



Decent work in global food value chains: Evidence from Senegal

Anna Fabry^{a,*}, Goedele Van den Broeck^b, Miet Maertens^a

^a Division of Bioeconomics, Department of Earth and Environmental Sciences, KU Leuven, Belgium

^b Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium



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ABSTRACT

The rapid growth and transformation of global food value chains has stimulated the development of rural labour markets and has important consequences for rural poverty reduction. While this transformation can be associated with substantial rural employment creation, there is still debate on the inclusiveness and quality of these jobs. We provide quantitative evidence on the inclusiveness of wage employment in the horticultural sector in Senegal and on the quality of this employment and disparities among vulnerable groups of workers. Using survey data from 525 workers, 392 hired workers in agro-industrial companies and 133 workers on small-scale farms, we assess the inclusiveness of employment towards female, young and migrant workers, and compare the quality of employment between these different groups of workers. The quality of employment is assessed through wages and a decent work index that captures multiple wage and non-wage dimensions of job quality. We use bivariate and multivariate analyses to examine the quality of employment and a decomposition analysis to explain wage gaps. Results suggest that job quality is better in the agro-industry than on small-scale farms. We find that the agro-industry is inclusive towards migrant, female and young workers, but that disparities in job quality exist within and across companies. Results illustrate substantial gender wage gaps across companies, but not within companies, and a lower likelihood of having decent employment among migrant and young workers. Our results suggest that wage gaps can be explained by differences in job characteristics, and are not directly based on workers' gender, age or migrant background.

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1. Introduction

The rapid growth and transformation of global food value chains - with increased high-value exports, more stringent food standards, increased importance of supermarkets, increased post-harvest handling and food processing and increased importance of vertically integrated estate farming - has important implications for rural labour markets in developing countries. A shift is occurring from informal and family labour on small-scale farms to formal and hired labour on medium and large-scale farms and in processing industries (Maertens et al., 2012; Rao & Qaim, 2013). High-value export sectors have caused a large increase in the creation of formal rural jobs (ILO, 2008). This is important because the creation of more and better jobs might be one of the most efficient ways to reduce rural poverty (Ayenew et al., 2017; Barrett et al., 2001; Davis et al., 2017). There is a recent body of literature that

analyses job creation in global food value chains, and how wage employment in the agricultural sector contributes to rural income mobility and poverty reduction (Deininger & Xia, 2016; Herrmann, 2017; Van den Broeck et al., 2017). Some studies specifically emphasize women's wage employment in global value chains and mostly highlight positive development effects (e.g. Krumbiegel et al., 2020; Maertens & Swinnen, 2012; Maertens & Verhofstadt, 2013; Van den Broeck & Maertens, 2015). Some studies are more sceptical towards women's employment in global value chains (e.g. Said-Allsopp & Tallontire, 2015) or find lower welfare outcomes for women than for men (e.g. Osabuohien et al., 2019). Few studies explore the inclusion of other vulnerable groups, such as rural youth and migrants, in global value chains - an exception is the study by Benali and co-authors (2018) who explore age-disaggregated employment in the vegetable export sector in Tanzania - while rural youth employment and rural out-migration are challenging issues that require increased attention, especially in Sub-Saharan Africa (Estruch et al., 2019; Fox et al., 2016).

The quality of jobs in global food value chains is a contentious issue. On the one hand, the outsourcing of production and post-harvest activities to developing countries might be driven by low

* Corresponding author at: Division of Bioeconomics, Department of Earth and Environmental Sciences, KU Leuven, Celestijnenlaan 200 E, B-3001 Leuven-Heverlee, Belgium.

E-mail addresses: anna.fabry@kuleuven.be (A. Fabry), goedelevandenbroeck@uclouvain.be (G. Van den Broeck), miet.maertens@kuleuven.be (M. Maertens).

wages and less strict labour (and other) regulations in these countries. On the other hand, global value chains might transmit better labour practices from consumer to producer countries, e.g. through private standards. Studies document that wages are relatively low and that employees face long working hours, unsafe work environments and insecure contracts (Krumbiegel et al., 2018; Staelens et al., 2018; Van den Broeck & Maertens, 2016). Improving job quality is high on the policy agenda, e.g. through the strive for full and productive employment and decent work for all in the Sustainable Development Goals (SDG 8), and the emphasis on job quality in the ILO decent work agenda (ILO, 2018; UN, 2019). While women, youth and migrants in developing countries often face inferior working conditions (Best & Mamie, 2008; Estruch et al., 2019; Kabeer & Mahmud, 2011; Sehnbruch et al., 2020), little is known on whether global value chains reinforce or alleviate such discrimination. Studies analysing job quality in global value chains focus on an assessment of wages, on the impact of standards on job quality, or on a descriptive analysis of working conditions (Ehlert et al., 2014; Krumbiegel et al., 2018; Meemken et al., 2019; Schuster & Maertens, 2016; Suzuki et al., 2018).

In this paper, we provide quantitative evidence on the inclusiveness of wage employment in horticultural value chains in Senegal, and on the quality of this employment and disparities among vulnerable groups of workers. We use data from an original survey among hired workers and semi-structured interviews with agro-industrial export companies. We first evaluate and compare job quality of hired workers on small-scale farms that supply the domestic market and workers in agro-industrial companies that are connected to export supply chains. We then assess the inclusiveness of employment in the horticultural export agro-industry towards female, young and migrant workers, and compare the quality of employment between these groups of workers. The quality of employment is assessed through wages, a decent work index that captures multiple wage and non-wage dimensions of job quality, and the incidence of decent work. We use multivariate regressions to examine quality of employment, and the Oaxaca-Blinder decomposition method to explain wage gaps.

Our study is innovative and relevant. First, empirical studies on decent work in developing countries are rather limited, and particularly evidence on job quality in the agricultural sector is scarce. While evidence emerges on decent work for (often formally) hired workers in global value chains, on plantations or in agro-industrial sectors, (often informally) hired workers in local value chains or on small-scale farms are often overlooked by researchers and policy-makers (Maertens, 2019; Meemken et al., 2019). Examples of studies with a focus on these workers include Ayenew et al. (2017) who examine job quality among rural workers in Tanzania and Ethiopia, and Meemken et al. (2019) who analyze the impact of standards on the wages and employment conditions of hired workers in the small-scale cocoa sector in Ivory Coast. By examining employment conditions in agro-industrial companies connected to global value chains and on small-scale farms in local value chains, we provide some novel evidence. Second, most studies focus on either monetary or non-monetary measures of quality of employment. Our approach, constructing a decent work index, allows for a more comprehensive assessment of job quality. In addition, by combining primary worker- and company-level data, we can control for a large set of factors in our regression and decomposition analyses. This allows for an appropriate comparison of decent work across different groups of workers, and assessment of wage gaps. Third, our focus on female, young and migrant workers in the horticultural export sector in Senegal is particularly relevant. Accessing productive and decent jobs is particularly challenging for rural youth in Senegal (Estruch et al., 2019; Hathie et al., 2015) and elsewhere in Africa (Fox et al., 2016), and

this lack of decent jobs is associated with rural outmigration. Horticultural exports from Senegal have grown very rapidly, resulting in substantial employment creation. Our study reveals to what extent this dynamic sector can be a source of decent rural employment.

2. Data and methods

2.1. Data collection

We collected quantitative data in the three main horticultural export areas in Senegal, including *Les Niayes*, the *Senegal River Delta* and the region around *Lac de Guiers* (Fig. 1). First, we conducted semi-structured interviews in December 2018 with 20 agro-industrial companies, randomly selected from a list provided by the Senegalese export agency ASEPEX. We collected information on the number of workers, employment conditions, company services, production and export strategies. In addition, we organized semi-structured interviews with workers of the sampled agro-industrial companies and workers hired on small-scale farms to gain more information on workers' perceptions about decent work.

Second, we conducted a worker survey in March-April 2019, which coincides with the peak export season when most workers are hired. We sampled workers hired by agro-industrial companies (agro-industry workers) as well as workers on small-scale horticultural family farms (small-scale farm workers), using for both a two-stage sampling strategy. For the agro-industry workers, we first selected ten of the 20 interviewed companies proportional to the number of hired workers in each region: five in *Les Niayes*, three in the *Senegal River Delta* and two around *Lac de Guiers*. In the second stage, we randomly selected about 5% of all workers from each of these companies. Workers were selected from different activities, including agricultural field workers, workers in conditioning centres, and technical and administrative staff. To have a sufficiently large sample of migrants, we oversampled migrant workers^{1,2}. For small-scale farm workers, we first selected 18 villages in a 5 km radius from the ten agro-industrial companies, and then randomly selected hired workers on the farms in these villages. We only interviewed hired workers who were not a member of the employer's household. We used a structured quantitative questionnaire with modules on demographic characteristics, employment conditions, work and migration history, life and job satisfaction, and aspirations. We applied a 12 month-recall for employment-related questions. Four observations are not retained in the analysis because of missing information. The final sample consists of 392 agro-industry workers, including 161 women and 231 men, 96 young and 296 older workers³, 136 migrant and 256 local workers, and 133 workers on small-scale farms.

2.2. Measuring quality of employment

To capture the multiple dimensions of quality of employment, we use three measures: 1) hourly wage, 2) a decent work index, and 3) decent work incidence. First, to compare the wage of different workers we calculate the hourly wage, based on the cash

¹ Migrant workers are defined as workers whose close relatives live elsewhere in Senegal (mainly in southern regions like Fatick, Kaolack and Kolda) and who go back home at least once a year.

