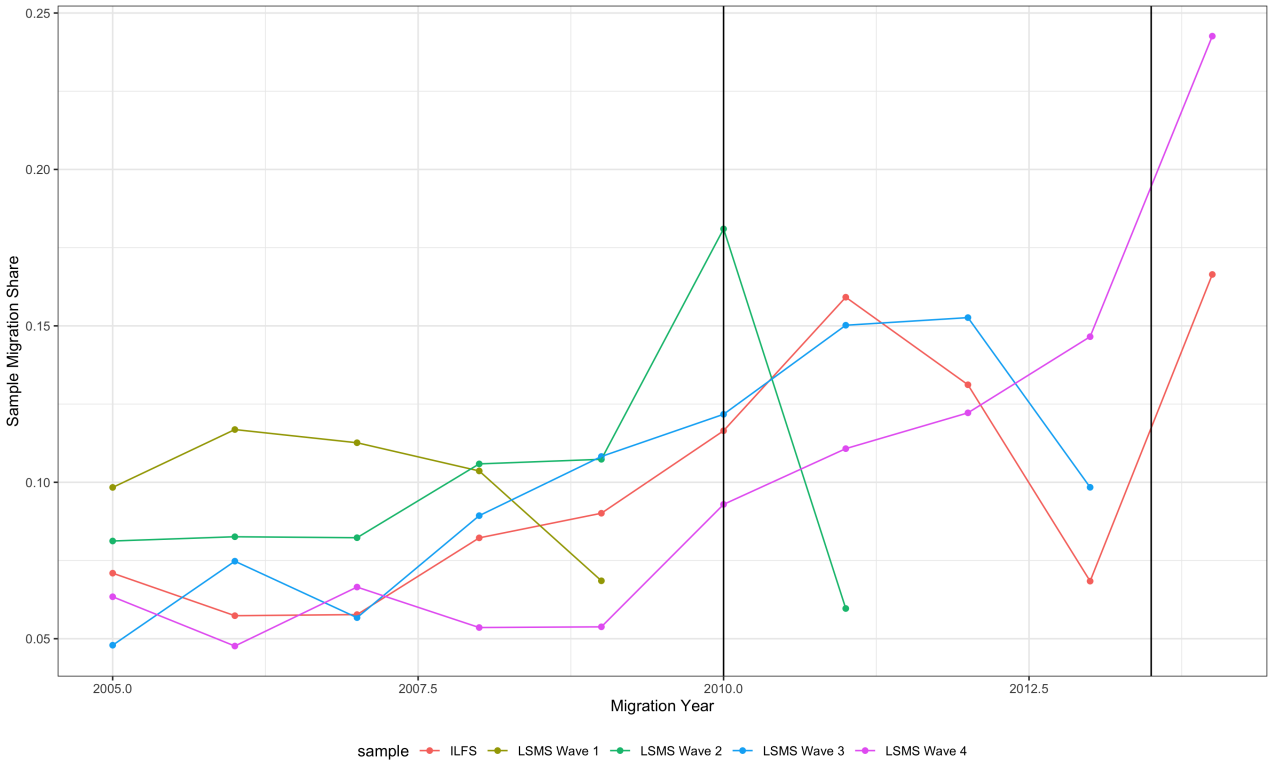

*Notes:* Displaying the share of workers earning above and below 150,000 TSH per month. The black lines indicates the date when the minimum wage laws were enacted. The sample does not include domestic workers, so the effective minimum wage in 2010 and 2013 is 70,000 and 100,000 TSH, respectively.

Figure 5: District Coverage Across Datasets



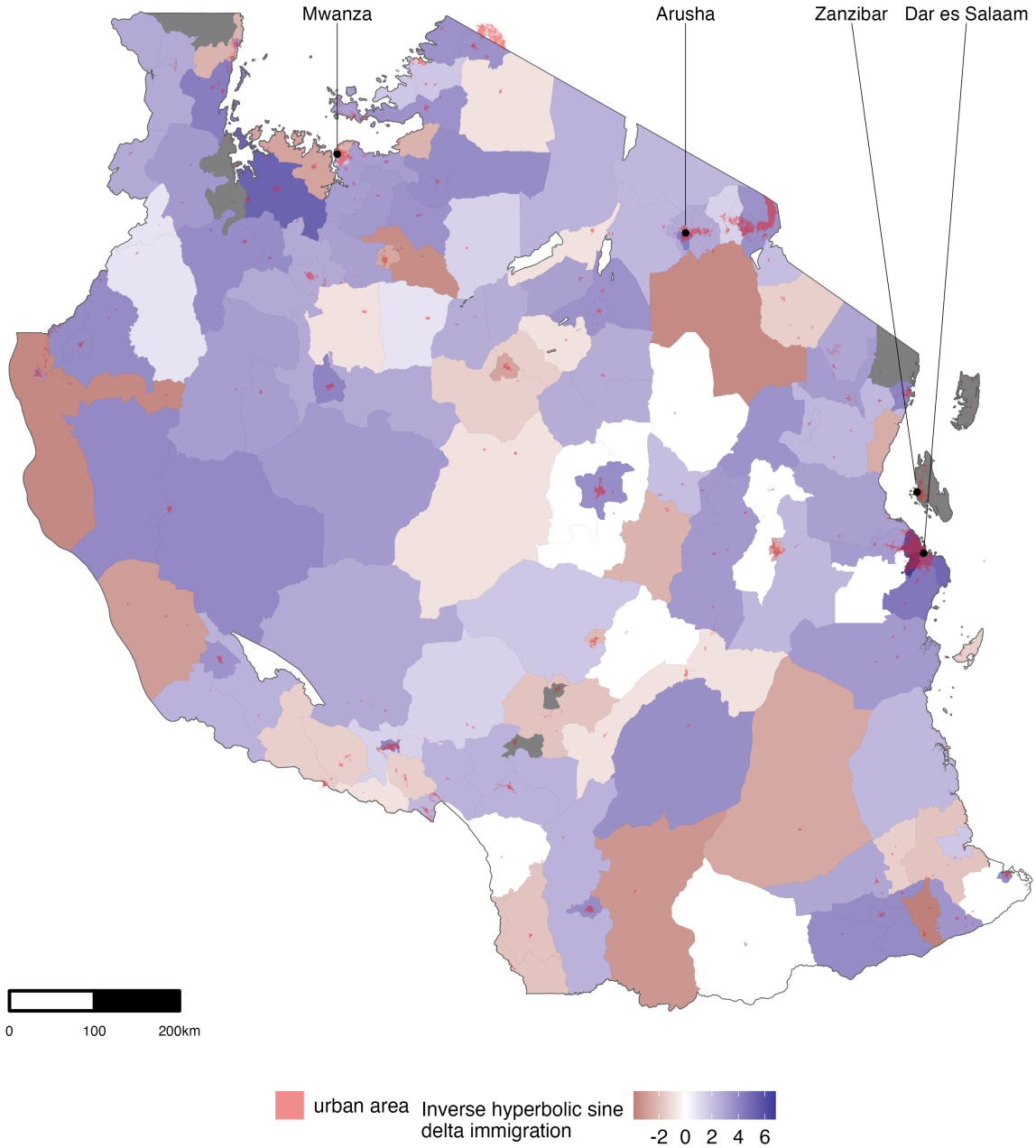

*Notes:* The 20 districts that were created in 2012 due to redistricting are counted as the single original district in the sample.

Figure 6: Share of Migrants by Year across Samples




*Notes:* Displaying the share of migrants who migrated after 2005. Rates are scaled by the number of years in the sample after 2005 so that the sums do not add to one. The two black lines indicate the point in time at which the two minimum wage laws were passed.

