

Special Economic Zones (SEZ) Wage Premium Hypothesis: An Unconditional Quantile Regression and Decomposition Approach

Journal of Interdisciplinary Economics

1–24

© The Author(s) 2025

Article reuse guidelines:

in.sagepub.com/journals-permissions-india

DOI: 10.1177/02601079251314229

journals.sagepub.com/home/jie

Nana Yaw Agyeman Owusu¹ , Robert Darko Osei¹
and Charles Godfred Ackah¹

Abstract

This study examines the determinants of wages within special economic zones (SEZs) and the broader workforce. It explores how SEZ employment, unionisation, education and gender affect wage levels and compares wage differentials between SEZ and non-SEZ employees. Using ordinary least squares, unconditional quantile regression and decomposition techniques, the study analyses firm–employee dataset of 1,240 employees in 2022. The findings show SEZ employment and unionisation significantly increase wages, with SEZ workers enjoying a wage premium. Education consistently boosts wages across percentiles, while gender disparities are more pronounced at higher-wage levels, with a wage gap of up to 21.10% against females. Decomposition reveals that 16.9% of the SEZ and non-SEZ wage gap is explained by observable factors like skills, while the remainder points to institutional or cultural biases. The study highlights SEZs' role in wage structures and emphasises the need for policies promoting wage equity, educational opportunities and gender equality in the labour market.

JEL Codes: F16, F13, C21

Keywords

Special economic zones, wage, unconditional quantile techniques, Ghana, union

¹ Institute of Statistical Social and Economic Research, University of Ghana, Accra, Ghana

Corresponding author:

Nana Yaw Agyeman Owusu, Institute of Statistical Social and Economic Research, University of Ghana, Accra, Ghana.

E-mail: nanaowusu@yahoo.com

Introduction

Trade liberalisation and globalisation have significant implications for various economic factors, including wages. Trade can affect the distribution of wages within an economy by influencing the demand and supply of different types of labour, impacting industries and firms differently (Jiang, 2023; Wolszczak-Derlacz & Nikulin, 2022). Wage inequality refers to the disparity in wages earned by individuals within a particular labour market or across different segments of the workforce (Feenstra & Hanson, 1996; ILO, 2018). It is influenced by several factors, including skill level, education, experience, industry structure, technological change and globalisation (Brick et al., 2023; Criscuolo et al., 2023). Global trends in firm wage inequality have shown significant variations across countries and regions. The share of income earned by top earners within firms has increased significantly in many countries. For example, according to the World Inequality Database, the top 1% of income earners capture a significant portion of the total income in several advanced economies, including the United States, the United Kingdom and Canada (Chancel et al., 2022). In some cases, the top 1% share of income has reached levels not seen since the early twentieth century. The International Labour Organization (ILO) also reports that wages for high-skilled workers have generally outpaced those of low-skilled workers in recent decades (ILO, 2018). Concurrently, gender-based remuneration disparities persist as pervasive challenges. Globally, women's wages consistently lag behind those of their male counterparts within the same organisational setting. The World Economic Forum's Global Gender Gap Report (2021) illuminates this dichotomy by quantifying the global gender wage gap at approximately 16%. Particularly in sub-Saharan Africa, the discrepancy is more pronounced, with the reported average earnings of women constituting 66% to 70% of men's earnings, one of the most substantial gender wage gaps recorded globally (World Economic Forum, 2021).

Moreover, wage inequality at the firm level in developing countries, including Africa, can exhibit diverse trends that are influenced by various factors. Africa, for example, experiences dual labour markets characterised by a formal sector with relatively higher wages and a large informal sector with lower wages (Mbaye & Gueye, 2018). This dualism can contribute to wage disparities, as workers in the formal sector, which tends to be more skilled and productive, earn higher wages than those in the informal sector. In the informal sector, wage inequality tends to be high, as these enterprises often lack formal wage structures, collective bargaining mechanisms and labour market regulations (ILO, 2018). Within the formal sectors, there has also been concern regarding the operations of foreign firms, which are usually large and attract large amounts of unskilled labour. Te Velde and Morrissey (2002), for example, observed that foreign ownership was associated with higher wages at the individual worker level in five African countries. In the specific case of Ghana, it was found that foreign firms can afford to pay higher wages as they have lower capital costs. However, since foreign firms are not more efficient, higher wages in foreign-owned firms in Ghana must reflect a rent-seeking (or bargaining) explanation (Te Velde & Morrissey, 2002).

One of the policies that have been advanced by developing countries in promoting trade liberalisation is the special economic zone (SEZ) policy. Indeed, SEZ studies began with export processing zones (EPZs) and classical and neo-classical trade ideas. These earlier studies examined whether enclaves, trade, infrastructure and tax incentives would improve welfare in the host country. However, neoclassical models have yielded ambiguous results (Hamada, 1974). In contrast to Hamada (1974), Miyagiwa (1986) and Young and Miyagiwa (1987) find that enclaves improve welfare in the absence of full employment. In recent studies, SEZs have been observed to have some impact on the labour market of countries that have championed this programme (Cirera & Lakshman, 2017; Cizkowicz et al., 2017). SEZ implementation can lead to shifts in employment patterns (Ambroziak & Dziemianowicz, 2021), with industries experiencing higher trade exposure, potentially facing wage pressures and changes in the demand for different types of labour. It is worth noting that the relationship between SEZs and wage inequality is complex, and empirical findings can vary across countries and contexts. Therefore, a careful analysis is required to understand the specific dynamics and implications of SEZs for wage inequality in different settings.

This study examines the relatively uncharted territory of SEZs and their influence on firm-level wage inequality using a case study of Ghana. Despite over two decades of SEZ policy implementation and the creation of approximately 30,000 direct jobs, the net impact on wage distribution and employment remains a subject of scrutiny. This article seeks to examine the following questions: Do SEZ firms pay higher wages than non-SEZ firms? Do SEZs indirectly affect workers' wages through factors such as education, gender and union membership? Are the relationships between SEZ firms and wages similar or dissimilar across different parts of the firm's wage bill distribution? Is the SEZ wage premium largely attributable to composition effects or wage structure effects? To navigate this area, our analysis employed an unconditional quantile regression (UQR) and decomposition framework to examine wage determinants across the distribution spectrum.

Literature Review

This literature review examines the theoretical and empirical evidence on the relationship between the establishment of SEZs and their impact on employee wages. Theoretical frameworks such as the spillover effect, human capital theory and the efficiency wage hypothesis provide critical insights into how SEZs may influence wage dynamics. The spillover effect emphasises the potential of SEZs to enhance broader labour market conditions by transferring skills, improving productivity and raising wage standards in adjacent sectors. A significant body of research has found that the introduction of SEZs tends to have a positive impact on workers' wages, particularly for skilled and educated employees. This wage premium can be attributed to several mechanisms facilitated by the SEZ policy. First, SEZs often attract investment in capital-intensive and technology-intensive industries, which raises the demand for skilled labour. Aggarwal (2007) studied the impact of

SEZs in India and found that their establishment led to a significant increase in wages for workers, with wage premiums being higher for skilled workers than for unskilled workers. The author attributed this to the technology transfer and productivity gains associated with SEZ investments. Similarly, Jin and Wang (2013) analysed the effects of SEZs in China and observed that the presence of SEZs increased the average wages of workers, with a larger effect on skilled workers. Wage increases are linked to technology spillovers and productivity gains facilitated by the SEZ model. Cling and Letilly (2001) examined SEZs in the Philippines and found that workers in SEZ firms earned higher wages than similar workers in non-SEZ firms.

