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NON-UNIONIZED WORKERS IN BRITISH GREEN SECTORS: EVIDENCE FROM THE LABOR FORCE SURVEY*

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Abstract

International Labour Organization (ILO) and United Nations Environment Programme (UNEP) suggest that green sectors should offer decent jobs respecting to unions and international labor rights and fulfill requirements of labor laws and collective bargaining system. Also, non-unionized working in green sectors poses a significant challenge in terms of creation decent jobs. In this line, this article presents several evidences from British Labour Force Survey to find some socio-economic obstacles behind unionization in green sectors by using logistic regression modeling method. The results suggest that union membership decision in green sectors is affected by a range of demographic and work-related factors used in the study. For example, those who are 16-24 age band, women workers, those who are employed by small sized enterprises and takes charge in high-ranked occupations are higher likelihood of non-unionized working in green sectors, compared to rest of the sectors.

Keywords: Green Sectors, Green Jobs, Decent Jobs, Non-Unionized Workers

1. Introduction

Green restructuring and environmental protection policies are new interest areas for many unions. However, they have obligations on two social dimensions of labor environmentalism: "just transition'' and "decent green jobs" while supporting to green economy. Also, for ILO and UNEP perspectives, works in green sectors should be decent job respecting to international labor rights. In this line, green jobs should meet at least requirements of labor laws and collective bargaining system. Additionally, enterprises in green sectors should recognize the unions as a social partner so that they can contribute to create decent jobs. Although unionization is one of the most important factors for decent job, in scope of the study, union density for the chosen British green sectors (17.1%) tends to be lower than rest of the sectors (23.6%) (LFS, 2014). The figure implies that being low-union density for British green sectors constitutes a substantial gap for creation decent jobs in ILO's and UNEP's perspectives. Essentially, it is expected that unions may play a critical role through collective bargaining system to create decent works in green sectors. Therefore, green sectors will offer good prospect for the both environmental protection and workers. In this line, systematic and specific analyses on non-unionized tendency in green sectors are limited in Britain. The study aims to examine to fill this gap, using data from British Labour Force Survey (LFS).

There is a considerable amount of theoretical and empirical academic work to clarify the reasons behind non-unionization. On the one hand, rational choice theories, for example, argue that economic benefits are a substantial factor in union membership decisions. On the other

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hand, other discussions suggest that individuals' attitudes are affected by a large number of demographic and work-related factors (Cam, 2014).

To explore the obstacles behind union membership in green sectors, we argue that non-unionization in green sectors is affected by demographic and work-related factors. In this work, the factors of non-unionization in green sectors are designed into five broader categories: demographic profile (age bands, gender and marital status), flexible work (part-time/full-time and temporary/permanent jobs), workplace characteristics (main industries, establishment size and public/private sectors), work-status nominators (education and occupations).

2. Definitions and Literature Review

Climate change is one of the major challenges which the world has faced ever. Climate change danger and deterioration in progression of natural resources jeopardize the living standards of the current and future generations. Recently, environmental pollution, loss of bio-diversity and rapid extinction of natural resources such as water, fertile agriculture lands, forest and fish are known as the most serious threats that sustainable development has faced ever. Climate change have negative effects on general economy and labor market through the increase in natural events that resulted from global warming such as floods, heat waves and falls in precipitation levels. Those events will ultimately lead a decrease in natural resources and species and also have significant impacts on labor markets of regions affected by climate change. In labor supply side, whilst climate change events are affecting force and ability of employment because of potential food scarcity, decrease in health conditions and etc., in labor demand side, it will also result in a decrease in job vacancies. This is because it will powerfully shake economic activities and existing enterprises. In this context, agriculture, tourism, insurance, forestry, fishery, infrastructure and energy sectors depending directly on climate conditions are defined as highly sensitive sectors against direct effects of climate change (Martinez-Fernandez *et al.* 2010). In the next years, the sustainable economic development with decent job and keeping high living standards will depend on how we manage and restore the natural resources and economic activities. If required-measures for coping with climate change are not taken on time, the economic growth and human development prospects will eventually reduce for future generations, in particularly for the poor (ILO and OECD, 2012). In this regards, it seems as a necessity to shift towards "green economy" to protect environment and reverse the impacts of climate change on economy. However, the green restructuring should also take into account social-justice on the base of democracy and participation of social partners in decision-making processes and respect of human and labor rights (ITUC, 2009a).

Although there is not a perfect consensus on definition of green economy, all definitions meet on common grounds. UNEP defines green economy *"as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities"* (UNEP, 2011). Economic greening needs big scale investments, new technologies, equipment's, buildings and infrastructures. The new investment areas will also stimulate the new employment opportunities in green economy (UNEP, 2012). In this line, there is a relationship between green economic growth and labor market that mutually support each other, but it doesn't occur automatically. It needs public intervention and structural changes such as making new policies and laws or amending existing policies and laws, and establishing strong labor market institutions or councils etc. (ILO and OECD, 2012; International Labour Conference, 2013).

