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Abstract

The rapid transformation of the agri-food sector in developing countries has created rural off-farm employment opportunities, especially for women. There is a growing concern about worker welfare and employment conditions in agri-food and export sectors but empirical evidence on this issue is scant. We analyze contractual preferences of female workers in the horticultural export sector in Senegal. We use a discrete choice experiment to assess women's preferences for a labour contract and employ a latent class model to capture preference heterogeneity. We find that women have a high willingness to accept a labour contract in the horticultural export industry and that differences in preferences for contract attributes can be explained by women's empowerment status.

Key Words: discrete choice experiment, employment preferences, rural off-farm employment, horticultural exports, Senegal

JEL classification: J43, Q12, Q17

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1 Introduction

Off-farm employment becomes an increasingly important source of household income in rural areas in poor countries. The agri-food sector is often the main source of employment in these areas. (ILO, 2008). During the last decades, the agri-food sector has been transforming and modernizing rapidly, leading to a more consolidated and vertically integrated agro-industry (McCullough et al., 2008; Mergenthaler et al., 2009; Reardon et al., 2009). This transformation implies a shift from family labour on smallholder farms to hired labour on medium and large-scale farms, and an increased use of hired labour in labour-intensive agro-industrial processing (Maertens et al., 2012; Rao and Qaim, 2013). This transformation and the resulting labour market effects are especially pronounced in high-value export sectors and supermarket-driven supply chains. In some countries and sectors, tens of thousands of jobs have been created in the past decade; for example in the Kenyan, Senegalese and Ethiopian horticultural export sectors (Maertens et al., 2012). A large share of the hired workers in these sectors are female (Maertens and Swinnen, 2012); which has been attributed to the type of job activities that are traditionally female or require 'delicate fingers' as well as to women's lower reservation wages (Dolan & Sorby, 2003).

Formal off-farm employment entails opportunities for rural development and is promoted as a development strategy to lift rural people out of poverty through income diversification (Ruben and Van den Berg, 2001). Several studies have shown that the expansion of high-value exports and supermarket retail in low- and middle-income countries results in upward income mobility and poverty alleviation, specifically through employment creation and labour market effects (for example Maertens et al., 2011; Mano et al., 2011). The wages earned in agro-industries add directly to household income and can additionally result in investment spillover effects on household's own farm and non-farm businesses (Maertens, 2009). Agro-industrial sectors employ a large share of women and wage income earned by women in particular might increase their decision-making power in the household and result in increased female empowerment (Kabeer et al., 2011; Maertens et al., 2012). In addition, female off-farm employment in agro-industrial sectors and associated female empowerment has been documented to be associated with additional non-monetary welfare benefits such as increased child schooling (Maertens and Verhofstadt, 2013) and reduced fertility rates (Van den Broeck and Maertens, 2015).

Yet, employment in the agro-industry entails threats as well. The large majority of workers in high-value export sectors are low-skilled labourers who work on a seasonal or day-to-day basis. The sectors employ many poor, uneducated and vulnerable women; as has been documented by Semboja and co-authors (2000) and McCulloch and Ota (2002) for the Tanzanian and Kenyan cut-flower industry, and by Barrientos and co-authors (2000) for the South-African fruit export sector. Less empowered workers run a higher risk to work in unhealthy, unsafe and inferior working conditions and to be exposed to exploitation and subordination. There is a growing concern about employment conditions and worker welfare in food sectors. It has been argued that off-farm employment can only be a major catalyst for development and poverty reduction in general, and for women's empowerment in particular if workers receive decent wages, non-wage benefits and secure job contracts (Charusheela, 2003; Kabeer et al., 2011). Given their lower level of education and poorer access to information, technology and productive resources, women are often in an inferior bargaining position vis-à-vis employers and therefore are more likely to face unfavourable employment conditions, such as lower wages or longer working hours (Garikipati, 2009; Maertens and Swinnen, 2012). Governments, civil society institutions and consumers are increasingly aware of worker welfare issues in agri-food sectors and private food companies increasingly demand compliance to ethical standards from their suppliers. A series of recent mediatised scandals about modern slavery (for example in the German pig meat processing sector and the Thai shrimp sector (Glotz, 2013; Hodal et al., 2014)) might further amplify this concern and boost the use of stringent labour standards.

A rather limited number of studies have investigated the employment conditions of workers in high-value export sectors in developing countries (Barrientos, 1997; Barrientos et al., 2000; Dolan and Sutherland, 2002; Kritzinger et al., 2004). A particular stream of recent research analyses how employment conditions change with the adoption of stringent labour standards and codes-of-conduct. Some authors find that working conditions improve to some extent with the adoption of labour standards (for example Barrientos et al., 2003; Colen et al., 2012; Ehlert et al., 2014; Schuster and Maertens, 2014) while others are more sceptical (for example Nelson et al., 2007; Riisgaard, 2009).

