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**Article**

## Incidence, salience, and spillovers: The direct and indirect effects of tax credits on wages

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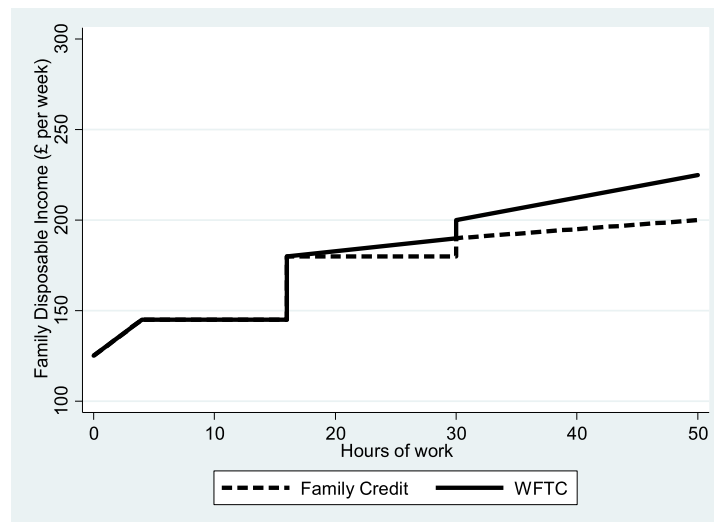
## Supplement to “Incidence, salience, and spillovers: The direct and indirect effects of tax credits on wages”

(*Quantitative Economics*, Vol. 10, No. 1, January 2019, 239–273)

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### DETAILED NOTES FOR TABLE 2

*Age* (21–24) takes value 1 if the individual is aged 21 to 24 and 0 otherwise (omitted). *Age* (25–34) takes value 1 if the individual is aged 25 to 34 and 0 otherwise. *Age* (35–44) takes value 1 if the individual is aged 35 to 44 and 0 otherwise. *Age* (45–54) takes value 1 if the individual is aged 45 to 54 and 0 otherwise. *Age* (55–60) takes value 1 if the individual is aged 55 to 60 and 0 otherwise. *White* takes value 1 if the individual is white and 0 otherwise (omitted). *Black* takes value 1 if the individual is black and 0 otherwise. *Asian* takes value 1 if the individual is Asian and 0 otherwise. *Other Ethnic* takes value 1 if the individual is of an ethnicity other than black, white or Asian and 0 otherwise. *Single* takes



NOTES: The figure presents the change in the budget constraint of a single parent with one child (aged under 11) with an hourly wage of £4.39 (median for single parents) from Family Credit in April 1999 to WFTC in October 1999. It also assumes a rent of £41.10 per week (median for social renters with children) and no childcare costs. This figure is taken from Dilnot and McCrae (1999).

FIGURE A.1. Budget constraint for single parents.

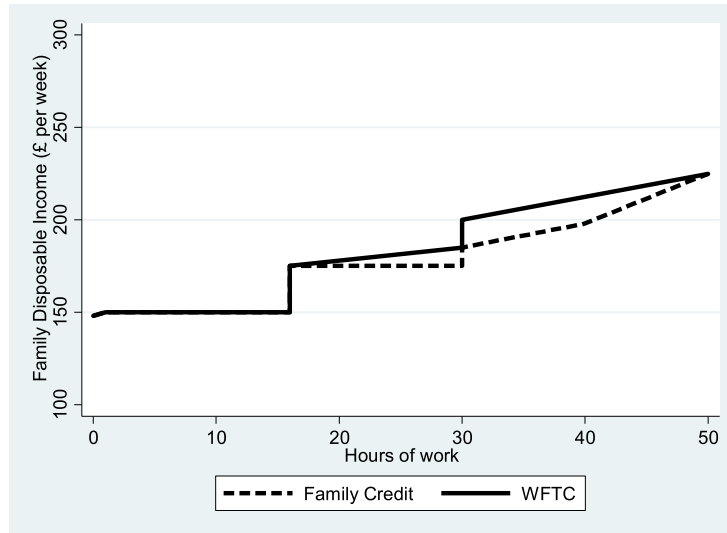
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TABLE A.1. Parameters of family credit and WFTC (£ per week).

