Structural Challenges to Employment Policy Effectiveness in Rural Regions: a General Equilibrium Assessment

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Abstract:

Rural development policy has a broad remit, in that it seeks to address social, environmental and economic objectives. A key economic objective that is common across rural development approaches is to improve employment outcomes in rural areas. Rural schemes and policies targeting employment directly or indirectly manifest within a wider context of national schemes and policies. Employment policies can roughly be divided into demand-side (such as cluster development) and supply-side (such as education and training) approaches. This paper explores the possibilities and limitations for national demand-side policies to improve employment outcomes in sub-national regions away from metropolitan centres due to systematic differences in economic structure. Particular attention is given to the interactions between regional and gender employment convergence. The approach developed can be used to develop 'reactionary' rural development schemes to compensate for differential impacts of national schemes in rural regions.

Key words: ….

Regional employment, industry clusters, rural development

1. Introduction

Rural development policy has a broad remit, in that it seeks to address social, environmental and economic objectives. A key economic objective that is common across rural development approaches is to improve employment outcomes in rural areas. Rural schemes and policies targeting employment directly or indirectly manifest within a wider context of national schemes and policies. This paper explores the possibilities and limitations for national demand-side policies to improve employment outcomes in sub-national regions away from metropolitan centres due to systematic differences in economic structure. Particular attention is given to the interactions between regional and gender employment convergence.

Improving employment outcomes, by means of increasing employment opportunities such as additional jobs or more rewarding jobs, is a shared objective at national, sub-national, and

local levels of government. Policy intervention can utilize public resources to assist labour markets by improving the quantity and quality of labour supplied to the market (supply-side) as well as generating additional demand for labour through incentive schemes to certain industries or clusters of industries (demand-side). While both are important, this paper focuses on the demand-side approach to increase employment opportunities. Specifically, it asks how courting certain industries over others at a national level will change employment income convergence sub-nationally. The usefulness to rural development policy comes from understanding how regions relatively far away from metropolitan centres gain more or less relative to other regions. If industries targeted nationally for growth leave certain regions behind, there is scope for using rural development policy to pointedly compensate these regions through locally-targeted interventions.

The next section lays out the theoretical framework used to look at employment structure, inter-industry linkages, targeted growth to increase employment demand, and inequality. Section 3 details the exact methodology used and the data sources from the case study, Northern Ireland, a devolved administration of the United Kingdom (UK). Section 4 describes the results and identifies the main patterns revealed from the analysis. The final section concludes and offers policy recommendations.

2. Theoretical Framework

There are important relationships that need capturing in order to understand how targeting certain industries can influence employment income inequality. These include (1) the economic structure of industries including the labour-intensity of an industry and intermediate inputs drawn from other domestic industries; (2) the employment structure of industries, beyond the labour-intensity but also the type of labour (e.g. skilled, unskilled).

Economic structure, in this case, is approached from a General Equilibrium (GE) framework. The use of production, and value-added multipliers derived from GE models have been a long-standing tool in terms of understanding how the structure of the economy interacts with various public policy objectives (Leontief 1970). Indeed, production and value-added multipliers are still a popular choice of policymakers to select and justify incentivising particular economic activities, because the benefits to the wider economy in terms of increased intermediate or factor demands can be demonstrated. In this case, Input-Output (IO) multipliers can be used to include the indirect, as well as direct, production and therefore employment changes, as certain industries experience relative growth over others.   The IO

framework, based on national accounts, provides the intra-industry linkages, as well as labour-intensity of each industry.

A framework to investigate employment structure requires breaking down the labour demand of each industry into greater detail. Many studies differentiate labour in terms of skill level, based on education or qualifications (Saari, Dietzenbacher, and Los 2014, Pieters 2010, Phimister and Roberts 2012). However, one of the issues in terms of both gender and regional labour market patterns is the fact that people can be restricted by informal labour commitments (such as caring responsibilities) or by location/transportation, meaning that they take employment below their qualification level to take advantage of greater flexibility or convenience. Considering the focus in this paper is to look at gender and rural employment convergence, it is argued that occupation (the functional role of labour actually employed) should be used instead of the potential occupation based on education. The underlying assumption this approach requires is that there are no supply-side issues in the labour market, specifically, as one industry expands and demands additional labour across several occupations, there is sufficient supply to fill all additional demands.

In this framework, a production shock to a particular industry influences employment income both directly and indirectly. The direct effect depends on the labour-intensity and employment structure of the sector being shocked. The degree to which production increases in other sectors to meet intermediate demands of the shocked sector, and, the employment structure of those industries generates an indirect effect. The distributional impacts of a given production shock will shaped by regional and gender patterns in employment structure.

3. Methodology and Data

The methodology used to establish and test employment income divergence and convergence is described below. The approach is applied using data from Northern Ireland (NI), a devolved administration of the United Kingdom (UK). In some cases, data availability has strongly influenced how the theoretical framework is operationalised, such as the number and classification of industries and regions.

3.1 Employment structure

A summary of aggregate employment structure by industry is provided in Table 1. This is a starting point from which to develop the detailed employment satellite account. The employment account has an industry dimension (indexed by s) of 21 industries following the United Kingdom Standard Industrial Classification (UKSIC2007). The employment

categories (indexed by *o*) follow the Standard Occupation Classification (SOC2010) to two digits (25 occupations) and gender (female and male) resulting in 50 categories. Employee numbers are available from the latest by industry, occupation, and full time (over 31 hours per week) / part time (30 hours per week or less) for females (Northern Ireland Statistics and Research Agency 2011a) and males (Northern Ireland Statistics and Research Agency 2011b) over 16 years of age at last birthday (including full time students in employment). Self-employment numbers are also available, but these were not included as self-employment income functions as operating surplus, and the analysis is limited to employment income only. A summary of employment structure

The first step is to establish employment structure in terms of 'physical' units, in this case by the number of full time equivalent (FTE). This requires converting employee numbers to FTEs. A conversion factor by industry, occupation and gender is calculated to convert employee numbers based on the 2011[1] Annual Survey of Hours and Earnings (Office for National Statistics 2011). It is assumed that one FTE is equal to 37 hours per week. A simple average combining the mean FTE per week by gender and industry with the mean FTE per week by gender and occupation is used to convert full time employee numbers. In the case of part time employees, the survey data is much sparser, with many missing values. Therefore the same simple average approach is applied but only by industry and occupation such that the conversion factors are the same for both female and male part time employees in the same industry and occupation. The breakdown following this approach of FTEs is shown in Table 2.