We complement these studies on the working conditions in food export sectors in developing countries with a study on employment in the Senegalese horticultural export industry. Horticultural exports expanded rapidly in Senegal during the last decade and have created employment opportunities, especially for rural women. We implement this research in one of the two main horticultural export regions in the country and specifically in an area

where no export companies are currently established but where new investments in horticultural exports are ongoing. This represents an ideal case to study labour contract preferences of rural women who are likely to be employed in the horticultural export industry in the near future. We use a discrete choice experiment, in which the respondent is presented different labour contracts with varying characteristics. In this way it is possible to study which specific contract attributes are preferred, and by which socio-economic characteristics these preferences are influenced. This approach allows us to analyse employment conditions and labour contract modalities in the food export industry ex ante and from the perspective of the workers themselves. Rather than analysing wage and non-wage labour conditions against a benchmark of national labour laws, international labour standards and codes-of-conducts or consumer perceptions, our approach specifically takes into account the preferences and needs of workers themselves. Such information on labour contract preferences of potential workers can give additional insights in the quality of employment conditions and provide relevant information in designing specific labour contracts, labour standards or labour codes-of-conduct.

2 Background and Data

2.1 Research area

Horticultural exports from Senegal increased from 5 million USD in 2003 to 45 million in 2011, with tomatoes, beans and mangoes as main export crops. The Saint-Louis region in the north of Senegal accounts for a major share of these exports. A first horticultural export company, a subsidiary of a large multinational holding, invested in this area in 2003 and started to export cherry tomatoes to the European Union (EU) in 2005. Since then the number of horticultural exporters in the region has increased to five, and the cultivated area and produce variety are still expanding. These export companies all rely completely on a vertically integrated production system with primary production, post-harvest handling and exporting organised by the company. They lease land from the rural communities and invest in their own irrigation infrastructure and processing units. These investments have created approximately 5000 jobs, of which 80% is occupied by women. Female workers are involved in harvesting, transformation and packing activities, and are hired on a permanent, seasonal or day-to-day basis. Most of the export companies are engaged in rural development programs, by providing health care services, supporting local schools or improving access to water. The employees mainly come from the surrounding villages where livelihoods are based on cropping, livestock production and small businesses.

Our research area covers three rural communities (Diama, Gandon and Fass) in the Saint-Louis region in the north of Senegal. We distinguish an area north of Saint-Louis town and the N2 road to Ross Bethio, where the five export companies are located, and an area south of Saint-Louis town where no export companies are operative yet but where new investments are ongoing. One company that already exports from the north area has a land lease deal with the local rural communities of Gandon and Fass, and is investing in irrigation infrastructure and a conditioning centre to start export activities from 2016 onwards. The company plans to produce a wide variety of vegetables and fruits for export to the EU, and envisages to employ 800 workers, of which 600 on a daily basis. The majority will be hired as field workers for harvesting or as factory workers for washing, sorting and packing of produce. The company specifically aims at targeting female workers from surrounding villages.

2.2 Data collection

Data were collected in two phases. First, we collected survey data during April - June 2013 in the communities north and south of Saint-Louis town. A stratified random sample of 500 households, clustered in 34 villages, was drawn, and a quantitative structured questionnaire was used. The survey provides household-level data on farm production, land and non-land assets, and living conditions, and individual-level data on demographic characteristics, employment conditions and off-farm earnings. Additional data were collected from the sampled villages, on geographical and institutional characteristics, and from the five export companies, on production activities, sourcing strategies and working conditions.

Second, we implemented a choice experiment in August - September 2013 in the communities south of Saint-Louis town. We selected 150 women from the original household sample. To ensure that the choice experiment is credible and not too hypothetical, we only selected women from the nine villages that are located close to the site where investments are ongoing. Households in this area are aware about the ongoing investments and the employment plans of the export company. We only selected women between 18 and 40 years old, similar to the age range of currently employed women in the five established horticultural export companies. To avoid bias from previous employment experience, we only selected women that were not previously employed in the horticultural export sector.

3 Choice experiment design

Choice experiments are conceptually based on Lancaster's consumer model, which states that consumers derive utility from the different attributes of a good or service rather than from the good itself (Lancaster, 1966). It implies that a good or service can be presented by describing its separate characteristics rather than describing the good or service as a whole. Moreover, experimental choice modelling allows us to study preferences that would be difficult or impossible to study by examining revealed preferences. This is especially the case for ex ante assessments of preferences, when the good or service is not yet available on the market. We use a choice experiment to ex ante assess women's willingness to accept an employment contract in the horticultural export industry. By presenting various hypothetical labour contract scenarios with different characteristics to respondents, we are able to assess women's contractual preferences.