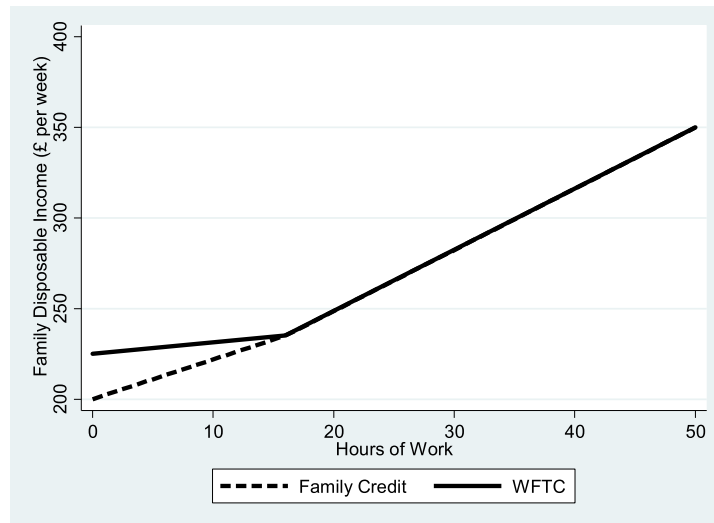
	April 1999 (FC)	October 1999 (WFTC)	June 2000 (WFTC)	June 2001 (WFTC)	June 2002 (WFTC)
<b>Basic credit (£)</b>	49.80	52.30	53.15	54.00	62.50
<b>Child credit (£):</b>					
under 11 years old	15.15	19.85	25.60	26.00	26.45
11 to 16 years old	20.90	20.90	25.60	26.00	26.45
over 16 years old	25.95	25.95	26.35	26.75	27.2
<b>30-hour premium (£)</b>	11.05	11.05	11.25	11.45	11.65
<b>Threshold (£)</b>	80.65	90.00	91.45	92.90	94.50
<b>Taper (%)</b>	70%	55%	55%	55%	55%
<b>Help with childcare</b>	Childcare expenses up to £60 (£100 for 1 (more than 1) child under 12 disregarded when calculating income	70% of childcare expenses up to 100 (150) for 1 (more than 1) child under 15	70% of childcare expenses up to 100 (150) for 1 (more than 1) child under 15	70% of childcare expenses up to 100 (150) for 1 (more than 1) child under 15	70% of childcare expenses up to 135 (200) for 1 (more than 1) child under 15

Note: The table shows the main parameters of Family Credit and WFTC. *Basic credit* is the basic amount of tax credit given to eligible household. *Child credit* are the supplements per child in the household, which vary depending on the age of the child. *30-hour premium* is the supplement given if the individual works 30 hours or more. *Threshold* is the weekly earnings threshold above which the tax credit is reduced. *Taper* is the rate at which the tax credit is reduced once total earnings after income tax and National Insurance are above the threshold.



