Can helping the sick hurt the able?
Incentives, information and disruption in a welfare reform

Short title: "Incentives and reorganisation in a welfare reform"

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Abstract

The UK Jobcentre Plus reform sharpened bureaucratic incentives to help disability benefit recipients (relative to unemployment insurance recipients) into jobs. In the long-run, the policy raised disability exits by 10% and left unemployment outflows roughly unchanged, consistent with beneficial reorganisation effects for both groups, while bureaucrats shifted job-brokering efforts from the unemployed to disability benefit recipients. We account for about 30% of the decline in the disability rolls from 2003-2008. In the short-run, we detect a reduction in unemployment exits and no effect on disability exits, suggesting important disruption effects, and highlighting the difficulty of welfare reform for myopic policymakers.

Keywords: Welfare benefits, Incentives, Public sector.

JEL Codes: H51, I13, J18

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Disability rolls have risen almost inexorably in advanced countries over the last forty years (see Autor and Duggan, 2003, for the US and Banks et al, 2015, for the UK). In the US, Social Security Disability Insurance cash transfers tripled from $40bn in 1979 to $124bn in 2010, and their share of total social security payments rose from 10% in 1988 to 20% in 2009 (Autor, 2012). Figure 1 shows that the numbers on the equivalent UK scheme, Incapacity Benefit, also rose fivefold for those of working age, from 400,000 in 1977 to 2 million in 2009.[1] Unlike in the US, however, the growth in the disability rolls in the UK came to a halt in the early 2000s, followed by a moderate decline thereafter. This coincided with the introduction of a major welfare reform in 2001 ("Jobcentre Plus" or JCPlus for short), which integrated job-brokering services and benefit provision for claimants of working age into one organization. The reform also strengthened job search assistance and monitoring for Incapacity Benefit recipients, something that had been in place for unemployment insurance claimants since the mid-1980s (e.g. Van Reenen, 2004).

The JCPlus reform physically merged the offices that welfare claimants attend to collect benefits, have work-focused interviews, and look for jobs and training/education opportunities. It simultaneously centralised information via modernised IT systems and reorganised premises, and changed the structure of bureaucratic incentives, without changing the overall financial generosity of the welfare system. In particular, an explicit incentive system was introduced, which awarded about three times as many "job points" to local bureaucrats (the benefit officers) for helping a disabled person into work than for helping a short-term unemployed person into work. These points fed into career progression and pay for the benefit officers.

Our empirical analysis exploits the staggered quasi-random rollout of the Jobcentre Plus policy across geographical areas, using quarterly administrative data on 374 districts in Great Britain over a nine-year period. We identify the policy impact by comparing the change in exit rates for disability and unemployment benefit claimants in districts treated at a point in time to that in districts treated at an earlier or later date (taking into account district-specific trends). Information on benefit claimants at the district

[1] See Banks et al. (2015) for benefit trends in the UK and related reforms.

level is provided by the Department for Work and Pensions, and we use quarterly series for stocks, inflows and outflows for various categories of welfare benefits, disaggregated by age and district, and, for the unemployed, by destination (e.g. to employment versus non-participation).

We obtain two main results. First, there were significant organisational disruption costs from the policy, with outflows from unemployment and disability benefits initially declining or not responding, respectively, immediately after the policy change. Second, in the long-run, the policy impact on unemployment outflows gradually rises to zero, while the corresponding impact on disabled outflows becomes positive, large and significant. These patterns are consistent with a simple model in which bureaucratic efforts to reduce the disabled rolls increased, while efforts to reduce unemployment rolls decreased. Overlaid on this, there was a long-term positive effect on both groups from the reorganisation through better information, but a short-run negative effect from adjustment costs due to organizational disruption. Our estimates imply that the response of disability outflows to Jobcentre Plus explains about 30% of the observed decline in the disability roll from 2003 to 2008.

Based on our empirical results, we provide a simple cost-benefit analysis of Jobcentre Plus that indicates positive net benefits from the policy. However, the presence of significant short-run costs from disruption and sunk set-up costs highlights why such welfare changes are hard to implement in practice. We estimate that it takes about seven years for the reform to break even, which is beyond the electoral time horizon of most politicians.

This paper links to two main strands of literature. First, the issue of welfare reforms has resurfaced following the Great Recession of 2008-2009. For example, increases in unemployment were much lower than expected in the UK[2] and Germany, and both countries experienced significant welfare reforms prior to the crisis. Although a large literature has studied the effects of financial incentives to benefit recipients on the duration of unemployment (e.g. Lalive et al, 2007), the role of explicit incentives in the provision of

[2] On the UK case see Blundell, Crawford and Jin (2014), Gregg, Machin and Salgado (2014) and Pessoa and Van Reenen (2014).

job placement services is much less explored. Another strand of this literature has emphasized the interplay between unemployment and disability insurance, as some job losers may turn to disability benefits once they are no longer eligible for unemployment benefits. For the UK, Petrongolo (2009) finds that welfare recipients subject to stricter job search requirements were more likely to start spells on health-related benefits within six months of the end of a claimant unemployment spell, while Mueller et al. (2016) find no evidence that expiry of unemployment benefits raised applications for disability benefits in the US over the Great Recession. By contrast, our work explores links between unemployment and disability insurance stemming from job placement, rather than jobseekers' incentives, and illustrates the role of such incentives in the recent decline in the disability roll.

A second strand of the literature has highlighted how incentive systems can be used to improve efficiency (see Bloom and Van Reenen, 2011, and Oyer and Schaefer, 2011 for recent surveys), and several papers in this literature have focused on the provision of incentives in the public sector (see inter alia Besley and Ghatak, 2005, for theoretical work, and Lavy, 2002, and Baiker and Jacobson, 2007, and Bertrand et al, 2018, for empirical applications to various departments of the public sector). Heckman et al. (2002) evaluate performance standards in a scenario close to ours, the provision of Government training programmes, and find that bureaucrats' rewards lead to cream-skimming and deliver significantly different short run and long-run programme impacts. We contribute to this literature by emphasizing the multitasking aspects in the provision of effort in government organisations. In addition, our analysis of public employment services relies on a clear measure for the productivity of bureaucrats – provided by welfare exits and job placement – something that may not be easily available for other public sector departments.

The paper is organised as follows. Section 1 outlines the institutional framework in the UK and the hypotheses we test and section 2 describes the data used in the empirical analysis and our empirical framework. In section 3, we report results on the short and long-run impacts of treatment on welfare exits for different categories of recipients. In Section 4, we perform a simple cost-benefit analysis of policy and in Section 5 examine the robustness of our results to a several alternative specifications. Section 6 concludes.

1. Institutional background and identification

1.1. The Jobcentre Plus system

There were major changes in the delivery of public employment and benefit services in the UK between 2001 and 2008. These changes came about against the backdrop of a wider policy emphasis on Welfare-to-Work initiatives that sought to increase labour market activity, aiming for "work for those who can and security for those who cannot" (Hyde et al., 2002). Links between benefit receipt and job search in the UK had been introduced with the Restart Programme in 1986 (Dolton and O'Neill, 1996, 2002) and were deepened with the introduction of the Jobseekers Allowance (JSA) in 1996, and the New Deal for Young People in 1998 (see Manning, 2009, Petrongolo, 2009 and Blundell et al., 2004). Mandatory work-focused interviews were in place for JSA recipients since 1996.

In March 2000, the Prime Minister announced the establishment of the JCPlus organization, with the scope to deliver an integrated, work-focused service to both employers and benefit claimants of working age in UK. The creation of JCPlus stemmed from the integration of the Employment Service and Benefits Agency into one organization, combining benefit advice with job placement services. The integration of JCPlus offices started in October 2001 in 25 pilot districts. The national rollout was scheduled in four successive waves between 2002 and 2006. By early 2008, virtually all offices were integrated.[3]

Two main changes resulted from the introduction of JCPlus, broadly relating to information and incentives (see Riley et al. 2011 for a more detailed description of the program). On the information side, the integration of employment services and welfare payments under one roof was accompanied by a

[3] The New Deal for Young People, the New Deal for Lone Parents and the Working Family Tax Credit were introduced before the start of our sample period. The New Deal for Young People and the New Deal for Lone Parents were piloted in early 1998 and extended nationally in April 1998. They were followed by the New Deal for Disabled People, which was piloted in September 1998 and extended nationally in July 2001. The Working Family Tax Credit was introduced nationally in October 1999 and subsequent changes to the credit were always rolled-out nationally. We are not aware of welfare policies that may have introduced any district-level variation in treatment since the introduction of JCPlus in October 2001.

massive investment in improved information technology (IT) and organisational restructuring. The average size of an office increased as premises were combined, re-built, and refurbished. Aggregate floor space decreased by 20%, as did the total staff count, even though operating costs per square meter increased by 12% because of high quality infrastructure and locations. Overall, the sunk costs of re-organization were put at around £1.8bn, but running costs were reduced by £240m per year (National Audit Office, 2008).

The second major change with JCPlus was the introduction of explicit performance targets called "Job Entry Targets". In contrast to the previous system of national-level targets for the number of beneficiaries to place into jobs, under the new regime every benefit officer who helped a benefit claimant into a job was awarded a certain number of explicit Job Entry Target points varying by the category of the benefit claimant. In addition, there was a district-level target in terms of the number of points to achieve each quarter. These performance standards acted like a benchmark for the managers and mattered for the career prospects of the benefit officers.[4]

The Government's evaluation of JCPlus by Riley et al. (2011), based on local variation in treatment intensity across the 48 Jobcentre Districts in Britain, has found evidence of beneficial long-term impacts of the policy on the outflow rate from welfare benefits in general, and job finding in particular, for nearly all benefit and demographic groups. Their simulations find that the increase in effective labour supply following JCPlus would imply a 0.1% increase in GDP.

1.2. Framework

One can theoretically expect at least three different effects of JCPlus on job placement. Firstly, the physical reorganization, installation of new IT systems and estate rationalization caused disruption. This would lead

[4] The UK welfare system had introduced performance benchmarking since the early 1980s (Propper and Wilson 2003; Bagaria et al, 2013). They have been designed according to targets embodied in the Public Service Arrangements (PSAs) of different government agencies. Makinson (2000) describes the performance standards in the Employment Service, The Benefits Agency, HM Customs and Excise and Inland Revenue. These mostly consisted of national-level targets for the number of beneficiaries to place into jobs, without explicit rewards at the individual or local level. The US welfare system has also introduced elements of performance pay within the recent US Ticket to Work (TTW) Program, providing job placement and ongoing employment support to disability insurance recipients. TTW service providers become eligible for payments from the Social Security as soon as beneficiaries receive earnings above a certain threshold.

to a short-run reduction in the productivity of welfare officers on all types of benefits.

Second, there may be a long-run impact of restructuring and modern IT systems on efficiency. IT replaces routine manual tasks (e.g. Michaels et al, 2014) such as recording job entries and keeping records of beneficiaries. Increased automation of services would improve the speed and accuracy with which benefits applications are processed. This reduces operating costs as well as the time officers spend on these back office functions, and enables them to focus on conducting more client-facing job finding interviews. Thus, we expect a long-run increase in job placements for all benefit groups, as the provision of welfare services becomes more efficient.

Thirdly, the introduction of Job Entry Targets implies a shift in job placement incentives across the two main groups of beneficiaries, in favour of Incapacity Benefit (IB) claimants, at the expense of the Jobseekers Allowance (JSA) claimants. IB and JSA are two main UK systems of disability and unemployment insurance, respectively. Before the introduction of JCPlus, there were broad national level targets for job placements and sub-targets for different benefit categories. For example, in 2001 there was a national target to place 1.36m jobless people into work, accompanied by a sub-target to place 275,000 "disadvantaged" individuals into work.[5] With the JCPlus policy, explicit award points were introduced under the new Job Entry Target system that were designed to reflect prioritizing IB claimants. As shown in Table 1, a benefit officer was awarded fifty per cent more points if he/she helped a person on IB into work than a long-term JSA claimant, and three times more points relative to a short-term JSA claimant.[6] High-powered incentives to help IB beneficiaries into jobs were also accompanied by the introduction of mandatory "work-focused" interviews, which were already in place for other categories of benefit claimants (most notably JSA claimants and lone parents on welfare) before the arrival of JCPlus.

Consider a multi-tasking model with fixed inputs along the lines of Holmström and Milgrom (1991). Assume that the JCPlus officers have a given stock of "inputs", and they can apply different

[5] This included those with disabilities, participants in New Deal for Lone Parents, partners of continuously unemployed for 26 weeks, homeless people and qualifying ex-offenders.
[6] The policy also introduced high job placement incentives for another category of claimants, the Lone Parents, and will explore these further sources of variation in Section 5.

amounts of this input to different individual clients, whereby officers' inputs affect clients' outcomes. In our context, the input variable represents staff time for interviews, job placement efforts, and the direct costs of the services provided. After the introduction of the explicit Job Entry Points system, we expect them to reallocate their efforts in favour of IB claimants, with adverse effects on JSA claimants' job finding prospects. Unfortunately, we are not able to measure staff inputs directly, but we can observe participant outcomes, and will relate these to the introduction of JCPlus in a reduced-form set-up.