Actually, green economy offers a "win and win approach" for politics, society, industry and the environmental measurements. In this sense, the green economy brings benefits in terms of environmental, economical and social sustainability (Wagner, 2004). However, there are some studies claiming to be faced with a new type unemployment problem because of skill inadequateness in the event of transition to green economy. "Pollution Haven" hypothesis, for example, argues that environmental legislations will result in shifting heavy polluting industries from developed economies to the economies having less environmental regulations to have a comparative cost advantage. This is because firms in conventional trade theory flow always towards the economies having more competitive cost advantages (Wagner, 2004; Rathzel and

Uzzell 2011). Also, environmentalists in political left and trade union movement consider that environmental regulations, incentives and other measures will compose an adverse effect increasing unemployment (Jacobs, 1991). The Trade Union Congress (TUC) agrees with the view that transition to green economy will lead job losses. For TUC, in case of being shifted to green economy, job gains and job losses will emerge in different regions and different time slots and the transition will create significant differences between new and old jobs in terms of skill-mix (Bird and Lawton, 2009). On the other hand, the Porter Hypothesis suggests that environmental regulations will trigger innovation and efficiency and may even provide to job gains, therefore these regulations will not make up a significant impact on competitiveness (Porter and Van der Linde, 1995; Wagner, 2004; Rathzel and Uzzell 2011). Also, Bezdek *et al.* (2008), in their study, examined the relationship among environmental protection, the economy and jobs. And they found that investments in environmental protection resulted in creating new jobs and displacing some jobs, but had a positive effect on net employment.

It is expected that green economy will bring with a lot of green jobs and also make up significant changes in existing employment structure. If skills needed by green jobs are gained to targeted labor force, as it is expected, green economy may have a potential for creation new green jobs. Traditionally, the term “green jobs” was used to address to the jobs contributing to sustainable, protection and development of environment in fields of biodiversity and nature conservation, environmental consultancy, waste disposal and pollution control. However, drawing clearly borders of green jobs is not easy due not to be clearly described in a certain part or sector of the labor market. In this sense, lately, the meaning of green jobs has been extended, including low-carbon jobs in renewable energy, resource and energy-efficient production, low carbon transport fuels, climate change consultancy and carbon finance sectors (Bird and Lawton, 2009). UNEP (2008) in their report defined the green jobs as “work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality”. Green jobs involve particularly works assisting to prevent loss of bio-diversity; protecting ecosystems; minimizing consumption of energy, row materials and water and avoiding all forms of waste and pollutions.

The green jobs will offer a good prospect to generate decent works (ILO, 2012a; ILO, 2013; ILO and OECD, 2012). This is because the green jobs and decent works can mutually support each other. The green jobs and decent works also have a lot of similarities and interrelated components and concepts such as working rights, better job conditions, social protection measures, occupational security, health, migration, well-paid, working time, social dialogue, organizing and collective bargaining freedom and job security (Evans-Klock *et al.* 2009). Today, decent work is defined by ILO as works which are guaranteed work right, sufficient wage and social security in circumstances of freedom, equality, security and human dignity. And ILO accepts that decent work involves employment, social protection, rights and social dialogue (UNEP, 2008; Evans-Klock *et al.* 2009; ILO and OECD, 2012).

The green jobs should respect to international labor rights and offer good working conditions. Additionally, in transition process to green economy, the policies and institutions should guarantee a just transition for all people and provide a large consensus operated by social dialogue (UNEP, 2012). Besides, it should constantly monitor practices and measures taken to fulfill requirements of labor laws and collective bargaining system (ILO, 2012b). In particular, a combination consisting of transformation of economies and workplaces, awareness increase, arrangement and inspection can become fundamental drivers to be applied of labor standards in a wide area through collective bargaining supported by corporate social responsibility and articles related to rights in job agreements (ILO, 2008). To do this, trade unions should also organize the workers in green sector to prevent inequalities and create decent works. Besides, if enterprises in green sectors respect to unionization process and see trade unions as a partner, trade unions may contribute to create decent works. Because, union-representation and benefiting from collective bargaining and strike rights are known as fundamental conditions for decent work (ITUC, 2009b). If workers in green sectors get less representation, organization and protection because of low union density or non-unionization, small share of collective agreements, weak organization and social dialogue, they may be

experienced poor working conditions and less control on jobs than others in old industries. Union busting in green sectors is one of the main obstacles making green jobs unclear in terms of decent work (Gausas *et al.* 2012). But, a lot of jobs in green sectors from renewable energy and turbine manufacture to the installation and maintenance of renewable energy devices covered by union agreements may bring with better working conditions. In this respect, both green and decent works will have been created at once. However, other jobs in growing green sectors such as waste and recycling have some risks in terms of occupational health and job insecurity (TUC, 2008). Unions are one of the non-ignorable sides to accomplish transition process to green economy and they have more responsibilities than other actors to create good quality and well-paid jobs, to struggle against poverty and to provide a just transition. This is an obligation needing to be fulfilled by unions with together other social actors. In this line, ILO has a program on decent work assisting to eradicate poverty (UNEP and Sustainlabour, 2008).

