Regulation, Employment and Wages

Ghazala Yasmeen Azmat
London School of Economics and Political Science

Dissertation submitted for the degree
DOCTOR OF PHILOSOPHY
in the Field of Economics

June 2006

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Abstract

Over the last two decades the institutional structures across the OECD countries have changed dramatically, having a significant impact on labour market performance. This thesis seeks to make four contributions to our understanding of the implications and applications of regulations. This is done in two distinct ways: firstly, to focus on a specific policy change in Chapter 1 and Chapter 2, and secondly, to analyse (more generally) the disparities in policies across the OECD countries, in Chapter 3 and Chapter 4.

Chapter 1 seeks to contribute to the literature on tax credit policies, which have been a popular way to alleviate in-work poverty. The assumption is typically that the incidence is on the claimant workers. However, economic theory suggests no particular reason to believe that this should be the case. This chapter investigates the incidence of the Working Families' Tax Credit (WFTC) in the UK introduced in 1999, which unlike similar tax credit policies was paid through the wage packet, increasing the connection between the employer and worker with regard to the tax credit. Using two stage parametric and non-parametric censored regression methods I find compelling evidence to suggest that the firm discriminates by cutting the wage of claimant workers relative to similarly skilled non-claimant workers when looking at men and that there is a spill-over effect onto the wage for both men and women.

Chapter 2 then goes on to look more closely at the acclaimed relationship between tax credits and labour supply. One of the principle aims of the WFTC was to increase the participation of those with low labour market attachment. The literature to date concludes that for lone mothers there was approximately a 5% point increase in employment. The differences-in-differences methodology that is typically used compare lone mother with single women without children. However, the characteristics of these groups are both observably and unobservably different, such that the identifying assumption may not be satisfied. I find that when I control for differential trends between people with and without children, the employment effect of WFTC falls significantly. Moreover, by looking at movements in the hour's distribution, it is clear that any WFTC effect is solely

borne on those working full-time (30 hours or more). Another concern is that I find that the policy did not induce people into the labour market from inactivity.

Chapter 3 seeks to explain why it is that in some OECD countries the male and female unemployment rates are very similar but in others (notably the 'Mediterranean' countries) the female unemployment rate is much higher than the male. The analysis shows that, in countries where there is a large gender gap in unemployment rates, there is a gender gap in both flows from employment into unemployment and from unemployment into employment. Overall it seems that differences in human capital accumulation between men and women interacted with labour market institutions is an important part of the explanation.

Chapter 4 looks at how the labour's share of GDP in many OECD countries has declined over the last two decades. The little evidence that exists on this important issue is almost entirely macro-economic. This chapter uses cross-country panel data evidence from a group of 'network industries', where there have been substantial changes of public ownership and entry barrier. The results show that privatisation can explain a significant proportion of the fall of labour's share in these industries, even when the endogeneity of the policy rules is accounted for using sociopolitical instrumental variables. The impact of privatisation has been somewhat offset by falling barriers which dampen profit margins.

Declaration & Statement of Conjoint Work

1. No part of this thesis has been presented to any other University for any degree.
2. The work presented in the thesis is my own and some parts of the thesis draw on joint work with my colleagues at the Centre for Economic Performance.
3. The contribution to each chapter is stated below:

% Contributed by Candidate

Introduction 100%

Chapter 1: The Incidence of an Earned Income Tax Credit: Evaluating the Impact on Wages in the UK 100%

Chapter 2: Before Leaving the Working Families' Tax Credit to Lie, Another Look at Labour Supply 100%

Chapter 3: Gender Gaps in Unemployment Rates in OECD Countries (With M. Guell & A. Manning) 33%

Chapter 4: Is Privatisation behind the Rise in the Profit Share: A Cross Country Industry Panel Data Analysis (With A. Manning & J. Van Reenen) 33%

Conclusion 100%

I certify that this is an accurate statement of the candidate's (Ghazala Yasmeen Azmat) contribution to the research described above.

Supervisor's Signature..... Date.....13/6/06

Candidate's Signature.....

Acknowledgements

I would like to begin by thanking my supervisor Alan Manning for his consistent guidance, support and encouragement. Special thanks also to Richard Blundell, Andrea Ichino and Steve Pischke for many helpful discussions.

I am also grateful to Emmanuel Frot, Maia Guell, Lisa Lynch, Michelle Pellizzari, Barbara Petrongolo, Marcia Schafgans and John Van Reenen for valuable comments. In addition, thanks go to the Economic and Social Research Council for financial support and to the Centre for Economic Performance for providing a stimulating work environment.

Finally, I would like to dedicate my thesis to my Abbu, Mum, Saima, Uzma and Zeeshan. Thanks for always being there for me.

Contents

List of Figures

List of Tables

Introduction

Over the last two decades the institutional structures across the OECD countries have changed dramatically. In turn, these changes have had a significant impact on labour market performance. Some of the most striking changes can be seen when looking at union power, employment protection, public sector employment, minimum wages, the social security system, welfare related policies and legislation concerning sex discrimination. Not only have these changes altered employment incentives, composition and structure but they have also impacted on the way in which wages are set and the distribution of wage.

This thesis seeks to make four contributions to our understanding of the implications and applications of regulations. This is done in two distinct ways: firstly, to focus on the impacts of a specific policy change in the UK and secondly, to analyse (more generally) the disparities in policies and outcomes across the OECD countries.

In particular, Part 1 (comprising of Chapter 1 and Chapter 2) illustrates the impact of changes in generosity and methods of payments of Earned Income Tax Credit policies. In general, these "tax subsidy" policies are motivated by the desire to encourage participation and hours of work of certain groups in the economy, for example, lone parents and low income couples. In particular, by analysing the direct and indirect effects of policies of this kind, we increase our insight into a policy that has become increasingly popular across the OECD countries (Earned Income Tax Credits in the USA, Self Sufficiency Program in Canada and Working Families' Tax Credit in the UK). In particular, we go beyond the existing literature to show that the impacts of such policies are not without externalities. Our empirical investigation is carried out using the changes in the UK in October 1999 when the government replaced the Family Credit (minimum hours based income supplement for families with children) with the Working Families' Tax Credit (WFTC).

In Chapter 1 we examine who are the beneficiaries WFTC. In particular, we investigate

whether there is evidence to suggest that tax credits are not fully incident on the employee who is eligible and claiming the tax credit. We use a simple general equilibrium model with perfect competition to show that under the assumption that the employer has formal knowledge, or at least awareness, of which of her employees are claiming the tax credit, she can share in the incidence of the tax credit by cutting the gross equilibrium wage of the claimant worker. This can be done without reducing the worker's net equilibrium wage such that the worker is no worse off and, more likely, still better off from receiving the tax credit. Moreover, given the degree of substitution between the claimant and other workers, the model predicts that there will be a spillover effect which reduces the wage of both eligible and similarly skilled ineligible workers.

We highlight two very important factors, which may be specific to the country where the change in policy occurs and which will determine the strength of the effect in question. Firstly, the method by which the tax credit is paid will play a vital role, as it can alter the amount of information that the employer has about her employees' eligibility circumstances. Secondly, institutional factors such as minimum wages impose a lower bound below which the employer cannot cut the wage. The empirical investigation using WFTC is interesting in its own right, but we regard it as particularly useful as it incorporates and exploits these two factors: the payment of WFTC through the wage packet and the introduction of the National Minimum Wage.

We then proceed to show that by using both a parametric and non-parametric two-stage censored regression based technique, this chapter finds strong evidence to suggest that, firstly, the firm discriminates by cutting the wage of the claimant worker relative to a similarly skilled non-claimant for men, such that the employer extracts a significant amount. Secondly, there is a "spillover" effect for both men and women such that as the average amount of WFTC and the fraction of employees claiming WFTC increases by industry (or by education group), the wages of similarly skilled claimants and non-claimants fall.

These results have important academic and policy implications. In particular, they imply that there is a significant shift in the burden of tax credits, in line with the theory presented. This is of critical policy importance as we can no longer assume that it is the case that the person eligible for such tax credits is the sole beneficiary. These results are critical to our understanding of the consequences of the expansion, application and generosity of tax credits. Moreover, the way in which they are distributed may have unexpected consequences.

Chapter 2 then goes on to look more closely at the acclaimed relationship between labour supply and tax credits. The magnitude and the popularity of the introduction of WFTC

induced a number of studies on the labour supply impact (Blundell et al (2005), Brewer et al (2005), Leigh (2005), Francesconi et al (2004), Gregg et al (2003)). Although the methodology and data varied, they all concluded that WFTC had a positive impact on the labour market employment of lone mothers. According to Brewer and Browne (2006), who composed an overview of the literature, the overall conclusion was that the generosity of the in-work credit system induced lone mothers to increase their participation in the labour market by 5 percentage points.

Most of the studies on WFTC use a methodology that evaluates the effect of WFTC by comparing the employment changes of lone mothers with single women without children, before and after the policy introduction. Since WFTC targets lone mothers but single women without children are unaffected by the policy, it is assumed that the effect of WFTC can be quantified by the relative increase in employment. However, it is not entirely convincing that the two groups satisfy the necessary assumption of having the same pre-policy trend in employment rates. Not only are the two groups observably and unobservably different but we also see that there is an increasing trend in the employment rate of lone mothers since the mid-1990s, while the level for single childless women has been high and has remained fairly flat over the same period. These concerns are reinforced when we look at the movements in the hours distribution and observe continuous increases in lone mothers working part-time and full-time. Moreover, there is no noticeable spike with the introduction of WFTC and then after 2000 the increases in employment flatten even though there were increases in the basic tax credit each year from 2000 to 2003.

In particular, this chapter addresses the concern of the suitability of the control group and to see how the results change when we control for group specific differential trends. Moreover, we look to see where, along the hours distribution, the change occurs. Overall, we find three key results: First, when we allow for differential trends, the effect of WFTC on employment falls to levels that are considerably lower than the literature's estimate of 5% points. Second, we find that this effect is borne solely on those working full time (30 hours or more). Finally, the policy change had no effect on those who were inactive.

These results offer valuable insight into two key issues: Firstly, the effectiveness of policy and secondly, the design of the policy. In particular, they imply that the increase in participation was greatly exaggerated when we do not account for the differential trends between treatment and control groups. Moreover, the policy was not as well targeted as initially considered, given that any increase to employment was solely borne on those who work 30 or more hours, while those who were inactive were unaffected by the policy.

Part 2 of this thesis comprises of two chapters (Chapter 3 and Chapter 4), which look at important empirical trends. In particular, Chapter 3 considers the gender gaps in

unemployment rates across the OECD countries and Chapter 4 reflects on the cross-country differences in the fall in labour's share of GDP. These issues have not been addressed in the previous literature but with the help of disaggregated data, we provide potential explanations for why we observe cross-country disparities in gender gaps in unemployment rates and in the rise in the profit share, respectively.

Chapter 3 starts from the stand point that although there is an enormous literature on gender gaps in pay and a vast literature on gender gaps in labour force participation rates (see Altonji and Blank (1999) for an overall survey and Blau and Kahn (2003) for a recent international comparison), there is very little recent literature on gender gaps in unemployment rates. There was a literature on the subject in the US in the 1970s and early 1980s (see, for example, Barrett and Morgenstern (1974); Niemi (1974); Johnson (1983)) but few recent papers perhaps because the female and male unemployment rates in the US have converged. But this convergence has not happened in all OECD countries. We highlight that the highest gender gaps in unemployment rates are to be found in the Mediterranean countries (Spain, Greece, Italy and France). Next come the Benelux countries (Belgium, Netherlands and Luxembourg), then the 'Germanic' countries (Germany, Austria and Switzerland), then the 'Nordic' countries (Sweden, Finland and Norway) and, finally the 'Anglo-Saxon' countries (US, UK, Ireland, Australia, Canada and New Zealand). In particular, in a number of the Mediterranean countries the 'unemployment problem' is largely a problem of female unemployment.

The aim of the chapter is to understand the cross-country variation in the gender gap in the unemployment rate. One should emphasize that the question we are interested in answering is not 'why are women less likely to be in employment than men?' (either measured as the employment-population ratio or the labour force participation rate) for which there are fairly obvious answers in terms of the allocation of domestic responsibilities and a large literature on the subject but the question 'why, once they have decided they want a job, are women in some countries much less likely to be in employment than men?'.

We find that although human capital theory and institutions can explain a large part of the observed differences in the gender gaps in unemployment rates, they probably do not account for all of the disparity. In addition there is some evidence that attitudes towards male and female unemployment may be important in explaining the gap in countries where unemployment is high.

In Chapter 4 we look into the well-known phenomena of the rise in the profit share. It is a fact that the share of profits in national income in the Eurozone area and Japan are at their highest for 25 years and that after tax profits are at their highest share in the US for 75 years. While some economists argue that this is due to globalisation,

others have attributed the fall in the labour share to deregulation in both labour and product markets. However, despite this interest in deregulation, the empirical work in the area is rather disappointing. Most authors work with aggregate data of one sort or another using cross-country panel regressions (Nicoletti and Scarpetta (2003a,b), Nickell (2003)). However, the results tend to be rather fragile (see Baker et al (2003)). This fragility is mainly a consequence of there being many events occurring simultaneously at the macro-level and disentangling the impact of product market deregulation from these other events is a formidable task. A second problem with the existing literature on the macro-effects of regulatory change is that product market deregulation tend to be focused in particular sectors so a sector specific approach is more attractive. Although enlightening, the disadvantage of this very micro approach is that it is hard to generalise to other sectors or across the economy as a whole.

In this chapter we take an intermediate approach to looking at the relationship between deregulation and rising profit shares by using panel data from sectors across several OECD countries. These are the "network industries" that have seen the greatest degree of regulatory reform – telecoms, post, gas, electricity, airlines, railways and roads. The timing of the reforms and the extent of reform vary significantly between countries. We exploit this differences as quantified in some new OECD data on public ownership and barriers to entry to explicitly test some key economic mechanisms.

We find that falling public ownership is associated with a higher wage bill share and this is driven by the positive effect of public ownership on employment. Thus strongly suggests that privatisation is an important reason for the falling wage bill share in the network industries in the OECD. These results are robust to a number of controls including adding a full set of fixed effects and using sociopolitical variable to tackle the endogeneity problem. Barriers to entry also appear to matter, in that higher barriers to entry are generally associated with lower labour share. This result is, however, less robust than the public ownership result. Moreover, these findings that privatisation tended to reduce labour's share helps to answer the question of why labour's share tended to fall in the OECD despite falling entry barriers (see Torrini (2005) or Blanchard and Giavazzi (2003)). An alternative explanation may be that deregulation on the labour market side could reduce labour's share through declines in worker bargaining power. However, in our analysis we do not find support for the labour market deregulation hypothesis.

Part I

Chapter 1

The Incidence of an Earned Income Tax Credit: Evaluating the Impact on Wages in the UK

1.1 Introduction

Over the last two decades there has been a huge expansion across many OECD countries in welfare to work programmes. Different approaches have been carried out to enhance the labour market attachment and earnings of the low skilled. The three (often conflicting) goals are to raise the standard of living, encourage work and self sufficiency and to keep government costs low.

A popular policy has been to use tax credits, for example, the Earned Income Tax Credit in the USA, the Self-Sufficiency Program in Canada and the Working Families' Tax Credit (WFTC) in the UK. In general, these "tax subsidy" policies are motivated by the desire to encourage participation and hours of work of certain groups in the economy, for example, lone parents and low income couples. These so-called "in-work benefits" aim to alleviate poverty at the lower end of the wage distribution, reduce income inequality and redistribute income by reducing the dispersion of earnings.

Given the prior aims and motivations of such policies, most of the literature to date focuses on estimating the labour supply response to changes in and/or introductions of tax credit policies (Eissa & Leibman (1996), Meyer and Rosenbaum (1999), Blundell et al (2005), Brewer et al (2005)). In particular, with regard to the WFTC, once the income

and substitution effect are accounted for, the policy was said to have had a "more than average" impact on lone parents and women with unemployed partners[1]. It is however, typically assumed that the incidence of the tax credit is solely on the claimant worker (and therefore the claimant household).

This chapter will investigate whether there is evidence to suggest that tax credits are not fully incident on the employee who is eligible[2] and claiming the tax credit. This can be with or without a boost to the economy's overall labour supply. We use a simple general equilibrium model with perfect competition to show that under the assumption that the employer has formal knowledge, or at least awareness, of which of her employees are claiming a tax credit, she can share in the incidence of the tax credit by cutting the gross equilibrium wage of the claimant worker. This can be done without reducing the worker's net equilibrium wage such that the worker is no worse off and, more likely, still better off from receiving the tax credit. Moreover, given the degree of substitution between the claimant and other workers, the model predicts that there will be a spillover effect which reduces the wage of both eligible and similarly skilled ineligible workers. The information assumption is still important in the spillover case because by knowing the fraction of eligible workers and the average amount claimed in the work-place, the employer can extract some of the tax credit by "averaging" out the effect.