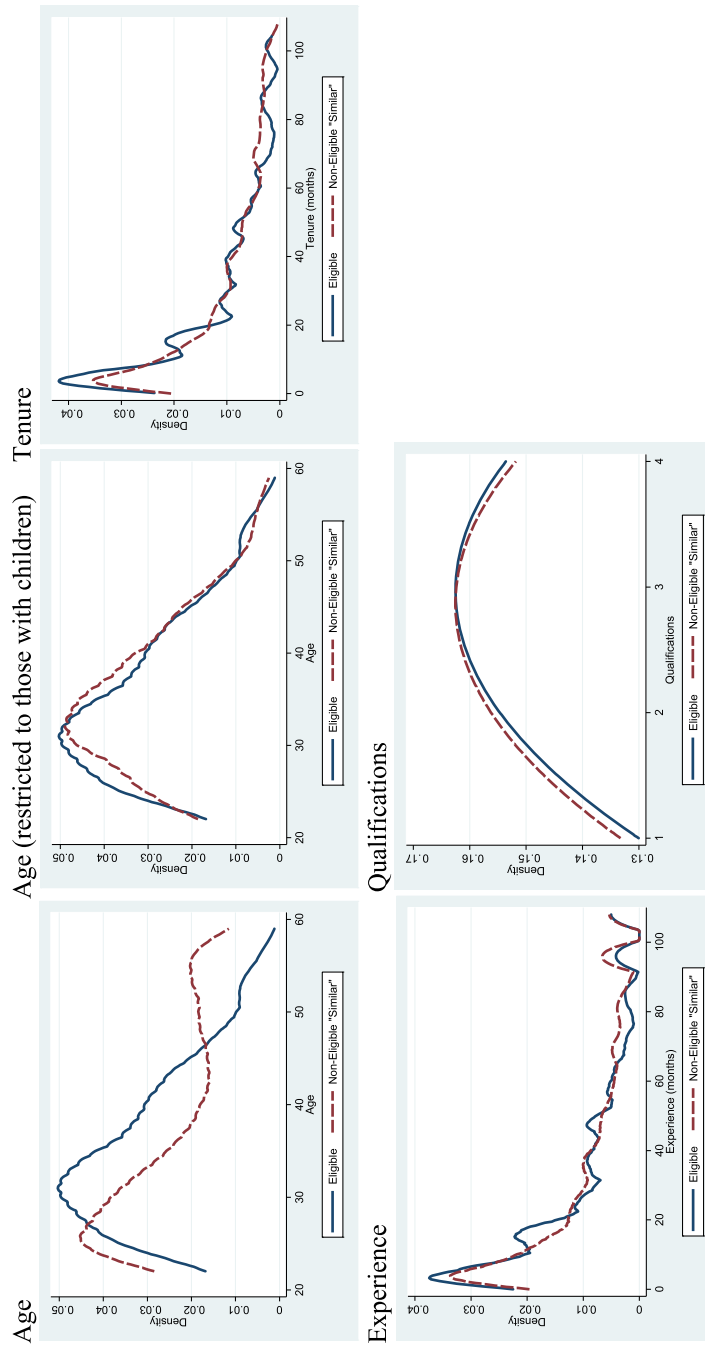
NOTES: The figure presents the change in the budget constraint of a man in a couple whose spouse is not working from Family Credit in April 1999 to WFTC in October 1999. It assumes they have one child (aged under 11) with an hourly wage of £5.87 (25<sup>th</sup> percentile for men in couples with children). It also assumes a rent of £41.10 per week (median for social renters with children) and no childcare costs. This figure is taken from Dilnot and McCrae (1999).

FIGURE A.2. Budget constraint for man in couple.



