Equilibrium Search and Tax Credit Reform*

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Abstract

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1 Introduction

r t p o s rn n t t pro r s n s st nt n t n n ot r ntr s[1] s pro r s r t p ot t s r fro po rs to n s o r r t p rt p t on on t r t ro ps n to t n or po rt t of t s po s on o r s pp s n st t ns ss n r r n t n n of t s t t pro r s n t ro r n r q r p of t s p p r s to op n p r q r s r o t t pro t n ppropr t or to r ss t s ss s n to pp t n o r n s s of t Br t s or n F s Cr t (F C) r for

t pro r s s s E C n t n F C (to t ts pr ssors n r nt s ssor) n t r ns r tt nt on n t no t r t r p o nt p ts of t s pro r s n t n n r of p r st s t p opt t r r n n r n s (s for p E ss n n) or str r s t o o ppro (for p B n t) t n t s of t st t or s t p ts o r t ross t s st s t r pp rs to n r ns ns s t t t t pro r s F C pos t ts on t p o nt of on ot t r s t ss r nt n rn n t of t s r for s on n o n n p s[2]

D sp t t of o r s pp st s t r s s rpr s n tt n r r n t q r p of t s r for s E pt ons n t r nt t t n n st s of A t ( ) ( ) n Rot st n (8) s n t fro t r p ns on n t s Rot st n (8) n t of t E C on o r r t p rt p t on n q s s n s ntr st st t s n ss n st n o r r t for s o n s t p ns on n E C p nts n fo n t t pr t rn n s of or rs t rn n s of n or rs ( )

[1]See Hotz and Scholz (2003) for EITC in the US, and Blundell and Hoynes (2004) for the British WFTC and its predecessors.

[2]Studies which have evaluated the employment impact of WFTC include Azmat (2006a), Blundell et al. (2004a), Blundell and Shephard (2009), Brewer et al. (2006), Francesconi and van der Klaauw (2004), Gregg and Harkness (2003), and Leigh (2007). These will be discussed in more detail in Section 5.5.

p o t st t r t on n E C s pp nts o r t p r o 8 – to n t of

t t s n fo n t t on p r nt n s n t n ros t of t pro r

r ross o s for s oo ropo ts for t t s oo

p o n no on r t s A t ( ) n t n n of t

Br t s F C n fo n n tos st t t r s s n t tt n of nt

or rs r t to s r s non or rs n t t t r r sp o r s on

s of s r s non or rs

po nt t of t s p p r s t rn n t t r for n to r

n t o rn nt r p t st n F Cr t (FC) pro r – t n for of n

or s pport r n f t r t or n F s Cr t

F C r pr s nt nt n p ns on or pro r s of s ppor s ons r

or n ro s t n ts pr ssor of r n r ts n t p r r t n

t pr s n of p n nt r n s ntr t t r for t r pt of F C f s

t o t (o s ntro ro p n t q s p r nt p o nt p st s)

so n t s s t r for f r to st Cons q nt t

o rn nt r r n t s r t of s r for s – n or n r s pro

r s s o s n – p n pon t n t r n q nt t t port n

of t s q r ts

n or r to r ss t s port nt s r q r o ot p o nt n

t str t o s r s s n q r o t p t t o of t

o r r t s to n sp rs on f n s r n t r r n pro t t

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n r) D p rt n fro t p t t p r port nt p t ons for

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r for s t r s tt pt to tr r t r s r of t r nt r n s t t

[illegible][3] [illegible]

[illegible][4]

[illegible]

[3] Our analysis remains partial equilibrium to the extent that capital is ignored, as is the product market and the possible effect of the reform on outcomes such as education and fertility. However, the model is equilibrium in the sense that employment, the distribution of wages, and the arrival rate of job offers are determined within the model.

[4] Lise et al. (2005) simulate the general equilibrium effect of a wide scale implementation of the Canadian Self-Sufficiency Project (SSP) in a model with ex-post worker-firm bargaining. They find substantial general equilibrium effects, which reverse the positive cost-benefit conclusions of their partial equilibrium evaluation. Kolm and Tonin (2006) consider the impact of introducing an in-work benefit in an analytical framework using a Pissarides (2000) search model. Here general equilibrium effects reinforce the employment impact of the programme through job creation.

t s so t t sp str t on r

An t rn t ppro t t n sp rs on s n q r o t nt ns t o o n or r ss pt on or rs to nt n s r n for n p o (B r tt n ort ns n 8) For p or rs t r r s r q t r r s t r for n r t s post t ro n t on nt nt nts so sp rs on n s pport n q r r s r q pro t n t o p s n r o r n rn n s ns t s s pp r nt p r n n o r to so t nt n for t ro n t n r pro t B n pon t n s s o ort ns n (onstr t t t or pro r s r s Bont ps t ( ) for nt n o s str t on o r pro t n t t t o n n p str t ons n for n ppropr t str t on o r pro t

o o t s s t rst t t t n p r q r o s r o s n s to n s po r for o t s n r n s s n s t st n t r t r n s r ns t o r o s n to pt r t r s o t o r r t n t poss t o r q r ts n r for s s s F C F rst s n on o t o s o t r s to n s o r s pp t s n ss r to t r s r t ro n t so t t t st s or rs pt s o rs n r ot rs s pr s nt n Bont ps t (for nt n o s str t ons o r pro t or r opport n t t t r str on t t t o rr r t s n p n nt o p o nt st t s s o r nt n r str on s p s t n ss s t p s t t t opt str t o n p or rs s n p n nt o t q o r str t on s r str on to poor t o t r t on t n t r pp t on s p r o rr r t s for n p or rs r o t n st t to t t o t p o R n t s o rr r t r str n port nt p rt o o r n ss

A p rt n nt t r o t o r r t s t t rt n ro ps o n s ost not o t or p rt t t so po nt n t r t n t pr s n o r n

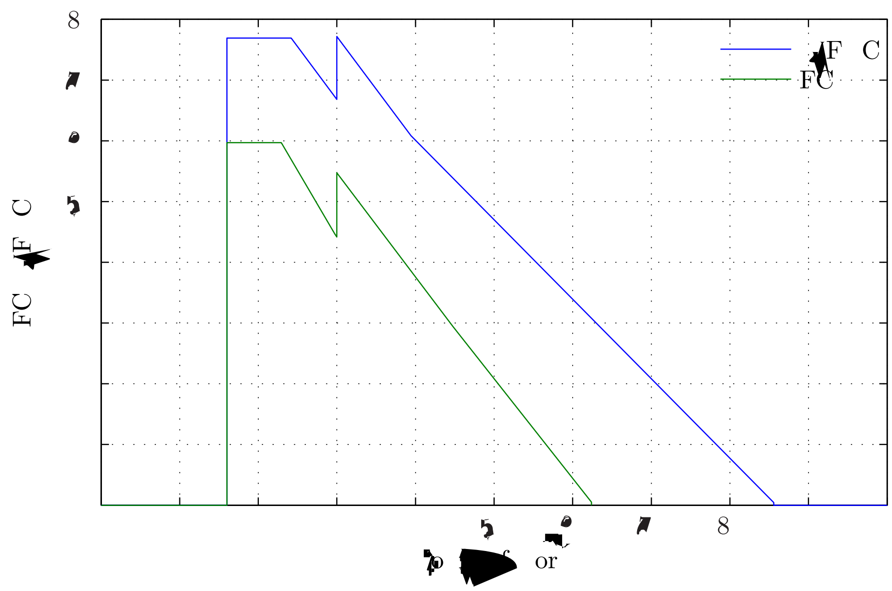
s ntr t t r for r pt of F C t s t r for n ss r to n orpor t o rs nto o r o t s of t non o r s pp o p r s t r s o of p or t t n s t t t n s r to fr oos t r o rs of or t o (A ton n son 88 n r 85 rt n r n o 5 o tt 8 rt) B n t (8) s Br t s o s o n r t to st t p of s r s or n t r for s n t r n t s n fo n t t t ntro on of F C pos t s on or t t s n s s r r o o n o

t o s s q nt rr o rs p s s n ss pt on nt n t ro o t t s p p r s s port nt not on n ts t to s t t pp r nt of o rs t n o s t so n ts t to pot nt pt r t so p rt t p n t nn n n tron o o (8) o nt r nt Br t s n for or rs o not tt pt to pro r fo fo n t ons for t s t r t r ss t s p r t no o s pt on of r s – r s r to o r t r t o s or p rt t o s t not ot

t n t s n orpor t t r pr s nt t ons of t t n tr nsf r s st r nt r st F C r nt ro or for o r p t ro n t to n n t str r p r t rs of o r o s t t n tr nsf r s s Cr – n n ntr st to t s nt r ts ppro opt n B r n r (ss or rs of t p s op t n t s o r r t s s to pt r r q r s n to st poss n nt n ns q n s of t t t r t n o r o

op t r st p s non p r tr st t on t n q s r to t t propos Bont ps t ( ) n st t o r o s n o r For r t s ort for s ntro s n t str r p r t n s t t q r p of F C o n t str r p r t rs n t str t on of r pro t s s to n st t t p of t r for on p o nt o or n p o nt r t ons n t ntr str t s n n t ro t t r s p s ot

2 The Working Families' Tax Credit reform



F r Cr r s n r FC n F C FC r rs to F Cr t s of Apr F C r rs to or n F s Cr t s of Apr F r ss s on p t s n n nst nt o r t of £ A n s pr ss n Apr pr s

s p s o t ( ) t t s r fro to ( ) t pro or s pport for for r sts t ro r t ( ) nt n n p r sr r fro n n t n t t nt t nt s n s nt t t t r st pot nt n r s of r t os r st t t n of t FC t p r (s F r) n n ss s n n ros t n s o r s t n no n sp n n on F C r s n to £ on n £ on p r to £ on on FC n 8 pr s nts t n p r t rs of FC n F C[5]

n n s n t of pro r ss s s F C t s n ss r to t n nt r t of t t s st s s s t t n s nt s n n t n nt t nts to ot r n ts F s n r pt of s o n ss fro t F C r for t n s q nt not r n t s n ts F rt r or t r

[5]There were also important administrative changes between FC and WFTC. In particular, while FC was paid direct to recipients as a cash benefit, WFTC was typically paid by employers through the wage packet.

[illegible] FC [illegible]

	April 1999 (FC)	October 1999 (WFTC)	June 2000 (WFTC)	June 2002 (WFTC)
Basic Credit	49.80	52.30	53.15	62.50
Child Credit				
under 11	15.15	19.85	25.60	26.45
11 to 16	20.90	20.90	25.60	26.45
over 16	25.95	25.95	26.35	27.20
30 hour credit	11.05	11.05	11.25	11.65
Threshold	80.65	90.00	91.45	94.50
Taper rate	70% after income tax and National Insurance	55% after income tax and National Insurance	55% after income tax and National Insurance	55% after income tax and National Insurance
Childcare	Expenses up to £60 (£100) for 1 (more than 1) child under 12 disregarded when calculating income	70% of total expenses up to £100 (£150) for 1 (more than 1) child under 15	70% of total expenses up to £100 (£150) for 1 (more than 1) child under 15	70% of total expenses up to £135 (£200) for 1 (more than 1) child under 15

Notes: All monetary amounts are in pounds per week and expressed in nominal terms. Minimum tax credit award is 50p per week in all years above.

[illegible] For [illegible][6]

[6] There were also important non-tax related reforms over this period, which we do not consider in our analysis. Various "New Deal" programmes were introduced which aimed to improve both the incentives and the ability of the long-term unemployed to obtain employment (see Blundell et al., 2004b). Furthermore, a national minimum wage was introduced in April 1999, at a rate of £3.00 per hour for those aged 18-21 (the development rate) and at the higher rate of £3.60 per hour for those aged 22 and over. Since their introduction, both the main and the development

3 The model

ss on so t t t or t o s to st t p of t F C r for n s ttn o t t or ss pt ons n r t opt o pt n str t s of or rs t n r r s t st st s n os t o r n t opt s ttn n o r t n or of r s A s r of t s s q nt not t on s s pr s nt n App n C

3.1 Model assumptions

ono ons sts of ont n of n t pop t on s nor to n t s n s t r r s to o s r or p r r st s (for p n r r t st t s n t pr s n of r n) t t r nt nn r n n $i \in \mathcal{I}$ n o r n s s t tr t s n n t n r nt t n_i not t fr on of t p i n t $\sum_i n_i$ As s o s n op r t n t s o r r t t s o r p r r to n n ot t t n tr nsf r s st (r n t on t on n p for t t t or t s) s t tr ns t on p r t rs of t o s ont n o s n n s for r t t onst nt s o nt r t $\rho_i >$ r s no ss to t r s n or n t no o s n s or rs) n t r p o or n p o s e n u to n t s r sp t st t s Jo s r r r s r t w n r q r o or h ss t t t r q r o t n o s t no o r r s t on of t r s of r n t r p rt t o s (o rs h_0) or t o s (o rs $h_1 > h_0$) t not ot [7] p rt r o rs s for t t r s op r t n s o no s t r n [8] rror n t on t on n t t s p for t o rn nt o rs n r t t s t $T_i^h(wh)$ not n t (pot nt n t) n t t s p p or r

rates have been subject to a number of above-inflation increases.

[7]The framework we develop generalizes to more than two hours choices, and can also be applied in the context of other non-wage amenities. See Hwang et al. (1998) for an analysis of non-wage amenities in an equilibrium search framework.

[8]Note that we are implicitly assuming an indivisibility in the production technology; two part-time workers are not a substitute for a single full-time worker.