In this chapter we highlight two very important factors, which may be specific to the country where the change in policy occurs. These factors will determine the strength of the effect in question. Firstly, the method by which the tax credit is paid will play a vital role, as it can alter the amount of information that the employer has about her employees' eligibility circumstances. For example, the Working Families' Tax Credit in the UK differed from its predecessor, Family Credit, in that WFTC was paid via the wage packet. The motivation for this change was to reduce the stigma attached to receiving tax credits in the form of a welfare benefit. However, using this method gave employers complete information on *which* employees were claiming and also *how much* WFTC they were receiving. Secondly, institutional factors such as minimum wages impose a lower bound below which the employer cannot cut the wage. This was the case in the UK with the introduction of the National Minimum Wage (NMW) in April 1999. This is also important because it implies that those at the lower end of the wage distribution are more likely to be protected by the national minimum from a cut in gross wage. Additionally (and perhaps more obviously), those at the top end of the wage distribution are unlikely to be affected because tax credits are less relevant to their household income, as they probably receive too little or they earn too much to be eligible. It is therefore those in

[1] See Blundell &Walker (2001).

[2] Eligibility usually being contingent on having children, working a certain number of hours and having a household income below a certain threshold level.

the middle of the wage distribution who are most likely to be affected.

The empirical investigation is carried out using the change in the UK in October 1999 when the government replaced the Family Credit (a minimum working hours based credit for families with children) with the Working Families' Tax Credit. The change in policy altered the eligibility criteria and it became more generous [3]. Although focusing on this policy change is important in its own right because of this increase in generosity, it is made even more interesting by the fact that we incorporate and exploit two crucial changes in the UK: firstly, the National Minimum Wage (NMW) was introduced six months prior to the WFTC and secondly, the WFTC was paid via the wage packet. The introduction of the NMW plays a fundamental role in this analysis as it offers an interesting identification strategy by acting as an exogenous barrier below which the employer cannot cut the gross wage. In the analysis it is also used as a point of censoring when comparing the change in wages before 1999 to after the introduction of the tax credit.

The payment of the tax credit though the wage packet also plays a central role in the analysis. In the UK employers became responsible in April 2000 for paying the WFTC through the employees' wage or salary. The eligible claimant would claim the approximate tax credit from the Inland Revenue, who would work out the amount of tax credit payable. The Inland Revenue would then notify the relevant employer of the amount of tax credit to be paid and when the tax credit is to start and finish[4]. Employers would pay the tax credit out of the tax and National Insurance contribution that they would otherwise have forwarded to the Inland Revenue[5]. Recent work in the USA by Leigh (2004) and Rothstein (2005) investigates the impact of increased labour supply resulting from changes in the Earned Income Tax Credit (EITC), on the equilibrium wage. In the US however, the employer is not responsible for income tax filing on behalf of employees and so the EITC is not visible in the wage packet. In the UK, payment of WFTC through the wage packet made the employer responsible for the payment of the tax credit and so increased the connection between the wage paying firm and the claimant employee. This chapter exploits these differences to get a good measure of the effect of tax credits on wages.

We use two measures of WFTC: the first is the reported number of claimants and the second is the amount of WFTC, which is calculated using the eligibility criteria. This second measure is particularly useful as it allows us to distinguish between the effect of the change in generosity from Family Credit and the change in visibility (i.e. payment through the wage packet) on the wage. Using both a parametric and non-parametric two-

[3] A more in-depth description will be given in a later section

[4] It is important to note that this notification would not break down the various components of the credit or distinguish between the WFTC and disabled person's tax.

[5] The employer will lose the benefit of the time lag between marking these deductions and forwarding on the account office.

stage censored regression based technique, this chapter finds strong evidence to suggest that, firstly, the firm discriminates by cutting the wage of the claimant worker relative to a similarly skilled non-claimant for men, such that the employer extracts 35%[6]. Secondly, there is a "spillover" effect for both men and women such that as the average amount of WFTC and the fraction of employees claiming WFTC increases by industry (or by education group), the wages of similarly skilled claimants and non-claimants fall. We find that the "spillover" effect by industry for men is approximately -0.2% and -0.3% for women and when looking by education group, the spillover effect for men is -0.1% and -0.7% for women[7]. Finally, as a robustness check we identify the workers for who the NMW binds and find that the tax credit does not have the same effect on their wages, indicating that the NMW protects them from a wage cut.

The analysis is extended to show that the size of the firm plays an important role in the size of the incidence transfer and as the size of the firm increases, the spillover effect is the principle effect. This is not particularly unusual when one considers that as the size of the firm increases, there is a higher chance that there are workers doing identical jobs, such that the employer would find it difficult to cut the gross wage of one worker and not the other on grounds of eligibility. She therefore shares the burden across all workers. Finally, we address the concern of selectivity in the "take-up" rates and the problem of previously ineligible workers altering their behaviour to become eligible. We tests the exogeneity of the WFTC variables using the Smith-Blundell (1986) procedure and find no evidence of endogeneity .

These results have important academic and policy implications. In particular, they imply that there is a significant shift in the burden of tax credits, in line with the theory presented. This is of critical policy importance as we can no longer assume that it is the case that the person eligible for such tax credits is the sole beneficiary. These results are critical to our understanding of the consequences of the expansion, application and generosity of tax credits. Moreover, the way in which they are distributed may have unexpected consequences.

The rest of the chapter is structured as follows: Section 1.2 gives a brief overview of the past literature on tax credits. Section 1.3 introduces a general equilibrium model which explains how a tax credit can reduce the gross equilibrium wage. In Section 1.4 a short history and the main descriptive statistics are given for tax credit policy changes in the UK. Section 1.5 describes the empirical framework used to test the hypothesis proposed in Section 1.3. Section 1.6 describes the data and explains the main results. Section 1.7 extends the analysis from Section 1.6 and highlights and deals with potential problems.

[6]These figures are calculated using the change in weekly wages over the average weekly WFTC claim.
[7]These figures are evaluated at the average WFTC rate and average fraction of eligible in the sample.

Section 1.8 discusses the implications of these results and suggests policy implications. Finally, Section 1.9 concludes.

1.2 Related Literature

As mentioned in the introduction, much of the literature to date focuses on evaluating the participation effect of tax credit changes/introduction. One of the most well known papers is that of Eissa & Leibman (1996) where the authors examine the impact of the Tax Reform Act of 1986 in the USA, which included the expansion of the Earned Income Tax Credit (EITC). They focus on the labour market participation and hours of work of single women with children and identify the change by comparing the change in the labour supply of single women with children and single women without children. They find that labour supply increases by 2.8%. Another prominent paper which focuses on the changes in labour supply of single women in the USA is that of Meyer and Rosenbaum (1999). They however, take a more general approach to looking at various policy changes in the US in the 1980s and 1990s that affect this group of women. They found that although benefit cuts, welfare time limit alterations, changes in training programs and childcare expansions had some impact on making women with children work, the largest share of the increase could be attributed to reforms in EITC. Blundell & Hoynes (2001) examine the labour market impact of in-work benefit reform in the UK and then compare it with the USA policy reform (i.e. EITC). They look at why the impact of similar reforms in the UK seem to be small relative to the USA (in terms of increasing employment rates). They conclude that it is attributed to the interactions with other means tested benefits in the UK, the importance of workless couples with kids, the level of income support given to non-working parents and the strength of the USA upturn in the 1990s.

In the UK work has been done to look at the labour supply impact of the Working Families' Tax Credit (WFTC), which was introduced in October 1999 and then replaced by a new tax credit in April 2003 (Child Tax Credit and Working Tax Credit). Using a structural model of labour supply, Brewer et al (2005) find that although labour supply increased for lone mothers, the effect on other groups in the economy was minimal. Blundell et al (2005) and Leigh (2005) also look at the labour supply impact but instead using the difference-in-difference methodology and find similar results. These papers find a 3-5% increase in participation of lone mothers, no significant effect on married mothers and -0.5 to 0.75% change in father's employment.

There are however, a growing number of papers that go beyond looking purely at participation effects from tax subsidies. In particular, an interesting aspect is that of the effect

on skill formation resulting from increased participation (Card, Michalopoulos & Robins (2001), Heckman, Lochner & Cossa (2002)). The main question posed in these papers is whether tax credits create an incentive to invest in skills that are useful for the work place, and/or if skills are acquired as a by-product of being in the workplace. The effects on human capital are rather ambiguous and depend on the view taken as to whether learning is rivalrous to work or not. Heckman et al find that the entry effect of EITC is small, but the reduction in the average earnings amongst uneducated women can be as large as 18%. In the UK, Lydon & Walker (2004) also question whether the introduction of the WFTC promoted incentives to increase investment in on-the-job search and training in general skills. They look to see if factors such as these promoted wage growth and found that for people who were previously claiming Family Credit, WFTC's predecessor, incentives are unchanged, but for those who became eligible for the tax credit and had not been previously eligible, there was a 2.7% wage progression.

More recently, literature in the US has emerged which looks at the incidence of tax credits. In particular, Leigh (2004) and Rothstein (2005) use different approaches to investigate the impact of changes in the EITC in the mid-1990s, to see if changes in labour supply had any impact on the equilibrium wage within the same skill group. Using variation across states in EITC supplements, Leigh (2004) generates cross-sectional variation in the average tax rate faced by women with children and finds that an increase of 10% in the generosity of EITC is associated with a 4% fall in wages of the high school drop-outs and a 2% fall in the wage of college graduates. In addition to the state variation, Leigh also uses variation across the wage distribution and still finds that increasing EITC is associated with a fall in hourly wage. The prime explanation for these results is that the increase in EITC generosity boosts labour supply as individuals respond to average falls in tax rates and not marginal tax rates. Rothstein uses variation across the wage distribution using the DiNardo, Fortin and Lemieux (1996) approach in the implementations of the mid-1990s federal EITC expansion (in which maximum total credits, associated marginal total credits and associated marginal tax rates approximately doubled over a three year period) to identify the EITC's effect on women's aggregate labour supply and on the female wage schedule. He found that wage changes were insignificant given the rise in labour supply, but the wage of EITC eligible women grew at a slower rate than that of non-eligible women.

1.3 Tax Credit Incidence: Theoretical Approach

The aim of this section is to show how, in a theoretical setting, it is possible for a tax credit to influence the equilibrium wage in a general equilibrium framework. The Proposition adapts the Harberger (1962) model of tax incidence[8] to show that a change in the tax credit can lead to a shift in the burden of the tax credit from employee to employer. Moreover, the model shows that when allowing for heterogeneity between workers, there is an indirect effect which affects both eligible and non-eligible. The impact of this effect will depend on the elasticity of substitution between the eligible worker and ineligible worker and the fraction of eligible workers in the work place.

Before introducing the main proposition, let us consider a very simple economy in which workers are perfect substitutes and the law of one wage applies. We can show that it is only in "special" circumstances that the imposition of the tax credit does not alter the wage of the claimant. Moreover, it implies that it is not only the claimant (or claimant's household) who is affected by the policy, but also other groups in the economy are affected.

Let workers comprise of either being eligible for a tax credit (group 1), N_1^s, or ineligible for a tax credit (group 2), N_2^s, and s is the subsidy rate. In equilibrium, at wage w, labour demand, N^d, will equal labour supply:

$$N^d(w(s)) = N_1^s(w(s)(1+s) + N_2^s(w(s)) \tag{1.1}$$

The effect of the subsidy on the gross wage is characterised by:

$$\frac{\partial \ln w}{\partial \ln(1+s)} = -\frac{\theta\eta_1^s}{\theta\eta_1^s + (1-\theta)\frac{\eta_2^s}{1+s} - \frac{\eta^d}{1+s}} \tag{1.2}$$

Where η_1^s and η_2^s are the labour supply elasticities for the eligible and ineligible group, respectively, and η^d is the labour demand elasticity. The fraction of each group is represented by θ. See Appendix for the proof.

We can interpret this simple calculation, given that the expression lies between 0 and 1, as the fraction of the subsidy that shifts from worker to employer. The larger the supply

[8] See Fullerton & Metcalf (2002) for a full review on tax incidence.

elasticity of group 1, the more elastic the labour demand and/or the larger the fraction, then the bigger the shift. Only in special circumstances will the tax credit have no effect on the gross wage, for example, if labour demand elasticity is infinite or if labour supply was perfectly elastic.

The path breaking general equilibrium analysis of Harberger (1962) derives the burden of a tax on capital in one sector. Here, the procedure is adapted to show the general equilibrium effect of a tax credit on input compensation in a one sector model which uses two different types of labour (N_1, N_2) to produce one good (X). The heterogeneity of workers comes from the difference in being able to satisfy the eligibility criteria[9]. In the simple economy example, the incidence effect is the same for all workers, but here by differentiating workers, we can look to see how the effect differs for the eligible and ineligible groups.

Proposition 1.1 *A change or an introduction of a tax credit under a general equilibrium setting, given that workers are not perfect substitutes, will result in a direct change in the gross wage of the eligible claimant group and an indirect effect on both groups.*

Let it be the case that workers who are eligible for the tax credit, N_1, are paid the gross wage w_1 and workers who are not eligible for the tax credit, N_2, are paid the gross wage w_2. The subsidy rate is given by s and θ is the fraction of eligible group. Another important feature here is the elasticity of substitution between the two groups, σ_x. The effect of the subsidy on the gross wage is given by:

$$\frac{\partial \ln w_1}{\partial \ln(1+s)} = -\frac{(1-\theta)\eta_1^s}{(1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X} \textit{if eligible claimant (group 1)} \tag{1.3}$$

$$\frac{\partial \ln w_2}{\partial \ln(1+s)} = \frac{\theta\eta_1^s}{(1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X} \textit{if ineligible (group 2)} \tag{1.4}$$

The proof is given in the Appendix.

[9] We do not specify a particular functional form since by assuming the production function $X = F[N_1, N_2]$ we avoid the limitations of computational general equilibrium models. This can be any production function with constant returns to scale. However, as noted by Fullerton & Metcalf (2002), using a log-linearisation method is only valid for small changes.

This proposition suggests that when one accounts for heterogeneity amongst workers, based on the eligibility criteria, it causes the wage of claimant workers to be different from the ineligible workers and the subsidy affects the gross wage of both groups of workers. The strength of this impact will depend on: (1) The fraction of each group, θ and (2) the level of substitutability between the two groups, σ_x. The substitution effect is captured in the labour demand elasticity and the effect on the non-eligible group becomes smaller as the proportion of claimants falls[10].

Since θ is defined as the cost share, it is endogenous in terms of the population share. It is interesting to look at the cross-derivatives with respect to s and θ. This tells us what happens to wages when the share changes:

$$\frac{\partial^2 \ln w_1}{\partial \ln(1+s)\partial\theta} = \frac{\eta_1^s(\sigma_X + \eta_2^s)}{((1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X)^2} \tag{1.5}$$

$$\frac{\partial^2 \ln w_2}{\partial \ln(1+s)\partial\theta} = \frac{\eta_1^s(\sigma_X + \eta_1^s)}{((1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X)^2} \tag{1.6}$$

The visibility of the tax credit may play an important role for the shift in incidence, such that the employer has some knowledge/information about which of her workers are eligible for the tax credit. The most simple and straightforward way in which this would be the case is when the tax credit is paid via the wage packet. Here the employer can see clearly if the worker is a claimant (and how much she is receiving). However, one can still maintain this assumption even in the event that the employer does not have full information. For example, if there exists some kind of "internal knowledge" of whether or not the employee is claiming tax credit (e.g. the employer may know if his employee has children), or it may be that there is statistical discrimination.

Finally, we may be interested to know how the results change when we consider a non-competitive framework, for example a monopsony or a wage posting model. In his paper, Harberger (1962) addresses this issue when looking at the corporate sector. He adjusts his analysis to accommodate for potential monopoly power and concludes that the tax bites into monopoly profit as well as into the returns in capital (in the context of our model, this would be the wage). Overall, although it would be interesting to lay out a model and to see how in equilibrium the distributions of the two different types of labour

[10]The simple economy case will be a special case here when $w_1 = w_2 = w$.

and the relative prices of the labour will change, in the end the tax burden that is not directly borne by monopsony profits will be "determined by a mechanism that differs only in minute details from that which determines the incidence of the [corporation income tax] in the competitive case"[11].

1.4 The Working Families' Tax Credit

In the UK, since the 1980s, there has been a dramatic shift in the composition of the lowest decile of the income distribution from pensioners, to families of working age and lone parents in particular (Goodman (2001)). The Working Families' Tax Credit (WFTC), introduced in October 1999, was designed to target low income families with an income supplement that was contingent on working. However, systems of support for families with dependent children in the UK have been around since 1971, when Family Income Support (FIS) was introduced. FIS entitled families with children and working more than 24 hours per week, to an income supplement.