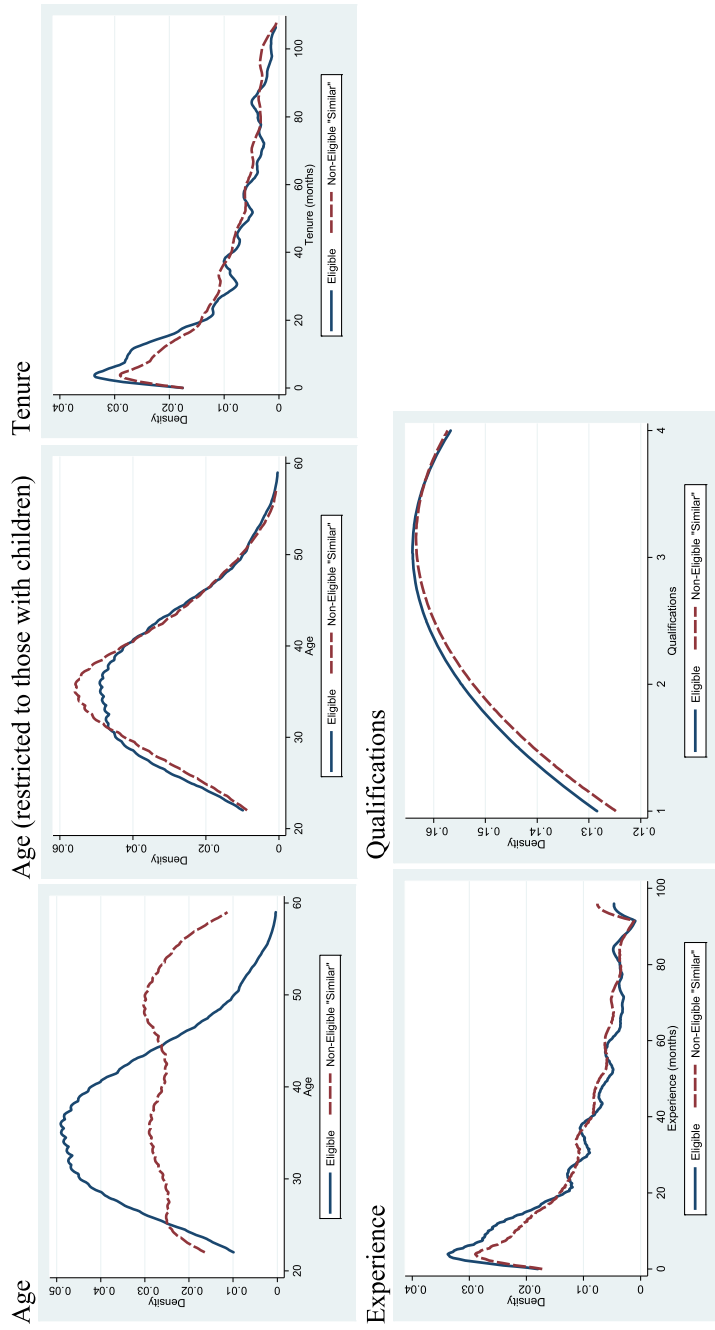
NOTES: The figure presents the change in the budget constraint of a woman in a couple who is working and whose spouse is working from Family Credit in April 1999 to WFTC in October 1999. It assumes they have one child (aged under 11), she has an hourly wage of £3.72 (25<sup>th</sup> percentile for women in couples with children) and the spouse has an hourly wage of £5.87 and works 40 hours per week. It also assumes a rent of £41.10 per week (median for social renters with children) and no childcare costs. This figure is taken from Dilnot and McCrae (1999).

FIGURE A.3. Budget constraint for woman in couple.



NOTES: “Eligible” are workers eligible for WFTC. “Noneligible (“Similar”)) are workers not eligible for WFTC but are matched based on their predicted wage,  $\hat{W}^c$ . The figures compare the characteristic of eligible and noneligible at  $5\% \leq \hat{W}^c \leq 10\%$  of wage distribution. *Age* (restricted to those with children) is a continuous measure of age in years. *Age* (restricted to those with children) is a continuous measure of age in years but the sample is restricted to those with children under 16 years of age. *Tenure* and *Experience* are measured in months. *Qualifications* takes value 1 if individual has a university degree; 2 if individual has stayed in school until 18 years and has A-Level or equivalent qualifications; 3 if individual has stayed in school until 16 years and has GCSE or equivalent qualifications; 4 if individual has no qualifications.

FIGURE A.4. Kernel density of characteristics for men—matched (pre-WFTC).