Figure 7: Change in Immigration in the five-year window before and after 2010



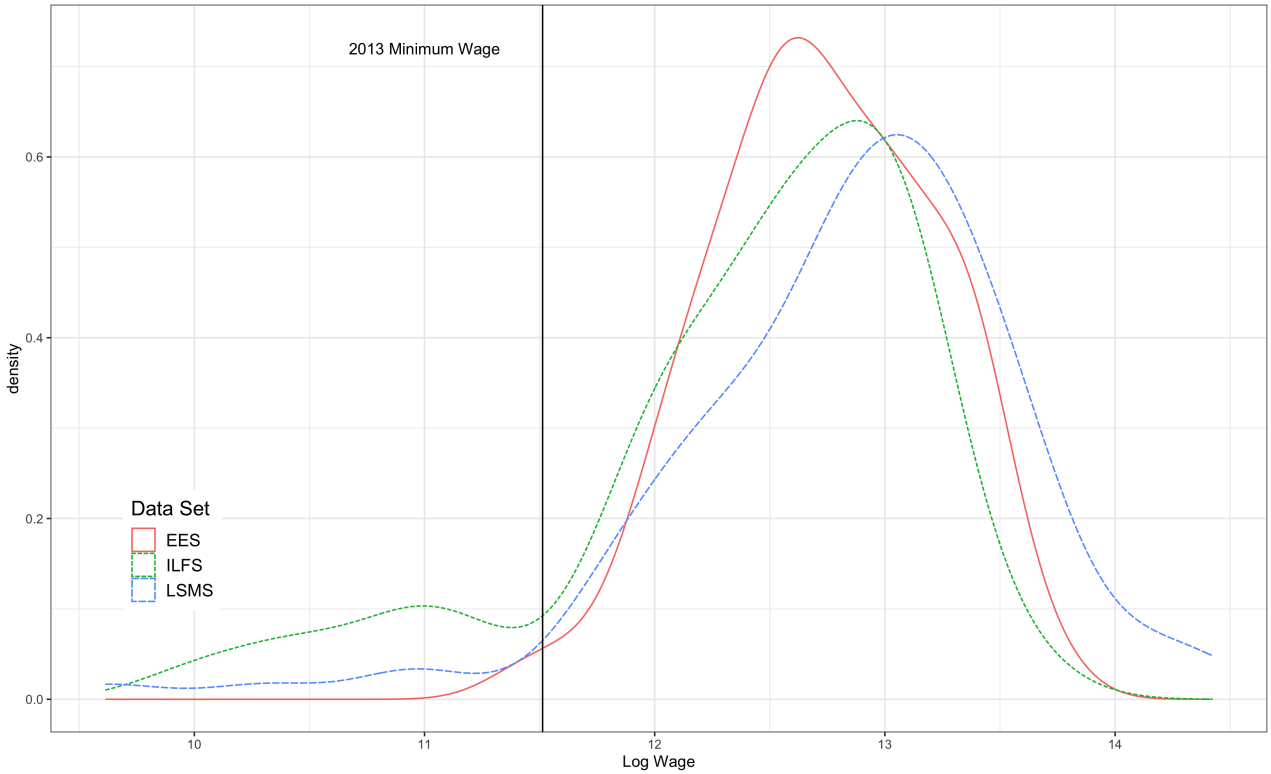

*Notes:* Displaying the inverse hyperbolic since of the change in immigration between the period 2005-2009 and 2010-2014. Red areas are are built up urban agglomerations. Districts in grey are missing data.

Table 2: Monthly Wage Summary Statistics

| Survey Year | 2005 | 2006 | 2007 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| *Panel A: All Employees:* | | | | | | | | |
| Wage | 324.3 | 401.4 | 347.9 | 348.7 | 339.3 | 362.1 | 371.1 | 380.5 |
| | (1436.2) | (1949.3) | (1638.8) | (271.8) | (274.9) | (333.5) | (329.2) | (319.6) |
| Wage + inkind | 411 | 513.9 | 438.7 | 391.5 | 379.3 | 403.7 | 402.1 | 407.2 |
| | (2092.8) | (2682.2) | (2108.3) | (322.8) | (310.3) | (371.6) | (356.9) | (344.1) |
| Minimum Wage | 0 | 0 | 0 | 86.4 | 76 | 66.1 | 61.3 | 90.3 |
| | (0) | (0) | (0) | (28.5) | (24.4) | (22.6) | (20.3) | (37.6) |
| *Panel B: Private Sector Employees:* | | | | | | | | |
| Wage | 308.1 | 341.4 | 288.9 | 269.1 | 263.1 | 325 | 340.4 | 335.9 |
| | (1455.3) | (1311) | (1237.6) | (258.6) | (267.2) | (364.1) | (377.5) | (359.1) |
| Wage + inkind | 394.1 | 452.9 | 379.2 | 314.8 | 302.2 | 362.8 | 374.5 | 367.3 |
| | (2016.2) | (1979.5) | (1722.9) | (324.5) | (317.5) | (401.5) | (410.9) | (389.6) |
| Minimum Wage | 0 | 0 | 0 | 89.6 | 78.6 | 68.4 | 63.5 | 94.6 |
| | (0) | (0) | (0) | (33.8) | (28.7) | (26.2) | (24.1) | (42.3) |

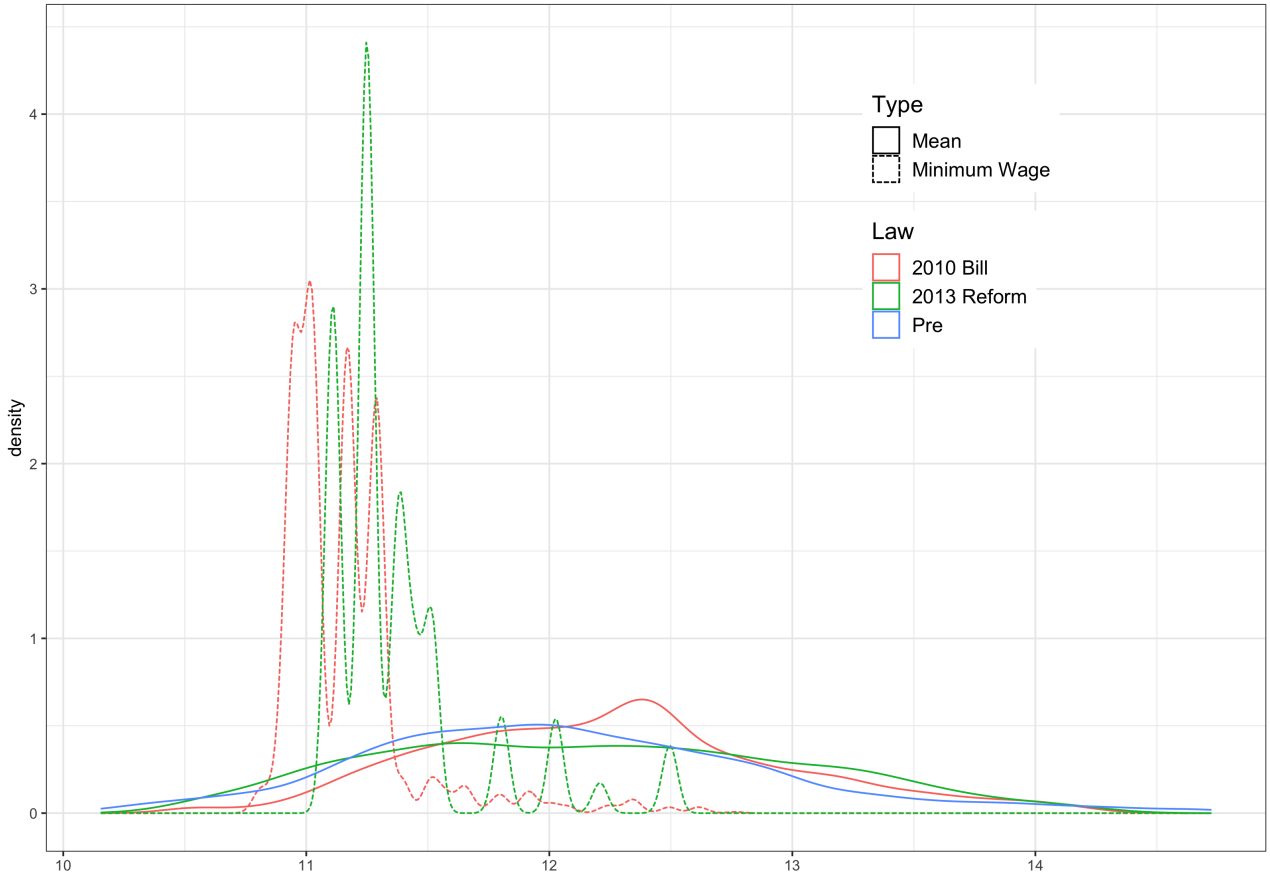
*Notes:* Source: EES. Reporting real average monthly wages in Thousands of TSH. Standard deviations in parenthesis. Wages are deflated using the Tanzanian CPI. All values are weighted by firm weight and the number of employees at the firm.