The wage differential was especially pronounced for college-educated workers, reflecting the higher demand for skilled labour in the zone. Human capital theory underscores the role of education and skills as key determinants of wages, suggesting that SEZs, through skill-intensive industries, may contribute to wage differentials. A cross-country study by Boyenge (2007) covering multiple developing countries found that SEZs tended to raise the wages of skilled workers more than of unskilled workers. This was again attributed to the shift towards more capital- and technology-intensive production within SEZs. The concentration of investment and economic activity within SEZs can also generate agglomeration economies, leading to higher overall wage levels for workers in the targeted municipalities than in the surrounding areas. Glick and Roubaud (2006) studied SEZs in Central America and found that the wages of workers in SEZ firms were generally higher than the national minimum wage and wages of similar workers in the informal sector. However, the wage premium is lower for low-skilled workers than for low-skilled workers. Cling et al. (2005) also show that average wages in the Zone Franche, Madagascar, are equivalent to other formal activity sectors, other things being equal and that labour standards there are higher than average.

These findings highlight the heterogeneous effects of SEZs on employee wages, with a more pronounced positive impact on skilled and educated workers than on their unskilled counterparts. However, contradictory evidence also exists, indicating that SEZs may offer lower wages than non-SEZ areas (Dehejia & Panagariya, 2016; Mireri, 2000; Sen & Dasgupta, 2008). For example, a study from Kenya found that employees in non-EPZ businesses were generally better paid than those in EPZs, challenging the assumption that SEZs always improve local wage standards (Mireri, 2000). Moreover, some studies have highlighted the potential limitations and caveats in the relationship between SEZs and wages. Studies focused on gender disparities, such as those observed in India's manufacturing industry, reveal that SEZs do not automatically equate equitable wage distributions. Women often earn significantly less than their male counterparts do, indicating that SEZs can perpetuate existing gender-based wage gaps (Abegaz & Nene, 2018). Aggarwal (2012a) found that the entry of SEZs into a district in India led to a decline in income inequality, potentially benefiting female workers more than male workers. However, Dehejia and Panagariya (2016) argued that, while SEZs may have disproportionately benefited female workers, they could also contribute to increasing income inequality

in some contexts. From a regional perspective, the analysis of SEZs in Poland indicates mixed effects on local labour markets and wages. The presence of SEZs did not uniformly elevate wage levels or improve labour market conditions in areas with high unemployment, highlighting the importance of supporting economic structures and regional development policies for SEZs to positively impact wages (Ambroziak & Dziemianowicz, 2021). Aggarwal (2007) further noted that the wage effects of SEZs in India were more pronounced in the manufacturing sector than in the service sector. This suggests that the specific industry focus and composition of SEZs can influence their impact on local labour markets. Furthermore, some studies have found that the additional effects of SEZs on employment and wages are unclear. Cirera and Lakshman's (2017) systematic review of the literature on the impact of SEZs on employment, wages and labour conditions in developing countries noted that despite the increase and spread in the number of zones, there is little evidence of the additional effect that these have on employment and wages. This literature suggests that, while SEZs have the potential to positively impact wage levels, their effectiveness is contingent upon thoughtful design, stringent implementation and integration with broader economic and social policies.

Ghana in Context

Ghana has a predominantly youthful population, as more than 50% of its people are under the age of 24 (GSS, 2021). Over the past two decades, there has been a notable shift in the country's employment landscape. The proportion of people working in the agricultural sector has declined from 55% in the early 2000s to 33% in 2020. During the same time frame, the service and industrial sectors saw an increase of 17 and 4 percentage points, respectively. Certain sectors, such as construction, mining and quarrying, transport, storage and communication, real estate and business services, are predominantly male dominated. However, women tend to dominate the manufacturing sector. In 2021, Ghana's national daily minimum wage was Gh¢12.53, about \$2.98 (MELR, 2022), which was slightly lower than that of neighbouring countries in West Africa. However, according to a study conducted in 2015, only 24% of urban employees earned income higher than or equivalent to the minimum wage (Anuwa-Amarh, 2015). Several studies found that individual demographic characteristics play a significant role in shaping wage outcomes in Ghana (Carmichael et al., 2021). Blunch and Verner (2005) observed that education level is a strong predictor of higher wages, with each additional year of schooling associated with a 10%–15% increase in earnings. This finding highlights the value of human capital development in the Ghanaian labour market. Additionally, gender disparities in wages are well documented. Studies by Sackey and Osei (2006) and Aryeetey et al. (2009) consistently report a gender wage gap, with women earning 20%–30% less than their male counterparts, even after controlling for factors such as education and experience. This reflects the persistent challenges of gender discrimination and occupational segregation in Ghana.

The characteristics of the employing firm also play a crucial role in determining the wage levels. Teal (2000) found that firm size is a significant determinant, with larger firms paying higher wages, potentially because of their ability to capture economies of scale and offer more comprehensive compensation packages. Similarly, Görg and Strobl (2001) observed a wage premium for workers in foreign-owned firms, suggesting the influence of different management practices and access to global resources. The role of labour market institutions, such as unions and collective bargaining, has been examined in the Ghanaian context (Teal, 1996). Blunch and Verner (2005) also reported a positive wage effect of union membership, highlighting the importance of worker representation and collective bargaining power in securing higher wages. However, Debrah and Ofori (2006) union influence has diminished in recent years due to the growth of the informal sector and the expansion of non-standard employment arrangements. The geographic location of employment has also emerged as a significant wage determinant in Ghana (Aryeetey, 2001). Obeng-Odoom (2014) found that workers in the Greater Accra and Ashanti regions enjoy higher wages compared to other parts of the country, likely due to the concentration of economic activities, infrastructure and agglomeration economies in these urban centres. The employment sector was also identified as a key factor. The dependence on agricultural and informal employment is associated with lower wages, whereas the formal sector and industrial jobs tend to offer higher earnings (Aryeetey et al., 2009; Teal, 2000). This reflects disparities in productivity, job security and access to social protection between the formal and informal labour markets in Ghana.

In this context, SEZ development in Ghana (ACET 2022) also sheds light on the wage dynamics within SEZs in Ghana. The report reveals that wages in SEZs are not significantly different from those in other sectors of the economy in Ghana (ACET, 2022) but felt short of empirical evidence. However, it highlights that some companies operating within SEZs offer better conditions of service and labour policies compared to many firms outside the zones. This suggests that while wages may not be substantially higher within SEZs, other aspects of employment make these companies more attractive to workers. In their study, Obeng et al. (2015) also examined the relationship between working conditions in SEZs and the empowerment of women in Ghana. The findings of this study suggest that the working conditions in SEZs in Ghana are relatively favourable for women's empowerment. According to the research, these favourable working conditions have had a positive impact on the economic and psychological well-being of women working in these zones. However, the study also highlights job insecurity, characterised by the fear of losing one's job or uncertainty regarding future employment, as a major hindrance to women's empowerment (Obeng et al., 2015).

These findings in the extant literature highlight the importance of considering the broader context, including the specific industry focus, the mechanisms driving the wage effects and the overall wage levels and labour conditions within SEZs when assessing their impact on local labour markets. More importantly, while the impact of SEZs on wages is a topic that has been widely studied, there are some gaps that this study intends to fill. The distributional aspect of wage impact is

another methodological concern, as highlighted by Cirera and Lakshman (2017). The study cautions that wage gains from SEZs may be unequally distributed, with higher-skilled and educated workers capturing a disproportionate share of the benefits. This points to the importance of examining the distributional impacts of SEZs rather than focusing solely on average or aggregate wage effects. Additionally, Aggarwal (2012a) finds evidence of increasing labour market segmentation, with outsourcing and the use of temporary contracts becoming more prevalent, especially in lower-skilled occupations. This changing labour market composition poses a challenge in accurately measuring the wage impacts of SEZs, as the observed changes may be driven by factors beyond the direct influence of the zones.