² We cannot control for the oversampling of migrant workers in our analysis because necessary information on the share of migrant workers to construct sampling weights is lacking. This implies that it is difficult to generalize from this sample.

³ Following ILO, we define young workers as workers below the age of 25 years.



Fig. 1. Map of the research area: (1) Les Niayes, (2) Senegal River Delta, (3) Lac de Guiers.

payment, the frequency of payment and the number of hours employed. Most workers receive a fixed cash wage⁴, which is paid with a varying frequency depending on the activity and the type of contract the workers have. Wage is a fundamental aspect of job quality (Schuster et al., 2019; Standing, 2003) and is therefore assessed in addition to other non-wage aspects.

Second, we create a decent work index (DW-index), which covers wage and monetary aspects of employment as well as non-wage and non-monetary aspects. Taking into account non-monetary aspects, such as fringe benefits, or non-wage aspects, such as working hours, is important because they can make up a large part of the overall benefits of a job or contribute to the quality of a job. We base the index on the guidelines put forward by the International Labor Organization (ILO, 2013a), and consider dimensions that are relevant for the agricultural sector and measurable at individual level. All indicators are objective measures to avoid self-reported bias (Burchell et al., 2014), and are adapted to the legal framework of Senegal (ILO, 2013b). Detailed calculations are described in Table A1 in annex. We consider four dimensions that are each measured with three indicators: (i) adequate earnings and productive work, (ii) decent work time, (iii) stability and security of work and (iv) safe work environment. The first indicates whether the worker receives the national minimum wage⁵, fringe benefits (transportation, housing and/or meals) and training from the employer. The second dimension indicates whether the worker is employed between 35 and 48 h per week (unless correct compensation is provided if employed longer), does not work during nights and/or holidays (unless correct compensation is provided), and receives sufficient time-off. The latter entails a maximum of 2,352

working hours per year, a maximum of 8 working hours per day for casual workers, and two days of holidays for every 30 days worked for employees with at least one year of service. The third dimension of stability and security of work indicates the contract type (written, oral or no contract), status (permanent, seasonal or daily) and job tenure (working for the same employer for more than one year). The last dimension of safe work environment indicates whether the worker has had any work-related accidents, can use on-site health care facilities when necessary and does not work unprotected with dangerous products (e.g. pesticides). We compute each dimension as the mean of its three binary indicators, and an aggregated index as the mean of the four dimensions. This implies that indices range between 0 and 1 (annex Table A1). This is the same approach used by other welfare indices, such as the Human Development Index and the Multidimensional Poverty Index (Alkire & Foster, 2011).

Third, we determine a cut-off value of the DW-index to create a binary variable for decent work incidence. In line with the Human Development Index and Multidimensional Poverty Index, we take the median minus one standard deviation as cut off-value. We consider a worker to have a decent job if his/her DW-index is above this cut-off.

2.3. Bivariate and multivariate analysis

We use a bivariate analysis to compare the quality of employment across different groups of workers. We first compare agro-industry workers and workers on small-scale farms and then focus on different groups of workers within the agro-industry (male vs. female workers, young vs. older workers, and migrant vs. local workers). We use t-tests for mean comparisons and a chi² test for comparisons of standard deviations for the wage and DW-index, and z-tests for the decent work incidence.

We use a multivariate analysis to derive whether differences in job quality remain after controlling for other characteristics. We first estimate the following regression model for all workers:

$$Y_a = \beta_0^1 + \beta_1^1 D_{Ga} + \beta_2^1 D_{Ya} + \beta_3^1 D_{Ma} + \beta_4^1 X_a + \beta_5^1 T_a + \varepsilon_a \quad (1)$$

⁴ Only few workers (<2%) are paid a piece rate. For these workers, the average hourly wage is calculated based on the average payment they receive, the frequency of this payment, and the number of hours employed. For workers paid in kind (22% of small-scale farm workers), the average hourly wage is calculated based on the estimated value of the payment, the frequency at which they receive the payment and the number of hours employed.

⁵ The national minimum wage is 214 CFA/h, which comes down to 0.33 €/h (at a fixed exchange rate of 655.957 CFA / €).

We estimate separate models in which Y represents one of the three measures of job quality – log-specified hourly wage, DW-index, and DW-incidence – of worker a . We are mainly interested in the variable T_a , a dummy variable for workers on a small-scale farm, and D_G , D_Y and D_M , dummy variables for female, young and migrant workers. X represents a vector of demographic characteristics (marital status, number of children, education, experience, ethnicity and religion); ε is an error term; and β are parameters to be estimated. We estimate this model for all workers, thereby comparing agro-industry workers and workers on small-scale farms. We additionally estimate the model for field workers only, comparing workers on small-scale farms who are mainly doing field jobs and agro-industry workers with a similar job.

We then estimate the following regression models for agro-industry workers only:

$$Y_i = \beta_0^2 + \beta_1^2 D_{Gi} + \beta_2^2 D_{Yi} + \beta_3^2 D_{Mi} + \beta_4^2 X_i + \varepsilon_i \quad (2)$$

$$Y_i = \beta_0^3 + \beta_1^3 D_{Gi} + \beta_2^3 D_{Yi} + \beta_3^3 D_{Mi} + \beta_4^3 X_i + \beta_6^3 A_i + \varepsilon_i \quad (3)$$

$$Y_i = \beta_0^4 + \beta_1^4 D_{Gi} + \beta_2^4 D_{Yi} + \beta_3^4 D_{Mi} + \beta_4^4 X_i + \beta_6^4 A_i + \beta_7^4 J_i + \varepsilon_i \quad (4)$$

$$Y_{ij} = \beta_0^5 + \beta_1^5 D_{Gi} + \beta_2^5 D_{Yi} + \beta_3^5 D_{Mi} + \beta_4^5 X_i + \beta_6^5 A_i + \beta_7^5 J_i + \beta_8^5 C_j + \varepsilon_{ij} \quad (5)$$

$$Y_{ij} = \beta_0^6 + \beta_1^6 D_{Gi} + \beta_2^6 D_{Yi} + \beta_3^6 D_{Mi} + \beta_4^6 X_i + \beta_6^6 A_i + \beta_7^6 J_i + \mu_j + \varepsilon_{ij} \quad (6)$$

We again estimate separate models for the different Y variables and focus on job quality for agro-industry worker i in company j . The main variables of interest, D_G , D_Y and D_M , and the vector X are the same as in model (1). We gradually control for more characteristics, including job activity A (production on the field, sorting/washing/packing in conditioning centers, technician, supervision and other activities), a vector J of other job characteristics (type of contract and job status – which are only included in the estimation of hourly wage), and a vector C of company characteristics (age, total workforce, share of women, youth and migrants employed, and location). In model (6) we use company fixed effects μ_j instead of company characteristics. We estimate OLS regressions⁶ and use robust standard errors⁷.

2.4. Decomposition analysis

To analyse wage gaps between male and female workers, young and older workers, and migrant and local workers, we apply the Oaxaca-Blinder (OB) decomposition. This approach is widely used in labour economics to investigate sources of wage inequality (Fortin et al., 2011; Jann, 2008). The wage gap is decomposed into two parts: 1) a part that is explained by differences in observable covariates between two groups, including demographic, job and company characteristics, and 2) a part that is explained by differences in returns to these characteristics and unobserved factors. The first part is referred to as the endowment effect and is associated with disparities in job status, contract type and activity. The second part is referred to as the structural effect and can relate to direct wage discrimination by the companies as well as to the impact of unobserved factors that are not controlled for.

We use a regression-based mean-decomposition method and express the wage gap as $D_{mean} = E[Y_1] - E[Y_2]$, where $E[Y_i]$ denotes the expected value of the logarithm of the hourly wage of group i

(Fortin et al., 2011; Islam et al., 2018; Kilic et al., 2015). We first store the estimated coefficients from model 5 where the groups are pooled as the reference-coefficients $\hat{\beta}^*$. We use the pooled, non-discriminatory coefficients as we do not want to impose assumptions on positive or negative discrimination towards a specific group (Jann, 2008). For simplicity, we combine the vectors of X , A , J and C into one vector V with K number of parameters. We then analyse model 5 for each group separately and store these coefficient estimates as $\hat{\beta}_1$ and $\hat{\beta}_2$. This implies we decompose D_{mean} as:

$$D_{mean} = \left[\sum_{k=1}^K (E[V_{1k}] - E[V_{2k}]) \hat{\beta}_k^* \right] + \left[\sum_{k=1}^K E[V_{1k}] (\hat{\beta}_{1k} - \hat{\beta}_k^*) + \sum_{k=1}^K E[V_{2k}] (\hat{\beta}_k^* - \hat{\beta}_{2k}) \right] \quad (7)$$

The decomposition method relies on two main assumptions. The first assumption of ignorability, which implies that the distribution of unobservables is the same in both groups, is likely not satisfied. Factors such as work effort, dedication and skills likely influence wages while they are not controlled for and might vary across the different groups of workers. This requires care in the interpretation of the results, especially in the interpretation of the structural effect as direct discrimination. The second assumption of overlapping support, which implies that none of the groups of workers is perfectly identified by the vector of observable factors X , is less restrictive. None of the variables is omitted from the group-specific wage regressions, implying that this assumption is satisfied. Yet, we want to stress that the available data does not allow us to rule out selection bias. If female, young or migrant workers refrain from entering employment in the agro-industry due to low wages and bad working conditions, our results might underestimate differences in wages and decent work, and the extent of discrimination.

3. Results

3.1. Horticultural exports and employment in Senegal

Horticultural production in Senegal has almost tripled in the period 1995–2017, and exports have increased from 2,000 tonnes to more than 110,000 tonnes in the same period (Fig. 2). Compared to other African countries, the Senegalese horticultural sector is expanding more rapidly (FAOSTAT, 2020). The three main export crops are green beans, mangos and melons, and the majority of the produce is supplied to the European Union.