Figure 8: 2014 Average Monthly Wage in Three Datasets



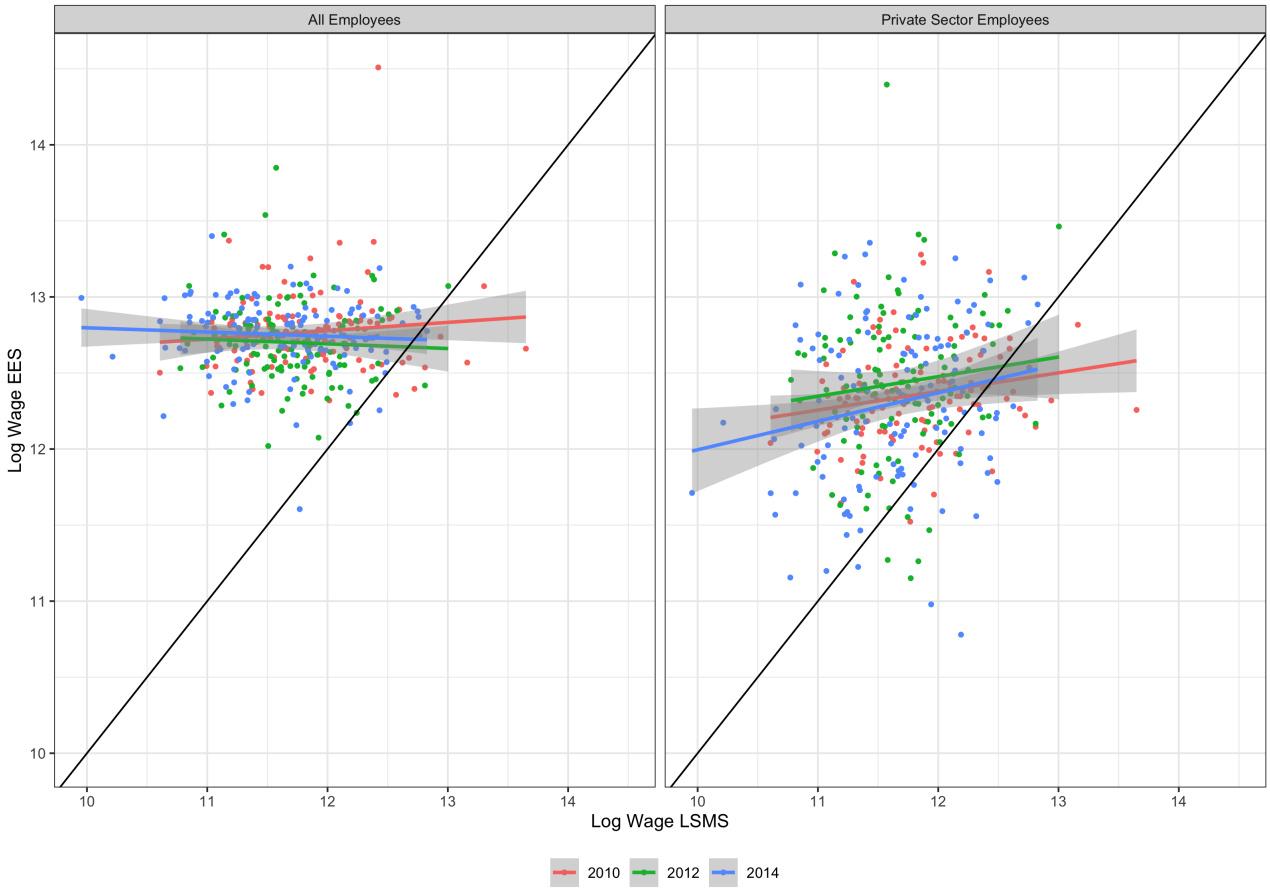

*Notes:* Plotting the distribution of log nominal mean wages across districts in the three datasets. All values are weighted by their respective survey weights. Excluding casual workers and public employers.

Figure 9: District-Industry Wage Densities by Current Wage Law



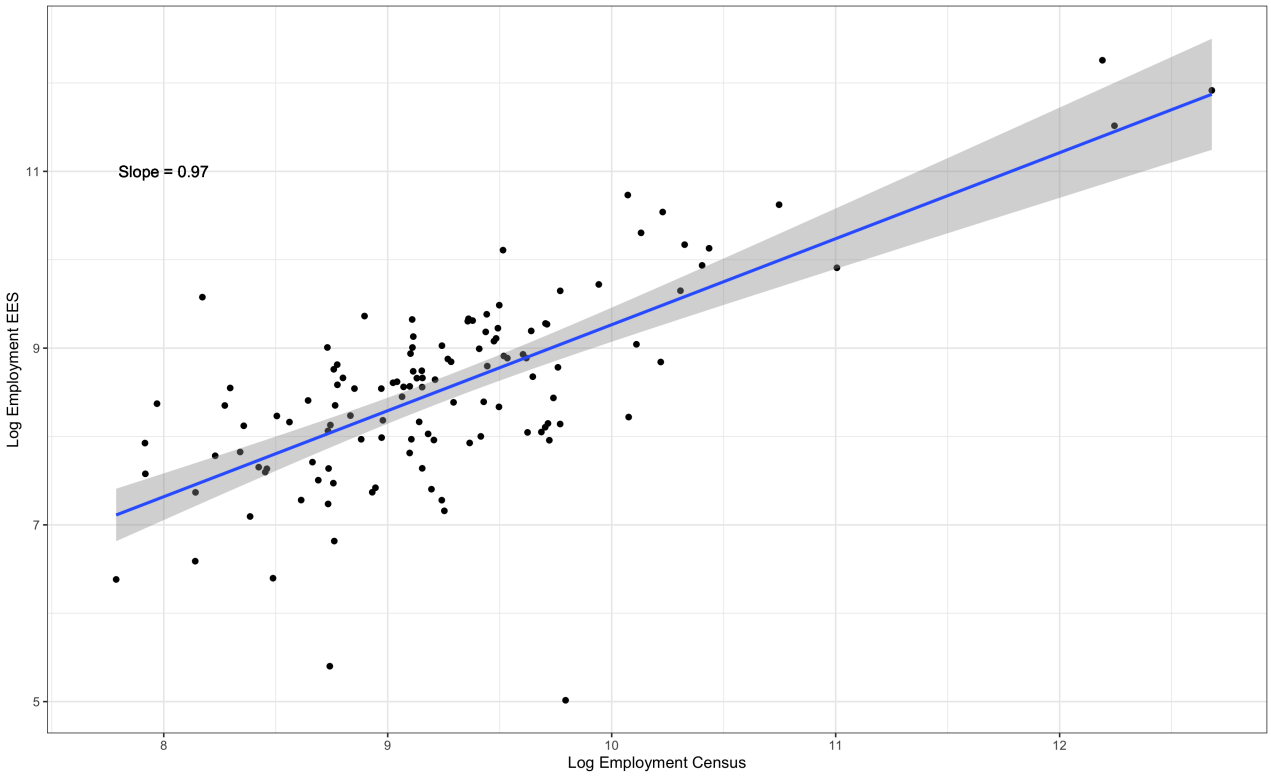

*Notes:* Source: EES. Plotting the distribution of real log mean wages (excluding inkind payments) by industry-district pair. All values are weighted by survey weights. Log wages are winsorized at the 1 and 99 percent levels.