Experimental choice modelling originates from marketing research but is increasingly used in environmental, agricultural and development economics, for example to analyse the effect of food labelling on consumer behaviour (Loureiro and Umberger, 2007; Rousseau and Vranken, 2013), environmental conservation (Hope et al, 2008; De Valck et al, 2014), and agricultural technology adoption (Ward et al., 2014; Lambrecht et al., 2015). Choice experiments have previously been used to assess contract preferences in developing countries, specifically to assess farmers' preferences for production and marketing contracts in Vietnam and Ethiopia (Schipmann and Qaim, 2011; Abebe et al., 2013), and for labour contracts of health workers in rural areas (Mandeville et al., 2014).

3.1 Attributes and attribute levels

We first define which attributes are most relevant for labour contracts in the horticultural export sector; which is important for a successful implementation of the choice experiment. On the one hand, it is not possible to present all relevant attributes as respondents are not able to compare more than ten attributes at the same time (Mangham et al., 2009). On the other hand, if essential attributes are missing in the choice experiment, respondents' choices are likely not realistic. Several possible attributes were listed after reviewing literature on employment conditions in high-value export sectors and analysing data from the household survey about working conditions of currently employed women. Additionally, we conducted focus group discussions with women in villages that were not selected for the final choice experiment to determine the most relevant attributes and associated attribute levels. We

retained six attributes – 1) contract type, 2) job task, 3) free health care service, 4) free transport service, 5) free training, and 6) daily wage – and two to four levels for each attribute (Table 1).

[Table 1 about here]

The first attribute, contract type, describes the length of a labour contract using three levels: 1) contract on a daily basis, 2) contract on a seasonal basis (hired for 3 to 9 months), and 3) a yearly contract. A large share of the workers in the horticultural export sector are hired on a temporary basis; either as seasonal labourer or day-to-day labourer. Longer contracts are sometimes advocated to offer more job security and associated benefits. On the other hand, women who like to be flexible in off-farm employment – for example because of the seasonal work on the family farm or reproductive tasks – might prefer a daily or seasonal contract so they can combine off-farm employment with tasks within the farm household.

For the second attribute, job task, we include three attribute levels: 1) field preparation, 2) harvesting and 3) packaging. Field preparation and harvesting take place in open air, while packaging is an indoor activity, often in air-conditioned factory halls. Field preparation involves all tasks on the field (mainly weeding and application of fertilizer and pesticides), except harvesting. We distinguish between field preparation and harvesting as harvesting is traditionally seen as a female task, while field preparation is done by both male and female farmers. Packaging includes all post-harvest handling activities (washing, sorting and packing of the produce) and is considered as a task that is specific for horticultural export companies.

The next three attributes describe complementary services that the companies could provide for employees. First, free transport service includes transport to and from the workplace. This service is highly relevant in the research area, as few of the respondents have own means of transportation and have to walk long distances or rely on public transport (which is present but not as a regular service). Second, free health care service includes medical assistance for the employees. As health facilities are not present in every village and only a small share of the respondents enjoy health insurance, this company service was found to be highly important by the focus group discussants. Three, free training involves courses on hygiene and safety practices in the workplace but also more basic reading and writing courses. A large share of the respondents are illiterate and are interested to be better educated and more informed. Other company services, such as provision of free meals, were found to be less important by the respondents in the discussion groups and were therefore not included in the final choice experiment.

The last attribute, daily wage, is a monetary attribute and is expressed in the local currency *franc Communauté Financière Africaine* (FCFA). To determine the functional relationship between wage and its derived utility, a sufficient number of levels is needed. We chose four different levels (1500, 1900, 2300 and 2700 FCFA/day), based on the legal minimum wage determined by the national government, and on data from the household survey about wages currently earned in the horticultural export companies by women.[2]

3.2 Choice cards

We use choice sets with three alternatives. We include two unlabeled alternatives that each represent a labour contract describing the six attributes with varying levels. Additionally, we include an opt-out option, i.e. not willing to work in a horticultural export company and thus not accepting a labour contract. If a woman chooses this option, no information is yielded about the specific attribute preferences, which is the main reason for conducting a choice experiment. We chose to include this option because it resembles best reality as women are not obliged to work in the horticultural export companies. Forcing respondents to make a choice they would not choose in reality would lead to even more biased estimates (Haaijer et al., 2001).

A large number of unique labour contracts can be constructed from this number of attributes and associated levels. The full factorial design would include 288 combinations (3^2x2^3x4), which is obviously too large to be evaluated by respondents. Various methods can be used to design and reduce the number of choice sets, such as orthogonal designs, based on minimization of the correlation between different attribute levels among the alternatives, and efficient designs, not only based on minimization of correlation but also on minimization of standard errors of parameter estimates (Bliemer and Rose, 2006). We use the D-efficiency criterion to design our choice experiment. This has the advantage that efficiency of parameter estimates is improved and that choice sets that do not yield extra information (for example if the choice is dominant) are avoided. We use Ngene software to generate the design, resulting in a D-error of 0.0349.