The 20 interviewed agro-industrial companies mainly focus on export production, and represent 10% of total horticultural production and 40% of total horticultural exports from Senegal. All export-oriented companies are GlobalGAP certified, and most companies are vertically integrated with primary production on land leased from rural communities (especially in the *Senegal River Delta* and around *Lac de Guiers*). Only 30% of the companies partially source from small-scale farmers through contract farming. While these companies are export-oriented, the majority (75%) distribute their products on both the local and the export market. Companies operate in the sector for 18 years on average, with the most recent companies around *Lac de Guiers*. They cultivate on average about 500 ha and hire on average about 1,000 workers, with large differences between companies (ranging from 50 to 2,000 ha and from 75 to 5,000 workers). The companies have few permanent staff but heavily rely on seasonal workers, who are hired for three to four months in the main export season, and casual workers who are employed and paid on a daily basis. The small-scale horticultural farms in our sample produce similar crops as the agro-industrial companies, but sell exclusively on the local market. They

⁶ A fractional regression model and a probit model were estimated for the DW-index and DW-incidence respectively, resulting in very similar estimates. We prefer the OLS regression given its efficiency and distributional assumptions.

⁷ Clustering of standard errors at village or company level does not alter our results.

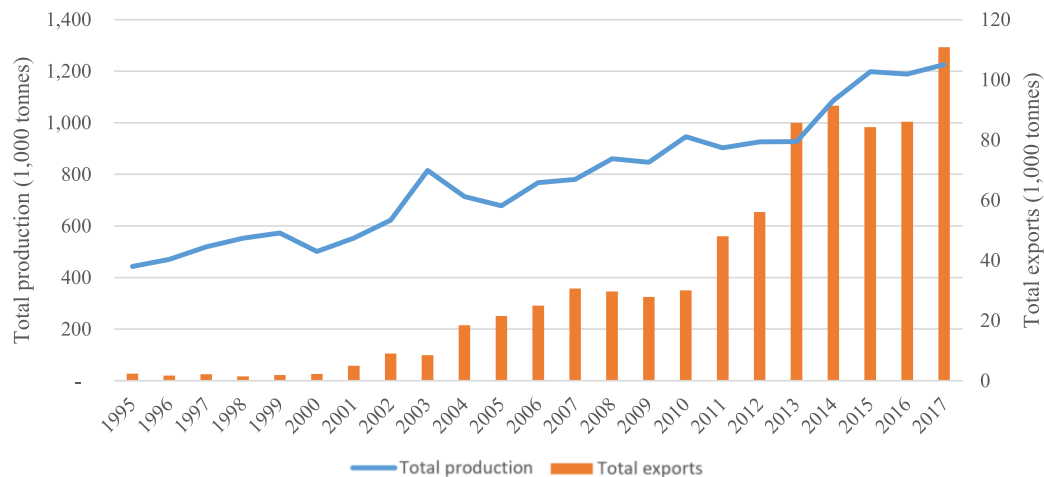


Fig. 2. Horticultural production and exports from Senegal, 1995–2017. Source: FAOSTAT, 2020

are all owned by Senegalese people and none of them is GlobalGAP certified. On average, they cultivate 1.5 ha of land and hire two workers per season, with some farms hiring up to 7 workers. Small-scale farms complement family labour with hired labour, and mainly hire seasonal workers who are paid a monthly or seasonal wage.

Based on our sample of companies, we estimate that the number of jobs created in the Senegalese horticultural agro-industry in 2019 is more than 30,000, and can reach up to 50,000 jobs in peak season, between November and April. The 20 interviewed agro-industrial companies hire about 20,000 workers during the peak season, of which 91% are temporary workers. Two-thirds of the workers in the sampled companies are female, and 29% are under 25 years old. The reported share of migrant workers is 5% but this is likely to be underestimated as the companies are not always aware of the origin of the workers.

Table 1 compares the characteristics of the sampled agro-industry and small-scale farm workers. None of the small-scale farm workers in our sample is female but they are more likely to be young and migrant workers compared to agro-industry workers. Small-scale farm workers are less likely to be married and have fewer children, are less educated (2.6 versus 5.5 years) and have less work experience (2.8 versus 5.5 years), and are more likely to belong to the Fula ethnicity, a semi-sedentary pastoralist community spread over several countries in West Africa. The majority of them (66%) are engaged in a mix of activities (seeding, irrigating, fertilizer application and harvesting). Workers in the agro-industry focus on a more specific task, which can be either on the field, doing similar activities as the workers on small-scale horticultural farms do, in the conditioning centres, or in the administrative units. Comparing agro-industry workers, we find that women have more children than men and are more likely to be Oulof, the main ethnicity in Senegal and the research areas. Men are more likely to be migrants and originate from regions where Fula and Serer ethnicities dominate. Women are more likely to work in the conditioning centres and harvesting, while men are more likely to perform technical functions and heavier production activities. Young workers are more likely to work in production. As migrant workers are more likely to be young and male, their characteristics largely correspond to these groups of workers. In addition, migrants are more likely to belong to non-Muslim religions. While the overall education level is very low, we do not find differences between the different groups of workers, but older and local workers have more work experience.

3.2. Quality of employment

The quality of employment in the horticultural sector in Senegal is relatively good, with better employment conditions in the agro-industry than on small-scale farms (Fig. 3). Detailed results can be found in Tables A2 and A3 in annex. We find that 88% of the agro-industry workers receive at least the minimum wage with an average wage of 353 CFA/h, while this is only 33% for small-scale farm workers whose wage is 218 CFA/h on average. Also non-monetary employment conditions are better in the agro-industry: the average DW-index for agro-industry workers is 0.53 compared to 0.41 for small-scale farm workers. Among the former 85% is classified as having decent work compared to only 62% among the latter.

The four dimensions of decent work differ slightly between agro-industry and small-scale farm workers. Agro-industrial companies perform better in terms of adequate earnings and productive work. Fringe benefits, especially the provision of meals and housing, are more common on small-scale farms while agro-industry workers receive more training. Decent work time is the worst dimension of employment quality. We find that 53% of the agro-industry workers and 39% of the small-scale farm workers work more than 48 h/week, that working during nights and holidays is common, and that few workers receive official annual leave. Working longer hours or not taking leave can be a deliberate choice on the part of casual workers themselves to increase earnings, or can be coerced by employers demanding overwork from their workers. Results reveal that compensation of overwork time is problematic. Only 28% of the agro-industry workers and none of the small-scale farm workers who work more than 48 h/week are adequately compensated for this overwork, and also working at night or during holidays is often not adequately compensated. The stability of work does not differ much between agro-industry and small-scale farm workers. Even though 56% of the agro-industry workers have no contract or only an oral agreement and 62% are employed on a daily basis, they work on average about 178 days per year, spread over eight months. Only 5% of the small-scale farm workers receive a written contract, but these workers are more likely to be employed on a seasonal basis. Further, the work environment in the agro-industry as well as on small-scale farms is relatively safe with a very low occurrence of work-related accidents, despite 22% of the workers using dangerous products. About 40% of workers have access to health care facilities.

A comparison between different groups of agro-industry workers reveals important differences (Fig. 3 and Tables A2 and A3 in

Table 1
Descriptive statistics of worker characteristics and activity in horticulture, by type of employer and group of workers.

	Small-scale farm and agro-industry workers			Agro-industry workers								
	Small-scale	Agro-industry	Test	Women	Men	Test	Youth	Older	Test	Migrant	Local	Test
<i>Worker characteristics</i>												
Female	0.000	0.411	***				0.396	0.416		0.103	0.574	***
Youth	0.526	0.245	***	0.236	0.251					0.301	0.215	*
Migrant	0.797	0.347	***	0.087	0.528	***	0.427	0.321	*			
Married	0.308	0.533	***	0.534	0.533		0.156	0.655	***	0.485	0.559	
Children (#)	0.594	1.880	***	2.516	1.437	***	0.208	2.422	***	1.162	2.262	***
	(1.376)	(2.436)		(2.567)	(2.241)		(0.648)	(2.554)		(1.974)	(2.571)	
Schooling (years)	2.647	5.518	***	5.081	5.823		4.990	5.692		5.419	5.570	
	(3.788)	(5.065)		(4.819)	(5.218)		(4.400)	(5.258)		(5.072)	(5.070)	
Experience (years)	2.767	5.485	***	5.610	5.398		1.833	6.669	***	4.485	6.016	**
	(4.684)	(6.420)		(6.423)	(6.429)		(3.025)	(6.777)		(4.946)	(7.030)	
Muslim religion	0.947	0.954		0.969	0.944		0.969	0.949		0.904	0.980	***
Oulof ethnicity	0.263	0.406	***	0.497	0.342		0.385	0.412		0.243	0.492	***
Fula ethnicity	0.361	0.258	**	0.186	0.307	***	0.323	0.237	*	0.324	0.223	**
Serer ethnicity	0.226	0.171		0.168	0.173		0.219	0.155		0.235	0.137	**
Other ethnicities	0.150	0.166		0.149	0.178		0.007	0.020	***	0.199	0.148	
<i>Activity</i>												
Production	0.331	0.316		0.354	0.290		0.417	0.280	**	0.353	0.297	
Technical	0.000	0.056	***	0.000	0.095	***	0.042	0.060		0.081	0.043	
Supervisor	0.008	0.066	***	0.068	0.065		0.000	0.090	***	0.029	0.086	**
Conditioning	0.000	0.306	***	0.453	0.204	***	0.260	0.320		0.162	0.383	***
Other/Mix	0.661	0.256	***	0.124	0.346	***	0.281	0.247		0.375	0.191	***
Number of observations	133	392		161	231		96	296		136	256	

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard deviations in parentheses.