The FTE matrix (of dimensions 50 x 21) is generated by adding together the FTEs of both full time and part time employees. This represents a 'physical' accounting of labour in that it is based on time. The relative cost of that time, or wage rate, is not reflected. The objective is to determine how the aggregate labour cost of each industry is distributed across occupation and gender to determine the employment structure behind labour demanded across industries. Therefore, we are looking for the *share* of total labour costs being spent on a given type of labour (in this case represented by occupation) by each industry. Dividing each element of the FTE matrix by its column total provides an initial share of labour costs *assuming that there is only one uniform wage rate for all labour categories*. The resulting *o* x *s* matrix (*q*   ) is used

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as an initial estimate, whereby the physical share and cost share of labour are the same (implying the unit cost of labour is unity).

Differentiated wage-rates by occupation are incorporated by first defining a relative wage index, based on the ration of reported earnings by occupation, and the economy-wide average. For example, in the physical/uniform-wage matrix, q, the wage rate is equal to one. Therefore, each occupation specific wage-rate is divided by the average wage rate to index each occupation as earning above average (greater than one) or below average (less than one). The average and occupation specific wage rates are based on mean gross hourly income excluding overtime from the Annual Survey of Hours and Earnings (Office for National Statistics 2011). A coefficient of variation (CV) is reported along with the sample mean for each occupation. This is used to calculate two indicators for each occupation, reflecting a lower v_o^l and upper v_o^u bound, between which it is assumed the occupation-average unit cost of labour falls.

$$v_o^l = \frac{\bar{x}_o - 2.5 CV_o \bar{x}_o}{\tilde{x}}$$ (1a)

$$v_o^u = \frac{\bar{x}_o + 2.5 CV_o \bar{x}_o}{\tilde{x}}$$ (1b)

The lower and upper bounds used are provided in Table 3: Unconstrained Type I Leontief multipliers.

A minimization problem is defined, whereby the cross-entropy distance between the physical/uniform-unit-cost labour share matrix (of dimensions o x s), q , and a new matrix that allows differentiated wage rates by occupation, $\hat{q}$, is minimized. This follows an approach widely applied to update Input-Output tables and Social Accounting Matrices (Robinson, Cattaneo, and El-Said 2001). In this case, the constraints imposed include that the new row totals need to be relatively larger or smaller than the original row totals depending on the defined range established using v_o^l and v_o^u, the column totals need to equal unity (maintaining the share structure), and each element of the new share matrix be between zero and one.

$$min \left[\sum_o \sum_s \hat{q}_{o,s} \ln \frac{\hat{q}_{o,s}}{q_{o,s}} \right]$$ (2)

Subject to:

$$v_o^l \sum_s q_{o,s} < \sum_s \hat{q}_{o,s} < v_o^u \sum_s q_{o,s} \qquad (3)$$

$$\sum_o \hat{q}_{o,s} = 1 \qquad (4)$$

and $0 \leq \hat{q}_{o,s} \leq 1$ $\qquad (5)$

The optimization problem is solved using PATHNLP in GAMS software (GAMS Development Corporation, Washington DC).

3.2 Regional employment structure

Census cross-tabulations were commissioned from the Northern Ireland Statistics and Research Agency detailing employee numbers by gender, occupation and industry at the NUTS3 geographical breakdown, however full time and part time figures were aggregated to protect confidentiality. This means it is assumed that the proportion of full time and part time employees in each occupation and industry do not vary across regions. Wage rates and average hours worked are also assumed to be constant across regions. Applying these assumptions, the share of labour costs by industry and occupation in a given region $\rho_{s,o,r}$ is calculated. The regional share parameter is used to determine regional employment structures by partitioning the wage-differentiated labour cost share matrix into five[2], according to the five NUTS3 regions (Belfast, Outer Belfast, East of Northern Ireland, North of Northern Ireland, West and South of Northern Ireland) with a superscript to denote the region $\hat{q}_{o.s}^r$.

3.3 Gross employment income

Labour costs to each industry by occupation can be calculated by multiplying the differentiated labour cost share matrix by the vector of labour costs, in this case the Compensation of Employment (COE) based on Regional Gross Value Added from the Office for National Statistics. Employment income paid to workers in a given region can be obtained by the following.

$$\sum_s \sum_o \bar{c}_s \hat{q}_{o,s}^r = y_r \qquad (6)$$

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[2] Alternatively, the row dimensions of the q matrix could be increased five-fold to include 250 labour categories. The organisation into five regional matrices seems more intuitive to consider.

Regions can be further sub-divided into two groups by gender by only summing over female (fo) or male (mo) held occupations.

$$\sum_s \sum_{o \in fo} \bar{c}_s \hat{q}_{fo,s}^r = y_{rf} \tag{7a}$$

$$\sum_s \sum_{o \in mo} \bar{c}_s \hat{q}_{mo,s}^r = y_{rm} \tag{7b}$$

Thus ten 'household groups' are defined, two for each region – one female and one male indexed by j. The between group inequality can be measured using the Theil index, where z is the employment income share and n the population share.

$$T_{between} = \sum_j z_j \log \left(\frac{z_j}{n_j} \right) \tag{8}$$

The population shares are designed to capture the working population, and therefore are calculated using Census figures by region and gender only for those who are employed and unemployed (not those who are economically inactive, retired, or under working age). This is the most consistent approach considering the analysis is designed to capture the impacts of *demand*-led employment growth focusing on the role of economic, and therefore employment, structure. Issues and policies impacting the *supply*-side, such as bringing additional inactive people into the formal labour market, or increasing education and training, are outside of the scope of this paper. Therefore, population takes on this specific definition.

The initial level and relative contribution of each group to the inequality measure provides a benchmark from which to compare the impacts of alternative production shocks on employment income distribution.

3.4 Targeted industry growth

Type I production multipliers from an I-O table are used to simulate the boost in production by a given industry (implicitly assuming some form of public incentives to increase presence of the sector). Matrix M of dimensions s x s contains the production multipliers. Column s shows the amount to which each industry increases production levels to fill intermediate demands driven by a £million increase is production from sector s. The multipliers are derived from an aggregated version of an IO table of Northern Ireland developed by the Agri-Food

and Biosciences Institute (AFBI) and are provided in Table 3. For example, the first column shows the direct and indirect production increase from each industry given a £million increase in industry A: Agriculture, forestry and fishing.

The approach assumes labour demand is fixed in proportion to the production increase (no change in labour-intensity), and employment structure also remains the same after the shock. Additional employment demanded by industries due to the direct and indirect production increase is calculated by multiplying the vector of combined direct and indirect production increases for each sector with the amount of labour input demanded per unit of additional output. q' is the o x s matrix of additional compensation paid to employees by each industry, γ is a vector of the proportion of labour costs per additional unit of production output for each industry, M is the sth column of the unconstrained production multiplier matrix, and $\hat{q}$ is the o x s matrix of employment costs by industry, and occupation/gender.

$$q' = \gamma M \hat{q} \tag{9}$$

Additional income to each household is determined by the additional labour costs under the shock, c' and the existing employment structure. The new employment income for each region when industry s is shocked can be calculated as below, where y_r is the baseline income calculated in (6).

$$y_r^s = y_r + \sum_s \sum_o c'_s \hat{q}_{o,s}^r \tag{10}$$

Revised employment income for the sub-groups in the region (female and male) are found by only summing over female (*fo*) or male (*mo*) occupations respectively.