In order to increase the efficiency of the design, prior information about the parameter estimates is required. This information can be obtained from estimates of other comparable studies. Even if no exact prior estimation values are known, partial knowledge about the

[2] The minimum wage in Senegal is 182.95 FCFA/hour, which we multiplied with eight working hours per day, resulting in 1463.60 FCFA/day (Ministère du travail et de l'emploi, 1996). The average wage earned by a daily worker is 2065 FCFA/day, 2489 FCFA/day for a seasonal worker, and 2620 FCFA/day for a yearly worker.

priors may already result in more efficient designs than when orthogonal designs would be used (Rose and Bliemer, 2009). In our case, no prior information was available because similar studies are lacking. We used a small positive or negative number (0.001 and -0.001) to indicate whether we expect a positive or negative effect for a specific parameter. We expect that the attributes length of a contract, company services and wage positively influence the probability that a labour contract would be chosen. It was not clear from the focus group discussion whether a job task was more favourable; therefore we did not add prior information about this attribute.

3.3 Implementation

When conducting a choice experiment in a low-income country, one needs to take into account that respondents are often illiterate and that cultural and language differences exist between the researchers and respondents (Mangham et al., 2009; Bennett and Birol, 2010). Before implementation we carried out a pilot test to ensure that respondents and enumerators clearly understood the concept and the used attributes and levels. The respondents were questioned in their mother tongue by a local enumerator, trained by the authors. We chose to work with female enumerators because of the easier communication with the female respondents. Before the choice experiment started, we clearly explained to the respondents the purpose of the study and the procedure of the choice experiment. We specifically asked to choose the contract or opt-out option they would also choose in reality. As a large share of the respondents are illiterate, the attribute levels are visually represented. Figure 1 depicts an example of a choice card.

[Figure 1 about here]

We presented 12 choice cards to each respondent. This was feasible because complementary information about the respondents was already obtained during the household survey. As the choice experiment took approximately 15 minutes, we avoided potential fatigue bias. To avoid learning bias, we presented the choice cards in a random order to each respondent. In addition to the choice sets, we also asked some questions about the respondents' view on employment in horticultural export companies and their motivation to become employed.

4 Econometric model

Experimental choice modelling is based on random utility theory, which implies that an individual compares a set of alternatives and chooses the one that yields the highest utility level (Louviere et al., 2000). Suppose that U_{ij} is the utility derived by individual i from alternative j. Then U_{ij} consists of a deterministic component (V), which linearly depends on the attributes of the alternative (Z_j) and the socio-economic characteristics of the individual (X_i), and a stochastic component (ε_{ij}) that captures unobserved heterogeneity across individuals and alternatives. Hence, $U_{ij} = V(Z_j, X_i) + \varepsilon_{ij}$. We cannot observe U_{ij} directly; instead we observe the likelihood of individual i to opt for alternative j. The probability of alternative j being chosen can be expressed in terms of a logistic distribution. Which specific distribution is used, depends on the assumptions made about preference heterogeneity.

A conditional logit model assumes that preferences across individuals are homogenous. However, individuals likely do not have similar preferences as they differ in socio-economic characteristics and attitudes. To account for the heterogeneity in preferences for a labour contract, we use a latent class model to assess women's preferences. The latent class model assumes a heterogeneous population that consists of a number of latent classes (Greene and Hensher, 2003). Within each latent class, preferences are assumed to be homogenous, but they differ substantially between classes. The latent class model simultaneously estimates the probability to belong to a certain class, depending on the socio-economic characteristics of the individual, and the probability that alternative j is chosen.[3] The probability that individual i chooses labour contract alternative j from a set of alternatives C conditional on the individual belonging to a latent class l takes the conditional logit form:

$$P_{ij/l} = \frac{\exp(V_{ij/l}(Z_{j/l}, X_{i/l}))}{\sum_{h=1}^{C} \exp(V_{ih/l}(Z_{h/l}, X_{i/l}))}$$

We can study the socio-economic characteristics of the different classes by appointing individuals to the class with the highest membership probability. These class-specific characteristics greatly help describing the sources of heterogeneity in preferences. This is an advantage of the latent class model compared to other models that account for preference heterogeneity, such as the random parameter logit model where differences in preferences can only be explained by a limited number of interaction terms between attributes and characteristics.

[3] The membership likelihood function is not a causal relation, but a probabilistic classification.