Figure 10: District Wage in the EES and LSMS



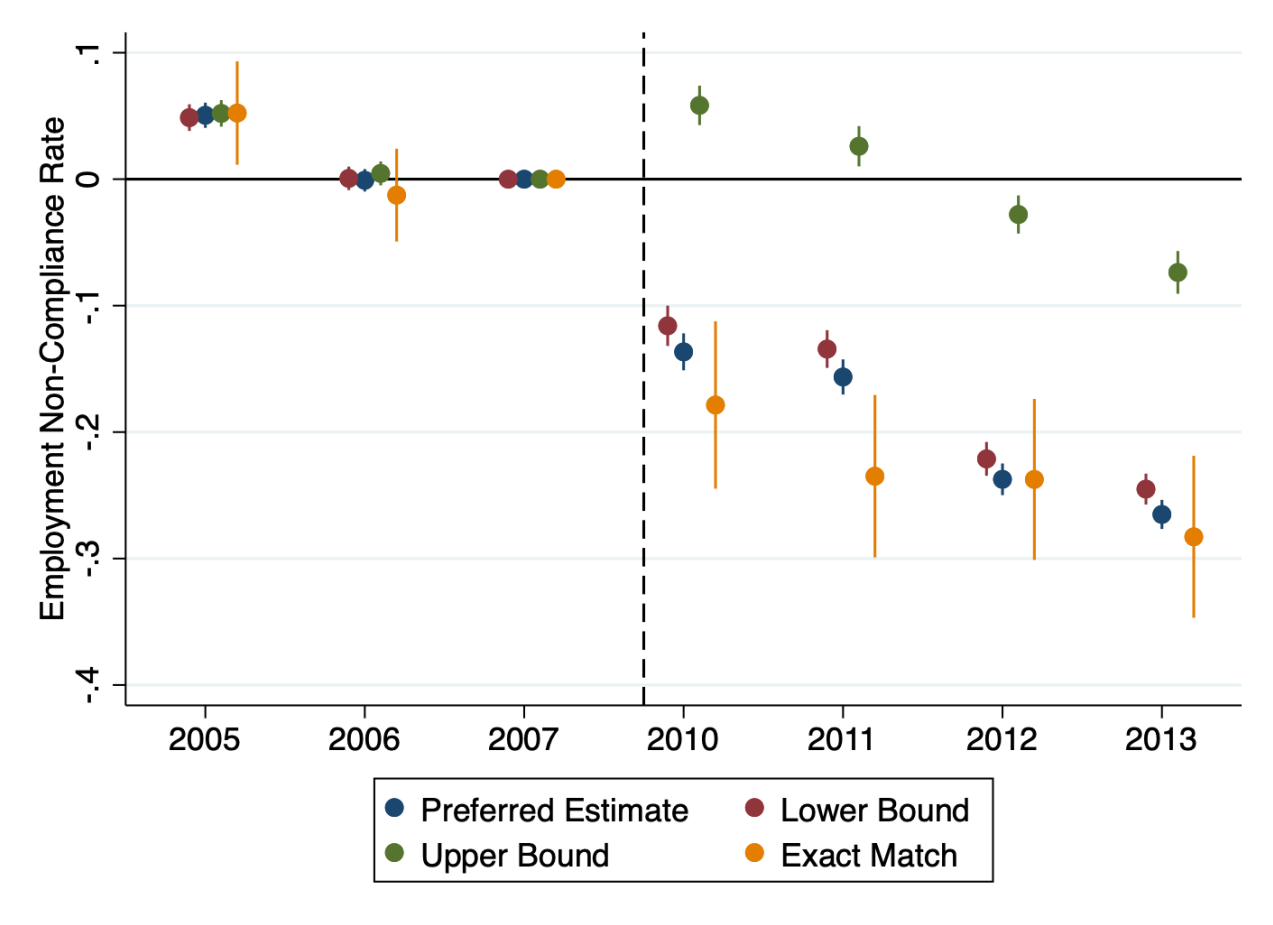

*Notes:* Displaying real log mean monthly wage (excluding inkind payments) by district. All values are weighted by their respective survey weights. The black line indicates the 45 degree line. The figure on the left includes all employees in the EES, while the figure on the right includes only employees in the private sector.

Figure 11: District Employment in the EES and Census




*Notes:* Displaying log employment in 2012 by district as measured using the EES and Census. All values are weighted by their respective survey weights. Butiama district is an outlier and not pictured.

Figure 12: Employment Minimum Wage Non-Compliance Event Study




*Notes:* Reporting the ENC coefficient estimates relative to the base year and 95% confidence intervals from equation (10). $N = 67,010$ firm-year observations. All regressions include district and sector fixed effects and are weighted using survey weights. The dashed line indicates the introduction of the 2010 minimum wage law.

Figure 13: Employment and Wage Bill Non-Compliance Rate Event Study


*Notes:* Reporting the ENC and GAP coefficient estimates relative to the base year and 95% confidence intervals from equation (10). $N = 67,010$ firm-year observations. All regressions include district and sector fixed effects and are weighted using survey weights. The dashed line indicates the introduction of the 2010 minimum wage law.

Figure 14: Employment and Wage Bill Non-Compliance Rate Levels


*Notes:* Reporting the ENC and GAP levels in each year and 95% confidence intervals. $N = 67,010$ firm-year observations. The wage share equation is weighted using survey weights and the employment equation is weighted using survey times employment weights. The dashed line indicates the introduction of the 2010 minimum wage law.

Table 3: Local Employment Elasticity

| | (1) $\Delta$ log wage | (2) $\Delta$ log empl | (3) $\Delta$ log empl | (4) $\Delta$ log empl |
|---|---|---|---|---|
| GAP | 0.806*** | 0.456** | | |
| | (0.114) | (0.209) | | |
| $\Delta$ log wage | | | 0.006 | 0.566** |
| | | | (0.124) | (0.230) |
| F-statistic | | | | 49.93 |
| District-Sector pairs | 521 | 521 | 521 | 521 |
| Estimation | OLS | OLS | OLS | IV |

*Notes:* Reporting the employment elasticities for the 2010 minimum wage law. $\Delta$ log wage is the change in real wages between 2007 and 2010. GAP measures the percentage by which firms would need to raise their wages to be in compliance with the minimum wage law. All columns include district and sector fixed effects as well as controls for the log HHI, log employment share in the largest industry, and the log number of firms. Robust standard errors clustered by sector in parenthesis. Reporting the Kleibergen & Paap cluster robust F-statistic. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 4: Spillover Effects to Casual Workers

| | (1) $\Delta$ log casual wage | (2) $\Delta$ log casual emp | (3) $\Delta$ log casual emp | (4) $\Delta$ log casual emp |
|---|---|---|---|---|
| GAP | 0.813 | -0.642 | | |
| | (0.508) | (1.726) | | |
| $\Delta$ log casual | | | -0.224 | -0.789 |
| wage | | | (0.207) | (1.444) |
| F-statistic | | | | 2.57 |
| District-Sector pairs | 182 | 182 | 182 | 182 |
| Estimation | OLS | OLS | OLS | IV |

*Notes:* Reporting the casual employment elasticities for the 2010 minimum wage law. $\Delta$ log casual wage is the change in real wages of casual workers between 2007 and 2010. GAP measures the percentage by which firms would need to raise their wages to be in compliance with the minimum wage law. All columns include district and sector fixed effects as well as controls for the log HHI, log employment share in the largest industry, and the log number of firms. Robust standard errors clustered by sector in parenthesis. Reporting the Kleibergen & Paap cluster robust F-statistic. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 5: Estimated Income Elasticity of Non-Migration