Actually, climate change is not a new interest field for unions. Unions fought for environment protection a long time ago. For example, in the early periods of industrialization, air and river pollution resulting from industrialization was one of the struggle areas of early unionists (Räthzel *et al.* 2010). Recently, climate change and environmental protection policies have begun to shine as a new interest area for many unions. Even some unions arrange some events for climate change and environment protection like environment networks, conferences and guidance (Hampton, 2015). Also, several researches are performed on discourses of unions on climate change. For example, Felli (2013) studied the major strategies of international trade unions on climate change as the deliberative, collaborative growth and the socialist. Rathzel and Uzzell (2011) discussed discourses of trade unions related to climate change on four theoretical approaches: "technological fix", "social transformation", "mutual interests" and "social movement". In this study, all discourses implied a re-invention of unions as social movements.

Core elements of labor environmentalism guarantee a just transition to green economy and contribute to creation of green jobs offering environmentally-friendly and decent working conditions (Stevis and Felli, 2015; ITF, 2010; ITUC, 2009a). For unions, decent works and just transition should be first step of transition to green economy. Essentially, these demands of unions are formulated to protect workers from poverty, poor working conditions and job insecurities (Rathzel *et al.* 2010). In this aspect, unions develop the connection between creating decent works and reducing carbon emissions and environmental pollution. As it is well known, it is less likely to guarantee well-paid and decent working conditions for non-unionized sectors due to lack collective bargaining. Protection of worker's rights and struggle against the power of employers can provide essentially through union representation (Kojola, 2009).

3. Methods

3.1. Data

It is difficult to draw clearly the boundary of green sectors. This is because there is no single definition agreed on green sectors. However, in 1999, the OECD and Eurostat had done a definition in based on the classification of the various economic activities called as "the environmental goods and services industry" (eco-industry). The eco-industry, in their definition, was defined as "activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products, and services that reduce environmental risk and minimize pollution." This definition contains 36 economic activities consisting of eco-industries from the provision of services for air pollution control to eco-tourism (Bilsen and Rademaekers, 2009). Also, the definition for Low-Carbon Environmental Goods and Services sectors (green sectors) have been also designed by United Kingdom Department for Business, Innovation and Skills (DBIS) to fill gaps in Standard Industrial Classification of Economic Activities Codes (SIC07), report, monitor and develop green sectors. DBIS has included its definition economic activities which may seem environmental, eco, renewable, sustainable, clean tech, low-carbon or no carbon. For BIS, green sectors do not have certain boundaries that can be separated with precise lines from other sectors, but a flexible or

umbrella concept. In its report, BIS emphasized that "in the strictest sense (green sectors) is not a sector, but a flexible construct or "umbrella" term for capturing a range of activities spread across many existing sectors like transport, construction, energy etc., but with a common purpose - to reduce environmental impact" (DBIS, 2013). DBIS has mapped 24 sub sectors (Level 2) under three broad categories comprising of Environmental, Renewable Energy and Low Carbon, as it is showed in Table 1. And then those sectors in level 2 have been separated to 119 sub subsectors in Level 3.

Table 1. DBIS, Definition of green sectors

Environmental	Renewable Energy	Low Carbon
Air Pollution		
Contaminated Land	Biomass	Additional Energy Sources
Environmental Consultancy	Geothermal	Alternative Fuel/ Vehicle
Environmental Monitoring	Hydro	Alternative Fuels
Marine Pollution Control	Photovoltaic	Building Technologies
Noise & Vibration Control	Wave & Tidal	Energy Management
Recovery and Recycling	Wind	Carbon Capture & Storage
Waste Management	Renewable Consulting	Carbon Finance
Water Supply and Waste Water Treatment		Nuclear Power

Source: DBIS (2013)

To concentrate and examine specifically socio-economic predictors of non-unionized workers in green sectors, we should focus on LFS published regularly by the Office for National Statistics (ONS) and a large house-hold based study. We drew the data from the final quarter (October to December Q4/Autumn) of 2014 LFS, since variable related to union representation only takes part in the final quarter.

The LFS uses Multi-Response Variables comprising of questions that can have more than one value for an individual case. The form with 799 variables used in 2014 LFS the final quarter were filled out by 95,704 respondents. We analyzed comparatively 3,030 respondents' self-reports in green sectors and 42,255 respondents' self-reports in rest of the sectors. We started our analysis with separating two parts of British industries: green sectors and rest of the sectors. In this context, we determined green sectors and rest of the sectors in the SICO7 (4 digits). In order to pull out green sectors from SIC07, we searched comprehensively the SIC07 and some case studies. Most of the green sectors for the study were chosen from the study, "Sector: Low Carbon Goods and Services Skills Action Plan in the D2N2 Area (Derby, Derbyshire, Nottingham and Nottinghamshire)" (D2N2, 2014). Rest of the green sectors were identified from SIC07 Codes (4 digits) by drawing from the DBIS's green sector definition which spans areas of economic activity in Table 1 and bearing in mind that green sectors is a flexible and umbrella concept. We defined 45 green economic activities (Level 2) from SIC07 that may contain in environmental, eco, renewable, sustainable, clean tech, and low-carbon. Meanwhile, we did not include the agriculture sectors to our analysis due to the small sample size. Therefore, the green sectors and rest of the sectors were produced from industries (4 digits) in SIC07 Codes by recoding. (See appendix for SIC codes used in the analysis). For the analysis, considering that all of jobs in chosen economic activities are green jobs is not possible technically. Although SIC07 Codes that is used by LFS does not strictly contain green sectors, LFS is the best currently available tool for finding evidence about non-unionized workers in green sectors. Nevertheless, we assume that chosen economic activities represent substantially employment in green sector. This may produce a constraint for the study.