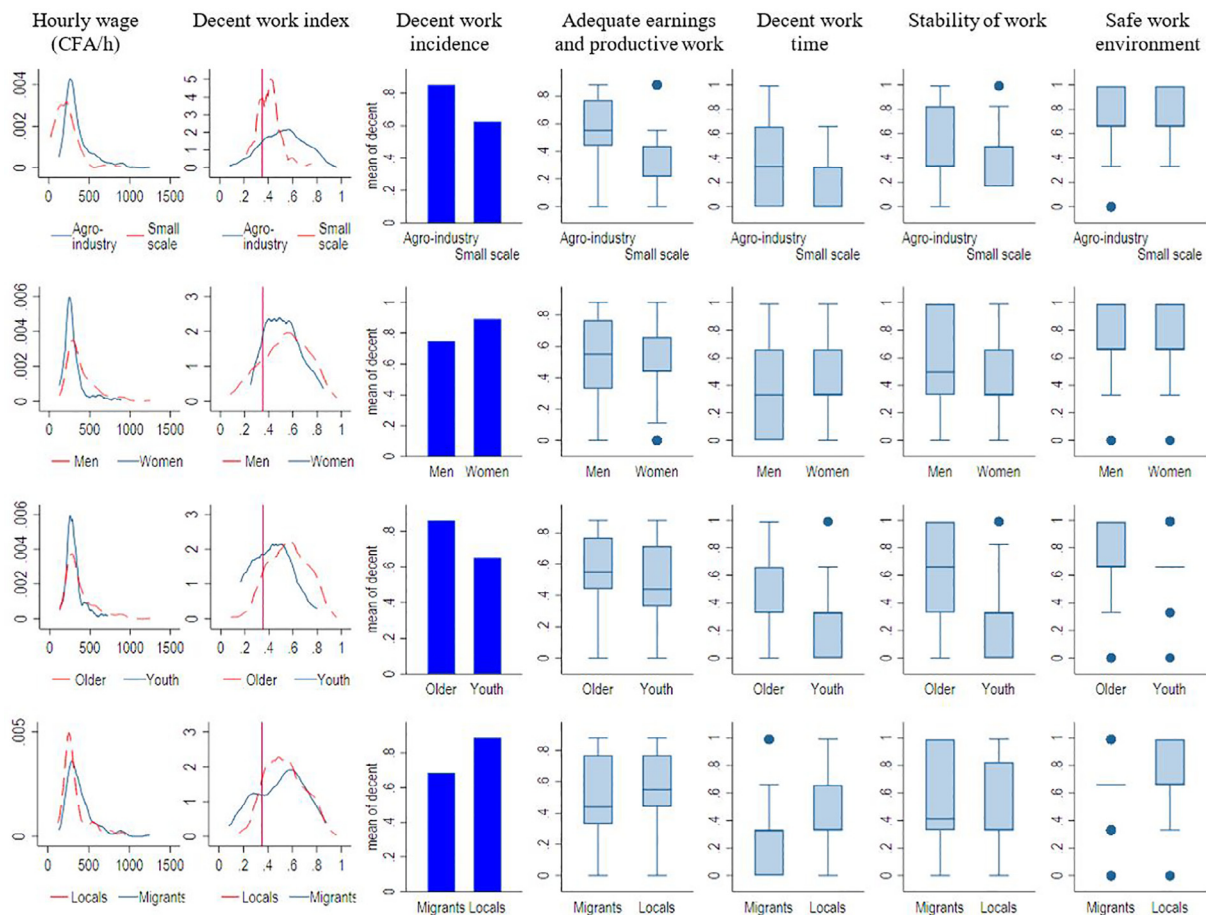


Fig. 3. Quality of employment. Notes: Density plot of wage: Comparison agro-industry ($M = 353$, $SD = 170$) and small-scale farms ($M = 218$; $SD = 141$). Comparison between female ($M = 297$, $SD = 132$) and male workers ($M = 392$, $SD = 182$), between youth ($M = 304$, $SD = 107$) and older workers ($M = 369$, $SD = 183$), and between migrant ($M = 388$, $SD = 175$) and local workers ($M = 334$, $SD = 164$). All differences in mean wage are significant at the $p < 0.01$ level. DW-index: Comparison agro-industry ($M = 0.53$, $SD = 0.17$) and small-scale farms ($M = 0.41$, $SD = 0.10$). Comparison between female ($M = 0.52$, $SD = 0.14$) and male workers ($M = 0.53$, $SD = 0.19$), no significant difference; between youth ($M = 0.43$, $SD = 0.16$) and older workers ($M = 0.56$, $SD = 0.16$), significant at the $p < 0.01$ level; and between migrant ($M = 0.50$, $SD = 0.20$) and local workers ($M = 0.54$, $SD = 0.16$), significant at the $p < 0.05$ level.

annex). First, women earn 24% less than men (297 versus 392 CFA/h), and they have less access to permanent and written contracts. Yet, they score better on the dimensions of decent work time and safe work environment. The aggregated DW-index does not differ significantly between male and female workers. However, the variation of the DW-index is larger for men, which explains why they are slightly less likely to have decent jobs (82%) compared to women (89%). Second, young workers score lower on all dimensions of the DW index than older workers, except for adequate earnings. Even though older workers earn 21% more on average, they have the same likelihood (88%) of receiving at least the minimum wage. Only 67% of young workers have a decent job while this is 91% for older workers. Third, migrants earn 16% more than local workers, but the DW-index is significantly lower for migrant workers. This is mostly due to a lower score for decent work time (they work on average 57 h/week, while for locals this is 49 h/week, and migrants work more often during nights and holidays as guards). In addition, migrants are more likely to use dangerous products. They are more likely to occupy permanent positions, but this does not translate into longer job tenure. Overall, 75% of migrant workers are employed in decent jobs compared to 91% of local workers.

3.3. Regression results

Our multivariate analysis reveals whether observed differences remain when controlling for other characteristics. Table 2 presents the estimates of the hourly wage, decent-work index and the decent-work incidence for all workers and for field workers only, as specified in Eq. (1). Estimated coefficients for all workers (columns 1–3) are very similar to those for field workers only (columns 4–6), indicating that results are robust to restricting the

sample to workers doing similar jobs. Although these regressions do not reveal causal relationships, these results point to interesting differences in job quality in global and local horticultural value chains. We find that small-scale farm workers earn 58% less, have a DW index that is 6.6 percentage points (pp) lower and are 10.4 pp less likely to have decent work, all other observable characteristics being equal.

Table 3 presents the different model estimates for (log-specified) wages of agro-industry workers specifically, as specified in Eq. 2–6. The high R^2 values indicate that up to 64% of the variability in wages is explained by the models, indicating a good fit. We find a wage gap across companies (model 2–4) but not within companies (model 5–6). In model 2, we control for worker characteristics and find that women earn 23% less than men, and migrants 11% more than local workers. When additionally controlling for activity (model 3) and job characteristics (model 4), the gender wage gap becomes smaller but remains significant, and the wage difference for migrant workers disappears. This implies that the wage difference between migrant and local workers is related to the type of job, whereas this is not or only partially the case for the gender wage gap. Yet, when comparing wages within companies (models 5 and 6), also the gender wage gap disappears completely. We do not find evidence of a wage gap for youth, as the coefficient is insignificant in all model specifications. Whether we explicitly control for company characteristics (model 5) or use company fixed effects (model 6) does not alter our results, indicating limited unobserved heterogeneity at company level.

Table 4 and Table 5 present the different model estimates for the DW-index and DW- incidence of agro-industry workers. The results for decent work differ to some extent from the results for wages, which justifies our approach to focus on wages and non-monetary aspects of job quality. In contrast to the gender wage

Table 2
OLS regression results for small-scale farm workers and agro-industry workers.

	All workers						Field workers only					
	Log(wage)		Decent work index		Decent work incidence		Log(wage)		Decent work index		Decent work incidence	
<i>Worker characteristics</i>												
Small-scale employer (dummy)	−0.578	***	−0.066	***	−0.104	*	−0.587	***	−0.065	***	−0.107	*
	(0.069)		(0.016)		(0.055)		(0.071)		(0.018)		(0.060)	
Female (dummy)	−0.245	***	−0.018		0.014		−0.271	***	−0.008		0.015	
	(0.046)		(0.016)		(0.036)		(0.069)		(0.022)		(0.055)	
Youth (dummy)	−0.096	*	−0.051	***	−0.142	***	−0.112		−0.039	**	−0.127	**
	(0.054)		(0.016)		(0.047)		(0.075)		(0.019)		(0.059)	
Migrant (dummy)	0.077		−0.007		−0.108	***	0.086		0.021		−0.094	*
	(0.052)		(0.015)		(0.039)		(0.066)		(0.017)		(0.049)	
Married (dummy)	0.068		0.017		−0.031		0.043		0.023		−0.074	
	(0.051)		(0.016)		(0.041)		(0.076)		(0.020)		(0.060)	
Total children (#)	0.008		−0.002		0		0.009		0.002		0.014	
	(0.011)		(0.004)		(0.008)		(0.014)		(0.004)		(0.011)	
<i>Ethnicity (Oulof as base level)</i>												
Ethnicity Fula	−0.151	***	−0.014		−0.078	*	−0.219	***	−0.042	**	−0.137	**
	(0.047)		(0.017)		(0.042)		(0.068)		(0.020)		(0.056)	
Ethnicity Serer	−0.088		−0.048	***	−0.085		−0.183	**	−0.063	***	−0.125	*
	(0.062)		(0.018)		(0.052)		(0.075)		(0.021)		(0.066)	
Other ethnicities	−0.117	*	−0.015		−0.046		−0.172	*	−0.021		−0.114	*
	(0.065)		(0.018)		(0.047)		(0.087)		(0.022)		(0.063)	
Muslim (dummy)	−0.06		−0.034		−0.121	*	−0.047		−0.042	*	−0.112	
	(0.075)		(0.024)		(0.064)		(0.084)		(0.025)		(0.079)	
Schooling (years)	0.018	***	0.007	***	0.002		0.024	***	0.009	***	0.005	
	(0.005)		(0.001)		(0.004)		(0.007)		(0.002)		(0.005)	
Experience (years)	0.008	***	0.007	***	0.007	***	0.007		0.007	***	0.006	
	(0.003)		(0.001)		(0.003)		(0.004)		(0.001)		(0.004)	
Constant	5.81	***	0.514	***	1.042	***	5.858	***	0.498	***	1.059	***
	(0.101)		(0.033)		(0.084)		(0.127)		(0.039)		(0.113)	
R ²	0.318		0.275		0.142		0.357		0.318		0.139	
N	497		525		525		325		353		353	

