

Differences-in-Differences Models and Extensions

Public Policy Evaluations

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Introduction (1)

Look at two papers:

- one that evaluates the effects of a tax credit in the UK: Francesconi and van der Klaauw (2007, *Journal of Human Resources*)
- and the other that uses the same reform to understand the path of labor supply adjustment: Blundell, Brewer and Francesconi (2008, *Journal of Labor Economics*)

UK Tax Credit — WFTC (1)

Francesconi and van der Klaauw (2007, *Journal of Human Resources*)

What?

- Evaluate the effect of the Working Families' Tax Credit (WFTC) on single mothers, using data from the first eleven waves of the British Household Panel Survey (BHPS), covering the period 1991-2001

Why?

- Up to April 2003, WFTC was the main in-work benefit in the UK
- WFTC had a crucial part in the Government's antipoverty strategy (along with National Minimum Wage and New Deal schemes):
 - Rapid growth of single-parent households
 - Stable or declining trends of labour market participation of single mothers (up to mid 1990s)
 - Increasing child poverty rates (from 10 percent in 1970 to 27 percent in 1992)

Methodology and contributions:

1. **DDD** (generalization of the DD method)
2. Employment outcomes and a wide range of other behavioural outcomes (e.g., earnings, WFTC receipt, childcare usage and expenditures, marriage, subsequent fertility)
3. Effort to identify **which parameters** account for the observed changes in behaviour

Institutional settings (in brief)

- WFTC was introduced on October 5th 1999, and replaced Family Credit (FC), which was introduced in 1988
- Eligibility to FC/WFTC — 3 basic requirements:
 - At least one adult in the family (or the lone parent in a single-parent family) must **work 16 hours or more per week**
 - Family must have at least one **dependent child**
 - Family savings and capital must be below a given amount (8,000) and family net income must be sufficiently low

UK Tax Credit — WFTC (4)

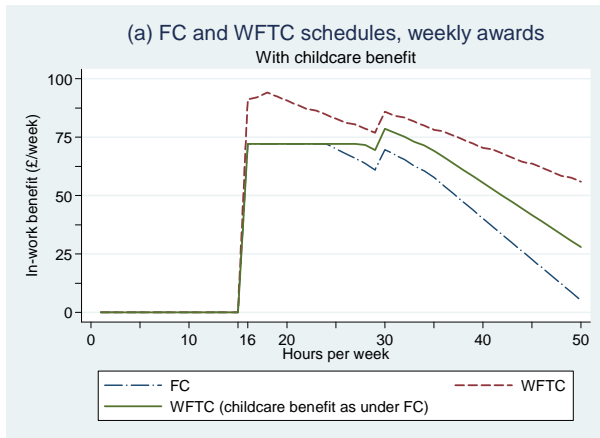
6 major changes from FC to WFTC:

1. **Basic rate:** increased (from £48.80 to £52.30 per week)
2. **Credit for children** in the age group 0-10: increased (by £5 p.w.)
3. **Income threshold:** increased (from £79 to £90 p.w.)
4. **Child maintenance:** fully disregarded (from 15 p.w. per child to full)
5. **Taper rate:** lower (from 70% to 55%)
6. **Child care costs:** under FC they are disregarded from net family income; under WFTC they are added to the maximum credit and are worth 70% of childcare cost (subject to a limit of £100 p.w. for one child and £150 p.w. for two or more children)

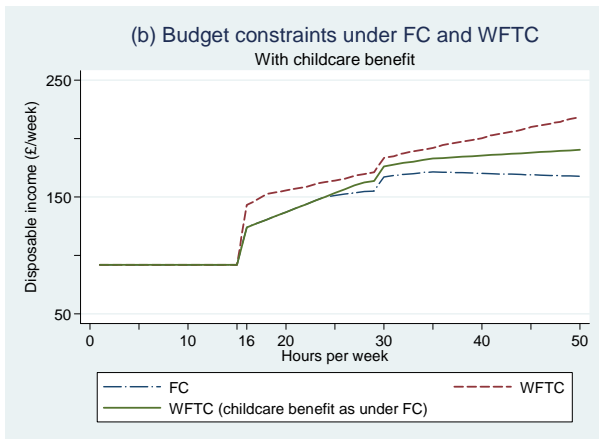
Plus, WFTC is not administered by the Benefits Agency, but by Inland Revenue (in the attempt to **reduce stigma**)

So, expect WFTC to have **increased the generosity** of in-work support relative to FC