The methodology for the study fundamentally depended on analysis of British LFS, using binary logistic models. Our approach takes non-standardized definitions of green sectors in SIC07 and analyses comparatively them with rest of the sectors. To do this, we are going to comparatively analyze non-unionized workers in green sectors that have been created as a result of transition to green economy, with rest of the sectors by employing data from LFS. And then we are going to analyze our findings.

3.1.1. Dependent Variable

The dependent variable, non-unionized workers, was produced by the question about trade union or staff association member. In this regard, those who reply the question as “no” is collapsed into non-unionized-workers. This question is asked only in the final quarter of each year. Also, the question refers to membership of trade union and staff association (Brook, 2002).

3.1.2. Independent Variables

In broader terms, the models in this study that control the differences between green sectors and rest of the sectors in terms of non-unionized workers previously emphasized four main categories: demographic profile, flexible work, workplace characteristics, and work-status nominators.

Among the demographic variables, age bands are recoded on the basis of the working age population (from 16 to 64 years old) into four brackets: 16-24, 25-34, 35-49 and 50-64 (Blanden and Machin, 2003). Other demographic variables refer to respondents who quote their gender and marital-status.

Flexible work variables, part-time/full-time and temporary/permanent jobs, are taken from respondents’ self-reports in LFS to control non-unionized workers in flexible work. Workplace characteristics consist of industries, establishment sizes, public or private are based on the main jobs. Industries in main sectors, which are derived from the international classification of SIC-2010, collapse into manufacturing, energy and water, construction and banking and finance. Reason for choosing these industries, economic activities choosing as green took in place mostly under the industries. Also, agriculture, forestry and fishing were executed due to the small sample size. Establishment size refers to the number of employees at workplace and it is collapsed into three bands in order to control the impacts of small, medium and large sized enterprises. Number of employees at workplace was recoded into three bands: small (<50), medium (50-249) and large (≥250) companies. Sizes of enterprises in this paper are determined only basing on the number of employees. In this respect, range of number of employees in entrepreneurs is taken from definition of European Commission (Forth *et al.* 2006; European Commission, 2005; Ayyagari *et al.* 2011; Gibson and Vaart, 2008). The third variable within workplace characteristics is whether workers are employed by public or private sectors. Proportions of employment in public or private are drawn from respondents’ self-reports in LFS to measure dimensions of non-unionized working for green sectors in terms of public and private sectors.

Among work-status nominators, qualification is obtained with five main categories from “degree or equivalent” to “no qualification”. Education refers to the highest qualification attained (Bird and Lawton, 2009; Cam, 2014). Occupation is compatible with their major level (single-digit) international classification. We have used education levels and existing positions at work as the work-status nominators in order to shed more light onto the impact of education and occupation status at work on non-unionized workers.

3.1.3. Analytical Technique

Logistic regression, which is widely employed when modeling binary outcomes and for predicting the probability of an event, is used by the analysis. The dependent dichotomous variable is respondents’ who reply the question as “no” the question about trade union or staff association member. The binary response is yes/no. The logistic models predict separately the probability of non-unionized workers for both green and rest of the sectors.

Separate and joint logistic regression models are specified for non-unionized workers in green and the rest of the sectors in Table 3 in order to analyze differential effects of demographic profile, flexible work, workplace characteristics, and work-status nominators on non-unionized workers. In logistic models, independent variables are successively added to

logistic models in sequential blocks. These blocks in Table 3 are designed into five broader categories of independent variables: demographic profile (age bands, female and single), flexible work (part-time and temporary jobs), workplace characteristics (main industries, establishment size and private sector), qualification-first work-status nominator and finally occupation-second work-status nominator.

Neither the order of variables within the blocks nor that of blocks within the models makes a significant difference to the results. However, using demographic profile (age bands, gender and marital-status) for Model 1 and then including flexible work (part-time and temporary jobs) in Model 2 evidenced to be better than other combinations for the goodness of fit. Also establishment size for rest of the sectors is not included into Model III, IV and V due to not provide the goodness of fit.

3.2. Research Results

3.2.1. Descriptive

Matching the green sectors with rest of the sectors is comparatively demonstrated in the Table 2. In this section, proportions and chi-square results of non-unionized workers for green sectors and rest of the sectors are comparatively analyzed as descriptive in terms of demographic profile, flexible work, workplace characteristics and work-status nominators. During analyzing the table, cell sample sizes (n) that are less than 25 have been ignored. This is because they are regarded as unreliable by LFS.