This revised income distribution across regions and genders leads to new income shares, and therefore a new value for the inequality indicator. Revised income shares for each industry being shocked are calculated using the new income distribution by region and gender.

$$z_j^s = \frac{y_j^s}{\sum_j y_j^s} \tag{11}$$

The degree to which shocking industry s has changed between group inequality is determined by replacing zj with each zsj in (8).

4. Results

The data and methods described above are used to calculate an employment structure matrix, reflecting relative compensation by occupation and gender. Baseline income is calculated across ten groups determined by NUTS3 region and gender, and the initial level of inequality benchmarked using Theil's index. After each industry is subjected to a production shock of £100 million, new income shares and inequality measures are calculated and used to look at the distributional impacts in terms of employment income when certain industries are targeted for growth.

4.1 Employment structure satellite account

The differentiated employment compensation matrix, $\hat{q}$ is solved for using the approach and data described in the previous section. The share matrix itself is not reported here, but instead the difference between the 'physical' demand matrix, , and the wage-differentiated matrix multiplied by the compensation of employment vector $\bar{c}$ is reported so that a more intuitive understanding of how using the cross-entropy programme has changed the employment cost structure can be reached. In Table 5 the difference in £ million between the new and original matrix is provided for every industry and occupation/gender. Negative elements indicate that the adjustment has caused the cost of purchasing labour employed in that occupation and industry to decrease compared to if a uniform wage rate is assumed. When an element is positive, that number represents the additional cost of employing the underlying quantity of labour in that occupation.

4.2 Regional employment structure

Based on the wage differentiated employment structure determined above, the baseline distribution of compensation of employees across regions and gender is calculated and presented in Figure 1. Similar shares of compensation to employees is paid to Outer Belfast (24%), East of Northern Ireland (25%) and West and South of Northern Ireland (22%) regions. Manufacturing is relatively important in terms of compensation paid to employees in the East, North, and West/South, while Public administration and defense, and Education activities take on relative importance in Outer Belfast. Belfast and the North are allocated 15% and 14% of aggregate compensation of employees respectively. The dominant industries in Belfast are similar to those in Outer Belfast, and those in the North include Manufacturing (similar to the East and West/South) and Education (similar to Belfast and Outer Belfast).

As the relative compensation index assumes no difference between male and female wages, the resulting distribution in Figure 1-b of compensation of employment between genders is based on structural differences alone, with no assumptions regarding a 'wage gap' between female and male employees of the same occupation and sector of employment. Economy wide, 55% of compensation is paid to male employees and 45% to female employees. Across industries, relatively more aggregate employment income is paid to female employees in the Human health and social work, Education, Other services, and to a lesser extend Financial and insurance activities. Aggregate compensation paid to male employees is relative higher in all other sectors, with the most notable differences in Manufacturing, Construction, and Transportation activities.

4.3 Employment income by gender and region

The income, income shares, and population shares for the ten groups, combining the five regions and two genders, are calculated as described earlier in order to establish the baseline inequality between groups using the Theil index. Table 6 shows the values used to calculate the index, including each groups contribution to the overall indicator of between group employment income inequality. The structure of the Theil index means that when a group has a larger income share than population share (in this case population includes employed and unemployed of working age), it makes a 'positive contribution' to overall between group inequality, and, when the income share is below the population share, that household group makes a 'negative contribution' to overall inequality. The magnitude of the contribution of the household group is determined by the size of the income share.

Both household groups (female and male) within Outer Belfast have income shares larger than population shares. Male household groups in Belfast and the East have income shares larger than their share of working population, but female households in the two regions have a lower income share than population share. All household groups in the remaining two regions, the North and West/South, have smaller income shares compared to population shares. The household group with the largest (absolute value) contribution to the between group inequality indicator is males in Outer Belfast (1.83), followed by males in the East (0.75), females in the North (-0.58), females in Belfast (-0.50), males in the North (-0.48), males in the West/South (-0.46), females in the East (-0.29), females in the West/South (-0.25), males in Belfast (0.17) and females in Outer Belfast (0.01). The sum of these values, or the between group inequality ($T_{between}$), is 0.22.

4.4 Employment convergence and divergence

The impact of industry-specific production shocks on between group employment income inequality for all industries are provided in Table 7. Arguably, some sectors are more likely to be targeted by government for directed growth by means of incentives for private investment or public investment such as Manufacturing, Information and communication, and Construction activities. However, national and regional government also compete with one another using tax breaks and infrastructure to establish less traditional industry clusters such as tourism, and in recent years film and television. So it is pertinent to look at the impacts of growing these industries as well. In terms of public-services employment, an already important employer in the case study, a 'production shock' in some of these sectors could be conceptualised as stemming from a government policy, for example, to increase staff-to-student ratios in primary and secondary education, or, to incentivize expansion of tertiary and university institutions.

Based on the aggregate measure of between group inequality, the largest reduction in inequality is from a shock to Other services (37% reduction in inequality), followed by Human health and social services, Education, and Construction (27%). Industries often associated with national schemes to incentivise growth, Information and communication activities and Manufacturing, fall in the lower to middle range in terms of reducing overall inequality (12% and 13%). Increasing Agriculture, forestry and fishing production, associated with many rural development policies, reduces the between group inequality index by 15%. Industries associated with tourism fair better in terms of reducing inequality, with Accommodation and food services changing the index by 24% and Arts, entertainment and recreation by 22%.

Looking at the impacts on regional employment income convergence the relative share (both positive and negative) of each region in terms of contributing to inequality can be summarised by looking at each regions 'contribution' to the Theil indicator. In the baseline, the North has the largest negative contribution (-1.05) followed by the West/South (-0.7) and Belfast (-0.37). The largest positive contributions come from Outer Belfast (1.84) and the East (0.46). The relative contributions of the five regions under different industry production shocks are shown in Table 8. In the table, cases in which the region 'gains' relative to other regions is coloured in blue, while cases in which the region is relatively worse off than other regions given that particular shock is coloured red. The only region that switches from a negative to a positive contribution to the inequality measure is Belfast when the production shock is applied

to Education, Other service activities, or Financial and insurance activities. The region with the most negative contribution in the baseline, the North, also gains from growth in these three industries. The industry growth that worsens the relative position of the North includes Professional, scientific and technical activities, Wholesale and retail trade and Mining and quarrying, all industries that when production is shocked the West/South gains relative to other regions.