[illegible] t o s ry r rst i t rn n s wh n o rs s for $h \in \{ , \}$ r t n t tr nsf r p to n n p [illegible] o [illegible] t r rst i s n $-T_i^u$ ss t t t t s $T_i^h(wh)$ s ont n o s r nt

r s n o no s str t on of r pro t n ot p rt t n f t s tors t str t on of p rt t r pro t s n on s pport $\underline{p}_0$ [illegible] t t str t on of f t r pro t s on s pport $\underline{p}_1, \overline{p}_1$ [illegible] or rs r ss to q pro t n r t r n t r no s ry opport n t ost of p o [illegible] s t t str t on f n ton H_i on s pport $\underline{b}_i, \overline{b}_i$ o s p f so of t pos [illegible] ss t t $\underline{b}_i$ s s nt [illegible] so t t n q r r s r t n t or r t n t pr s n s of t s t [illegible] t t of n n p o n s n $b -$ [illegible] r s for p [illegible] or [illegible] t t s ss n r n n t n n on t r s t t [illegible] or $wh - T_i^h(wh) -$ [illegible] t C_i^h not n t on t r s t t [illegible] or t o rs h Fro t o [illegible] s pos t o t on nor t on C_i^0 for i

n s n nt r p rt t (f t) o of rs t t o no s (t [illegible] or r) r t λ_{ui}^0 [illegible] n n p o n λ_{ei}^0 [illegible] n p o o nt n fo s on t s ons f [illegible] or [illegible] postpon n s ss on on rn [illegible] t s rr r t s p n pon t o r st t (or t tn ss) of t o r r t t r t rn to t s ss n on 5[9] E p o nt sp s n t r t δ_i r r [illegible] t r n s r p o n p rt t of f t o s r n t ro o t t s p [illegible] p no r str ons on t r t n t of t s q nt t s t not t t t ss pt on t t t o str on n o rr [illegible] n p o r n p n [illegible] t r n s r rr nt n n p rt t or f [illegible] or s o ons r n o r nt f n r str on

[illegible] r ss of o s r r r st i or no s r r r st [illegible] or rs r ss to s p p rt t (f t [illegible] of rs fro t str t on F_0 [illegible] t t [illegible]

[9] A more realistic approach would also endogenize the job offer arrival rates λ_{ji}^h at the micro-level by relating them directly to an endogenously determined worker search effort, as in Christensen et al. (2005). In our analysis we do not allow the search effort of workers to vary with their current wage or to directly respond to any changes in the tax system. Non-hours labour supply responses to tax reforms, such as search effort, may be quantitatively important as emphasized by the new-tax responsiveness literature (Feldstein, 1995). However, incorporating this into our model is non-trivial and is left as an extension for future research.

r not $\underline{w}_0$ ($\underline{w}_1$) n t r $\overline{w}_0 \geq \underline{w}_0$ ($\overline{w}_1 \geq \underline{w}_1$) s p s t

t o rn nt to n t on t s n tr ns rs on o r p r r st i

r s r n to o so st t s ss pt on t pr s n nt s n t s

s s t Eq A D s n t on A n ro s E p o nt Eq t

t s pr s ot t t t s ss pt on o s not p or rs

t t s str t on rn n s s s or rs r n t r

pt n o r n so r t r s r p n s t r nt r t s

As not n t ntro on ss n or rs op r t n t s o r r t p r ts

nt r st n sp o r s so or o r not t r t p rt r t r or (n

o r s ss s) n st n r t

ss t t t post n p o rs s pr or to or n t t

pot nt p o o n t n t r pt or r r F rt r or r s

post n s t t t r t s r s n or rs s r ss

nst nt t ro o t n n s p o nt t n n r n ntr st to t p p rs

s r o s r no on r p t r r t t t r so t

o r n s r s t or p t r s r

str p n on t r q r o or s str t s r s ss n t

n s on

3.2 Worker strategies

n t s s s t opt str t s n p o n p or rs or

r t ons r pr s nt n App n A o pro n $q_i(w)$ s t t t to

t p i n o n t p w s t s s t p rt t

p $q_i(w)$ n t str on r t n t rr r t s or ot t n

p rt t s r ss n p n nt rr nt o or t n n t t n or r

to t r n $q_i(w)$ t s nt to p r t nst nt n o s t n p rt t n

f t p o nt n o or s $q_i(w)$ so y s

$$wh_1 - T_i^1(wh_1) - C_i^1 \quad q_i(w)h_0 - T_i^0(q_i(w)h_0) \qquad (\ )$$

s n q so t on pro t t on t on on o or r n t r t s r

s str ss t n on (n ss pt on nt n t ro o

$dq_i(w)/dw >$ p o o pt o r w' fro t r

rr nt o rs s or t t s (on nt on) str r t r t n t r r f t

o o n p rt t o o r pt f n on f $q_i(w') > w$ r p rt t

o o n s f o r pt f n on f $q_i^{-1}(w') > w$

n p o or rs so r s r str t n r p n n

t r or not f t or p rt t o r s r t $\phi_i(b)$ not t r s r t on

for *full-* or on t on on o s r t p i n no s r s r ost b s t s

s r for to t st n r r s r q t on t o s r (s for p

ort ns n n nn 88) t s r o f ot t pr s n of t s n s

or rs s p n o rs fr o str t ons n p rt r t s to s nt f t r

rn n s t n t of t r t n App n t t $\phi_i(b)$ s t so t on to

$$\phi_i(b)h_1 - T_i^1(\phi_i(b)h_1) - C_i^1 \quad b - T_i^u + h_1 \int_{\phi_i(b)}^{\infty} B_i(w)dw \qquad (\ )$$

r

$$B_i(w) \equiv \frac{\left(\ - T_i^{1\prime}(wh_1)\right) \left[(\kappa_{ui}^0 - \kappa_{ei}^0)\overline{F}_0(q_i(w)) + (\kappa_{ui}^1 - \kappa_{ei}^1)\overline{F}_1(w)\right]}{\ + \rho_i/\delta_i + \kappa_{ei}^0\overline{F}_0(q_i(w)) + \kappa_{ei}^1\overline{F}_1(w)}$$

r κ_{ji}^h λ_j^h t $j \in \{u, e\}$ n $h \in \{ \ , \ \}$ Fro o r s ss on o t s t t

t st pt o r for p rt t o s s p n $q_i(\phi_i(b))$ B pro

not t t n t r κ_{ui}^h κ_{ei}^h for $h \in \{$ $B_i(w)$ for (w, i) so t t t

opt str t of n p or rs s n p n nt of t q o r str t ons

s s t s n s n Bont ps t ( ) For r f r s r t o pt n

str t of n s n

or r pt n str t s

	F t r	rt t r
n p o	$w' \geq \phi_i(b)$	$w' \geq q_i(\phi_i(b))$
E p o t	$w' > w$	$w' > q_i(w)$
E p o p rt t	$w' > q_i^{-1}(w)$	$w' > w$

Notes: Assumes a current wage w and either a full-time or part-time wage offer w'. $q_i(w)$ is as defined in equation 1; $\phi_i(b)$ is as defined in equation 2.

3.3 Steady state flows

s s on r s n r o st st t o s s q t ons F tr t t str t o rs n t r rr r t s s n n t t r s n q r o t

3.3.1 Distribution of reservation wages

n r n st st s t s n ss r to ns r t str t on o (t) r s r t on s or o r p ro p (not s r t to t str t or oppor t n t sts r n to $A_i(w)$ $H_i(\phi_i^{-1}(w))$ not t str t on o t r s r t on s on st t sto o n p o n p or rs s A_{ui} n A_{ei} r sp n t s r r t to A_i r n to

$$A_i(\phi) \quad u_i A_{ui}(\phi) + (\; - u_i) A_{ei}(\phi). \qquad (\;)$$

n or r to s t q r o t o r r t t s n ss r to t r n t str t on o r s r s on st t n p o A_{ui} so r to s t s ro t n p o nt poo nto p o nt t s s s s to t r n t q r n p o nt r t n st r q r t t o s st q t o t o t n p o nt poo to t r p rt t or t p o nt n

n p or rs pt t t s t st s s t r r s r

$$\delta_i(- u_i)A_{ei}(\phi) \quad \lambda^0_{ui}u_i\int_{-\infty}^{\phi}\overline{F}_0(q_i(w))dA_{ui}(w) + \lambda^1_{ui}u_i\int_{-\infty}^{\phi}\overline{F}_1(w)dA_{ui}(w). \qquad ( )$$

ot t t r str t ons (F_0 n F_1) r t on q nt t s n t o t t o not t s r or r t p *i* B r nt t n q t t n r t ons p t n t ns t s o p o n n p or r r s r n n t q t on s s to r t n pr ss on for t str t on of ϕ on st t n p o

$$u_iA_{ui}(\phi) \quad \int_{-\infty}^{\phi}\frac{dA_i(w)}{+\kappa^0_{ui}\overline{F}_0(q_i(w)) + \kappa^1_{ui}\overline{F}_1(w)}. \qquad (5)$$

n $\underline{w}_i \equiv$ n$\{\underline{w}_1, q_i^{-1}(\underline{w}_0)\}$ n $\overline{w}_i \equiv$ $\{\overline{w}_1, q_i^{-1}(\overline{w}_0)\}$ n t $\phi \to \infty$ n q t on 5 t n t n pr ss on for t st st t n p o nt r t or rs o n o r p t p

$$u_i \quad \frac{}{+\kappa^0_{ui} + \kappa^1_{ui}}A_i(\underline{w}_i) + \int_{\underline{w}_i}^{\overline{w}_i}\frac{dA_i(w)}{+\kappa^0_{ui}\overline{F}_0(q_i(w)) + \kappa^1_{ui}\overline{F}_1(w)} + (- A_i(\overline{w})) \qquad ( )$$

pos s t n p o nt r t nto t r p rts t os n o pt o rs t o pt so n r ot rs n t o r o rs

3.3.2 Between jobs

t n to ns r t fr o or rs rr nt p o n p rt t n f t s n not t s r sp q nt t s s m_{0i} n m_{1i} so t t $m_{0i} + m_{1i}$ $- u_i$ so t $G_{1i}(w)$ not t fr on of f or rs of t no r t r t n w n s r n $G_{0i}(w)$ s t r n t s s n n on pt s t t of r str r t r t n t sso t t r o rs p t n r of n o f t p t r t ro t r n stro or r n r of r fro p rt t or f t r) st

t q t n r of n o pt s o n

$$m_{1i}g_{1i}(w)\left[\delta_i + \lambda_{ei}^0\overline{F}_0(q_i(w)) + \lambda_{ei}^1\overline{F}_1(w)\right]$$
$$f_1(w)\left[\lambda_{ui}^1 u_i A_{ui}(w) + \lambda_{ei}^1 m_{0i} G_{0i}(q_i(w)) + \lambda_{ei}^1 m_{1i} G_{1i}(w)\right]. \quad (7)$$

n r n n o o s pr ss on for p rt t o s p w

$$m_{0i}g_{0i}(w)\left[\delta_i + \lambda_{ei}^0\overline{F}_0(w) + \lambda_{ei}^1\overline{F}_1(q_i^{-1}(w))\right]$$
$$f_0(w)\left[\lambda_{ui}^0 u_i A_{ui}(q_i^{-1}(w)) + \lambda_{ei}^0 m_{0i} G_{0i}(w) + \lambda_{ei}^0 m_{1i} G_{1i}(q_i^{-1}(w))\right]. \quad (8)$$

Bot q t ons 7 r so t r s ss nt t on n pr s nt o r s non p r tr st t on t n q nt r t n q t on 7 n q t on 8 (t o ot q t ons r nt r t p o t n t n t rn t r pr s nt t ons of t q t ons

$$m_{1i}G_{1i}(w)\left[\delta_i + \lambda_{ei}^0\overline{F}_0(q_i(w)) + \lambda_{ei}^1\overline{F}_1(w)\right] + \lambda_{ei}^0 m_{1i}\int_{-\infty}^{w} G_{1i}(x)dF_0(q_i(x))$$
$$\lambda_{ui}^1 u_i \int_{-\infty}^{w} A_{ui}(x)dF_1(x) + \lambda_{ei}^1 m_{0i}\int_{-\infty}^{w} G_{0i}(q_i(x))dF_1(x) \quad (\ )$$

n

$$m_{0i}G_{0i}(w)\left[\delta_i + \lambda_{ei}^0\overline{F}_0(w) + \lambda_{ei}^1\overline{F}_1(q_i^{-1}(w))\right] + \lambda_{ei}^1 m_{0i}\int_{-\infty}^{w} G_{0i}(x)dF_1(q_i^{-1}(x))$$
$$\lambda_{ui}^0 u_i \int_{-\infty}^{w} A_{ui}(q_i^{-1}(x))dF_0(x) + \lambda_{ei}^0 m_{1i}\int_{-\infty}^{w} G_{1i}(q_i^{-1}(x))dF_0(x). \quad (\ )$$

pr ss ons for G_{0i} n G_{1i} fro o r ot n p t n ppropr t t r t r t t t r s pro n nt n o r n ss s ons r s p r for o r q t on (t t w) n q t on (t t $q_i(w)$) so r to n t t t nt r t o r t ross s on str t ons of p rt t

n f s s rs t n r on t on

$$(m_{1i}G_{1i}(w) + m_{0i}G_{0i}(q_i(w)))\left[\delta_i + \lambda^0_{ei}\overline{F}_0(q_i(w)) + \lambda^1_{ei}\overline{F}_1(w)\right]$$
$$\lambda^0_{ui}u_i\int_{-\infty}^{w} A_{ui}(x)dF_0(q_i(x)) + \lambda^1_{ui}u_i\int_{-\infty}^{w} A_{ui}(w)dF_1(x). \quad (\ \ )$$

s n q t not t t t of q t on r tt n s

$$\delta_i(\ \ - u_i)A_{ei}(w) - u_iA_{ui}(w)\left[\lambda^0_{ui}\overline{F}_0(q_i(w)) + \lambda^1_{ui}\overline{F}_1(w)\right]$$
$$\delta_iA_i(w) - u_iA_{ui}(w)\left[\delta_i + \lambda^0_{ui}\overline{F}_0(q_i(w)) + \lambda^1_{ui}\overline{F}_1(w)\right] \quad (\ \ )$$

so n n q t o t q t on n n t ro t n t n

$$(m_{1i}G_{1i}(w) + m_{0i}G_{0i}(q_i(w)))\left[\ \ + \kappa^0_{ei}\overline{F}_0(q_i(w)) + \kappa^1_{ei}\overline{F}_1(w)\right]$$
$$A_i(w) - u_iA_{ui}(w)\left(\ \ + \kappa^0_{ui}\overline{F}_0(q_i(w)) + \kappa^1_{ui}\overline{F}_1(w)\right) \quad (\ \ )$$

n s st t t nto q t ons n 8 to n t t r rn n s str t ons n pr ss ons for t rn n s ns t s g_{0i} n g_{1i} s t n nt r t to t n t r sp t str t on f n ons (G_{0i} n G_{1i}) n p o nt s r s (m_{0i} n m_{1i})