We use effects coding to estimate the categorical attribute levels, instead of dummy coding in which the base level is correlated with the intercept (Bech and Gyrd-Hansen, 2005). Additionally, we include an alternative specific constant (ASC) in the utility function, coded as 1 for the opt-out option and 0 for the two hypothetical labour contract alternatives. A negative coefficient estimate of the ASC implies that respondents are willing to be employed in the horticultural export sector.

5 Results and discussion

In this section, we first assess the number of classes and the fit of the latent class model. We then describe the class-specific socio-economic characteristics and end with a discussion on the heterogeneity in preferences across classes.

5.1 Number of classes and fit

We determine the optimal number of latent classes using NLOGIT software 5.0 version. The estimated variance matrix fails to converge when imposing more than two classes, indicating that preference patterns for more than two classes cannot be established. The two-segment latent class model shows a significant improvement in statistical properties over the single-segment conditional logit model (Table 2). The Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC) are significantly lower for the latent class model while the McFadden Pseudo R^2 increases from 0.16 to 0.46, which indicates an excellent model fit (Hensher et al., 2005). A likelihood ratio test is used to test the null hypothesis that the conditional logit model fits the data better than the latent class model. The sample value of the likelihood ratio is 139.14 with a critical value of $\chi^2_{(24\text{-}9,0.01)} = 5.23$, thus rejecting the null hypothesis and confirming the use of the latent class model. All statistical criteria therefore suggest that the use of a two-segment latent class model most closely resembles the preference patterns in our data.

[Table 2 about here]

5.2 Class-specific characteristics

The socio-economic characteristics of the two latent classes are presented in Table 3. In general, members of the first latent class can be described as less empowered and poorer women while members of the second class are more empowered and less poor women. This classification of less and more empowered women is in line with the conceptual framework of Kabeer (1999), who defines empowerment as ‘the expansion in people's ability to make

strategic life choices in a context where this ability was previously denied to them'. Access to resources, including human, social, financial and physical capital, and the pursuit of one's own goals are crucial dimensions for empowerment. We highlight some key differences in characteristics between the two classes; most of which relate to the indicators proposed by Kabeer (1999) to measure women's empowerment.

[Table 3 about here]

First, class one members are less educated than class two members. 73% of women in the first class did never go to school – and are thus illiterate – compared to 58% in the second class. Class one members have on average an education of 2.1 years compared to 3.7 years for class two. Second, only half of class one women has an own mobile phone while this is more than three quarters for class two women. Having a mobile phone can be considered as an indicator of female empowerment as it is one of the main devices to gain information in rural areas of developing countries (Kikulwe et al., 2014). Third, household composition influences a woman's position within the household. Class one women live significantly more in polygamist, large households, with an older household head. The study by Boserup (1970) showed that women in such households have a lower decision-making power. Moreover, 61% of women in class one belong to the Pular ethnicity compared to 44% in class two, and 38% of women in class one belong to the Wolof ethnicity compared to 56% in class two. As described by Lépine and Strobl (2013), Pular women often have a lower bargaining power than Wolof women in rural Senegal. Fourth, women in class one live in poorer agricultural families. 51% of class one is poor according to the Multidimensional Poverty Index (MPI) compared to 44% of class two. Total household income per capita is lower for women in the first class and more than half of their income is derived from agriculture (both crop production and livestock). Fifth, class one members live in more remote, single-ethnicity villages with lower access to services. To illustrate, only 22% of class one has a public transport stop in the village compared to 60% of class two, and 44% of class one has a health facility in the village compared to 70% of class two. Finally, the motivation for being employed differs across class members (Table 4). 58% of women in the first class wants to be employed to become more independent compared to 35% of women in the second class. Contrary, 49% of class two women wants to be employed to gain money for own and family purposes compared to 21% of class one. The motivation of less empowered women to be off-farm employed is mainly to become more empowered, while the motivation of more empowered women is to increase total household income.

[Table 4 about here]

5.3 Class-specific preferences

The estimates of the latent class model are presented in Table 5. We include the covariates that are most informative about class membership (no education, ownership of mobile phone, household size, distance to concrete road and reason for employment) in the latent class model to estimate the class membership likelihood function more accurately. Latent class one is a relatively large segment with an average class membership probability of 72%, while latent class two has a 28% class probability.

[Table 5 about here]

First, the ASC estimate is for both classes negative and significant. This implies that in general, women in the sample are willing to accept a labour contract. The high willingness to be employed is also reflected in the low frequency of selecting the opt-out option: this option was selected 25 times by 12 different women, and never consistently for one respondent through all choice cards. This high willingness of accepting a labour contract among women in the area where horticultural export companies are expanding their production and exporting activities, indicates that women see this as an opportunity and that the future demand for labour from these companies can be met.