Initially the contribution of each gender to employment income inequality is 1.85 (males) and -1.63 (females). All production shocks reduce inequality between female and male employees, with the largest relative improvement for female employees when Education, Public Administration, Other services, and Health and human services industries experience the production shock. The ranking and contribution of female employees to the revised Theil indicator for most sectors are provided in Table 9.

5. Conclusions

The analysis illustrates that structural differences in employment persist along regional and gender lines, and that these differences can require negotiating a trade-off between regional and gender convergence of employment income. The traditional focus of rural development policy on primary food and fiber production (although certainly with historic and economic reasoning and justification) in terms of the specific issue of improving employment convergence, only produces middling results at best. Tourism and recreation show a bit more promise in terms of gender employment convergence, but do not fair much better in terms of regional convergence than traditional rural industry.

A production shock in any one industry does not improve the relative position of all three 'rural' regions compared to the metropolitan and affluent surrounding region. Therefore, there is little chance in the case study that national incentives targeting only a few industries will have a comparable impact across all rural regions. However, anticipating which regions will be left behind using the approach shown here can provide an opportunity to introduce compensating measures, potentially funded through the rural development mechanism.

Table 1. Employment structure by industry based on Census 2011 and Regional Gross Value Added (Office for National Statistics)

	Industry (UKSIC 2007)	FTEs	Share of FTEs	Gross COE (£ million)	Share of gross COE	Rank (FTEs)	Rank (COE)
A	Agriculture, forestry and fishing	4,828	0.81	105	0.60	17	17
B	Mining and quarrying	1,886	0.31	40	0.23	19	19
C	Manufacturing	72,802	12.15	2,723	15.50	3	1
D	Electricity, gas, steam and air conditioning supply	3,440	0.57	72	0.41	18	18
E	Water supply; sewerage, waste..	5,747	0.96	162	0.92	16	15
F	Construction	41,108	6.86	1,058	6.02	6	6
G	Wholesale and retail trade; repair of motor vehicles...	95,999	16.02	2,317	13.19	1	4
H	Transportation and storage	25,589	4.27	730	4.15	9	8
I	Accommodation and food service activities	29,010	4.84	485	2.76	7	12
J	Information and communication	17,498	2.92	519	2.95	12	10
K	Financial and insurance activities	21,095	3.52	800	4.55	11	7
L	Real estate activities	5,805	0.97	128	0.73	15	16
M	Professional, scientific and technical activities	25,526	4.26	506	2.88	10	11
N	Administrative and support service activities	25,631	4.28	543	3.09	8	9
O	Public administration and defence; compulsory social security	58,873	9.83	2,047	11.65	4	5
P	Education	54,237	9.05	2,340	13.32	5	3
Q	Human health and social work activities	87,675	14.63	2,452	13.95	2	2
R	Arts, entertainment and recreation	9,845	1.64	182	1.04	14	14
S	Other service activities	12,029	2.01	335	1.91	13	13
T	Activities of households as employers...	234	0.04	27	0.15	21	20
U	Activities of extraterritorial organisations and bodies	259	0.04		0.00	20	21
	Total	*599,119*	*100*	*17,571*	*100*	*231*	*231*

Table 2. Physical employment by SOC2010 occupation and gender based on 2011 Census tables (Office for National Statistics)

		FTEs	Share of FTEs	Female (F)FTEs	Share of FFTEs	Male (M)FTEs	Share of MFTEs	Rank FTEs	Rank FFTEs	Rank MFTEs
11	Corporate managers and directors	35,114	5.86	12,075	4.47	23,039	7.00	5	10	6
12	Other managers and proprietors	12,022	2.01	4,950	1.83	7,071	2.15	18	14	16
21	Science, research, engineering and technology prof.	23,609	3.94	4,806	1.78	18,804	5.72	13	15	7
22	Health professionals	31,870	5.32	25,610	9.48	6,259	1.90	6	4	17
23	Teaching and educational professionals	27,764	4.63	18,852	6.98	8,912	2.71	12	6	14
24	Business, media and public service professionals	28,352	4.73	12,934	4.79	15,419	4.69	10	8	11
31	Science, engineering and technology associate prof.	10,589	1.77	2,530	0.94	8,060	2.45	20	19	15
32	Health and social care associate professionals	6,710	1.12	4,279	1.58	2,431	0.74	22	17	24
33	Protective service occupations	5,130	0.86	468	0.17	4,662	1.42	23	24	19
34	Culture, media and sports occupations	4,608	0.77	1,675	0.62	2,933	0.89	24	20	23
35	Business and public service associate professionals	29,804	4.97	13,606	5.04	16,198	4.92	9	7	9
41	Administrative occupations	76,605	12.79	45,271	16.76	31,335	9.53	1	1	1
42	Secretarial and related occupations	13,719	2.29	12,693	4.70	1,026	0.31	17	9	25
51	Skilled agricultural and related trades	3,718	0.62	316	0.12	3,402	1.03	25	25	22
52	Skilled metal, electrical and electronic trades	30,741	5.13	733	0.27	30,008	9.12	7	22	2
53	Skilled construction and building trades	17,377	2.90	612	0.23	16,766	5.10	14	23	8
54	Textiles, printing and other skilled trades	16,165	2.70	5,321	1.97	10,845	3.30	15	13	13
61	Caring personal service occupations	40,292	6.73	34,668	12.83	5,624	1.71	4	2	18
62	Leisure, travel and related personal service occupations	10,615	1.77	7,107	2.63	3,508	1.07	19	11	21
71	Sales occupations	42,921	7.16	26,859	9.94	16,062	4.88	3	3	10
72	Customer service occupations	8,760	1.46	4,557	1.69	4,203	1.28	21	16	20
81	Process, plant and machine operatives	30,572	5.10	6,235	2.31	24,338	7.40	8	12	5
82	Transport and mobile machine drivers and operatives	28,184	4.70	866	0.32	27,318	8.30	11	21	4
91	Elementary trades and related occupations	13,747	2.29	2,580	0.96	11,167	3.39	16	18	12
92	Elementary administration and service occupations	50,129	8.37	20,568	7.61	29,560	8.99	2	5	3
	Total	599,119	100	270,172	100	328,947	100			

