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Do Gendered Segregation and Wage Gaps in Mining Sector Matter? Case of Côte d'Ivoire

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Abstract

The extractive industries sector, due to its economic potential and legislation favorable to large multinationals, has boosted the growth of tertiary services and the creation of direct and indirect jobs. Despite this, the growth generated by the extractive sector does not translate into the effective participation of women and equal distribution of income between men and women. The main objective of the paper is to examine the sectoral and occupational segregation of jobs and wages in the Ivorian extractive sector. We used two segregation indices widely used in the literature: The Duncan index (ID) and the Karmel Maclachlan index (KM) to measure Occupational segregation in Côte d'Ivoire. The data used was obtained from the National Accounts produced by the National Institute of Statistics of Cote d'Ivoire. The data cover the period ranging from 2004 to 2014 and relate to the number of employees broken down by socio-professional category and gender, taking into account the Ivorian Classification of Activities and Products (CIAP). We compare the trend of segregation over time in whole economy and specifically in extractive sector. Also, we analyzed the segregation by sex and socio-professional category and used the decomposition of the changes in segregation indices calculated. Finally, we provide a benchmark between Ghana and Côte d'Ivoire. Over the period 2004-2014, sectoral segregation was more pronounced in the extractive sector, although it remained moderate in the economy as a whole. Significant gender inequalities were correlated with the period between the years of great crisis intensity (2002-2010). The effect of gender composition is responsible for the persistence of segregation in the economy, particularly in the extractive sector, given its sharp increase over the decade. However, the mixed employment effect remains significant. Policy orientations should be directed towards: 1) promoting skills development for women working in the extractive sector 2) promoting access to jobs in extractive industries by making it more attractive to women.

Keywords

Extractive Sector, Gender Inequalities, Labor Market, Sectoral Segregation, Côte d'Ivoire

1. Introduction

This paper examined the sectoral and occupational segregation of jobs and wages in the Ivorian extractive sector. Occupational/sectoral segregation refers to the unequal trend between men and women in different occupations in the labor market or a given industry (Borrowman & Klasen, 2019). It also results in gender disparities in the distribution of economic benefits from a given sector of activity (Santos Silva & Klasen, 2021; Arora et al., 2023).

The paper provided essential information on the dynamics of gender inequalities over the period 2004-2014. It allowed assessing the robustness of the ranking of gender segregation in the extractive sector compared to the economy as a whole. This study added to the literature on the role of growth in reducing gender inequality and improving women's economic opportunities (Bue et al., 2022; González et al., 2022; Ghosh, 2022; Rodríguez Hernández, 2023). More specifically, it analysed how job creation fostered by growth in the extractive sector impacts women's employment participation and income relative to men. Although growth alone is not sufficient to reduce gender disparities, its effects did positively affect gender outcomes through access to decent jobs, the provision of economic opportunities to vulnerable groups, and the creation of employment opportunities for women (Baah-Boateng, 2022; Borrowman & Klasen, 2019).

In recent years, the extractive industries sector, due to its economic potential and legislation favorable to large multinationals, has boosted the growth of tertiary services and the creation of direct and indirect jobs (AGEPE, 2013). Indeed, this sector is by far the most dynamic, with a growth rate of 8.1% over the 2010-2014 period. In terms of value-added, its contribution to real GDP varies from 0.3% to 8.3% over the period 1996-2009. Its growth increased from 0.2% to 252% respectively from 1999 to 2003 and reached 30.7% in 2013 (**Figure 1**). Given its significant growth performance, it, therefore, constitutes a growth lever following Agriculture, the key engine of the Ivorian economy.

Looking through the literature, the growth generated by the extractive sector does not translate into the effective participation of women and equal distribution of income between men and women. According to the National Institute of Statistics (NIS) report (NIS, 2008), the representativeness of women is estimated at 18%. The opportunities offered by this sector cannot, therefore, be optimally exploited for overall economic gain because of the limited potential benefits for women whose role in extractives is poorly documented (Jenkins, 2014).

The gender distribution by type of employment in the extractive sector is highly unequal. Women were most concentrated in lower-paying jobs relative to

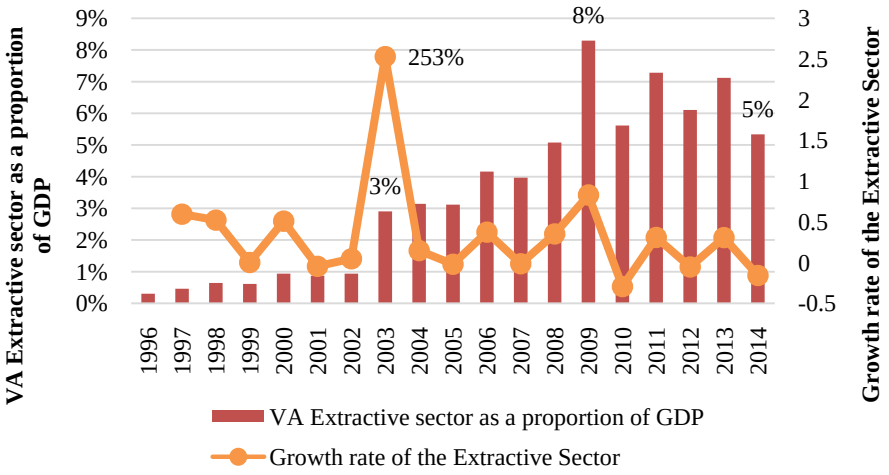

Figure 1. Evolution of the proportion of the value added of the mining and mineral extraction sector to GDP from 2000 to 2015.