While the initial disruption and the long-run efficiency gains should have impacts that are broadly similar (at least qualitatively) across all categories of beneficiaries, the introduction of explicit incentives is expected to have opposite effects on JSA and IB recipients. We will exploit this distinction between common and asymmetric shocks to guide our interpretation of our estimated impacts of policy in the short- and long-run.

1.3. Identification

We exploit the staggered rollout of JCPlus offices across 374 Local Authority Districts in Great Britain to identify the causal impact of the policy. Figure 2 illustrates the gradual diffusion of JCPlus over seven years. The figure plots the share of JSA claims covered in each quarter, as computed by Riley et al. (2011) by combining the timing of treatment in each office and the number of office-level claims in the quarter of treatment. Treatment intensity rises from zero in 2001 to virtually 100% in 2008. Figure 3 presents a map of the policy roll out, showing no obvious patterns of geographic clusters that adopted the policy at the same time.

We consider treatment as the "go live" quarter for a district. To address concerns that districts were not randomly assigned into treatment, our estimates control for district-specific trends, and we test for pre-treatment effects for various benefit categories.

There are multiple benefit offices in a district (between 32 and 171), and districts had discretion about JCPlus rollout across local offices.[7] We find that although observables cannot predict which districts are treated in each wave, there appear to be systematic components of office level treatment within districts. For example, we find evidence that districts tended to treat offices with higher JSA outflow first, while this is not true for district-level treatment. Further, the points system was formally set at the district level, so this seems the natural level of variation in treatment, and we consider a district as treated in the quarter when the first office in the district gets integrated.

We adopt a difference-in-differences framework to identify the causal impact of JCPlus. Since all districts are treated eventually, effectively we are comparing districts that are treated in a particular year and quarter to those who are treated at a later stage. Our main outcomes are the number of exits from disability and unemployment benefits in each quarter in each district, controlling for existing stocks of claimants.

One potential concern is that jobseekers may be manipulating the benefit category to which they, thus affecting the composition of the claimant stock in each clients' group and the corresponding outflow rate from benefits. For instance, benefit applicants may have an incentive to enter under the IB rules rather than under JSA rules. However, being classified as eligible for IB requires a medical certificate, and conditions for continuous receipt of benefits have been made stricter with the Welfare Reform and Pensions Act of 1999,[8] leaving limited leeway to manipulate eligibility across benefit types. A related concern is that the introduction of JCPlus may affect jobseekers' decisions whether to sign-on at all for benefits. To examine these concerns in more detail, we analyse the impact of JCPlus on the *inflows* into different benefit categories.

[7] National Audit Office (2008) states that **"**Whilst an overall vision of the service improvements was successfully communicated from the centre, the detailed planning of the roll-out was delegated to the districts…. Implementation of Jobcentre Plus was a locally driven process".

[8] In May 1999, the Welfare Reform and Pensions Act introduced 'c*ontinuing assessment of possibility of returning to work'* (Burchardt, 1999), with more frequent assessment of the conditions affecting the claimant's ability to work.

2. Data and Empirical Specifications

We use administrative data provided by the UK Department of Work and Pensions, covering the whole population on welfare. Information on existing benefit claims is organized in two main datasets. The first dataset contains monthly information from June 1983 onwards on the stocks, inflows and outflows of unemployment benefits' recipients (JSA), disaggregated by exit destination (work, other benefits, or inactivity). The data is available at the Local Authority District level. There are 380 districts in Great Britain, of which 326 in England, 32 in Scotland and 22 in Wales,[9] with an average population of 120,000 in the 2001 census, which is slightly above the average size of US counties. We further disaggregate claimants by age groups, 18-24 year olds, and 25-59 year olds.[10] The second dataset contains quarterly information from 1999Q3 onwards on other welfare benefits, among which the key disability benefit is IB. The same geographic and age breakdowns are available as for JSA, but given higher time aggregation for IB claims, in our main analysis we aggregate monthly JSA claims at the quarterly level and show JSA estimates on monthly data as a robustness test. As IB claims are not recorded for six districts, we restrict our sample to the 374 districts on which information is available on both JSA and IB claims.

We estimate all specifications on a sample period of nine years, from 1999Q3 to 2008Q2, the quarter before the collapse of Lehman's, which triggered the Great Recession and a huge upsurge of unemployment. Also, the introduction of the Employment and Support Allowance (ESA) in October 2008 gradually phased out the IB, and the overall disability roll on both IB and ESA post 2008 would not be strictly comparable with the IB series up to 2008.

Descriptive statistics are presented in Table 2. Columns (1) and (2) refer to national aggregates per quarter, and columns (3) and (4) refer to (unweighted) averages across districts, age groups and quarters.

[9] Local government in England operates under either a single-tier system of unitary authorities and London boroughs, or a two-tier system of counties and district councils. The spatial units in our analysis include the unitary authorities, London boroughs and districts within counties. There are 326 such units in England. Local government in Scotland is organized through 32 unitary authorities. Since 1 April 1996, local government in Wales is organized through 22 single-tier principal areas.

[10] We have also considered an alternative age cut-off 25-54 for the older age group, and the empirical results were not affected.

There are over 900,000 JSA claimants each quarter during our sample period. The quarterly JSA outflow is slightly above the corresponding inflow, as unemployment was falling over the period considered. The average outflow rate from unemployment is 70% per quarter, corresponding to an expected unemployment duration of 4.3 months. The average stock of IB claims during the same period is just over two million, with much lower turnover than for JSA, implying that IB claims last on average almost nine years (1/(0.028×4)=8.93). Quarterly IB inflows are larger than outflows, as the IB caseload is on average still rising during 1999-2008 (see Figure 1).

We estimate benefit outflow equations in a difference-in-differences framework. We start with a static specification that identifies the average effect over time following JCPlus introduction:

$$\ln Y_{ait}^{B} = \beta^{B} D_{it} + \gamma_{1}^{B} \ln U_{ait-1}^{B} + \gamma_{2}^{B} \ln U_{a\prime it-1}^{B} + \delta_{ai}^{B} + \delta_{at}^{B} + \delta_{i}^{B} t + \varepsilon_{ait}^{B}, \tag{1}$$

where Y_{ait}^{B} is the number of claimants in age group a leaving the benefit register B (JSA or IB) in district i and quarter t. D_{it} is a treatment dummy that turns on in the quarter when the first office in district i is treated. The coefficient of interest β^{B} is identified by the staggered rollout of JCPlus, with different districts becoming treated in each wave. In a robustness test, we allow β^{B} to vary over time, and we show that the policy effect looks stable across different waves when the post-wave window is kept fixed. As noted above, we find that the timing of when a district was treated appeared to be unrelated to observables.

We include as controls the stock of claimants of benefit B at the end of the previous quarter for the own age group, U_{ait-1}^{B}, as well as for the other age group, $U_{a\prime it-1}^{B}$ (old/young respectively). Our preferred specifications include a full set of fixed effects (district by age, δ_{ai}^{B}) and age by time dummies (δ_{at}^{B}), as well as district-specific trends ($\delta_{i}^{B} t$), but we also show more restrictive specifications just including separate district, age and time fixed effects. We cluster the standard errors at the district level, at which the policy is defined, but results are robust to alternative ways of dealing with spatial autocorrelation (e.g. Conley, 1999).

While the treatment effect β^{B} in equation (1) is an average over all post-treatment quarters, potential adjustment costs in the implementation of JCPlus suggest that short- and long-run policy effects may indeed differ, thus we next estimate the following dynamic specification of policy impact:

$$\ln Y_{ait}^{B} = \sum_{\tau=1}^{11} \beta_{\tau}^{B} D_{it+\tau} + \beta_{LR}^{B} D_{iLR} + \gamma_1^{B} \ln U_{ait-1}^{B} + \gamma_2^{B} \ln U_{a\prime it-1}^{B} + \delta_{ai}^{B} + \delta_{at}^{B} + \delta_{i}^{B} t + \varepsilon_{ait}^{B} \; . \quad (2)$$

The $D_{it+\tau}$ term is broken down such that D_{i1} is the quarter in which the policy is turned on, D_{i2} is the first quarter after the policy is turned on, and so on. D_{iLR} is the "long-run", defined as twelve quarters or more since the policy change. While ending the dynamics after three years is somewhat arbitrary, the treatment coefficients seem stable afterwards and we show that the qualitative results are robust to alternative dynamic specifications (e.g. Table A4)

The presence of adjustment costs would suggest, for either type of benefit, $\beta_t^B < \beta_{t+1}^B$, implying that initial negative disruption unwinds as the new organizational structure settles in. The incentive hypothesis suggests that, in each quarter t, the policy effects on IB should be stronger than on JSA i.e. $\beta_t^{IB} > \beta_t^{JSA}$.

3. Results

In this section, we present both the average impact of JCPlus on the outflow from benefits, as well as its dynamic evolution, and then turn to examining its effect on inflows into benefits.

3.1. Basic Results on Outflows from benefits

Table 3 reports estimates of specification (1) for the log outflow from unemployment (JSA, columns 1-3) and disability rolls (IB, columns 4-6). All regressions control for pre-existing stocks and include age, district and time effects. Column 1 shows that the introduction of JCPlus had on average a negative and significant impact on the unemployment outflow, suggesting that a treated district experiences on average a 4.8% decrease in unemployment outflows. Given an average unemployment outflow of about 650,000 per quarter, this implies about 31,000 more people staying on unemployment benefits each quarter. This overall impact is consistent with both disruption effects and incentives for benefit officers to substitute effort away from the unemployed and towards the disabled. As expected, the lagged stock of own age unemployed claimants enters with a significant positive coefficient. The lagged stock of claimants in the other age group may capture both job competition effects across age groups and the effects of district-specific shocks affecting all age groups in the same direction. The negative coefficient on this variable in column 1 is indeed consistent with a job competition effect, although this is not robust to changes in specification, as shown in the next two columns. The main policy effect remains virtually unchanged when we control for district by age and age by year interactions in column 2, as well as district-specific linear trends in column 3.

The corresponding regressions of IB outflows deliver a positive but insignificant effect of policy on the disability rolls when district trends are not included (columns 4 and 5). This becomes larger and significant at the 10% level when district trends are included in column 6. Given an average quarterly IB outflow of 56,000, a point estimate of 2.35% implies that introduction of JCPlus drives almost an additional 1,300 people off the IB register each quarter.[11] Unlike for JSA outflows, the positive correlation between the IB outflow of age a and the IB stock of age a' is consistent with the presence of district-specific shocks that district trends may not be sufficient to absorb.

To distinguish between the transition dynamics into the new regime and long-run policy effects, Table 4 looks more closely at the time structure of treatment, allowing for varying impact of policy by quarter since its introduction as in equation (2). All estimates presented from now on are based on the richer specification that controls for district by age and age by year interactions, as well as district-specific trends. Column 1 for JSA outflows shows a clear pattern of monotonically rising policy effects over time. The policy impact is negative and strongly significant in the first ten quarters since intervention, it declines and becomes less significant in quarter 11, and stays very close to zero from quarter 12 onwards.

For IB outflows in column 2 of Table 4, the policy impact tends to be positive but small and insignificant for the first year or so (except in the very first quarter when it is larger and significant at the

[11] The results of Table 2 are robust to conditioning on stocks (by age group) of other benefit recipients (i.e. IB and lone parent stocks in JSA outflow equations, JSA and lone parent stocks in IB outflow equations).

10% level), and becomes much larger and more precise from quarter 6 onwards. The estimated long-run effect of about 11% implies an extra 6,160 claimants leaving the IB register each quarter. In Table A1, we allow for alternative dynamic structures of policy effects. For JSA, long-run impacts of policy are negative however one defines the long-run horizon starting earlier than three years since the policy change (see columns 1 and 2). For IB, the long-run impact stays positive for all long-run horizons considered.

One explanation for the more positive long-run effect of policy on disability relative to unemployment outflows is the new structure of bureaucratic incentives, whereby officers devote more effort to helping IB recipients into new jobs than JSA recipients after the policy change. Overlaid on this, however, there are (i) an initial disruption effect as new premises and IT systems bed down and (ii) a generally positive effect on both groups from improved organization and information.