Table 3: Unconstrained Type I Leontief multipliers

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A	1.07	0.02	0.12	0.02	0.02	0.03	0.03	0.02	0.04	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
B	0.01	1.10	0.01	0.16	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
C	0.28	0.20	1.29	0.13	0.20	0.26	0.27	0.21	0.24	0.23	0.19	0.15	0.22	0.21	0.22	0.23	0.24	0.21	0.20	0.21
D	0.02	0.03	0.02	1.05	0.02	0.02	0.01	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02
E	0.01	0.01	0.01	0.00	1.24	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
F	0.05	0.03	0.02	0.04	0.09	1.32	0.02	0.03	0.03	0.02	0.05	0.05	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.02
G	0.04	0.02	0.02	0.02	0.03	0.03	1.05	0.03	0.02	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
H	0.04	0.15	0.05	0.06	0.09	0.04	0.05	1.26	0.06	0.06	0.15	0.06	0.06	0.07	0.07	0.07	0.06	0.09	0.09	0.05
I	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	1.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05
J	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	1.03	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03
K	0.06	0.11	0.06	0.08	0.09	0.06	0.05	0.06	0.06	0.06	1.21	0.27	0.07	0.07	0.08	0.07	0.07	0.08	0.08	0.07
L	0.05	0.05	0.05	0.05	0.08	0.07	0.06	0.06	0.06	0.07	0.10	1.09	0.07	0.08	0.09	0.09	0.08	0.08	0.09	0.09
M	0.04	0.04	0.03	0.05	0.07	0.05	0.03	0.04	0.04	0.05	0.13	0.05	1.11	0.09	0.06	0.05	0.07	0.11	0.10	0.03
N	0.02	0.03	0.02	0.03	0.08	0.05	0.02	0.05	0.04	0.04	0.07	0.03	0.08	1.11	0.04	0.09	0.05	0.15	0.08	0.02
O	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	1.00	0.00	0.00	0.00	0.00	0.00
P	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.04	1.14	0.03	0.03	0.03	0.02
Q	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	1.18	0.03	0.03	0.04
R	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	1.10	0.05	0.02
S	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.08	1.10	0.02
T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Total	1.79	1.89	1.79	1.80	2.17	2.08	1.72	1.97	1.76	1.78	2.18	1.91	1.88	1.94	1.89	2.05	2.03	2.19	2.08	1.75

Table 4. Relative wage index by SOC2010 occupation using data from the Annual Survey of Hours and Earnings 2011

	Occupation	Mean hourly pay full time employees-gross (£)	Coefficient of Variation	Lower bound index	Upper bound index
11	Corporate managers and directors	20.00	0.05	1.40	1.80
12	Other managers and proprietors	16.80	0.2	0.67	2.02
21	Science, research, engineering and technology professionals	17.60	0.05	1.23	1.59
22	Health professionals	19.46	0.05	1.36	1.75
23	Teaching and educational professionals	23.03	0.05	1.61	2.08
24	Business, media and public service professionals	17.11	0.05	1.20	1.54
31	Science, engineering and technology associate professionals	11.82	0.05	0.83	1.07
32	Health and social care associate professionals	13.05	0.05	0.91	1.18
33	Protective service occupations	17.19	0.05	1.21	1.55
34	Culture, media and sports occupations	13.89	0.2	0.56	1.67
35	Business and public service associate professionals	14.56	0.05	1.02	1.31
41	Administrative occupations	10.23	0.05	0.72	0.92
42	Secretarial and related occupations	10.21	0.1	0.61	1.02
51	Skilled agricultural and related trades	8.12	0.1	0.49	0.81
52	Skilled metal, electrical and electronic trades	11.61	0.05	0.81	1.05
53	Skilled construction and building trades	10.23	0.05	0.72	0.92
54	Textiles, printing and other skilled trades	9.42	0.1	0.57	0.94
61	Caring personal service occupations	8.96	0.05	0.63	0.81
62	Leisure, travel and related personal service occupations	9.21	0.1	0.55	0.92
71	Sales occupations	7.93	0.05	0.56	0.71
72	Customer service occupations	8.05	0.1	0.48	0.81
81	Process, plant and machine operatives	8.76	0.05	0.61	0.79
82	Transport and mobile machine drivers and operatives	9.45	0.05	0.66	0.85
91	Elementary trades and related occupations	7.77	0.05	0.54	0.70
92	Elementary administration and service occupations	7.54	0.05	0.53	0.68
	Average	12.48			
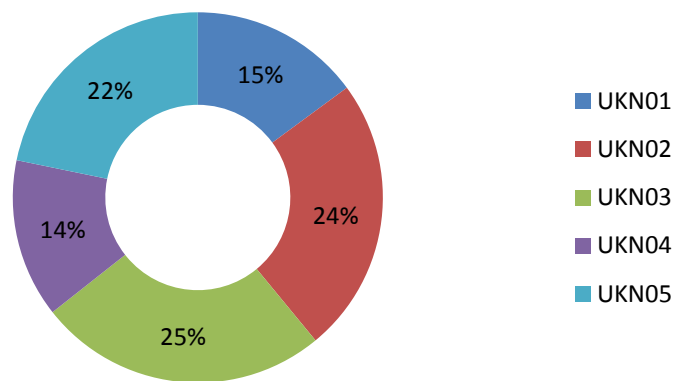
(a) Regional share
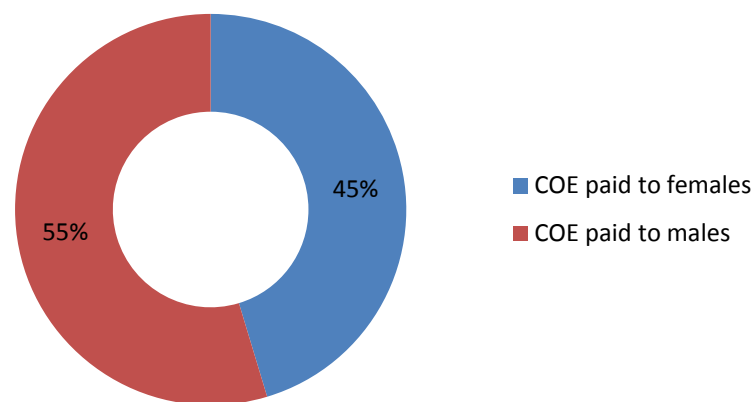
(b) Gender share
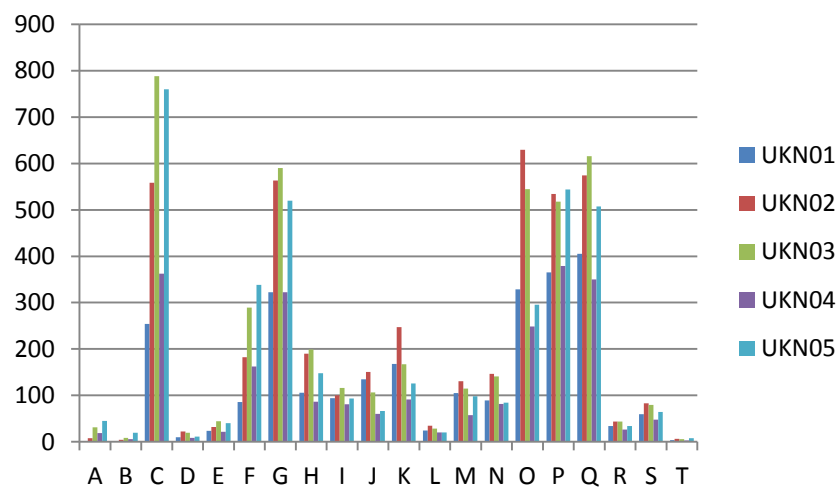
(c) Region and industry in £million
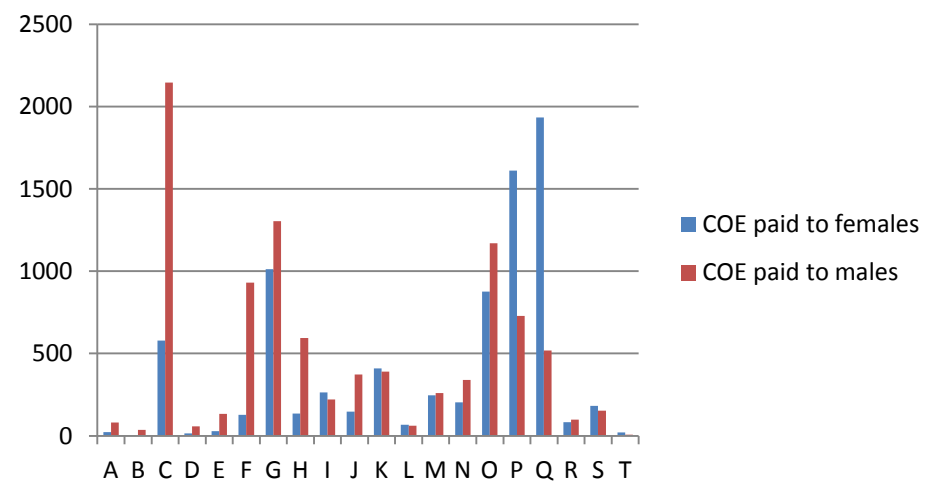
(b) Gender and industry in £million