3.4 Firm behaviour

n t s s r r t opt o r of r s n t on to oos po r s to r s ro s tors op n n of n s r s of n pro t to n s t r s t n t o r t n s n t s pp of n s n t rr r t of rs t t ro no t ro n r t t n f n on (s on 5)

ost of f t pro t p t v n s s n $c_1(p, v)$ ss t t t s f n on s str on t $c_1(p,\ \ )$ pro of t str t (w, v) s n $(p - w)h_1L_1(w, v) - c($ r $L_1(w, v) \equiv \sum_i n_il_{1i}(w, v)$ s t st

st t p o nt of s r r $l_{1i}(w,v)$ s t st st t p o nt of t p i

or r tt n V_1 not t r t sto of f t o n s $l_{1i}(w,v)$ so s t

q t on

$$(\delta_i + \lambda_{ei}^0 \overline{F}_0(q_i(w)) + \lambda_{ei}^1 \overline{F}_1(w)) l_{1i}(w,v) \quad \frac{v}{V_1}\left[\lambda_{ui}^1 u_i A_{ui}(w) + \lambda_{ei}^1 m_{0i} G_{0i}(q_i(w)) + \lambda_{ei}^1 m_{1i} G_{1i}(w)\right]$$

n s t n or o nt r n t p o nt n r s t ss pt on

t t n s t s p n pro t of r s n t t v nt rs t o pr ss on

for $l_{1i}(w,v)$ t p t t s n n t r t $l_{1i}(w,v)$ $\bar{l}_{1i}(w)v/V_1$ n

s r t $\overline{L}_1(w) \equiv \sum_i n_i \bar{l}_{1i}$ t

$$\bar{l}_{1i}(w) \quad \frac{\kappa_{ei}^1 A_i(w) + \left[\kappa_{ui}^1(\;+ \kappa_{ei}^0 \overline{F}_0(q_i(w))) - \kappa_{ei}^1(\;+ \kappa_{ui}^0 \overline{F}_0(q_i(w)))\right] u_i A_{ui}(w)}{\left(\;+ \kappa_{ei}^0 \overline{F}_0(q_i(w)) + \kappa_{ei}^1 \overline{F}_1(w)\right)^2} \qquad (\quad)$$

s o t n s st t t n q t on n t q t on for $l_{1i}(w,v)$ to n t t

ross s str t ons E f t r oos s ts opt po $K_1(p)$ n

opt r t n po $v_1(p)$ to ts st st t pro [10] t n t rr r t of

o rs to t t o r of ot r r s ot p rt t n f t) or rs

s n n

$$(K_1(p), v_1(p)) \quad \underset{(w,v)}{\mathrm{r}} \quad \pi_1(p,w)\frac{v}{V_1} - c_1(p,v)$$

r

$$\pi_1(p,w) \quad (p-w) h_1 \overline{L}_1(w). \qquad (\;)$$

opt n $v_1(p)$ q t s t r n st of n t on n to t p

pro fro s n t s

$$\left.\frac{\partial c_1(p,v)}{\partial v}\right|_{v=v_1(p)} \quad \frac{\pi_1(p,K_1(p))}{V_1} \qquad (\;)$$

t r or n r t t rst or r n t ons for t opt o

[10] This implicitly assumes that firms have a zero rate of time preference.

s t n op t or r t $\pi_1(p)$ $\pi_1(p, K_1(p))$ s s

$$\pi_1(p) \quad \pi_1^*(\underline{p}_1) + h_1 \int_{\underline{p}_1}^{p} \overline{L}_1(K_1(y))dy$$
$$(\underline{p}_1 - \underline{w}_1^*)\overline{L}_1(\underline{w}_1^*) + h_1 \int_{\underline{p}_1}^{p} \overline{L}_1(K_1(y))dy$$

r $\underline{w}_1^*$ s q t on for st pro t t r $(p \quad \underline{p}_1)$ tt n t o q to (t t w K_1 t n

$$K_1(p) \quad p - \left[\pi_1^*(\underline{p}_1) + h_1 \int\limits_{\underline{p}_1}^{p} \overline{L}_1(K_1(y))dy\right] \times \frac{}{h_1\overline{L}_1(K_1(p))} \qquad ( )$$

s for n r so for t q r of o r o rs r n o o s pr ss ons o s for po n on n r t n forts of p rt t r s ot t t q t on (n t rr spon n pr ss on for p rt t r s) p n pon t nt r str t on of ot p rt t n of rs n t s po n ons n t t s so n ss r to t r t s on or r on t ons of r s n ot s tors o so t t t n t q r s n p nt

3.5 Equilibrium

n or r to os t n o n t rr r t of of rs p nt t r t t n n ons s n ort ns n ( ) r t tot of t s M_h n s for $h \in \{ , \}$ p n s on t tot sto of n s V_h

$$V_0 \quad \int_{\underline{p}_0}^{\overline{p}_0} v_0(p)d\ (p) \quad \text{n} \quad V_1 \quad \int_{\underline{p}_1}^{\overline{p}_1} v_1(p)d\ (p) \qquad (\ 8)$$

(t $v_h(p)$ n n q t on) n t tot nt ns t st s r fo or rs S_h

$$S_h \quad \sum_i n_i \left[s_{ui}^h u_i + s_{ei}^h(\ - u_i)\right] \qquad (\ )$$

[redacted] r s^h_{ji} not s t o no s s r [redacted] or rs for i $j \in \{u, e\}$ n $h \in \{ , \}$ t n f n on n o rs s for h s [redacted] r tt n s

$$M_h\left(V_h, \sum_i n_i \left[s^h_{ui}u_i + s^h_{ei}(\quad - u_i)\right]\right) \qquad (\quad)$$

[redacted] r M_h s ss to n sn n ot ts r nts on n n r o o n o s o of r rr r t s for [redacted] or r r t n r t to t [redacted] s of t s or n to

$$\lambda^h_{ji} \qquad \frac{s^h_{ji}M_h}{\sum_i n_i(s^h_{ui}u_i + s^h_{ei}(\quad - u_i))}. \qquad (\quad)$$

r t q r of t ono [redacted] n n D n t on

Definition 1 *A market equilibrium in the economy is defined by* $\{F_0, F_1, v_0, v_1\}$ *such that simultaneously:*

1. *The arrival rates of job offers* $\{\lambda^0_{ui}, \lambda^0_{ei}, \lambda^1_{ui}, \lambda^1_{ei}\}_{i\in\mathcal{I}}$ *are given by equation 21*

2. *The distribution of wage offers in the economy is:*

$$F_0(K_0(p)) \qquad \int_{\underline{p}_0}^{p} \frac{v_0(p)d\ \ (p)}{V_0} \quad \textit{and} \quad F_1(K_1(p)) \qquad \int_{\underline{p}_1}^{p} \frac{v_1(p)d\ \ (p)}{V_1}$$

   with V_0 *and* V_1 *as defined in equation 18.*

3. *Each worker of type* (b, i) *follows the strategy described in Table 2.*

4. *The strategy of each type-p firm is to choose a vacancy level and wage that maximizes profits given the job offer arrival rates, strategies of other firms' and workers':*

$$(K_1(p), v_1(p)) \qquad \underset{(w,v)}{\text{r}} \quad \pi_1(p, w)\frac{v}{V_1} - c_1(p, v)$$
$$(K_0(p), v_0(p)) \qquad \underset{(w,v)}{\text{r}} \quad \pi_0(p, w)\frac{v}{V_0} - c_0(p, v)$$

   where $\pi_h(p, w)$ *is as defined in equation 15.*

t of r str t ons (s p rt of D n t on) r q to t str t on of r pro s fro t s r t on t t or pro r s p r s n q r for p ort ns n ( ) for s p proof

4 Estimation

n t s s s ss t str r st t on of o r o s n on t n s r t rst r t o oo n on n t n pro to s ss t nt t on of o r o n t t r st p st t on pro r opt t n s ss o r pp t on of t t n tr nsf r s st n t t s n st t on s ts r pr s nt n on

4.1 Likelihood function

r t oo ntr t on for n s n r nt o r r t pos t ons n t r nt n t tr ns t ons r t on os s t t of Bont ps t ( ) n nt n to s u n e to n t r sp st t s of n p o nt n p o nt n n to not p rt t n f t s ot o not s n nfor t on on t rst s r tr ns t on t s ps n r s r t ons r n

t_{ub} ps n p o nt r t on

t_{uf} r s n p o nt r t on

d_{ub} f n p o nt r t on ft nsor s

d_{uf} f n p o nt r t on r t nsor s

t_{eb} ps p o nt r t on

t_{ef} r s p o nt r t on

d_{eb} f p o nt r t on ft nsor s

d_{ef} f p o nt r t on r t nsor s

rn n s r not s s

w_u f pt n po n s

$q_i(w_u)$ p rt pt n po n s

d_u f w_u no s r s

w_e f of po s t t of rst nt

$q_i(w_e)$ p rt of po s t t of rst nt

d_e f w_e no s r s

rr nt p o nt s n

h_e^0 f p or n t p rt t s tor s

h_e^1 f p or n t f t s tor s

n n t tr ns t ons r n

v_u^0 f n po pt p rt t o s

v_u^1 f n po pt f t o s

v_e^0 f po pt p rt t o s

v_e^1 f po pt f t o s

4.1.1 Unemployed workers

s n t o not r t oo ontr t on for n p or rs of t p i For n p or o t n po nt to f t o p n w_u or p rt t o p n $q_i(w_u)$ (n t r st d_u n d_{uf}) t oo ontr t on s

ɣ n

$$
(\lambda_{ui}^0+\lambda_{ui}^1)^{2-d_{ub}} \quad \mathrm{p}\left[-\left(\lambda_{ui}^0+\lambda_{ui}^1\right)(t_{ub}+t_{uf})\right]\frac{A_i(\underline{w}_i)}{+\kappa_{ui}^0+\kappa_{ui}^1}
\times\frac{(\lambda_{ui}^0 f_0(q_i(w_u)))^{v_u^0}(\lambda_{ui}^1 f_1(w_u))^{v_u^1}}{\lambda_{ui}^0+\lambda_{ui}^1}+\left\{\int_{\underline{w}_i}^{w_u}(\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b))^{2-d_{ub}}\right.
\times\quad \mathrm{p}\left[-\left(\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b)\right)(t_{ub}+t_{uf})\right]
\left.\times\frac{(\lambda_{ui}^0 f_0(q_i(w_u)))^{v_u^0}(\lambda_{ui}^1 f_1(w_u))^{v_u^1}}{\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b)}\underbrace{\frac{dA_i(b)}{+\kappa_{ui}^0\overline{F}_0(q_i(b))+\kappa_{ui}^1\overline{F}_1(b)}}_{u_i dA_{ui}(b)}\right\}
$$

nt r t oɣ r t str t on of poss r s rɣ t s n t oɣ f o not o s r pt t n p o (d_u) non t ss ɣ $d_{ub}+d_{uf} <$ t n t st st t s t t t f t r s rɣ of s n n ɣ s no r t r t n $\overline{w}_i$ t t r for s t r oo ontr t on s

$$
(\lambda_{ui}^0+\lambda_{ui}^1)^{2-d_{ub}-d_{uf}} \quad \mathrm{p}\left[-(\lambda_{ui}^0+\lambda_{ui}^1)(t_{ub}+t_{uf})\right]\frac{A_i(\underline{w}_i)}{+\kappa_{ui}^0+\kappa_{ui}^1}
\times\left[\frac{(\lambda_{ui}^0)^{v_u^0}(\lambda_{ui}^1)^{v_u^1}}{\lambda_{ui}^0+\lambda_{ui}^1}\right]^{1-d_{uf}}+\left\{\int_{\underline{w}_i}^{\overline{w}_i}(\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b))^{2-d_{ub}-d_{uf}}\right.
\times\quad \mathrm{p}\left[-\left(\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b)\right)(t_{ub}+t_{uf})\right]
\left.\times\left[\frac{(\lambda_{ui}^0\overline{F}_0(q_i(b)))^{v_u^0}(\lambda_{ui}^1\overline{F}_1(b))^{v_u^1}}{\lambda_u^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b)}\right]^{1-d_{uf}}\frac{dA_i(b)}{+\kappa_{ui}^0\overline{F}_0(q_i(b))+\kappa_{ui}^1\overline{F}_1(b)}\right\}.
$$

F n ɣ ot d_u n $d_{ub}+d_{uf}$ t n n ɣ s r n ɣ r o s rɣ n t p o nt st t st so ons r t pro t t t s n ɣ s ɣ f t

r s r [redacted] t t s r t r t n $\overline{w}_i$ oo ntr t on t n s

$$\text{p}\left[-(\lambda_{ui}^0+\lambda_{ui}^1)(t_{ub}+t_{uf})\right]\frac{A_i(\underline{w}_i)}{+\kappa_{ui}^0+\kappa_{ui}^1}$$
$$+\left\{\int_{\underline{w}_i}^{\overline{w}_i}\text{p}\left[-\left(\lambda_{ui}^0\overline{F}_0(q_i(b))+\lambda_{ui}^1\overline{F}_1(b)\right)(t_{ub}+t_{uf})\right]\right.$$
$$\left.\times\frac{dA_i(b)}{+\kappa_{ui}^0\overline{F}_0(q_i(b))+\kappa_{ui}^1\overline{F}_1(b)}+(\ -A_i(\overline{w}_i))\right\}.$$

4.1.2 Employed workers

oo ntr t on of t p i n [redacted] or n t (p rt t [redacted] $w_e\ (q_i(w_e))$ s n

$$\{m_{0i}g_{0i}(q_i(w_e))\}^{h_e^0}\{m_{1i}g_{1i}(w_e)\}^{h_e^1}\left[\delta_i+\lambda_{ei}^0\overline{F}_0(q_i(w_e))+\lambda_{ei}^1\overline{F}_1(w_e)\right]^{2-d_{eb}-d_{ef}}$$
$$\times\ \text{p}\left[-\left(\delta_i+\lambda_{ei}^0\overline{F}_0(q_i(w_e))+\lambda_{ei}^1\overline{F}_1(w_e)\right)(t_{eb}+t_{ef})\right]$$
$$\times\left[\frac{\delta_i^{1-v_e^0-v_e^1}(\lambda_{ei}^0\overline{F}_0(q_i(w_e)))^{v_e^0}(\lambda_{ei}^1\overline{F}_1(w_e))^{v_e^1}}{\delta_i+\lambda_{ei}^0\overline{F}_0(q_i(w_e))+\lambda_{ei}^1\overline{F}_1(w_e)}\right]^{1-d_{ef}}.$$

ot t t n t [redacted] o not s n nfor t on on [redacted] pt [redacted] n o to o tr ns t on r son for opt n s t nfor t on ppro s t t t [redacted] op o s not p r t tr ns t ons sso [redacted] [redacted] r o s[11] F n [redacted] of n p [redacted] o [redacted] r ss n (d_e) t n t oo ntr t on s s p n m_{1i} t r [redacted] or r [redacted] or n p rt t or $-u_i$ o [redacted] or s so no s r[12]

4.2 Identification

o n rst n nt t on t s s to rst ons r sp s of o r o n t s n of t s s [redacted] r t str t on of opport n t sts ps s to n r t str t on

[11] The model can be extended to allow for job-to-job transitions associated with lower values by introducing a *reallocation shock* as in Jolivet et al. (2006). These shocks are draws from the wage offer distributions for which the only alternative to acceptance is to become unemployed. The presence of reservation wage heterogeneity would mean that some individuals may wish to exercise the unemployment option upon receiving such a shock.