NOTES: “Eligible” are workers eligible for WFIC. “Noneligible (“Similar”)” are workers not eligible for WFIC but are matched based on their predicted wage,  $\hat{W}^c$ . The figures compare the characteristic of eligible and noneligible at  $5\% \leq \hat{W}^c \leq 10\%$  of wage distribution. *Age* is a continuous measure of age in years. *Age (restricted to those with children)* is a continuous measure of age in years but the sample is restricted to those with children under 16 years of age. *Tenure* and *Experience* are measured in months. *Qualifications* takes value 1 if individual has a university degree; 2 if individual has stayed in school until 18 years and has A-Level or equivalent qualifications; 3 if individual has stayed in school until 16 years and has GCSE or equivalent qualifications; 4 if individual has no qualifications.

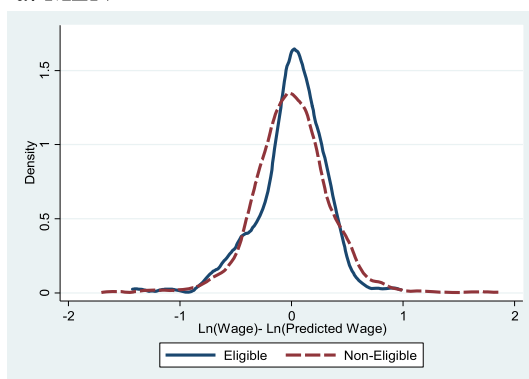
FIGURE A.5. Kernel density of characteristics for women—matched (pre-WFIC).

TABLE A.2. Effect of WFTC on Ln(wages) using Tobit.

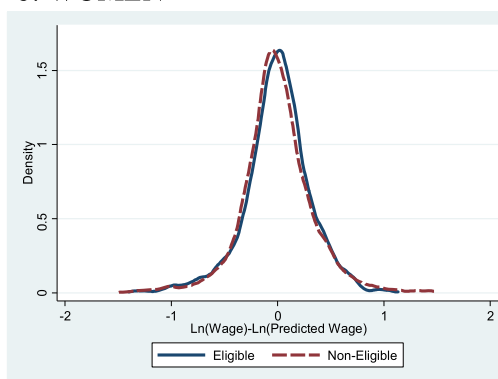
	Ln (Wages)					
	Men			Women		
	[1] ALL	[2] Single	[3] Married	[4] ALL	[5] Single	[6] Married
Predicted wage	0.985*** [0.00399]	0.940*** [0.00778]	1.019*** [0.00587]	1.004*** [0.00333]	0.955*** [0.00631]	1.031*** [0.00453]
WFTC	-0.170*** [0.0439]	-0.115 [0.0724]	-0.174*** [0.0501]	0.0521*** [0.0103]	0.0377*** [0.0133]	0.0535*** [0.0142]
FC generosity	0.0386 [0.108]	0.24 [0.149]	-0.088 [0.136]	-0.0207 [0.0369]	-0.0342 [0.0505]	-0.0229 [0.0490]
Spillover (industry)	-0.0587*** [0.0142]	-0.162*** [0.0240]	-0.0125 [0.0184]	-0.148*** [0.0141]	-0.107*** [0.0192]	-0.174*** [0.0180]
Spillover (education)	-0.0881*** [0.0282]	0.290*** [0.0551]	-0.240*** [0.0437]	-0.0220* [0.0120]	0.106*** [0.0193]	-0.0944*** [0.0137]
Constant	-0.0176 [0.0112]	0.0719*** [0.0214]	-0.0974*** [0.0168]	-0.0528*** [0.00855]	0.0227 [0.0155]	-0.0928*** [0.0124]
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89,994	30,261	59,733	91,761	32,559	59,202