Data and Methodology

This study involved data collected from 328 firms (118 SEZ and 210 non-SEZ firms) and 1,240 employees in Ghana in 2022. For SEZ firms, the study relied on a list of registered firms from the Ghana Free Zone Authority. This list includes 185 enterprises operating in 2021. The list was dominated by four major categories of manufacturing activities: garment manufacturing, furniture manufacturing, food and beverage production and the fabrication of metal items. However, several free point businesses and service firms registered under the free zones programme were included in the list. For the non-SEZ list, the survey sample was derived from the population of eligible firms obtained from the Ghana Statistical Service (GSS)-Integrated Business Establishment Survey and Ghana Investment Promotion Centre. The selection of similar firms (control group) was made in line with the characteristics of firms operating in SEZs in Ghana according to a series of firm-level characteristics, including size, sector and location. This allows pooling of the two databases to form a comprehensive employer–employee dataset. The firms in the dataset were largely located in Accra, Tema, Kumasi and Sekondi-Takoradi, Ghana's key industrial cities. For each firm successfully interviewed, the study employed convenience sampling to select four employees, ensuring balanced representation by stratifying the sample based on role (management and non-management) and gender (one male and one female from each category) across SEZ and non-SEZ firms.

Variables

The study of wage dynamics within SEZs in Ghana utilises a range of variables, as shown in Table 1, to explore how various factors influence employee earnings. The dataset includes observations of 1,240 employees, focusing on various attributes related to wages, demographics and employment characteristics. Wages expressed in Ghanaian Cedi (Gh¢) show an average of approximately Gh¢ 1,890.58, with a high degree of variability, as indicated by a standard deviation of Gh¢1,719.15. When wages are logarithmically transformed to $\ln Wage$, the mean

Table 1. Descriptive Statistics of Selected Variables.

Variable	Obs.	Mean	Std. Dev.
Wage (Ghc)	1,240	1,890.58	1,719.15
lnWage (log of wage)	1,240	7.22	0.86
SEZ	1,240	0.32	0.46
GENDER	1,240	0.33	0.47
WRKEXP	1,240	3.63	6.05
Education (years)	1,240	13.55	2.90
AGE (log)	1,240	3.50	0.25
PERMWRK	1,240	0.88	0.31
PRODWORKER	1,240	0.44	0.49
UNION	1,240	0.27	0.44
FOREIGN	1,240	0.37	0.48
Firm size			
SMALL	1,240	0.26	0.44
MEDIUM	1,240	0.39	0.48
LARGE	1,240	0.34	0.47
Industry (categorical variable)			
CONSTRUCTION	1,240	0.02	0.15
SERVICE	1,240	0.08	0.27
COMMERCE	1,240	0.03	0.18
MANUFACTURING	1,240	0.85	0.35
Region			
Ashanti	1,240	0.26	0.44
Central	1,240	0.04	0.20
Eastern	1,240	0.03	0.18
Greater Accra	1,240	0.57	0.49
Volta	1,240	0.01	0.05
Western	1,240	0.07	0.26

stabilises at 7.22 with a standard deviation of 0.86, which aids in normalising the data for further statistical analysis.

Regarding the employment environment, about 32% of employees work within SEZs, denoted by the binary variable SEZ, where 1 represents employees within SEZs.

The gender composition of the workforce, identified by the GENDER variable, was 33% female. Employees have an average work experience of 3.63 years (WRKEXP) and are predominantly permanent workers (88%), as shown by the PERMWRK variable. Production roles are significant, with 44% of the workforce classified under the PRODWORKER variable, indicating that they are production workers.

Union membership stands at 27% among employees (UNION) and 37% work in foreign-owned firms (FOREIGN). Regarding firm size, 26% were classified as small (fewer than 20 employees), 39% as medium (20–99 employees) and 34% as large (more than 100 employees). Industry categorisation showed a dominant presence in manufacturing (85%), highlighting the industrial nature of employment among the surveyed groups.



Figure 1. Kernel Densities of Log Employee's Wage.

The regional distribution across Ghana shows significant localisation in major urban and industrial centres, with 34% of employees based in Accra, 20% in Tema, 26% in Kumasi and smaller proportions in Sekondi-Takoradi (7%) and other regions (12%).

This geographical breakdown is crucial to understanding regional employment trends and the impact of SEZs on local economies. This comprehensive set of descriptive statistics forms the basis for a deeper analysis of wage disparities and the economic impacts of SEZs in Ghana.

Figure 1 further depicts the nature of SEZ–non-SEZ disparity in wage for our given sample. The figure shows the kernel density of employee monthly wage. The diagrams indicate clearly that SEZ densities lie to the right of non-SEZ densities. The density graph of log wages between SEZ and non-SEZ firms provides visual evidence of potential wage disparities and differences in wage distributions.

Figures 2–5 further reveal some important facts. The graphs display the wage distribution for both SEZs and non-SEZ workers, with upper and lower limits represented by error bar plots. The mean wages with confidence intervals broken down by gender, unionised, permanent worker and firm size category of the firm are depicted in the respective graphs below. Figure 3 highlights that being unionised helps to reduce the wage differential between workers in SEZs and non-SEZ firms. This indicates that unionised workers in SEZs tend to have wages closer to



Figure 2. Gender Wage Gaps.

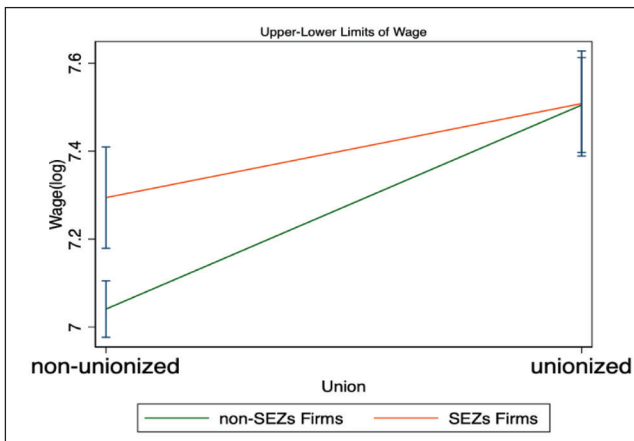


Figure 3. Unionised and Non-unionised Wage Gaps.

those in non-SEZ firms. This could be due to the perception that unions in Ghana are particularly strong and capable of negotiating better wages and benefits for their members. It implies that unions have the power to extract higher wages from employers in both SEZs and non-SEZ firms, thus narrowing the wage gap between the two types of firms. Figure 5 also displays the wage distribution of permanent workers and temporal workers by SEZ status.

The standard deviations, as indicated by the error bars, represent the variability in wages within each group. However, interestingly, the means for older SEZ firms and older non-SEZ firms are similar, suggesting a convergence in wages between these two categories regardless of SEZ status. The specific factors contributing to wage differentials may vary depending on the industry, location and

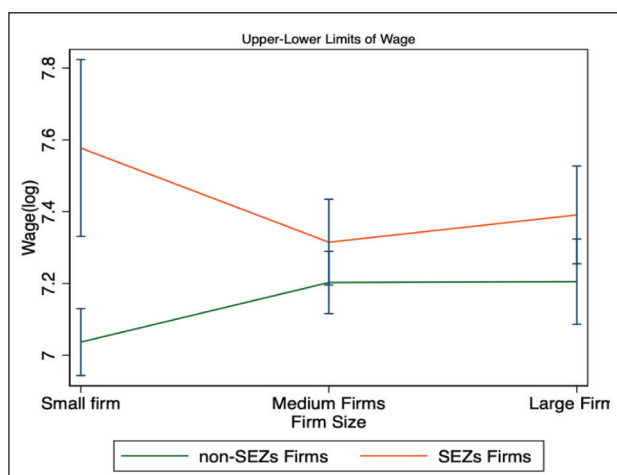


Figure 4. Firm's Size and Wage Gap.