UK Tax Credit — WFTC (5)



UK Tax Credit — WFTC (6)



Data and Methods

- First eleven waves of BHPS, 1991-2001 (panel data)
- Estimation sample includes unmarried non-cohabiting (non-married) women who are at least 16 years old and were born after 1940 (thus aged at most 60 in 2001)
[excludes long-term sick and disabled, and those in full-time education in any given year]
- Sample of 3,333 single women of whom:
 - 1,826 childless women (**control group**)
 - 1,507 lone mothers (**treatment group**)

Outcomes (y variables)

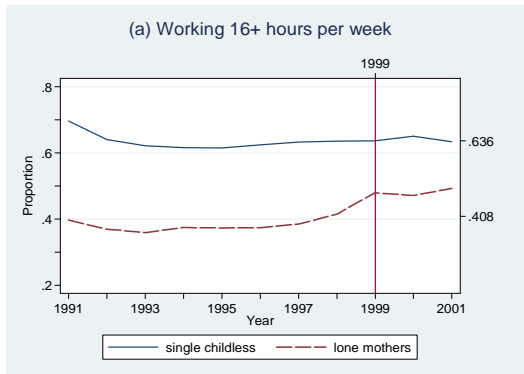
- Employment (working 16+ per week, working 30+ per week) + transitions
- Labour income
- FC/WFTC receipt and FC/WFTC award
- IS receipt
- Usage of paid child care
- Weekly child care expenditures
- Entry into marriage/remarriage
- Birth rates (lone mothers)
- Entry into lone motherhood (single childless women only)

Basic controls (X variables):

- Age
- Education
- Ethnic origin
- Number of children by age group
- Housing tenure
- Region of residence

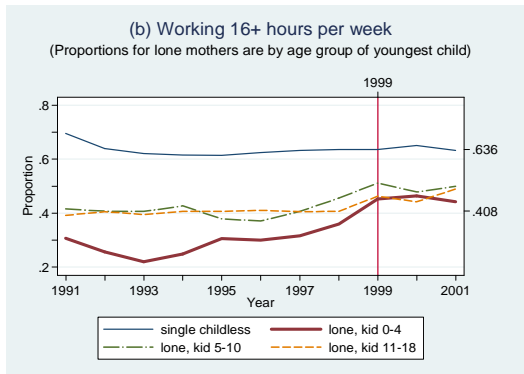
Graphical Overview of WFTC on Employment (1)

Figure 4. Working 16 or More Hours per Week – Single Childless Women and Lone Mothers (BHPS sample)



Graphical Overview of WFTC on Employment (2)

Figure 4. Working 16 or More Hours per Week – Single Childless Women and Lone Mothers (BHPS sample)



Estimate DDD regressions of the form:

$$y_{it} = \alpha_1 + \alpha_2 d_{it} + (\alpha_{31} + \alpha_{32} d_{it})t + [\alpha_{41} + \alpha_{42}(t - s)] I(t \geq s) + \beta d_{it} I(t \geq s) + \mathbf{X}'_{it} \gamma + \mu_i + \epsilon_{it}, \quad (1)$$

where $s = 1999$; d_{it} = indicator for the treatment group (single women with children); β = treatment effect (i.e., WFTC effect).

Eq. (1) allows for different pre-reform trends for control and treatment groups; allows for common non-WFTC related policy effect in 1999 (and after) both through change in intercept and slope; includes fixed effects (μ_i), and allows for compositional changes over time (subscript t) and \mathbf{X} variables.

Main identification condition:

- Other than the introduction of WFTC, there are no contemporaneous shocks that affect the **relative outcomes** of the treatment and control groups.

Example: There is no other change in the environment that influences labour market behaviour of single mothers differently from that of childless women (e.g., minimum wage affects all women)

Potential problem: the comparable increase in basic child benefits under Income Support between 1998 and 1999 may be problematic in this respect. (In terms of employment outcomes, however, these increases are modest and imply a negative income effect that could lead to a small downward bias in our effect estimates.)

Treatment Effect Estimates on Eligible Employment (working 16 or more hours per week) — $N=14,357$

	(i)	(ii)
	[$\alpha_{31} = \alpha_{32} = 0$]	
Level estimate ($\mu_i = 0$)	0.053	0.059
	(0.019)	(0.022)
Fixed effects estimate	0.053	0.051
	(0.014)	(0.018)

See paper for results on other outcomes and explanation on **mechanisms**.