In 1988, FIS was renamed Family Credit (FC) with some structural reform and an increase in generosity. Namely, the hours requirement fell to 16 hours and a childcare disregard was introduced to encourage higher participation especially amongst mothers of young children. In October 1999, FC became WFTC and the government estimated twice as many families to be in receipt of WFTC as received by FC. Figure 1.1 shows how the number of claimants changed from 1988 to 2002[12]. There were 1.1 million claims for WFTC in August 2000, which increased to 1.3 million claims in August 2001. This is almost 430,000 more than claimed under Family Credit in August 1999 .

Eligibility for WFTC was based on the family income being less then £92.90 per week, the presence of children, a minimum of 16 hours of work in the family per week and low household savings. Although not innovative, it was more generous and extended further up the income distribution. In particular, the marginal deduction rate fell from 70% to 55% and there was a larger childcare subsidy. The maximum weekly rate of WFTC was made up of an adult credit for each child and a bonus if the claimant or their partner worked for 30 hours or more each week. An important aspect of the policy was that income from most other benefits, like housing benefit, child benefit and council tax benefit were not included in the calculation for the entitlement of WFTC. This, as argued in Blundell & Walker (2001), could potentially offset the work incentive effects of WFTC.

[11] See Harberger (1962).

[12] In April 2003, WFTC changed again to the Working Tax Credit.

In terms of government spending on the program, by 2000 the government had spent £5 billion per year (which accounts for 1.5% of the government budget and 0.6% of the GDP). This was almost £2 billion more than that expected under FC. The huge increase in expenditure came from increased credit per child from £19.85 to £26; the threshold support increase from £80.65 to £92.90, and of course, the reduced taper. In addition, the childcare cost accounted for 70% of actual childcare cost (accounting for weekly childcare costs up to a maximum of £135 for one child and £200 for two or more children). The effect of these changes meant that those who were currently receiving the maximum payment would see a small increase in the level of their payment if they had children under the age of 11 years old. Those with net income between £80.65 and £92.90 would move from being on the taper to receiving full support. The others on the taper would see the taper rate fall from 70% to 55% and the largest cash gain would go to those who were previously just at the end of the taper. Figure 1.2 shows how the average claim changed over time. In addition, an encouraging sign of WFTC effectiveness was that its take-up rate by 2002 was estimated to be 72-76% compared to 66-70% under FC. The take-up rate was highest for those entitled to the biggest awards. Also, the greater generosity of WFTC relative to FC meant that the take-up of WFTC was higher than would have been expected had FC simply continued unchanged.

As mentioned in the introduction, one key difference between FC and WFTC was that the payment was made through the wage packet. This was an attractive move because it became more convenient to distribute and it reduced the stigma attached to the tax credit for being a welfare benefit. In April 2000, the eligible claimant would claim the approximate tax credit from the Inland Revenue, who would work out the amount of tax credit payable. The Inland Revenue would then notify the relevant employer of the amount of tax credit to be paid and the employer would pay the tax credit out of the tax and National Insurance contribution that they would otherwise have forwarded to the Inland Revenue.

1.5 Empirical Framework

In this section we empirically test the theoretical hypothesis that a change in tax credit can lead to a shift in the incidence from worker to employer. In addition to a direct effect on claimants, we examine whether there exists an indirect (spillover) effect of the tax credit on the wage of both the claimant and similarly skilled ineligible (and/or non claimants), which becomes stronger when the fraction of claimant workers and/or the

average tax credit amount increases within an industry (or within an education group)[13]. Finally, we use the empirical model to distinguish between the effect of the change in generosity of the WFTC and the change of its visibility on the wage. We propose both a parametric and non-parametric two stage censored regression model to estimate these effects. In addition, as a robustness check we extend the two stage analysis to identify those workers for who the NMW binds to see how WFTC affects their wages. Before explaining the methodology, let us begin by discussing the identification of some key variables.

We want to identify the effect of WFTC on the wages of "similar" people, where some are eligible for WFTC and some are not eligible. We define "similar" people as those who have the same predicted wage in the absence of WFTC. The idea is that we want to estimate the (log) wage, W_i^*:

$$W_i^* = \beta_0 + \beta_1 W_i^c + \beta_2 WFTC_i + \beta_3 FCGen_i + \beta_4 (\bar{WFTC} * \theta) + u_i \qquad (1.7)$$

Where W_i^c is the counterfactual (log) wage we would have if there was no WFTC; $WFTC_i$ is the tax credit variable[14] and $FCGen_i$ represents the change in the generosity of WFTC from Family Credit (FC). The spillover effect, $(\bar{WFTC} * \theta)$, is captured using the average WFTC in an industry (or education group), weighted by the fraction of claimants in that industry (education group) and u_i is the error term. The main problems for identification are that we do not know the counterfactual wage and secondly, we may be concerned that u_i is correlated with $WFTC_i$. Our task is therefore to construct some sort of *predicted* measure of the counterfactual wage, $\hat{w}_i$, and to find an appropriate WFTC measure, $\hat{WFTC}_i$. In other words, we want to ensure that: $correl(\hat{w}_i, u_i) = correl(\hat{WFTC}_i, u_i) = 0$. This section is devoted to explaining how this is done.

One of the key tasks is to construct a measure for WFTC. We identify the WFTC variable in two ways: (1) Using a simple indicator which identifies those who report claiming WFTC, we work out the probability of claiming WFTC and (2) using the eligibility criteria, we identify those who are eligible for WFTC and the amount for which they are entitled. In addition, this second measure enables us to distinguish between the change in generosity from Family Credit (FC) to WFTC and the change of visibility from payment as a welfare benefit to payment through the wage packet. We do this by calculating the

[13] We use two measures of spillover: Industry and education groups. We discuss these later in this section.

[14] The construction of this variable will be discussed in more detail later in this section.

amount of FC a person would be eligible for, given that it was still in operation and then by taking the difference from the amount of WFTC, we work out the increase in generosity. However, since eligibility does not imply take-up, it is good to estimate using both methods.

The receipt of WFTC differs across households for four main reasons: (1) hourly wages, (2) hours worked, (3) household income and (4) presence of children. These four factors not only determine *eligibility*, but will also determine the *amount* received. The outcome variable under investigation is the hourly wage variable and so the variation in the latter three factors (hours worked, household income and presence of children) can be used to evaluate the change in hourly wage that is due to the change in tax credit policy. Typically, the literature on tax credits ignores the different sources of variation and the analysis is conducted by comparing people with children to those without (Eissa & Leibman (1996), Blundell et al (2005)). We use the variation from all three factors to conduct the analysis, but we are assuming that people do not alter their behaviour (significantly enough) in hours of work, for example, to make the criteria endogenous. We discuss this in more detail later in this section[15].

By comparing eligible with non-eligible workers who have the same pre-WFTC wage, we do not have the standard treatment and control group because of the potential spillover effects discussed in Section 1.3. Instead, as it will become clear later in this section, we use a cross-sectional wage structure before WFTC (as the *predicted* wage variable) and then add in the wage growth and policy change to see what happens to the eligible and non-eligible with the same predicted wage. Essentially, we use a predicted wage measure which is some function of characteristics, a WFTC variable which is also some function of characteristics and then we identify the effect through a particular functional form. For example, suppose that two people have the same predicted wage before WFTC is introduced. They both have children and a low household income, but one person (or one household) works too few hours to be eligible for WFTC. Here we compare their relative before and after wage changes.

Typically the literature on tax credit analysis only focuses on women since, as noted in Eissa (1995), they are usually the largest group of taxpayers eligible for WFTC and they are the group most relevant for studying whether WFTC reduces welfare dependency. However, for the purpose of our analysis, it seems reasonable to look at both women *and* men. The institutional structure of WFTC specifies that either parent can claim the tax credit in their wage packet. Given that in a coupled household it is more likely that the

[15] We are not concerned by presence of children since, at least in the short run, this will not be altered. In addition we use *predicted* weekly wages to work out household income (this will become clear in the next section).

male member of the household will be in work, it is therefore more likely that he will be the tax credit claimant. It therefore not justified to drop men from our analysis.

1.5.1 The role of the National Minimum Wage:

In the same year as the WFTC was introduced, the UK had another important introduction: National Minimum Wage (NMW). For the first time, the government introduced a national minimum in April 1999 of £3.60 for adults (aged 22 years and above) and £3.00 for those aged 18 - 21 years[16]. Since this policy was introduced only six months before the introduction of the WFTC, we may pose the question: Is this a nuisance or an aid for the following analysis?

We argue that the NMW plays a fundamental role in the evaluation method and is something that should not be ignored in any analysis on WFTC. In the following analysis it is used for both identification and as a censoring point. It offers an unusual source of variation because it is a floor below which the employer *cannot* cut the wage. Although it has the strongest effect on those at the lower end of the wage distribution, as WFTC does, the NMW will protect those with the lowest wages from a wage cut (i.e. the part of the wage distribution where the employer is set to gain the most in incidence). This has a very interesting implication that it is those in the middle of the wage distribution who lose the most, since those at the upper end of the wage distribution will either not be eligible to claim or will receive so little that either they don't claim or it is not in the employer's interest to cut their wage.

1.5.2 The "WFTC (LFS)" Indicator:

The UK's Quarterly Labour Force Survey (LFS), which is discussed in more detail in the next section, contains information on the types of family related benefits that are claimed. From Spring 2000, information on WFTC claim is reported[17]. This is a useful variable as it helps to identify reported claimants, however take-up of the tax credit is likely to be correlated with the amount of WFTC to be claimed and other individual, household and job characteristics. For this reason we use the probability of claiming WFTC instead of actual claim in a probit model, such that:

[16] Although there were Wage councils abolished in 1993

[17] It is important to note that this is *reported* claim and not government reported *actual* claim.

$$Pr(ClaimWFTC = 1|X, WFTCamount) = \Phi(\theta' X_i + \gamma WFTCamount_i) \quad (1.8)$$

Where $\Phi(.)$ denotes the standard cumulative distribution function of the standard normal, X_i is a 1xK vector of conditioning variables[18] and we use the predicted WFTC amount.

In addition, to make the analysis more rigorous and to account for the individual level of importance of WFTC (relative to household income), a "WFTC Rate" is calculated using the policy eligibility criteria. The nature of this variable allows us to distinguish between the two important changes with regard to the WFTC, namely the change in generosity and change in visibility.

1.5.3 Calculation of the "WFTC Rate" variable:

WFTC Rate The wage change analysis becomes complicated when measuring the amount of WFTC as WFTC is computed using *household* income rather than the individual wage. One possible way of tackling this is to use the data to match earners in the household and then to estimate the amount of WFTC the household is entitled to claim using the eligibility criteria. This variable is then used in the regression framework. The (per week) WFTC has 3 main parts[19]: (1) A basic credit of £59.00 (one for each family), (2) A 30 hour tax credit bonus of £11.45 (where the worker works at least 30 hours per week) and (3) A tax credit for each child in the eligible household of £26.00. In addition, the criteria also specified that the household should have low savings. The LFS does not report data on savings and so we cannot use it in constructing the WFTC variable. However, here this is not a big problem since only 3.6% of couples and 2.7% of lone parents reports having savings over £5,000 and for those on maximum awards, no one reports having savings over £5,000[20].

The payable WFTC is based on each component added together to make a maximum credit. If net household income ($HHInc$) is above £92.90 per week, the maximum WFTC is reduced. There will be a reduction of £0.55 for each pound over £92.90. If the net income is below £92.90, the maximum WFTC is payable.

In general, the "WFTC" variable is calculated as follows:

[18] The controls include: Age, Education, Region, Ethnicity, Experience (plus higher orders), Tenure (plus higher orders), Marital Status, Number of Children, Firm Size, Public Ownership, Occupation Type, Industry Type, Full-time Status.

[19] Figures are given for April 2001.

[20] Working Families' Tax Credit Statistics, Inland Revenue Quarterly Enquiry (2002).

- *Gross WFTC = £59.00(if hours=>16) + £11.45(if hours=>30) + £26.00 per child (given hours=>16)*

- $Reduced\ WFTC = \begin{cases} (HHInc\text{-}£92.90(per\ week))*55\% & if\ HHinc=>£92.90 \\ 0 & otherwise \end{cases}$

- *WFTC = Gross WFTC - Reduced WFTC*

It is important to note that when we calculate household weekly income, we use the *predicted* wage (and not actual wage) of the earner in the sample[21] using wage data from before 1999. The weekly wage of the earner in the sample is calculated by multiplying the predicted hourly wage with hours worked and then the total household weekly income will include the weekly wage of other members of the household. Since WFTC affects the wage through the household income, we cannot put actual weekly wages into calculating the $WFTC$ variable as it would be endogenous and this is why we use the predicted household income.

In addition to this, instead of using this $WFTC$ variable in the wage analysis that follows, we use the *rate* of WFTC (*WFTCRate).* Since wages are used to calculate the $WFTC$ variable, they are endogenous when used as a regressor in any analysis where wage is the dependent variable. It is the case that $WFTC$ will increase as wages (or household income) decreases. The $WFTCRate$, on the other hand, is a non-linear variable which weights household $WFTC$ by *(predicted)* weekly wages.

- $WFTC\ Rate = \left(\frac{WFTC}{weekly\ wage}\right)$

FC Generosity The change in tax credit criteria in 1999 meant that WFTC was more generous compared with FC for three main reason: (1) The threshold increased from £86.65 (per week), (2) Credit for each child increased from £19.85, (3) The taper fell from 70%[22]. By constructing a counterfactual FC variable using this criteria when WFTC was in operation, we can calculate the change in generosity of the policy, such that:

- $FC\ Generosity = \left(\frac{WFTC-FC}{weekly\ wage}\right)$

This will allow us to distinguish between the two effects on wages: change in generosity and change in visibility.

[21] The earner referred to here is the female worker when we restrict the analysis to just women and likewise, it is the male workers when we restrict the analysis to men.

[22] In 1998-99 the last year of Family Credit, the basic rate was £52.30 and the 30 hour bonus was £11.05.

1.5.4 Spillover Effect

The theory suggests that as the elasticity of substitution increases between eligible and ineligible workers and/or as the fraction of eligible increases, then there is a stronger spillover on to the wages of all "similar" workers. We measure spillover in two ways: (1) by industry and (2) by education group. When we use the WFTC claim variable, this is simply the fraction of claimants by industry (education group) and when using the WFTC rate variable this is the average rate in the industry (education group) weighted by the fraction of eligible in the industry (education group). Tables 1.1a and 1.1b shows these figures.

1.5.5 Two-Stage Empirical Strategy

The two components to the empirical strategy are as follows:

(1) The wage is estimated before the imposition of NMW (i.e. predicted wages are calculated using data before 1999)

(2) The predictions from stage 1 are used to compare the before and after effect of WFTC from 2000 to 2003.

Finally, we extend the analysis to identify the workers with a binding NMW to see how the tax credit affects their wage outcomes.

1.5.5.1 Stage One: Predicted Wage

Using a linear regression method on the log wage before 1999, W_i^c, we estimate the expected log wage. This is done by controlling for individual, family and job characteristics in the vector X_i, where X_i is a 1xK vector of conditioning variables[23]. The aim of this exercise is to predict the wage as closely as possible to the earned wage without the NMW and WFTC.

The expected wage, w_i, is calculated such that:

[23]The controls include: Age, Education, Region, Ethnicity, Experience (plus higher orders), Tenure (plus higher orders), Marital Status, Number of Children, Firm Size, Public Ownership, Occupation Type, Industry Type, Full-time Status.

$$E(\log wage|X)_i = \hat{\alpha}X_i = \hat{w}_i \tag{1.9}$$

Is there a Problem of Sample Selection? The predicted wage variable is key to our analysis. We make the assumption that the *relative* rates of return, $\hat{\alpha}$, on the vector X remain the same in the post-WFTC period (2000-2003). This is not to say that the rates of return are unchanged throughout, but we are assuming that if there are changes in the rates of return, they will be the same for both eligible and non-eligible workers with the same predicted wage. This is a less restrictive assumption, however it relies on the supposition that an increase in labour supply does not change the composition of each group. If, for example, a change in tax credit increases participation by drawing in people from unemployment or inactivity, one may argue that the returns to skill for the eligible group fall relative to the non-eligible and so, in effect the average "predicted" wage falls. Although it is difficult to solve this problem of sample selection, we argue in this section that the analysis is free from these selection issues.