Second, we find that the wage parameter estimate is positive and significant. This is consistent with economic theory and implies women's willingness to accept a labour contract increases with the offered wage. It is theoretically possible to calculate the reservation wage, i.e. the lowest wage rate at which a worker would be willing to accept a labour contract, by dividing the ASC coefficient over the wage coefficient. However, the interpretation of the magnitude of this reservation wage is likely unreliable given the low frequency of the opt-out selection and the hypothetical bias that is associated with stated preference methods (Ready et al., 2010).

Third, we find some variability in the type of contract women prefer. We find that less empowered women (class one) do not have significant preferences for a contract type. More empowered women (class two) prefer a daily contract over a yearly contract, though they prefer a seasonal contract over a daily contract. This implies that more empowered women prefer a flexible contract, likely because they want to be able to easily change jobs if better opportunities arise or to easily adapt if the farm-household division of labour requires them to take up farm productive or household reproductive tasks. This is in line with a recent study by Stavrou et al. (2015) who find that in European countries where gender empowerment is high, the share of women who are part-time employed is higher than in countries with low gender

empowerment. However, we need to be cautious about our findings. We targeted women without any experience in wage employment outside their own family farm, and these women might not be aware of employee rights and the possibilities to terminate a permanent or longer term contract. Nevertheless, our findings indicate that job security is not very important to rural women without any previous employment experience, rather job flexibility is. This contradicts somewhat the emphasis that is put on job security in the debate on decent employment.

Fourth, we also find some variability in the type of work women prefer. We find that less empowered women do not have significant preferences for a job task. More empowered women prefer to work in handling and packing activities, that take place in a conditioning centre, over production activities in the field, while they are indifferent between working in harvesting activities or other field work. A possible explanation is that post-harvest handling and packing in an air-conditioned factory hall is perceived to be a more 'modern' type of employment in a 'better' environment (out of the sun) than more 'traditional' production activities in the field. More empowered women might have different job aspirations and attach more value to working in such a 'modern' environment. Less empowered women might attach less value to this or might be more used to production activities and field circumstances from working on the own family farm. Again we need to be cautious here. As the respondent women do not have employment experience, they might misjudge the strenuousness of jobs in the conditioning centres. Nevertheless, the observed preference of more empowered rural women to have factory jobs at the conveyer belt rather than working in agricultural activities in the field, and the observed high willingness to accept a job outside the own family farm, does not corroborate the view that farming and agricultural activities are the preferred livelihood of rural people – as it is sometimes put forward by the international research and aid community.

Fifth, we find that company services matter but not to the same extent for the two latent classes. For more empowered women we only find a significant effect for pick-up service while for less empowered women we find significant effects for all company services, including free pick-up service, health care and training. If we compare the coefficient estimates for the company services within the first latent class, we find that less empowered women value free health care most, followed by free training and free pick-up service. This is likely explained by the fact that less empowered women have fewer access to health facilities in their own village and are less educated than more empowered women. The findings imply that by providing complementary services, companies in the region can increase the chance to

attract sufficient labourers and to retain labourers by increasing the utility workers derive from the labour contact.

6 Conclusion

In this study, we use a discrete choice experiment to assess women's ex ante preferences for labour contracts in the Senegalese horticultural export sector, and employ a latent class model to capture heterogeneity in preferences. Our research shows that women have a high willingness to accept a labour contract in the export industry, and that differences in preferences for contract specifications are explained by women's empowerment status. We find that more empowered women prefer flexible, seasonal contracts that include job tasks in the conditioning centres and that provide pick-up service. Less empowered women prefer labour contracts that offer company services, especially health care and training, and to a lesser extent pick-up service. In general, these preferences can be explained by existing market imperfections and government failures, such as the absence of health care services, transport possibilities and educational infrastructure. The preference for flexible, temporary contracts and job flexibility instead of job security, might stem from an imperfect labour market with few employment opportunities for women, and the absence of child care services and the need for women to be flexible in case other labour market opportunities arise or labour needs in the household and the family farm rise.

The creation of off-farm employment has been argued to be an important poverty-reducing strategy in rural areas of developing countries. Yet, off-farm employment will not automatically result in improvements of living standards unless accompanied by dedicated efforts to improve employment conditions and create decent work opportunities (ILO, 2014). In our research area, the horticultural export sector is the main contributor to employment creation. By optimising labour contracts and taking into account workers' preferences, the sector can be a major contributor to rural development and female empowerment. While wages earned in the export industry can add importantly to household income – as shown by Maertens et al. (2011) – also complementary company services to their employees can contribute importantly to development in the region. Especially less empowered women with a low level of education, low access to information, low decision-making power within the household, a high risk of being poor and living in more remote villages, value health care, training and transport services provided by the employers. Especially for those women, employment in the horticultural export sector with labour contracts that are tailored to their needs, can be a way out of poverty and subordination.