An alternative explanation would be that incentives do not matter but somehow the (beneficial) organization and information treatment had a disproportionately larger effect on IB claimants than the unemployed. It is not obvious why this should be the case, but in Section 5, we perform a further test of the incentives hypothesis. We look at policy effects on benefit outflows for a third group of welfare recipients, lone parents, with very different demographic characteristics and constraints from IB recipients, but for whom bureaucratic incentives moved in the same direction as for IB recipients. We find that the policy effects on the outflow of lone parents from benefits follows a very similar pattern to that of IB outflows, in line with the underlying incentive structure.

3.2 Pre-policy effects

A threat to a causal interpretation of our estimates would be the existence of differential pre-policy effects, over and above the effects captured by the district-specific trends. For example, if districts initially selected for treatment were those in which IB outflows were already increasing (and/or JSA outflows decreasing), we would estimate a positive (respectively, negative) impact of treatment even in the case in which the policy had no real effect. To investigate this, we look at pre-treatment effects by including four quarterly pre-treatment dummies in specification (2):

$$\ln Y_{ait}^{B} = \sum_{\tau=-3}^{11} \beta_{\tau}^{B} D_{it+\tau} + \beta_{LR}^{B} D_{iLR} + \ln U_{ait-1}^{B} + \gamma_{2}^{B} \ln U_{a'it-1}^{B} + \delta_{ai}^{B} + \delta_{at}^{B} + \delta_{i}^{B} t + \varepsilon_{ait}^{B} \qquad (3)$$

We report the results graphically in Figure 4. Panel A refers to JSA and Panel B refers to IB. Neither outflow pattern shows signs of significant pre-policy effects. No pre-treatment dummies are significantly different from zero individually, and tests on their joint significance give F-stats of 0.15 for JSA and 0.97 for IB.

3.3 Inflow Rates

While the focus of our analysis is on the intended impact of the introduction of JCPlus on benefit outflows, the policy may have potential side effects on the take-up rate of welfare benefits, because of changes in treatment of recipients of either type of benefit. The resulting bias in the estimated policy effect depends on underlying selection mechanisms. For example, if reduced incentives to help JSA recipients into work dissuaded less motivated individuals to sign up for unemployment benefits, the estimated policy impact on JSA outflow would be upward biased – and vice versa for IB.

To examine this issue directly we analyse the impact of the JCPlus on inflows into JSA and IB, and estimate a specification similar to equation (1), using the inflow into each benefit category as the dependent variable:

$$\ln(Inflow_{ait}^{B}) = \beta^{B} D_{it} + \rho \ln Pop_{ait} + \delta_{ai}^{B} + \delta_{at}^{B} + \delta_{i}^{B} t + \varepsilon_{ait}^{B}, \qquad (4)$$

where $Inflow_{ait}^{B}$ denotes the number of individuals of age a, signing-on for benefits of type B in district i in quarter t. In the outflow equations, we have controlled for the stock of existing benefit claimants, and the corresponding stock in the inflow equations is the age-specific population (Pop_{ait}). Ideally, as inflows (mostly) consist of people flowing from employment into welfare, one should control for local employment on the right-hand side, but in the absence of high-frequency employment data at the district level we use the population figures as a proxy.[12]

[12] We assign the mid-year population estimate from www.nomisweb.com (taken on the 30th of June each year) to all the quarters in the year. Using interpolated quarterly population estimates (from the mid-year estimates) does not change our results.

Estimates of inflow equations are reported in Table 5, distinguishing between long-run effects and transition dynamics. Column 1 shows that, on average, JCPlus had a negative and significant effect on the inflows into JSA, both in the short- and long-run, while the impact on the IB outflow was overall close to zero.

To address whether this could pose a concern for our results due to changing composition of benefit recipients, we repeat outflow regressions controlling for various lags of the corresponding inflows. The results are reported in Table 6. Columns 1 through 3 refer to JSA outflows. Although the coefficients on the inflow variables, especially at one and two quarterly lags, are positive and significant as one would expect – since more recent welfare recipients are more likely to leave – our main results are robust to their inclusion. To see this, in column 3 we report the estimates of our baseline specification (2) on the same sample as in column 2, in which some observations are lost when we condition on lagged inflows. The long-run effects in columns 1 and 2 are almost identical to those of our baseline specification in column 3, and the dynamic effects are only slightly muted by the inclusion of inflows. Columns 4-6 refer to IB outflows, and all coefficients measuring the impact of policy are both qualitatively and quantitatively similar across specifications. In particular, the long-run positive effect of the policy on IB is still large and significant when we control for inflows. Hence, despite some effects on JSA inflows, any resulting change in claimants' composition does not appear to significantly affect our results.

3.4. Outflows to employment versus other destinations

The JSA (although not the IB) database contains information on the destination of JSA outflows, which is elicited in a form that JSA claimants fill out when they leave the register. This information allows us to disaggregate outflows into alternative destinations, and in particular to look at outflows into work separately from outflows into other states (such as different benefits, training, inactivity, etc.). We distinguish four broad destinations: work (representing 32% of exits in our sample); other benefits (4%); other destinations (38%), and unknown destinations (25%). "Other" destinations include education, training, retirement, prison, death and defective claims. While disaggregate data on each of these reasons of exit are available, the corresponding cell sizes are tiny, and zero in the majority of cases, and thus we bundle them in one single residual destination. Unknown destinations represent cases in which the claimant failed to fill the exit form.

Results of JSA outflow equations by destination are reported in Table 7, where Panel A refers to work and benefit destinations and Panel B refers to other and unknown destinations. Columns 1, 3, 5 and 7 show that JCPlus has reduced JSA outflows across the board of possible destinations over our sample period, and with similar intensities for all known destinations. These results are closely comparable to the estimates for total JSA outflow reported in Table 2.

Negative effects on JSA outflows into both work and non-work can be rationalized if one takes into account the “stick” (search effort monitoring) and “carrot” (job search assistance) components of the interactions between JSA claimants and dedicated staff at Job Centres. The change in the incentive structure implies that JSA claimants would receive less assistance with the job search process than before, thus lowering their job finding rates, at least in the short run. However, insofar as poorer job search assistance also implied less frequent contact with JSA claimants, one may expect looser monitoring and fewer transitions off benefits due to sanctions or discouragement (see Manning, 2008, for the effects of monitoring on the time spent on JSA benefits).

In the long run, outflow effects are insignificant and near zero for all destinations except for benefits (see column 4 of Table 7). The coefficient on benefits is fairly noisy and only significant at the 10% level but suggests that three years after the policy change JSA spells are somewhat more likely to terminate with another benefit spells. While this result highlights some reshuffling across benefit categories as an unintended consequence of policy – as already noted for the UK by Petrongolo (2009) – its quantitative magnitude is small. In the cost-benefit evaluation that follows, we will measure the impact of JCPlus on job creation based on the estimates of transitions into work, as reported in column 2.

3.5. Policy effects: The Big Picture

Our empirical results speak to an ongoing debate on the factors behind the increase in the disability roll in many high-income countries in recent decades. As we noted in the Introduction the UK represents an interesting case study because after two decades of sustained increase, the number of IB claimants reached a plateau in the early 2000s and started to fall in 2005. These changes in trends correlate quite closely with the introduction and the gradual rollout of the JCPlus, and we use our estimates for the impact of policy on the IB outflow to quantitatively assess the role of the JCPlus in the decline of the IB stock.

To do this, we compute the "steady state" change in the IB stock, as predicted in a flow model with entry and exit into IB. We obtain the change in the IB rate from the long-run parameter estimates of Table 4, and set the change in the corresponding entry rate to zero, as Table 5 delivers a near zero and insignificant effect of policy on IB inflows. The procedure is detailed in Appendix C1. In our calculations, we consider that a district has reached its new steady state level of IB exits and stock twelve quarters after the start of treatment and ignore the previous dynamic adjustment.

The results are shown graphically in Figure 5. We end our predictions in 2008Q3, as the gradual replacement of IB with the ESA in October 2008 generates a break in the overall series of health-related claims. The blue line represents the actual IB series, which reaches its peak in 2003Q4, with nearly 2.4 million claimants, and declines steadily afterwards, dropping just below 2.1 million claimants in 2008Q3. The grey line represents the predicted IB stock, absent the JCPlus reform. Without the reform, the IB stock would have continued to increase for another year, surpassing the 2.4 million mark, and would have then declined at a slower rate, reaching 2.17 million claimants in 2008Q3. We therefore assess that the introduction of JCPlus explains 30% of the total decline in IB claims in the first seven years since its introduction.[13]

4. Cost-benefit evaluation

For the purpose of our cost-benefit evaluation we consider a policy simultaneously introduced throughout the country, as the staggered rollout would not offer much general insight into costs and benefits of similar

[13] The drop in IB recipients between 2003Q4 and 2008Q3 amounts to 324,640 claims. We estimate that the reform reduced the claim count by 98,947 over the same period.

hypothetical policies in other contexts. We conduct two thought experiments. First, we assume away the transitional disruption costs and assume that the steady state is reached immediately upon JCPlus introduction. This gives an idea of the long-run welfare effects of the policy. Second, we explicitly incorporate the dynamic effects reported in Table 3 and 7 and illustrate how costs and benefits map out over the transition to the long-run steady state. This produces lower benefits because disruption effects cause an initial increase in the welfare rolls. With discounting, this will reduce the present value of the policy change because the losses – including the initial rise in welfare rolls and set-up costs – are front-loaded, whereas the long-run benefits are more heavily discounted.

Our cost-benefit calculations take into account (i) the savings in administration costs implied by the reorganization of the welfare system; (ii) the increase in output implied by the impact of the policy on job finding; (iii) the net exchequer savings which enter into welfare through a lower deadweight loss taxation (the rest simply being transfers); (iv) the sunk set-up costs. We abstract from the leisure gains and/or psychic losses for being on welfare.

4.1. Long-term Cost-benefit Evaluation

The results of the analysis of long-term effects are presented in Table 8. According to audit reports, the annual running costs post-policy were £3.3bn (row 2), about £238m lower than pre-policy (see rows 12 and 3). The long-term impact of JCPlus on job creation is obtained from the long-term estimates reported in Figure 4. Since the long-term policy impact on JSA outflows is statistically insignificant and quantitatively very close to zero (-0.003), we therefore assume that the reform has no long run impact on unemployment outflows. The long-term impact of the reform on IB exits is 0.13, as shown in Figure 4. Using this estimate, we obtain the implied steady-state fall in the IB rate (IB stock over population), according to a flow model of IB entry and exit, as shown in Appendix C1. Not all of these exits would be into employment. From the Labour Force Survey (LFS) quarterly panel data for 1998Q2-2008Q2 we observe that 28% of IB exits are to jobs, while 72% of terminations transit into other benefits or out of the labour force. We also find that 62% of the exits to jobs are full-time while the rest are part-time. We assume that non-employment exits would be to other benefits with cost equivalent to IB on average. This implies that IB spells that do not terminate into employment do not contribute to either job creation or to benefit savings. This is a conservative estimate of policy benefits, as several IB exits will be to states not covered by welfare benefits.[14]

We use wage outcomes as proxies for additional output created, and consider three possible cases for the wages of individuals finding employment after an IB spell: the national minimum wage, the observed mean wage for individuals ending an IB spell in the LFS, and the median wage in the overall wage distribution, obtained from the ASHE 1% sample of taxpayers. The middle case seems the most realistic but the minimum wage and median wage scenarios provide useful lower and upper bounds, respectively. Columns 1 to 3 in Table 8 correspond to the three alternative wage outcomes considered. Row 4 reports weekly earnings for each wage outcome, and row 5 reports the increase in GDP obtained by combining wage levels with job creation resulting from IB exits. The overall GDP gains range between £0.5bn and £1.9bn per year.

Row 6 of Table 8 reports the net gain resulting from a reduced deadweight cost of taxation. This is set to 40% (Gruber, 2011) of the lower net exchequer cost arising from increased tax revenues and lower benefit payments. The mean IB payment in 2000 was £74.71 per week. When an IB recipient finds a job, this benefit saving is accompanied by a change in the tax revenue that depends on the earnings and household composition of the recipient. We used the IFS TAXBEN[15] simulation model to approximate net taxes paid by the 30% of IB exits who found jobs.[16] Combining these elements produces a benefit from a lower deadweight loss between £158m and £500m.

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[14] While there is no strong reason to believe that the job finding rate for the marginal treated IB recipient is the same as for the average recipient, variation in such proportion would not alter our substantial conclusions about the long-run cost-benefit analysis of JCPlus. This is because the saving in administrative costs is sufficient to offset the set-up costs of JCPlus within a few years, even absent any job finding effects because administrative cost savings outweigh the cost of the reform.

[15] Estimates were provided by Barra Roantree of the Institute for Fiscal Studies using the IFS tax and benefit micro-simulation model, TAXBEN.