Firstly, we use a dataset[24] with an extremely detailed education variable (which proxies for skill) and so we do not have the issue of selection on observables. It can be seen from the descriptive statistics in Table 1.1c that the proportion of eligible with no education does not increase for the eligible group relative to the ineligible after 1999. Secondly, the introduction of the NMW imposes a lower bound below which the employer cannot cut the gross wage. In essence, this means that a huge influx of lower skilled workers will not impact the wage as severely as it would have done without a minimum wage. Finally, in the particular case of WFTC, there is evidence to suggest that participation only increased for lone mothers. Recent work by Blundell et al (2005) finds that although there was a 3% increase in participation for lone parents (where the sample of lone fathers is very small), there was no effect on married mothers and a -0.5% effect on married fathers. In effect, this suggests that the increase in participation is only an issue for a sub-sample of eligible workers. In the analysis that follows, we look separately at men and women and for each, the effect on the sub-samples of married and single parents.

1.5.5.2 Stage Two: Estimating the Wage Change

Let us consider the situation in which we have two groups of people: (1) Those eligible for (and/or claiming) WFTC and (2) those not eligible (and/or not claiming). The model

[24] The Quarterly Labour Force Survey.

predicts that the employer can gain by cutting the gross wage of the eligible (claimant). In addition, the model in Section 1.3 predicts that as the elasticity of substitution between eligible and ineligible workers increases, the aggregate effect on the wages of all people in the same skill group will become stronger.

In the absence of the NMW, we would therefore want to estimate the following wage equation(s):

$$(1)W_i^* = \delta_0 + \delta_1 \hat{w}_i + \delta_2 \Pr(ClaimWFTC)_i + \delta_3 \theta^{ind} + \delta_4 \theta^{edu} + \varepsilon_i$$

$$(2)W_i^* = \gamma_0 + \gamma_1 \hat{w}_i + \gamma_2 WFTCrate_i + \gamma_3 FCGen_i + \gamma_4 (\bar{WFTCrate}^{ind} * \theta^{ind})$$

$$+\gamma_5 (\bar{WFTCrate}^{edu} * \theta^{edu}) + v_i$$

Where $\hat{w}$ captures the predicted wage before the policy changes of 1999 are introduced and equation (1) and (2) use the different measures of WFTC, $\Pr(Claim\ WFTC)_i$ and $WFTCrate_i$, respectively. In equation (2) we also include a measure of the change in generosity from FC to WFTC, $FCGen$. The spillover, θ^{ind} and θ^{edu}, measures the fraction of claimants (eligible) in each industry and education group, respectively. When using the WFTC rate variable, we use these fractions to weight the average WFTC rate in each industry, $\bar{WFTCrate}^{ind}$, and average WFTC rate in each education group, $\bar{WFTCrate}^{edu}$, respectively.

For simplicity, we will use a general expression in the rest of this section:

$$\begin{aligned} W_i^* &= \beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC}^{ind} * \theta^{ind}) + \beta_4 (\bar{TC}^{edu} * \theta^{edu}) + u_i \quad (1.10) \\ st.TC &= \{\Pr(Claim\ WFTC)_i, (WFTCrate_i, FCGen_i)\} \end{aligned}$$

Where TC is the tax credit variable, which represents two different measures: $\Pr(Claim\ WFTC)$ and $WFTCrate$ (including the change in generosity variable, $FCGen_i$ and where $(\bar{TC} * \theta)$ is a measure of the "Spillover" effect. This is estimated by taking the average WFTC, $\bar{TC}$, in each industry (education group) and then weighting it by the fraction of WFTC eligible workers, θ, in that industry (education group)[25].

[25] When using the WFTC (LFS) we only use the fraction of claimants in each industry and education group, respectively.

However, the imposition of the NMW in April 1999 distorts the actual wage from the predicted wage for those who the NMW binds. Figure 1.3 represents this distortion. It highlights that for those with a binding NMW, there exists a "Gap" between actual and predicted wage. For those who are unaffected by the NMW (i.e. those who were previously earning above the national minimum), no "Gap" exists between the actual wage and the predicted wages. This imposition has two main roles. Firstly, it acts as a point of censor and secondly, it can be used as an identification restriction.

This imposition implies that we have a censored regression model where the censoring point in 1999 is £3.60, the NMW[26]. At this point we have a positive probability mass at the NMW. Essentially:

$$W_i = \begin{cases} w_{\min} \text{ if } W_i^* \leq w_{\min} \\ W_i^* \quad \text{if } W_i^* > w_{\min} \end{cases} \tag{1.11}$$

In essence if W_i^* denotes the actual (log) wage where $E(\log wage|X)_i = \hat{\alpha}X_i = \hat{w}$, we only observe W_i^* when $W_i^* > w_{\min}$ and so we can define observed (log) wages, W_i , as:

$$W_i = \max(w_{\min}, W_i^*) \tag{1.12}$$

In the context of our model this implies:

$$W_i = \max(w_{\min}, \beta_0 + \beta_1 \hat{w_i} + \beta_2 TC_i + \beta_3(\bar{TC} * \theta) + u_i) \tag{1.13}$$

Figure 1.4 gives a clear representation of the type of effects we would expect.

Standard Censored Tobit Model A model that is directly relevant here is the Tobit model (Tobin, 1956). We can re-write the above as :

[26]The NMW changes between 1999 and 2003 and we adjust the censoring point accordingly.

$$W_i - w_{\min} = \max(0, (\beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta) + u_i) - w_{\min}) \tag{1.14}$$

To estimate β we assume W_i^* given the covariates has a homoskedastic normal distribution (i.e. $u|x \sim Normal(0, \sigma^2)$). Since the model is in log transformation, the assumption is more plausible but is still quite strong. We compare these Tobit estimates with a non-parametric alternative in the following section. The advantages of a non-parametric estimator, according to Berg (1998), are that it is robust to non-normality of the error terms and it is robust to heteroskedasticity (which is common in most cross-sectional datasets).

Censored Least Absolute Deviation: Powell's Estimator An alternative way to estimate the model, without imposing a structure on the distribution of u is to use Powell's (1984) censored least absolute deviation (LAD) estimator. Powell's estimator is restricted to a linear functional form and he shows that the median function $q_{50}(\beta, \hat{w}_i, TC_i, (\bar{TC} * \theta))$ is equal to the function $\max(w_{\min}, \beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta) + u_i)$, such that:

$$\begin{aligned} & q_{50}(W_i | \hat{w}_i, TC_i, (\bar{TC} * \theta)) \\ = \; & \max(w_{\min}, q_{50}(\beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta) + u_i | \hat{w}_i, TC_i, (\bar{TC} * \theta)) \\ = \; & \max(w_{\min}, \beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta)) \end{aligned} \tag{1.15}$$

Where q_{50} denotes the median of the distribution conditional on covariates and the median distribution of u_i is assumed to be zero. The censored LAD objective is to consistently estimate β by the parameter vector that minimises:

$$\sum_{i=1}^{N} |W_i - \max(w_{\min}, \beta_0 + \beta_1 \hat{w}_i + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta))| \tag{1.16}$$

The consistency of this estimator does not require knowledge of the distribution of the u, nor is it assumed that the distribution is homoskedastic, only that it has median 0[27].

[27] As pointed out by Deaton (1997), a useful property of quantiles is that they are preserved under monotone transformations. Here, since we have a set of positive observations, and we take the logarithms,

Identification with the NMW The NMW offers an interesting variation which allows us to test the hypothesis that if the employer is restrained by an exogenous barrier to cut the gross wage, she cannot cut the wage below the predicted wage. In the event that a NMW binds, the implication is that for those who have a predicted wage below the NMW, there no negative tax credit effect. Given that we have some workers with a predicted wage above the NMW and some with a predicted wage below the NMW, we test this by identifying each group to see how WFTC affected each separately in an extended Tobit model.

Since we want to estimate:

$$W_i^* = \beta_0 + \beta_1 \hat{w_i} + \beta_2 TC_i + \beta_3 (\bar{TC} * \theta) + u_i \tag{1.17}$$

Where we assume that the error is normally distributed (i.e. $u|x \sim Normal(0, \sigma^2)$) and, as before, a censored model. The introduction of the NMW in April 1999 imposed the restriction on observed wages to be:

$$W_i = \max(w_{\min}, W_i^*) = w_{\min} + \max(0, W_i^* - w_{\min}) \tag{1.18}$$

The average wage, given the tax credit and predicted wage, is given by:

$$\begin{aligned} & E[W_i|\hat{w_i}, TC_i] \\ = \; & w_{\min} + E[\max(0, W_i^* - w_{\min})|\hat{w_i}, TC_i] = 0.\Pr(W_i^* < w_{\min}) \\ +(1 - \Pr(W_i^* \; < \; & w_{\min}) E[W_i^* - w_{\min}|W_i^* \geq w_{\min}, \hat{w_i}, TC_i] \\ = \; & (1 - \Pr(W_i^* < w_{\min})[-w_{\min} + E[W_i^*|W_i^* \geq w_{\min}, \hat{w_i}, TC_i]] \end{aligned} \tag{1.19}$$

Since we assume a standard normal, this can be re-written as:

the median of the logarithm of the median of the untransformed data.

$$
\begin{aligned}
& E[W_i|\hat{w}_i, TC_i] \\
= \; & \Phi(\frac{\beta_0 + \beta_1\hat{w}_i + \beta_2 TC_i + \beta_3(\bar{TC} * \theta) - w_{\min}}{\sigma})[-w_{\min} + E[W_i^*|W_i^* \geq w_{\min}, \hat{w}_i, TC_i]]
\end{aligned} \tag{1.20}
$$

To work out the final term, we use the truncated normal distribution [28]. Therefore, if $u|x \sim Normal(0, \sigma^2)$, then:

$$
\begin{aligned}
E[u_i|\hat{w}_i, TC_i, u_i \; > \; & w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC} * \theta)] \\
= \; & \frac{\sigma\phi(\frac{w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC}*\theta)}{\sigma})}{1 - \Phi(\frac{w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC}*\theta)}{\sigma})}
\end{aligned} \tag{1.21}
$$

Substituting this into the wage equation, W_i, we get[29]:

$$
\begin{aligned}
W_i \; = \; & w_{\min}.\Pr(W_i^* < w_{\min}) + (1 - \Pr(W_i^* < w_{\min}))(\beta_0 + \beta_1\hat{w}_i + \beta_2 TC_i + \beta_3(\bar{TC} * \theta) \\
& + \frac{\sigma\phi(\frac{w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC}*\theta)}{\sigma})}{1 - \Phi(w\frac{w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC}*\theta)}{\sigma})})
\end{aligned} \tag{1.22}
$$

And so the equation that we estimate is:

$$
\begin{aligned}
W_i \; = \; & \beta_0 + \beta_1\hat{w}_i + \beta_2 TC_i + \beta_3(\bar{TC} * \theta) \\
+ \Pr(W_i^* \; < \; & w_{\min})(w_{\min} - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC} * \theta)) \\
& + \phi(\frac{w_{\min} - \beta_0 - \beta_1\hat{w}_i - \beta_2 TC_i - \beta_3(\bar{TC} * \theta)}{\sigma})
\end{aligned} \tag{1.23}
$$

[28] We suppose that $z \sim Normal(0, 1)$, then for any constant c, $E(z|z > c) = \frac{\phi(c)}{1 - \Phi(c)}$ and $\phi(.)$ is the standard normal denisty of z given $z > c$ is $\phi(z)/[1 - \Phi(c)]$, $z > c$, and then intergrating $z\phi(z)$ from c to ∞.

[29] Where $\Pr(W_i^* < w_{\min}) = 1 - \Phi(\frac{\beta_0 + \beta_1\hat{w}_i + \beta_2 TC_i + \beta_3(\bar{TC} * \theta) - w_{\min}}{\sigma})$. We use the general notation for simplicity.

Essentially this equation uses the data on everyone to estimate the equation in Section 1.5.3. In addition, by using the probability of the predicted wage being below the minimum wage, we can use this equation to see how the tax credit will affect those for who the NMW binds. Basically this is a robustness check on our estimates as we make the assumption that the NMW acts as a exogenous barrier and so we would expect that the tax credit will have no effect or less of an effect.

1.5.6 Standard Error Correction of the Predicted Regressor

It is not immediately clear how to deal with the standard errors since we use cross-sectional data, $\hat{w}_i$ is constructed using data from a *different* dataset (i.e. different period to that of the Second Stage). It is not automatically clear how to correct the standard errors since the $\hat{w}_i$ is neither a straightforward generated regressor, nor a regressor generated from a "Split Sample" as described by Angrist and Krueger (1994).

After much deliberation, we find that the simplest way to ensure the robustness of the standard errors is to conduct what we call a Two Stage Bootstrap: The resampling method of bootstrapping is applied first to the data which generates $\hat{w}_i$ and then to the final regression(s) in Stage 2.

1.6 Data & Results

The empirical investigation is done using the UK's Quarterly Labour Force Survey (LFS). The LFS is a repeated cross-section quarterly survey and it has information on individuals, households and families. This includes, information on employment, earnings and a variety of control variables needed to estimate the (log) wage equation in the first stage. The constructed data set uses data from 15 quarterly LFSs: from 1997 quarter 4 (December-Febuary) to 2003 quarter 1 (March-May), inclusive[30]. The sample includes people who are aged between 21 and 60 years old[31]. People in full-time education, sick/disabled or on a government training programme are removed from the sample. In addition, observations of gross wages below £2 and above £60 are excluded. The resulting sample size, after pooling all 15 quarters, is 366,317.

[30] Although data is available beyond this period, WFTC is replaced in April 2003 by the Working Tax Credit.

[31] We use data on people over 21 to avoid the problem of having two different minimum wages.

The LFS does contain information on benefit receipt[32] but it does not indicate how much WFTC the reported claimant receives. In addition to using the dummy variable that indicates receipt in the analysis that follows, data on household income, hours worked, presence of children (i.e. the eligibility criteria) is used to "roughly" estimate the amount of benefit received (or, at least, how much she is eligible for).

Tables 1.1c presents the descriptive statistics for eligible and for those who are not eligible, before and after 1999. However, it is important to note that these are unmatched and only give the group averages. There are a similar proportion of white workers in the sample (around 93-96%) and the number working in the public sector is roughly 27% for both groups. The non-eligible and eligible tend to have the same mean age of 35-38 years and the tenure is fairly similar at around 33 months for the ineligible and 26 months for the eligible. Also, the proportion each group being married is around 60%. There are some noticeable differences between the two groups. In particular, the mean hourly wage for the eligible group is £6.00 and for the non-eligible group it is £8.24 and the proportion with no qualifications in the non-eligible group is 12% versus 18% in the eligible group. The number of hours worked is around 36 hours in the non-eligible group compared with 28 hours in the eligible group and (as expected) the eligible have a higher probability of children.

The summary statistics indicate that the eligible group are not identical to the ineligible. This is not a surprise and although we are not solely comparing people with children to those without (as identification comes from various sources of the eligibility criteria), one would expect differences in characteristics. However, for the purpose of this analysis, the most important thing is that the *composition* of the groups do not change. It can be seen from Table 1.1c that there is almost no change in the summary statistics for the eligible and ineligible before and after 1999 (the year that both the NMW and WFTC where introduced). As described in the empirical framework, workers are matched on their predicted wages before 1999 and then the change in gross wage is assessed after the introduction of WFTC. As a means of checking that the WFTC variables are representative, Figure 1.5 uses the WFTC indicator variable to show that as the predicted wage increases, the fraction of claimants fall. In the same way, Figures 1.6 and 1.7 show that as the amount of WFTC (rate) falls and as the fraction of eligible people falls, the predicted wage increases, respectively.

Another pressing issue is that when using the "WFTC Rate" variable, not all assumed eligible are actual claimants. To ensure that this sample of eligible workers is representative of the actual group of claimants, Figure 1.8 and Figure 1.9 compare the fraction

[32]This includes: Family Credit (pre-October 1999), WFTC, Maternity Allowance and Guardian Allowance.

of recipient families by gross weekly earnings with that of those in the sample. It can be seen that the patterns are fairly similar and so it is probable that the wage distribution is well represented.

1.6.1 Results

In this section we present the OLS, Tobit and Censored LAD results on log wages for men and women, respectively. In addition, we look separately at the results for single men, married men, single women and married women. The regression results in Tables 1.2a and 1.2b estimate the equations in Section 1.5.3 using the probability of claiming WFTC, Pr($Claim\ WFTC$), and the WFTC Rate variable, $WFTCrate$, respectively. We end this section by presenting the results in Tables 3a and 3b for when the NMW is used for identification. This is essentially used as a robustness check for the previous results.

1.6.1.1 Men

The regressions are first performed for men, with the output displayed in Table 1.2a. This table and Table 1.2b, report the marginal effects of WFTC and the spillover effect on the actual (log) wage, W_i^*, between 2000 and 2003. There are three striking results to come out of the analysis on men. The first interesting result is that a WFTC claimant has approximately a 20% fall in his gross wage relative to a similarly skilled non-claimant (non eligible) who has the same predicted wage. From Panel B, when we use the WFTC Rate, the results are confirmed. Here the results tell us that as the rate of WFTC increases for the eligible worker, the gross wage falls 24% relative to a similarly skilled non eligible worker. When we evaluate this at the average weekly wage and average weekly WFTC, this implies that there is a 35% shift in incidence from the eligible worker to the employer. The results become weaker when we look at lone fathers but since the number of lone fathers, claiming WFTC is very small (Blundell et al, 2005), we would expect this effect.