Figure 1. Compensation of employment distribution by NUTS3 region, gender and UKSIC2007 industry based on the extended labour account

Table 5. Difference between the physical/uniform-wage labour cost matrix and the compensation-differentiated labour cost matrix by SOC2010 occupation, gender and UKSIC2007 industry (£ million)

|	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
F11	0.26	0.17	16.14	0.34	0.56	3.48	72.08	6.59	1.86	1.11	14.50	0.29	1.38	2.81	7.56	-1.88	12.65	0.45	2.08	0.08
F12	0.51	0.01	0.91	0.01	0.46	0.41	4.00	0.31	11.32	0.42	0.24	1.21	0.33	4.59	2.09	-1.66	5.26	2.70	1.23	0.07
F21	0.21	0.10	10.54	0.21	0.81	1.57	1.69	0.41	0.24	5.48	2.07	0.08	1.94	0.65	4.40	-4.83	3.49	0.22	0.44	
F22	0.31	0.02	2.88	0.05	0.03	0.52	20.38	0.36	0.99	0.41	2.03	0.23	2.19	1.99	8.02	-4.15	205.07	0.41	0.82	0.20
F23	0.17		1.03		0.15	0.26	1.00	0.08	5.09	0.47	0.14	0.04	0.52	0.85	25.04	382.54	11.03	2.30	1.66	0.17
F24	0.23	0.07	9.19	0.43	0.66	2.76	4.22	1.22	0.80	1.80	3.04	0.89	7.77	1.82	15.13	-6.37	16.49	1.40	3.17	
F31	0.16	0.03	4.57	0.02	0.14	0.45	0.86	0.14	0.14	-0.15	0.10	0.01	-0.16	0.56	0.55	-6.50	0.17	0.03	0.11	
F32	0.04		0.78	0.01	0.01	0.23	2.94	0.14	0.39	0.03	0.12	1.58	0.10	0.27	2.10	-3.53	7.77	0.16	1.80	0.12
F33			0.12			0.03	0.16	0.15	0.03	0.03	0.06	0.01	0.01	0.27	3.18	-0.01	0.05	0.01	0.02	
F34	0.05		2.16			0.17	1.81	0.09	0.28	1.19	0.09	0.02	0.58	0.24	0.87	-1.97	0.18	1.72	0.25	
F35	0.41	0.14	21.26	0.38	1.27	3.31	19.72	3.30	3.41	1.98	12.65	1.65	3.12	8.33	14.08	-9.78	6.47	1.07	1.98	
F41	0.52	0.12	1.33	-0.42	0.55	0.42	7.27	5.11	1.30	-2.99	-28.29	-2.58	-9.38	3.87	-53.29	-44.03	-21.38	-1.52	-1.39	0.11
F42	0.59	0.09	3.01	0.00	0.29	1.51	5.11	1.10	6.17	-0.49	-0.47	-0.15	-3.96	1.13	-0.25	-26.99	-5.01	0.07	0.21	0.03
F51	-0.29		-0.10		0.00	-0.03	-0.13	0.00	-0.01	-0.01	-0.06	-0.03	-0.03	-0.21	-0.12	-0.51	-0.89	-0.05	-0.07	-0.02
F52	0.01	0.01	1.17	0.00	0.03	0.29	0.54	0.11	0.06	-0.22	0.00	0.00	-0.03	0.06	0.01	-0.14	-0.01	0.00	0.01	
F53	0.00		0.05	0.00	0.01	0.05	0.06	0.02	0.03		0.00	-0.01	-0.04	0.02	-0.08	-2.82	-0.03	-0.02	-0.02	
F54	0.06		-1.87		0.00	-0.09	-0.59	0.02	0.92	-0.15	-0.07	-0.07	-0.19	-0.01	-0.73	-9.78	-4.58	-0.27	-0.30	0.00
F61	0.05	-0.01	-0.79	-0.03	-0.02	-0.37	-0.81	-0.10	-0.13	-0.45	-2.22	-1.65	-1.92	-0.54	-5.43	-195.76	-180.33	-0.99	-2.50	-0.27
F62	0.04	0.00	-0.08	-0.02	0.00	-0.04	0.02	0.95	0.52	-0.09	-0.19	-0.13	-0.18	0.23	-0.93	-6.98	-3.00	-1.15	-12.47	0.19
F71	-0.05	-0.02	-3.92	-0.11	-0.08	-0.57	-147.37	-0.38	-3.66	-2.19	-4.97	-0.38	-4.14	-1.07	-0.97	-3.14	-2.04	-0.64	-1.27	-0.03
F72	0.01	-0.01	-1.05	-0.49	-0.05	-0.15	-1.30	-0.25	-0.09	-5.61	-5.53	-0.25	-0.94	-1.58	-2.02	-1.41	-2.27	-0.32	-0.28	
F81	-0.12	-0.03	-39.17	-0.12	-0.54	-0.56	-2.29	-0.19	-0.46	-0.44	-0.34	-0.21	-0.80	-0.39	-0.65	-1.40	-1.49	-0.10	-0.49	-0.02
F82	-0.01	-0.01	-0.54	-0.01	-0.08	-0.21	-0.40	-1.56	-0.04	-0.07	-0.02	-0.01	-0.05	-0.09	-0.37	-0.50	-0.28	-0.02	-0.03	
F91	-1.91	-0.01	-14.42	-0.02	-0.45	-1.39	-2.88	-0.27	-0.68	-0.20	-0.11	-0.08	-0.40	-1.29	-0.41	-1.83	-1.57	-0.18	-0.35	-0.04
F92	-0.17	-0.05	-5.93	-0.10	-0.86	-1.48	-15.73	-4.44	-29.36	-2.07	-2.62	-0.91	-1.36	-12.91	-11.38	-71.69	-36.47	-3.88	-4.51	-0.78