Figure 5. Permanent/Non-Permanent Workers Wage Gap.

other contextual factors. Conducting further analyses, such as regression modeling or decomposition, can provide a more detailed understanding of the observed wage differences.

Estimation Approaches

In this study, we first identify the factors that determine monthly employee wages at the mean and selected quantiles using OLS and the UQR technique proposed by Firpo et al. (2009). Using the Oaxaca–Blinder decomposition technique and the

unconditional quantile decomposition (UQD) technique proposed by Fortin et al. (2011), we further estimate the inequality gap between SEZs and non-SEZs. The estimation strategy is explained as follows.

The Ordinary Least Square (OLS)

The study first estimates a wage equation at the individual level and explains the factors that determine an individual's wage. The general form of the wage equation is as follows:

$$\ln wage_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon, \quad (1)$$

where $\ln wage$ represents the logarithm of an employee's monthly wages. $\beta_0, \beta_1, \beta_2, \dots, \beta_n$ are the coefficients of the independent variables used in the study and represent the effects of each variable on the wage. Each coefficient indicates the change in wage associated with a one-unit change in the corresponding independent variable, holding other variables constant. $X_1, X_2, \dots, X_n$ are the independent variables that are hypothesised to influence the wage. They include individual-specific characteristics (e.g., education, SEZs, experience, gender and unionisation), firm characteristics (e.g., size and ownership), and contextual factors (e.g., industry and region). ε is the error term or residual, representing unobserved or unaccounted factors that affect wages but are not included in the model. The estimation of the wage of the coefficients ($\beta_0, \beta_1, \beta_2, \dots, \beta_n$) was done using OLS and the result of this estimation is provided in Table 2.

The Unconditional Quantile Regression (UQR)

Addressing the limitations of OLS, which are confined to assessing average effects, this study utilised UQR technique developed by Firpo et al. (2009). The UQR approach is instrumental in uncovering the varied impacts that an independent variable can have across the different quantiles of the dependent variable's distribution, thus providing a richer and more comprehensive understanding of the data. Unlike conditional quantile regression (CQR), which estimates quantiles conditional on the values of predictor variables, UQR estimates quantiles without conditioning on any specific values of the predictors. This makes UQR useful when one is interested in understanding how different factors influence the entire distribution of the response variable rather than just specific conditional quantiles. In this study, we employ the UQR approach to analyse how various factors impact different wage distribution segments. This approach was chosen because of its interpretational benefits compared to the CQR approach. In this study, we employ the UQR approach to analyse how various factors impact different segments of wage distribution, as defined in (2) to (5). UQR starts by defining the marginal distribution function in equation (2) with the dependent variable Y , denoted as $F_Y(y)$, through an integration process. This function encapsulates the probability distribution of Y across all values without conditioning the specific values of the independent variables.

$$F_Y(y) = \int F_{Y|X}(y|X=x).d F_X(x). \quad (2)$$

Influence function (IF) (equation (3)): The IF is critical to the UQR methodology. For the τ th quantile q_τ , the IF measures the degree of influence that each observation of Y exerts on the estimation of the quantile. It is defined using the probability density function at $f_Y(q_\tau)$, and an indicator function that determines whether the observations fall below the quantile.

$$IF(Y; q_\tau, F_Y) = (\tau - 1\{Y \leq q_\tau\}) / f_Y(q_\tau). \quad (3)$$

Re-centred influence function (RIF) (equation (4)): The RIF for the τ th quantile is established by re-centring the IF. It essentially adjusts the IF by adding the quantile value q_τ to it. This adjusted function, $RIF(Y; q_\tau, F_Y)$ is then used as the new dependent variable in the subsequent regression analysis.

$$RIF(Y; q_\tau, F_Y) = q_\tau + (\tau - 1\{Y \leq q_\tau\}) / f_Y(q_\tau). \quad (4)$$

Quantile regression estimation (equation (5)): Finally, to estimate the unconditional quantile partial effects (UQPE), the UQR utilises the RIF regression. As denoted in equation (5), $\alpha(\tau)$ signifies the UQPE, which is the expected change in the RIF given a one-unit change in X , across different quantiles. This allows for an examination of how the independent variable—like SEZ activity—influences the wage distribution at varying quantiles.

$$\alpha(\tau) = E[dE[RIF(Y; q_\tau, F_Y)|X] / dx]. \quad (5)$$

The UQR method outlined in this study harnesses these equations to systematically investigate the entire distribution of the dependent variable. By doing so, it enables the analysis of how an independent variable, such as a firm's SEZ status, may affect wages differently at the lower, median and upper levels of the wage distribution. It thereby overcomes the constraints of OLS, which can only offer insights into the average effects and not the distribution-wide impacts.

Decomposition Techniques

The Blinder–Oaxaca (OB) decomposition allows for the decomposition of wage gaps between two groups into the portion explained by differences in observable characteristics (explained component) and the portion attributed to unexplained factors, such as discrimination or unmeasured variables (unexplained component). The model estimates the contributions of various factors to the observed differences in outcomes. The Blinder–Oaxaca decomposition model can be expressed as follows:

$$Y_{gi} = \beta_{go} + \sum_{k=1}^K X_{ik} \beta_{gk} + V_{gi}. \quad (6)$$

The OB method starts by considering linear models for the log of wage, Y_{gi} , for group g (SEZ employees or non-SEZ employees), which includes a constant term,

a vector of coefficients β_{gk} , and a set of observable characteristics X_{ik} . Here β_{go} represents the group-specific constant term, and V_{gi} is the error term for employee i in group g .

The method quantifies the wage differential between SEZ employees and non-SEZ employees by computing the wage difference between the two groups as defined in equation (7).

$$\hat{\Delta}_{OB} = \bar{Y}_N - \bar{Y}_E, \quad (7)$$

where $\bar{Y}_N$ and $\bar{Y}_E$ are the mean log wages for individual workers in SEZs and non-SEZ firms, respectively.

Finally, equation (8) further divides this difference into its constituent parts. Here, the first term represents the composition effect and the second term represents the wage structure effect. The composition effect is part of the wage gap due to group differences in observable characteristics such as gender, education level and union membership. The wage structure affects the portion of the wage gap because of differences in how the market rewards these characteristics, which could be due to market inefficiencies or discrimination.

$$\hat{\Delta}_{OB} = \sum_{k=1}^K (\bar{X}_{Nk} - \bar{X}_{Ek}) \bar{\beta}_{Ek} + (\hat{\beta}_{NO} - \hat{\beta}_{EO}) + \sum_{k=1}^K \bar{X}_{Nk} (\bar{\beta}_{Nk} - \bar{\beta}_{Ek}). \quad (8)$$

The Unconditional Quantile Decomposition (UQD)

While the mean decomposition method of Oaxaca and Blinder has been widely adopted for its robustness in dissecting wage disparities, scholars have highlighted certain limitations. Specifically, mean decomposition is less effective when the distribution of the outcome variable is not symmetrical or when non-linear relationships are present within the data (Agyire-Tettey et al., 2018; Firpo et al., 2009). To overcome these limitations, this study utilises UQD, an advanced technique that provides a more granular analysis of wage differentials across different points in the wage distribution. The UQD method offers several advantages, including the ability to handle non-linear relationships and non-normal distributions more effectively than the OB method. Additionally, it enables the assessment of wage differentials at various quantiles, thus illuminating the distributional effects that the OB method might overlook.