Referring to demographic profile in the table, there are significant relationships between green and rest of the sectors in terms of age bands (except 16-24 age band), gender and marital status ($p<.001$). Demographic variables display more unfavorable for green sectors than rest of the sectors in terms of unionized employment. Basically, the most salient gap between green and rest of the sectors occurs in 35-49 age bands. Workers in green sectors who are in range of 35-49 age (83.5%) are significantly more likely to be non-unionized, as opposed to rest of the sectors (73.7%). Similarly, 87.8% of female employed in green sectors are significantly more likely to tend to be non-unionized, compared to rest of the sectors (73.1%). Proportion of married-employees for green sectors (82.2%) demonstrates significantly higher than rest of the sectors (73.5%) in terms of being non-unionized.

As for flexible work, the table illustrates significant differences between green sectors and rest of the sectors in terms of part-time, full-time and permanent jobs ($p<.001$). However, flexible works illustrate more disadvantages for green sectors than rest of the sectors in terms of unionization. In this regard, proportions of non- unionized part-time and full-time jobs for green sectors (in turn 92.8% and 81.3%) are significantly higher than rest of the sectors (in turn 80.4% and 74.7%). Similarly, 78.7% of permanent jobs in green sectors are more likely to be non-unionized, compared to rest of the sectors (72.9%).

Table 2. Non-unionized workers in green and rest of the sectors

		Green Sectors		Rest of the Sectors	
		N[a]	%[b]	N[a]	%[b.c]
Demographic profile					
Age Bands	16-24	127	90.7	6,448	91.8
	25-34	440	88.0	11,196	80.7***
	35-49	781	83.5	18,750	73.7***
	50-64	633	76.4	14,990	70.8***
Gender	Female	503	87.8	26,424	73.1***
	Male	1,601	81.5	27,512	79.9
Marital-Status	Single	662	84.7	18,898	82.1
	Married	1,218	82.2	28,024	73.5***
Flexible Work					
	Part-Time Jobs	334	92.8	16,890	80.4***
	Full-Time Jobs	1,770	81.3	37,002	74.7***
	Temporary Jobs	80	87.9	3,370	84.4
	Permanent Jobs	1,478	78.7	41,320	72.9***
Workplace Characteristics					
Main Industries	Manufacturing	269	74.7	5,884	83.7***
	Energy and Water	303	66.7	364	79.1***
	Construction	540	86.8	3,792	91.8***
	Banking and finance	992	90.0	9,124	89.3
Establishment Size	Small Size	809	89.2	24,924	83.6***
	Medium Size	393	79.9	9,954	68.4***
	Large Size	368	64.2	9,458	61.0
	Private Sector	2,000	85.7	45,656	86.9
	Public Sector	100	50.8	8,080	45.4
Work-Status Nominators					
Qualification	Degree or Equiv.	808	86.8	15,050	68.9***
	Higher Education	237	84.6	4,852	68.0***
	GCE. A Level	421	76.3	13,490	80.3*
	GCSE Grd. A-C	359	82.5	11,710	81.8
	No Qualification	101	82.8	3,342	83.5
Occupation	Managers, Sen Official & Pro	853	86.5	14,194	67.1***
	Assoc. Prof, Technical	257	80.1	7,512	77.9
	Admin & Secret	208	88.9	6,508	79.5***
	Skilled Trades Occupations	422	82.4	5,676	86.6**
	Personal Service	6	60.0	5,412	74.4
	Sales and Customer Service	35	71.4	4,838	84.6*
	Proc, Plant & Mach Ops	163	71.2	3,416	77.2*
	Elementary Occupations	159	81.5	6,340	84.2

Notes: a Sample size is weighted; b Distributions as (column) % of all in each category; c Chi-square results are for the gap between green sectors and rest of the sectors in each line: *p< .05, **p< .01, ***p< .001

Source: Authors' analysis from LFS, October to December Q4/Autumn, 2014.

Figures of workplace characteristics display that there are significant differences between green and rest of the sectors in terms of main industries (except banking and finance) and establishment size (p<.001). In this line, the figures report that manufacturing, energy and water, and construction industries are more favorable for green sectors than rest of the sectors in terms of unionization. The most salient gap between the both sectors occurs in energy and water industries. 66.7% of workers at energy and water industries for green sector are

significantly less likely to be employed non-unionized, compared to rest of the sectors (79.1%). As for less for green sectors, for example, are significantly more likely to work non-unionized, as opposed to rest of the sectors (68.4%). The figures did not find any differences between green and rest of the sectors in terms of non-unionization in public and private sectors. However, unarguably, it is noticed that public sectors for the both sectors are more favorable than private sectors in terms of unionization.

Finally, when considered from work-status nominators of view, some variables of qualification and occupation point out that there are significant relationship between green and rest of the sectors. Referring to the figures, those who hold degree or equivalent and higher education for green sectors have significantly less tendency to be unionized than rest of the sectors. 86.8% of those who have degree or equivalent are significantly more likely to be non-unionized worker, compared to rest of the sectors (68.9%). From the point of occupation, the table for the both sectors does not point out a linear distribution between higher-ranked and lower-ranked occupations. Most substantial gaps between green and rest of the sectors are observed in managers, senior officials and professionals, and administrative and secretarial services. And those who take charge in administrative and secretarial services positions for green sectors (88.9%), for example, is significantly more likely to work non-unionized, as opposed to rest of the sectors (79.5%).