[16] We consider two household types, a single adult and a couple with two dependent children, and obtain the associated tax payments. We assume that single adults represent two thirds of IB exits, while members of couples with two children consistent with our estimates represent the remaining third from the LFS 1998Q2-2002Q2.

The sum of the three components reported in rows 3, 5 and 6 of Table 8 represents the total annual welfare impact of the policy in the long run. This implies an annual net benefit between £1.2bn and £3.3bn in 2010 prices (row 8). This benefit needs to be compared to the set-up cost. Audit reports estimate the set-up cost to be a one-off expenditure of £2.3bn (row 10). The policy easily covers the sunk costs of the programme, even on conservative assumptions. If we use the 3.5% social discount rate used by the UK government (HM Treasury, 2003) our cost-benefit analysis implies a net benefit of JCPlus of £33bn, even under the most conservative assumptions about re-employment earnings (row 11).

4.2. Cost Benefit Evaluation with Transitional Dynamics

While previous calculations ignore the transitional dynamics, we now consider the dynamic effects of policy for each quarter since the policy change. The effect of the reform on job finding among JSA claimants is based on the estimates reported in column 2 of Table 7. The effect on IB exits is based on the estimates reported in column 2 of Table 4. As we do not observe the destination of IB exits, we impute exit destinations using transition rates estimated in the LFS, as detailed above, but will perform some robustness analysis on the parameter measuring IB exits into employment.

In this case we cannot impose the steady-assumptions used to compute the steady-state rise in the number of jobs, as this would be equivalent to assuming that the JSA and the IB rates reach their steady state levels within a quarter. We thus simply obtain the out-of-steady-state number of jobs created as the predicted change in the benefit outflow in the relevant quarter, net of job separations during that quarter. With labour market churning, some of the workers who find jobs separate in subsequent quarters. We estimate these flows from the (pre-policy) LFS panel. For individuals who were on JSA and found jobs 2.3% lost them in the next quarter, and for IB the figure was 0.5%.[17] The three earnings scenarios, as well as the running costs, are the same as those considered for the long-run analysis of Table 8.[18]

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[17] The job separation rate is obtained as the ratio of inflows into JSA or IB to the employed population of working age. Quantitative results obtained here are very similar to those obtained on an analytical approximation of the change in employment rates during the transition to a new steady state (see Appendix C2).

[18] For the benefit and tax simulation we assume that 70% of JSA exits who find jobs live alone, while 30% live in a

The evolution of costs and benefits over time is represented in Figure 6. The flat, solid line represents the set-up costs, while the three dashed lines represent cumulative benefits since the quarter in which the policy turns on, for the three different levels of earnings. Flow social benefits eventually exceed the costs, but taking into account dynamics effects delivers net losses during the first 6-7 years since intervention, depending on assumptions about re-employment earnings. These results are robust to alternative assumptions on the job finding rates of IB recipients. Consider the middle earnings scenario: with a baseline IB job-finding rate of 28% the effects of policy break even in 2009Q1, reducing their job-finding rate to 10% would move the break-even point one quarter later, while raising it to 50% would move it two quarters earlier.

Short- and medium-run losses following JCPlus implementation are mainly due to the decline in JSA outflows during the first two years of the new regime. Only after seven years into the new regime are job entry gains from IB recipients sufficient to compensate both the initial job entry losses and the set-up cost. Therefore, although this is a policy that passes the cost-benefit test in the long run, a policy maker would be unable to cover the costs of its implementation for seven years. Constitutionally, UK general elections are held every five years and the average tenure of a minister is usually only two years. Thus, a politician's discount rate would be much higher than the social discount rate, possibly leading to under-investment (see e.g. Aghion et al, 2013).

5. Robustness Tests and Extensions

5.1. Heterogeneous Treatment Effects over Time

The policy rollout was introduced in five waves across the country, and our baseline estimates pool variation from all waves for identification. An important issue is whether the effect of treatment is heterogeneous across different waves, in which case the dynamic policy effects that we estimate might instead be due to

couple with two children. For IB, about 67% of those who find jobs live alone, while 33% live in a couple with two children.

averaging over heterogeneous effects in earlier and later waves.

To investigate this, we estimate equation (1) adding one year at a time to our working sample. In order to avoid conflating dynamics effects with heterogeneous wave effects we keep a fixed post-treatment window of one year. The results are reported in Table 9. Panel A refers to JSA outflows. Although the standard errors tend to be larger in the smaller samples, treatment effects for JSA are remarkably stable across waves, ranging between -0.0476 and -0.0581. IB estimates in Panel B are everywhere positive and in the same ballpark, except for wave three where they are zero.

5.2 Lone Parents' Benefits

Besides JSA and IB, lone parents (overwhelmingly single mothers) on income support are the third largest category on welfare rolls. Table 1 shows that the points awarded to helping a lone parent into work are the same as for IB, and in this Section we investigate policy effects on their outflow rates. However, the two groups of claimants may differ in important aspects, most notably demographics and constraints faced in the process of return to work. In particular, child-care constraints and costs can make work particularly costly for lone parents and one may expect this group not to react in the same way as IB recipients to the same incentive treatment. Furthermore, JCPlus introduced work-focused interviews for IB recipients, while these were already in place for Lone Parents on welfare since 2001. For these reasons, one should interpret comparisons across these groups with some caution.

Table 10 reports results of lone parents' welfare outflow equations. In column (1) we estimate the static specification (1) and detect a near zero effect of policy. In column (2), we distinguish between transition dynamics and long-run effects of policy, and find evidence of non-significant policy impacts in the very short run, followed by positive, significant and sizeable impacts from quarter 7 onwards. While these positive effects are smaller than the corresponding policy effects obtained for IB recipients in Table 4, they are qualitatively consistent with the same incentive structure highlighted in Table 1.

We next test for pre-policy effects based on equation (3) and plot the corresponding treatment estimates in Figure 7. The dynamic pattern is very similar to that reported in Figure 4, Panel B, for the IB outflows. Pre-treatment dummies not significantly different from zero (with a p-value of joint F-test of 0.31), and post treatment effects are initially close to zero and become positive and clearly significant in the long run. Quantitatively, the long-run effect of policy on Lone Parents' outflows from welfare is about 80% of its effect on IB outflows.

5.3. Spillover Effects

One potential concern is that, in common with standard difference in differences approaches, our main estimates do not factor in geographic spillovers from treated to adjacent control areas. For example, higher search effectiveness for one group of welfare recipients registered in a certain area may increase job competition for recipients registered in neighbour areas whenever individuals may search for jobs outside their district boundaries. Furthermore, jobseekers may selectively choose where to register as claimant, based on variation in treatment.

We examine geographic spillovers by observing benefit outflows in districts contiguous to treated ones, using an augmented version of equation (1):

$$\ln Y_{ait}^{B} = \beta^{B} D_{it} + \mu^{B} NBR_{it} + \gamma_1^{B} \ln U_{ait-1}^{B} + \gamma_2^{B} \ln U_{a'it-1}^{B} + \delta_{ai}^{B} + \delta_{at}^{B} + \varepsilon_{ait}^{B}. \quad (5)$$

where the dummy NBR_{it} turns one in the quarter when a neighbour district is treated. Neighbour districts are defined as those that share a border with the reference district. The effect of interest μ^{B} is identified by the fact that different districts had their neighbours treated in different quarters.

The results are shown in Table 11. Column 1 shows evidence of a negative and significant spillover effect from neighbour treatment, whose magnitude is about one quarter of the main effect of local treatment. This is possibly consistent with jobseekers' preferences to register for benefits in non-treated districts, and is in line with results reported in Table 5 about the negative impact of policy on the local JSA inflows. For IB, we do not detect any meaningful spillover effect, again in line with the absence of policy effects on IB inflows. Importantly, the main (local) impact of policy for both JSA and IB remains extremely robust whether or not geographic spillovers are accounted for.

5.4. Other Robustness Tests

We have subjected our results to several other robustness tests, some of which we describe below.

Other programmes. A concern with our design is that our estimated treatment effects may be potentially confounded by other policies implemented at the same time. The only other important policy targeted at IB claimants we are aware of is the “Pathways to Work” programme, which aimed to help claimants better understand and manage their health conditions and thereby improve their work prospects. It was originally introduced in October 2003 in eight pilot areas, and rolled-out to 14 expansion areas from October 2005.[19] When including post-treatment dummies for the areas affected our baseline estimates are virtually unchanged.

Weighting. To address the concern that our results may be driven by a few small districts, we weight observations by the district-level, age-specific benefit caseload in the pre-policy period (1999Q3). Table A2 reports the results for equation (1) using this weighting system. Column 1 shows an average policy effect on JSA outflows of -4.5%, which is very close to the baseline -4.8% estimate of Table 3. Dynamic effects reported in column 2 are also very similar to those based on unweighted regressions of Table 4. Likewise, for IB both the average effects and their dynamic structure are very similar to those obtained on the unweighted regression of Tables 3 and 4.

Estimates at Monthly Frequency. We are able to estimate JSA (but not IB) outflow equations at the monthly, rather than quarterly, frequency. The dependent variable is now the monthly outflow from JSA, having included the stock at the end of the previous month as a control. Column 1 in Table A3 shows a policy coefficient on unemployment outflows of -3.6%, which is in the same ballpark of the baseline -4.8% estimate. The dynamic results in column 2 are also very similar to the baseline results and in particular,

[19] See Becker et al. (2010). Pilot areas were Bridgend, Gateshead, Somerset, East Lancashire, Essex, Derbyshire and Renfrewshire, Inverclyde, Argyll and Bute. The expansion occurred in three phases: phase 1 from October 2005 (covering Tees Valley, Cumbria, Lancashire West and Glasgow), phase 2 from April 2006 (covering Barnsley, Doncaster & Rotherham, City of Sunderland, County Durham, Lanarkshire & East Dunbartonshire, Liverpool & Wirral, Greater Manchester Central and South West Wales; and phase 3 from October 2006 (covering Eastern Valleys, Greater Mersey and Staffordshire).

they deliver a non-significant impact of policy in the long run.

6. Conclusions

The UK embarked on a major change in the administration of welfare benefits for the unemployed and the disabled in 2001 with the introduction of Job Centre Plus. Bureaucratic incentives to help the disabled into jobs were sharpened, and offices were re-organised to be more efficient. At the same time, the growth of the stock of Incapacity Benefit recipients, which had been rising for 30 years, stopped increasing. By exploiting the staggered introduction of JCPlus across UK districts, we evaluate this policy in the light of a framework encompassing incentives, reorganization and disruption costs. We show that there are potentially two unintended consequences of the policy change. First, the relative incentives to help the unemployed into jobs fell. Second, the re-organization of the job centres temporarily reduced outflow rates from benefits, likely due to disruption effects.

We found several results that are consistent with the existence of incentive and organization effects. First, we detect an increase in the exit rates of Incapacity Benefit recipients in the long run, while unemployment exits initially decline and eventually revert to pre-policy reform levels. Second, Lone Parents on welfare, a group of benefit recipients affected by the same incentive structure as the disabled, experienced a very similar welfare exit pattern as the disabled, following the introduction of JCPlus. Overlaid on the impact of incentives, we find evidence of initial disruption effects for all groups of welfare recipients, followed by long-term efficiency gains from the reorganisation of offices.

A dynamic cost-benefit analysis of the policy suggests that the short-run costs are easily outweighed by long-run benefits. However, the benefits of the program take time to be visible and this poses a problem for policy-makers whose time horizons may be much shorter than that of a social planner. This highlights the political economy problem at the heart of welfare reform: changes to the administration of the benefit system that have long-run benefits may have significant short-run costs, and this makes it hard to build up a coalition for change.

There are many directions that the work could be taken. To what extent does the increased labour supply lead to lower equilibrium wages (not just due to compositional changes)? Can we unbundle further some of the elements of the policy to distinguish incentives effects from information (which conceivably could be more important for the disabled)? Could similar reforms be effective in other countries that have also seen large increases in the disability rolls? These are important avenues for future research.