Our results show that it is important to assess employment conditions from the perspective of workers themselves. Our ex ante insights on worker preferences for labour contract specifications are complementary to insights on conditions at the work floor from more traditional ex post employment studies, and can help to optimize labour contracts. Choice experiments are an ideal tool for studying worker preferences. Our study contributes to demonstrating that, even though discrete choice modelling originates from consumer behaviour studies in high-income settings, this method can be applied to a wider range of research questions, and in different settings, including a poor, rural area with illiterate respondents who are not used to make complex, hypothetical choices.

Table 1. Overview of attributes, levels and coding structure. Source: The authors.

Attributes	Attribute levels	Coding
1. Contract type (CT)	1. Daily contract *(base level)*	CT1 = -1; CT2 = -1
	2. Seasonal contract	CT1 = 1; CT2 = 0
	3. Yearly contract	CT1 = 0; CT2 = 1
2. Job task (JT)	1. Field preparation *(base level)*	JT1 = -1; JT2 = -1
	2. Harvesting	JT1 = 1; JT2 = 0
	3. Packaging	JT1 = 0; JT2 = 1
3. Free pick-up service	1. No *(base level)*	-1
	2. Yes	1
4. Free health care	1. No *(base level)*	-1
	2. Yes	1
5. Free training	1. No *(base level)*	-1
	2. Yes	1
6. Wage	1. 1500 FCFA/day	Continuous variable
	2. 1900 FCFA/day	
	3. 2300 FCFA/day	
	4. 2700 FCFA/day	

Table 2. Statistical properties of conditional logit model and latent class model. Source: The authors.

Statistical properties	Conditional logit model	Latent class model
Segments	1	2
Log likelihood	-1129.13	-1059.56
Number of parameters	9	24
AIC	2276.30	2167.10
BIC	1151.68	1119.69
McFadden Pseudo R^2	0.16	0.46
Observations	1800	1800
Individuals	150	150

Table 3. Socio-economic characteristics of full sample and two latent classes. Source: The authors.

Characteristics	Full sample		Latent class 1		Latent class 2		
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	
Age (years)	26.71	6.31	26.92	6.61	26.21	5.53	
Married (%)	67.33		71.03		58.14		*
Children (number)	1.69	1.38	1.87	2.09	1.26	1.51	**
No education (%)	68.67		72.90		58.14		**
Schooling (years)	2.57	3.54	2.10	3.35	3.72	3.78	***
Ownership mobile phone (%)	57.33		49.53		76.74		***
Polygamous household (%)	27.33		31.78		16.28		**
Household size (persons)	10.75	5.93	11.81	6.48	8.09	2.89	***
Age of household head (years)	53.47	11.61	55.35	11.59	48.81	10.40	***
Pular ethnicity (%)	56.00		60.75		44.19		**
Wolof ethnicity (%)	43.33		38.32		55.81		**
Poor household[1] (%)	49.33		51.40		44.19		
Total household income per capita (FCFA)	361,235	412,456	319,178	352,369	465,888	523,867	**
Share of agricultural income (%)	48.84		55.46		32.50		***
Total land (ha)	3.34	4.10	3.89	4.37	1.97	2.98	***
Livestock[2] (TLU)	32.49	91.01	34.75	92.35	26.86	88.41	
Distance from concrete road (km)	2.49	2.99	3.02	3.01	1.16	2.53	***
Multiple ethnicities in village (%)	63.33		53.27		88.37		***
Public transport stop (%)	33.33		22.43		60.47		***
Presence of health facility (%)	51.33		43.93		69.77		***

Comparisons are made between latent classes using one-sided t-tests. Significant differences are indicated with * $p < 0.1$, ** $p < 0.05$ or *** $p < 0.01$.

[1]The Multidimensional Poverty Index (MPI) is calculated according to the guidelines by the United Nations Development Programme (Alkire and Santos, 2010).

[2]One tropical livestock unit (TLU) equals 1 cow/horse, 0.8 donkey, and 0.2 sheep/goat.

Table 4. Motivation to become employed in horticultural export sector. Source: The authors.

Motivation to become employed	Latent class 1	Latent class 2	
To gain independence	57.94%	34.88%	***
Income for own purposes	10.28%	25.58%	***
Income for family purposes	11.21%	23.26%	**
Social contact	4.67%	6.98%	
Other	15.89%	9.30%	

Comparisons are made between latent classes using one-sided t-tests. Significant differences are indicated with * $p < 0.1$, ** $p < 0.05$ or *** $p < 0.01$.

Table 5. Coefficient estimates and membership function of latent class model with two classes. Source: The authors.