*Note:* The coefficients and standard errors (in parenthesis) are reported. \*\*\* represents significance at the 1% level, \*\* represents significance at the 5% level, and \* represents significance at the 10% level. Standard errors are bootstrapped with 200 replications. We include a full set of time dummies (each quarter of each year) in all the regressions. The regression is based on equation (3), where *Predicted wage* ( $\hat{W}^c$ ) is the predicted wage, which has been corrected for changes in average earnings and general inflation using quarterly indexes,  $t$ . *WFTC* ( $TC^d$ ), calculated as the weekly WFTC divided by households' weekly (predicted) income, measures the direct effect of WFTC on eligible workers. *FC generosity* ( $\Delta TC$ ) is the change in households' entitlement from Family Credit to WFTC divided by households' weekly (predicted) income. *Spillover* ( $TC^s$ ) is the average WFTC (weighted by the fraction of eligible) in each industry group (*Industry*) and education group (*Education*), respectively.

a: MEN



b: WOMEN



NOTES: The plots show the estimates of the residual wage difference of the predicted wage (i.e., the counterfactual wage) from the actual wage separately for eligible (“Eligible”) and noneligible (“noneligible”) workers in 1998, before the introduction of WFTC.

FIGURE A.6. Kernel density of residual wage in pre-WFTC period.

TABLE A.3. Effect of WFTC eligibility on Ln (wages).

	Ln (Wage)			
	Men		Women	
	OLS [1]	CLAD [2]	OLS [3]	CLAD [4]
Predicted wage	0.977*** [0.00404]	0.973*** [0.00400]	0.983*** [0.00384]	1.018*** [0.00374]
WFTC eligibility	-0.163*** [0.00671]	-0.149*** [0.00911]	0.00741 [0.00508]	-0.00654 [0.00511]
Spillover (industry)	-0.0547*** [0.00982]	-0.0567*** [0.0119]	-0.0796*** [0.00752]	-0.0384*** [0.00857]
Spillover (education)	-0.0527*** [0.0102]	-0.0628*** [0.0107]	-0.0358*** [0.00850]	-0.0197** [0.00860]
Constant	0.0101 [0.0123]	0.0124 [0.0121]	-0.00351 [0.0100]	-0.108*** [0.0103]
Time dummies	Yes	Yes	Yes	Yes
Observations	89,994	89,758	91,761	90,545

*Note:* The coefficients and standard errors (in parenthesis) are reported. \*\*\* represents significance at the 1% level, \*\* represents significance at the 5% level, and \* represents significance at the 10% level. Standard errors are bootstrapped with 200 replications. We include a full set of time dummies (each quarter of each year) in all the regressions. *Predicted wage* ( $\hat{W}^c$ ) is the predicted wage, which has been corrected for changes in average earnings and general inflation using quarterly indexes,  $t$ . *WFTC eligibility*, is a dummy variable that takes value 1 if the household receives some positive amount of WFTC and zero otherwise. *Spillover* ( $TC^s$ ) is the average WFTC (weighted by the fraction of eligible) in each industry group (*industry*) and education group (*education*), respectively.

value 1 when the individual is single and 0 otherwise (omitted). *Married* takes value 1 when the individual is married and 0 otherwise. *Divorced/Widowed* takes value 1 when the individual is divorced or widowed and 0 otherwise. *University* takes value 1 if individual has a university degree and 0 otherwise (omitted). *High School\_18* takes value 1 if individual has stayed in school until 18 years and has A-Level or equivalent qualifications and 0 otherwise. *High School\_16* takes value 1 if individual has stayed in school until 16 years and has GCSE or equivalent qualifications and 0 otherwise. *No Qualifications* takes value 1 if individual has no qualifications and 0 otherwise. *North East* (omitted), *Greater Manchester*, *Merseyside*, *Rest of North West*, *South Yorkshire*, *West Yorkshire*, *Rest of Yorkshire*, *East Midlands*, *West Midlands*, *Rest of West Midlands*, *Eastern*, *Inner London*, *Outer London*, *South East*, *South West*, *Wales*, *Strathclyde*, *Rest of Scotland*, and *Northern Ireland* represent the different regions of the UK. Each region is included separately as a categorical variable. *Full-time* takes value 1 if the individual works more than 30 hours and 0 otherwise (omitted). *Part-time* takes value 1 if the individual works less than 30 hours and 0 otherwise. *Private Sector* takes value 1 if the individual works in the private sector and 0 otherwise (omitted). *Public Sector* takes value 1 if the individual works in the public sector and 0 otherwise. *No. Children* (0) takes value 1 if the individual does not have any children and 0 otherwise (omitted). *No. Children* (1) takes value 1 if the individual has one child and 0 otherwise. *No. Children* (2) takes value 1 if the individual has two children and 0 otherwise. *No. Children* (3) takes value 1 if the individual has 3 children and 0 otherwise. *No. Children* (4) takes value 1 if the individual has 4 children and 0 otherwise. *Tenure* and *Experience* are measured in months. Major occupation