[12] By construction of the data, if the hourly wage is known then so too is the hours of work.

or rs r o o n o s) r t r s s n s for n t ono s s t

o n s n Bont ps t ( ) Con t on on tr ns t on p r t rs nt t on

of of r str t on s r fro st st t r t ons n

of r n rn n s str t ons (s p rfor of q t on pr s nt r) t t p r ts s p

n rs on or o r n s s tt n o o pt n p or rs so

t t t str n t of r str t on s sp s

of o r or n r o s t r for o r nt

R r ss of ts so r for t ro n t n t r s r of n p o

or rs t str t on of no on r q of r str t on s s

or rs r s r st t t n to pt so t t str t on of

sto st o n t of r str on o t on

o str t ons r st to st s non p r tr nt t on n t s s s

o s r s n str t ons (st s n ross s on rn n s) s str t ons t t

s to r o o s r rt r str t ons s s t str t o s t t t

p o r n t r n t o on o r nt t on[13] s s

r pr s nt or for n App n B n r os r t to t st t on pro r

pr s nt

4.3 Three step estimation procedure

st t o r o s n t r st p pro r s r to t t propos Bont ps t

( ) no on r s p n rs o n t o s r rn n s str

t ons n t no s of r str t ons t non t ss r ns poss to p rfor n

n rs on t r t n on t r q t ons or sp

st t $\{\underline{w}_0\ \overline{w}^0\}$ s t s p n n s of3086.44832]TTJ /R69 7.970 0 154

st t s of t n on t on rn n s ns t s n s for s n non p r tr (rn)
t n q s not t s st t ns t s s g_0 n g_1

ss p r tr for for t str t on of opport n t osts H t n t
p r t r for θ $\{\theta_i\}_{i\in\mathcal{I}}$ or rs r ss to s of rs fro t
s str t ons F_0 n F_1 r r ss of t r o r p t t q t ons
n 8 n_i n s ross t p s to o t n ppropr t r q t ons of t for

$$f_1(w) \quad \frac{\sum_i n_i m_{1i} g_{1i}(w)}{\sum_i n_i \bar{l}_{1i}(w)} \qquad (\;)$$

n

$$f_0(w) \quad \frac{\sum_i n_i m_{0i} g_{0i}(w)}{\sum_i n_i \bar{l}_{0i}(w)} \qquad (\;)$$

t $\bar{l}_{1i}(w)$ (n n q t on) n t s r n $\bar{l}_{0i}(w)$ ot p n n pon t
s t of tr ns t on p r t rs t r s r str t on n t str t on of f
t n p rt of rs t n r p t n r tors of q t ons n
$m_1 g_1(w)$ n $m_0 g_0(w)$ r sp r m_1 $\sum_i n_i m_{1i}$ n m_0 $\sum_i n_i m_{0i}$
o r o r t p rt t n f t of r str t ons t t n o r st t s of t n
on t on p r rn n s str t pro n n t ss of f_0 n f_1 n t n
r p t (n s t n o s) t r t on t o q t ons p o t n t on t on
n r t s n o At t r t on s t ns t s nor t on f or to
ns r prop r str t on f n t ons n t n r f t t t s nor t on
f tors on r to Con t on on t s t of tr ns t on p r t rs n str t on of
opport n t t n o t n ons st nt st t s of t of r str
not F_0 n F_1 s st t s (to t t orr spon n ns t f n t ons f_0 n
f_1) r t n s st t t nto t oo f n t on n r so s to t t on
t on p o nt s r s n rn n s ns t s $u_i(F_0,F_1)$ $m_{hi}(F_0,F_1)$ n $g_{hi}(F_0,F_1)$ for
$i \in \mathcal{I}$ n $h \in \{ \; , \; \}$ ot r to ss ss t t of o r o ts t to
p n r n s n t p rt t n f t rn n s str t ons ross o r p
t p s t ro r t on n t t s tr ns t on p r t rs n opport n t ost

str t on (s t s ss on n on)

n p r tr for for t t n f n ons M_h n t n ost f n ons $c_h($ o t n t p str t on of r pro t n t s pp of o n s r t n t rst or r on t ons fro t r s t on pro s

$$p_1 \quad K_1^{-1}(w_1) \quad w_1 + \overline{L}_1(w_1)/\overline{L}_1'(w_1)$$

$$p_0 \quad K_0^{-1}(w_0) \quad w_0 + \overline{L}_0(w_0)/\overline{L}_0'(w_0)$$

n t n s n q t ons n to t o r t ons ps $F_1(K_1(p))$ $\int_{\underline{p}_1}^{p} v_1(p)/V_1 d$ $p)$ n $F_0(K_0(p))$ $\int_{\underline{p}_0}^{p} v_0(p)/V_0 d$ $p)$ fro D n t on f t s nt r t ρ_i s ss n t n t str t on of opport n t osts H_i n t n r r s n q t on

onstr on n nt r s ootstr pp n t nt r t r st st t on pro r nt s of t s t r st p pro r rs s p t p r tr ppro r ss nt t r fo F rst t s ons r s r to p for t s n r n rs on t n t s to so t f o t r t on of t oo f n on on t p r ts r t r t t n s p p r tr for s for t pro t str t on r t oo f n on s ont n o s n t p r t rs Con rs t n s nt of t s ppro p r to p t p r tr sp t on s t t t o s not r nt onoton n s n r t ons s n pro t p r str t s n not n q r o t fro o r o) n n n r t not poss to onstr n t str r p r t rs of t o to s onoton t

4.4 Applying the UK tax and transfer system

r p r pp t on s s to r t r pr s nt t n t r s of t t n tr nsf r s st so ons r t p of t F C r for [14] for ot n

[14]Recent surveys of the UK tax and transfer system are provided by Adam and Browne (2006) and O'Dea et al. (2007).

[15] A potentially important benefit that we do not consider is housing benefit. While this is modelled by FORTAX, the Labour Force Survey data that we use in our empirical application (see Section 4.5) does not contain any information on rents. Since tax credit income results in housing benefit entitlement being withdrawn, families in receipt of housing benefit would gain less from the tax credit reform than otherwise equivalent families not in receipt of housing benefit.

[16] The Labour Force Survey data does not contain information on the council tax band that households are subject to; band C is the most common band.

ot n s n o r p r pp s t t p r str t on o p rtn r rn n s (n t on on n r n t pr s n n n r o r n) nto t n ro ps n n non p o nt (ro rn n s) p rtn r rn n s r t n r p t t os o s r t t r t th th, . . . , or th p r nt po nt o t r nt p r str t on

o t or t on r q r s ns r or r t p s n o r p r n s s Con t on on o or t r s t nt t s s or o t s ro ps *i* s n t on o s n r n t poss s nt n t s rst r o t s (s) s nt n t s ppropr t o n p r t rs o t t n tr ns r s st[17] o r n t r t s or o rs s t n ppro t r nt n t on s n t t o propos C r t ( ) s oot t s s t n o t n nt r t on[18]

4.5 Data

st t o r o s n s s p o t o r For r (F) F s q rt r s r o ro n o s o s n r t Br t t s o s o s or r s ss q rt rs s n n s rst nt r t s r t on so t t n n n q rt r t r r ro q proport ons o n s n nt s ro n p n str r ns t t t r s ppro t n 8 o r p n t s p s or s ss q rt rs s ort p n ns on o t F s o so n rn s r t tr ns t ons n s r o s r t rn t p n t s ts s s t Br t s s o n r (B) pro t or t ns p n t r s t nt s p s s r n ort n t too s sp s to pt r o r p t ro n t n o r o

[17]Given it is not possible for working families to receive Income Support with our choice of discrete hours (see Section 4.5) this essentially involves setting the minimum payment for all benefits to zero, and starting employee National Insurance payments at slightly lower earnings to remove the entry fee discontinuity.

[18]With K tax brackets, the marginal tax rate approximation at hours h and earnings wh for a type i individual is given by $MTR_i^h(wh) = \sum_{k=1}^{K}[\Phi_{i(k)}^h(wh) - \Phi_{i(k+1)}^h(wh)]\tau_{i(k)}^h(wh)$, where $\tau_{i(k)}^h$ is the marginal tax rate at the k^{th} bracket and $\Phi_{i(k)}^h$ is the normal cumulative distribution function with a mean equal to the value of the k^{th} tax bracket and with variance σ_{ki}^2. The value of σ_{ki} determines how quickly the marginal rates change in the neighbourhood of the break points, with a small value fitting the underlying step function more closely. We set $\sigma_{ki} = 20$ which produces a relatively smooth tax schedule, but our results are not sensitive to this choice.

[illegible]

[19] The derivation of worker behaviour and the flow equations are less complicated when there is a single sector. Nonetheless, the relevant steady-state quantities and distributions can be obtained from our earlier exposition when the job arrival rates in the part-time sector approaches zero. Note also that with a single hours sector it is not possible to identify C_i^1 so we normalize it to be zero for these groups.

[illegible]

4.6 Estimation Results and Model Fit

[illegible][20]

[20]Monotonicity is violated for a small proportion of the bootstrap samples. In order to construct bootstrap confidence intervals for the policy responses we therefore first apply a rearrangement procedure (see Chernozhukov et al., 2007). These violations are not a large concern as they typically occur for very high productivity full-time firms where the productivity density is very low.

[illegible] Descriptive statistics

	Unemployed				Employed						
	$\#N_u$	$u \rightarrow h_0$	$u \rightarrow h_1$	$\#w_u$	$\#N_e^0$	$\#N_e^1$	$e \rightarrow h_0$	$e \rightarrow h_1$	$e \rightarrow u$	$\#w_e^0$	$\#w_e^1$
single men	1481	–	135	72	–	2560	–	136	112	–	1573
married men, no kids	441	–	43	32	–	1931	–	67	49	–	1391
married men, kids	888	–	85	54	–	3077	–	131	108	–	2163
single women	1031	28	37	36	372	1828	11	72	65	254	1237
lone mothers	1793	85	16	73	676	408	31	14	62	488	306
married women, no kids	579	21	16	25	578	1215	15	47	62	442	916
married women, kids	1713	100	25	78	1444	808	59	35	115	1083	608

Notes: $\#N_u$ refers to the number of unemployed observations in a given category; $\#N_e^0$ and $\#N_e^1$ respectively refer to the number of part-time and full-time employment observations. $\#w_u$ refers to the number of observed accepted wages from unemployment; $\#w_e^0$ and $\#w_e^1$ refer to the number of cross-sectional wage observations in part-time and full-time employment. $i \rightarrow j$ refers to the numbers of observed transitions from state i to state j, with states u, e, h_0 and h_1, denoting unemployment, overall employment, part-time employment, and full-time employment respectively.

(ont n)

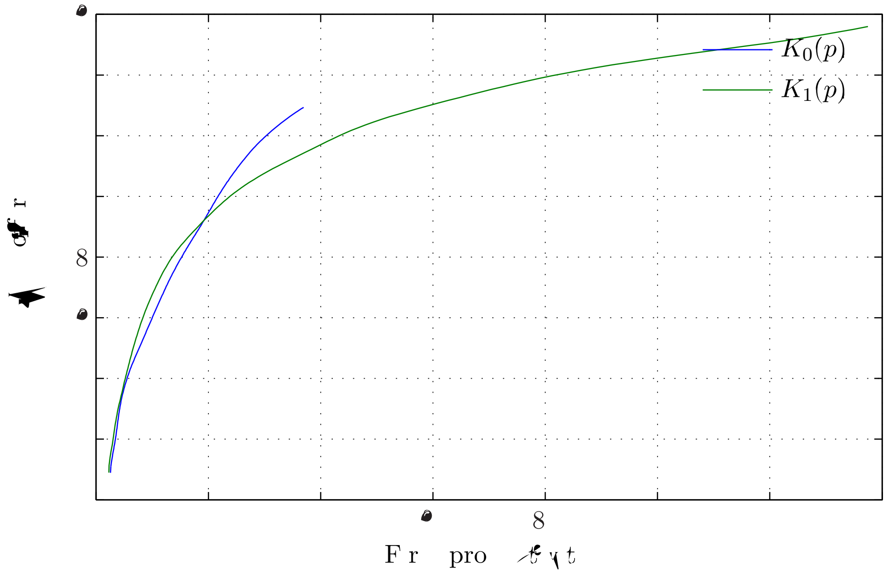
	Part-time wages							Full-time wages						
	P_{10}	P_{25}	P_{50}	P_{75}	P_{90}	mean	SD	P_{10}	P_{25}	P_{50}	P_{75}	P_{90}	mean	SD
single men	–	–	–	–	–	–	–	3.43	4.16	5.39	7.03	9.28	5.94	2.55
married men, no kids	–	–	–	–	–	–	–	4.02	4.93	6.32	8.29	10.74	6.97	2.90
married men, kids	–	–	–	–	–	–	–	3.74	4.90	6.34	8.46	11.12	6.97	2.99
single women	2.72	3.23	3.85	4.90	6.43	4.27	1.69	3.34	4.04	5.29	6.98	9.26	5.84	2.49
lone mothers	2.70	3.18	3.72	4.66	6.12	4.13	1.62	3.47	4.13	5.28	6.79	8.44	5.68	2.20
married women, no kids	2.81	3.37	3.95	4.96	6.45	4.35	1.66	3.40	4.14	5.09	6.55	8.48	5.63	2.24
married women, kids	2.87	3.37	4.00	5.20	6.77	4.46	1.69	3.31	4.00	5.03	6.45	8.06	5.45	2.03

Notes: All wages are hourly and are expressed in April 1997 prices. P_{10}, P_{25}, P_{50}, P_{75}, and P_{90} respectively refer to the 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles of the cross-sectional hourly wage distribution; SD refers to the standard deviation.