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 0.216*** | 0.007 | 0.011** | 0.021*** | 0.036*** |
| | (0.080) | (0.016) | (0.005) | (0.007) | (0.010) |
| F-statistic | | | | | 19.41 |
| Districts | 124 | 124 | 124 | 124 | 124 |
| Estimation | mw | w | HT | OLS | IV |

*Notes:* The table presents the elasticity of non-migration for non-migrants $(\theta)$ for various measure of income. Column 1 reports the minimum wage elasticity. Column 2 reports the wage elasticity without controlling for the employment rate. Column 3 reports the estimation results for the Harris-Todaro model (excluding controls and assuming risk neutrality). Columns (4) and (5) report the expected income elasticity calibrated with $(\rho = 2)$. Column (4) reports the OLS results and Column 5 reports the IV results, instrumenting for expected income using the average minimum wage in the district. The sample include migration data from the LSMS and ILFS for 2010-2014. Robust standard errors weighted by destination district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 6: Non-Migration Model First-Differences Comparison for $\rho = 2$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 0.108** | -0.007 | 0.004 | 0.004 | 0.063* |
| | (0.053) | (0.009) | (0.006) | (0.006) | (0.036) |
| F-statistic | | | | | 3.16 |
| Districts | 119 | 119 | 119 | 119 | 119 |
| Estimation | mw | w | HT | FD | FD-IV |

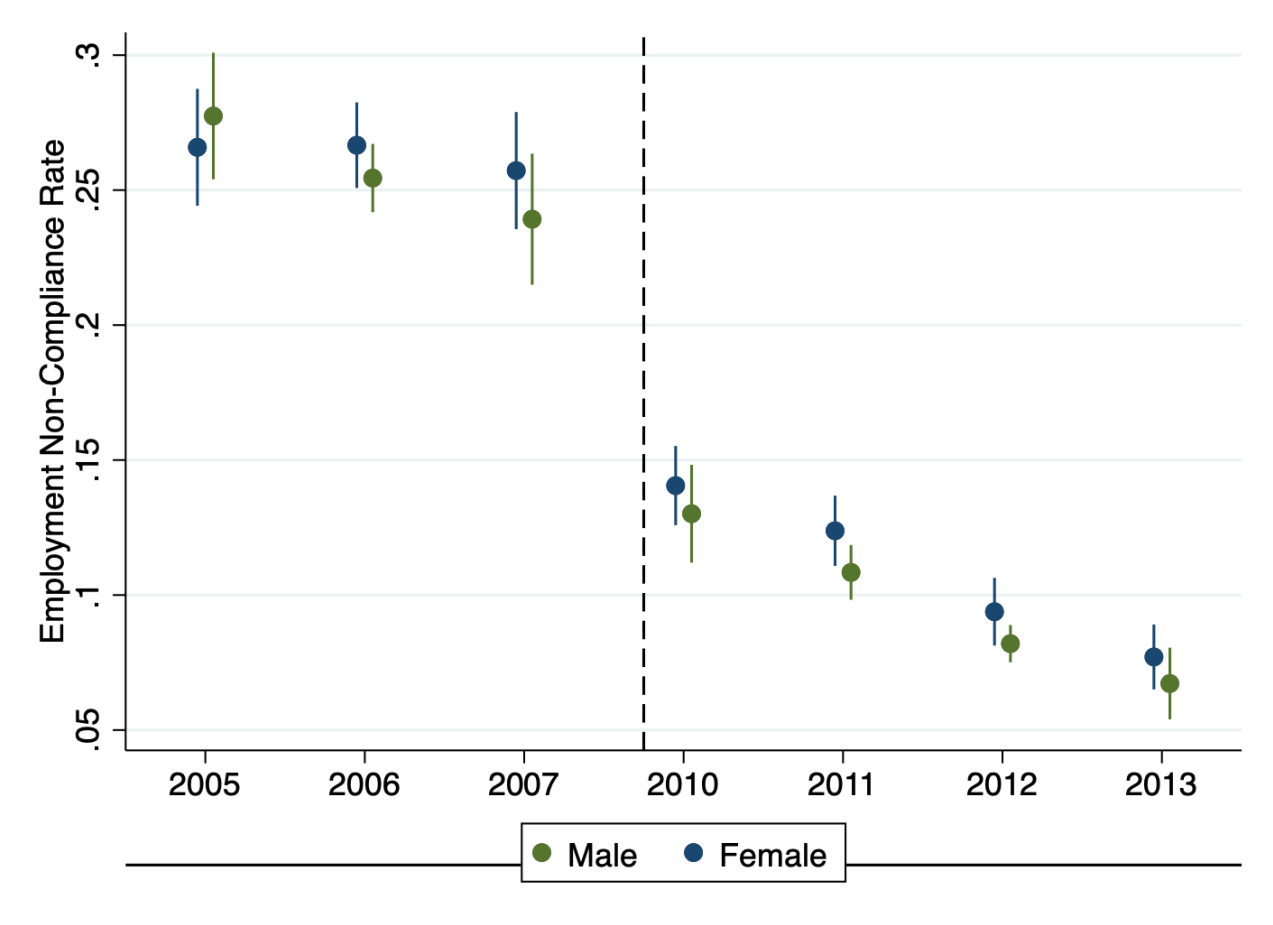
*Notes:* Reporting the first-differences in non-migration between 2005-2009 and 2010-2014. Column 1 reports the direct effect of the minimum wage. Column 2 reports the effect of the wage without controlling for the employment rate. Column 3 reports the estimation results for the Harris-Todaro model. Column 4 reports the OLS results for the migration model. Column 5 uses the migration model and instruments for expected income using the average minimum wage in the district. Robust standard errors weighted by district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 7: Estimated Income Elasticity of Migration among Migrants

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 3.382*** | 0.609** | 1.130*** | 0.368*** | 0.522*** |
| | (0.730) | (0.237) | (0.055) | (0.051) | (0.094) |
| log distance | -0.466*** | -0.467*** | | -0.542*** | -0.575*** |
| | (0.059) | (0.062) | | (0.060) | (0.062) |
| F-statistic | | | | | 230.66 |
| District Pairs | 15252 | 15252 | 15252 | 15252 | 15252 |
| Controls | Y | Y | N | Y | Y |
| Estimation | mw | w | HT | Poisson | IVP |

*Notes:* The table presents the elasticity of migration $(\theta)$ for various measure of income. Column 1 reports the minimum wage elasticity. Column 2 reports the wage elasticity without controlling for the employment rate. Column 3 reports the estimation results for the Harris-Todaro model (excluding controls and assuming risk neutrality). Columns (4) and (5) report the expected income elasticity calibrated with $(\rho = 2)$. Column (4) reports the poisson results and Column 5 reports the IV-Poisson (GMM) results, instrumenting for expected income using the average minimum wage in the district. The sample include migration data from the LSMS and ILFS for 2010-2014. Robust standard errors weighted by destination district starting population in parenthesis. $^{*}p < .1,^{**} p < .05,^{***} p < .01$

Figure 15: Minimum Wage Compliance Rate by Gender




*Notes:* Reporting share of male and female employees paid below the minimum wage in each year and 95% confidence intervals. $N = 65,533$ and 55,358 firm-year observations for males and females, respectively. The dashed line indicates the introduction of the 2010 minimum wage law. Coefficients to the left of the dashed line were not subject to the minimum wage law.