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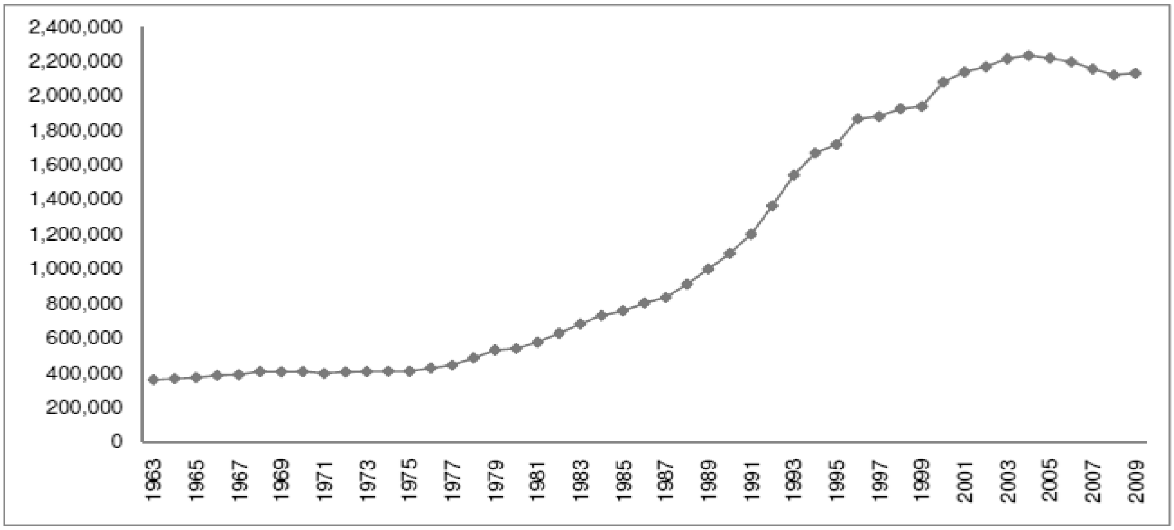
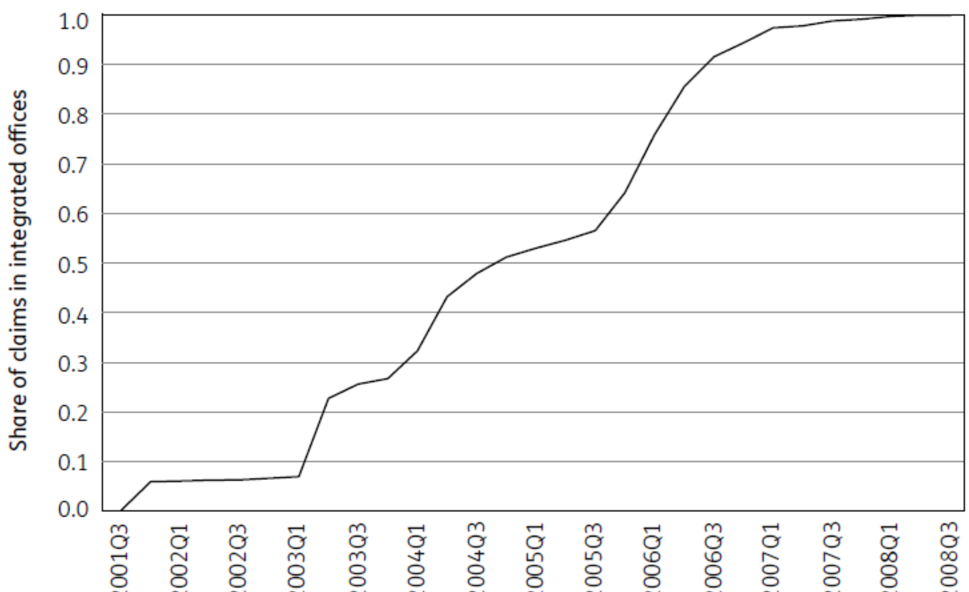
Figure 1
Incapacity Claimants (6 Months Plus) of Working Age: 1963 -2009



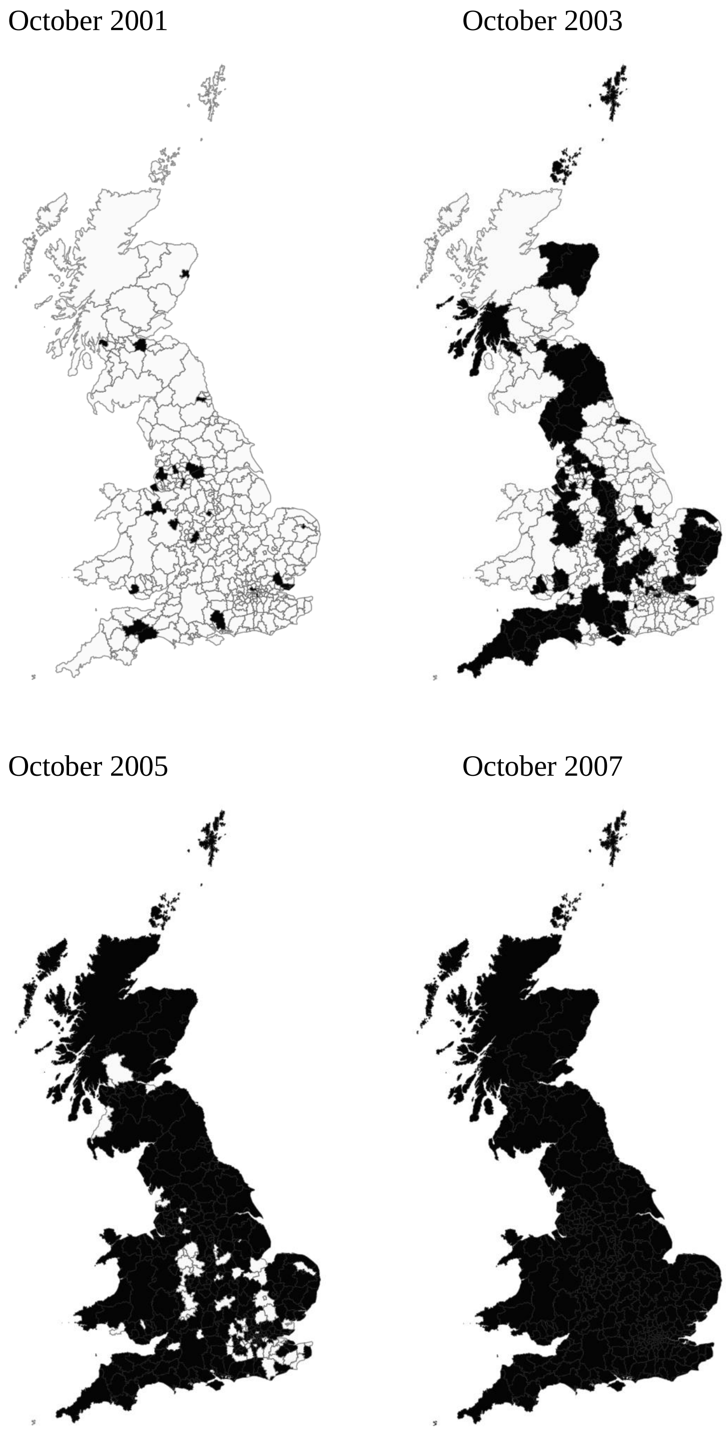
Source: Figure 2.1 in Beatty, Christina and Steve Fothergill, S. (2013), reproduced with permission of SNCSC.

Figure 2
The Staggered Rollout of Jobcentre Plus



Source: Riley et al. (2011). The line shows the share of JSA claims covered by Jobcentre Plus. This has been computed by Riley et al. (2011) by matching the office-level rollout schedule with the number of claims registered at each office in the quarter in which Jobcentre Plus was introduced. This Figure was reproduced under the terms of the Open Government Licence http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/.

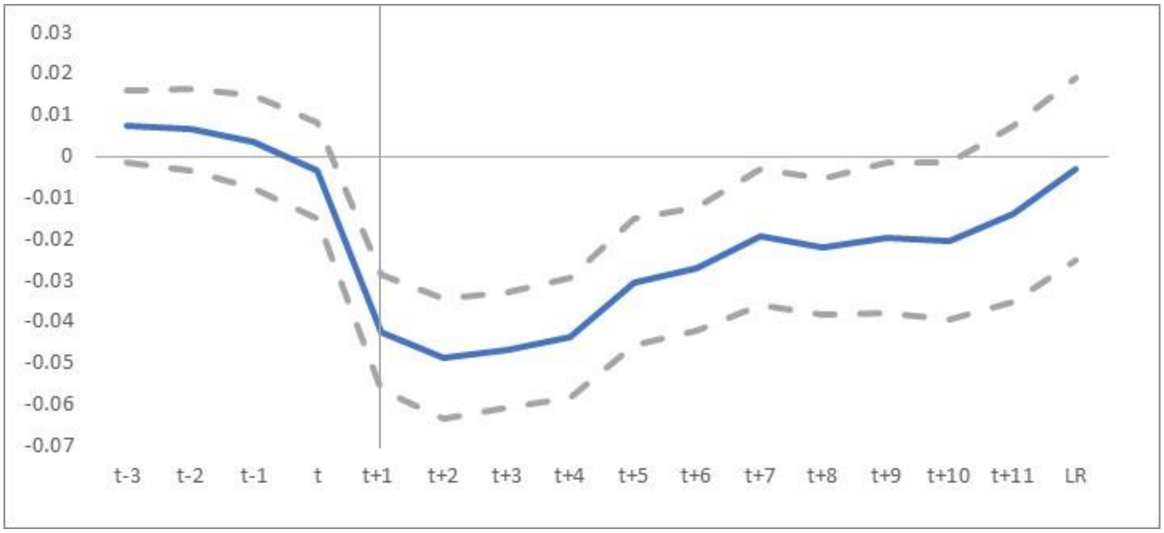
Figure 3
Map of Policy Diffusion



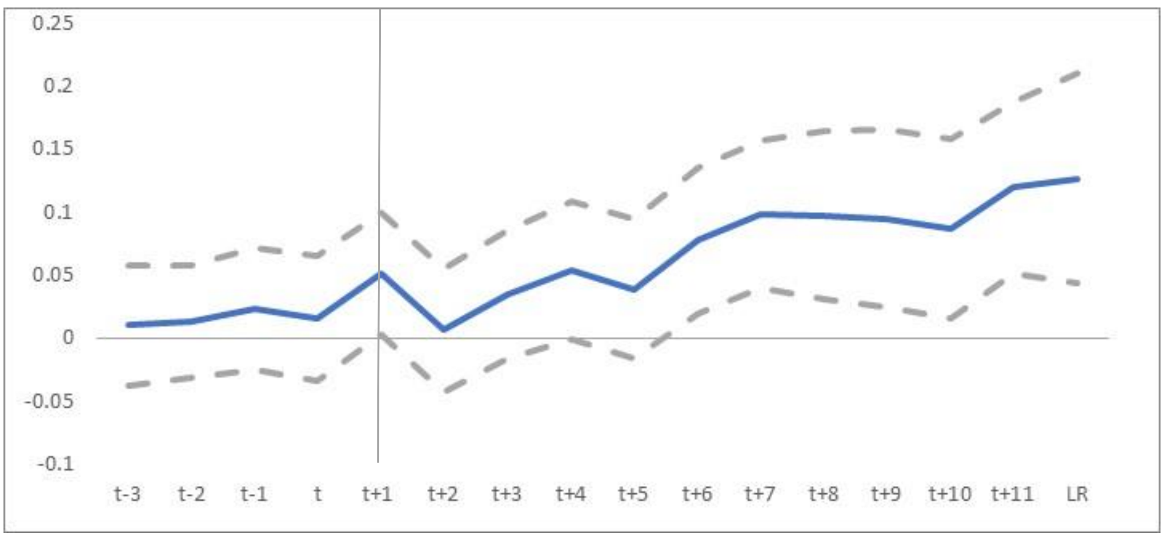
Notes. The maps show additional districts covered at each date.