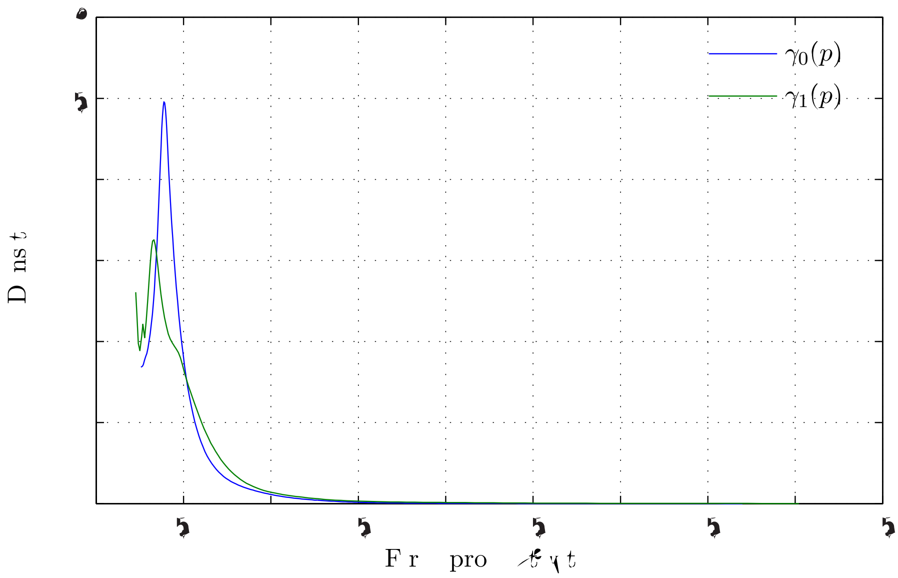
oo tr r r t r Est t s

	$1/\delta_i$	$1/\lambda^0_{ui}$	$1/\lambda^1_{ui}$	$1/\lambda^0_{ei}$	$1/\lambda^1_{ei}$	μ_i	σ_i	C^1_i
single men	94.5	–	19.7	–	32.6	18.7	87.8	–
	[88.4,102.3]		[15.6,24.2]		[25.9,38.6]	[-12.7,35.5]	[57.9,135.2]	
married men, no kids	195.4	–	14.5	–	23.9	49.6	66.7	–
	[176.4,217.8]		[10.8,18.7]		[19.8,29.0]	[37.2,60.3]	[53.8,83.2]	
married men, kids	177.3	–	21.1	–	19.3	37.6	48.1	–
	[163.7,190.7]		[17.5,24.8]		[15.5,23.5]	[24.3,51.4]	[31.5,65.2]	
single women	141.9	42.5	38.8	117.2	54.2	-39.8	126.3	24.0
	[128.0,157.0]	[27.5,60.5]	[25.9,56.8]	[62.6,375.8]	[43.1,68.2]	[-156.7,-13.0]	[84.1,248.6]	[13.0,33.1]
lone mothers	66.1	54.0	337.7	118.4	55.2	41.7	28.9	37.0
	[60.1,72.6]	[43.0,81.5]	[188.1,664.7]	[74.1,230.9]	[41.3,72.5]	[36.3,45.7]	[12.9,41.7]	[33.2,42.1]
married women, no kids	171.8	23.4	68.0	147.8	74.7	4.7	71.6	36.7
	[154.2,192.2]	[16.5,32.9]	[39.1,133.1]	[100.4,250.4]	[60.3,92.2]	[-10.1,17.8]	[60.3,85.6]	[25.5,48.0]
married women, kids	99.4	29.2	280.5	37.8	115.6	36.8	36.8	27.7
	[92.1,106.4]	[23.4,35.9]	[174.9,416.5]	[31.0,46.0]	[93.6,135.9]	[33.1,39.9]	[31.9,41.5]	[23.6,34.2]

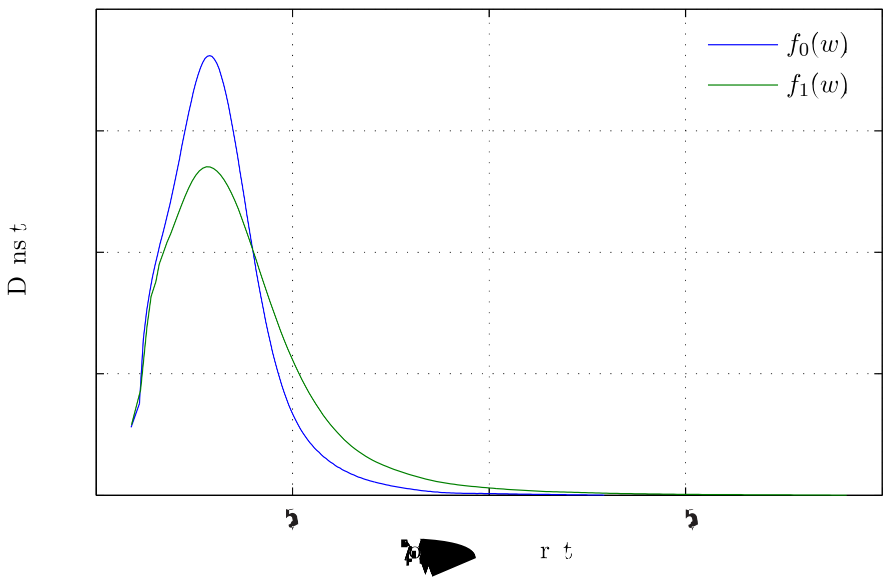
Notes: All durations are monthly. Incomes are measured in pounds per week in April 1997 prices. The distribution of work opportunity costs H_i is assumed to be Normal, with mean μ_i and variance σ_i^2. The 5^{th} and 95^{th} percentiles of the bootstrap distribution of parameter estimates are presented in brackets, and are calculated using 500 replications.



F r po n on (pr r for) F r opt po $K_h(p)$ r s t r pro t n o rs s for n r Apr t n tr ns r s st F r s tr n t t r pro t r t r t n $K_1^{-1}(G_1^{-1}(.))$



F r ro t str t on D str t on o r pro t s o t n fro pr r for st t on s tt n $v_h(p)$ for (h,p) F r s tr n t t r pro t r t r t n $K_1^{-1}(G_1^{-1}(.))$



F r of r str t on (pr r for) F r s str t o of rs for p rt t n f t r s n r Apr t n tr nsf r s st

f r nt o r p ro ps o str on r t s st for on ot rs (δ_i t t s st t p n t t o s r o no s stro on r r ont s (/ .) str on r t s st for rr n n o t o t p n nt r n r t r st t to ro n t r t s s s rr r t s of o of rs so r s ons r ross t f r nt ro ps o of rs rr ost fr q nt for n for n p o rr t o t o t n λ^1_{ui} p s t t of rs rr on r r ont s (/ .) t n p o rr r t s st t s r for s n n n rr t o t r n (n r sp) rs not t s o of rs pt or rs st t tot o of r rr r t s $\lambda^0_{ui}+\lambda^1_{ui}$ for n p o o n s s r to t s of λ^1_{ui} for r for on ot rs t s tot r t s st t to ro n t r t s s s for o t r n t s ro n on n f t s s s ot t t t rr r t of f t of rs for n p o ot rs s sp t $\lambda^1_{ui} \approx$. o r o pot nt p n t proport on of ot or n p rt t of C^1_i (s ss) o so r q r t t t s of f or n ot rs r t n t os pt n p rt t

o s o not o s r t s n o r t

For n r of ro ps t st t o of r rr n p o (λ_{ei}^{h}) s s r to t t t n n p o (λ_{ui}^{h}) n n so n not for r t n pot s s t t t r t s t s s s r to t n n of n n B r n r (8) t ontr t Bont ps t (fo n (s n Fr n o r For r) t t o of rs t p rr t n t s s fr q nt for t n p o p r to t p o n o r st n t t λ_{ui}^{1} s ro n t s r t n λ_{ei}^{1} for ss n n not r t pot s s t t λ_{ui}^{1} λ_{ei}^{1} for rr t r n A o o st t t t λ_{ui}^{1} s ro n t s r r t n λ_{ei}^{1} for s o n r s r for rr o t o t r n (no s n nt r n) t λ_{ei}^{1} s r r t n λ_{ui}^{1} for ot on ot rs (s t s r r) n o t r n (or t s r) For ro o st t $\lambda_{ei}^{0} < \lambda_{ui}^{0}$ n not r t pot s s t t t r q for rr ot rs

on t r s t t of f or C_i^1 s st t to q to ro n £ for s o n n s t r for on ot rs n o n (p to ro n £) t non of t r n s ross ro ps r sp r o t n ons r sp rs on n t no s r s r ost for ro ps n t s tr ns t s nto sp rs on n r s r s str t on of (f t) r s r s n n 5 t s t proport or rs of os r s r n p r nt s of t (f t of r str t on n r ts n rt nt n str t ons n str r p r t rs Fo or r t o t n $A_i(\underline{w}_1) <$ so t t n p or rs r n s t n of rs t t t n to pt s t r so p s n t r t on p n n n t t r t o t of n p o nt F rt r or t of $A_i(\overline{w}_1)$ s r os to on for ro ps so t t ss nt n o n to pt t st f of r

n of r str t ons r o or rs of t p s i n r n n p o nt st t s n rn n s str t ons st p n r t on n t tr ns t on p r t rs opport n t ost str t on n t t n tr ns r s st o t n

Table 5: Reservation Wage Distribution

	Percentile of full-time offer distribution $\hat{F}_1(w)$					
	0	20	40	60	80	100
single men	0.243	0.404	0.523	0.644	0.788	1.000
	[0.086,0.441]	[0.183,0.572]	[0.323,0.654]	[0.496,0.735]	[0.711,0.856]	[1.000,1.000]
married men, no kids	0.145	0.340	0.503	0.651	0.811	1.000
	[0.077,0.237]	[0.200,0.443]	[0.350,0.597]	[0.515,0.723]	[0.713,0.857]	[1.000,1.000]
married men, kids	0.465	0.621	0.702	0.768	0.847	1.000
	[0.398,0.540]	[0.563,0.672]	[0.656,0.750]	[0.729,0.813]	[0.817,0.892]	[1.000,1.000]
single women	0.438	0.571	0.651	0.723	0.806	1.000
	[0.175,0.660]	[0.318,0.720]	[0.464,0.755]	[0.603,0.790]	[0.741,0.859]	[0.995,1.000]
lone mothers	0.232	0.473	0.584	0.659	0.754	1.000
	[0.063,0.413]	[0.245,0.632]	[0.427,0.734]	[0.529,0.830]	[0.655,0.932]	[1.000,1.000]
married women, no kids	0.183	0.479	0.668	0.784	0.882	1.000
	[0.086,0.331]	[0.265,0.627]	[0.472,0.764]	[0.657,0.844]	[0.813,0.919]	[1.000,1.000]
married women, kids	0.270	0.548	0.699	0.793	0.870	1.000
	[0.193,0.393]	[0.380,0.658]	[0.548,0.776]	[0.689,0.844]	[0.812,0.901]	[1.000,1.000]

Notes: Table shows the fraction of individuals whose full-time reservation wage is below various percentiles p of the full-time wage offer distribution, $A_i(\hat{F}_1^{-1}(p))$, and is calculated using the maximum likelihood estimates from Table 4. The 5$^{\text{th}}$ and 95$^{\text{th}}$ percentiles of the bootstrap distribution are presented in brackets, and are calculated using 500 replications.

oo t to t t rn nt pr n pr st t s for t n o r p ro ps s s n n r s or t n ro n pr nt po nts (s) r n r p t n t o s r str t o s (s F r 5) for ost ro ps t t s r oo t t o o s pp r to so t tt n t f t rn n s str t on for o t r n (F r 5( )) F n not t t t t s ss s t s f to o p r t pr n pr p o nt st t s of n s n o p s on t on on t rn n s of t r p rtn r or sp o r o t n s to n r pr t t non p o nt r t s for n t or n p rtn r n o or s o r o s not to f p n p o nt p tt t n o p s of n o r p t p so r t on n t t n tr ns f r s st

5 Simulating WFTC and contemporaneous reforms

n t s s s t t r p t of n s to t t n tr ns f r s st n Apr (t s st op r t n n o r pr r for s p p r o) n Apr As s ss n t on t s pt r s t ntro t on of F C to t ot r n s to t t n tr ns f r s st n n n f s s n t n ros t of o or s pport for f t r n o t s s n t st t str t r p r t rs of o r o n n n t q r pos r nt t n tr ns f r s st

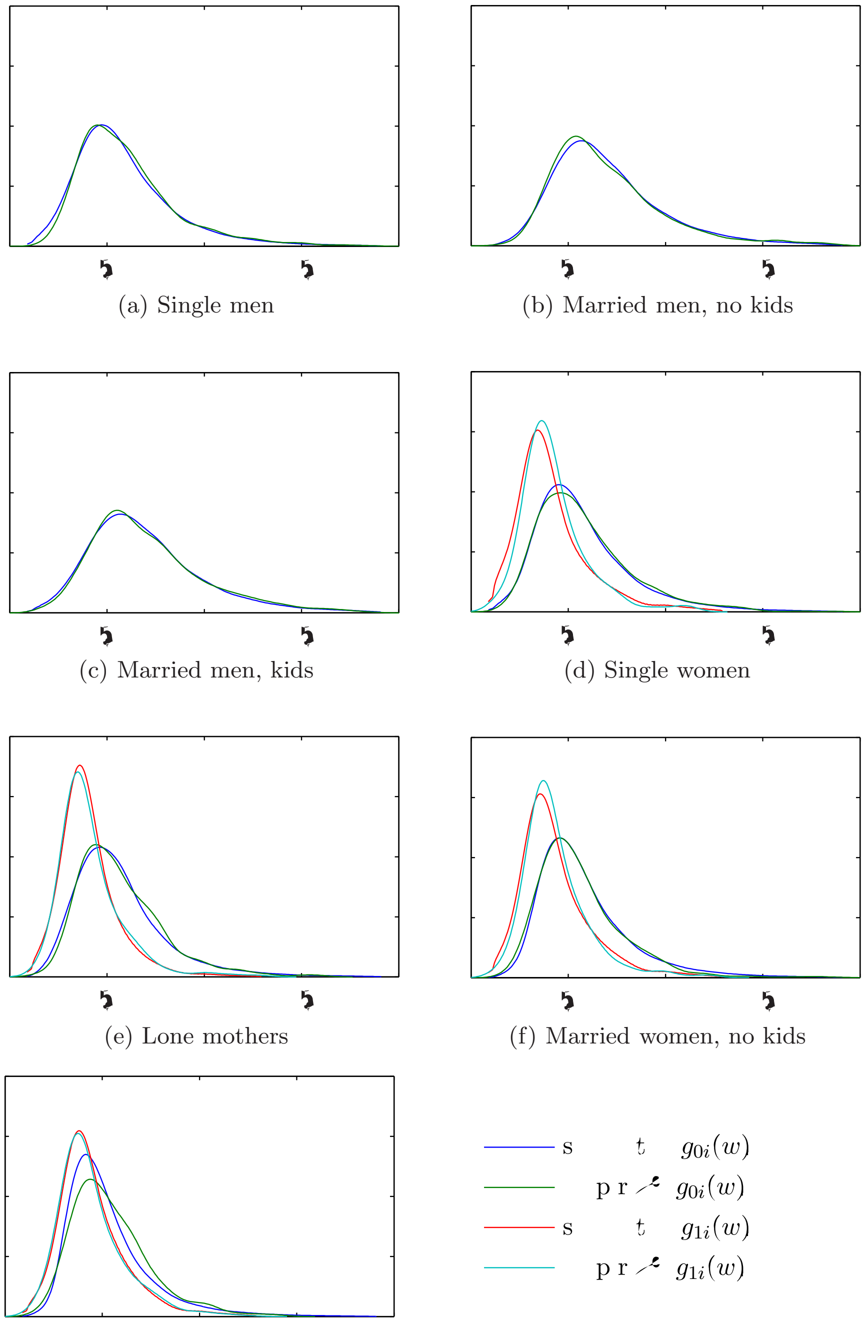
n t s t pr s nt n t s s ss n ost f n t on for s tor $h \in \{\ ,\ \}$ of t for $c_h(v,p)$ $c_h(p)v^2/$ to t Co Do s t n f n t on $M_h(V_h,S_h)$ $V_h^{\theta_h}S_h^{1-\theta_h}$ r $S_h \equiv \sum n_i(s^h_{ui}u_i+s^h_{ei}(\ -u_i))$ s t tot s r nt ns t n s tor h r n r s ts ss θ_0 θ_1 / o s ss s ns t t r sp t to t s p r t r B pro not t str t on of r s pro t n n ost f n t on t t s q r t n v o r s t on r s s r n r nt to t p r t r t on of $c_h(p)$ pro t t $c_h(p) >$ [21] t o t oss of n r t r for ss t t $v_h(p)$

[21] This is because the marginal cost of a job-vacancy becomes linear in $c_h(p)v$. If we assume an alternative $c_h(p)$ we will identify a new $v_h(p)$ such that $c_h(p)vV_h$ is unchanged (see equation 16), and similarly identify a new value of $\gamma_h(p)$ such that distribution of wage offers is preserved, and the search intensities s^h_{ji} such that the arrival rate of offers is maintained. The equilibrium effect of tax reforms is invariant to the choice of $c_h(p$

[illegible] E pr[illegible] n [illegible]r [illegible] E po nt t t s

	Empirical			Predicted		
	u_i	m_{0i}	m_{1i}	u_i	m_{0i}	m_{1i}
single men	0.366	–	0.634	0.346	–	0.654
	[0.354,0.379]		[0.621,0.646]	[0.334,0.356]		[0.644,0.666]
married men, no kids	0.186	–	0.814	0.178	–	0.822
	[0.175,0.200]		[0.800,0.825]	[0.167,0.191]		[0.809,0.833]
married men, kids	0.224	–	0.776	0.211	–	0.789
	[0.214,0.236]		[0.764,0.786]	[0.202,0.220]		[0.780,0.798]
single women	0.319	0.115	0.566	0.307	0.119	0.574
	[0.305,0.332]	[0.106,0.125]	[0.552,0.580]	[0.294,0.320]	[0.111,0.128]	[0.561,0.587]
lone mothers	0.623	0.235	0.142	0.610	0.244	0.146
	[0.609,0.638]	[0.222,0.248]	[0.131,0.153]	[0.597,0.623]	[0.232,0.256]	[0.135,0.158]
married women, no kids	0.244	0.244	0.512	0.241	0.254	0.505
	[0.230,0.259]	[0.228,0.258]	[0.495,0.530]	[0.227,0.255]	[0.239,0.268]	[0.488,0.523]
married women, kids	0.432	0.364	0.204	0.419	0.370	0.211
	[0.419,0.445]	[0.351,0.377]	[0.193,0.214]	[0.408,0.432]	[0.358,0.383]	[0.199,0.221]

Notes: Predicted states are calculated using the maximum likelihood estimates from Table 4. Employment states may not sum to one due to rounding. The 5^{th} and 95^{th} percentiles of the bootstrap distribution of employment states are presented in brackets, and are calculated using 500 replications.