Table 8: Estimated Income Elasticity of Migration among Male Migrants

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 3.461*** | 0.546** | 1.112*** | 0.444*** | 0.580*** |
| | (0.722) | (0.248) | (0.065) | (0.057) | (0.101) |
| log distance | -0.618*** | -0.608*** | | -0.692*** | -0.717*** |
| | (0.075) | (0.078) | | (0.072) | (0.072) |
| F-statistic | | | | | 334.83 |
| District Pairs | 15252 | 15252 | 15252 | 15252 | 15252 |
| Controls | Y | Y | N | Y | Y |
| Estimation | mw | w | HT | Poisson | IVP |

*Notes:* The table presents the elasticity of migration ($\theta$) for males for various measure of income. See Table 7 for column details. The sample include male migration data from the LSMS and ILFS for 2010-2014. Wage and employment data is for male employees only. Robust standard errors weighted by destination district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 9: Estimated Income Elasticity of Migration among Female Migrants

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 4.606*** | 0.624*** | 1.064*** | 0.347*** | 0.561*** |
| | (0.909) | (0.216) | (0.052) | (0.055) | (0.112) |
| log distance | -0.556*** | -0.575*** | | -0.620*** | -0.654*** |
| | (0.058) | (0.060) | | (0.060) | (0.065) |
| F-statistic | | | | | 199.95 |
| District Pairs | 15252 | 15252 | 15252 | 15252 | 15252 |
| Controls | Y | Y | N | Y | Y |
| Estimation | mw | w | HT | Poisson | IVP |

*Notes:* The table presents the elasticity of migration ($\theta$) for females for various measure of income.See Table 7 for column details. The sample include female migration data from the LSMS and ILFS for 2010-2014. Wage and employment data is for female employees only. Robust standard errors weighted by destination district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 10: Migration Model First Stage Results

| | (1) Expected Income | (2) Expected Income | (3) Expected Income |
|---|---|---|---|
| log minimum wage | 2.491*** | 3.077*** | 1.778*** |
| | (0.164) | (0.168) | (0.126) |
| log distance | 0.157*** | 0.104*** | 0.118*** |
| | (0.014) | (0.015) | (0.014) |
| log stock | 0.457*** | 0.513*** | 0.508*** |
| | (0.014) | (0.019) | (0.018) |
| log origin labor force size | -0.055*** | -0.042** | -0.049** |
| | (0.020) | (0.020) | (0.021) |
| log destination labor force size | -0.071*** | -0.039* | -0.022 |
| | (0.021) | (0.022) | (0.023) |
| Constant | -30.724*** | -37.249*** | -23.609*** |
| | (1.864) | (1.918) | (1.474) |
| District Pairs | 15252 | 15252 | 15252 |
| Controls | Y | Y | Y |
| Sample | All | Male | Female |

*Notes:* The dependent variable is defined as $\log(e_d \times (w_d)^{1-\rho} - 1)/(1-\rho))$. Column 1 uses the whole sample. Column 2 uses data for males only and column 3 uses data for females only. The sample include migration data from the LSMS and ILFS for 2010-2014. Robust standard errors weighted by destination district starting population in parenthesis. $^{*}p < .1,^{**} p < .05,^{***} p < .01$

# A Alternative Rho Calibrations

Table 11: Estimated Income Elasticity of Non-Migration for various values of $\rho$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 0.036*** | 0.036*** | 0.036*** | 0.036*** | 0.036*** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| F-statistic | 19.09 | 19.4 | 19.41 | 19.41 | 19.41 |
| Districts | 124 | 124 | 124 | 124 | 124 |
| $\rho$ | 1 | 1.5 | 2 | 2.5 | 3 |

*Notes:* The table presents the IV estimates of the elasticity of non-migration $(\theta)$ for non-migrants for various values of $\rho$. The model instruments for expected income using the average minimum wage in the district. The sample include migration data from the LSMS and ILFS for 2010-2014. Robust standard errors weighted by district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

Table 12: Estimated Income Elasticity of Migration for various values of $\rho$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\theta$ | 0.517*** | 0.522*** | 0.522*** | 0.522*** | 0.522*** |
| | (0.093) | (0.094) | (0.094) | (0.094) | (0.094) |
| log distance | -0.574*** | -0.575*** | -0.575*** | -0.575*** | -0.575*** |
| | (0.062) | (0.062) | (0.062) | (0.062) | (0.062) |
| F-statistic | 228.64 | 230.63 | 230.66 | 230.66 | 230.66 |
| District Pairs | 15252 | 15252 | 15252 | 15252 | 15252 |
| Controls | Y | Y | Y | Y | Y |
| $\rho$ | 1 | 1.5 | 2 | 2.5 | 3 |

*Notes:* The table presents the IV-Poisson estimates of the elasticity of migration $(\theta)$ for various values of $\rho$. The model instruments for expected income using the average minimum wage in the district. The sample include migration data from the LSMS and ILFS for 2010-2014. Robust standard errors weighted by district starting population in parenthesis. $^{*}p < .1,^{**}p < .05,^{***}p < .01$

# B Minimum Wage Law

Tanzania's Employment and Labour Relations Act, 2004 set forth a broad set of regulations "to promote economic development through economic efficiency, productivity and social justice" (p. 6). The act applied to all laborers in the country, both public and private, except for those in the People's Defence force, the police force, prison services and the national service (Employment and Labour Relations Act, 2004, p. 5). The legislation made it illegal for children under the age of 14 to work (and under the age of 18 in hazardous sectors). The maximum number of usual hours that an employee could work were set at 9 hours per day, 6 days per week and 45 hours per week (p. 19). The penalty for violating these laws was up to one year in jail and a 5 million shilling fine (p. 79). The legislation did not set an official binding minimum wage, but made a provision to set one within three years, laying the groundwork for creating a national minimum wage (p. 84).

Progress continued with the 2007 Labour Institutions Act, which allowed for the creation of sectoral wage boards that would determine the minimum wage within their sector. In 2010, minimum wages were passed into law in eight sectors. I report the monthly minimum wages for these sectors in Column 2 of Table 13. Each minimum wage stipulated an hourly, daily, weekly, fortnightly, and monthly rate. Adding further complexity, several sectors provided different levels for subsectors, creating 20 total minimum wages. The differences within sectors could be large; for domestic and hospital services the monthly minimum wage ranged from 65,000 TSH for domestic workers to 150,000 TSH for tourist hotels. Employers in any sector not mentioned were required to pay all employees at least 80,000 TSH per month for full time work. The "all other sectors" minimum wage equalled that for health services and commerce, industry, and trade, and exceeded the minimum wage for agriculture (70,000 TSH per month) and domestic workers (65,000 TSH per month).

These sectoral minimum wages remained in place until July 2013 when the 2010 Wage Order was repealed and replaced. The new Wage Order increased the minimum wage in all sectors that were covered in the 2010 and created sectoral minimum wages for eight additional sectors. Sectors that were added in the 2013 Wage Order are noted by an X in Column 1 of Table 13. The sectoral minimum wages for those sectors were not increased proportionally. In Column 4 of Table 13, I report the percentage increase in the minimum wage for each sector. Among sectors that were covered in 2010, the change varied from -38% for other domestic workers to 66.7% for tourist hotels and domestic workers employed by diplomats. Outside of domestic and hospital services the largest changes were for health services (+65%) to aviation services (-14.3%). For sectors that were all newly covered in 2013, the effective minimum wage in those sectors increased by at least 75%, while the national minimum wage rose by 25%. The variation in these changes are displayed In Figure 1, where I plot the minimum wage in each sector relative to the national minimum wage in 2010 and 2013.