TABLE A.4. Additional robustness checks.

	Ln (Wage)									
	Men [1]	Women [2]	Men [3]	Women [4]	Men [5]	Women [6]	Men [7]	Women [8]	Men [9]	Women [10]
Predicted wage	0.972*** [0.00454]	1.014*** [0.00370]	0.976*** [0.00556]	1.015*** [0.00410]	0.958*** [0.00459]	0.979*** [0.00365]	0.976*** [0.00463]	1.024*** [0.00382]	0.966*** [0.00801]	1.025*** [0.00593]
WFTC rate	-0.246*** [0.0518]	-0.0188* [0.0107]	-0.309*** [0.0648]	-0.0053 [0.0106]	-0.247*** [0.0508]	0.0183* [0.0105]	-0.223* [0.120]	0.0279 [0.0256]	-0.253*** [0.0507]	0.0000554 [0.0107]
FC Generosity	0.00234 [0.118]	0.0579 [0.0387]	0.14 [0.143]	0.043 [0.0400]	0.185 [0.114]	0.035 [0.0383]	-0.161 [0.672]	-0.186 [0.131]	0.0888 [0.116]	0.0621 [0.0397]
Spillover (industry)	-0.0448*** [0.0171]	-0.0863*** [0.0132]	-0.0972** [0.0411]	0.00685 [0.0135]	-0.0522*** [0.0169]	-0.0680*** [0.0120]	-0.0592*** [0.0172]	-0.0936*** [0.0139]	-0.0473* [0.0271]	-0.107*** [0.0204]
Spillover (education)	-0.131*** [0.0352]	-0.0388*** [0.0121]	-0.0981*** [0.0199]	-0.229*** [0.0144]	-0.184*** [0.0350]	-0.0709*** [0.0130]	-0.133*** [0.0355]	-0.0227* [0.0128]	-0.437*** [0.0584]	-0.150*** [0.0193]
Constant	0.00598 [0.0134]	-0.0928*** [0.00996]	-0.027 [0.0165]	-0.0698*** [0.0109]	0.0417*** [0.0135]	-0.0166* [0.00982]	-0.00588 [0.0137]	-0.115*** [0.0104]	0.0589** [0.0240]	-0.0994*** [0.0161]
Continuous hours measure	Yes	Yes	No	No	No	No	No	No	No	No
Exclude proxy respondent	No	No	Yes	Yes	No	No	No	No	No	No
Exclude report $\leq$ NMW	No	No	No	No	Yes	Yes	No	No	No	No
Change from FC to WFTC $\leq$ £10	No	No	No	No	No	No	Yes	Yes	No	No
Presence of young children	No	No	No	No	No	No	No	No	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89,666	90,591	64,273	67,971	88,511	87,189	87,995	81,850	36,714	40,082

Note: The coefficients and standard errors (in parenthesis) are reported. \*\*\* represents significance at the 1% level, \*\* represents significance at the 5% level, and \* represents significance at the 10% level. Standard errors are bootstrapped with 200 replications. We include a full set of time dummies (each quarter of each year) in all the regressions. *Continuous hours measure* uses the actual hours of work variable when predicting the wage rather than a discrete measure of bracketed hours. *Exclude Proxy Respondent* excludes responses by proxy respondents. *Exclude report  $\leq$  NMW* excludes individuals who report a wage at or below the national minimum wage (NMW) after the introduction of the NMW. *Change from FC to WFTC  $\leq$  £10* restricts the analysis to those who were previously eligible for Family Credit and are now eligible for WFTC, but for whom the change in the amount they receive is less than £10 extra per week. *Presence of children* restricts the analysis to those with children aged 16 or under.