men. Only 18.7% of women were employed in administrative and commercial positions, while 11.6% were employed as technicians in the mining industry (AGEPE, 2013). As for technical jobs, they remain predominantly male. According to this AGEPE (2013) study on the structure of employment in the mining and petroleum sector, there were only 20.3% of women against 79.7% of male employees.

The extent of gender inequality by industry or type of employment is measured in the literature using segregation measurement indices (Anker, 1998; Baah-boateng, 2014; Borrowman & Klasen, 2019). In this paper, we use two indices to capture the level of gender, occupational, and wage segregation in this sector: the Duncan index (ID) and the Karmel Maclachlan index (KM). Klimova and Ross (2012) examined the dynamics of gender inequality in the Russian labor market between 1994-2001. They used the Karmel and Maclachlan (KM) index to measure gender occupational segregation.

They showed a decline in the index over the period, reflecting the reduction in gender inequality. However, this decline, although significant, did not imply an overall decrease in gender inequalities. In his work on Ghana, Baah-boateng (2014) assessed the evolution of occupational segregation in the labor market using the Duncan index and the marginal matching index. Using the criterion of Jahn et al. (1947), he showed that occupational segregation in the Ghanaian labor market was generally moderate but declining.

In Côte d'Ivoire, very few studies addressed sectoral and occupational segregation and specifically the extractive sector. Existing research had focused on the employment situation of women and did not go beyond describing the proportions in extractives. This paper provided essential information on the dynamics of sectoral segregation from 2004-2014 in the economy as a whole and the extractive sector. It thus shed light on gender segregation in the Ivorian case, which was not very detailed in the literature.

Firstly, the descriptive analysis highlighted the rates of women's representa-

tion according to socio-professional categories and the differences in wages between the sexes. Secondly, the study of segregation trends was based on the calculation of two indices (ID, KM) to assess the robustness of the classification of sectoral and occupational segregation in the Ivorian economy. This study used a set of data from the national accounts, including information on the workforce, wage bill, socio-professional categories (SPC) for the extractive sector, and the economy as a whole.

The rest of the study was structured as follows. Section 2 described the data and provided the methodology for calculating segregation indices. Section 3 assessed sectoral segregation in the formal extractive sector of the Ivorian economy. Section 4 concluded and suggested economic policy recommendations to reduce sectoral segregation in the extractive industry.

2. Material and Methods

2.1. Data

The data used was obtained from the National Accounts produced by the National Institute of Statistics of Cote d'Ivoire. The data cover the period ranging from 2004 to 2014 and relate to the number of employees broken down by socio-professional category and gender, taking into account the Ivorian Classification of Activities and Products (CIAP). The information on the extractive sector considers three sub-sectors: the hydrocarbons sub-sector, the metal ores sub-sector, and finally, the other extractive activities, which include quarries, granites, and sand extraction.

Data provided information on the wage bill broken down by occupational category, citizenship, and gender for the extractive sector and the economy as a whole.

2.2. Primary Data Samples

The study covered an average sample of 250,446 employees per year. The average rate of women's representation in the economy as a whole over the period 2004-2014 was 15 percent, while it is estimated at around 9 percent in the extractive sector (**Table 1**). There was an increase in the proportion of women employees over the period 2004-2014 in the economy as a whole, with values ranging from 13% to 17% over the same period. On the other hand, a decrease of about 6% was observed in the extractive sector over the period. Analyzing according to socio-professional categories (SPCs), on average, women were more represented in middle management positions (27%) and supervisory staff positions (22%). This trend was the same in the extractive sector, with lower proportions in middle management positions (17%) and supervisory positions (14%). In both sectors, the low representation of women in managerial positions (13% of women against 87% of men) and workers (4%) reflects discrimination at the higher levels (high level of education) and lower levels requiring physical strength or endurance (AGEPE, 2013).

Table 1. Female representation rate by SPCs in the economy and the extractive sector.