Table 13: Sectoral Minimum Wages

| Sector | National 2010 (1) | Minimum Wage 2013 (2) | Minimum Wage 2010 (3) | Increase (%) (4) |
|---|---|---|---|---|
| Health Services | | 132000 | 80000 | 65.0 |
| Agricultural Services | | 100000 | 70000 | 42.9 |
| Trade, Industries and Commercial Services | | | | |
| Trade, Industry and Commerce | | 115000 | 80000 | 43.8 |
| Financial Institutions | X | 400000 | 80000 | 400.0 |
| Communication Services | | | | |
| Telecommunication Services | | 400000 | 300000 | 33.3 |
| Broadcasting, Mass Media, and Postal Services | X | 150000 | 80000 | 87.5 |
| Mining | | | | |
| Mining and Prospecting Licenses | | 400000 | 350000 | 14.3 |
| Primary Mining Licences | | 200000 | 150000 | 33.3 |
| Dealers Licenses | | 300000 | 250000 | 20.0 |
| Brokers Licenses | | 200000 | 150000 | 33.3 |
| Education | X | 140000 | 80000 | 75.0 |
| Domestic and Hospital Services | | | | |
| Domestic Workers employed by Diplomats | | 150000 | 90000 | 66.7 |
| Domestic Workers employed by entitled officers | | 130000 | 80000 | 62.5 |
| Domestic Workers | | 80000 | 65000 | 23.1 |
| Other domestic workers | | 40000 | 65000 | -38.5 |
| Tourists hotel | | 250000 | 150000 | 66.7 |
| Medium Hotels | | 150000 | 100000 | 50.0 |
| Restaurants and Bars | | 130000 | 80000 | 62.5 |
| Private Security Services | | | | |
| International security Companies | | 150000 | 105000 | 42.9 |
| Private Security | | 100000 | 80000 | 25.0 |
| Energy Services | | | | |
| International Energy Companies | X | 400000 | 80000 | 400.0 |
| Energy Services | X | 150000 | 80000 | 87.5 |
| Transport Services | | | | |
| Aviation Services | | 300000 | 350000 | -14.3 |
| Clearing & Forwarding | | 300000 | 230000 | 30.4 |
| Inland Transport | | 200000 | 150000 | 33.3 |
| Construction Services | | | | |
| Contractor Class I | X | 325000 | 80000 | 306.2 |
| Contractors Class II-IV | X | 280000 | 80000 | 250.0 |
| Contractors Class V-VII | X | 250000 | 80000 | 212.5 |
| Fishing and Marine Services | | 200000 | 165000 | 21.2 |
| Other sectors not mentioned above | X | 100000 | 80000 | 25.0 |

*Notes:* Reporting nominal monthly minimum wages in Tanzanian Shillings for the 2010 and 2013 wage orders for each covered sector. National 2010 indicates sectors that were subject to the national minimum wage of 80,000 TSH in 2010 that were later covered in the 2013 revision. Sectors with minimum wages for subsectors are indented.

Table 14: EES Firm Employment Summary Statistics

| | min wage | wage | employees | casual | hires | female |
|---|---|---|---|---|---|---|
| | (1000 TSH) | | % of total | | | (%) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Agriculture* | | | | | | |
| 2005-2007 | | 123.3 | 4.2 | 23.8 | | 30.0 |
| 2010-2013 | 70 | 317.4 | 3.9 | 31.9 | 2.6 | 30.2 |
| 2014 - 2017 | 100 | 413.2 | 4.1 | 25.1 | 3.9 | 22.0 |
| *Fishing* | | | | | | |
| 2005-2007 | | 105.9 | 0.2 | 0.5 | | 18.3 |
| 2010-2013 | 165 | 262.2 | 0.3 | 0.4 | 0.0 | 13.5 |
| 2014 - 2017 | 200 | 173.7 | 0.2 | 0.4 | 0.0 | 9.7 |
| *Mining* | | | | | | |
| 2005-2007 | | 203.9 | 0.5 | 2.2 | | 12.8 |
| 2010-2013 | 150 | 407.7 | 0.9 | 1.1 | 0.2 | 12.2 |
| 2014 - 2017 | 200 | 664.5 | 1.4 | 1.1 | 0.9 | 8.1 |
| *Manufacturing, Commerce, Trade* | | | | | | |
| 2005-2007 | | 195.8 | 13.0 | 42.2 | | 22.5 |
| 2010-2013 | 80 | 236.2 | 21.7 | 41.2 | 16.6 | 24.2 |
| 2014 - 2017 | 115 | 356.0 | 25.1 | 37.2 | 13.7 | 19.3 |
| *Energy Services* | | | | | | |
| 2005-2007 | | 441.5 | 0.7 | 0.8 | | 17.2 |
| 2010-2013 | 80 | 766.1 | 0.8 | 0.4 | 0.5 | 19.0 |
| 2014 - 2017 | 150 | 933.6 | 1.2 | 0.2 | 0.2 | 23.1 |
| *Construction* | | | | | | |
| 2005-2007 | | 248.9 | 1.5 | 5.7 | | 15.4 |
| 2010-2013 | 80 | 331.0 | 2.1 | 5.0 | 1.2 | 15.9 |
| 2014 - 2017 | 250 | 493.9 | 2.2 | 7.0 | 1.6 | 8.4 |
| *Inland Transport* | | | | | | |
| 2005-2007 | | 199.8 | 1.2 | 0.3 | | 9.3 |
| 2010-2013 | 150 | 350.1 | 1.5 | 0.9 | 1.1 | 13.0 |
| 2014 - 2017 | 200 | 419.2 | 1.5 | 1.4 | 1.8 | 7.8 |
| *Aviation Services* | | | | | | |
| 2005-2007 | | 323.9 | 0.2 | 0.1 | | 24.6 |
| 2010-2013 | 350 | 534.6 | 0.1 | 0.1 | 0.0 | 38.9 |
| 2014 - 2017 | 300 | 1084.5 | 0.2 | 0.0 | 0.1 | 21.9 |
| *Clearing and Forwarding* | | | | | | |
| 2005-2007 | | 151.9 | 1.2 | 1.7 | | 17.8 |
| 2010-2013 | 230 | 432.5 | 1.5 | 1.7 | 1.5 | 22.7 |
| 2014 - 2017 | 300 | 624.6 | 1.1 | 0.4 | 0.7 | 17.8 |
| *Hotels* | | | | | | |
| 2010-2013 | 100 | 164.3 | 4.0 | 1.8 | 4.9 | 49.7 |
| 2014 - 2017 | 150 | 195.7 | 4.2 | 2.3 | 6.0 | 29.8 |

*...Continued on next page*

EES Firm Employment Summary Statistics – *continued from previous page*

| | min wage | wage | employees | casual | hires | female |
|---|---|---|---|---|---|---|
| | (1000 TSH) | | (%) of total | | | (%) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Restaurants* | | | | | | |
| 2005-2007 | | 88.6 | 3.9 | 3.1 | | 50.9 |
| 2010-2013 | 80 | 163.1 | 3.7 | 2.5 | 4.0 | 56.8 |
| 2014 - 2017 | 130 | 188.8 | 2.7 | 1.4 | 4.4 | 27.1 |
| *Information Services* | | | | | | |
| 2005-2007 | | 267.2 | 1.4 | 1.0 | | 37.4 |
| 2010-2013 | 80 | 447.0 | 0.8 | 0.2 | 0.3 | 38.7 |
| 2014 - 2017 | 150 | 585.8 | 1.0 | 0.6 | 0.6 | 25.1 |
| *Telecommunication Services* | | | | | | |
| 2005-2007 | | 263.3 | 1.2 | 1.0 | | 38.7 |
| 2010-2013 | 300 | 795.1 | 0.6 | 0.0 | 0.4 | 32.0 |
| 2014 - 2017 | 400 | 824.3 | 1.1 | 10.6 | 0.9 | 24.7 |
| *Financial Services* | | | | | | |
| 2005-2007 | | 1542.1 | 3.2 | 0.2 | | 40.8 |
| 2010-2013 | 80 | 842.7 | 2.1 | 0.1 | 2.6 | 42.9 |
| 2014 - 2017 | 400 | 1227.3 | 2.1 | 0.2 | 2.4 | 29.7 |
| *Private Security* | | | | | | |
| 2010-2013 | 80 | 183.7 | 1.5 | 0.4 | 2.8 | 18.8 |
| 2014 - 2017 | 100 | 200.3 | 2.7 | 0.4 | 6.2 | 12.0 |
| *Education* | | | | | | |
| 2005-2007 | | 208.5 | 11.7 | 4.3 | | 32.3 |
| 2010-2013 | 80 | 433.9 | 17.3 | 2.3 | 27.8 | 43.5 |
| 2014 - 2017 | 140 | 656.7 | 19.7 | 2.9 | 26.3 | 28.6 |
| *Health Services* | | | | | | |
| 2005-2007 | | 186.8 | 6.3 | 0.9 | | 56.3 |
| 2010-2013 | 80 | 384.9 | 7.3 | 1.6 | 9.0 | 60.4 |
| 2014 - 2017 | 132 | 507.5 | 7.3 | 1.9 | 11.6 | 44.2 |
| *All Others* | | | | | | |
| 2005-2007 | | 288.8 | 49.6 | 12.1 | | 31.5 |
| 2010-2013 | 80 | 436.2 | 29.7 | 8.3 | 24.4 | 34.9 |
| 2014 - 2017 | 100 | 640.6 | 22.2 | 7.1 | 18.6 | 24.4 |

*Notes*: Reporting the average values during each of the three periods. Columns(1) and (2) report the minimum wage and average monthly wage in thousands of Tanzanian Shillings. Columns (3)-(5) report the employment, casual employment, and hires as a percentage of the total. Column (6) reports the share of workers in that sector-period that are female.