Figure 4

Panel A: Dynamic Effects of JCPlus on JSA Outflows

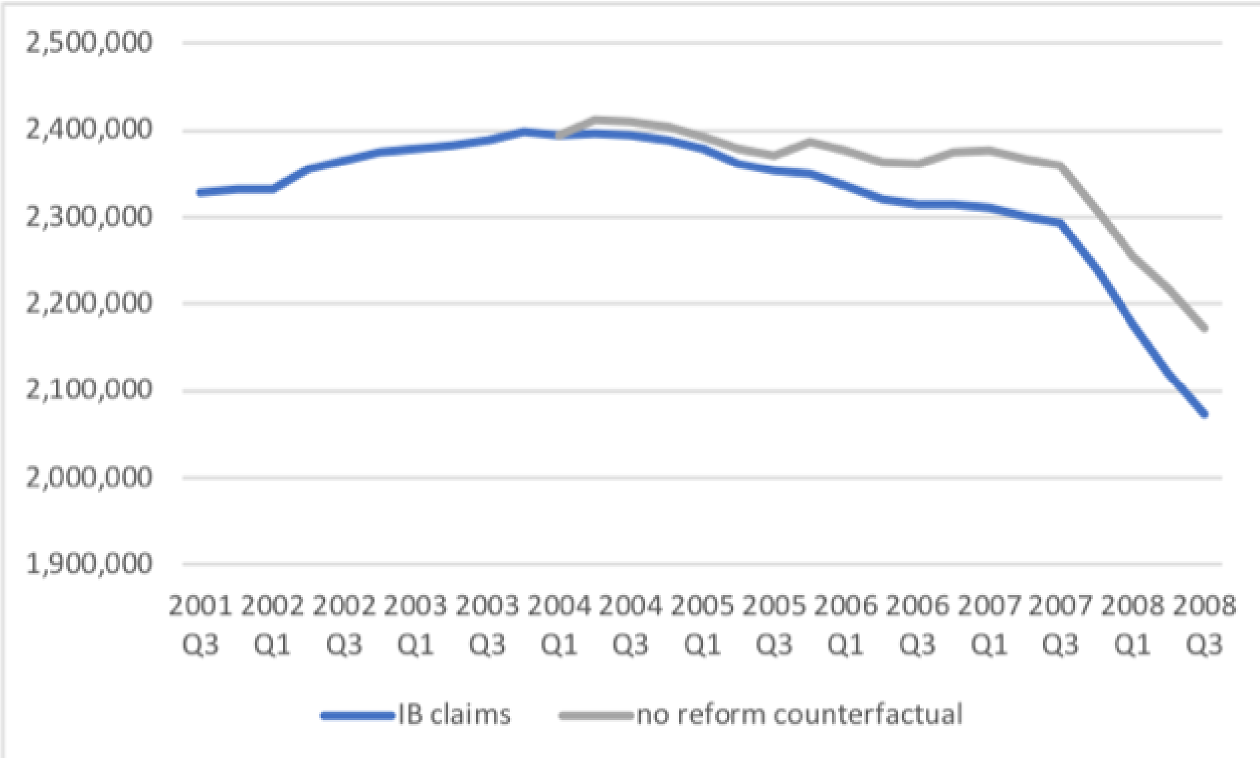


Panel B: Dynamic Effects of JCPlus on IB Outflows



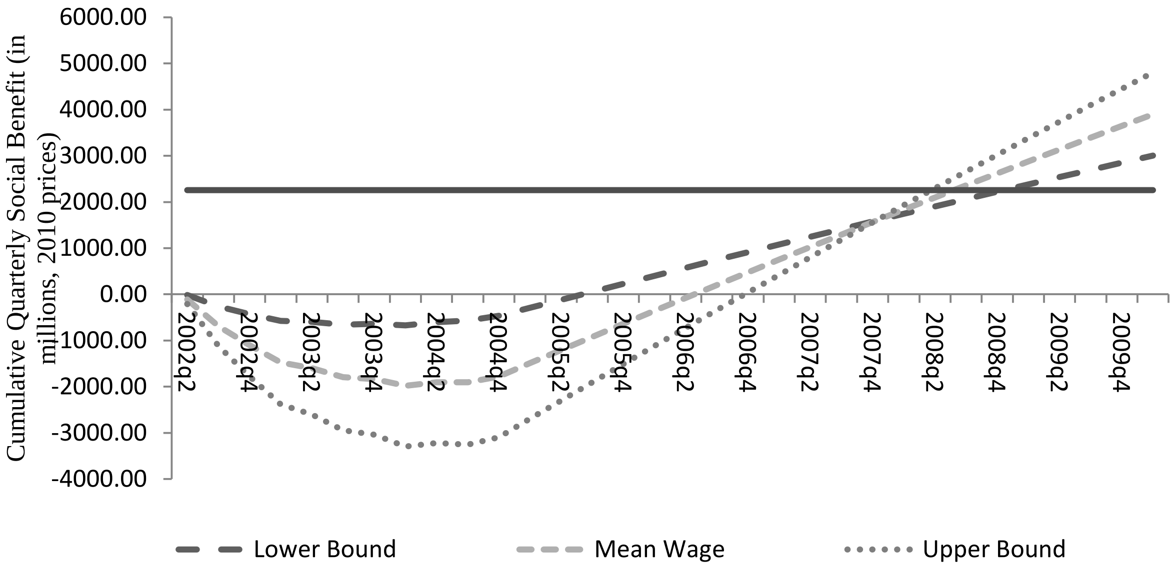
Notes. Panels A and B plot coefficients on $D_{it-3} - D_{iLR}$, obtained from estimating specification (3) for JSA outflows (Panel A) and IB outflows (Panel B). Dashed lines represent 95% confidence intervals. See also notes to Table 3 for same sizes and extra regressors included.

Figure 5
Impact of JCPlus on the Overall Decline of IB Claims



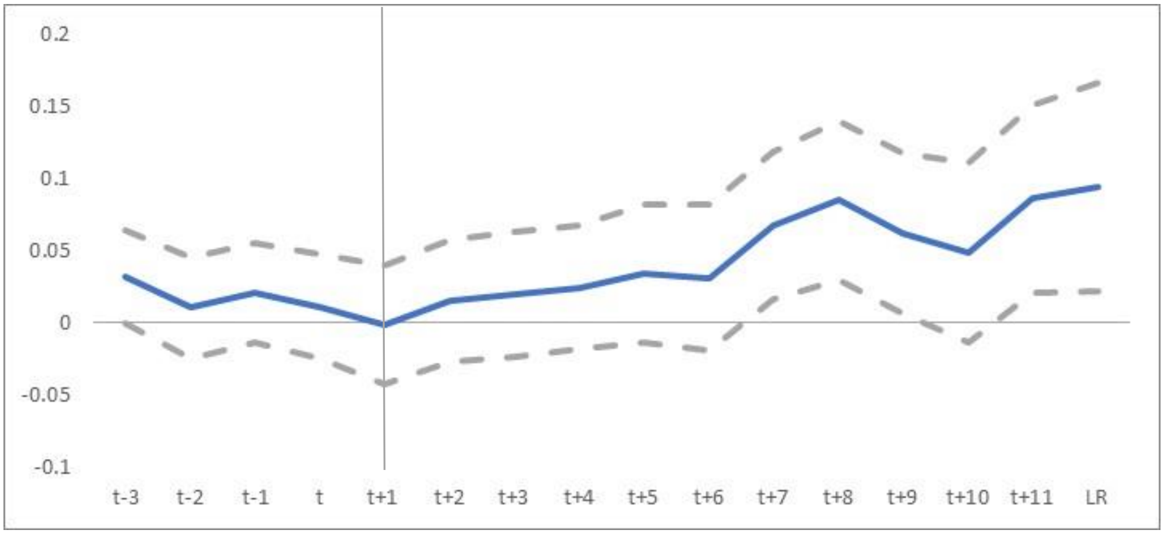
Notes. The counterfactual series adds to the actual series the long run steady state effect of the reform on IB. This does not take account of transitional dynamics in IB stocks, which we found to be small. The transition to the new steady states is based on the population-weighted share of labour markets that reached the steady state.

Figure 6
Cost-Benefit Evaluation of JCPlus with Transitional Dynamics



Notes. The solid horizontal line represents set-up costs of the policy. The dashed lines represent the cumulative benefit of the policy in each quarter, based on parameter estimates reported in column 2 of Table 7 (for JSA outflows) and column 6 of Table 4 (for IB outflows), and calculations described in the text.

Figure 7
Dynamic Effects of JCPlus on Lone Parents' Outflows from Welfare



Notes. The Figure plots coefficients on $D_{it-3} - D_{iLR}$, obtained from estimating specification (3) for Lone Parents' outflows from welfare. Dashed lines represent 95% confidence intervals. See also notes to Table 10 for sample sizes and extra regressors included.

Table 1
Job Entry Target points (2002-03)

Client Group	Points Awarded
Disabled people and inactive benefits (IB)	12
Lone parents (LP)	12
New Deal 50+, 25+, Young People	8
Other long term JSA	8
Short term unemployed JSA	4
Employed job-entries	1

Notes. The second column lists the number of points awarded to a benefit officer for placing a claimant from the corresponding benefit category into work.

Table 2
Summary Statistics

	Quarterly Aggregate		Average across all district-age-quarter cells	
	Mean	SD	Mean	SD
	(1)	(2)	(3)	(4)
JSA Stock	869,843	94,721	1,163	1,661
JSA Inflow	603,236	48,386	806	836
JSA Outflow	607,707	69,087	812	854
JSA Outflow rate	0.700	0.057	0.882	0.263
IB Stock	2,010,995	62,675	2,688	4,410
IB Inflow	140,899	11,253	188	248
IB Outflow	55,369	5,727	74	111
IB Outflow rate	0.028	0.003	0.048	0.042

Notes. The sample period is 1999Q3-2008Q2. Columns (1) and (2) aggregate quarterly stocks and flows at the national level and then take averages over 36 quarters. Columns (3)-(5) report (unweighted) averages of the district-age-quarter cells used in our analysis. The number of cells is 26,928 (36 quarters × 374 districts × 2 age groups). JSA represents unemployment benefits; IB represents disability benefits. Stock variables are measured at the start of each quarter and flow variables are measured over the quarter.

Table 3
Policy Effects on Outflows from Unemployment (JSA) and Disability Benefits (IB)

	Dependent variable: ln(total outflow)					
	(1)	(2)	(3)	(4)	(5)	(6)
Benefit:	JSA	JSA	JSA	IB	IB	IB
D_{it}	-0.0477***	-0.0477***	-0.0475***	0.0188	0.0188	0.0235*
	(0.0047)	(0.0047)	(0.0044)	(0.0133)	(0.0133)	(0.0138)
$\ln(U_{ait-1})$	0.7150***	0.5767***	0.5523***	0.4080***	0.5277***	0.5611***
	(0.0190)	(0.0569)	(0.0586)	(0.0445)	(0.1034)	(0.1600)
$\ln(U_{a'it-1})$	-0.0614***	0.0769	0.0525	0.1918***	0.0721*	0.1054*
	(0.0118)	(0.0467)	(0.0455)	(0.0569)	(0.0387)	(0.0556)
District*Age FE		√	√		√	√
Age*Time FE		√	√		√	√
District trends			√			√
Observations	26,180	26,180	26,180	26,180	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The specification estimated is equation (1), where the dependent variable is the log of quarterly JSA outflow in columns 1-3, and the log of quarterly IB outflow in columns 4-6. D_{it} takes value 1 in the post-policy period and zero otherwise. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1

Table 4
Dynamic Effects of Policy

	Dependent variable: ln(total outflow)	
	(1)	(2)
	JSA	IB
D_{it+1}	-0.0444***	0.0404**
	(0.0054)	(0.0196)
D_{it+2}	-0.0512***	-0.0049
	(0.0057)	(0.0210)
D_{it+3}	-0.0493***	0.0223
	(0.0055)	(0.0208)
D_{it+4}	-0.0462***	0.0405*
	(0.0056)	(0.0220)
D_{it+5}	-0.0329***	0.0248
	(0.0061)	(0.0215)
D_{it+6}	-0.0297***	0.0633***
	(0.0060)	(0.0223)
D_{it+7}	-0.0223***	0.0827***
	(0.0068)	(0.0237)
D_{it+8}	-0.0250***	0.0811***
	(0.0070)	(0.0247)
D_{it+9}	-0.0227***	0.0772***
	(0.0077)	(0.0274)
D_{it+10}	-0.0235***	0.0687**
	(0.0080)	(0.0280)
D_{it+11}	-0.0169*	0.1004***
	(0.0094)	(0.0271)
D_{iLR}	-0.0068	0.1038***
	(0.0100)	(0.0315)
$\ln(U_{ait-1})$	0.5529***	0.5626***
	(0.0588)	(0.1599)
$\ln(U_{a'it-1})$	0.0530	0.1069*
	(0.0453)	(0.0554)
District*Age FE	√	√
Age*Time FE	√	√
District trends	√	√
Observations	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The specification estimated is equation (2), where the dependent variable is the log of quarterly JSA outflow in column 1, and the log of quarterly IB outflow in column 4. $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. D_{iLR} indicates treatment 12+ quarters after the policy is introduced. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for district, time and age fixed effects. The last row contains the p-value of the F-test for the joint significance of the post-treatment dummies. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Table 5
Policy Effects on Inflows into JSA and IB

	Dependent variable: ln(total inflow)			
	(1) JSA	(2) JSA	(3) IB	(4) IB
D_{it}	-0.0561***		-0.0052	
	(0.0058)		(0.0078)	
D_{it+1}		-0.0386***		-0.0105
		(0.0063)		(0.0116)
D_{it+2}		-0.0684***		-0.0228**
		(0.0071)		(0.0093)
D_{it+3}		-0.0747***		-0.0018
		(0.0072)		(0.0100)
D_{it+4}		-0.0585***		-0.0001
		(0.0076)		(0.0118)
D_{iLR}		-0.0476***		0.0049
		(0.0078)		(0.0084)
$\ln(population_{ait})$	-0.1044**	-0.1037**	-0.0410	-0.0413
	(0.0407)	(0.0407)	(0.0632)	(0.0631)
Observations	26,180	26,180	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The specification estimated in columns 1 and 3 is equation (4), where the dependent variable is the log of quarterly JSA and IB inflows, respectively. D_{it} takes value 1 in the post-policy period and zero otherwise. The specification estimated in columns 2 and 4 is the dynamic version of equation (4). $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. D_{iLR} indicates treatment 5+ quarters after the policy is introduced. $population_{ait}$ denotes the mid-year population estimate by age and district. All regressions control for district, time and age fixed effects as well as age*district and age*time interactions and district-specific linear trends. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Table 6
Dynamic Effects of Policy – Controlling for Inflows