Overall, non-unionized working displays significantly higher for green sectors (82.9%) than rest of the sectors (76.4%). However, it is seen with a varying degree of influence across the demographic and work-related benchmarks used in Table 2.

3.2.2. Logistic Regression Models

Both separate and joint logistic regression models to review the differential influences of demographic profile, flexible work, workplace characteristics and work-status nominators on non-unionized workers in green sectors are setup in Table 3. Reference categories are defined in the last category of bivariate analysis for each predictor variable.

Model 1 involves in demographic profile containing age bands, gender and marital status. Model 1 displays that age bands have significant influences on non-unionized workers regardless of green or rest of the sectors ($p<0.001$). The likelihood of non-unionized workers in range of 16-24 years old, for example, is significantly almost five times higher for rest of the sectors (OR=4.84, $p<0.001$) than reference category, while displaying almost three times higher the likelihood of being non-unionized workers for green sectors (OR=2.97, $p<0.01$). In respect of gender composition, although female employed by green sectors (OR=1.67, $p<0.001$) demonstrates significantly a higher likelihood of being non-unionized, as opposed to male; female working in rest of the sectors is significantly lower likelihood of being non-unionized (OR=0.65, $p<0.001$), compared to male. As for marital status, those who are single are significantly higher likelihood of working non-unionized in rest of the sector (OR=1.12, $p<0.001$), as opposed to those who are married. However, Model 1 failed to find significant differences between marital status and the likelihood of being non-unionized in green sectors.

Model 2 brings in flexible work comprising of part-time and full-time jobs as well as temporary and permanent jobs. Part-time and temporary jobs are strong predictors in terms of non-unionization for rest of the sectors ($p<0.001$). Referring Table 3, the likelihoods of non-unionized workers in part-time jobs are significantly higher for rest of the sectors (OR=1.55, $p<0.001$) than full-time jobs. Similarly, temporary jobs demonstrates significantly higher likelihood of being non-unionized workers (OR=1.40, $p<0.001$), compared to permanent jobs. However, Model 2 did not detect significant differences among flexible work covariates to explain the likelihood of being non-unionized workers for green sectors. Therefore, flexible work between green and rest of the sectors reveals a component of the sect oral difference in terms of non-unionization.

Table 3. Non-unionized Workers in Green and Rest of the Sectors

	Odds Ratios for Rest of the Sectors					Odds Ratios for Green Sectors				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
Demographic Profiles										
Age Bands										
16-24	4.84***	4.75***	3.16***	3.41***	3.79***	2.97***	3.84***	3.52***	4.04***	4.03***
25-34	1.72***	1.97***	1.99***	1.86***	1.99***	2.24***	2.89***	2.83***	2.62***	2.64***
35-49	1.17***	1.25***	1.53***	1.46***	1.47***	1.58***	1.78***	1.89***	1.81***	1.84***
50-64	I	I	I	I	I	I	I	I	I	I
Female	0.65***	0.61***	1.23**			1.67***	1.85***	2.20***	2.29***	1.94***
Single	1.12***	1.18***								
Flexible Work										
Part-time Jobs		1.55***		1.34**	1.29*					
Temporary Job		1.40***	2.11***	1.92**	2.20***					
Workplace Characteristics										
Industries			***	***	***			***	***	***
Manufacturing			0.67***	0.71***	0.93			0.35***	0.39***	0.42***
Energy and Water			0.53***	0.51***	0.60*			0.26***	0.31***	0.29***
Construction			1.11	1.20	1.52***			0.61*	0.73	0.73
Banking and finance			I	I	I			I	I	I
Establishment Size								***	***	***
Small Size								3.08***	3.44***	3.54***
Medium Size								1.95***	2.02***	2.06***
Large Size								I	I	I
Private Sector			4.79***	5.08***	5.13***			4.34***	4.58***	5.01***
Work-status Nominators										
Qualification				***	***				***	***
Degree or Equiv.				1.71***	1.02				1.44	1.08
Higher Education				0.97	0.65*				1.13	0.93
GCE. A Level				0.89	0.70*				0.51	0.46*
GCSE Grd. A-C				1.00	0.80				0.97	0.88
No Qualification				I	I				I	I
Occupation					***					**
Managers, Sen Official & Pro					1.64**					0.84
Assoc. Prof, Technical					1.62**					0.58
Admin & Secret					1.43*					1.18
Skilled Trades Occupations					0.76					0.47*
Personal Service					1.00					0.12*
Sales and Customer Service					0.96					0.74
Proc, Plant & Mach Ops					0.53***					0.41*
Elementary Occupations					I					I
∆ df	7	8	8	8	8	4	4	8	8	8
-2 LLR	31064.2	28017.9	5859.5	5274.5	5181.2	1944.4	1698.0	1422.7	1274.5	1251.9
∆ -2 LLR		3046.3	22158.4	585.0	93.3		246.4	275.3	148.2	22.6
Significance of ∆ -2 LLR			***	**	***				*	*

Note: Significance of difference from the reference category: *p< .05, **p< .01, ***p< .001.
Source: Authors' analysis from LFS, October to December Q4/Autumn, 2014.