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
M11	1.18	1.48	76.57	1.46	3.11	25.00	96.65	23.78	1.73	2.80	16.14	0.44	1.85	3.78	13.84	-1.94	5.24	0.57	2.32	0.20
M12	3.42	0.01	3.08	0.15	2.39	1.74	10.24	1.37	12.89	0.55	0.31	1.54	0.75	11.08	5.28	-2.19	1.85	3.56	0.68	0.19
M21	0.68	0.70	54.53	2.09	3.90	17.65	5.85	3.53	0.60	19.50	7.15	0.29	5.15	2.31	11.70	-9.11	3.12	0.43	1.73	
M22	0.07		2.19	0.01	0.05	0.32	10.64	0.21	0.26	0.25	0.53	0.02	1.43	0.37	3.02	-0.76	42.91	0.15	0.28	
M23	0.11	0.04	0.88	0.03	0.17	0.43	0.50	0.31	4.65	0.43	0.08	0.07	0.57	0.13	13.49	165.30	1.37	1.29	0.94	0.08
M24	0.26	0.18	15.42	0.77	1.56	19.20	5.59	2.28	0.65	2.82	3.70	1.65	9.58	2.21	15.70	-4.71	5.92	1.12	12.17	0.08
M31	0.29	0.23	15.31	0.21	0.97	2.45	2.27	1.25	0.30	-1.42	-0.03	0.01	-0.88	1.24	0.87	-16.21	-0.13	0.07	0.34	
M32			1.92	0.01	0.03	0.27	0.84	0.05	0.12	0.02	0.10	0.86	0.06	0.21	1.54	-1.33	4.33	0.09	1.71	
M33	0.08	0.02	2.27	0.01	0.05	0.27	0.77	2.46	0.16	0.04	0.10	0.01	0.06	1.90	32.44	-0.12	0.16	0.07	0.04	
M34	0.01	0.01	4.94	0.03	0.08	0.44	1.87	0.25	0.45	2.03	0.15	0.02	0.94	0.48	1.31	-3.28	0.23	3.57	0.34	
M35	0.90	0.40	36.59	0.86	3.12	8.37	39.35	11.88	1.98	2.14	14.10	1.45	2.77	7.00	15.57	-5.45	2.33	1.03	1.40	
M41	0.28	0.05	-0.17	-0.31	0.35	-0.14	2.47	3.82	0.47	-1.89	-18.19	-1.55	-3.59	4.10	-66.84	-10.29	-5.57	-1.00	-0.74	0.02
M42	0.01	0.00	0.22	0.00	0.02	0.08	0.58	0.16	0.28	-0.21	-0.07	-0.01	-0.27	0.12	-0.20	-1.70	-0.39	-0.02	-0.01	0.04
M51	-2.09	-0.03	-1.08	-0.15	-0.08	-1.31	-0.68	-0.07	-0.18	-0.11	-0.12	-0.32	-0.25	-4.58	-2.34	-3.11	-0.65	-3.15	-0.43	-0.12
M52	1.14	0.56	30.98	-0.61	1.18	10.06	19.24	5.49	0.57	-6.12	-0.29	-0.10	-1.14	2.11	-0.93	-4.05	-0.88	-0.09	-0.19	
M53	0.34	0.00	-4.60	-0.38	-0.02	-22.51	-0.12	0.16	0.09	-0.25	-0.25	-0.38	-0.72	0.01	-1.58	-14.93	-1.57	-0.27	-0.21	0.04
M54	0.08	0.00	-13.12	-0.04	-0.02	-0.72	-2.24	0.02	0.42	-0.98	-0.15	-0.07	-0.64	-0.06	-0.82	-1.67	-2.27	-0.51	-0.66	0.00
M61	0.00	-0.01	-0.53	-0.01	-0.03	-0.19	-0.31	-0.11	-0.08	-0.15	-0.41	-0.43	-0.43	-0.32	-2.55	-16.58	-33.64	-0.34	-1.47	-0.20
M62	0.06	0.00	-0.01	-0.01	0.01	-0.02	0.13	1.02	0.36	-0.09	-0.07	-0.25	-0.09	0.60	-1.10	-11.72	-0.74	-1.37	-1.35	0.02
M71	-0.08	-0.01	-4.22	-1.02	-0.15	-1.20	-80.24	-0.32	-1.13	-2.80	-4.24	-0.19	-1.22	-1.48	-0.93	-1.89	-0.67	-0.55	-0.36	
M72	0.00	0.00	-0.79	-0.25	-0.06	-0.16	-1.10	-0.28	-0.06	-7.30	-3.94	-0.15	-0.90	-2.50	-1.36	-0.58	-1.01	-0.16	-0.20	
M81	-0.23	-1.59	-128.90	-1.36	-3.32	-15.45	-7.84	-1.63	-0.69	-2.08	-0.53	-1.05	-3.23	-1.53	-6.43	-3.72	-3.41	-0.63	-0.93	-0.02
M82	-0.14	-2.07	-24.94	-0.58	-4.45	-16.35	-19.30	-30.74	-0.58	-0.83	-0.46	-0.25	-1.28	-3.01	-7.79	-8.52	-5.37	-0.72	-0.96	-0.01
M91	-7.01	-0.43	-43.46	-0.46	-2.33	-32.97	-7.33	-1.47	-0.88	-0.54	-0.39	-0.41	-0.99	-4.84	-4.95	-2.18	-1.38	-0.76	-1.10	
M92	-0.46	-0.17	-30.36	-0.59	-9.41	-5.84	-48.17	-36.31	-21.47	-3.58	-3.40	-0.74	-1.93	-28.93	-23.35	-14.16	-19.08	-3.77	-3.41	-0.14