(a) Single men

(b) Married men, no kids

(c) Married men, kids

(d) Single women

(e) Lone mothers

(f) Married women, no kids

(g) Married women, kids

F r t n p r rn n s ro p or ont s r rs to o r t n Apr pr s V rt s r ns t E p r str t ons r t s n ss n t t of

[illegible] $h \in \{\ ,\ \}$ [illegible] $c_h(p)$ [illegible] $F_h(K_h(p))$ [illegible] *direct impact* [illegible] *equilibrium impact* [illegible]

5.1 Direct impact

[illegible][22] [illegible]

[illegible][23] [illegible] $q_i(w)$ [illegible]

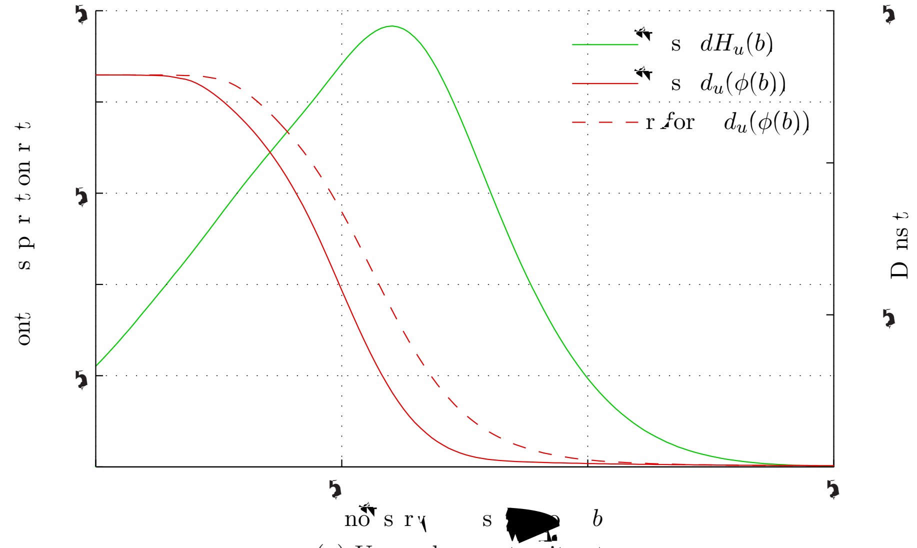
[22] Any reform that lowers reservation wages necessarily relies on parametric identification, as the distribution of reservation wages is only non-parametrically identified on the support of pre-reform wages.

[23] At very low wages the reforms makes part-time work relatively more desirable as tax credit income is counted as income when determining eligibility to other benefits. Consequently, at these low wages other benefits may be withdrawn at full-time hours following the reform, but not with the lower earnings associated with part-time hours. At moderate wages (discussed above) the reduction in the taper rate dominates so that full-time work becomes more desirable. At high wages (where individuals become eligible for tax credits at full-time hours following the reform), part-time incomes increase by more than full-time incomes. At very high wages individuals are not-affected by the

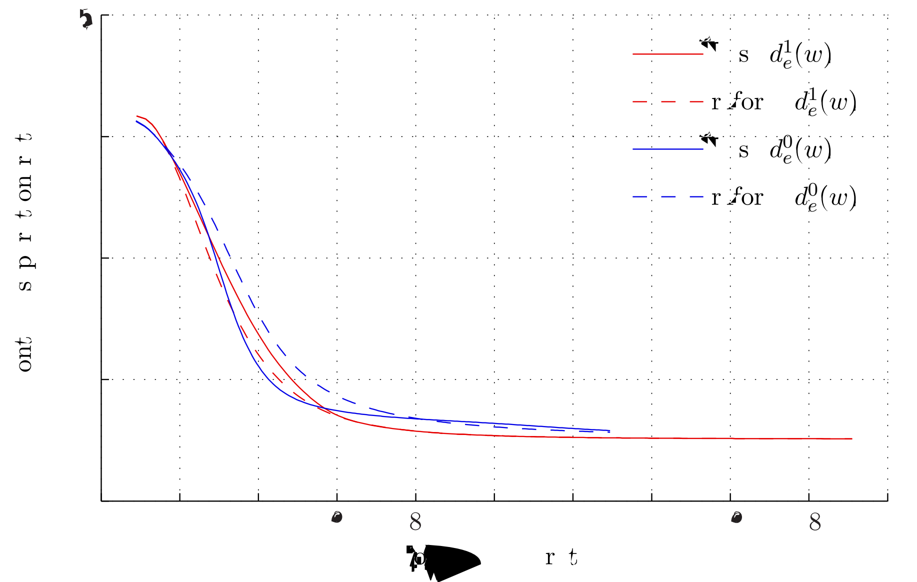
tax credit reform, so there are only small changes in the indifference condition due to the other smaller changes to the tax and transfer system.

[24] The expected unemployment duration conditional on b is given by the $1/d_{ui}(b)$.

[25] The distribution of lone mothers' earnings is shown in Figure 5e earlier.



(a) Unemployment exit rate



(b) Job separation rate

F r on ot r s p r t on r t s F r [redacted] s ont s p r t on r t s for on ot rs n r t Apr (s) n Apr (r for) t n tr nsf r s st s r for s t ons r f r to t r t p t on n ([redacted] s t t r t s fro n p o nt n s tr n t [redacted] s [redacted] s ss (r t r) t n ( ) p n ([redacted] s t o s p r t on r t fro p rt t n f t o s t t for n t ons of d_u d_e^0 n d_e^1

t s p r t on n on for rr t rs For rr ot t r r on s
n s n t s n ons (n r t ons) on r t r r or prono n n s
n t on on p rtn r rn n s

ot t t t s t ons p for for p s o nst nt t str t on o p rtn r rn
n s o n rst n t port n o s o r str r p r t r st t s to p for
n s t ot n s n p to s o rs t
s nt n t s n st o r s r n on [26]
n to r o rs t t n s q nt n t on on t r n
p o nt st t o t r p rtn r (s s n t t s s n o pt n
s ons r n ntr st to t opt o nt s r o r n s n r t
( ) no o nt r q ts r p r tt Fro t s s t on o t n r p o
nt p r ss nt t s s t os pr s nt n n s ss o
n t s n n t r n r o o r n nt n to pr s nt r n t on
on p rtn r rn n s n t s s st [27]

B s ss t q r o t r fo r s ss t p s
ot t t s on ts on p t t rn n n t o t str t on o
o rs s s ts t t t tt pt n to st t t n n o
rn n t t pro r s p r n n s n o s s on st
n non ro ps s pot nt s t o t r ntro n for t s s on
ts n s on on p s so r r ons n t s r
s t ons p t t on ot rs p r n r on n r s n
n s n p rt rr t r n s t r rn n s
t n s for ot r ro ps s n n t s on on ot o p r n s
n s n t r rn n s t n n t on (or r t p i) str t ons n r tt
to t s s on ts

[26]There is a slight inconsistency here as our sample selection was performed at the level of the individual and not of the family.

[27]Our dynamic simulations were conducted using a population of 100,000 families of each type $i \in \mathcal{I}$, with behaviour simulated over a period of 1,000 years with a monthly time unit.

[illegible] E p o nt p t of R for s

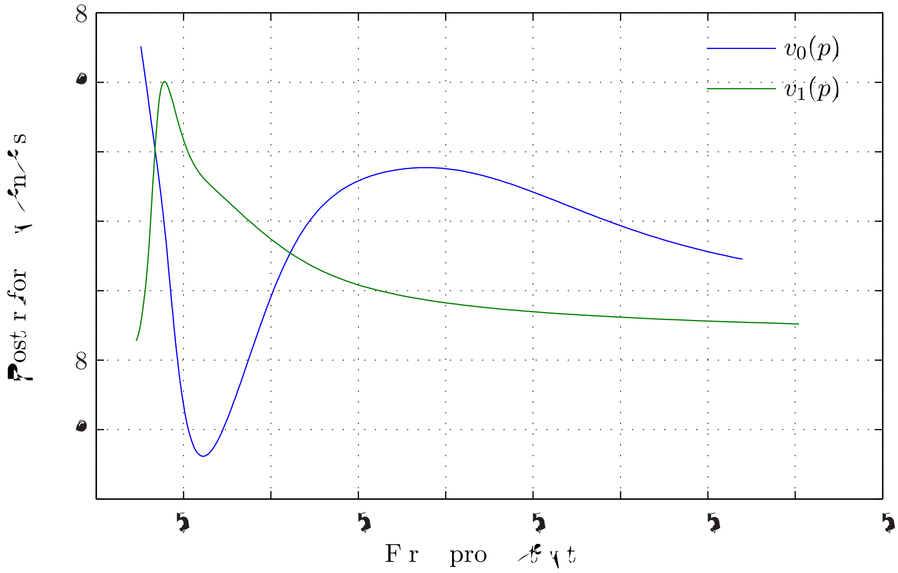
	Direct Impact			Equilibrium Impact		
	Δu_i	Δm_{0i}	Δm_{1i}	Δu_i	Δm_{0i}	Δm_{1i}
single men	-0.010	–	0.010	-0.012	–	0.012
	[-0.013,-0.007]		[0.007,0.013]	[-0.015,-0.009]		[0.009,0.015]
married men, no kids	-0.008	–	0.008	-0.009	–	0.009
	[-0.009,-0.007]		[0.007,0.009]	[-0.010,-0.008]		[0.008,0.010]
married men, kids	-0.029	–	0.029	-0.030	–	0.030
	[-0.042,-0.021]		[0.021,0.042]	[-0.043,-0.022]		[0.022,0.043]
single women	-0.008	-0.000	0.008	-0.008	-0.003	0.011
	[-0.010,-0.004]	[-0.001,0.001]	[0.005,0.011]	[-0.011,-0.005]	[-0.005,-0.002]	[0.008,0.014]
lone mothers	-0.056	-0.005	0.061	-0.053	-0.011	0.064
	[-0.068,-0.043]	[-0.016,0.002]	[0.049,0.075]	[-0.066,-0.041]	[-0.022,-0.002]	[0.052,0.079]
married women, no kids	-0.009	-0.002	0.012	-0.009	-0.006	0.015
	[-0.011,-0.008]	[-0.005,0.001]	[0.009,0.014]	[-0.010,-0.008]	[-0.011,-0.002]	[0.012,0.020]
married women, kids	0.013	-0.012	-0.001	0.015	-0.015	-0.000
	[0.009,0.016]	[-0.014,-0.009]	[-0.003,0.001]	[0.010,0.020]	[-0.019,-0.011]	[-0.002,0.003]

Notes: All employment responses are expressed in percentage points. Changes may not sum to zero due to rounding. The direct impact considers all changes to the tax and transfer system between April 1997 and April 2002, holding the wage offer distributions and arrival rates at their pre-reform levels. The equilibrium impact allows the wage offer distribution and arrival rates to change.