	ECONOMY					EXTRACTIVE				
	SM	MM	TSW	AWE	Mean	SM	MM	TSW	AWE	Mean
2004	18.92	24.59	18.21	11.24	12.81	1.57	3.15	3.94	3.94	12.6
2005	18.81	25.15	19.05	10.37	12.8	1.69	3.3	5.75	2.45	13.19
2006	18.92	25.49	20.64	10.8	13.36	0.62	1.86	2.35	2.6	7.43
2007	19.26	25.72	21.25	10.84	13.88	0.29	0.58	1.3	1.88	4.04
2008	18.58	26.31	21.43	11.78	14.45	0.67	1.53	2.83	1.84	6.87
2009	18.53	27.07	22.24	11.75	14.86	0.55	2.58	2.99	1.95	8.07
2010	20.65	26.11	22.07	13.32	15.91	0.82	3.94	4.24	2.82	11.82
2011	20.84	25.94	23.7	13.21	16.41	1.65	2.56	4.59	2.74	11.54
2012	22.84	28.36	23.98	13.11	16.55	0.63	1.98	2.55	2.75	7.91
2013	22.13	28.48	23.35	13.53	16.86	0.8	1.51	2.36	3.43	8.1
2014	22.64	29.45	23.94	13.04	16.9	0.44	1.24	2.72	2.05	6.44
Mean	20.5	27.03	22.2	12.32	15.3	13.34	17.05	14.13	4.3	8.7

SM: Senior Management; MM: Middle Management; TSW: Technicians and Skilled Workers; ASE: Apprentice Workers and Employees.

2.3. Occupational Segregation by Gender and Wage Gap

During the decade 2004-2014, the trend in the male/female (M/F) workforce ratio was downward although it remained high with values oscillating between 7 and 5 men per woman in the economy as a whole. The internal restructuring of socio-professional categories according to gender had not spared any occupational layer. This restructuring was becoming more feminine and took place in 2011, except for the middle management class, where the change did not take place until 2014. Indeed, the male-female ratio had decreased by 25% in each occupational layer. Among senior managers and supervisors, the male-to-female rate fell from 4 men to 1 woman to 3 over the period 2004 to 2014. Moreover, over the same period, the ratio decreased from 3 to 2 for middle managers, and from 8 to 7 for blue-collar workers (Table 2).

In the extractive sector, gender discrimination is sharply observed over the period 2004 to 2011, with peaks of 19 men for one woman on average in 2007. From 2008 to 2010, the ratio decreased slightly but remained high, with values ranging from 12 to 7 men for one woman. Discrimination was high in each socio-professional category but was particularly pronounced among employees, laborers, blue-collar workers, and apprentices, and senior managers. In 2007, the peak of the M/F ratio among employees, laborers, blue-collar workers, and apprentices was 40 men to one woman. Among senior managers, the disparities tend to decrease but remain high over the period from 2007 to 2014, reaching a peak in 2006 with a very high ratio of 35 men to one woman and a minimum of 8 men to one woman.

Table 2. Male/female ratio in the economy and in the extractive sector.

	ECONOMY					EXTRACTIVES				
	SM	MM	TSW	AWE	Mean	SM	MM	TSW	AWE	Mean
2004	4.3	3.1	4.5	7.9	6.8	24.1	3.5	13.2	2.5	11.1
2005	4.3	3.0	4.3	8.6	6.8	10.1	4.0	3.8	13.7	6.1
2006	4.3	2.9	3.8	8.3	6.5	35.5	6.8	10.0	23.6	13.1
2007	4.2	2.9	3.7	8.2	6.2	24.7	20.1	5.7	40.3	19.6
2008	4.4	2.8	3.7	7.5	5.9	20.7	11.4	5.7	28.2	12.5
2009	4.4	2.7	3.5	7.5	5.7	12.9	5.3	3.8	28.6	7.3
2010	3.8	2.8	3.5	6.5	5.3	13.1	5.4	3.4	21.0	7.2
2011	3.8	2.9	3.2	6.6	5.1	7.8	7.1	3.8	17.0	7.0
2012	3.4	2.5	3.2	6.6	5.0	8.6	6.7	8.8	21.3	9.2
2013	3.5	2.5	3.3	6.4	4.9	8.5	7.4	9.0	25.0	10.3
2014	3.4	2.4	3.2	6.7	4.9	17.3	10.5	5.2	11.6	10.7
Mean	3.9	2.7	3.5	7.1	5.5	6.5	4.9	6.1	21.9	10.4

During the decade 2004-2014, the extractive sector presented a gender reclassification of employees according to the socio-professional category as of 2010. Indeed, the class of supervisors became masculine, while the types of workers, senior managers, and middle managers became feminine. It was clear from the descriptive analysis that the extractive sector, compared to the economy as a whole, showed intense discrimination in terms of women's participation according to socio-professional categories compared to the economy as a whole.

2.4. Occupational Segregation by the Wage Gap

The overall wage ratio represented the ratio of women's wage bill to total annual wages. Over the period 2004-2014, the overall wage ratio increased from 16.6% to 21.8% in the economy as a whole. In the extractives, this wage ratio increased from 9.0% to 9.4% over the period, with peaks of 16.3% and 14.4% observed respectively in 2005 and 2011 (**Table 3**).