Table 6. Initial measure of employment income inequality by gender and region

Region	Gender	Population share nj	Income share zj	Log(zj/nj)	Contribution to Theil index
Belfast	Female	7.4	6.9	-0.073	-0.505
	Male	7.8	8.0	0.021	0.170
Outer Belfast	Female	10.8	10.9	0.001	0.012
	Male	11.6	13.3	0.138	1.832
East of Northern Ireland	Female	11.7	11.4	-0.026	-0.299
	Male	13.2	13.9	0.054	0.755
North of Northern Ireland	Female	6.9	6.3	-0.094	-0.589
	Male	8.0	7.6	-0.060	-0.458
West and South of Northern Ireland	Female	10.1	9.9	-0.025	-0.251
	Male	12.3	11.9	-0.038	-0.446
Tbetween					*0.220*

Table 7: Inequality indicator after production growth of £100 million by region and gender

	Belfast		Outer Belfast		East of NI		North of NI		West and South of NI		Theil	%Change
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Tbtwn	Ts-T/T
Agriculture, forestry and fishing	-0.581	0.042	-0.078	1.597	-0.110	0.724	-0.584	-0.468	-0.014	-0.341	0.186	-15%
Mining and quarrying	-0.595	0.164	-0.138	1.617	-0.212	0.543	-0.567	-0.511	0.087	-0.204	0.184	-16%
Manufacturing	-0.635	-0.031	-0.098	1.572	-0.024	0.695	-0.581	-0.499	0.164	-0.372	0.191	-13%
Electricity, gas, steam etc...	-0.568	0.123	0.036	1.721	0.058	0.699	-0.603	-0.498	-0.255	-0.502	0.211	-4%
Water supply; sewerage, etc...	-0.344	0.066	-0.092	1.574	-0.133	0.681	-0.557	-0.505	-0.123	-0.399	0.168	-24%
Construction	-0.586	-0.051	-0.115	1.472	-0.130	0.590	-0.519	-0.431	0.227	-0.295	0.161	-27%
Wholesale and retail trade; repair of etc...	-0.549	0.050	0.009	1.610	-0.030	0.589	-0.556	-0.518	0.061	-0.482	0.184	-16%
Transportation and storage	-0.485	0.091	0.023	1.706	0.036	0.651	-0.543	-0.593	-0.044	-0.635	0.205	-7%
Accommodation and food services	-0.429	0.289	-0.037	1.486	-0.031	0.622	-0.463	-0.457	-0.133	-0.680	0.167	-24%
Information and communication	-0.166	0.563	0.178	1.601	-0.183	0.338	-0.551	-0.447	-0.361	-0.779	0.193	-12%
Financial and insurance	-0.290	0.318	0.186	1.674	-0.227	0.291	-0.493	-0.485	-0.160	-0.637	0.176	-20%
Real estate activities	-0.439	0.201	0.054	1.697	-0.238	0.589	-0.519	-0.441	-0.174	-0.545	0.186	-16%
Professional, scientific and technical	-0.386	0.252	-0.021	1.572	-0.027	0.558	-0.592	-0.551	-0.045	-0.579	0.181	-18%
Administrative and support service	-0.291	0.234	0.001	1.754	0.000	0.498	-0.407	-0.502	-0.280	-0.813	0.194	-12%
Public administration and defence...	-0.337	0.079	0.206	1.797	0.026	0.525	-0.589	-0.565	-0.151	-0.776	0.215	-2%
Education	-0.164	0.566	-0.143	1.450	-0.025	0.091	-0.431	-0.299	0.047	-0.933	0.160	-27%
Human health and social work	-0.438	0.323	0.048	1.437	0.025	0.438	-0.499	-0.438	-0.018	-0.718	0.160	-27%
Arts, entertainment and recreation	-0.340	0.228	0.078	1.597	-0.176	0.538	-0.523	-0.488	-0.136	-0.606	0.172	-22%
Other service activities	-0.204	0.259	0.208	1.430	-0.161	0.320	-0.480	-0.403	-0.209	-0.623	0.139	-37%

Table 8. Regional 'winners' and 'losers' under different industry growth patterns

	Belfast	Outer Belfast	East	North	West and South	Tbetween
Original Contribution	**-0.34**	**1.84**	**0.46**	**-1.05**	**-0.70**	*0.22*
Other service activities	0.06	1.64	0.16	-0.88	-0.83	*0.14*
Human health and social work activities	-0.11	1.48	0.46	-0.94	-0.74	*0.16*
Education	0.40	1.31	0.07	-0.73	-0.89	*0.16*
Construction	-0.64	1.36	0.46	-0.95	-0.07	*0.16*
Accommodation and food service activities	-0.14	1.45	0.59	-0.92	-0.81	*0.17*
Water supply; sewerage, waste management ...	-0.28	1.48	0.55	-1.06	-0.52	*0.17*
Arts, entertainment and recreation	-0.11	1.68	0.36	-1.01	-0.74	*0.17*
Financial and insurance activities	0.03	1.86	0.06	-0.98	-0.80	*0.18*
Professional, scientific and technical activities	-0.13	1.55	0.53	-1.14	-0.62	*0.18*
Wholesale and retail trade; repair of motor ...	-0.50	1.62	0.56	-1.07	-0.42	*0.18*
Mining and quarrying	-0.43	1.48	0.33	-1.08	-0.12	*0.18*
Real estate activities	-0.24	1.75	0.35	-0.96	-0.72	*0.19*
Agriculture, forestry and fishing	-0.54	1.52	0.61	-1.05	-0.36	*0.19*
Manufacturing	-0.67	1.47	0.67	-1.08	-0.21	*0.19*
Information and communication	0.40	1.78	0.16	-1.00	-1.14	*0.19*
Administrative and support service activities	-0.06	1.76	0.50	-0.91	-1.09	*0.19*
Transportation and storage	-0.39	1.73	0.69	-1.14	-0.68	*0.20*
Electricity, gas, steam and air conditioning supply	-0.45	1.76	0.76	-1.10	-0.76	*0.21*
Public administration and defence; compulsory social security	-0.26	2.00	0.55	-1.15	-0.93	*0.22*

Table 9: Ranking of sectors in terms of impact on gender employment income ineqaulity measured by Theil's index

Tfemale	Rank	Industry with production increase
-0.716	1	Education
-0.845	2	Public administration and defence; compulsory social security
-0.845	3	Other service activities
-0.883	4	Human health and social work activities
-0.978	5	Administrative and support service activities
-0.985	6	Financial and insurance activities
-1.014	7	Transportation and storage
-1.065	8	Wholesale and retail trade; repair of motor vehicles and motorcycles
-1.071	9	Professional, scientific and technical activities
-1.083	10	Information and communication
-1.093	11	Accommodation and food service activities
-1.098	12	Arts, entertainment and recreation
-1.123	13	Construction
-1.174	14	Manufacturing
-1.250	15	Water supply; sewerage, waste management and remediation activities
-1.316	16	Real estate activities
-1.332	17	Electricity, gas, steam and air conditioning supply
-1.367	18	Agriculture, forestry and fishing
-1.425	19	Mining and quarrying

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