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard errors in parentheses. 28 small-scale farm workers are excluded from the wage regressions because of missing or unrealistic values.

Table 3

OLS regression results for hourly wage (logarithm of CFA/h) of agro-industry workers.

	(2)		(3)		(4)		(5)		(6)
<i>Worker characteristics</i>									
Female (dummy)	−0.225 (0.046)	***	−0.195 (0.049)	***	−0.125 (0.041)	***	−0.024 (0.034)		−0.015 (0.031)
Youth (dummy)	−0.069 (0.047)		−0.074 (0.047)		0.007 (0.044)		−0.013 (0.038)		0.016 (0.036)
Migrant (dummy)	0.106 (0.052)	**	0.098 (0.052)	*	0.060 (0.043)		−0.002 (0.036)		0.024 (0.035)
Married (dummy)	0.068 (0.047)		0.053 (0.047)		−0.010 (0.041)		−0.022 (0.034)		−0.022 (0.033)
Total children (#)	0.006 (0.012)		0.005 (0.012)		0.008 (0.011)		−0.002 (0.009)		−0.001 (0.008)
<i>Ethnicity (Oulof as base level)</i>									
Ethnicity Fula	−0.099 (0.043)	**	−0.080 (0.043)	*	−0.084 (0.037)	**	−0.078 (0.032)	**	−0.071 (0.031)
Ethnicity Serer	0.024 (0.068)		0.027 (0.070)		0.059 (0.062)		−0.036 (0.047)		−0.029 (0.046)
Other ethnicities	−0.102 (0.060)	*	−0.097 (0.060)		−0.009 (0.049)		0.024 (0.042)		0.020 (0.040)
Muslim (dummy)	0.071 (0.084)		0.068 (0.088)		0.100 (0.076)		0.118 (0.058)	**	0.131 (0.056)
Schooling (years)	0.019 (0.004)	***	0.019 (0.004)	***	0.010 (0.003)	***	0.011 (0.003)	***	0.009 (0.003)
Experience (years)	0.008 (0.003)	**	0.007 (0.004)	**	−0.003 (0.004)		0.003 (0.003)		0.003 (0.003)
<i>Activity (production as base level)</i>									
- Technical			0.077 (0.104)		0.007 (0.080)		0.029 (0.065)		0.041 (0.068)
- Supervisory			0.122 (0.085)		0.112 (0.077)		0.095 (0.059)		0.119 (0.050)
- Conditioning			0.060 (0.055)		0.028 (0.049)		0.022 (0.045)		0.055 (0.043)
- Other activities			−0.044 (0.049)		−0.025 (0.046)		−0.035 (0.047)		−0.053 (0.046)
<i>Job characteristics</i>									
Oral contract (vs no contract)					0.167 (0.044)	***	0.082 (0.035)	**	0.060 (0.034)
Written contract (vs no contract)					0.151 (0.058)	**	0.128 (0.045)	***	0.092 (0.038)
Casual worker (vs permanent)					−0.478 (0.069)	***	−0.557 (0.056)	***	−0.540 (0.050)
Seasonal worker (vs permanent)					−0.279 (0.056)	***	−0.285 (0.050)	***	−0.278 (0.048)
<i>Company characteristics</i>									
Company age							−0.378 (0.072)	***	
Total workers							−0.137 (0.053)	**	
% temporary workers							0.04 (0.009)	***	
% female workers							−0.021 (0.005)	***	
% young workers							−0.01 (0.002)	***	
% migrant workers							−0.013 (0.004)	***	
<i>Location (Senegal River Delta as base level)</i>									
- Lac de Guiers							−0.16 (0.087)	*	
- Niayes							0.102 (0.090)		
Constant	5.626 (0.107)	***	5.608 (0.111)	***	5.889 (0.115)	***	6.084 (0.307)	***	5.737 (0.097)
R ²	0.197		0.210		0.433		0.612		0.641

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard errors in parentheses. N = 392 in all models. Model 6 controls for company fixed effects.

gap, women have a 3.7 pp lower DW-index than men (model 6) after controlling for all company differences but are not less likely to have decent work. The gap in the DW-index for youth in comparison with older workers is significant only across companies, but not within companies, and the probability of young workers to have decent work is 10.4 to 12.8 pp lower than for older workers. While migrants receive a higher wage than locals and their

DW-index does not differ significantly from that of local workers, their likelihood to have decent work is 7.3 to 14 pp lower if company fixed effects are not controlled for.

The results in Tables 3–5 reveal that workers with a higher level of education and more job experience receive higher wages, have a higher DW index and a higher likelihood to have decent work. Moreover, workers with higher levels of education and with more

Table 4
OLS regression results for decent work-index of agro-industry workers.

	(2)		(4)		(5)		(6)
<i>Worker characteristics</i>							
Female (dummy)	−0.022 (0.017)		−0.010 (0.018)		−0.043 (0.017)	**	−0.037 (0.016)
Young (dummy)	−0.077 (0.021)	***	−0.082 (0.021)	***	−0.027 (0.017)		−0.015 (0.017)
Migrant (dummy)	−0.026 (0.018)		−0.032 (0.018)	*	0.011 (0.016)		0.018 (0.016)
Married (dummy)	0.025 (0.019)		0.022 (0.019)		−0.001 (0.015)		−0.002 (0.015)
Children (#)	−0.003 (0.004)		−0.004 (0.004)		0.000 (0.003)		0.000 (0.003)
<i>Ethnicity (Oulof as base level)</i>							
Ethnicity Fula	0.005 (0.020)		0.006 (0.020)		−0.011 (0.016)		−0.010 (0.016)
Ethnicity Serer	−0.052 (0.021)	**	−0.052 (0.021)	**	−0.040 (0.020)	**	−0.037 (0.020)
Other ethnicities	−0.016 (0.021)		−0.015 (0.021)		−0.026 (0.019)		−0.025 (0.018)
Muslim (dummy)	−0.039 (0.028)		−0.035 (0.027)		−0.024 (0.018)		−0.020 (0.017)
Schooling (years)	0.009 (0.002)	***	0.010 (0.002)	***	0.008 (0.001)	***	0.007 (0.001)
Experience (years)	0.008 (0.001)	***	0.008 (0.001)	***	0.007 (0.001)	***	0.007 (0.001)
<i>Activity (production as base level)</i>							
- Technical			0.053 (0.028)	*	0.041 (0.024)	*	0.045 (0.024)
- Supervisory			−0.030 (0.034)		−0.011 (0.024)		−0.003 (0.026)
- Conditioning			−0.015 (0.021)		−0.006 (0.017)		0.007 (0.017)
- Other activities			−0.045 (0.019)	**	−0.017 (0.018)		−0.023 (0.018)
<i>Company characteristics</i>							
Company age					0.289 (0.029)	***	
Total workers					0.268 (0.023)	***	
% temporary workers					−0.044 (0.004)	***	
% female workers					0.021 (0.002)	***	
% young workers					0.000 (0.001)		
% migrant workers					0.018 (0.002)	***	
<i>Location (Senegal River Delta as base category)</i>							
- Lac de Guiers					0.209 (0.042)	***	
- Niayes					0.067 (0.033)	**	
Constant	0.512 −0.038	***	0.521 −0.038	***	0.097 −0.127		0.576 −0.039
R ²	0.273		0.291		0.503		0.526

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard errors in parentheses. N = 392 in all models. Model 6 controls for company fixed effects.

experience are involved in different activities, doing different tasks, and have different job characteristics. Table 3 shows that also these job characteristics, such as having a contract and being employed permanently, are associated with higher wages for agro-industry workers. On the other hand, there are no significant differences in wages between the type of activities, apart from a significantly higher wage for agro-industry workers in a supervisory job (which is not significant across all specifications). Moreover, technical jobs result in a higher DW-index score and conditioning activities in a lower DW-incidence – differences that disappear when company characteristics are controlled for.

The type of company matters a lot for job quality. Wages are lower in older and larger companies with fewer temporary workers and a more diversified labour force while decent work scores and incidences are higher in these companies. This again points

to the complementarity in wage and non-wage aspects of job quality, and suggests that companies make a trade-off between wages and other employment conditions.