Table 15: EES Firm Size Summary Statistics

| | min wage (1000 TSH) (1) | Firms Total (2) | employees (% of total) 5-49 (3) | 50+ (4) | Private (%) (5) | Districts (6) |
|---|---|---|---|---|---|---|
| *Agriculture* | | | | | | |
| 2005-2007 | | 1722 | 59.6 | 6.0 | 96.7 | 105 |
| 2010-2013 | 70 | 1090 | 70.1 | 15.2 | 85.5 | 111 |
| 2014 - 2017 | 100 | 1584 | 69.3 | 19.0 | 95.0 | 100 |
| *Fishing* | | | | | | |
| 2005-2007 | | 205 | 47.7 | 2.3 | 73.6 | 38 |
| 2010-2013 | 165 | 240 | 93.4 | 2.5 | 93.1 | 29 |
| 2014 - 2017 | 200 | 382 | 98.5 | 1.2 | 98.8 | 12 |
| *Mining* | | | | | | |
| 2005-2007 | | 142 | 69.8 | 15.6 | 89.9 | 30 |
| 2010-2013 | 150 | 161 | 81.7 | 17.0 | 97.2 | 29 |
| 2014 - 2017 | 200 | 508 | 77.4 | 15.0 | 97.4 | 60 |
| *Manufacturing, Commerce, Trade* | | | | | | |
| 2005-2007 | | 7321 | 67.5 | 4.3 | 94.9 | 96 |
| 2010-2013 | 80 | 15735 | 62.9 | 3.8 | 98.7 | 114 |
| 2014 - 2017 | 115 | 23876 | 61.9 | 4.3 | 98.9 | 124 |
| *Energy Services* | | | | | | |
| 2005-2007 | | 317 | 71.9 | 9.0 | 5.9 | 74 |
| 2010-2013 | 80 | 138 | 55.9 | 37.1 | 23.1 | 69 |
| 2014 - 2017 | 150 | 130 | 33.1 | 64.2 | 41.6 | 39 |
| *Construction* | | | | | | |
| 2005-2007 | | 860 | 76.8 | 4.0 | 87.5 | 69 |
| 2010-2013 | 80 | 1422 | 80.1 | 5.7 | 95.9 | 88 |
| 2014 - 2017 | 250 | 2182 | 85.2 | 6.0 | 98.2 | 67 |
| *Inland Transport* | | | | | | |
| 2005-2007 | | 493 | 51.6 | 7.8 | 70.6 | 40 |
| 2010-2013 | 150 | 837 | 73.4 | 6.3 | 95.7 | 42 |
| 2014 - 2017 | 200 | 1231 | 78.2 | 8.8 | 93.6 | 55 |
| *Aviation Services* | | | | | | |
| 2005-2007 | | 114 | 69.2 | 3.6 | 57.5 | 12 |
| 2010-2013 | 350 | 62 | 74.1 | 5.9 | 58.5 | 14 |
| 2014 - 2017 | 300 | 154 | 44.6 | 6.1 | 70.2 | 20 |
| *Clearing and Forwarding* | | | | | | |
| 2005-2007 | | 632 | 67.0 | 4.4 | 82.5 | 21 |
| 2010-2013 | 230 | 585 | 77.2 | 8.8 | 80.5 | 41 |
| 2014 - 2017 | 300 | 683 | 79.5 | 7.8 | 86.2 | 31 |
| *Hotels* | | | | | | |
| 2010-2013 | 100 | 4084 | 70.8 | 2.2 | 100.0 | 100 |
| 2014 - 2017 | 150 | 6707 | 68.5 | 2.7 | 100.0 | 113 |

*...Continued on next page*

EES Firm Size Summary Statistics – *continued from previous page*

| | min wage (1000 TSH) (1) | Firms Total (2) | employees (% of total) 5-49 (3) | 50+ (4) | Private (%) (5) | Districts (6) |
|---|---|---|---|---|---|---|
| *Restaurants* | | | | | | |
| 2005-2007 | | 4899 | 68.7 | 0.9 | 99.3 | 83 |
| 2010-2013 | 80 | 5829 | 71.4 | 0.5 | 99.6 | 102 |
| 2014 - 2017 | 130 | 6994 | 74.5 | 0.4 | 100.0 | 105 |
| *Information Services* | | | | | | |
| 2005-2007 | | 738 | 66.8 | 5.7 | 56.3 | 49 |
| 2010-2013 | 80 | 502 | 52.5 | 6.2 | 51.9 | 95 |
| 2014 - 2017 | 150 | 768 | 81.5 | 9.2 | 76.2 | 51 |
| *Telecommunication Services* | | | | | | |
| 2005-2007 | | 2314 | 16.8 | 1.4 | 48.9 | 108 |
| 2010-2013 | 300 | 249 | 57.6 | 9.2 | 75.2 | 59 |
| 2014 - 2017 | 400 | 675 | 66.5 | 8.2 | 87.2 | 57 |
| *Financial Services* | | | | | | |
| 2005-2007 | | 2686 | 88.0 | 1.4 | 16.4 | 103 |
| 2010-2013 | 80 | 1269 | 66.3 | 4.5 | 59.4 | 89 |
| 2014 - 2017 | 400 | 2166 | 68.6 | 4.3 | 58.3 | 82 |
| *Private Security* | | | | | | |
| 2010-2013 | 80 | 357 | 70.3 | 25.6 | 98.7 | 34 |
| 2014 - 2017 | 100 | 779 | 73.1 | 24.1 | 100.0 | 41 |
| *Education* | | | | | | |
| 2005-2007 | | 7092 | 82.5 | 3.0 | 15.3 | 116 |
| 2010-2013 | 80 | 3063 | 76.7 | 11.2 | 81.4 | 124 |
| 2014 - 2017 | 140 | 5080 | 76.9 | 13.9 | 81.3 | 123 |
| *Health Services* | | | | | | |
| 2005-2007 | | 2479 | 69.7 | 10.0 | 52.1 | 113 |
| 2010-2013 | 80 | 2480 | 64.6 | 13.7 | 86.6 | 123 |
| 2014 - 2017 | 132 | 3786 | 69.8 | 15.6 | 84.5 | 123 |
| *All Others* | | | | | | |
| 2005-2007 | | 25986 | 52.5 | 4.0 | 11.3 | 119 |
| 2010-2013 | 80 | 11230 | 57.6 | 8.6 | 50.0 | 123 |
| 2014 - 2017 | 100 | 14083 | 62.1 | 8.2 | 60.4 | 123 |
| *All* | | | | | | |
| 2005-2007 | | 58009 | 61.5 | 3.9 | 39.2 | 119 |
| 2010-2013 | | 49332 | 65.5 | 6.1 | 83.6 | 124 |
| 2014 - 2017 | | 71783 | 67.4 | 6.8 | 87.5 | 124 |

*Notes*: Reporting the average values during each year in each of the three periods. Column (2) reports the total number of firms in that sector-period. Columns (3)-(6) report the share of those firms with 5-49 employees, at least 50 employees and that are private, respectively. Column (6) reports the number of districts in which there are at least one firm in that sector operating in the sample.