The decomposition process begins by calculating the wage differentials at various quantiles between SEZs and non-SEZ firm workers:

$$\Delta_{\tau}^y = E \left[RIF(Y_E, q_{\{E, \tau\}}) \right] - E \left[RIF(Y_N, q_{\{N, \tau\}}) \right], \quad (8)$$

where Δ_{τ}^y is the differential at the τ th quantile. The wage differential is then separated into two key components:

$$\Delta_{\tau}^y = \left[(X_E - \bar{X}_N) \hat{\beta}_{E, \tau} \right] + \left[(\hat{\beta}_{E, \tau} - \hat{\beta}_{N, \tau}) \hat{X}_{N, \tau} \right] \quad (9)$$

where the first term represents the composition effect at the t th quantile and the second term reflects the wage structure effect. By deploying UQD, this study breaks new ground by analysing SEZ wage differentials in Ghana. It quantitatively dissects the differences into those attributable to varying firm and worker characteristics (composition effect) and those attributable to differing rewards for the same characteristics in the labour market (wage structure effect). These insights are crucial for policymakers concerned with both the causes of wage inequality and the identification of appropriate remedial strategies.

Results

Determinants of Employee Wage: OLS Estimation

Table 2 presents the results of the OLS estimation. The OLS estimation of employee wages provides insights into the determinants of wage disparities within the workforce, highlighting the complex interplay of various socio-economic factors. The results demonstrate that working within SEZs generally benefits employees with higher wages, although this advantage seems to diminish when other factors are accounted for, as evidenced by the decreasing coefficients from 0.2270 ($p < .01$) to 0.0126 (not significant). This trend suggests that, while SEZs offer economic benefits, their impact on wages may be moderated by additional workplace and demographic characteristics. Unionisation emerges as a robust positive influencer of wages, with coefficients ranging from 0.2838 to 0.2224, all statistically significant. This finding supports the notion that collective bargaining power significantly enhances wages. A consistent gender wage gap is observed, where female workers are at a disadvantage, with negative coefficients. This persistent disparity underscores the existing structural inequalities in wage distribution and highlights the need for policies that focus on gender wage parity. Education also proves to be a key factor, with every additional year of schooling correlating with increased wages, thus reinforcing the value of educational investments.

The influence of firm characteristics, such as size and foreign ownership, also provides an understanding of the organisational impacts on wage structures. Small firms were chosen as the reference category for firm size to provide a baseline for comparing how medium and large firms differ in wage-setting practices, reflecting differences in economies of scale, resources and management structures. The Ashanti region was chosen as the reference category for geographic variables due to its central economic role in Ghana. The region provides a balanced mix of urban and rural characteristics, making it a suitable baseline for comparative analysis. Interestingly, while larger firms sometimes exhibit a negative wage effect compared with smaller firms, foreign ownership consistently correlates with higher, suggesting differing management practices and economic scales. Regional differences in Ghana also reveal significant wage variances, with the Greater Accra and Western regions showing higher wages compared to the Ashanti reference region. This regional wage disparity highlights uneven economic development across regions, highlighting the need for region-specific economic and developmental policies.

Table 2. OLS Estimation of Employee Wage.

Variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS
SEZ	0.2270*** (0.0521)	0.0970** (0.0470)	0.0769* (0.0439)	0.0126 (0.0451)
Unionised		0.2838*** (0.0443)	0.2015*** (0.0413)	0.1948*** (0.0430)
Gender (female)		-0.2268*** (0.0451)	-0.1009** (0.0457)	-0.1038** (0.0455)
Education (years)		0.1252*** (0.0084)	0.1175*** (0.0084)	0.1139*** (0.0085)
Age (log)			0.9942*** (0.0976)	0.9854*** (0.0980)
WorkExp			0.0004 (0.0050)	0.0002 (0.0049)
PermWork			0.1771*** (0.0609)	0.2040*** (0.0626)
ProdWork			-0.0332 (0.0438)	-0.0278 (0.0443)
Firm size (ref. small)				
Medium				-0.0578 (0.0517)
Large				-0.1223* (0.0627)
Foreign (ownership)				0.1263*** (0.0444)
Industry				
Service				-0.0988 (0.1188)
Commerce				-0.3659*** (0.1183)
Manufacturing				-0.2260** (0.0962)
Admin regions (ref. Ashanti)				
Central				0.0665 (0.1238)
Eastern				0.0965 (0.0955)
Greater Accra				0.1697*** (0.0516)
Volta				0.4719 (0.4201)
Western				0.2568*** (0.0765)
Constant	7.1461*** (0.0290)	5.4807*** (0.1115)	1.9471*** (0.3619)	2.1327*** (0.3688)
Observations	1,240	1,240	1,240	1,240
R-squared	0.0152	0.2380	0.3282	0.3501

Notes: Robust standard errors in parentheses: *** $p < .01$, ** $p < .05$, * $p < .1$.

SEZs and Wage Gap: Unconditional Quantile Estimation

The UQR analysis presented in Table 3 offers a nuanced understanding of how various factors impact employee wages across different quantiles. SEZs display a mixed impact on wages, with a significant disadvantage for lower-wage earners at the 25th quantile ($-0.0848, p < .1$) and benefits for higher-wage earners at the 75th quantile ($0.1550, p < .05$). This may suggest that, while SEZs may promote higher wages for workers, they could be less beneficial for lower positions. Unionisation emerges as a robust positive factor, especially benefiting those in the upper-middle to higher-wage brackets ($0.2156, p < .01$ at the 50th quantile), indicating the effectiveness of collective bargaining in improving wage conditions. The UQR estimation in Table 3 also reveals a significant gender wage gap, with women particularly disadvantaged at higher-wage levels ($-0.2110, p < .01$ at the 75th quantile), pointing to systemic inequalities that might be exacerbated at the senior level. Education consistently boosts wages across all quantiles, highlighting its role as a fundamental lever of economic mobility. Age also showed a universal positive impact, with older workers earning more, reflecting the value of experience. Permanent employment significantly enhances wages in the upper quantiles, thus underlining the importance of job security. Regional disparities are evident, with areas such as Greater Accra showing higher wages in the upper quantiles, necessitating targeted regional policies.

In comparative terms, the analyses in Tables 2 and 3 shed light on wage determinants through two different methods: OLS and UQR. Table 2 uses OLS to give us a broad view, showing how factors such as working in SEZs, being unionised and higher education generally affect wage premiums in Ghana. However, this advantage diminishes when other factors are taken into consideration. This aligns with the ambiguity observed in prior studies (Aggarwal, 2012a; Glick & Roubaud, 2006) on the incremental wage effects of SEZs, suggesting that their influence on wages is moderated by a range of workplace and demographic characteristics. The positive impact of unionisation on wages, coupled with the moderation of this effect within SEZs, provides new empirical evidence to complement the literature's observations on the unequal distribution of wage gains in Ghana (ACET, 2022; Ackah & Bofah, 2019; Cotula & Mouan, 2021). This underscores the importance of considering the interplay between institutional factors and specific characteristics of SEZs when analysing their labour market impacts. While this approach provides a good overview, it misses some of the finer details.