	Dependent variable: ln(total outflow)					
	(1) JSA	(2) JSA	(3) JSA	(4) IB	(5) IB	(6) IB
D_{it+1}	-0.0431***	-0.0435***	-0.0457***	0.0080	-0.0005	-0.0003
	(0.0053)	(0.0054)	(0.0054)	(0.0192)	(0.0184)	(0.0186)
D_{it+2}	-0.0427***	-0.0429***	-0.0524***	0.0489*	0.0403	0.0388
	(0.0054)	(0.0055)	(0.0057)	(0.0253)	(0.0247)	(0.0242)
D_{it+3}	-0.0350***	-0.0340***	-0.0505***	0.0155	0.0060	0.0036
	(0.0051)	(0.0050)	(0.0054)	(0.0230)	(0.0226)	(0.0224)
D_{it+4}	-0.0319***	-0.0295***	-0.0474***	0.0542***	0.0441**	0.0433**
	(0.0055)	(0.0056)	(0.0056)	(0.0196)	(0.0195)	(0.0193)
D_{it+5}	-0.0216***	-0.0182***	-0.0342***	0.0408*	0.0304	0.0304
	(0.0054)	(0.0056)	(0.0061)	(0.0230)	(0.0235)	(0.0236)
D_{it+6}	-0.0205***	-0.0174***	-0.0310***	0.0641**	0.0527**	0.0525**
	(0.0054)	(0.0056)	(0.0060)	(0.0249)	(0.0241)	(0.0244)
D_{it+7}	-0.0128**	-0.0097	-0.0227***	0.0689**	0.0535	0.0554
	(0.0059)	(0.0059)	(0.0067)	(0.0343)	(0.0343)	(0.0343)
D_{it+8}	-0.0163***	-0.0137**	-0.0254***	0.1090***	0.0916**	0.0931***
	(0.0060)	(0.0059)	(0.0070)	(0.0359)	(0.0355)	(0.0353)
D_{it+9}	-0.0153**	-0.0124*	-0.0231***	0.0833***	0.0656**	0.0679**
	(0.0066)	(0.0065)	(0.0077)	(0.0308)	(0.0298)	(0.0296)
D_{it+10}	-0.0182***	-0.0157**	-0.0235***	0.1142***	0.0960***	0.0993***
	(0.0067)	(0.0065)	(0.0080)	(0.0314)	(0.0311)	(0.0313)
D_{it+11}	-0.0088	-0.0070	-0.0168*	0.1404***	0.1193***	0.1246***
	(0.0080)	(0.0078)	(0.0093)	(0.0332)	(0.0331)	(0.0335)
D_{iLR}	-0.0023	-0.0006	-0.0062	0.1251***	0.1006***	0.1036***
	(0.0082)	(0.0078)	(0.0099)	(0.0395)	(0.0382)	(0.0384)
$\ln(Inflow)_{it-1}$	0.2517***	0.2527***		0.1121***	0.1153***	
	(0.0298)	(0.0272)		(0.0307)	(0.0326)	
$\ln(Inflow)_{it-2}$		0.0485***			0.0367	
		(0.0093)			(0.0286)	
$\ln(Inflow)_{it-3}$		0.0053			0.0365	
		(0.0097)			(0.0230)	
$\ln(Inflow)_{it-4}$		0.0165			0.0319	
		(0.0210)			(0.0261)	
$\ln(U_{ait-1})$	0.4133***	0.3944***	0.5450***	0.4876***	0.4605***	0.5464***
	(0.0428)	(0.0511)	(0.0666)	(0.1487)	(0.1575)	(0.1715)
$\ln(U_{a'it-1})$	0.0430	0.0403	0.0470	0.1058*	0.1265**	0.1398**
	(0.0415)	(0.0377)	(0.0437)	(0.0556)	(0.0638)	(0.0667)
Observations	25,432	23,188	23,188	25,432	23,188	23,188

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The specification estimated is equation (2); having added controls for lagged benefit inflows. The dependent variable is the log of quarterly JSA inflow in columns 1-3, and the log of quarterly IB inflow in columns 4-6. $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. D_{iLR} indicates treatment 12+ quarters after the policy is introduced. . U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects as well as age*district and age*time interactions and district-specific linear trends. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Table 7 –Panel A
Policy Effects on JSA Outflows into Alternative Destinations.

	Dependent variable: ln(JSA outflow) by destination			
	(1)	(2)	(3)	(4)
	Work	Work	Benefits	Benefits
D_{it}	-0.0467***		-0.0332**	
	(0.0061)		(0.0144)	
D_{it+1}		-0.0190**		-0.0100
		(0.0092)		(0.0230)
D_{it+2}		-0.0660***		-0.0560**
		(0.0092)		(0.0225)
D_{it+3}		-0.0472***		-0.0641***
		(0.0097)		(0.0244)
D_{it+4}		-0.0465***		-0.0189
		(0.0113)		(0.0234)
D_{it+5}		-0.0170		0.0114
		(0.0120)		(0.0268)
D_{it+6}		-0.0300***		0.0170
		(0.0116)		(0.0241)
D_{it+7}		-0.0183		0.0142
		(0.0120)		(0.0256)
D_{it+8}		-0.0188		0.0322
		(0.0125)		(0.0285)
D_{it+9}		-0.0007		0.0018
		(0.0159)		(0.0295)
D_{it+10}		-0.0122		0.0289
		(0.0145)		(0.0306)
D_{it+11}		-0.0014		0.0247
		(0.0161)		(0.0329)
D_{iLR}		0.0189		0.0576*
		(0.0166)		(0.0334)
$\ln(U_{ait-1})$	0.6040***	0.6046***	0.4112***	0.4127***
	(0.0486)	(0.0488)	(0.0836)	(0.0842)
$\ln(U_{a'it-1})$	0.0813***	0.0820***	-0.0162	-0.0146
	(0.0216)	(0.0213)	(0.0392)	(0.0390)
Observations	26,180	26,180	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. Columns 1, 3, 5 and 7 are based on specification (1) and columns 2, 4, 6 and 8 are based on specification (2). The dependent variable is the JSA outflow into work (columns 1 and 2); other benefits (columns 3 and 4); other destinations (columns 5 and 6; gone abroad education, training, retirement, prison or court, new claim review, defective claim, ceased claiming, deceased), and unknown destinations (columns 7 and 8). D_{it} takes value 1 in the post-policy period and zero otherwise. $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. D_{iLR} indicates treatment 12+ quarters after the policy is introduced. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects as well as age*district and age*time interactions and district-specific linear trends. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Table 7 – Panel B
Policy Effects on JSA Outflows into Alternative Destinations.

	Dependent variable: ln(JSA outflow) by destination			
	(5)	(6)	(7)	(8)
	Other	Other	Unknown	Unknown
D_{it}	-0.0377***		-0.0298***	
	(0.0067)		(0.0078)	
D_{it+1}		-0.0451***		-0.0512***
		(0.0124)		(0.0139)
D_{it+2}		-0.0305***		-0.0066
		(0.0100)		(0.0125)
D_{it+3}		-0.0479***		-0.0219
		(0.0115)		(0.0135)
D_{it+4}		-0.0423***		-0.0430***
		(0.0116)		(0.0133)
D_{it+5}		-0.0103		-0.0112
		(0.0112)		(0.0124)
D_{it+6}		-0.0310***		-0.0376***
		(0.0104)		(0.0125)
D_{it+7}		-0.0066		-0.0028
		(0.0124)		(0.0140)
D_{it+8}		-0.0202		-0.0290**
		(0.0132)		(0.0147)
D_{it+9}		-0.0223*		-0.0136
		(0.0135)		(0.0154)
D_{it+10}		-0.0241*		-0.0262*
		(0.0127)		(0.0152)
D_{it+11}		-0.0010		-0.0028
		(0.0157)		(0.0187)
D_{iLR}		-0.0075		-0.0117
		(0.0155)		(0.0172)
$\ln(U_{ait-1})$	0.5216***	0.5221***	0.4904***	0.4903***
	(0.0864)	(0.0866)	(0.0854)	(0.0854)
$\ln(U_{a'it-1})$	0.0222	0.0226	0.0423*	0.0422*
	(0.0306)	(0.0305)	(0.0241)	(0.0241)
Observations	26,180	26,180	26,180	26,180

Notes. See notes to Panel A on previous page.

Table 8
Cost-Benefit Analysis of JCPlus: Long-Run Evaluation

	Re-employment earnings		
	(1) Lower bound (min wage)	(2) Mean re-employment earnings for IB exits	(3) Upper bound (median wage)
1. Administration cost in old regime (2000 prices) (£m)	3,552	3,552	3,552
2. Administration cost in new regime (2000 prices) (£m)	3,314	3,314	3,314
3. Annual saving in administrative costs (£m)	238	238	238
4. Weekly earnings	122	250	360
5. Increase in GDP from wage income (£m)	623	1,349	1,942
6. Deadweight gain (40% net exchequer saving) (£m)	158	285	518
7. Annual social benefit (2000 prices) (£m)	1,020	1,871	2,698
8. Annual social benefit (2010 prices) (£m)	1,254	2,301	3,318
9. PDV of social benefit (£m)	35,840	65,761	94,808
10. Total Setup Cost (2010 prices) (£m)	2,259.6	2,259.6	2,259.6
11. Net benefit (£m)	33,580	63,501	92,548

Notes. Figures reported represent the long-run cost-benefit analysis of a policy introduced nationally (i.e. transitional dynamics is ignored). The administrative costs are from NAO (2008). The benefits are based on D_{iLR} parameter estimates reported in column 6 of Table 3, and calculations described in the text.

Table 9
Treatment Effects over Time

	1999:4-2002:2	*1999:4-2003:2*	*1999:4-2004:2*	*1999:4-2005:2*	*1999:4-2006:2*	*1999:4-2007:2*	*1999:4-2008:2*
			Dependent variable: ln(total outflow) from JSA				
D_{it}	-0.0476***	-0.0542***	-0.0510***	-0.0534***	-0.0581***	-0.0532***	-0.0475***
	(0.0134)	(0.0082)	(0.0057)	(0.0053)	(0.0046)	(0.0043)	(0.0044)
$\ln(U_{ait-1})$	0.5821***	0.5721***	0.5646***	0.5717***	0.5582***	0.5489***	0.5523***
	(0.0206)	(0.0460)	(0.0550)	(0.0541)	(0.0624)	(0.0600)	(0.0586)
$\ln(U_{a'it-1})$	0.1170***	0.1011**	0.1070**	0.0882**	0.0752	0.0568	0.0525
	(0.0380)	(0.0490)	(0.0499)	(0.0446)	(0.0494)	(0.0475)	(0.0455)
Observations	8,228	11,220	14,212	17,204	20,196	23,188	26,180
			Dependent variable: ln(total outflow) from IB				
D_{it}	0.0238	0.0332	0.0001	0.0125	0.0190	0.0130	0.0235*
	(0.0467)	(0.0312)	(0.0208)	(0.0192)	(0.0153)	(0.0141)	(0.0138)
$\ln(U_{ait-1})$	0.4668**	0.4339***	0.4159***	0.4447***	0.4792***	0.5100***	0.5611***
	(0.1845)	(0.1549)	(0.1566)	(0.1566)	(0.1598)	(0.1576)	(0.1600)
$\ln(U_{a'it-1})$	-0.0985	-0.1255*	-0.0638	-0.0288	0.0269	0.0612	0.1054*
	(0.0929)	(0.0758)	(0.0572)	(0.0497)	(0.0468)	(0.0481)	(0.0556)
Observations	8,228	11,220	14,212	17,204	20,196	23,188	26,180

The specification estimated is equation (1), where the dependent variable is the log of quarterly JSA and IB outflows in the top and bottom panels, respectively. D_{it} takes the value 1 in the post-policy period and zero otherwise. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects, as well as district*age and age*time interactions. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1

Table 10
Policy Effects on Welfare Outflows for Lone Parents (LP)