3.4. Decomposition of wage gaps

The results of the decomposition analysis on wages for agro-industry workers are reported in Table 6. Aggregate effects for worker, activity, job and company characteristics are reported; the decomposition to the level of individual characteristics is reported in Table A4 in annex. We find that 97% of the gender wage gap is related to the endowment effect and hence explained by differences in observed characteristics. Only 3% of the observed gender wage gap among agro-industry workers can be attributed to a structural effect and/or unobserved factors. We find that the

Table 5
OLS regression results for decent work incidence of agro-industry workers.

	(2)		(4)		(5)		(6)
<i>Worker characteristics</i>							
Female (dummy)	0.019 (0.035)		0.032 (0.039)		−0.041 (0.034)		−0.029 (0.033)
Young (dummy)	−0.189 (0.051)	***	−0.206 (0.050)	***	−0.128 (0.042)	***	−0.104 (0.045)
Migrant (dummy)	−0.140 (0.039)	***	−0.148 (0.040)	***	−0.073 (0.037)	**	−0.058 (0.036)
Married (dummy)	0.005 (0.040)		0.014 (0.039)		−0.012 (0.033)		−0.013 (0.031)
Children (#)	−0.003 (0.008)		−0.011 (0.009)		−0.008 (0.008)		−0.007 (0.007)
<i>Ethnicity (Oulof as base level)</i>							
Ethnicity Fula	0.012 (0.043)		0.004 (0.043)		−0.004 (0.038)		−0.001 (0.038)
Ethnicity Serer	−0.099 (0.054)	*	−0.088 (0.051)	*	−0.099 (0.052)	*	−0.092 (0.052)
Other ethnicities	−0.003 (0.044)		0.001 (0.044)		−0.018 (0.040)		−0.015 (0.039)
Muslim (dummy)	−0.198 (0.044)	***	−0.161 (0.048)	***	−0.104 (0.040)	***	−0.095 (0.040)
Schooling (years)	0.006 (0.003)	*	0.009 (0.003)	**	0.006 (0.003)	**	0.004 (0.003)
Experience (years)	0.007 (0.003)	***	0.008 (0.003)	***	0.004 (0.003)		0.004 (0.003)
<i>Activity (production as base level)</i>							
- Technical			0.022 (0.060)		0.001 (0.072)		0.008 (0.073)
- Supervisory			−0.059 (0.036)		0.013 (0.038)		0.031 (0.043)
- Conditioning			−0.183 (0.051)	***	−0.099 (0.042)	**	−0.075 (0.041)
- Other activities			−0.182 (0.046)	***	−0.048 (0.041)		−0.059 (0.040)
<i>Company characteristics</i>							
Company age					0.472 (0.082)	***	
Total workers					0.440 (0.064)	***	
% temporary workers					−0.072 (0.011)	***	
% female workers					0.034 (0.006)	***	
% young workers					−0.003 (0.001)	**	
% migrant workers					0.035 (0.005)	***	
<i>Location (Senegal River Delta as base category)</i>							
- Lac de Guiers					0.263 (0.088)	***	
- Niayes					0.255 (0.077)	**	
Constant	1.074 (0.067)	***	1.139 (0.073)	***	0.446 (0.242)	*	1.066 (0.081)
R ²	0.173		0.231		0.422		0.444

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard errors in parentheses. N = 392 in all models. Model (6) controls for company fixed effects

largest part of the endowment effect relates to job characteristics (58%), in particular to the job status as casual or permanent worker. Company characteristics explain 29% of the endowment effect, with especially older companies and companies with a higher share of young workers contributing to the gender wage gap. The type of activity only explains 12% of the endowment effect, and worker characteristics are not important at all. This suggests that the observed gender wage gap is associated with the job status of women, and much less with the type of activities they perform or their experience and schooling.

Also in the decomposition of the youth and migrant wage gaps, the endowment effect is substantial with respectively 96% and 91% of the observed wage differences explained by differences in characteristics. Differences in returns to characteristics are negligible. Job characteristics, especially holding a contract and job status as

permanent worker, explain most of the differences in wages between young and older workers. For migrants, both job and company characteristics are important in explaining the endowment effect. Again, job status is important, as having seasonal or permanent jobs leads to higher wages for migrant workers. Companies with an older labour force corroborate the wage differential between migrant and local workers; while younger companies and companies with a higher share of migrant workers corroborate the wage differential between young and older workers.

4. Discussion

The growth in horticultural exports and the development of horticultural value chains in Senegal is an important source of employment creation in rural areas. We estimate that at least

Table 6
Decomposition analysis of wage gaps for different groups of agro-industry workers.

	Gender		Age		Migrant status	
<i>A. Mean wage gap</i>						
Mean wage (CFA/h)	Female		Young		Migrant	
	297.483	***	304.332	***	387.920	***
	(10.393)		(10.867)		(14.967)	
	Male		Older		Local	
	391.655	***	368.754	***	334.414	***
	(11.971)		(10.628)		(10.258)	
Mean wage gap	94.171	***	64.422	***	−53.506	***
	(15.853)		(15.200)		(18.145)	
Wage ratio	1.32		1.21		0.86	
<i>B. Aggregate decomposition</i>						
Endowment effect	91.014	***	61.710	***	−48.767	***
	15.733		15.919		15.347	
	97%		96%		91%	
Structural effect	3.158		2.713		−4.739	
	13.551		13.920		15.543	
	3%		4%		9%	
<i>C. Detailed decomposition</i>						
<i>C.1. Endowment effect</i>						
Worker characteristics (agg.)	0.943		12.737		9.145	
	(8.068)		(11.287)		(8.588)	
	1%		21%		−19%	
Activity (agg.)	11.345	**	2.412		−5.668	
	(5.681)		(3.625)		(4.686)	
	12%		4%		12%	
Job characteristics (agg.)	52.435	***	66.171	***	−24.316	**
	(10.349)		(10.030)		(11.106)	
	58%		107%		50%	
Company characteristics (agg.)	26.289	***	−19.610	*	−27.928	***
	(8.948)		(10.217)		(9.457)	
	29%		−32%		57%	
<i>C.2. Structural effect</i>						
Worker characteristics (agg.)	22.050		78.572	**	−114.054	
	(56.948)		(57.713)		(73.000)	
Activity (agg.)	−18.711		−25.206		43.215	
	(18.615)		(20.972)		(29.356)	
Job characteristics (agg.)	−17.402		−51.901**	***	−1.337	
	(12.982)		(21.141)		(17.304)	
Company characteristics (agg.)	−321.053		−182.679		−115.422	
	(258.995)		(305.907)		(314.840)	

Note: *p < 0.1; ** p < 0.05; *** p < 0.01. Standard errors in parentheses. N = 392.

30,000 formal jobs have been created directly by the agro-industry in the three main horticultural production regions in Senegal. Given an earlier figure of about 12,000 to 15,000 jobs in 2005 (Maertens, 2009), this implies a doubling of the number of jobs over 15 years.

Our results document that global food value chains can entail important employment opportunities for rural women and youth, and can trigger rural to rural migration. We estimate that women occupy 66% of the jobs in the agro-industry. The large inclusion of women is in line with previous studies on global food value chains in various African countries (e.g. Barrientos et al., 2003; Maertens & Swinnen, 2012; Rao & Qaim, 2013; Suzuki et al., 2018). We find that 29% of the agro-industry workers in our sample are younger than 25 years, and that more than 5% originate from rural areas in other regions of Senegal (mainly Fatick, Kaolack and Kolda). The former is in line with the study of Benali and co-authors, (2018) who indicate that employment in vegetable export chains in Tanzania is inclusive towards younger workers (aged 15–34). The documented inclusiveness towards female, young and migrant workers is important from a development perspective for multiple reasons. First, various studies show that engaging women in formal wage employment contributes to favourable development outcomes, such as female empowerment, reduced fertility rates and increased child schooling (Krumbiegel et al., 2020; Maertens & Swinnen, 2012; Maertens & Verhofstadt, 2013; Van den Broeck & Maertens, 2015). Second, the enormous challenges that rural youth

in Sub-Saharan Africa face to access formal and productive employment are seen as an important economic development problem (Estruch et al., 2019; Fox et al., 2016). The growth and transformation of global food value chains can contribute importantly to alleviate this. Third, the inclusion of migrant workers from other rural areas may induce positive spill-over effects on the regions of origin of these migrants (Christiaensen & Todo, 2014).

Overall, the job quality in agro-industrial companies is relatively good. Although the agro-industry offers mainly casual and seasonal jobs, due to the seasonality of production and international demand (Nolte & Ostermeier, 2017), export companies are increasingly expanding their product range, their destination markets and the length of their export and production season, resulting in longer employment periods for seasonal and casual workers. While wages are lower than in the non-farm sector in the same region (Van den Broeck & Maertens, 2017), they are substantially higher than on small-scale farms. Also in terms of non-wage dimensions, the quality of employment is better in the agro-industry. These differences cannot be attributed solely to the type of employer but disparities in employment quality remain even after controlling for a wide set of worker characteristics, and when comparing only field workers in the agro-industry and on small-scale farms.