Moreover, the examination of the wage gaps indicated significant differences in average wages between men and women and in favor of men for the four socio-professional categories in the economy (**Table 3**). In general, salary differences were more pronounced at the higher levels, although there would be a less equal distribution of salaries between men and women in the middle management category in 2014. In addition, the wage gap was narrowing sharply among blue-collar and white-collar workers (by 30 times the wage gap among senior managers). Moreover, from 2004 to 2009, the average monthly wage gap between men and women in these two categories was in favor of women (**Figure 2**).

The high level of gender discrimination in the extractive sector over the period 2004-2014 had not been without effect on the trend in average per capita

Table 3. Overall ratio of women's and men's wages in the economy.

	ECONOMY					EXTRACTIVES				
	SM	MM	TSW	AWE	Mean	SM	MM	TSW	AWE	Mean
2004	12.54	24.80	22.94	12.11	16.60	4.15	28.73	7.57	39.58	9.03
2005	12.83	27.10	25.53	13.07	18.12	9.93	25.22	26.27	7.29	16.33
2006	14.99	27.35	26.37	12.60	18.84	2.81	14.60	10.04	4.23	7.66
2007	13.05	27.73	27.09	12.96	18.98	4.05	4.98	17.50	2.48	5.11
2008	13.73	27.16	27.21	13.20	19.47	4.83	8.74	17.65	3.55	7.98
2009	14.64	29.45	29.47	13.60	20.73	7.76	19.03	26.06	3.50	13.62
2010	15.23	29.29	27.19	13.55	20.06	7.62	18.51	29.08	4.76	13.88
2011	16.40	30.48	29.39	14.50	21.75	12.75	14.03	26.07	5.87	14.35
2012	17.32	31.58	29.32	12.80	21.22	11.69	14.89	11.38	4.70	10.83
2013	17.33	33.21	29.49	14.24	21.91	11.78	13.48	11.12	4.00	9.66
2014	17.98	31.88	29.89	13.30	21.81	5.77	9.55	19.39	8.65	9.38
Mean	13.38	22.91	21.85	11.77	16.87	8.98	14.49	17.77	5.39	11.40

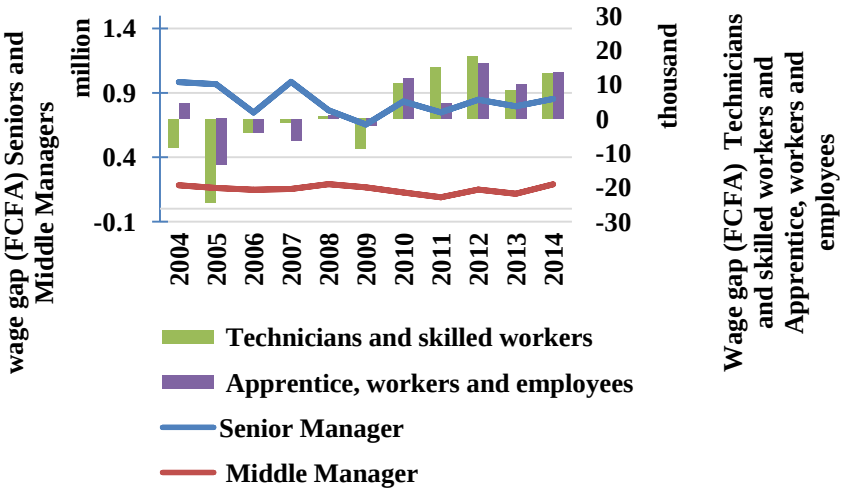

Figure 2. Wages gap (M-F) in economy by SPCs from 2004-2014.

wage differentials (Figure 3). The periods 2004-2005 and 2007-2011 were marked by a decline in earnings among women, with the overall ratio of women's and men's wages growing by 7 percent and 3 percent respectively over the periods 2005-2007 and 2011-2014 (Table 3).

This accentuated decline in the wage ratio was consistent with the peaks in gender discrimination observed over the periods 2005-2007 and 2011-2014, respectively (Table 3). There were significant differences in average wages in favor of men, whatever the socio-professional category considered.

Significant differences are observed among executives over the period, with values ranging from XOF 4,200,000 (2004) to XOF 3,304,998 (2014) and decreasing over time (Figure 2). The increased decline in salaries among senior executives