In stark contrast, Table 3, using UQR, digs deeper and examines how these same factors affect wages at different levels, from the lowest to the highest earners. This method reveals more detailed patterns, such as SEZs, sometimes lowering wages at the bottom but raising them at the top and a more pronounced gender wage gap at higher-wage levels. The UQR analysis reveals a mixed impact of SEZs, with disadvantages for lower-wage earners and benefits for higher-wage earners. This nuanced finding addresses the challenge of accurately isolating the additional effects of SEZs, as discussed in the literature (Cirera & Lakshman, 2017; Cling et al., 2005). The persistent gender wage gap identified in this study reinforces the concerns raised in the literature (Abegaz & Nene, 2018; Boahen &

Table 3. Unconditional Quantile Estimation of Employee Wage.

	(1)	(2)	(3)	(4)	(5)
Variables	10th	25th	50th	75th	90th
SEZ	-0.0161 (0.0536)	-0.0848* (0.0488)	0.0479 (0.0594)	0.1550** (0.0755)	0.0570 (0.0919)
Unionised	0.0108 (0.0566)	0.0576 (0.0459)	0.2156*** (0.0577)	0.2785*** (0.0762)	0.1583* (0.0808)
Gender (female)	-0.0156 (0.0598)	-0.0787 (0.0535)	-0.0878 (0.0548)	-0.2110*** (0.0594)	-0.0582 (0.0707)
Education (years)	0.0661*** (0.0120)	0.0915*** (0.0098)	0.1532*** (0.0100)	0.1229*** (0.0106)	0.0821*** (0.0107)
Age (log)	0.6667*** (0.1447)	0.8588*** (0.1174)	1.0819*** (0.1217)	0.9890*** (0.1255)	0.9528*** (0.1416)
WorkExp	-0.0129** (0.0065)	-0.0051 (0.0052)	-0.0012 (0.0057)	0.0037 (0.0064)	0.0041 (0.0073)
PermWork	0.1715* (0.0970)	0.1668* (0.0867)	0.2359*** (0.0837)	0.2952*** (0.0815)	0.1825*** (0.0658)
ProdWork	0.0527 (0.0537)	0.0299 (0.0481)	-0.0372 (0.0546)	-0.1303** (0.0648)	-0.1284* (0.0713)
Firm size (ref. small)					
Medium	-0.0874 (0.0623)	-0.0275 (0.0566)	-0.0726 (0.0688)	-0.1788** (0.0744)	-0.1168 (0.0797)
Large	-0.1696** (0.0699)	-0.0002 (0.0640)	-0.1060 (0.0696)	-0.1531* (0.0838)	-0.0620 (0.0938)
Foreign (ownership)	0.0237 (0.0484)	-0.0726 (0.0477)	0.0692 (0.0493)	0.1820*** (0.0638)	0.1275 (0.0818)
Industry					
Service	0.1051 (0.1587)	-0.2450* (0.1398)	-0.0413 (0.1653)	-0.2840 (0.2239)	-0.1347 (0.3304)
Commerce	-0.0163 (0.1855)	-0.0360 (0.1414)	-0.1306 (0.1988)	-0.8663*** (0.2170)	-0.7411** (0.2979)
Manufacturing	-0.0869 (0.1495)	-0.2992*** (0.1144)	0.0061 (0.1436)	-0.3656* (0.1880)	-0.3641 (0.2916)
Admin regions (ref. Ashanti)					
Central	0.0681 (0.1257)	0.3243*** (0.1114)	0.2641* (0.1457)	0.2111 (0.1320)	0.0646 (0.1563)
Eastern	0.2201** (0.0972)	0.2042 (0.1261)	0.1227 (0.1266)	0.0867 (0.1692)	0.0482 (0.1988)
Greater Accra	-0.0264 (0.0648)	0.2409*** (0.0575)	0.3875*** (0.0618)	0.3485*** (0.0637)	0.0716 (0.0691)
Volta	0.2821** (0.1246)	0.0291 (0.4365)	-0.0921 (0.5214)	0.3392 (0.6684)	1.3044 (1.0453)
Western	0.0390 (0.1009)	0.4483*** (0.0827)	0.6132*** (0.1186)	0.3120** (0.1231)	0.0552 (0.1407)
Constant	3.2074*** (0.5424)	2.5369*** (0.4355)	0.8741** (0.4221)	2.6242*** (0.4835)	3.9017*** (0.6204)
Observations	1,240	1,240	1,240	1,240	1,240
R-squared	0.0934	0.2190	0.3675	0.2946	0.1426

Note: Robust and bootstrapped standard errors for UQR are all given in parentheses.

*** $p < .01$, ** $p < .05$, * $p < .1$

Opoku, 2021; Glick & Roubaud, 2006) about the potential for SEZs to exacerbate labour market segmentation and disproportionately impact certain worker groups such as lower-skilled and female workers. This finding aligns with the broader literature on gender wage disparities, which highlights the complex interplay of factors including discrimination, occupational segregation and differences in human capital investments. Again, the positive role of unionisation, especially for upper-middle to higher-wage brackets, aligns with the emphasis on examining the distributional effects (Aggarwal, 2012b).

The findings of the present study are crucial for creating policies that address specific issues, such as improving the conditions for lower-wage earners in SEZs or tackling wage inequality among higher-earning women. By comparing the two, the UQR shows its strength in highlighting the specific wage issues that OLS might overlook, making it a valuable tool for developing targeted economic policies that help everyone, regardless of where they stand on the wage ladder.

The Decomposition Results: OB and UQD

Table 4 provides summary results from the Oaxaca–Blinder mean decomposition in column (1) and the UQD in columns (2) to (6).

The decomposition estimation unravelled the explained and unexplained components of wage disparities across various wage quantiles. The results vividly demonstrate that SEZ employees consistently earn more than their non-SEZ counterparts across all quantiles, with significant differences ranging from 0.0941 in the 25th percentile to 0.316 in the 50th percentile. This indicates a pervasive wage premium for SEZ employees that is most pronounced at the median wage level. The decomposition reveals that a significant portion of these wage differentials can be attributed to observable characteristics such as education, experience and job type, with an overall explained mean difference of 0.169 log points. This

Table 4. The Main Sources of SEZ Wage Differentials.

	(1)	(2)	(3)	(4)	(5)	(6)
	Mean (OLS)	q10	q25	q50	q75	q90
SEZ employee	7.367*** −0.0438	6.456*** −0.0541	6.833*** −0.058	7.501*** −0.0558	7.963*** −0.05	8.406*** −0.06
Non-SEZ employees	7.134*** −0.0291	6.331*** −0.0331	6.738*** −0.029	7.185*** −0.0336	7.706*** −0.0394	8.113*** −0.0451
Difference	0.233*** −0.0525	0.125** −0.0635	0.0941 −0.0648	0.316*** −0.0651	0.256*** −0.0636	0.293*** −0.0751
Explained	0.169*** −0.0507	−0.0829 −0.0605	0.187*** −0.0667	0.303*** −0.065	0.167*** −0.0569	0.190*** −0.0676
Unexplained	0.0637 −0.0578	0.208** −0.0825	−0.0924 −0.0773	0.013 −0.0734	0.0887 −0.0742	0.103 −0.0927
Observations	1,240	1,240	1,240	1,240	1,240	1,240

Note: Robust standard errors for the UQD are given in parentheses. *** $p < .01$, ** $p < .05$, * $p < .1$.

suggests that SEZ employees are likely to possess attributes or engage in roles that merit higher pay. It is also intriguing to note that at the 10th percentile, the explained difference becomes negative, hinting that if SEZ and non-SEZ workers had similar characteristics, non-SEZ workers might actually out-earn SEZ workers in this lower-wage bracket. This is consistent with earlier findings, where the SEZs effect was not shown at the lower quantiles of the wage distribution. The unexplained component, while smaller at the mean (0.0637 log points), became significant at the lower quantiles, particularly at the 10th percentile (0.208 log points). This suggests that factors not captured by observable characteristics, including discrimination or institutional biases, may play a larger role in shaping wages at the lower end of the wage spectrum.