	Dependent variable: ln(total outflow)	
	(1) LP	(2) LP
D_{it}	0.0004	
	(0.0115)	
D_{it+1}		-0.0134
		(0.0170)
D_{it+2}		0.0024
		(0.0165)
D_{it+3}		0.0054
		(0.0160)
D_{it+4}		0.0099
		(0.0162)
D_{it+5}		0.0192
		(0.0194)
D_{it+6}		0.0150
		(0.0196)
D_{it+7}		0.0499***
		(0.0191)
D_{it+8}		0.0670***
		(0.0194)
D_{it+9}		0.0424**
		(0.0207)
D_{it+10}		0.0286
		(0.0232)
D_{it+11}		0.0654***
		(0.0243)
D_{iLR}		0.0686***
		(0.0253)
$\ln(U_{ait-1})$	0.4593***	0.4606***
	(0.1426)	(0.1426)
$\ln(U_{a'it-1})$	-0.2634***	-0.2621***
	(0.0784)	(0.0784)
Observations	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The dependent variable is the log of quarterly LP outflow. D_{it} takes the value 1 in the post-policy period and zero otherwise. $D_{it-\tau}$ and $D_{it+\tau}$ indicate, respectively, treatment τ quarters before and τ quarters after the policy is introduced. D_{iLR} indicates treatment 12+ quarters after the policy is introduced. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects, as well as age*district and age*time interactions and district-specific linear trends. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1

Table 11
Spillover Effects of JCPlus into Neighbouring Districts

	Dependent variable: ln(total outflow)	
	(1)	(2)
	JSA	IB
D_{it}	-0.0456***	0.0245*
	(0.0044)	(0.0139)
NBR_{it}	-0.0136***	-0.0072
	(0.0045)	(0.0152)
$\ln(U_{ait-1})$	0.5528***	0.5615***
	(0.0587)	(0.1600)
$\ln(U_{a'it-1})$	0.0529	0.1058*
	(0.0454)	(0.0556)
Observations	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2006Q2. The estimated specification is equation (5). The dependent variable is the log of quarterly JSA outflow in columns 1 and 2, and the log of quarterly IB outflow in columns 3 and 4. D_{it} takes the value 1 in the post-policy period and zero otherwise. NBR_{it} takes the value 1 when a neighbouring district is treated and zero otherwise. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for age, district and time fixed effects, as well as age*district and age*time interactions and district-specific linear trends. *** p<0.01, ** p<0.05, * p<0.1

Online Appendices: Not intended for publication

A. Appendix Tables

Table A1
Alternative Dynamic Structures of Policy Effects

	Dependent variable: ln(total outflow)			
	(1)	(2)	(3)	(4)
	JSA	JSA	IB	IB
D_{i1}	-0.0498***	-0.0472***	0.0301	0.0360*
	(0.0058)	(0.0055)	(0.0197)	(0.0198)
D_{i2}	-0.0578***	-0.0546***	-0.0182	-0.0103
	(0.0060)	(0.0058)	(0.0207)	(0.0210)
D_{i3}	-0.0567***	-0.0533***	0.0074	0.0164
	(0.0056)	(0.0055)	(0.0203)	(0.0209)
D_{i4}		-0.0506***		0.0342
		(0.0056)		(0.0214)
D_{i5}		-0.0381***		0.0171
		(0.0061)		(0.0213)
D_{i6}		-0.0357***		0.0544**
		(0.0058)		(0.0219)
D_{i7}		-0.0292***		0.0722***
		(0.0066)		(0.0221)
D_{4LR}	-0.0385***		0.0444***	
	(0.0051)		(0.0157)	
D_{8LR}		-0.0263***		0.0751***
		(0.0069)		(0.0208)
$\ln(U_{ait-1})$	0.5528***	0.5529***	0.5613***	0.5617***
	(0.0587)	(0.0588)	(0.1598)	(0.1598)
$\ln(U_{a'it-1})$	0.0530	0.0530	0.1056*	0.1060*
	(0.0454)	(0.0453)	(0.0554)	(0.0554)
Observations	26,180	26,180	26,180	26,180

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2008Q2. The specification estimated is (the analogue of) equation (2), where the dependent variable is the log of quarterly JSA outflow in columns 1-3, and the log of quarterly IB outflow in columns 4-6. $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. $D_{\tau LR}$ indicates treatment τ+ quarters after the policy is introduced. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for district, time and age fixed effects as well as age*district and age*time interactions. The last row contains the p-value of the F-test for the joint significance of the post-treatment dummies. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Table A2
Outflow Regressions Weighted by District-Level Benefit Caseload

	Dependent variable: ln(total outflow)			
	(1) JSA	(2) JSA	(3) IB	(4) IB
D_{it}	-0.0450***		0.0039	
	(0.0067)		(0.0086)	
D_{it+1}		-0.0321***		0.0004
		(0.0059)		(0.0089)
D_{it+2}		-0.0469***		-0.0148
		(0.0078)		(0.0104)
D_{it+3}		-0.0520***		-0.0001
		(0.0077)		(0.0123)
D_{it+4}		-0.0460***		0.0010
		(0.0072)		(0.0129)
D_{it+5}		-0.0399***		0.0236*
		(0.0070)		(0.0125)
D_{it+6}		-0.0320***		0.0253*
		(0.0071)		(0.0139)
D_{it+7}		-0.0294***		0.0450***
		(0.0086)		(0.0144)
D_{it+8}		-0.0204**		0.0565***
		(0.0087)		(0.0203)
D_{it+9}		-0.0249***		0.0597***
		(0.0087)		(0.0182)
D_{it+10}		-0.0267***		0.0390**
		(0.0071)		(0.0175)
D_{it+11}		-0.0308***		0.0371**
		(0.0075)		(0.0155)
D_{iLR}		-0.0110		0.0541**
		(0.0100)		(0.0216)
$\ln(U_{ait-1})$	0.5942***	0.5959***	0.8001***	0.7988***
	(0.0126)	(0.0124)	(0.0620)	(0.0620)
$\ln(U_{a'it-1})$	0.0153	0.0149	0.0622**	0.0652**
	(0.0124)	(0.0122)	(0.0307)	(0.0307)
Observations	26,110	26,110	26,145	26,145

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from 1999Q3 to 2006Q2. The estimated specification is equation (1) for columns 1 and 3 and equation (2) for columns 2 and 4. The dependent variable is the log of quarterly JSA outflow in columns 1 and 2, and the log of quarterly IB outflow in columns 3 and 4. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for district, time and age fixed effects as well as age*district and age*time interactions. Regressions are weighted by the respective benefit caseload in the district-age group in 1999Q3. Standard errors are clustered at the district level. Time effects are a separate dummy for each quarter by year pair. *** p<0.01, ** p<0.05, * p<0.1

Table A3
Treatment Effects on Monthly Outflows from JSA

	Dependent variable: ln(total outflow)	
	(1)	(2)
D_{it}	-0.0360***	
	(0.0045)	
D_{it+1}		-0.0396***
		(0.0056)
D_{it+2}		-0.0456***
		(0.0061)
D_{it+3}		-0.0452***
		(0.0059)
D_{it+4}		-0.0353***
		(0.0061)
D_{it+5}		-0.0164**
		(0.0066)
D_{it+6}		-0.0198***
		(0.0072)
D_{it+7}		-0.0212***
		(0.0075)
D_{it+8}		-0.0099
		(0.0080)
D_{it+9}		-0.0111
		(0.0087)
D_{it+10}		-0.0108
		(0.0093)
D_{it+11}		-0.0008
		(0.0102)
D_{iLR}		0.0107
		(0.0116)
$\ln(U_{ait-1})$	0.6009***	0.6014***
	(0.0874)	(0.0876)
$\ln(U_{a'it-1})$	-0.0139	-0.0134
	(0.0289)	(0.0287)
Observations	77,792	77,792

Notes. The sample is a panel of 374 districts and two age groups (18-24 and 25-59) from January 1999 to December 2008. The specifications estimated are equations (1) and (2) in columns 1 and 2, respectively. The dependent variable is the log of monthly JSA outflow. D_{it} takes the value 1 in the post-policy period and zero otherwise. $D_{it+\tau}$ indicates treatment τ quarters after the policy is introduced. U_{ait-1} denotes the stock of individuals on same benefits in the same age group at the beginning of the quarter, and $U_{a'it-1}$ denotes the corresponding stock for the other age group. All regressions control for district, time and age fixed effects as well as age*district and age*time interactions. *** p<0.01, ** p<0.05, * p<0.1.

Appendix B: Data Description

Our empirical analysis combines various data sources.

The design of the policy and the list of districts covered under each wave of the rollout was provided by the Department of Work and Pensions.

1. The Job Seeker's Allowance database is downloaded from www.nomisweb.co.uk and it provides monthly information from 1983 on the stocks, inflows and outflows of recipients' unemployment benefits. The data is available at various geographical levels. We use the data at the Local Authority Districts across Great Britain and there are 374 districts defined on a consistent basis. The data can be disaggregated by age.

2. Data on other welfare benefits – including Incapacity Benefit (IB) – is sourced directly from the Department of Work and Pensions Tabulation Tool – www.tabulation-tool.dwp.gov.uk/WorkProg/tabtool.html. This provides only quarterly data on the stocks, inflows and outflows of benefit recipients. The data is available for Great Britain (i.e. including England, Wales and Scotland) at the Local Authority Districts level from 1999 Q3 onwards. The 4 quarters in the dataset are defined as February-April, May-July, August-October and November-January. The data can be disaggregated by age. To be consistent across JSA and IB datasets, the monthly JSA information is aggregated to the quarterly level (February-April, May-July, August-October and November-January).

3. We use the quarterly micro-level panel data from the UK Labour Force Survey from 1998 to 2008 to obtain estimates on the household composition of benefit claimants, mean wages, origins of benefit inflows and destination of benefit leavers. The data is securely provided by the UK Data Service under Special Access License. The quartiles of the weekly earnings

distribution were taken from the 2000 New Earnings Survey.

4. We used digitized boundary datasets and geographic look-up tables corresponding to the census geography of Great Britain, provided by the UK Data Service. We used the boundary data in ArcGIS to illustrate the policy rollout and to define the neighbours of districts.

5. Finally, the IFS had generously provided benefits estimates using the IFS tax and benefit micro-simulation model, TAXBEN. In order to estimate the net exchequer cost of benefit claimants, their estimates assumed that the house rent is £44 per week (the average among families receiving income support, jobseeker's allowance or incapacity benefit) and that all disposable income is spent on items subject to the standard rate of VAT and no excise duties.

Appendix C

C1. Steady-state change in the IB rate

In order to make predictions for the evolution of the IB stock and our cost-benefit analysis, we translate our estimates of flow changes into changes in welfare stocks. We obtain the steady state change in the IB rate, based on permanent changes in the IB outflow rate following the introduction of Jobcentre Plus.

Assume there are only two states, employment and IB, and denote by s the inflow rate from employment into IB, and by f the outflow rate from IB into employment. In steady state, the IB rate is constant, and flow equilibrium implies that the IB rate (as a fraction of the total population) is given by:

$$u = \frac{s}{s + f}$$

The policy has an impact on f, leaving s unaffected. The resulting change in the (log) IB rate is given by

$$d \ln u = -(1-u) d \ln f.$$

The implied change in the number of jobs in steady state is given by:

$$\Delta e = -u \, d \ln u = u(1-u) d \ln f \qquad \text{(C1)}$$

According to our estimates, $d \ln f = \beta - (1-\alpha) d \ln u$, where β is the treatment effect estimated by diffs-in-diff, and α is the coefficient on the log IB stock. The terms in u on the right-hand side of (B1) are evaluated using the actual IB rate in the pre-policy period.

C2. Off steady-state approximation

At each point in time the unemployment rate evolves according to

$$\frac{du_t}{dt} = s_t(1-u_t) - f_t u_t. \qquad \text{(C2)}$$

Solving (B2) forward one period gives:

$$u_t = \gamma_t u_t^* + (1-\gamma_t) u_{t-1}, \qquad \text{(C3)}$$

where u_t^* denotes steady state unemployment and γ_t denotes the rate of convergence to it:

$$\gamma_t = 1 - \exp(f_t + s_t).$$

Using a log-linear approximation to (B3) it can be shown that:

$$d \ln u_t = -\gamma_{t-1}(1 - u^*_{t-1}) d \ln f_{t,}$$

where, as above, $d \ln f = \beta - (1 - \alpha) d \ln u$, u is evaluated using the actual IB rate in the previous quarter and u^* is evaluated using the (constant) pre-policy inflow rate into benefits obtained from the Labour Force Survey and the time varying outflow rate from benefits as obtained from our estimates.

While the steady-state result stated above is only used for IB predictions (as the steady-state impact of policy on the JSA outflow is close to zero), the off-steady state results are used to obtain predictions for both the IB and JSA rate during the transition to a new steady state.