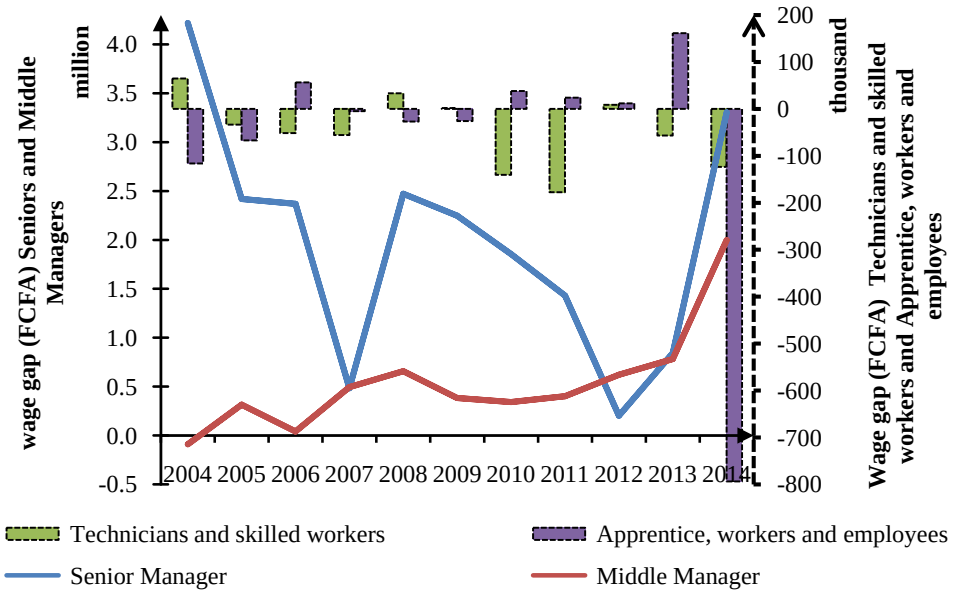

Figure 3. Wage gap (H-F) in extractive sector by SPCs from 2004 to 2014.

between 2008-2012 came as a result of the post-electoral crisis of 2011, which had significant effects on economic activity. The differences among middle managers, supervisors, and workers followed the same trends over the period. But the differences were narrowed significantly over time compared to senior managers. This less pronounced wage gap was observed in all socio-professional categories, except for senior managers, where men earned more than women.

2.5. Measuring Occupational Segregation

Occupational segregation is assessed across the literature using composite segregation indices that could serve as a basis for comparison over time. This paper used two segregation indices widely used in the literature: the Duncan index (ID) and the Karmel Maclachlan index (KM). The choice of these two indices relied on the robustness check of the results obtained. It also minimized possible calculation errors from one index to another. Each index ranged from 0 (low segregation) to 1 (high occupational segregation).

Index ID. Duncan's index, developed by (Duncan & Duncan, 1955), measures the absolute sum of the difference between the proportion of women and the proportion of men in each occupational category. It indicates the percentage of men (or women) who would have to change occupations to keep the gender ratio of each profession equal to the gender ratio of workers as a whole. The index is expressed as follows:

$$\mathrm{ID} = \frac{1}{2}\sum_{i-1}^{n}\left|\frac{W_i}{W} - \frac{M_i}{M}\right| \quad 0 \le \mathrm{ID} \le 1 \tag{1}$$

where $\frac{W_i}{W}$ is the proportion of women in the SPC_i and $\frac{M_i}{M}$ represents the proportion of men in the SPC_i and $i = 1, 2, \cdots, n$ represents the SPC under

consideration. It indicates the percentage of men or women who would have to change SPCs without replacement to achieve an equal distribution of men and women in all socio-professional categories. The advantage of the ID is that it provides generalizable and straightforward results. However, any change in the occupational structure or gender composition of the SPC affects the value of the index (Anker, 1998).

KM index. The KM index was developed by Karmel and Maclachlan (1988). One of the main advantages of the index is that it takes into account the proportion of men and women in total employment while maintaining occupational structure (Watts, 1994). It is, therefore, not sensitive to changes in the size of occupations. The KM index is expressed as follows:

$$\mathrm{KM} = \frac{1}{T}\sum_{i=1}^{n}\left|(1-a)M_i - aW_i\right| \tag{2}$$

where W_i and M_i represents respectively the number of women and men employed in the SPC_i, a is the proportion of women in total employment and represents the total number of employees.

Some studies decomposed the index values (Baah-boateng, 2014; Klimova & Ross, 2012) to address the limitations of segregation indices in accounting for changes in the structure and composition of the sexes in different occupations over time. The decomposition of the index values was done according to three components: the gender composition effect, the occupational composition effect, and the residual effect. The various effects were measured by:

$$\Delta\mathrm{compSEX} = \frac{1}{2}\left[\sum_{i=1}^{n}\left|\frac{w_{it}T_{i0}}{\sum_i w_{it}T_{i0}} - \frac{m_{it}T_{i0}}{\sum_i m_{it}T_{i0}}\right| - \sum_{i=1}^{n}\left|\frac{w_{i0}T_{i0}}{\sum_i w_{i0}T_{i0}} - \frac{m_{i0}T_{i0}}{\sum_i m_{i0}T_{i0}}\right|\right] \tag{3}$$