These findings not only highlight the wage advantage enjoyed by SEZ employees but also underscore the complexity of wage formation, influenced by both measurable attributes and less tangible factors. The finding that a significant portion of this wage premium can be explained by observable worker characteristics suggests that SEZ employees possess attributes that merit higher pay, as discussed in the literature. However, the increasing unexplained component at lower-wage quantiles highlights the potential role of unobservable factors such as discrimination or institutional biases in shaping wage inequalities. This aligns with the concerns raised about the need to account for broader labour market dynamics and their disproportionate impacts on certain worker groups (Cirera & Lakshman, 2017). The literature on labour market segmentation and dual labour markets has long emphasised the role of institutional factors, such as employment protections and barriers to mobility, in perpetuating wage disparities, particularly for marginalised workers.

This dual nature of wage disparities offers important insights for policymakers and business leaders aiming to foster more equitable wage practices and address the underlying causes of wage inequity, ensuring a fair distribution of economic benefits within and beyond SEZs.

Conclusion

This study investigates the wage dynamics within SEZs in Ghana, utilising a robust methodological framework that combines OLS, UQR and decomposition techniques. The findings reveal and contribute significantly to the discourse on economic development and labour economics, particularly in the context of developing economies such as Ghana. The results confirm that SEZs have a distinct impact on wage structures, aligning with some previous studies that suggest that SEZs generally promote better compensation than non-SEZ environments. This is evident from the wage premium that SEZ employees enjoy across various wage quantiles, particularly at the higher end of the distribution. However, the benefits are not uniformly distributed. This study highlights a significant gender wage gap, particularly at higher-wage quantiles, pointing to structural inequalities that persist within the labour market. This disparity necessitates targeted policy interventions to promote gender equality and ensure that the benefits of economic

zones are shared more equitably. The apparent wage premium in the upper quantiles also suggests that lower-earner workers within SEZs do not experience the same level of wage benefits, which could contribute to widening income disparities within the zones. Education has emerged as a critical determinant of wages, reinforcing the notion that investment in human capital is fundamental to enhancing wage equity and economic mobility. The positive correlation between education and wages across all quantiles highlights the need for policies that enhance educational access and quality, which equip the workforce with the skills needed to thrive in more advanced job roles within SEZs. Unionisation within SEZs also plays a pivotal role in shaping wage dynamics. This underscores the importance of collective bargaining in improving wage conditions and suggests that strengthening labour unions could be a vital strategy in addressing wage disparities.

Following from this study, policymakers should consider strategies that not only promote the expansion of SEZs but also ensure that the economic benefits generated by these zones are distributed more broadly among the workforce. This includes enhancing educational opportunities, supporting robust union activities and implementing gender-focused policies to address wage and employment inequalities. Additionally, the regional disparities observed in wage levels suggest the need for region-specific economic zone policies that cater to the unique needs and economic conditions of the different areas in Ghana.

Finally, while this study provides a comprehensive analysis of wage determinants and differentials within the Ghanaian SEZ context, there are a few limitations that should be acknowledged and addressed in future research. First, the cross-sectional nature of the data limits their ability to establish causal relationships and address potential endogeneity concerns. Longitudinal studies that track wage dynamics over time, as well as the potential impacts of policy changes or firm-level interventions, would enhance our understanding of SEZs and labour market outcomes in Ghana. Second, incorporating additional data sources and qualitative insights could help uncover the underlying mechanisms shaping observed wage differentials. By addressing these limitations and expanding the research agenda, future studies can build upon the foundations laid by this analysis, ultimately contributing to a more holistic understanding of SEZs and employee wages in Ghana.

Ethical Statement

The study was approved by the Ethics Committee of the University of Ghana.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author, Nana Yaw Agyeman Owusu, upon reasonable request.

Author Contributions

Nana Yaw Agyeman Owusu, Charles Ackah and Robert Osei contributed to the design and implementation of the research. Nana Yaw Agyeman Owusu contributed to the analysis of the results and to the writing of the manuscript. Charles Ackah and Robert Darko conceived the original and supervised the project. All authors approved the final manuscript.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors are very grateful to Riksbankens Jubileumsfond for financial support through the project 'SEZs: A force for good to reduce inequality?'

ORCID iD

Nana Yaw Agyeman Owusu  <https://orcid.org/0000-0002-4859-8609>

References

- Abegaz, M., & Nene, G. (2018). Gender wage and productivity gaps in the manufacturing industry. The case of Ghana. *Economic Papers*, 37(3). <https://doi.org/10.1111/1759-3441.12224>
- ACET. (2022). *Sustainable export processing zones in Ghana: An ecosystem and benchmarking report*. <https://acetforafrica.org/research-and-analysis/reports-studies/reports/sustainable-export-processing-zones-development-in-ghana-an-ecosystem-and-benchmarking-report/>
- Ackah, C. G., & Bofah, R. O. (2019). The exporter wage premium hypothesis: An unconditional quantile regression and decomposition approach. *Journal of African Business*, 20(3). <https://doi.org/10.1080/15228916.2019.1582265>
- Aggarwal, A. (2007). Impact of special economic zones on employment, poverty and human development. In *Human Development* (Issue 194).
- Aggarwal, A. (2012a). Impact of SEZs on human development: Empirical evidence and issues. In A. Aggarwal (Ed.), *Social and economic impact of SEZs in India*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198077275.003.0009>
- Aggarwal, A. (2012b). Social and economic impact of SEZs in India. In *Social and economic impact of SEZs in India* (pp. 1–336). <https://doi.org/10.1093/acprof:oso/9780198077275.001.0001>
- Agyire-Tettey, F., Ackah, C. G., & Asuman, D. (2018). An unconditional quantile regression based decomposition of spatial welfare inequalities in Ghana. *Journal of Development Studies*, 54(3). <https://doi.org/10.1080/00220388.2017.1296571>
- Ambroziak, A. A., & Dziemianowicz, W. (2021). The impact of special economic zones on local labour markets in Poland. *Miscellanea Geographica*. <https://doi.org/10.2478/mgrsd-2020-0032>
- Anuwa-Amarh, E. T. (2015). *Understanding the urban informal economy in Ghana: A survey report*. Friedrich Ebert Stiftung Ghana. <https://books.google.ca/books?id=gFm4QAACAAJ>
- Aryeetey, E. (2001). *Globalization, employment and poverty in Ghana*. ILO.
- Aryeetey, E., Owusu, G., & Mensah, E. J. (2009). *An analysis of poverty and regional inequalities in Ghana*. Global Development Network.
- Blunch, N.-H., & Verner, D. (2005). Revisiting the link between poverty and child labor: The Ghanaian experience. <https://doi.org/10.2139/ssrn.298562>
- Boahen, E. A., & Opoku, K. (2021). Gender wage gaps in Ghana: A comparison across different selection models. *WIDER working paper 2021, 10* (January).