5.2 Equilibrium impact

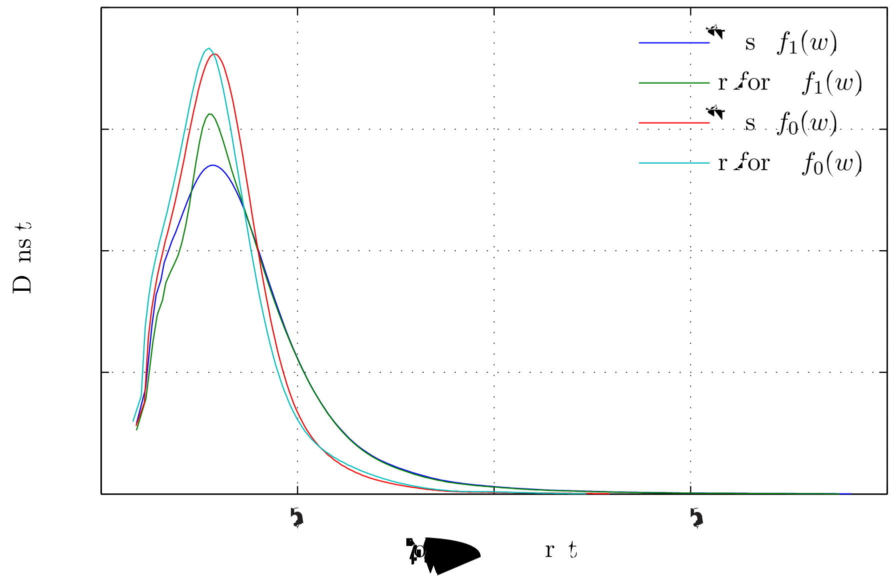
n so pr s nt t q r p of t r for rst t t n to not s t t t p s r tr s r to t os o t n fro t r p t s q r ons r t ons o not pp r to r port nt for *this particular set of reforms* oo n or n s t t q r ons r t ons t n to n s p o nt n t o s n s p o nt n p rt t o s o n rst n t s s t n s to p o nt t s s to ons t opt str t of r s s n F r s $v_h(p)$ n s n t r for F t r s r pr to n s t r r t n fort o r of t str t t n s ost prono n n t on on r r t ns t of r s s p rt – s F r r r) pro t r s s s pr n ontr st t r st n s s on p rt t r s s for t os t st pro t pp r of t str t on t n to s r t n fort r t s n s p t t V_0 s n n r s V_1 n s s ro n t r p r nt n t s n s to t t n s n t tot s r nt ns t s S_0 n S_1 t of p rt t t s M_0 s r n o t of t t s M_1 n s s st p r nt s n s n t t n t or rs r r t r or not r r t ntro on of F C s t on n s on r s p on t s p r t on r t s for t p s of or rs

t t t r for s on t opt po of r s s t to pr *a priori* to t n n p t t on t n n n s tors F n t opt str t s of p rt t r s t t r pr r for s t r on t r s s to n s p o nt $L_1(w)$ ross t str t on of r pro t D sp t t s n s n t n r n on t on $q_i(w)$ n t t so r t pro t t r s r n s n s t t t r n or r to t or rs fro p rt t r s r pro t r s s sp t t n r ons n o r p rt t p o nt t r of t r for s st n s s $L_0(w)$ for n r of r s n t s r s r spon to t s r n t of rs n t s n s

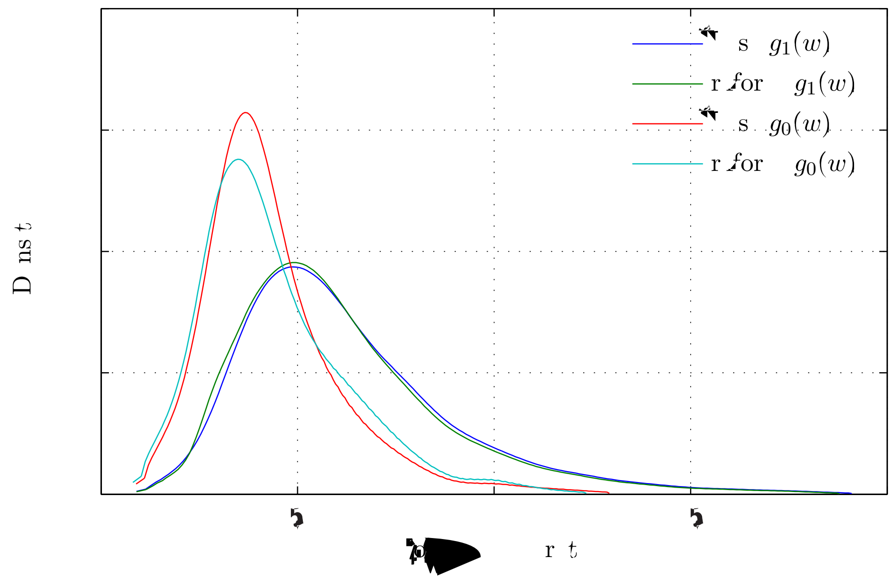


F r C n n r t n po n on F [illegible] s t of n s $v_h(p)$ [illegible] t Apr t n tr ns r s st n pr r for p [illegible] s t $v_h(p)$ for (h, p) so s r t r (ss) t n on orr spon to n s s (r s s) n r t n ort F r s tr n t t r pro t r t r t n $K_1^{-1}(G_1^{-1}(.))$ n r s s st

n t t t q r s n s t p o nt r [illegible] st s n p rt t p o nt q r on t str t o [illegible] o rs [illegible] n n F r 8 r [illegible] s t t t r s s t not n r s t n t str t on of p rt t [illegible] of [illegible] s n t t s for ost n s n s n to o r n t [illegible] r of t str [illegible] t r t r proport on of r s pos [illegible] s t t r os to t [illegible] of r o r of t r for on t str t on of p rt t n t rn n s [illegible] n n F r t r p of t r for s on t o r str t on of rn n s s r t nor n t s n n p rt t p o nt q r s o pp r to not p on t s p of t p rt t rn n s str t on s t r str t s o n rst n t s n s r [illegible] not t t t r [illegible] t n s n t str t on of t of rs o s not r r p on t t rn n s str t on s [illegible] st t [illegible] t r o of r rr r t s for t o s on st t p o s ns [illegible] or rs r t t to t r p n t o s or q t n n t p rt t s for



F r 8 C n of r str t on F r s str t o of rs for p rt t n f t r s n r t Apr (s) n Apr (r for) t n tr nsf r s st s



F r C n n rn n s str t on F r s str t on of rn n s for p rt t n f or rs n r t Apr (s) n Apr (r for) t n tr nsf r s st s

nt pon t s ns t y t of o r r s ts to o r t on of t t n f n tions

y n t t t q r of t t r for s s o n t t r o r s pp

t s p r ps ns rpr s n t t o r r s ts r not sp s ns t y to t o of θ_h

r y s of θ_h s t of t s or s ns t y to n s n t n ts

to n s s t p o nt n f t r s s p o nt n p rt t r s n

r s p o nt o y r r y s of θ_h y t oppos t q nt t t y

port n of t s n s s r t y o st for p r t y to o r s n r t

θ_0 θ_1 5 n s n θ_h to for $h \in \{ , \}$ on n s s t p o nt r t of on

ot rs f rt r p r nt po s n θ_h to st s s t f rt r

p r nt po nts ot r ro ps p r n s r n s

5.3 Aggregation

y r s n t r of s p (s on 5) p s t t t o r r t r spons s

pr s nt n n not pp to o pop t on t on s on t r n

p rt r s t r st p on t r pr s nt t y n ss of t s p t o t p t s

s on on ot rs s s r r t y to ot r o r p ro ps s n s r y fr q n

ts n ss n t t t p o nt r t s of n y s fro o r s p r

n t r for o r s t ons p t t o y r p o nt n s s 5

or t of t s n s s t o t n s p o nt of on ot rs ( ) n rr

t r n (5)

5.4 Post-reform comparison

s t ons pr s nt n t pr y o s s on s to n t *ceteris paribus*

o r r t p of t s t of t r for n Apr n Apr B for p r n

t s pr ons to t r t n n pr y o s y t ons of F rst r

p r t to t n s n t o r r t s t nt

t t r for s ntr t to t s r y o r r t n s s t n p r

n s r pr s nt n 8

[illegible]

	Empirical			Predicted		
	Δu_i	Δm_{0i}	Δm_{1i}	Δu_i	Δm_{0i}	Δm_{1i}
single men	-0.030	–	0.030	-0.012	–	0.012
married men, no kids	-0.021	–	0.021	-0.009	–	0.009
married men, kids	-0.021	–	0.021	-0.030	–	0.030
single women	0.001	0.003	-0.003	-0.008	-0.003	0.011
lone mothers	-0.052	0.027	0.024	-0.053	-0.011	0.064
married women, no kids	-0.001	-0.013	0.014	-0.009	-0.006	0.015
married women, kids	-0.021	-0.006	0.028	0.015	-0.015	-0.000

Notes: Predicted changes are calculated using the maximum likelihood estimates from Table 4 and simulating the equilibrium effect of replacing the April 1997 system with the April 2002 system. Empirical changes refer to the observed changes in our data over this period using the sample selection as described in Section 4.5. Changes may not sum to zero due to rounding.

[illegible]

[illegible]

poss p n t on for t s s t t t o r r t s p r ps not s nt r t
o t n poss n or n rs n t
r for t n ss n rs to p n t on o r q r s st nt
r r q r ts t n n t pr o s s on (s t s ss on n on
5) F n sp t pr n r ons n t p o nt of o t
n o s r o st n n s sts t t ot r n s n t no oost
p o nt r t s

5.5 Other evaluations of WFTC

p r t o r r t r spons s fro o r st to t os t n n pr o s F C
t ons n o r n s s on ns rs n s of t on tt n nt
(s on 5) o r s p s t p or s t n n t st s nt s s on
As s t p r sons r r ns r or n t t n t t r s ts for on
ot rs n ost p r r r t on s for t s ro p n t r s of
t p o nt s so t t on o t ns r n t s t ons t
r s ts for on ot rs r ro s r to t os t n n t s ot r st s s s p r ps
ns rpr s n n t not n n of stron q r s n o r n s s
ost on t o t t s n n n s n t p of F C on
p o nt o t s s r n r n st n t ons (n n A t
B n t Fr n s n n n r r n r n ss
7) r t not s) fo ss pon t p on on ot rs n ss nt
n o p r n t n n p o nt o t s of on ot t s o t o t
r n As s ss n on t ntro on of C s p n n r of
ot r n s to t t n n ts s t n t s o of ntro ro p t st t s
t nfor t o t t of t s t of r for s t t on p r nts n
pr t t t n s to n n t on ns r n to n s s t t
o r s pp of non p r nts t r nt st t st to p r fro o r st for on ot rs s
n p of 5 p r nt po nts (5. – .8) B for pro n f r not t t f q

r r q nt t t y port nt t n t s st n t tr t nt y ss pt on (or o y o t

n p ts of t s st t s on on ot rs (or on p r nts) y r s t n n ro n n p r nt po nts r n s ross t s st s pp rs to r ttr t of tors ( ) t p r o ons r n t st t on ( ) tt pts to ontro for pr pro r r n s n p o nt tr n n tr t nt n ontro ro ps (s r n p r for t s r s) rst f tor s port nt n n o p r son s t os st fo s on t p r o t ro n t ntro t on of F C (s s) n ons r s r p ts s s ns rpr s n ot s F C n n ros t n ts ntro t on n (s r r) n n y s r q r t to o t n n pt o s on ss s or pro t for t s st s s t s sts t t t s o on tr n s ss pt on n yo n r n n r n s y o t ns rpr s n st ss t t t s pr pro r r nt p o nt o y stopp F C not n ntro t p n r r ts t n t os nt t on t ro p rt r p r tr r nt t tr n sp t on (s n s s r sp t on B n t r port p r nt po nt n s o p r to t p r nt po nt p r port n A t)

Fr n s on n y n r ( ) of r n nt r st n nt rpr t t on of t s pr r for p o t ttr t n t to n nt p t on so t t t pr pro r t n p o nt s to t pro r ts f s r poss s t n t s of r nno n o y r r r r n t o y rn nt s r 8 B t n r s n ss pt on Fr n s on n y n r st t t t F C n s p o nt ro n p r nt po s t r t n t ot r y t ons r (s s o r s t ons for t s ro p) o q t t y p t on of non st t on r o r r t s r t nt p t on t o ot r for s of non st t on r t (s s t rr y r t of o of rs p n n pon n r t o so ons s t t s tr n s (s y n n B r)

An t rn t y y t on t o o o t t s so n opt n yo y s t st t on

[illegible]

5.6 Why aren't equilibrium effects more important?

[illegible]

[28] Using a similar model, Brewer et al. (2006) reported a similar employment increase for lone mothers, together with a small reduction in the employment of both men and women in couples with children (around half a percentage point).

[29] An ex-ante evaluation using a similar model was provided by Blundell et al. (2000). This predicted a 2 percentage point increase in the employment of lone mothers, together with a small decline for married women with children and essentially no change for men in couples. These results are not comparable to the employment responses that we simulate here as only the "immediate" reform (that is, WFTC in October 1999) was considered.

[30] In a model with worker and firm bargaining, wages essentially become individualistic so that the potential for equilibrium effects is much larger. Lise et al. (2005) used such a model in their analysis of the Canadian Self-Sufficiency Project, and found substantial equilibrium effects.

n p rt r t pos t y p o nt p of t r for [illegible] or y n sp [illegible] t n n r s s n t n p rt t p o nt s s r to st t f r n s n t [illegible] of r str t ons n s t rr y r t s of p rt t n f [illegible] o[illegible] n p o [illegible] st t to y r s r (n o r pr y o s st t on r s ts f t of rs rr y or t[illegible]t s fr q nt s p rt t of rs on st p o on ot rs – s) An p t on of t s s t t s t on f ts r f [illegible] s n r p rt [illegible] s

o t r r pr f n p o nt r ps ns rpr s n t n s
n p o nt s fo n to stron st for on ot r p r nt po nt n s s
pr rs t ons s st q r ns r t ons o p ro t n s
n p o nt n rn n s for ost ro ps r o n t t r of n n
pt n o r t t r for s o pp r to to p n so of t
n s n p o nt o r t r nt p r o for so ro ps ot r n s n t no
pp r or port nt

E n t o q r s not pp r r port nt for t s p rt r s t of r for s
t o s not p t t t s o s nor n t t F C s on
n f t r n q r s t pot nt to or port nt
for t r f r ss t r t onstr t t t t q r s of t s
r for s r ns r o r r t so pr s of on ot rs on
of t n n r s of F C

t t t s p p r r pr s nts n port nt rst st p n s n p r q r
s r o s to t t p of t r for po s D sp t p r for n o r p r
n s s on n t on s t s t t r n or r t
p t n t s ro p A n t r t ns on t r for n o n rpor t n t ro n t
or r pro n ss t t s or r f o n of r pro on t no o s
F rt r or n t t t t n tr ns r s st s of n ntr s (n n t) p n
pon f n to so t nt or t r r s t on of t o r of p s
n pon t n s s of r t o s to p or t p of t
po s on o s o o r s pp o t ons F n n t port n of o r s pp n
o r s t on r s n rpor t n ro n o no s s r nt ns t (s n C r st ns n
t o f t f rt r ns on n s n r spon to n n
n n n nt s of t s r pr s nt non tr t ns ons t o s s st r
t n n of f t r r s r

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GR P. AND S. HAR N SS ( ) f r r for n on p r nts p o nt n t C ntr for r t n n s t on or n p r

GU R B. F. GUV N N AND G. L. Q ANT ( ) Jo nt r or pport n t s n Fr ons or n p r t on B r of E no s r 8

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Appendix

A Worker strategies

n t s pp [illegible] r t opt str t s of p o n n p [illegible] or rs [illegible] r pr s nt n t on[31] s n t s not t on s n t n t t t of n p o nt V_{ui} st s t s

$$\begin{aligned}\rho_i V_{ui} \quad & b - T_i^u \; + \; \lambda_{ui}^0 \mathbb{E}_{w\sim F_0} \quad \{V_{ei}^0(w) - V_{ui}, \;\} \\ & + \; \lambda_{ui}^1 \mathbb{E}_{w\sim F_1} \quad \{V_{ei}^1(w) - V_{ui}, \;\} \end{aligned} \tag{A }$$