$$\Delta\mathrm{compOCC} = \frac{1}{2}\left[\sum_{i=1}^{n}\left|\frac{w_{i0}T_{it}}{\sum_i w_{i0}T_{it}} - \frac{m_{i0}T_{it}}{\sum_i m_{i0}T_{it}}\right| - \sum_{i=1}^{n}\left|\frac{w_{i0}T_{i0}}{\sum_i w_{i0}T_{i0}} - \frac{m_{i0}T_{i0}}{\sum_i m_{i0}T_{i0}}\right|\right] \tag{4}$$

with m_i and w_i representing respectively the proportion of men and women in the SPC_i; T_{i0} and T_{it} the total number of employees in the SPC_i respectively for the periods i and 0 (with $T_i = m_i + w_i$). $\Delta\mathrm{compSEX}$ denoted the effect of changes in the gender composition within the occupational category while keeping the size of employees unchanged in the initial period. $\Delta\mathrm{compOCC}$ represented the effect of changes in the occupational structure (size) by considering the gender composition set in the two periods. The residual effect connected the two previous effects.

3. Result

3.1. Analysis of Segregation by Sex and Socio-Professional Category

Segregation measurements (**Figure 4**) indicated a relationship between the indices ID and KM. The KM index, which maintained a stable employee structure,

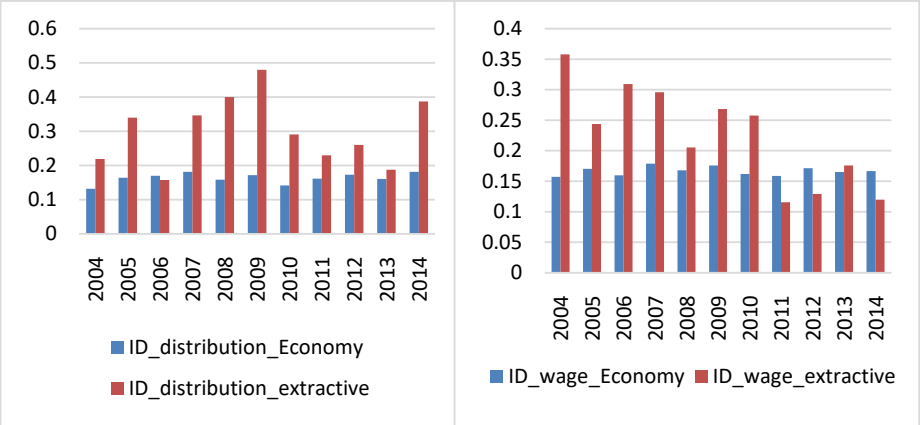

Figure 4. Results of gender segregation in the whole economy and the extractive sector from 2004 to 2014 by workforce and wage.

followed the same trends but did not show discrimination in terms of both headcount and wages, unlike the ID index, which took into account the structural change of employees in the calculation. In this paper, the degree of occupational segregation was assessed using Jahn et al. (1947) criterion. According to this criterion, the occupational segregation was low (below 0.3) and irregular across the economy as a whole over the period 2004 to 2014. Indeed, the ID index values calculated ranged from 0.132 in 2004 to 0.182 in 2014, and followed the same trend over the entire period. The distribution by gender in the socio-professional categories was, therefore slightly unequal throughout the economy.

Comparative analysis of the indices calculated for the extractive sector relative to other sectors of the economy indicated that segregation in this sector was moderate and irregular, with estimated values ranging from 0.219 in 2004 to 0.387 in 2014. The highest peak was observed in 2009, with a discrimination index of 0.480 (**Figure 4**). The dynamism of the extractive industries sector revealed the origins of the variation in sectoral segregation. This dynamism could be understood according to a breakdown into two periods: 2003-2009 and 2010-2014.

Over the first period (2003-2009), the average annual growth rate of the extractive sector was 24.8%, and the Value Added/Gross Domestic Product (VA/GDP) ratio was 4.5%, while for the second period (2010-2014), these values were respectively 8.1% and 6.3% (**Table 4**). The change in the index values over these respective periods was positive and increasing from period to period from 0.039 to 0.040. One could notice increasing discrimination in the years of high crisis intensity and where the sector was more dynamic. These results allowed for highlighting the correlation between crisis scenarios and sectoral segregation.

Segregation related to wages was low and irregular (less than 0.3) across the economy as a whole, with variations on average every two years. It remained moderate, uneven but declining over the period in the extractive sector. There was a decline in the ID index in the extractive sector between 2004 and 2014,

Table 4. Performance indicators for the extractive industries sector and origins of the change in occupational segregation for the period 1996 to 2014.

Period	Annual average growth.	Ratio VA extractive sector/GDP	Variation ID	Sex comp. effect	Occupational mix effect
1996-2002	24.20%	0.70%	-	-	-
2003-2009	24.80%	4.50%	0.0397	0.4125	0.1284
2010-2014	8.10%	6.30%	0.0401	0.0586	0.0652

with index values ranging from 0.358 to 0.120. The redistribution of gains from growth generated by the extractive industry was unevenly distributed between men and women. In other words, female employees were relatively less well paid than their male counterparts.