	Latent class 1			Latent class 2		
	Class probability = 72%			Class probability = 28%		
	Coefficient		SE[3]	Coefficient		SE[3]
CT1 (Seasonal)[1]	0.0733		0.0593	0.2109	*	0.1254
CT2 (Fixed)[1]	-0.0074		0.0611	-0.2766	**	0.1290
JT1 (Harvest)[2]	0.0556		0.0614	-0.0325		0.1102
JT2 (Packaging)[2]	0.0675		0.0601	0.3823	***	0.1216
Free pick-up service	0.1992	***	0.0384	0.8354	***	0.0828
Free health care	0.5495	***	0.0399	0.0697		0.0736
Free training	0.3734	***	0.0389	-0.0292		0.0800
Wage (1000 FCFA)	0.1900	*	0.1007	0.4536	**	0.2092
ASC[4]	-4.1183	***	0.4858	-1.2650	**	0.5017
Membership function						
Constant	2.3514		1.8262			
No education	1.1637	*	0.5953			
Own phone	-2.0385	***	0.6366			
Distance to road	-0.1293	**	0.0641			
Household size	0.1914	***	0.0739			
Independence	1.3334	**	0.5699			

[1]CT = Contract type ; Base level = Daily contract

[2]JT = Job task ; Base level = Field preparation

[3]SE = standard error

[4]ASC = Alternative Specific Constant; 1=opt-out option is chosen, 0=contract option is chosen.

Significant coefficient estimates are indicated with * $p<0.1$, ** $p<0.05$ or *** $p<0.01$.

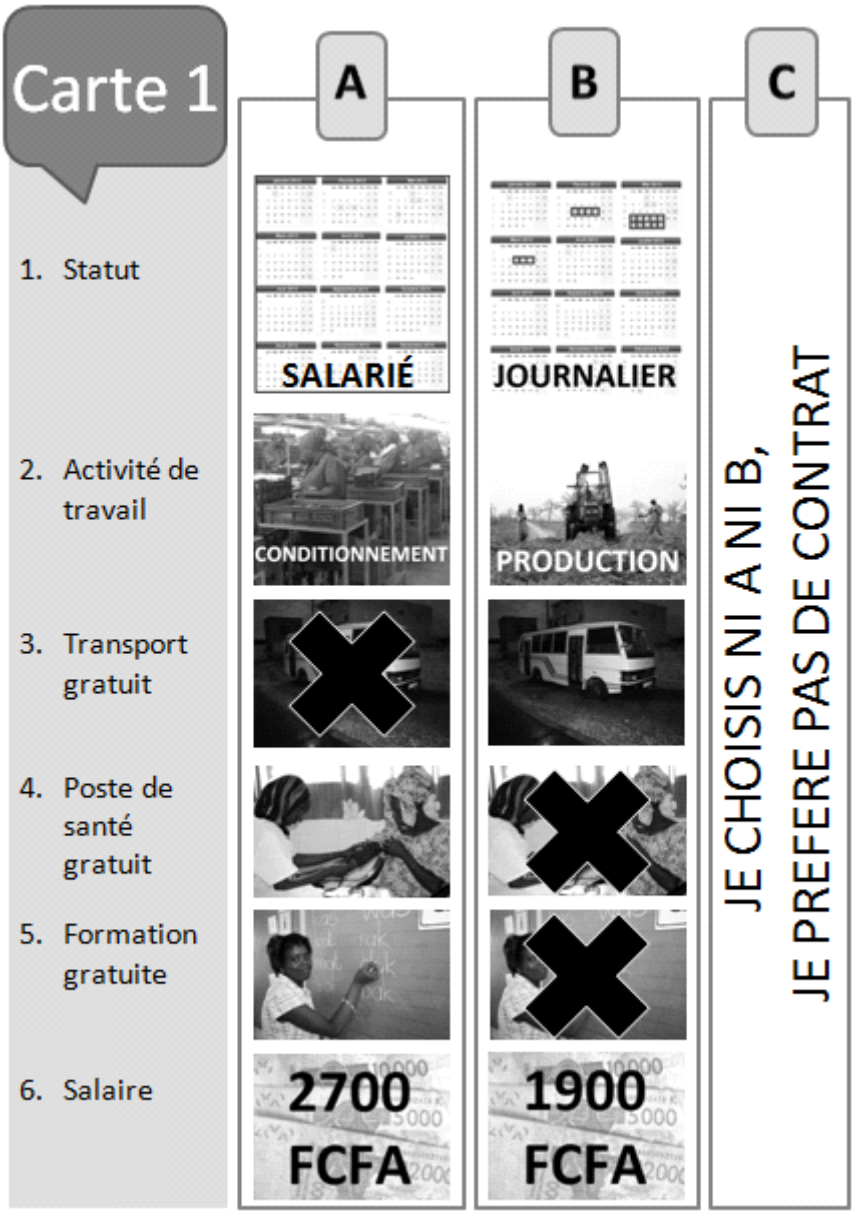

Figure 1. Example of a choice card. Source: The authors.

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