Our findings reveal that wages and job quality within the agro-industry vary with worker, job and company characteristics and

that there are trade-offs between wage and non-wage aspects of job quality across and within companies. We find that women are slightly more likely to have decent work than men and score similar to men on non-wage dimensions of quality of employment, while women's wages are on average 24% below those of men. Our regression results reveal that this gender wage gap is much more important across companies than within companies while gender differences in decent work scores are more prevalent within companies. We find a much larger gender wage gap than other studies focussing on horticultural export sectors, e.g. 9% in Zambia and 6% in Kenya (Tallontire et al., 2005), as well as compared to studies on industry sectors, e.g. 18% in Mali and 8% in Bangladesh (Dombia & Meur, 2003; Menzel & Woodruff, 2019). While other studies conclude that gender wage gaps are explained by occupational differences (Dolan & Sutherland, 2002; Kritzing et al., 2004; Maertens & Swinnen, 2012), our decomposition analysis reveals that gender wage gaps are mainly due to contractual rather than occupational differences. Moreover, the decomposition analysis reveals that the gender wage gap is almost completely explained by gender differences in observed factors, suggesting that women would be paid equally when they would have similar jobs as men. Our data and methods do not allow to reveal if and why women choose to take up lower-paying jobs or why companies hire women for lower-paying jobs – a lower reservation wage among women has been suggested as a possible explanation in other studies (Maertens & Verhofstadt, 2013; Van den Broeck, Van Hoyweghen, & Maertens, 2016). Despite the substantial gender wage gap, our findings contradict statements that women face unfavourable employment conditions in general (Garikipati, 2009; Maertens & Swinnen, 2012).

Moreover, we find a lower job quality for young workers, mostly in non-wage aspects. The wage of young workers is on average 21% below that of older workers, but our decomposition analysis suggests that young workers are paid equally when they have the same jobs as older workers. The wage gap mainly relates to the lack of written contracts (79%) and a status as casual worker (86%). We find that migrant workers face inferior employment conditions and are 16 pp less likely to have decent work, but benefit from wages that are on average 16% higher. It cannot be ruled out that migrants deliberately choose for different working conditions than local workers. Our findings imply that global food value chains create formal employment opportunities for rural youth and migrants, but that within these formal jobs migrant workers face inferior working conditions and young workers receive lower wages. This is more prevalent across companies than within companies, suggesting that some companies discriminate less than others and that company selection is important for these workers.

Our results clearly document the importance of looking beyond wages and taking into account non-wage dimensions in assessing the quality of employment. We find some opposing results, such as lower wages but a higher likelihood of decent work for women, and the opposite for migrant workers. These nuanced findings show that quality of employment is a complex and multidimensional issue. Moreover, a multidimensional index such as the decent work index based on ILO guidelines that we construct in this paper, is useful in quantitative analyses on quality of employment and highly complementary to a focus on monetary measures. A multidimensional index is also useful for identifying a cut-off point and incidences of decent or indecent work. Yet, a limitation to our approach is that this cut-off point was identified only based on the distribution of decent work scores within our sample of agro-industrial workers in Senegal. This allows for a comparison of decent work between different groups of workers in the sector

but does not allow us to make more absolute claims on the occurrence of decent work in the sector. Ideally, a decent work cut-off point is determined for a larger sample of workers from different sectors and different countries, which requires further empirical research.

5. Conclusion

This article draws on the recent policy attention to decent work for all and job quality, and investigates decent work in global food value chains. The study provides quantitative evidence on the inclusiveness of wage employment in the horticultural sector in Senegal, and on the quality of this employment and disparities among vulnerable groups of workers. We find that the agro-industry is rather inclusive towards women, youth and migrants, and offers relatively good quality jobs. We find a much better overall job quality and a higher incidence of decent work in the export agro-industry than on small-scale horticultural farms producing for the local market, implying that the ongoing agro-industrialization of the horticultural export sector might contribute to the advancement of the decent work agenda.

Yet, we find substantial differences in wages and decent work across workers, jobs and companies. We find substantial gender and youth wage gaps that can to a large extent be attributed to differences in job characteristics related to women's and youth's casual employment status. While migrants are observed to have larger wages, their overall job quality is inferior. The decent work for all agenda could be further advanced in the Senegalese horticultural export sector by respecting decent work times, especially for migrant workers, and by offering more stable jobs and written contracts, especially for women and young workers. Our findings stress the complementarity between wage and non-wage dimensions of job quality. Decent work is a complex and multidimensional issue that requires looking beyond wages and single dimensions of job quality. Given the lack of empirical evidence on decent work from other sectors and countries, further empirical research is needed to understand the potential of global food value chains as a source of inclusive, decent and equitable rural employment.

CRedit authorship contribution statement

Anna Fabry: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing. **Goedele Van den Broeck:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Miet Maertens:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Table A1

Dimensions and indicators of decent work index

Indicator	Definition	Calculation
<i>1) Adequate earnings and productive work</i>		
Minimum wage	The worker earns at least the minimum wage (214 CFA/h)	• 1 if the hourly wage is at least the minimum wage • 0 otherwise
Fringe benefits	The worker receives fringe benefits (housing, meals and/or transportation) in addition to the wage	• 1 if 3 fringe benefits received • 0.66 if 2 fringe benefits received • 0.33 if 1 fringe benefits received • 0 otherwise
Training	The worker receives job training	• 1 if job training received • 0 otherwise
<i>2) Decent work time</i>		
Weekly hours	The worker works on average between 35–48 h/week: working more than 40 h/week (48 h/week) should be compensated by a 115% (140%) wage increase	• 0 if worked more than 48 h/week without compensation • 1 otherwise
Unsocial hours	Worker works during nights and/or official holidays: working during nights and/or official holidays should be compensated by a resp. 160% and 200% wage increase	• 0 if worked during nights and/or holidays without compensation • 1 otherwise
Work intensity	The worker does not exceed the max. hours worked: • The yearly hours worked in the agricultural sector is limited to 2,352 h/year • Casual workers are not allowed to work more than 8 h/day • When employed for more than 12 consecutive months, the worker should receive 2 days of paid holiday per month worked	• 0 if worked more than 2,352 h/year; or if worked more than 8 h/day; or if no annual leave • 1 otherwise
<i>3) Stability and security of work</i>		
Type of contract	Type of contract	• 1 if written contract • 0 otherwise
Status	Status	• 1 if permanent • 0.5 if seasonal • 0 otherwise
Tenure	Tenure	• 1 if employed for more than 1 year • 0 otherwise
<i>4) Safe work environment</i>		
Health facilities	The worker can benefit from on-site health facilities whenever necessary	• 1 if health facilities are provided • 0 otherwise
Work accidents	The worker has had any work accidents since the start of his employment for the current employer	• 1 if no work accidents • 0 otherwise
Dangerous products	The worker works unprotected with dangerous products (e.g. pesticides such as Arsenal or D6)	• 1 if no dangerous products • 0 otherwise

Note: The index is based on the guidelines put forward by the International Labor Organization (ILO, 2013a).

Table A2

Outcome variables for different groups of workers

		Small-scale farm and agro-industry workers			Agro-industry workers								
		Small-scale	Agro-Industry	test	Female workers	Male workers	test	Young workers	Older workers	test	Migrant workers	Local workers	test
Wage (CFA/hour)	Mean	218.239	352.977	***	297.483	391.655	***	304.332	368.754	***	387.920	334.414	***
	s.d.	141.121	169.609	**	132.993	182.010	***	106.659	182.881	***	174.718	164.169	
Decent Work Index	Mean	0.407	0.527	***	0.516	0.535		0.428	0.559	***	0.503	0.540	**
	s.d.	0.096	0.172	***	0.144	0.189	***	0.163	0.163		0.197	0.156	***
Adequate Earnings	Mean	0.312	0.538	***	0.512	0.557	**	0.510	0.547		0.532	0.541	
	s.d.	0.198	0.215		0.236	0.198	**	0.223	0.212		0.193	0.227	**
Decent Work Time	Mean	0.174	0.335	***	0.363	0.316	*	0.248	0.363	***	0.284	0.362	***
	s.d.	0.209	0.265	***	0.256	0.270		0.267	0.258		0.285	0.250	*
Stability Of Work	Mean	0.424	0.530	***	0.455	0.582	***	0.309	0.601	***	0.539	0.525	
	s.d.	0.176	0.327	***	0.273	0.351	***	0.276	0.310		0.374	0.300	***
Safe Work Environment	Mean	0.72	0.710		0.736	0.684	**	0.646	0.725	***	0.658	0.731	***
	s.d.	0.221	0.220		0.193	0.236	***	0.219	0.218		0.236	0.208	*
Decent work incidence	Mean	62.41%	85.20%	***	89.44%	82.25%	**	66.67%	91.22%	***	74.26%	91.02%	***
Number of observations		133	392		161	231		96	296		136	256	

14 Note: *p<0.1; ** p<0.05;*** p<0.01. Comparison of means through two-sided t-tests (continuous variables) and z-tests (binary variables).