In model 2, reflection of flexible work for rest of the sectors reduced effects of those who are non-unionized workers in range of 16-24 years old and non-unionized female, whilst boosting influences of those who are non-unionized workers in range of 24-34 and 35-49 years old and non-unionized single. Flexible work echo for green sectors strengthened the influences of all age bands and female (see the change in log-likelihood ratio in Table 3).

Model 3 put workplace characteristics consisting of industries, establishment size and private sector into the analysis. Workplace characteristics have significant effects on non-unionization regardless of the sectors. In this respect, energy and water, for example, present significantly a lower likelihood of working non-unionized for green sectors and rest of the sectors (in turn OR=0.26, p<0.001 and OR=0.53, p<0.001), compared to banking and finance. In respect of establishment size, the likelihood of non-unionized workers is significantly three times higher to be in small- sized enterprises for green sectors (OR=3.08, p<0.001), compared to large-sized enterprises. Private sector illustrates significantly a higher likelihood of non-unionized workers for both green and rest of the sectors (in turn OR=4.34, p<0.001 and OR=4.79, p<0.001), as opposed to public sectors.

When adding workplace characteristics into the analysis, we can observe that the reflection of workplace characteristics for rest of the sectors increased the influences of those who are non-unionized workers in 25-34 and 35-49 age bands and non-unionized female, but reduced the significance of non-unionized female (p<0.05), while eradicating the effect of non-

unionized single. The impact of workplace characteristics transformed the correlation between female and non-unionization from positive to negative (OR=1.23, p<0.01). Also, reflection of workplace characteristics eliminated the effect of part-time jobs on non-unionized workers, in spite of enhancing the impact of temporary jobs. As for green sectors, the echo of workplace characteristics weakened the impacts of 16-24 and 25-34 age bands on the analysis, while strengthening the effect of 35-49 age band. Also, the reflection of workplace characteristics for green sectors boosted the influence of female on the analysis (see the change in log-likelihood ratio in Table 3).

Model 4 integrates education-work-status nominator with the analysis. Education is predicted a strong effect on non-unionized workers regardless of green or rest of the sectors (p<0.001). In this sense, those who held degree and equivalent, for example, demonstrates significantly a higher likelihood of being non-unionized workers for rest of the sectors (OR=1.71, p<0.001), compared to no qualification. However, Model 4 found a limited difference between qualification categories and non-unionization in terms of clarifying likelihood of being non-unionized for green sectors. Hence, education categories between green and rest of the sectors compose another component of the sector difference in terms of non-unionization.

Incorporating education into the analysis, for rest of the sectors, we can see that the reflection of education enhances the effect of 16-24 age band, whilst reducing the influences of 25-34 and 35-49 age bands and eradicating the impact of female. Also, the echo of education became reactive the effect of the part-time jobs, while increasing the impact of temporary jobs. The influence of qualification made weak the impacts of energy and water industries on the analysis, while making strong the effects of manufacturing industries and private sectors. As for green sectors, the reflection of education boosted the impact of 16-24 age band and female on the analysis, whilst decreasing the effect of 25-34 and 35-49 age bands. Also, the effect of education strengthened the influences of all workplace characteristic categories on the analysis (see the change in log-likelihood ratio in Table 3).

Model 5 aims to measure the effect of occupations on the analysis. Therefore, all independent variables fitting for the analysis have been put into Model 5. Model 5 proves that occupations are a limited predictor for green sectors (p<0.01), but strong predictor for rest of the sectors (p<0.001). Referring to Table 3, unsurprisingly the model suggests that the likelihood of non-unionized workers in higher-ranked occupations is greater than lower-ranked occupations. Those who are in managerial and senior positions, for example, are more likely to tend to be non-unionized for rest of the sectors (OR=1.64, p<0.01) as opposed to elementary occupations. However, the model displays limited differences between occupations and non-unionization for green sectors. Therefore, occupations emerge as another component of the sector difference between green and rest of the sectors in terms of non-unionization.

Joining occupations into the analysis, for rest of the sectors, the impact of occupations boosted the effects of age band categories. Also, the reflection of occupations shrank the impact and the significance of part-time jobs (p<0.05), whilst increasing the influence of temporary jobs. The effect of occupations reduced the significance of manufacturing (p>0.05) and energy and water industries (p<0.05), while enhancing the significance of construction industries (p<0.001) and the effect of private sectors. The reflection of occupations dropped down the significance of those who hold degree and equivalent (p<0.05), despite raising the significances of those who had higher education and GCE A Level. Finally, for green sectors, occupations effect made a limited impact on demographic profiles. In addition, occupations echo for green sectors strengthened mainly the influences of workplace characteristics, except energy and water industry. The same time the reflection of occupations did not make a significant effect on education (see the change in log-likelihood ratio in Table 3).

4. Conclusions

We tried to explore socio-economic predictors of nature of non-unionization for green sectors and rest of the sectors in Britain to examine and contribute researches on non-unionization affected by demographic and work-related factors. The analysis that we performed by using

logistic regression models detected significant findings about demographic and work-related obstacles of union membership in green sectors.