The second salient result is that there is a strong and negative spillover effect when we look by industry and by education group. When using the WFTC rate variable in Panel B, which has the advantage of telling us the amount the worker is eligible for, this result is essentially telling us is that as the fraction of men eligible for WFTC increases in an industry (in an education group), there is a wage fall for all similar workers by about 6% (15%). This is approximately -0.2% (-0.1%) when evaluated at the average WFTC rate, which is weighted by the fraction of total eligible.

Finally, in Panel B where we include a measure which controls for the change in the tax

credit generosity from Family Credit to WFTC, there does not seem to be any significant effect. In essence, this implies that the effect on the gross wages is a result of the change in payment method (i.e. the payment through the wage packet).

1.6.1.2 Women

As noted earlier, it is traditional to focus on women when looking at the participation effects of tax credits. However, when looking at the wage impact the reasoning for this is less obvious since men are at least, if not more, likely to claim the tax credit in their wage packet. In particular in a coupled household, it is more likely that it is the male household member who will be in the labour force and so he is more likely to be the claimant. The results in Table 1.2b offer interesting insights and confirm this hypothesis. When using the probability of claiming WFTC variable in Panel A, the results indicate that the direct effect of WFTC is negative only for lone mothers and a positive effect on married women[33]. However, these results are not very stable and when we replace the claim variable with the WFTC rate variable in Panel B, the effect on both groups is insignificant. It is not entirely obvious why the downward direct effect should be stronger for men than women. One explanation may be that women have a lower average wage than men and they work, on average, fewer hours and so the potential incidence from WFTC are smaller. Alternatively, it may be that women are more likely to be "protected" from a wage (growth) cut because of the NMW barrier.

The result that is fascinating for women is the strong and negative spillover effect, by industry and education groups. This is the case when all women are grouped together, as with men. The result is essentially telling us that as the fraction of claimant women increases in the work place, there is a bigger wage fall for everyone in the same skill group (i.e. those with the same predicted wage). This is coherent with the theory laid out in Section 1.3 where the proposition implies that, given the elasticity of substitution, the shift in the burden of the tax incidence increases with the fraction of eligible (claimants). When comparing the results from the three different estimation techniques, the story remains coherent but the order of magnitude of the coefficients fall when we use the Censored LAD. The results from the WFTC Rate variable in Panel B confirm this and imply that as the fraction of women eligible for WFTC increases in an industry (in an education group), there is a wage fall for all similar workers by about 9% (4%). This is approximately -0.3% (-0.7%) when evaluated at the average WFTC rate, which is weighted by the fraction of total eligible.

[33] When using the Censored LAD measure.

1.6.1.3 NMW Identification

Tables 3a and 3b run an OLS regression using the probability of claiming WFTC variable and WFTC rate variable, respectively. By using the NMW for identification purposes, we are essentially running a robustness check to ensure that the eligible workers with a predicted wage below the minimum wage are "protected" from any wage cut resulting from the introduction of the NMW. We identify whether a worker has a positive probability of having a predicted wage below the NMW and interact it with the WFTC variable. In addition, we control for the potential selectivity bias associated with this probability (using the truncated normal distribution). Although the results in Table 1.3b, which uses the WFTC rate variable are insignificant, in Table 1.3a it is clear that the WFTC claim does not affect the workers for who the NMW binds in the same way as those for who the NMW doesn't bind. Moreover, the results seem to indicate that there is a wage increase for claimant workers (above their predicted wage).

1.7 Extensions

In this section, we try to broaden the analysis to investigate some interesting questions. First, does the size of the firm have any impact on the share in incidence between workers and firms? Second, is the WFTC variable endogenous?

1.7.1 Firm Size

There is a large literature relating the size of the firm to wages. Brown & Medoff (1989) conclude that one of the main reasons why wages are higher in larger firms is that they hire higher quality workers. So far we have assumed a competitive model and so we would expect that the hourly wages would be the same in all firms, otherwise we would need a model with rents. We try to investigate this proposition by applying the methodology from Section 1.5 to compare (1) Small sized firms (employing 1-19 workers), (2) Medium sized firms (20-49 workers) and (3) Large sized firms (more than 50 workers).

Tables 1.4a and 1.4b report the OLS, Tobit and Censored LAD estimates for each firm size category using the probability of claiming WFTC, Pr($Claim\ WFTC$), and the WFTC Rate variable, $WFTCrate$, respectively for men and women. The main consistent result coming from this analysis is that as the size of the firm increases, the degree of "spillover" by industry also increases. This seems quite reasonable given that larger firms have more

uniformity in wage contracts across workers as there are more people doing identical jobs and receiving the same hourly wage rate. It would be harder for the employer to only cut the gross wage of those claiming WFTC and to leave the wage of the non-claimants unchanged. Instead, the higher industry spillover effect reflects that the burden of the tax credit is shared across all workers and that as the fraction of claimants increases, the size of the cut also increases. The "direct" effect results and the "spillover" effect by education group are, however, inconclusive. We may have expected that the direct effect would be stronger in smaller firms, where contracts are more individualistic and so it becomes "easier" for the employers to discriminate compared to large firms in which there are many workers with the same characteristics and differentiated only by eligibility.

1.7.2 Endogeneity of the WFTC Variable

The estimation technique used to derive the WFTC rate variable uses the eligibility criteria to estimate the amount of WFTC a worker is eligible for, given his predicted wages. In the analysis we compare the results from using this variable to the WFTC claim variable obtained from the LFS. This LFS indicator variable is the number of reported claimants. Since not all (predicted) eligible people are actual claimants, we have two main concerns:(1) Sample selection in the "take up"/claim of WFTC and (2) Problems with "switchers" and new entrants to WFTC which may distort the sample. Neither of these issues would be a problem if the WFTC dummy variable was exogenous. In this section, we first discuss these two issues and then try to test the endogeneity of the WFTC dummy variable using the Smith-Blundell (1986) procedure.

1.7.2.1 Sample Selection in the Take-up Rate

A well known phenomena in any analysis on tax credits is that the take-up rate is not 100% and there is often selectivity associated with who claims. In Brewer (2003) a full literature review is given on the work done to explain non-take up. The main explanations given for why eligible people do not claim their tax credit are that there are distortions in the budget constraint; stigma costs associated with receipt and/or costs of time to proceed with the claim (relative to the gain). Although we know that the WFTC recipients will be a select group in general, the two-stage method used in this chapter should control for this by comparing people with the same pre-WFTC wage. However, we may still be concerned by the sample selection associated with which of the eligible workers actually claim. Assuming that the calculated number of eligible, using the method in Section 1.5.3, are the correct number of eligible and that those who report claiming WFTC in the LFS

do actually claim WFTC, we could try to set up a sample selection model to correct for it. However, in order to do this we need some sort of instrument which would determine take-up but not be in the wage equation and it is not entirely obvious what instrument should be used.

1.7.2.2 Entrants, Switchers & Other Compositional Changes

Throughout the chapter we assume that the composition of claimants and non-eligible (and/or non-claimant) remain the same. This is not to say that we assume that the labour supply remained unaltered, given that one of the main aims of the policy is to encourage participation. Instead we were assuming that the average observed and unobserved characteristics in each sub-group remains the same.

However, the entry of previously unemployed or inactive workers may threaten the compositions and/or change in behaviour (modification of characteristics) of a previously ineligible worker to become eligible. For example, the variation for eligibility comes from the presence of children, a low household income and a minimum working hours requirement of 16 hours. Although in the short-run it may be difficult for a worker to adjust the former two factors to become eligible, she can (possibly) alter the household hours of work to maximise a gain from WFTC or moreover, to even secure eligibility.

According to Battistin and Rettore (2003) if there is an entry effect, stronger conditions for identification are needed. One way to test to see if entry/switching alter the compositions would be by using a panel dataset, such as the Five Quarter (LFS) Longitudinal Dataset. Using a panel data set framework, we can estimate the wage growth of workers, controlling for the factors that determine eligibility as well as all the other controls used in the analysis. We expect that the wage growth will be low for those receiving WFTC but who were not previously. However, there is one main problem here: we only have quarter 4 1998 to quarter 4 1999 which would give us data before the introduction of the NMW and WFTC and data afterwards and so the sample size is too small to give us any credible results.

1.7.2.3 Endogeneity Test for the *WFTC* Variable: Smith-Blundell Procedure

Given that it is not entirely obvious how we can "solve" the two problems mentioned above, we instead test to see if the WFTC variable is endogenous. If the WFTC variable is not endogenous, the two problems would not be an issue.

If it is the case that the LFS WFTC claim variable, $WFTC^I$, is endogenous in the censored regression model, such that:

$$W_i = \max(w_{\min}, \beta_0 + \beta_1 \hat{w_i} + \beta_2 WFTC_i^I + \beta_3 (\bar{WFTC} * \theta) + u_i) \tag{1.24}$$

$$\text{Where } WFTC_i^I = \alpha_0 + \alpha_1 \hat{w_i} + \alpha_2 HHInc_i + \alpha_3 Hours_i + \alpha_4 Children_i + v_i$$

In the $WFTC_i^I$ equation we know that the latter three explanatory variables are part of the eligibility criteria and since both household income, $HHInc$, and hours worked, $Hours$, are potentially endogenous, for identification we assume that the presence of children, $Children$, is exogenous. For identification we need the rank condition $\alpha_4 \neq 0$.

In this section we use a two-step procedure proposed by Smith and Blundell (1986) that will deliver a simple test for the endogeneity of the WFTC variable. Under bivariate nomality of (u, v) we can write:

$$u_i = \phi v_i + e_i \tag{1.25}$$

Where $\phi = \eta/\tau^2, \eta = Cov(u, v), \tau^2 = Var(v)$, and e is independent of v with zero mean normal distribution and variance, say τ_1^2. Further, because (u, v) are independent of $\hat{w_i}, e$ is independent of $(\hat{w_i}, v)$. Thus plugging this into the Tobit gives:

$$W_i = \max(w_{\min}, \beta_0 + \beta_1 \hat{w_i} + \beta_2 WFTC_i^I + \beta_3 (\bar{WFTC} * \theta) + \phi v_i + e_i) \tag{1.26}$$

where $e|\hat{w_i}, v \sim Normal(0, \tau_1^2)$. It follows that, if we knew v we could estimate all coefficients by standard censored Tobit. Since we don't, we follow the Smith-Blundell procedure such that: (a) Estimate the reduced form of TC by OLS; this step gives $\hat{\boldsymbol{\alpha}}$. Define the reduced-form OLS residual as $\hat{v_i} = WFTC_i^I - \hat{\alpha_0} - \hat{\alpha_1} \hat{w_i} - \hat{\alpha_2} HHInc_i - \hat{\alpha_3} Hours_i - \hat{\alpha_4} Children_i$. (b) Estimate a standard Tobit of W_i on $\hat{w_i}$, $WFTC_i^I$ and $\hat{v_i}$.

Table 1.5 shows that since $\hat{v}_i$ is insignificant, there is little evidence to suggest that the WFTC variable is endogenous in the equation[34].

1.8 Discussion & Policy Implications

The main aim of this chapter was to analyse the impact of a tax credit on wages in a general equilibrium framework. By using this set-up, we could encapsulate the effect on the economy as a whole and not solely on the claimant. Moreover, we accounted for how changes in the design of the policy altered modelling assumptions. For example, the WFTC was not only more generous than Family Credit (its predecessor), but it was paid through the wage packet and this in turn altered the amount of information to the employer.

The results presented in Section 1.6 imply that there was a significant shift in the burden of tax credits, in line with the theory presented. This is of critical policy importance as we can no longer assume that it is the case that the person eligible for such a tax credit is the sole beneficiary. When calculating the share of incidence using the weekly wage and average weekly WFTC amount, we find that for men almost 35% incidence is shifted to the employer. In terms of spillover effect onto the wage of both eligible and similarly skilled ineligible, as the amount of WFTC (weighted by the fraction of eligible) rises in an industry and/or education group, there is a -0.2% fall in the wage (given the predicted wage) by industry and -0.1% fall by education group for men. For women, the spillover effect is -0.3% by industry and -0.7% by education group. Moreover, the increase in generosity does not explain the shift in incidence, indicating that the change in payment method played an important role. Finally, it is not clear why there is no significant direct effect on women. One possible explanation may be that women have a lower average wage than men and they work, on average, fewer hours and so the potential incidence from WFTC are smaller. Alternatively, it may be that women are more likely to be "protected" from a wage (growth) cut because of the NMW barrier.

These results are important in their own right since they highlight the consequences of the expansion, application and generosity of tax credits. However, in the case of the UK, they are important with respect to the new changes in tax credit policy. In April 2003 the government's new tax credit (Child Tax Credit and Working Tax Credit) was introduced. Essentially, the new system divides the old WFTC into these two parts. Child tax Credit is paid to low income families with children, regardless of whether the parents are in

[34] Under $\phi = 0, e = u$, normality of v plays no role: as a test for endogeneity of $WFTC^I$, the Smith-Blundell approach is valid without any distributional assumptions on the reduced form of $WFTC^I$.

work. The Working Tax Credit, on the other hand, works in a similar way to WFTC (i.e. contingent on working a minimum of 16 hours and earning below a certain threshold) but unlike WFTC, the Working Tax Credit is not just restricted to those with children. The idea is to make work pay for non-parents as well as parents. For the purpose of future research, investigating these changes would be interesting.

In addition, it may be interesting to look closer at the institutional role with regard to extracting tax credit incidence. In the case of minimum wages, it has been discussed that they act as a barrier such that they reduce the power of the employer to cut the gross wage. Perhaps looking at the public versus private sector and/or unionised versus non-unionised firms can help to shed some more light on whether institutions either prevent or encourage the employer to extract the tax credit incidence.

1.9 Conclusion

The increased use of tax credits as a method of "in work benefits" has raised a great deal of popular interest in the UK and in many other countries where they have been initiated. The move to integrate the social security system within the tax system was favoured as a means to reward people who are in work and to "make work pay"[35]. This chapter focuses on looking at the indirect consequences of such a policy by focusing on the effect on gross equilibrium wages in the UK following the introduction of the Working Families' Tax Credit in October 1999. There is evidence to suggest that the employer does share in the incidence of the tax credit by cutting the wage of claimant workers relative to non-claimants and through a spillover effect on all (similarly skilled) workers.