Table A3

Descriptive statistics for the indicators of decent work index for different groups of workers

	Small-scale farm and agro-industry workers			Agro-industry workers								
	Small-scale	Agro-Industry	test	Female workers	Male workers	test	Young workers	Older workers	test	Migrant workers	Local workers	test
1) Adequate earnings												
1.1. Minimum wage	0.331	0.878	***	0.808	0.926	***	0.875	0.878		0.949	0.840	***
1.2. Fringe Benefits	0.524	0.241	***	0.240	0.241		0.254	0.237		0.238	0.242	
Meals	0.865	0.163	***	0.106	0.204	***	0.229	0.142	**	0.154	0.168	
Transport	0.000	0.497	***	0.593	0.429	***	0.479	0.503		0.427	0.535	**
Housing	0.707	0.061	***	0.019	0.091	***	0.052	0.064		0.132	0.023	***
1.3. Training	0.090	0.513	***	0.503	0.520		0.417	0.544	**	0.427	0.559	**
2) Decent work time												
2.1. Weekly hours	0.045	0.319	***	0.367	0.286	*	0.188	0.362	***	0.235	0.363	***
Worked > 48h/w	0.391	0.526	***	0.429	0.593	***	0.625	0.493	**	0.574	0.500	
Compensation > 48h/w	0.000	0.277	***	0.290	0.270		0.150	0.329	***	0.167	0.344	***
Worked > 40h/w	0.887	0.875		0.789	0.935	***	0.896	0.868		0.919	0.852	*
Compensation > 40h/w	0.000	0.219	***	0.228	0.213		0.151	0.241	*	0.176	0.243	

Table A3 (continued)

	Small-scale farm and agro-industry workers			Agro-industry workers								
	Small-scale	Agro-Industry	test	Female workers	Male workers	test	Young workers	Older workers	test	Migrant workers	Local workers	test
2.2. Unsocial hours	0.218	0.571	***	0.640	0.524	**	0.469	0.605	**	0.478	0.621	***
Worked at night	0.165	0.230		0.149	0.286	***	0.323	0.199	**	0.287	0.199	**
Compensation night	0.000	0.156	**	0.292	0.106	**	0.032	0.220	**	0.077	0.216	*
Worked holidays	0.767	0.579	***	0.553	0.597		0.521	0.598		0.625	0.555	
Compensation hol.	0.000	0.405	***	0.438	0.384		0.220	0.458	***	0.306	0.465	**
2.3. Work Intensity	0.263	0.125	***	0.093	0.147		0.094	0.135		0.147	0.113	
<8h/day	0.015	0.214	***	0.367	0.108	***	0.292	0.189	**	0.125	0.262	***
<2.352h/year	0.767	0.809		0.919	0.732	***	0.875	0.787	*	0.750	0.840	**
Annual leave	0.008	0.166	***	0.050	0.247	***	0.010	0.216	***	0.213	0.141	*
3) <i>Stability of work</i>												
3.1. Contract	0.045	0.444	***	0.323	0.528	***	0.208	0.520	***	0.500	0.414	
Written contract	0.045	0.444	***	0.323	0.528	***	0.208	0.520	***	0.500	0.414	
Oral contract	0.699	0.301	***	0.398	0.234	***	0.427	0.260	***	0.272	0.316	
No contract	0.256	0.255		0.280	0.238		0.365	0.220	***	0.228	0.270	
3.2. Status	0.504	0.302	***	0.168	0.396	***	0.094	0.370	***	0.368	0.268	**
Casual	0.023	0.617	***	0.776	0.507	***	0.865	0.537	***	0.552	0.652	*
Seasonal	0.947	0.161	***	0.112	0.195	**	0.083	0.186	**	0.162	0.160	
Permanent	0.030	0.222	***	0.112	0.299	***	0.052	0.277	***	0.287	0.188	**
3.3. Tenure > 1year	0.737	0.860	***	0.890	0.840		0.635	0.932	***	0.765	0.910	***
4) <i>Safe work environment</i>												
4.1. Work accidents	0.023	0.041		0.025	0.052		0.021	0.047		0.044	0.039	
4.2. Dangerous products	0.150	0.219	*	0.110	0.299	***	0.250	0.210		0.324	0.164	***
4.3. Health care	0.346	0.398		0.360	0.424		0.229	0.453	***	0.360	0.418	
Number of observations	133	392		161	231		96	296		136	256	

Note: *p<0.1; ** p<0.05;*** p<0.01. Comparison of means through two-sided t-tests (continuous variables) and z-tests (binary variables). All indicators are scored between 0 and 1, and are explained in Table A1.

Table A4

Decomposition analysis of wage gaps for different groups of workers

	Gender			Age			Migrant		
	Endowment	Structural		Endowment	Structural		Endowment	Structural	
Total difference	91.014 (15.733)	*** (13.551)		61.710 (15.919)	*** (13.920)		-48.767 (15.347)	*** (15.543)	
<i>Worker characteristics</i>									
Female (dummy)				-0.062 (0.320)	-10.587 (10.444)		-1.488 (6.287)	-2.383 (8.270)	
Youth (dummy)	-0.041 (0.244)	-9.428 (7.269)					0.235 (1.231)	13.555 (7.960)	*

(continued on next page)

Table A4 (continued)

	Gender			Age			Migrant		
	Endowment	Structural		Endowment	Structural		Endowment	Structural	
Migrant (dummy)	2.091 (6.874)	-0.115 (7.412)		-0.503 (1.675)	3.747 (11.562)				
Married (dummy)	0.012 (0.361)	-11.526 (14.153)		-3.498 (7.070)	0.581 (7.860)		-0.514 (1.102)	-2.803 (16.457)	
Total children	-1.004 (4.071)	28.464 (15.505)	*	2.061 (8.347)	3.343 (4.677)		1.024 (4.152)	-0.663 (15.114)	
Ethnicity Oulof	-0.440 (1.490)	-0.187 (8.058)		0.076 (0.304)	2.921 (8.066)		0.709 (2.393)	-9.206 (7.326)	
Ethnicity Fula	-2.871 (1.584)	-2.732 (4.113)	*	2.051 (1.543)	4.883 (6.286)		2.393 (1.518)	6.152 (5.728)	
Ethnicity Serer	-0.013 (0.118)	4.162 (4.250)		-0.157 (0.812)	-0.365 (5.702)		0.244 (1.255)	-2.350 (4.270)	
Other ethnicity	0.664 (0.944)	-1.963 (3.845)		2.873 (1.667)	-2.501 (3.492)	*	-1.170 (1.123)	3.643 (4.477)	
Muslim (dummy)	-1.563 (1.428)	-21.050 (43.936)		-1.204 (1.451)	39.154 (48.922)		4.714 (2.577)	-134.218 (51.344)	***
Years of schooling	4.399 (3.253)	28.365 (15.853)	*	4.149 (3.404)	28.773 (15.309)	*	0.897 (3.200)	-11.116 (21.479)	
Job tenure (years)	-0.289 (0.959)	8.059 (14.070)		6.638 (7.259)	8.622 (9.698)		2.101 (2.436)	25.335 (18.578)	
<i>Activity</i>									
Production	1.741 (1.987)	-7.477 (8.542)		3.616 (3.464)	-2.169 (10.279)		1.526 (1.889)	26.177 (12.885)	**
Technical	0.199 (3.182)	-0.510 (1.010)		0.040 (0.642)	0.545 (1.813)		-0.079 (1.268)	5.517 (4.027)	
Supervisory	0.003 (0.097)	-5.898 (2.731)	**	-0.076 (2.440)	-0.632 (0.626)		-0.049 (1.570)	2.599 (2.301)	
Conditioning	8.712 (6.142)	-8.766 (14.200)		-2.110 (2.326)	-11.361 (8.305)		-7.705 (5.450)	13.819 (9.691)	
Other activities	0.690 (5.065)	3.940 (5.988)		0.942 (1.195)	-11.589 (8.704)		0.639 (4.649)	-4.896 (12.200)	
<i>Job characteristics</i>									
No contract	0.782 (0.912)	-2.833 (4.136)		2.737 (1.529)	7.068 (5.790)	*	-0.785 (0.918)	9.597 (5.098)	*
Oral contract	-0.912 (1.191)	6.629 (5.011)		-0.930 (1.225)	-8.168 (6.350)		0.247 (0.413)	-5.455 (5.389)	
Written contract	2.730 (1.951)	-2.902 (8.757)		4.151 (2.873)	-0.427 (5.870)		-1.144 (1.043)	-8.931 (14.375)	
Casual	28.504 (5.801)	-22.880 (14.524)	***	34.578 (6.085)	-54.681 (24.232)	**	-10.653 (5.628)	2.647 (18.870)	*
Seasonal	-1.274 (1.057)	2.669 (2.857)		-1.573 (1.244)	1.530 (3.242)		0.025 (0.601)	-5.841 (3.961)	
Permanent	22.606 (5.405)	1.916 (4.955)	***	27.207 (5.235)	2.777 (2.812)	***	-12.006 (5.729)	6.645 (7.786)	**
<i>Company characteristics</i>									

Table A4 (continued)

	Gender		Age		Migrant	
	Endowment	Structural	Endowment	Structural	Endowment	Structural
Company age	16.147 (8.539)	303.352 (199.496)	-18.766 (10.278)	402.942 (131.212)	-7.517 (8.195)	-215.677 (226.087)
Total workers	2.288 (3.020)	22.976 (339.312)	-11.019 (8.730)	-53.848 (274.594)	2.746 (3.150)	-29.566 (462.924)
% temporary workers	2.112 (7.114)	-668.108 (800.422)	-16.206 (11.197)	-677.912 (568.770)	-12.971 (9.429)	102.674 (1,029.843)
% female workers	-4.102 (6.087)	-2.362 (309.982)	15.225 (9.890)	100.856 (228.434)	-3.600 (6.191)	72.022 (403.036)
% young workers	16.835 (6.008)	30.853 (25.930)	-2.230 (5.545)	32.887 (25.683)	-9.398 (5.152)	-59.414 (30.272)
% migrant workers	2.536 (4.525)	18.718 (31.798)	16.880 (9.242)	22.846 (28.166)	1.614 (4.559)	5.547 (38.645)
Location						
Delta	4.256 (3.057)	-25.967 (17.011)	-5.915 (3.894)	-30.416 (11.927)	-4.617 (3.219)	8.923 (18.864)
Lac de Guiers	-6.731 (5.309)	35.611 (10.416)	4.132 (3.592)	54.230 (16.564)	4.451 (3.721)	-24.185 (18.571)
Niayes	-7.052	-36.125	-1.712	-34.264	1.365	24.254

Note: *p<0.1; ** p<0.05; *** p<0.01. Standard errors in parentheses. N = 392.

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