The extractive sector, therefore, appeared unequal in terms of gender compared to other sectors of the economy. Significant variations in the gender pay gap should be interpreted with caution. There was a narrowing of the wage gap between men and women in the manufacturing sector in most countries, but in some countries like Ghana, this wage gap remained relatively high in occupational categories (Baah-boateng, 2014). A decline in the gender wage gap reflected a reduction in male wages rather than an increase in female wages (ILO, 2007) In some cases, a narrowing gap may also masked a social divide between women (Benería, 2008).

3.2. Decomposition of the Changes in Segregation Indices

The ID index decomposition over the period 2004-2014 showed an increase of segregation in the economy of 4.9% over the period (**Table 5**). The change in the lowest segregation (3.9%) was observed over the period 2007-2010. Moreover, in the extractive sector, the trend was higher. The increase in the segregation index was 16.8% between 2004 and 2014, a more pronounced increase compared to other sectors of the economy. The proportion of employees in the extractive sector who should have been promoted to reach a zero level of segregation increased from 22% to 39% between 2004 and 2014. The decline in gender inequality was recorded in 2004-2006 and 2007-2010 by 6.2% and 5.6%, respectively.

Figures in brackets indicate results for the extractive sector.

The decomposition of the ID index showed that the factors determining the increase in gender segregation in the economy were attributable to a gender composition effect from 2004 to 2014. Indeed, the gender composition effect had a high impact (about 4%) on the increase in occupational segregation, while the impact of change in professional structure was only 1%. This indicated that the increase in discrimination was partly due to a rise in the share of women in employment from 12.8% to 16.9% (**Table 1**). This positive effect showed that women's participation had increased in female-dominated positions or SPCs, which had, therefore, not had a reducing effect on occupational segregation.

Table 5. Origins of variations in occupational segregation between 2004 and 2014.

	2004-2014	2004-2006	2007-2010	2011-2014
Variation ID	0.0495	0.0381	−0.0399	0.0201
	(0.1681)	(−0.0617)	(−0.0553)	(0.1573)
Sex comp. effect	0.0362	0.0421	0.0463	0.0213
	(0.3543)	(0.2224)	(0.0971)	(0.1302)
Occupational mix effect	0.0111	0.0036	0.0057	0.0041
	(0.1019)	(0.0621)	(0.0319)	(0.0313)
Residual effect	0.0402	0.0401	0.0453	0.0166
	(0.4879)	(0.2582)	(0.1147)	(0.1866)

The results of the decomposition of the ID index calculated in the extractive sector indicated two significant pieces of evidence. First, the gender composition effect was high compared to the economy as a whole. It was lower (0.097) only in 2007-2010. Over the entire study period, the high level of occupational segregation was explained by a low feminization of jobs in the extractive sector. This was reflected in a sharp decline in the share of women in total employment, from 12% in 2004 to 6% in 2014 (Table 1).

The negative effect in terms of gender indicated that women's integration into the labor market was low and also that those who were in the labor market had very few opportunities for professional transition. Secondly, the positive effect of 10.1% on the composition of socio-professional categories contributed significantly to the increase in occupational segregation.

3.3. Benchmark

Table 6 showed the indices of occupational segregation in the extractive sector and the total economy calculated for Ghana in 2006 and 2013. The indices were calculated using data from nationally representative labor force surveys conducted in conjunction with the Ghana Living Standards Survey in 2005/2006 and 2012/2013 (Baah-boateng et al., 2017). Results obtained in the two countries (Côte d'Ivoire and Ghana) showed similar trends in the two economies. Regardless of the index and the year considered, gender segregation was higher in the extractive sector than in the economy as a whole. This result confirmed the work of Eftimie et al. (2009), which showed that women tend to be paid less than men and have less financial security and social benefits in the extractive sector.

For details see Baah-boateng et al. (2017) from the GLSS V of 2005/06 and GLSS VI of 2012/13.

Figures in parentheses indicate results for Côte d'Ivoire from Authors' computations based on National Accounts data.

To sum, the result shows a persistence of sectoral segregation in the Ivorian economy over the period 2004-2014. Also, we see a lowest and irregular of the occupational segregation across the economy as a whole. Concerning what happen

Table 6. Comparison of occupational segregation indices in the economy as a whole and extractives in Ghana and Côte d'Ivoire.

Segregation index	2006		2013	
	Extractive	Economy	Extractive	Economy
ID	0.414 (0.157)	0.183 (0.170)	0.258 (0.187)	0.212 (0.160)
KM	0.169 (0.022)	0.091 (0.031)	0.106 (0.028)	0.085 (0.032)
DS	0.513 (0.141)	0.401 (0.133)	0.426 (0.180)	0.314 (0.122)

in extractive sector, the comparison within Côte d'Ivoire and Ghana shows that gender segregation was higher in the extractive sector than in the economy as a whole. The following section looks at the discussions.