[illegible] r $V_{ei}^0(w)$ n $V_{ei}^1(w)$ r t s of p rt t n t p o [illegible] n r [illegible] w [illegible] or [illegible] o r p o n p rt t (h [illegible]

$$\begin{aligned}\rho_i V_{ei}^0(w) \quad & wh_0 - T_i^0(wh_0) + \lambda_{ei}^0 \mathbb{E}_{x\sim F_0} \quad \{V_{ei}^0(x) - V_{ei}^0(w), \;\} \\ & + \lambda_{ei}^1 \mathbb{E}_{x\sim F_1} \quad \{V_{ei}^1(x) - V_{ei}^0(w), \;\} + \delta_i(V_{ui} - V_{ei}^0(w))\end{aligned}$$

n [illegible] or rs p o n t (h h_1)

$$\begin{aligned}\rho_i V_{ei}^1(w) \quad & wh_1 - T_i^1(wh_1) - C_i^1 + \lambda_{ei}^0 \mathbb{E}_{x\sim F_0} \quad \{V_{ei}^0(x) - V_{ei}^1(w), \;\} \\ & + \lambda_{ei}^1 \mathbb{E}_{x\sim F_1} \quad \{V_{ei}^1(x) - V_{ei}^0(w), \;\} + \delta_i(V_{ui} - V_{ei}^1(w)).\end{aligned}$$

o pro [illegible] n $q_i(w)$ $\Re \to \Re$ s t t $V_{ei}^1(w)$ $V_{ei}^0(q_i(w))$ s ns t t t [illegible] or r s n r [illegible] n o n t [illegible] w n p rt t [illegible] $q_i(w)$ t

[31] For notational simplicity, here we do not explicitly write the value functions or the resultant reservation wages as a function of the work opportunity b.

t r for [illegible] s t t t of f t ō [illegible] r tt n s

$$\rho_i V_{ei}^1(w) \quad wh_1 - T_i^1(wh_1) - C_i^1 + \lambda_{ei}^0 \int_{q_i(w)}^{\overline{w}_0} (V_{ei}^0(x) - V_{ei}^1(w)) dF_0(x) + \lambda_{ei}^1 \int_{w}^{\overline{w}_1} (V_{ei}^1(x) - V_{ei}^1(w)) dF_1(x) + \delta_i (V_{ui} - V_{ei}^1(w)).$$

[illegible] s to ō t n t n op n t on $V_{ei}^{1\prime}(w)$ o o [illegible] rst p rfor nt r t on p rts on t o to ō t n

$$\rho_i V_{ei}^1(w) \quad wh_1 - T_i^1(wh_1) - C_i^1 + \lambda_{ei}^0 \int_{q_i(w)}^{\overline{w}_0} \overline{F}_0(x) dV_{ei}^0(x) + \lambda_{ei}^1 \int_{w}^{\overline{w}_1} \overline{F}_1(x) dV_{ei}^1(x) + \delta_i (V_{ui} - V_{ei}^1(w)) \quad (\text{A} \quad)$$

[illegible] n r nt [illegible] t r sp to w s

$$\rho_i V_{ei}^{1\prime}(w) \quad h_1(\quad - T_i^{1\prime}(wh_1)) - \lambda_{ei}^0 \overline{F}_0(q_i(w)) V_{ei}^{0\prime}(q_i(w)) q_i'(w) - \lambda_{ei}^1 \overline{F}_1(w) V_{ei}^{1\prime}(w) - \delta_i V_{ei}^{1\prime}(w).$$

ot n t t $V_{ei}^{1\prime}(w) \quad V_{ei}^{0\prime}(q_i(w)) q$ [illegible] s p t o q t on to ō t n

$$h_1(\quad - T_i^{1\prime}(wh_1)) \quad (\delta_i + \rho_i + \lambda_{ei}^0 \overline{F}_0(q_i(w)) + \lambda_{ei}^1 \overline{F}_1(w)) V_{ei}^{1\prime}(w) \qquad (\text{A} \quad)$$

n p rfor n s r s t o t ons for p rt t [illegible] rr t t n o o s pr ss on

$$h_0(\quad - T_i^{0\prime}(wh_0)) \quad (\delta_i + \rho_i + \lambda_{ei}^0 \overline{F}_0(w) + \lambda_{ei}^1 \overline{F}_1(q_i^{-1}(w))) V_{ei}^{0\prime}(w). \qquad (\text{A} \quad)$$

ot so t t q t n q t on A (t [illegible] [illegible] t t n o o s pr ss on for p rt t p o nt (t [illegible] $q_i(w)$) p s t t $q_i(w)$ s t so t on to

$$wh_1 - T_i^1(wh_1) - C_i^1 \quad q_i(w) h_0 - T_i^0(q_i(w) h_0)$$

s q t on fro t n t t o t n t ss p pr ss on s on t on on

n n p o nt t rr r t s for ot f t n p rt t o s r ss n p n nt

of t n s rr nt o or so t t t s on n ss r to p r t nst nt n o s

t s[32] t t r s r for n p or rs t s not

ϕ_i s t st pt f r for *full-t* or n V_{ui} $V^1_{ei}(\phi_i)$ $V^0_{ei}(q_i(\phi_i))$ t

st pt f r for p rt or s t n $q_i(\phi_i)$ n t r r t q t on A

s

$$\rho_i V_{ui} \quad b - T^u_i + \lambda^0_{ui}\int_{q_i(\phi_i)}^{\overline{w}_0}(V^0_{ei}(w) - V_{ui})dF_0(w) + \lambda^1_{ui}\int_{\phi_i}^{\overline{w}_1}(V^1_{ei}(w) - V_{ui})dF_1(w)$$

$$b - T^u_i + \lambda^0_{ui}\int_{q_i(\phi_i)}^{\overline{w}_0}\overline{F}_0(w)dV^0_{ei}(w) + \lambda^1_{ui}\int_{\phi_i}^{\overline{w}_1}\overline{F}_1(w)dV^1_{ei}(w).$$

st t t n o r pr ss ons for $V^{0\prime}_{ei}(w)$ n $V^{1\prime}_{ei}(w)$ fro q t on A n q t on A n to t

o

$$\rho_i V_{ui} \quad b - T^u_i + \lambda^0_{ui}\int_{q_i(\phi_i)}^{\overline{w}_0}\frac{h_0(\;\; - T^{0\prime}_i(wh_0))\overline{F}_0(w)}{\delta_i + \rho_i + \lambda^0_{ei}\overline{F}_0(w) + \lambda^1_{ei}\overline{F}_1(q_i^{-1}(w))}dw$$

$$+ \lambda^1_{ui}\int_{\phi_i}^{\overline{w}_1}\frac{h_1(\;\; - T^{1\prime}_i(wh_1))\overline{F}_1(w)}{\delta_i + \rho_i + \lambda^0_{ei}\overline{F}_0(q_i(w)) + \lambda^1_{ei}\overline{F}_1(w)}dw.$$

B n t on of t r s r n s t t o q to $\rho_i V^1_{ei}(\phi_i)$ (fro q t on A)

to o t n t n p t q t on n n ϕ_i n t r s of t str r p r t rs of o r

o

$$\phi_i h_1 - C^1_i \quad b - T^u_i + (\lambda^0_{ui} - \lambda^0_{ei})\int_{q_i(\phi_i)}^{\overline{w}_0}\frac{h_0(\;\; - T^{0\prime}_i(wh_0))\overline{F}_0(w)}{\delta_i + \rho_i + \lambda^0_{ei}\overline{F}_0(w) + \lambda^1_{ei}\overline{F}_1(q_i^{-1}(w))}dw$$

$$+ (\lambda^1_{ui} - \lambda^1_{ei})\int_{\phi_i}^{\overline{w}_1}\frac{h_1(\;\; - T^{1\prime}_i(wh_1))\overline{F}_1(w)}{\delta_i + \rho_i + \lambda^0_{ei}\overline{F}_0(q_i(w)) + \lambda^1_{ei}\overline{F}_1(w)}dw$$

n ot t n r tor n no n tor of t nt r t r s δ_i n p rfor n s p

n of r t n o t n t s p pr ss on pr s nt n q t on n t n

t t

[32] In the more general case, this indifference condition would depend upon the distributions of wage offers.

B Identification

n or s ss t nt t on of o r o str t t s s or for s t o t t t t n t on on t s t of tr ns t on p r t rs t o s r str t ons of p rt t n f s to t t str t on s pt t n p o r s nt to s p r t nt f f r n r s r t on str t ons n t s r n t str r of t o t n p r ts nt t on of t opport n t st n pro t str t ons t $G^U_{1i}(w)$ n $G^U_{0i}(w)$ not t r sp t str t on f n o s rst pt t p *i* n p o or rs n f t n p rt t o s n n pt f r t t s t st s s t r r s r G^U_1 n

$$G^U_{1i}(w) \quad \int_{-\infty}^{w} \Pr(W_1 < w | W_1 > x) dA_{ui}(x) \quad \int_{-\infty}^{w} \frac{F_1(w) - F_1(x)}{\overline{F}_1(x)} dA_{ui}(x)$$

$$A_{ui}(w) - \overline{F}_1(w) \left[\int_{\underline{w}}^{w} \frac{dA_{ui}(x)}{\overline{F}_1(x)} + A_{ui}(\underline{w}) \right]$$

s r t fr on of p rt t o s pt t t p no or t n $q_i(w)$ n n to n

$$G^U_{0i}(q_i(w)) \quad A_{ui}(w) - \overline{F}_0(q_i(w)) \left[\int_{\underline{w}}^{w} \frac{dA_{ui}(x)}{\overline{F}_0(q_i(x))} + A_{ui}(\underline{w}) \right].$$

n t o pr ss t t r sp ns t f n ons of s $g^U_{hi}(w) \equiv G^U_{hi}{}'(w)$ for $h \in \{$ r t

$$A_{ui}(w \;\; F_0) \quad G^U_{0i}(q_i(w)) + \frac{\overline{F}_0(q_i(w)) g^U_{0i}(q_i(w))}{f_0(q_i(w))} \qquad \text{(A)}$$

$$A_{ui}(w \;\; F_1) \quad G^U_{1i}(w) + \frac{\overline{F}_1(w) g^U_{1i}(w)}{f_1(w)} \qquad \text{(A)}$$

t r for onstr t s t t t str t on of r s r s on st t n p o on s pport $\underline{w}_i, \overline{w}_i$ s nt o f r f n ons F_0 n F_1[33] F rt r or t r q r nt t t $A_{ui}(w \;\; F_1)$ $A_{ui}(w \;\; F_0$ s s to nt f or st p r t r C^1_i

[33] Recall from Section 3.3.1 that $\underline{w}_i \equiv \min\{\underline{w}_1, q_i^{-1}(\underline{w}_0)\}$ and $\overline{w}_i \equiv \max\{\overline{w}_1, q_i^{-1}(\overline{w}_0)\}$.

[illegible] st t t n q t ons A [illegible] n A [illegible] nto q t ons [illegible] n 8 fro t n [redacted] n n t t no s r r s r [redacted] str t on to t n t [redacted] n r nt q t ons o rn n t o t on of [redacted] of r str t ons

$$F_1'(w) \quad m_{1i} g_{1i}(w) R_i^1(w \; F_0, F_1) \qquad (A\ [illegible])$$

$$F_0'(q_i(w)) \quad m_{0i} g_{0i}(q_i(w)) R_i^0(w \; F_0, F_1) \qquad (A\ 8)$$

[redacted] r

$$R_i^1(w \; F_0, F_1) \equiv \frac{\left(\; + \kappa_{ei}^0 \overline{F}_0(q_i(w)) + \kappa_{ei}^1 \overline{F}_1(w) \right) - u_i g_{1i}^U(w) \kappa_{ui}^1 \overline{F}_1(w)}{\kappa_{ui}^1 u_i G_{1i}^U(w) + \kappa_{ei}^1 \left(m_{0i} G_{0i}(q_i(w)) + m_{1i} G_{1i}(w) \right)}$$

n

$$R_i^0(w \; F_0, F_1) \equiv \frac{\left(\; + \kappa_{ei}^0 \overline{F}_0(q_i(w)) + \kappa_{ei}^1 \overline{F}_1(w) \right) - u_i g_{0i}^U(q_i(w)) \kappa_{ui}^0 \overline{F}_0(q_i(w))}{\kappa_{ui}^0 u_i G_{0i}^U(q_i(w)) + \kappa_{ei}^0 \left(m_{0i} G_{0i}(q_i(w)) + m_{1i} G_{1i}(w) \right)}.$$

Eq t ons A [illegible] n A 8 n s st of r nt q t [redacted] to [redacted] t t n t on t ons $F_1(\underline{w}_i)$ n $F_0(q_i(\underline{w}_i))$ st s s non p r tr nt t on of [redacted] of r n ons on t on on t s t of tr ns t on p r t rs nt t on of t n r n opport n t ost str t on n t pro t str t ons t [redacted] s s s r n on

C Notation summary

Indexing

$i \in \mathcal{I}$ n o s r t p

$h \in \{\ ,\ \}$ o [redacted] or

$j \in \{u, e\}$ p o nt st t

w [redacted] s

p r pro t

v o n s

b no s r t [redacted] for n p [redacted] or rs

Workers

n_i fr on o t or rs

ρ_i or r s nt r t

C_i^h t s t or n h o rs

s_{ji}^h o or r s r nt ns t

$\phi_i(b)$ or r s r

$q_i(w)$ p rt or n r

$H_i(b)$ t str t on o no s r t b

$A_i(w)$ t str t on o r s r s

$A_{ui}(w)$ t str t on o r s r s on st n p o

$A_{ei}(w)$ t str t on o r s r s on st p o

Transitional parameters

λ_{ji}^h o rr r t s

δ_i o str on r t

κ_{ji}^h n s λ_{ji}^h/δ_i

Employment states

u_i n p o nt r t

m_{0i} p rt or r t

m_{1i} or r t

Taxes

$T_i^h(wh)$ n t t s t o rs h n rn n s wh

$T_i^{h\prime}(wh)$ r n t r t t o rs h n rn n s wh

T_i^u n t t n n p o

Wage distributions

$F_h(w)$ str t o rs

$\overline{F}_h(w)$ n s $- F_h(w)$

$G_{hi}(w)$ t str t s on st p o

$g_{hi}(w)$ ns s on st p o

$\underline{w}_h, \overline{w}_h$ s ppo str t ons

$\underline{w}_i$ n s n$\{\underline{w}_1, q_i^{-1}(\underline{w}_0)\}$

$\overline{w}_i$ n s $\{\overline{w}_1, q_i^{-1}(\overline{w}_0)\}$

Firms

(p) t str t on o r pro t

$\gamma_h(p)$ ns t o r pro t

$\underline{p}_h, \overline{p}_h$ s pport o r pro t

$K_h(p)$ opt po

$v_h(p)$ opt r t n po

$c(p, v)$ n st

$l_{hi}(w, v)$ st st t p o or r i

$L_h(w, v)$ tot st st t p o nt $\sum_i n_i l_{hi}(w)$

$\bar{l}_{hi}(w)$ n s t t $l_{hi}(w, v)$ $\bar{l}_{hi}(w)v/V_h$

$\overline{L}_h(w)$ n s $\sum_i n_i \bar{l}_{hi}(w)$

$\pi(p, v)$ st st t pro $(p - w)h_h\overline{L}_h(w)$

Matching technology

V_h r t sto o n s

S_h tot s r nt ns t

$M_h(S_h, V_h)$ r t t n n on

θ_h t n n on st t

Further notation from appendix

V_{ui} o n p o nt

$V^h_{ei}(w)$ o p o nt

$G^U_{hi}(w)$ t str t o s pt n p o

$g^U_{hi}(w)$ ns s pt n p o