Logistic models prove that non-unionized workers in green sectors are significantly affected by demographic profiles. As age bands grow up, the likelihood of working non-unionized in green sectors increases in a linear mode. The logistic models provide evidence to be significantly higher likelihood of non-unionized tendency in green sectors for female. This may be a result that female employment in green sectors was smaller than male or unionization tendency for female is a lower than male in general. This confirms research findings which reported that female employment was smaller than male in sectors linked to the low-carbon economy in Britain (Bird and Lawton, 2009). However, the models do not find any significant relationship between marital-status and non-unionized employment.

Empirical evidences did not detect significant differences flexible work covariates in terms of clarifying the likelihood of working non-unionized. However, ILO (2013) reported that substantial proportion of green jobs for renewable energy sectors in Germany and Spain consisted of full-time and permanent jobs.

The logistic analyses point out that workplace characteristics have significant effect on non-unionized workers in green sectors. Energy and water and manufacturing industries for green sectors illustrate significantly lower likelihood in terms of working non-unionized, as opposed to banking and finance. As establishment size grows up, the likelihood of being non-unionized employees in green sectors decreases in a linear mode. The reason for this can be that large sized enterprises are more favorable than medium and small sized enterprises for union-organizing. Empirical evidence also suggests that private sector for the both sectors reveals more likely to work non-unionized, compared to public sector.

The evidence also suggests that there are no significant differences between work-status nominators and non-unionization in green sectors. The reason for this may be that green sectors hire generally workers who hold higher educational attainments and take charge in higher-ranked occupations.

Priorities of unions in transition to green economy can be summed up as the demands to create green and decent jobs, transform and improve traditional ones and include democracy and social justice in environmental decision-making processes (Rathzel *et al.* 2010). Therefore, green sectors should not only be good prospect for the environmental protection, but also for workers. This study suggests that unions play a critical role through collective bargaining system to create decent works for green sectors. This research originally found that age bands, female and establishment sizes and high-ranked occupations have negative effects on union-membership for British green sectors. Also these groups for green sectors illustrate higher likelihood of working non-unionized, compared to rest of the sectors. It is interesting that the study found a limited link between union-membership and education. Also data does not support the top-down model. In this line, unions organizing in green sectors should develop special programs and campaigns for workers in targeted groups, in particular young and female workers, to encourage them more than rest of the sectors to organize.

There is, however, a need for specific analysis to examine that whether jobs in unionized green sectors offer decent working conditions or not. To do this, it is needed to special nature of the data set searching relationship between union membership and green sectors. Future research may focus on an analysis on this way. Besides, it would be useful to perform a qualitative research to improve the study.

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Appendix: Green Sectors: Environmental, Design and Manufacture–SIC 2007

Level 1	Level 2 (SIC07 Codes)
Manufacture of Electrical Equipment	2711: Manufacture of electric motors, generators and transformers 2712: Manufacture of electricity distribution and control apparatus 2732: Manufacture of other electronic and electric wires and cables 2733: Manufacture of wiring devices 2740: Manufacture of electric lighting equipment 2751: Manufacture of electric domestic appliances 2752: Manufacture of non-electric domestic appliances 2790: Manufacture of other electrical equipment
Manufacture of Metal Products and Equipment	2521: Manufacture of central heating radiators and boilers 2530: Manufacture of steam generators, except central heating hot water boilers 2811: Manufacture of engines and turbines, except aircraft, vehicle and cycle engines 2812 Manufacture of fluid power equipment* 2813: Manufacture of other pumps and compressors 2821: Manufacture of ovens, furnaces and furnace burners 2825: Manufacture of non-domestic cooling and ventilation equipment
Alternative Fuel Vehicles	2910: Manufacture of motor vehicles 3020: Manufacture of railway locomotives and rolling stock 3099: Manufacture of transport equipment n.e.c.
Production and Distribution of Electricity	3511: Production of electricity* 3513: Distribution of electricity *
Production and Distribution of Gas	3521: Manufacture of gas* 3522: Distribution of gaseous fuels through mains* 3530: Steam and air conditioning supply*
Water Collection, Treatment and Supply	3600: Water Collection, Treatment and Supply*
Sewerage	3700: Sewerage*
Waste Management and Remediation Activities	3811: Collection of non-hazardous waste* 3812: Collection of hazardous waste* 3821: Treatment and disposal of non-hazardous waste* 3822: Treatment and disposal of hazardous waste* 3831: Dismantling of wrecks* 3832: Recovery of sorted materials* 3900: Remediation activities and other waste management services*
Green Buildings, Power and Energy Infrastructure	4110: Development of building projects 4120: Construction of residential and non-residential buildings 4221: Construction of utility projects 4299: Construction of other civil engineering projects n.e.c. 4329: Other construction installation* 4399: Other specialized construction activities n.e.c.*
Environmental Engineering and Technical Consultancy	7111: Architectural activities 7112: Engineering activities and related technical consultancy
Environmental R&D	7211: Research and experiment al development on biotechnology* 7219: Other research and experimental development on natural sciences and engineering* 7490: Other professional, scientific and technical activities n.e.c*.
Specialized Cleaning and Landscape Service Activities	8122: Specialized cleaning services* 8130: Landscape service activities*

**Note: ***Added by authors from LFS, 2014

Source: D2N2 (2014)