3.4. Discussion

Of importance of the study is examining how the sectoral and occupational segregation of jobs and wages levels have evolved in the Ivorian extractive sector. Based on literature, we provide facts that explain the trend of sectoral and occupational segregation of jobs and wages. The high level of segregation in the extractive sector could be attributed to a combination of factors that contributed to inequalities in working conditions in the extractive industry. According to Armah et al. (2016), these factors could be structured as follows: 1) low levels of education and training; 2) women's preferences; and 3) gender-specific social and cultural norms related to the extractive sector.

According to neoclassical theory, segregation in the labor market was justified by an investment in human capital that differed between men and women. In many developing countries, women were disadvantaged in terms of necessary (Becker, 1981) human capabilities (education, health...). Their low level of education was mostly justified by cultural barriers favoring the education of boys over girls and also by family expectations regarding women's productive and reproductive responsibilities, which pushed them to be more focused on domestic tasks and men in the labor market (World Bank, 2017). Cases of the resilience of girls' school interruptions were exacerbated by early marriage and unwanted pregnancies.

Moreover, the choice of training system (Elson, 1999) since independence was a significant factor in access to jobs in large mining companies. In Côte d'Ivoire, very few (Zah, 2010) public institutions provided training in mining occupations. Moreover, the various scenarii of the military, socio-political and electoral crises had considerably delayed investment efforts in the education sector, resulting in a mismatch between education and employment in the economy, particularly the extractive industry. As shown by Couppié et al. (2014), gender or sectoral segregation between men and women mainly stemmed from the selec-

tive sorting of the type and level of education.

This highlight the (exogenous) differences between men and women (social preferences, risk aversion, etc.) that led to different choices on the labor market (Blau & Kahn, 2017). Given the low level of human capital, women turned to occupations or sectors with low human capital requirements, less risky (in terms of wage negotiations, promotions to higher levels, etc.), and also allowing them part-time jobs. This led to a specialization of occupations/sectors that reinforced gender segregation and wage differentials. The low interest of women in technical positions compared to tertiary jobs might be explained by the gender relations that kept them away from these areas (AGEPE, 2013).

The under-representation of women in extractive industries was linked to cultural and gender factors based on socio-cultural norms. In the African cultural context, power relations were deeply gendered. The specialization of gender attributes that influenced decisions about investment in human capital and the labor market at the grassroots level promoted the specialization between men and women of the types of jobs and sectors of activity that were deemed "acceptable or not" for women. The lower social and cultural status of women compared to men confines them to the background and limited their access to better-paid jobs and positions of responsibility in mining companies. A set of social norms addressing stereotypes and prejudices promoted segregation in this sector both among employers in hiring practices and among workers (active exclusion to preserve their professional status) (Goldin, 2006).

4. Conclusion

This paper highlighted the persistence of sectoral segregation in the Ivorian economy over the period 2004-2014. During this period, gender occupational segregation increased in the extractive sector but remained moderate throughout the economy in socio-professional categories. However, wage differentials tended to narrow, although they remained high in the extractive industry. This positive labor market performance in terms of pay masked the worsening inequalities in women's access to jobs despite the decline in the gender pay gap. The decline over time of the wage gap indicated that women's access to lower-paying occupations had improved, given their low representation at the higher levels of the socio-professional category scale (Baah-boateng, 2014). The findings were consistent with the work of Borrowman and Klasen (2019), who found that sectoral and occupational segregation persisted in most developing countries. They showed that performance in terms of economic growth and the reduction of education gaps between men and women was not sufficient to erode the persistence of segregation.

The gender composition effect was an essential element in the persistence and increase of segregation in sectors of the economy. Moreover, the compositional effect of the structure of occupations remained significant over the period 2004-2014. The critical issue in addressing sectoral and occupational segregation

was to identify its root causes in the context of developing countries. Indeed, if the reasons for women's low labor market participation and systematically low wages relative to men were linked to social gender ideologies, development policies must go beyond positive economic outcomes in terms of women's education and employment. As the World Bank report (2017) suggested, the distribution of unpaid work was a crucial constraint affecting women's ability to participate equitably in the labor market and singularly in the extractive sector where occupational segregation was more pronounced.

Given the highly segregated nature of the extractive sector, with a low concentration of women in highly technical jobs (laborers) and in highly educated responsibilities (senior management), a policy effort was needed to ensure inclusive economic growth to improve the occupational structure in favor of highly skilled occupations for both men and women. The implementation of educational policies aimed at gender equality must be intensified through awareness-raising, training, and capacity building for women to increase women's participation and promote their access to better-paid jobs. Specifically, incentives for young girls to enter the fields of science, engineering, and technology should be encouraged. Action to promote gender equity in the labor market required policies to make it more attractive to women since market forces alone were not the only instrument for reducing sectoral or occupational segregation.

Far beyond policies aimed at improving human capital and women's access to the labor market, it was essential to take into account feminist economic arguments highlighting the empowerment of women in unpaid work.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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