1.10 Bibliography

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1.11 Tables and Figures

Table 1.1a: Claimants/Eligibility by Industry

	No. of Eligible	Average WFTC Rate	No. of Claimants
Agriculture & Fishing	174	0.37	66
	1.1%		0.8%
Energy & Water	57	0.2	58
	0.3%		0.7%
Manufacturing	1585	0.28	1052
	9.6%		12.8%
Construction	507	0.28	254
	3.1%		3.1%
Distribution, Hotels & Restaurants	5369	0.64	2274
	32.7%		27.7%
Transport & Communication	776	0.33	519
	4.7%		6.3%
Banking, Finance, Insurance	1576	0.37	871
	9.6%		10.6%
Public Admin, Education & Health	5331	0.44	2675
	32.4%		32.5%
Other Services	1068	0.61	455
	6.5%		5.5%

Table 1.1b: Claimants/Eligible by Education Group

	No. of Eligible	Average WFTC Rate	No. of Claimants
High	572	0.01	405
	3.4%		4.9%
Medium	5181	0.13	2893
	31.6%		35.3%
Low	7818	0.23	3603
	47.7%		43.9%
No Qualifications	2828	0.11	1291
	17.2%		15.8%

Notes.
1. These figures show the averages by combining men and women. In the analysis we use the averages for each group separately

Table 1.1c: Descriptive Statistics

	Ineligible		**Eligible**	
	Before 1999	After 1999	Before 1999	After 1999
Age	38.67	39.32	35.34	34.53
	[11.91]	[11.83]	[8.94]	[9.18]
White	0.96	0.96	0.93	0.92
	[0.18]	[0.19]	[0.25]	[0.27]
No Qualifications	0.12	0.10	0.18	0.17
	[0.32]	[0.30]	[0.38]	[0.37]
Public Sector	0.28	0.29	0.27	0.25
	[0.44]	[0.45]	[0.44]	[0.43]
Married	0.62	0.61	0.65	0.54
	[0.48]	[0.48]	[0.47]	[0.49]
Hours of Work	36.82	36.78	28.05	25.23
	[13.58]	[13.73]	[14.44]	[12.97]
Hourly Wage	8.24	8.88	6.68	6.01
	[5.21]	[5.55]	[4.58]	[3.58]
Tenure	33.69	33.31	25.71	27.62
	[29.04]	[27.88]	[25.78]	[25.69]
Experience	92.62	95.64	78.48	55.89
	[98.02]	[100.25]	[85.15]	[58.31]
% in Small Firms	25%	24%	36%	40%
% in Medium Firms	17%	17%	19%	21%
% in Large Firms	56%	56%	44%	38%
Observations	**79288**	**234693**	**9111**	**21973**

Table 1.2a: Stage Two Regression Results (Men)

A - WFTC (LFS)

	ALL			*SINGLE*			*MARRIED*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.976	0.98	0.973	0.927	0.933	0.922	1.012	1.015	1.007
	[0.004]**	[0.004]**	[0.004]**	[0.006]**	[0.006]**	[0.007]**	[0.004]**	[0.005]**	[0.006]**
Pr(Claim WFTC)	-0.157	-0.186	-0.203	-0.072	-0.079	-0.138	-0.129	-0.172	-0.177
	[0.020]**	[0.022]**	[0.029]**	[0.039]	[0.039]*	[0.046]**	[0.030]**	[0.031]**	[0.036]**
Spillover (Education)	-0.055	-0.051	-0.058	0.087	0.093	0.098	-0.125	-0.122	-0.144
	[0.009]**	[0.010]**	[0.011]**	[0.017]**	[0.015]**	[0.018]**	[0.013]**	[0.012]**	[0.014]**
Spillover (Industry)	-0.056	-0.058	-0.051	-0.138	-0.14	-0.125	-0.023	-0.026	-0.029
	[0.011]**	[0.010]**	[0.012]**	[0.015]**	[0.019]**	[0.020]**	[0.013]	[0.013]*	[0.015]*
Constant	0.046	0.018	0.023	0.13	0.352	0.123	-0.053	0.365	-0.04
	[0.015]**	[0.012]	[0.013]+	[0.022]**	[0.002]**	[0.020]**	[0.018]**	[0.001]**	[0.017]*
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89992	89992	89740	30261	30261	30158	59731	59731	59671

B - WFTC Rate

	ALL			*SINGLE*			*MARRIED*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.977	0.981	0.971	0.932	0.938	0.922	1.012	1.015	1.003
	[0.003]**	[0.004]**	[0.005]**	[0.006]**	[0.007]**	[0.007]**	[0.005]**	[0.005]**	[0.006]**
WFTC rate	-0.114	-0.175	-0.248	-0.072	-0.099	-0.12	-0.106	-0.187	-0.242
	[0.026]**	[0.033]**	[0.045]**	[0.054]	[0.054]+	[0.065]+	[0.037]**	[0.038]**	[0.059]**
FC Generosity	-0.001	0.063	0.108	0.19	0.235	0.005	-0.136	-0.068	-0.053
	[0.078]	[0.096]	[0.114]	[0.139]	[0.110]*	[0.164]	[0.120]	[0.120]	[0.151]
Spillover (Education)	-0.107	-0.101	-0.148	0.277	0.286	0.228	-0.261	-0.257	-0.325
	[0.031]**	[0.033]**	[0.035]**	[0.049]**	[0.057]**	[0.055]**	[0.042]**	[0.044]**	[0.046]**
Spillover (Industry)	-0.057	-0.061	-0.057	-0.161	-0.164	-0.15	-0.011	-0.014	-0.017
	[0.013]**	[0.012]**	[0.017]**	[0.025]**	[0.028]**	[0.027]**	[0.018]	[0.018]	[0.021]
Constant	0.009	0	0.033	0.113	0.352	0.122	-0.044	-0.078	-0.028
	[0.016]	[0.012]	[0.013]*	[0.022]**	[0.002]**	[0.021]**	[0.019]*	[0.001]**	[0.018]
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89994	89994	89710	30261	30261	30159	59733	59733	59632

Table 1.2b: Stage Two Regression Results (Women)

A - WFTC (LFS)

	ALL			*SINGLE*			*MARRIED*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.991	1.007	1.021	0.939	0.952	0.957	1.021	1.037	1.054
	[0.004]**	[0.004]**	[0.004]**	[0.005]**	[0.006]**	[0.006]**	[0.004]**	[0.004]**	[0.005]**
Pr(Claim WFTC)	0.071	0.065	0.027	0.018	0.011	-0.041	0.092	0.09	0.059
	[0.009]**	[0.007]**	[0.010]**	[0.011]	[0.012]	[0.011]**	[0.016]**	[0.015]**	[0.021]**
Spillover (Education)	-0.041	-0.025	-0.026	0.059	0.074	0.084	-0.107	-0.092	-0.096
	[0.009]**	[0.009]**	[0.009]**	[0.012]**	[0.011]**	[0.013]**	[0.011]**	[0.004]**	[0.011]**
Spillover (Industry)	-0.085	-0.09	-0.042	-0.055	-0.057	-0.026	-0.105	-0.111	-0.052
	[0.008]**	[0.006]**	[0.009]**	[0.012]**	[0.015]**	[0.013]*	[0.012]**	[0.015]**	[0.011]**
Constant	0.01	-0.025	-0.111	0.106	0.069	0.052	-0.057	0.341	-0.129
	[0.021]	[0.012]*	[0.012]**	[0.020]**	[0.002]**	[0.016]**	[0.021]**	[0.006]**	[0.014]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82278	82278	81244	30272	30272	29913	52006	52006	51388

B - WFTC Rate

	ALL			*SINGLE*			*MARRIED*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.991	1.005	1.018	0.94	0.952	0.952	1.022	1.037	1.053
	[0.003]**	[0.003]**	[0.004]**	[0.006]**	[0.006]**	[0.007]**	[0.004]**	[0.004]**	[0.005]**
WFTC rate	0.069	0.052	0.009	0.052	0.032	-0.012	0.071	0.057	0.02
	[0.010]**	[0.009]**	[0.011]	[0.012]**	[0.016]*	[0.015]	[0.014]**	[0.015]**	[0.014]
FC Generosity	-0.072	-0.02	0.025	-0.077	-0.02	-0.006	-0.077	-0.032	0.018
	[0.033]*	[0.032]	[0.040]	[0.050]	[0.056]	[0.060]	[0.050]	[0.058]	[0.050]
Spillover (Education)	-0.048	-0.029	-0.043	0.092	0.11	0.101	-0.128	-0.11	-0.124
	[0.012]**	[0.014]*	[0.013]**	[0.021]**	[0.023]**	[0.021]**	[0.014]**	[0.017]**	[0.016]**
Spillover (Industry)	-0.138	-0.148	-0.092	-0.081	-0.088	-0.058	-0.173	-0.187	-0.114
	[0.013]**	[0.014]**	[0.014]**	[0.021]**	[0.018]**	[0.022]**	[0.019]**	[0.019]**	[0.017]**
Constant	-0.026	-0.024	-0.074	0.105	0.073	0.074	-0.071	-0.104	-0.162
	[0.020]	[0.009]**	[0.011]**	[0.019]**	[0.002]**	[0.017]**	[0.020]**	[0.013]**	[0.013]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82283	82283	81253	30272	30272	29922	52011	52011	51376

Table 1.3a: NMW Identification Results
(WFTC (LFS))

	WFTC (LFS)		
	All	**Single**	**Married**
Predicted wage	1.061	1.018	1.066
	[0.005]**	[0.009]**	[0.007]**
Pr(Claim WFTC)	-0.012	-0.075	0.043
	[0.016]	[0.019]**	[0.029]
Spillover (Education)	0.008	0.14	-0.074
	[0.008]	[0.013]**	[0.010]**
Spillover (Industry)	-0.072	-0.028	-0.093
	[0.008]**	[0.014]*	[0.011]**
$Pr(W^*<w_{min})$	2.908	2.685	2.56
	[0.078]**	[0.114]**	[0.113]**
$\phi(.)$	0.966	0.973	0.722
	[0.050]**	[0.073]**	[0.069]**
$Pr(W^*<w_{min})$*Predicted wage	-2.392	-2.244	-2.034
	[0.071]**	[0.104]**	[0.101]**
$Pr(W^*<w_{min})$*Pr(Claim WFTC)	0.162	0.249	-0.051
	[0.050]**	[0.058]**	[0.100]
$Pr(W^*<w_{min})$*Spillove (Education)	0.225	0.024	0.27
	[0.053]**	[0.077]	[0.075]**
$Pr(W^*<w_{min})$*Spillove (Industry)	-0.537	-0.373	-0.542
	[0.066]**	[0.092]**	[0.093]**
Constant	-0.171	-0.107	-0.15
	[0.015]**	[0.024]**	[0.019]**
Year Dummies	Yes	Yes	Yes
Observations	185592	63887	121705

Table 1.3b: NMW Identification Results
(WFTC Rate)

	WFTC Rate		
	All	**Single**	**Married**
Predicted wage	1.068	1.025	1.075
	[0.005]**	[0.009]**	[0.007]**
WFTC rate	-0.034	-0.111	0.026
	[0.019]+	[0.028]**	[0.026]
FC Generosity	-0.096	0.098	-0.246
	[0.057]+	[0.089]	[0.075]**
Spillover (Education)	0.051	0.281	-0.088
	[0.015]**	[0.023]**	[0.019]**
Spillover (Industry)	-0.124	-0.051	-0.163
	[0.015]**	[0.025]*	[0.019]**
$Pr(W^*<w_{min})$	2.933	2.722	2.58
	[0.082]**	[0.119]**	[0.116]**
$\phi(.)$	1.035	1.003	0.853
	[0.050]**	[0.073]**	[0.067]**
$Pr(W^*<w_{min})$*Predicted wage	-2.44	-2.269	-2.141
	[0.072]**	[0.105]**	[0.100]**
$Pr(W^*<w_{min})$*WFTC rate	-0.003	0.18	-0.191
	[0.047]	[0.064]**	[0.072]**
$Pr(W^*<w_{min})$*FC Generosity	0.842	0.27	1.304
	[0.181]**	[0.253]	[0.266]**
$Pr(W^*<w_{min})$*Spillove (Education)	0.22	-0.194	0.487
	[0.106]*	[0.150]	[0.150]**
$Pr(W^*<w_{min})$*Spillove (Industry)	-0.622	-0.516	-0.548
	[0.099]**	[0.139]**	[0.140]**
Constant	-0.197	-0.121	-0.186
	[0.015]**	[0.024]**	[0.019]**
Year Dummies	Yes	Yes	Yes
Observations	185592	63887	121705

Table 1.4a: Stage Two Regression Results – *FIRM SIZE* (Men)

A - WFTC (LFS)

	SMALL			*MEDIUM*			*LARGE*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.882	0.892	0.89	0.98	0.983	0.981	1.025	1.027	1.016
	[0.008]**	[0.008]**	[0.009]**	[0.011]**	[0.011]**	[0.010]**	[0.005]**	[0.005]**	[0.007]**
Pr(Claim WFTC)	-0.225	-0.277	-0.334	-0.113	-0.122	-0.072	-0.11	-0.113	-0.097
	[0.026]**	[0.041]**	[0.042]**	[0.058]	[0.067]+	[0.066]	[0.049]*	[0.050]*	[0.058]+
Spillover (Education)	0.002	0.011	0.019	-0.022	-0.019	-0.067	-0.047	-0.046	-0.056
	[0.023]	[0.030]	[0.024]	[0.026]	[0.022]	[0.027]*	[0.014]**	[0.013]**	[0.016]**
Spillover (Industry)	-0.019	-0.026	-0.042	-0.007	-0.008	0.02	-0.087	-0.088	-0.085
	[0.023]	[0.020]	[0.026]	[0.021]	[0.026]	[0.028]	[0.015]**	[0.013]**	[0.018]**
Constant	0.241	0.391	0.167	0.048	0.041	0.02	-0.103	-0.116	-0.101
	[0.029]**	[0.018]**	[0.026]**	[0.031]	[0.003]**	[0.030]	[0.019]**	[0.017]**	[0.021]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20191	20191	20096	14321	14321	14283	44272	44272	44245

B - WFTC Rate

	SMALL			*MEDIUM*			*LARGE*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.868	0.879	0.867	0.982	0.985	0.983	1.037	1.039	1.026
	[0.008]**	[0.008]**	[0.010]**	[0.010]**	[0.012]**	[0.010]**	[0.007]**	[0.006]**	[0.008]**
WFTC rate	-0.132	-0.199	-0.246	-0.093	-0.138	-0.261	-0.189	-0.203	-0.502
	[0.031]**	[0.048]**	[0.052]**	[0.103]	[0.124]	[0.117]*	[0.163]	[0.151]	[0.179]**
FC Generosity	-0.203	-0.153	-0.151	0.024	0.062	0.277	0.374	0.384	0.684
	[0.111]	[0.159]	[0.152]	[0.297]	[0.309]	[0.272]	[0.296]	[0.251]	[0.345]*
Spillover (Education)	-0.166	-0.154	-0.286	-0.05	-0.05	-0.152	0.026	0.029	0.005
	[0.086]	[0.067]*	[0.074]**	[0.081]	[0.076]	[0.077]*	[0.047]	[0.044]	[0.054]
Spillover (Industry)	-0.051	-0.056	-0.063	0.025	0.023	0.068	-0.094	-0.096	-0.104
	[0.031]	[0.036]	[0.034]+	[0.038]	[0.033]	[0.036]+	[0.022]**	[0.026]**	[0.027]**
Constant	0.28	0.255	0.24	0.035	0.353	0.004	-0.157	0.353	-0.148
	[0.029]**	[0.003]**	[0.027]**	[0.032]	[0.003]**	[0.029]	[0.023]**	[0.019]**	[0.023]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20191	20191	20072	14322	14322	14282	44273	44273	44242

Table 1.4b: Stage Two Regression Results– *FIRM SIZE* (Women)

A - WFTC (LFS)

	SMALL			*MEDIUM*			*LARGE*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.95	0.981	0.991	1.019	1.033	1.049	1.02	1.027	1.04
	[0.009]**	[0.008]**	[0.008]**	[0.009]**	[0.008]**	[0.010]**	[0.006]**	[0.007]**	[0.006]**
Pr(Claim WFTC)	0.052	0.04	0.008	0.081	0.081	0.034	0.08	0.079	0.028
	[0.016]**	[0.010]**	[0.016]	[0.022]**	[0.023]**	[0.024]	[0.017]**	[0.019]**	[0.017]
Spillover (Education)	-0.058	-0.035	-0.066	0.041	0.058	0.058	-0.048	-0.04	-0.033
	[0.017]**	[0.019]+	[0.017]**	[0.019]*	[0.023]*	[0.023]*	[0.014]**	[0.014]**	[0.013]*
Spillover (Industry)	0.042	0.034	0.087	-0.035	-0.039	-0.007	-0.183	-0.183	-0.123
	[0.018]*	[0.017]*	[0.017]**	[0.019]	[0.023]+	[0.023]	[0.013]**	[0.011]**	[0.013]**
Constant	0.075	0.008	-0.03	-0.062	-0.097	-0.146	-0.028	0.325	-0.145
	[0.029]**	[0.023]	[0.021]	[0.026]*	[0.023]**	[0.028]**	[0.030]	[0.002]**	[0.019]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22961	22961	22458	15484	15484	15292	35087	35087	34971