- Boyenge, S. J.-P. (2007). ILO database on export processing zones (Revised). In *ILO Working Paper*.
- Brick, C., Schneider, D., & Harknett, K. (2023). The gender wage gap, between-firm inequality, and devaluation: Testing a new hypothesis in the service sector. *Work and Occupations*. <https://doi.org/10.1177/07308884221141072>
- Carmichael, F., Darko, C., & Kanji, S. (2021). Wage effects of educational mismatch and job search in Ghana and Kenya. *Education Economics*, 29(4). <https://doi.org/10.1080/09645292.2021.1900790>
- Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2022). *World inequality report (2022)*. <https://wir2022.wid.world>
- Cirera, X., & Lakshman, R. W. D. (2017). The impact of export processing zones on employment, wages and labour conditions in developing countries: Systematic review. *Journal of Development Effectiveness*, 9(3), 344–360. <https://doi.org/10.1080/19439342.2017.1309448>
- Cizkowicz, P., Cizkowicz-Pękała, M., Pękaia, P., & Rzońca, A. (2017). The effects of special economic zones on employment and investment: A spatial panel modeling perspective. *Journal of Economic Geography*, 17(3), 571–605. <https://doi.org/10.1093/jeg/lbw028>
- Cling, J. P., & Letilly, G. (2001). Export processing zones: A threatened instrument for global economy insertion? *The World Bank and International Poverty Reduction Strategies View project*. <https://www.researchgate.net/publication/4796339>
- Cling, J. P., Razafindrakoto, M., & Roubaud, F. (2005). Export processing zones in Madagascar: A success story under threat? *World Development*, 33(5). <https://doi.org/10.1016/j.worlddev.2005.01.007>
- Cotula, L., & Mouan, L. (2021). Labour rights in special economic zones: Between unilateralism and transnational law diffusion. *Journal of International Economic Law*, 24(2). <https://doi.org/10.1093/jiel/jgab012>
- Criscuolo, C., Hijzen, A., Schwellnus, C., Barth, E., Bertheau, A., Chen, W.-H., Fabling, R., Fialho, P., Garita, J., Gorshkov, A., Grabska-Romagosa, K., Haramboure, A., Kambayashi, R., Koelle, M., Lankester, V., Leidecker, T., Muraközy, B., Nordström Skans, O., Nurmi, S., ... Zwysen, W. (2023). Worker skills or firm wage-setting practices? Decomposing wage inequality across 20 OECD countries. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4324842>
- Debrah, Y. A., & Ofori, G. (2006). Human resource development of professionals in an emerging economy: The case of the Tanzanian construction industry. *International Journal of Human Resource Management*, 17(3), 440–463. <https://doi.org/10.1080/09585190500521425>
- Dehejia, R., & Panagariya, A. (2016). The link between manufacturing growth and accelerated services growth in India. *Economic Development and Cultural Change*, 64(2), 221–264. <https://doi.org/10.1086/683842>
- Feenstra, R. C., & Hanson, G. H. (1996). Globalization, outsourcing, and wage inequality. *American Economic Review*, 86(2), 240–245. <https://doi.org/10.3386/w5424>
- Firpo, S., Fortin, N. M., & Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica*, 77(3), 953–973. <https://doi.org/10.3982/ecta6822>
- Fortin, N., Lemieux, T., & Firpo, S. (2011). Decomposition Methods in Economics. In O. Ashenfelter & D. Card (Eds.), *Handbook of labour economics* (pp. 1–102). Elsevier. [https://doi.org/https://doi.org/10.1016/S0169-7218\(11\)00407-2](https://doi.org/https://doi.org/10.1016/S0169-7218(11)00407-2)
- Glick, P., & Roubaud, F. (2006). Export processing zone expansion in Madagascar: What are the labour market and gender impacts? *Journal of African Economies*, 15(4). <https://doi.org/10.1093/jae/ejk016>
- Görg, H., & Strobl, E. (2001). Multinational companies and productivity spillovers: A meta-analysis. *Economic Journal*, 111(475). <https://doi.org/10.1111/1468-0297.00669>

- GSS. (2021). *Ghana 2021 population and housing census: Ghana Statistical Service* (Vol. 3B, Issue November). https://statsghana.gov.gh/gssmain/fileUpload/pressrelease/2021_PHC_General_Report_Vol_3B_Age_and_Sex_Profile_181121.pdf
- Hamada, K. (1974). An economic analysis of the duty-free zone. *Journal of International Economics*, 4(3), 225–241. [https://doi.org/10.1016/0022-1996\(74\)90044-0](https://doi.org/10.1016/0022-1996(74)90044-0)
- ILO. (2018). *Global wage report 2018/19: What lies behind the gender pay gaps*. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_650553.pdf
- Jiang, Z. (Jasmine) J. (2023). ‘Multinational firms’ sourcing decisions and wage inequality: A dynamic analysis. *Journal of Economic Dynamics and Control*, 146. <https://doi.org/10.1016/j.jedc.2022.104554>
- Jin., W., & Wang, J. (2013). The economic impact of special economic zones: Evidence from Chinese municipalities. *Journal of Development Economics*, 101(1), 133. <https://doi.org/10.1016/j.jdeveco.2012.10.009>
- Mbaye, A. A., & Gueye, F. (2018). Labor markets and jobs in West Africa. *African Development Bank Working Paper Series*, 297(297).
- MELR. (2022). *Ministry of Employment and Labour Relations, Statistical Report, 2021*. https://www.melr.gov.gh/files/publications/2021_Statistical_Report:_Findings_of_which_will_serve_as_a_guide_to_implementation_of_the_changes_and_reforms_needed_to_realise_the_vision.pdf
- Mireri, C. (2000). The impact of export processing zone development on employment creation in Kenya. *Singapore Journal of Tropical Geography*, 21(2). <https://doi.org/10.1111/1467-9493.00072>
- Miyagiwa, K. F. (1986). A reconsideration of the welfare economics of a free-trade zone. *Journal of International Economics*, 21(3–4), 397–405. [https://doi.org/10.1016/0022-1996\(86\)90045-0](https://doi.org/10.1016/0022-1996(86)90045-0)
- Obeng, F. A., Wrigley-Asante, C., & Teye, J. K. (2015). Working conditions in Ghana’s export processing zone and women’s empowerment. *Work Organisation, Labour & Globalisation*, 9(2). <https://doi.org/10.13169/workorglaboglob.9.2.0064>
- Obeng-Odoom, F. (2014). *Oiling the urban economy: Land, labour, capital, and the state in Sekondi-Takoradi, Ghana*. Routledge. <https://doi.org/10.4324/9781315773889>
- Sackey, H. A., & Osei, B. (2006). Human resource underutilization in an era of poverty reduction: An analysis of unemployment and underemployment in Ghana. *African Development Review*, 18(2). <https://doi.org/10.1111/j.1467-8268.2006.00140.x>
- Sen, S., & Dasgupta, B. (2008). Labour under stress: Findings from a survey. *Economic and Political Weekly*, 43(3), 65–72.
- Te Velde, W., & Morrissey, O. (2002). Foreign ownership and wages: Evidence from five African countries. *Credit Research Paper*, 1(19).
- Teal, F. (1996). The size and sources of economic rents in a developing country manufacturing labour market. *Economic Journal*, 106(437). <https://doi.org/10.2307/2235367>
- Teal, F. (2000). Real wages and the demand for skilled and unskilled male labour in Ghana’s manufacturing sector: 1991–1995. *Journal of Development Economics*, 61(2). [https://doi.org/10.1016/S0304-3878\(00\)00064-X](https://doi.org/10.1016/S0304-3878(00)00064-X)
- Wolszczak-Derlacz, J., & Nikulin, D. (2022). Within- and between-firm wage inequalities and trade integration in GVC. *Journal of International Trade and Economic Development*, 31(8). <https://doi.org/10.1080/09638199.2022.2071456>
- World Economic Forum. (2021). The global gender gap report. In *World Economic Forum* (Issue March). <https://www.weforum.org/reports/global-gender-gap-report-2021>
- Young, L., & Miyagiwa, K. F. (1987). Unemployment and the formation of duty-free zones. *Journal of Development Economics*, 26(2), 337–350. [https://doi.org/10.1016/0304-3878\(87\)90038-1](https://doi.org/10.1016/0304-3878(87)90038-1)