TABLE A.5. Accounting for differential trend.

	Ln (Wages)			
	Men [1]	Women [2]	Men [3]	Women [4]
Predicted wage	0.969*** [0.00455]	1.019*** [0.00368]	0.967*** [0.00455]	1.019*** [0.00356]
WFTC	-0.261*** [0.0484]	0.0039 [0.0104]	-0.269*** [0.0393]	0.00555 [0.00990]
FC Generosity	0.159 [0.109]	0.0484 [0.0383]	0.238*** [0.0846]	0.0484 [0.0369]
Spillover (industry)	-0.0619*** [0.0170]	-0.105*** [0.0132]	-0.0960*** [0.0169]	-0.176*** [0.0127]
Spillover (education)	-0.167*** [0.0351]	-0.0228* [0.0121]	-0.186*** [0.0349]	-0.0568*** [0.0116]
Constant	0.0126 [0.0135]	-0.101*** [0.00991]	0.213*** [0.0127]	-0.0498*** [0.00937]
RegionXIndustry	Yes	Yes	No	No
TrendXIndustry	No	No	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	89,712	90,537	89,712	90,537

*Note:* The coefficients and standard errors (in parenthesis) are reported. \*\*\* represents significance at the 1% level, \*\* represents significance at the 5% level and \* represents significance at the 10% level. Standard errors are bootstrapped with 200 replications. We include a full set of time dummies (each quarter of each year) in all the regressions. *RegionXIndustry* account for local labor market trends by interacting region with industry when constructing the counterfactual wage. *TrendXIndustry* account for differential trends in industry growth by interacting time trend with industry when constructing the counterfactual wage.

groups are given by: *Manager* takes value 1 if the individual is manager or administrator and 0 otherwise. *Professional* takes value 1 if the individual works in a professional occupation and 0 otherwise. *Asso. Prof.* takes value 1 if the individual works in an associate prof and tech occupation and 0 otherwise. *Clerical* takes value 1 if the individual works in a clerical or secretarial occupation and 0 otherwise. *Crafts* take value 1 if the individual works in a craft or related occupation and 0 otherwise. *Personal* takes value 1 if the individual works in a personal or protective occupation and 0 otherwise. *Sales* takes value 1 if the individual works in a sales occupation and 0 otherwise. *Plant /Mach.* takes value 1 if the individual works in plant and machine operatives and 0 otherwise. *Size Firm (1–10)* takes value 1 if the number of employees at the workplace is between 1 and 10 and 0 otherwise. *Size Firm (11–19)* takes value 1 if the number of employees at the workplace is between 11 and 19 and 0 otherwise. *Size Firm (20–24)* takes value 1 if the number of employees at the workplace is between 20 and 24 and 0 otherwise. *Size Firm (25–49)* takes value 1 if the number of employees at the workplace is between 25 and 49 and 0 otherwise (omitted). *Size Firm (50+)* takes value 1 if the number of employees at the workplace is between 50 and 249 and 0 otherwise. Major industry sectors in main job are given by: *Agriculture and Fishing* (omitted); *Energy and Water*; *Manufacturing*; *Construction*; *Distribution, Hotels and Restaurants*; *Transport and Communication*; *Banking, Finance and Insurance*; *Public Admin*; *Education and Health*, *Other*

*services*; and *Workplace outside UK*. Each industry is included separately as categorical variables.

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Co-editor Petra E. Todd handled this manuscript.

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