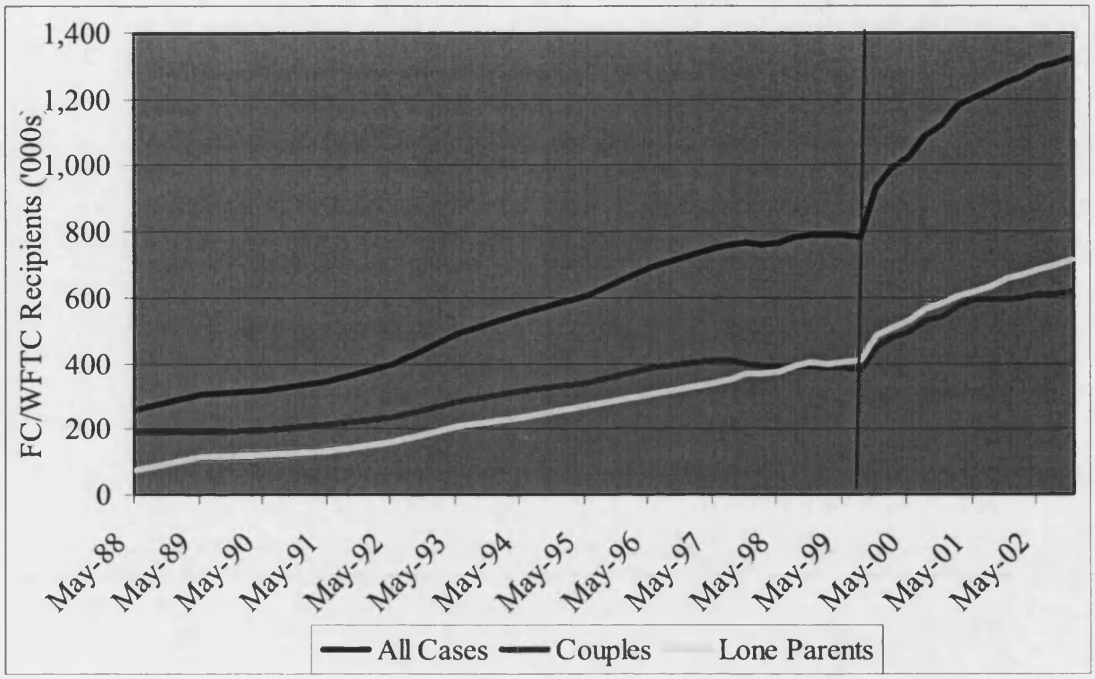
B - WFTC Rate

	SMALL			*MEDIUM*			*LARGE*		
	OLS	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**	**OLS**	**Tobit**	**C-LAD**
Predicted wage	0.958	0.986	0.995	1.008	1.021	1.036	1.014	1.021	1.035
	[0.008]**	[0.008]**	[0.009]**	[0.007]**	[0.009]**	[0.009]**	[0.006]**	[0.006]**	[0.006]**
WFTC rate	0.049	0.025	-0.025	0.047	0.039	0.001	0.089	0.084	0.022
	[0.014]**	[0.023]	[0.016]	[0.024]*	[0.024]	[0.024]	[0.022]**	[0.021]**	[0.022]
FC Generosity	-0.005	0.076	0.141	-0.063	-0.031	0.026	-0.098	-0.079	-0.021
	[0.059]	[0.082]	[0.065]*	[0.085]	[0.068]	[0.086]	[0.072]	[0.072]	[0.071]
Spillover (Education)	-0.067	-0.04	-0.084	0.029	0.051	0.031	-0.054	-0.043	-0.046
	[0.022]**	[0.029]	[0.025]**	[0.029]	[0.029]+	[0.030]	[0.019]**	[0.021]*	[0.019]*
Spillover (Industry)	-0.02	-0.041	0.004	-0.048	-0.055	-0.023	-0.268	-0.27	-0.189
	[0.025]	[0.025]+	[0.027]	[0.035]	[0.036]	[0.035]	[0.019]**	[0.020]**	[0.020]**
Constant	0.064	0.006	-0.065	-0.032	0.329	-0.108	-0.066	-0.082	-0.137
	[0.026]*	[0.002]**	[0.022]**	[0.019]	[0.004]**	[0.025]**	[0.025]**	[0.018]**	[0.017]**
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22962	22962	22428	15484	15484	15297	35091	35091	34970

Table 1.5: Test of Exogeneity
(Smith-Blundell Procedure)

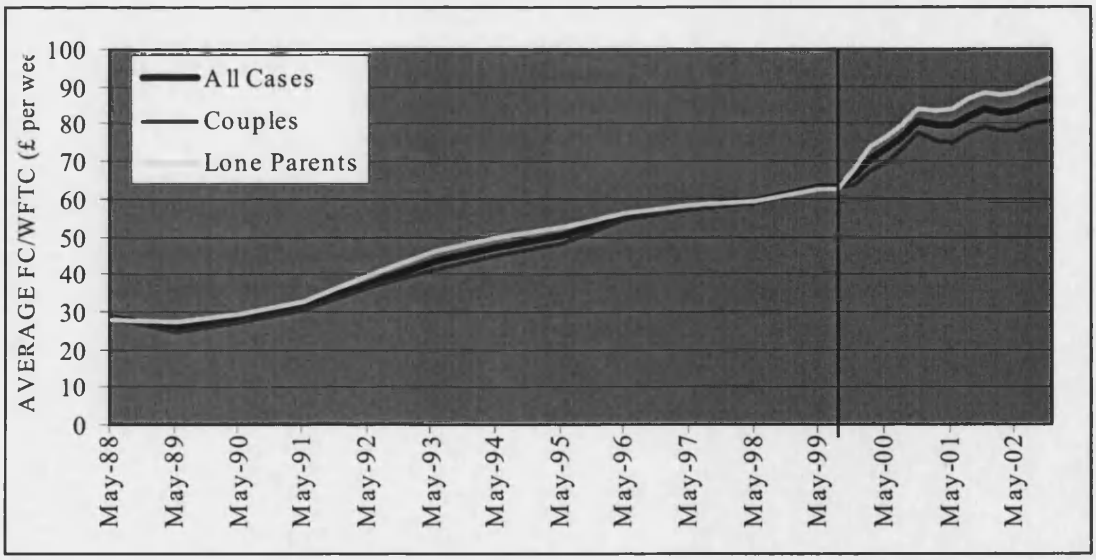
	Smith-Blundell: Stage 2
Predicted wage	0.999
	[0.002]**
WFTC Dummy	-0.065
	[0.014]**
Spillover	-0.073
	[0.006]**
Residual	0.014
	[0.015]
Constant	-0.019
	[0.005]**
Observations	183224
Censored	*7352*
Uncensored	*175872*

Figure 1.1: FC/WFTC Recipients By Family Type, May 1988-Nov 2002



Notes.
1. Working Families' Tax Credit Statistics, Inland Revenue Quarterly Enquiry (2003)

Figure 1.2: Average FC/WFTC Awarded By Family Type, May 1988- Nov 2002



Notes.
1. Working Families' Tax Credit Statistics, Inland Revenue Quarterly Enquiry (2003)

Figure 1.3: Distortion between Actual & Predicted Wages after the Introduction of the NMW

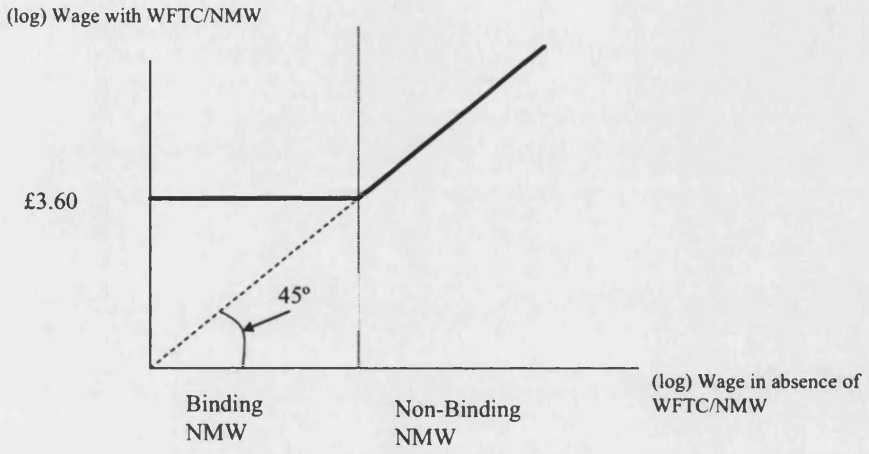


Figure 1.4: Spillover Effect

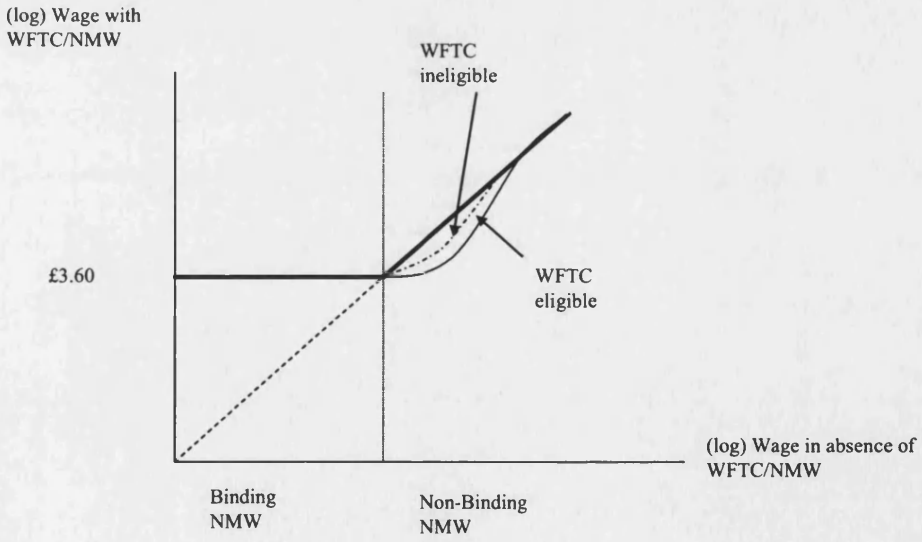


Figure 1.5: Fraction Claiming WFTC By Predicted Wage

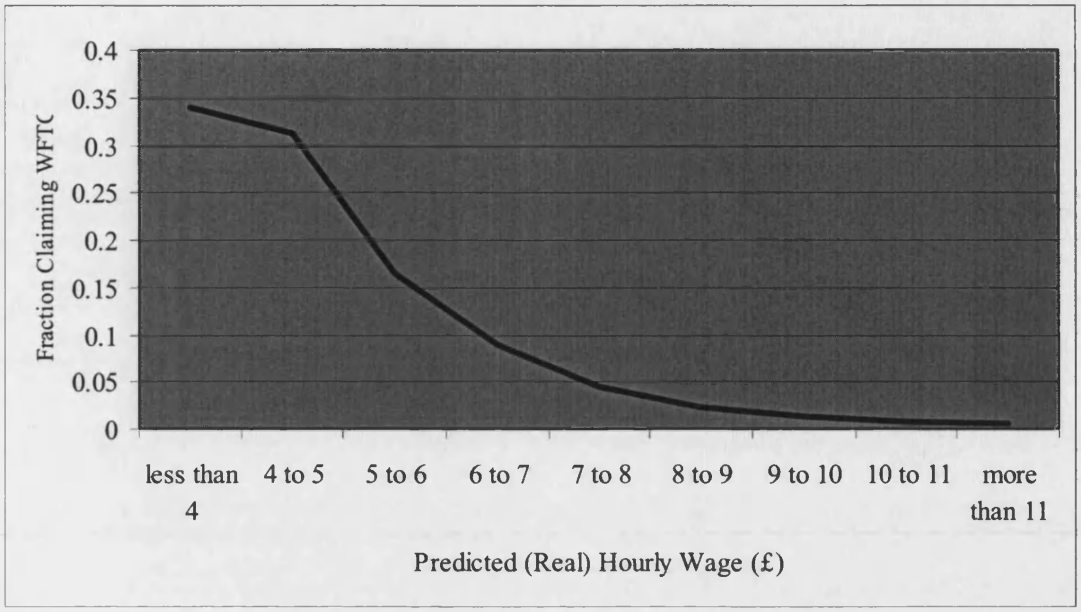


Figure 1.6: Average WFTC Rate By Hourly Predicted Wage

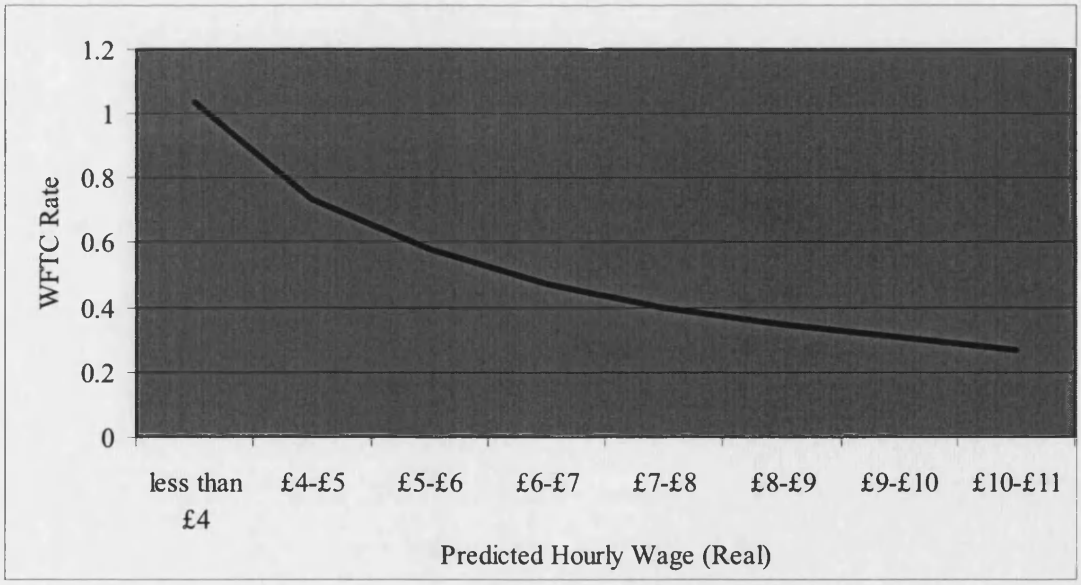


Figure 1.7: Fraction Eligible for WFTC By Predicted Hourly Wage

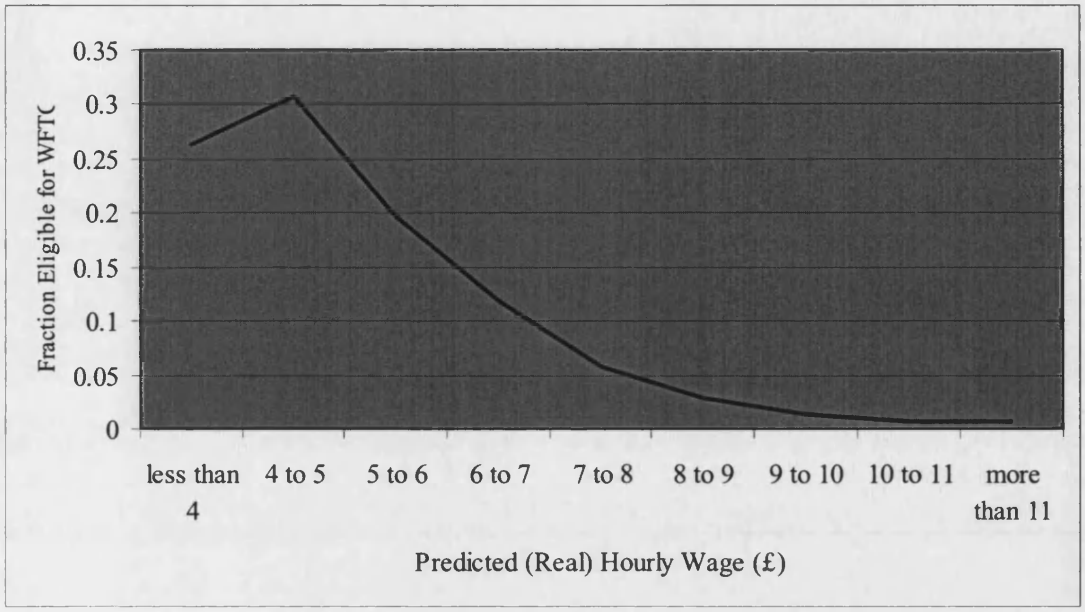


Figure 1.8: Fraction of Recipient Earning Brackets (Gross Weekly) – All Cases

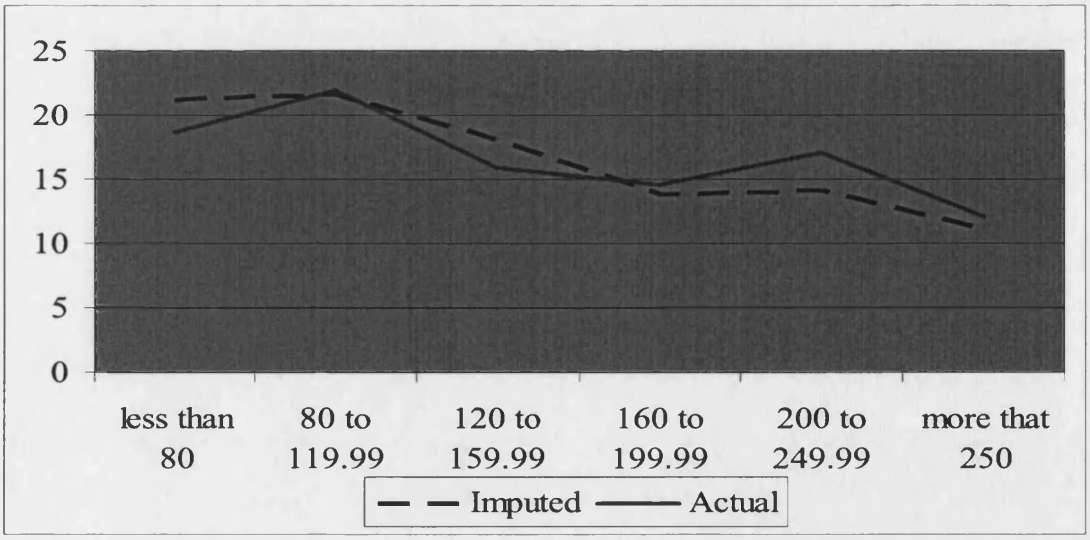
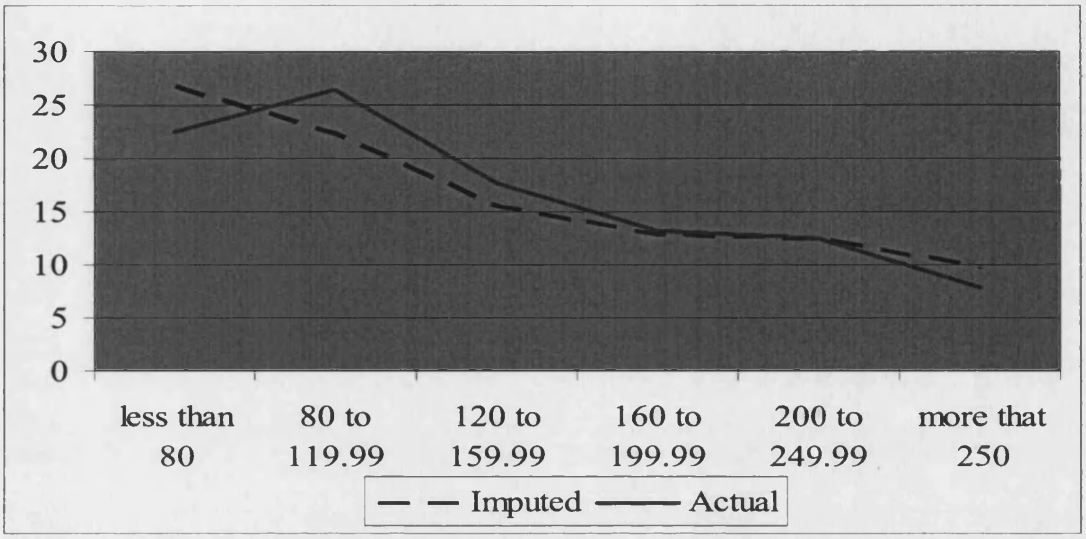


Figure 1.9: Fraction of Recipient Earning Brackets (Gross Weekly) – Lone Parents



1.12 Appendix 1.A: Proofs for Section 1.1.3

1.12.1 Proof 1

Let labour demand equal labour supply:

$$N^d(w(s)) = N_1^s(w(s)(1+s)) + N_2^s(w(s))$$

Differentiate with respect to s:

$$\begin{aligned}
\frac{\partial N^d}{\partial w}\cdot\frac{\partial w}{\partial s} &= \left[\frac{\partial N_1^s}{\partial w}\cdot\frac{\partial w}{\partial s} + \frac{\partial N_1^s}{\partial w}.w + \frac{\partial N_1^s}{\partial w}\cdot\frac{\partial w}{\partial s}.s\right] + \frac{\partial N_2^s}{\partial w}\cdot\frac{\partial w}{\partial s} \\
\frac{\partial N^d}{\partial w}\cdot\frac{\partial w}{\partial s} &= \left[w + (1+s)\frac{\partial w}{\partial s}\right]\frac{\partial N_1^s}{\partial w} + \frac{\partial N_2^s}{\partial w}\cdot\frac{\partial w}{\partial s} \\
\frac{w}{N^d}\cdot\frac{\partial N^d}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} &= \left[1 + \frac{[1+s]}{w}\cdot\frac{\partial w}{\partial s}\right]\frac{w}{N^d}\cdot\frac{\partial N_1^s}{\partial w} + \frac{w}{N^d}\cdot\frac{\partial N_2^s}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} \qquad (1.27)
\end{aligned}$$

Since:

$$N^d = N_1^s + N_2^s$$

Re-write the above results:

$$\begin{aligned}
\frac{w}{N^d}\cdot\frac{\partial N^d}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} &= \left[1 + \frac{[1+s]}{w}\cdot\frac{\partial w}{\partial s}\right]\frac{w}{N_1^s+N_2^s}\cdot\frac{\partial N_1^s}{\partial w} + \frac{w}{N_1^s+N_2^s}\cdot\frac{\partial N_2^s}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} \\
\frac{w}{N^d}\cdot\frac{\partial N^d}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} &= \frac{N_1^s}{N_1^s+N_2^s}\cdot\frac{w}{N_1^s}\cdot\frac{\partial N_1^s}{\partial w}\left[1 + \frac{[1+s]}{w}\cdot\frac{\partial w}{\partial s}\right] + \frac{N_2^s}{N_1^s+N_2^s}\cdot\frac{w}{N_2^s}\cdot\frac{\partial N_2^s}{\partial w}\cdot\frac{1}{w}\cdot\frac{\partial w}{\partial s} \qquad (1.28)
\end{aligned}$$

Let:

$$\theta = \frac{N_1^s}{N_1^s+N_2^s}$$

And so:

$$\frac{w}{N^d}.\frac{\partial N^d}{\partial w}.\frac{1}{w}.\frac{\partial w}{\partial s} = \theta.\frac{\partial N_1^s}{\partial w}.\frac{w[1+s]}{N_1^s}\left[\frac{1}{[1+s]}+\frac{1}{w}.\frac{\partial w}{\partial s}\right]+(1-\theta)\frac{\partial N_2^s}{\partial w}.\frac{w}{N_2^s}.\frac{1}{w}.\frac{\partial w}{\partial s}$$

$$\eta^d.\frac{1}{1+s}.\frac{\partial \ln w}{\partial \ln(1+s)} =$$
$$\theta\eta_1^s\left[1+\frac{\partial \ln w}{\partial \ln(1+s)}\right]+(1-\theta)\eta_2^s.\frac{1}{1+s}.\frac{\partial \ln w}{\partial \ln(1+s)}\left(\frac{\eta^d}{1+s}-\theta\eta_1^s-(1-\theta)\frac{\eta_2^s}{1+s}\right)\frac{\partial \ln w}{\partial \ln(1+s)} = \theta\eta_1^s$$

$$\frac{\partial \ln w}{\partial \ln(1+s)} = \frac{\theta\eta_1^s}{\frac{\eta^d}{1+s}-\theta\eta_1^s-(1-\theta)\frac{\eta_2^s}{1+s}} \tag{1.29}$$

$$\frac{\partial \ln w}{\partial \ln(1+s)} = -\frac{\theta\eta_1^s}{\theta\eta_1^s+(1-\theta)\frac{\eta_2^s}{1+s}-\frac{\eta^d}{1+s}} \tag{1.30}$$

1.12.2 Proof 2: Proposition

Assume a general equilibrium model with two types of labour i. Where $i = 1, 2$.

Labour is the only factor of production and labour demand for each factor is given by:

$$N_1^d(w_1, w_2) \text{ and } N_2^d(w_1, w_2)$$

The production of one good, X, occurs in a constant return to scale environment:

$$X = F[N_1, N_2]$$

The model is developed using equations of change (i.e. using the log-linearisation method of Jones (1965)). Fully differentiate to get:

$$dX = F_{N_1}.dN_1 + F_{N_2}.dN_2$$

Where F_{N_i} is the marginal product for $i = 1, 2$.Divide through by X:

$$\frac{dX}{X} = \frac{F_{N_1}.N_1}{X}.\frac{dN_1}{N_1}+\frac{F_{N_2}.N_2}{X}.\frac{dN_2}{N_2} \tag{1.31}$$

Let θ be the factor share for group and w_1 be the factor payment (gross wage) for group 1 such that:

$$\theta = \left(\frac{w_1}{p_X}\right)\frac{N_1}{X}$$

By profit maximising:

$$w_1 = p_X F_{N_1} \tag{1.32}$$

Let $(1-\theta)$ be the factor share for group 2 and w_2 be the factor payment (gross wage) for group 2 such that:

$$(1-\theta) = \left(\frac{w_2}{p_X}\right)\frac{N_2}{X}$$

By profit maximising:

$$w_2 = p_X F_{N_2} \tag{1.33}$$

And so:

$$\frac{dX}{X} = \theta.\frac{dN_1}{N_1} + (1-\theta).\frac{dN_2}{N_2}$$

$$\hat{X} = \theta\hat{N_1} + (1-\theta)\hat{N_2}$$

The elasticity of substitution between the two groups can be given by:

$$\sigma_X = \frac{d(\frac{N_1}{N_2})/(\frac{N_1}{N_2})}{d(\frac{w_2}{w_1})/(\frac{w_2}{w_1})}$$

Where the differentiation in the numerator is:

$$\frac{N_2.dN_1 - N_1.dN_2}{N_2^2}.\frac{N_2}{N_1} = \frac{dN_1}{N_1} - \frac{dN_2}{N_2} = \hat{N_1} - \hat{N_2}$$

And so (with a similar differentiation to the denominator):

$$\sigma_X = \frac{\hat{N_1} - \hat{N_2}}{\hat{w_2} - \hat{w_1}} \tag{1.34}$$

$$\hat{N_1} - \hat{N_2} = \sigma_X(\hat{w_2} - \hat{w_1})$$

So far, the resulting system of equations are given by:

$$\hat{N_1} - \hat{N_2} = \sigma_X(\hat{w_2} - \hat{w_1}) \tag{1}$$

$$\hat{X} = \theta\hat{N_1} + (1-\theta)\hat{N_2} \tag{2}$$

Assuming constant returns to scale the value of output in each industry must equal the factor payment:

$$p_X X = w_1 N_1 + w_2 N_2 \tag{3}$$

$$w_2 N_2 = p_X X - w_1 N_1$$

$$w_2 = \frac{p_X X}{N_2} - \frac{w_1 N_1}{N_2}$$

$$dw_2 = -dw_1 \frac{N_1}{N_2}$$

$$\frac{dw_2}{w_2} = -\frac{dw_1}{w_1}\frac{N_1 w_1}{N_2 w_2}$$

$$\hat{w_2} = -\hat{w_1}\frac{N_1 w_1/p_X X}{N_2 w_2/p_X X}$$

$$\hat{w_2} = -\left(\frac{\theta}{1-\theta}\right)\hat{w_1} \tag{1.35}$$

Substitute into (1) :

$$\hat{N_1} - \hat{N_2} = \sigma_X(-\left(\frac{\theta}{1-\theta}\right)\hat{w_1} - \hat{w_1}) \tag{1.36}$$

Turning now to the labour supply of each group. It is here that the tax credit is incorporated because the tax is placed on the worker rather than on the employer (such that the gross wage for group 1 is w_1 and the net wage is $w_1(1+s)$) and for group 2 the gross and the net wage is w_2.

The labour supply for group 1 is given by:

$$N_1^s(w_1(1+s)) \Longrightarrow \hat{N_1} = \eta_1^s\left[1+\hat{w_1}\right] \tag{4}$$

The labour supply for group 2 is given by:

$$N_1^s(w_2) \Longrightarrow \hat{N_2} = \eta_2^s\hat{w_2} \tag{4'}$$

Using (1)

$$\eta_1^s\left[1+\hat{w_1}\right] - \eta_2^s\hat{w_2} = \sigma_X(\hat{w_2} - \hat{w_1})$$

Since

$$\hat{w_2} = -\left(\frac{\theta}{1-\theta}\right)\hat{w_1}$$

This implies

$$\eta_1^s\left[1+\hat{w_1}\right] + \eta_2^s\left(\frac{\theta}{1-\theta}\right)\hat{w_1} = -\frac{\sigma_X}{1-\theta}\hat{w_1}$$

$$(1-\theta)\eta_1^s + [(1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X]\hat{w_1} = 0$$

$$\hat{w_1} = \frac{\partial \ln w_1}{\partial \ln(1+s)} = -\frac{(1-\theta)\eta_1^s}{(1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X} \tag{5}$$

For group 2:

$$\hat{w_2} = \frac{\partial \ln w_2}{\partial \ln(1+s)} = \frac{\theta\eta_1^s}{(1-\theta)\eta_1^s + \theta\eta_2^s + \sigma_X} \tag{5'}$$

Appendix 1.B: Additional Tables & Figures

Table 1.A1: National Minimum Wage (Archived Rates)

Aged 22 years & older		
	1st April 1999 to 30th September 2000	£3.60
	1st October 2000 to 30th September 2001	£3.70
	1st October 2001 to 30th September 2002	£4.10
	1st October 2002 to 30th September 2003	£4.20
Aged 18-21 years, inclusive		
	1st April 1999 to 30th September 2000	£3.00
	1st October 2000 to 30th September 2001	£3.20
	1st October 2001 to 30th September 2002	£3.50
	1st October 2002 to 30th September 2003	£3.60

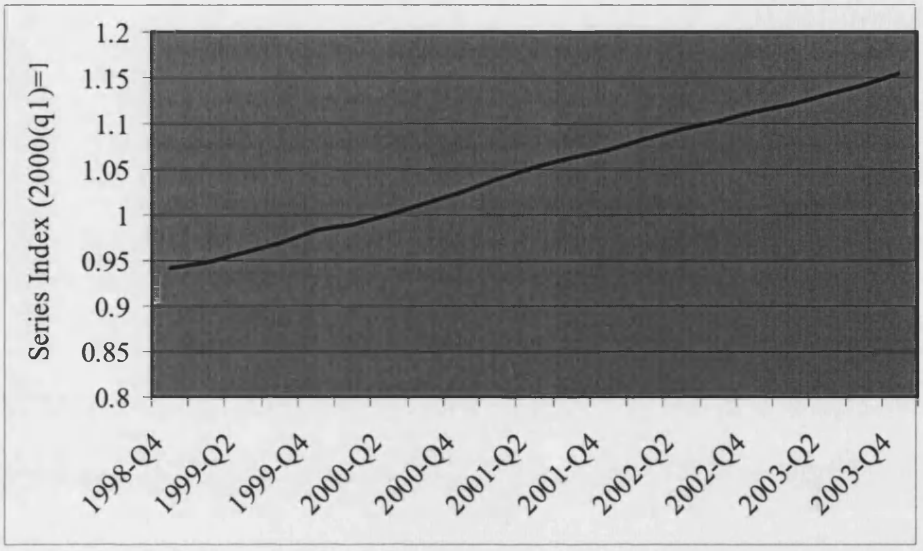
Notes.
1. Source- HM Revenue & Customs: National Minimum Wage

Table 1.A2: Working Families' Tax Credit Rates & Thresholds, 1999-2003

			1999-00	2000-01	2001-02	2002-03
Reduction	Basic Tax Rate	£ per week	52.3	53.15	59	62.5
	30 Hour Tax Credit	£ per week	11.05	11.25	11.45	11.65
	Per Child Credit	£ per week	20.9	25.6	26	26.45
	Income Threshold	£ per week	90	91.45	92.9	94.5
	Income Taper		55%	55%	55%	55%
	Minimum Award	£ per week	0.5	0.5	0.5	0.5

Notes.
1. Source - Working Families' Tax Credit Statistics, Inland Revenue Summary Statistics (Feb 2003)

Figure 1.A1: Average Earning Index For the Whole Economy



Notes.
1. Source - Office of National Statistics

Chapter 2

Before Leaving the Working Families' Tax Credit To Lie, Another Look at Labour Supply

2.1 Introduction

In October 1999, the Working Families' Tax Credit (WFTC) was introduced in the United Kingdom with the intension to "make work pay" for families with children and to encourage labour market participation amongst the low skilled. This minimum hours based income supplement was not an innovative policy but it was much more generous compared with it's predecessor (Family Credit) and it extended further up the wage distribution. Spending on WFTC corresponded to £6.3 billion in 2002/03 compared with only £2.3 billion under Family Credit in 1998/9. Eligibility for WFTC was contingent on working a minimum of 16 hours in the household, the presence of children, having a "low" household income[1] and having financial assets below £8,000. Although the amount of WFTC varied a great deal with the number and age of children, on average a lone parent household received £91.98 in 2002, compared with £59.48 in 1998 and coupled households received, on average £80.79 in 2002, compared with £59.15 in 1998.

The magnitude and the popularity of this tax credit policy induced a number of studies on the labour supply impact of WFTC (Blundell et al (2005), Brewer et al (2005), Leigh (2005), Francesconi et al (2004), Gregg et al (2003)). Although the methodology and data

[1] Given the October 1999 criteria, families with a net income below £92.90 would recieve the maximum amount of WFTC and it would then be tapered at 55%.

used varied, they all concluded that WFTC had a positive impact on the labour market employment of lone parents. According to Brewer and Browne (2006), who composed an overview of the literature, the overall conclusion was that the generosity of the in-work credit system induced lone mothers to increase their participation in the labour market by 5 percentage points. When looking at couples with children (in a two-earner household) there was a negative effect of WFTC.

The literature focuses its attention on looking at the labour market impact of WFTC on lone parents as they were one of the biggest beneficiaries of the tax credit policy. The government targeted this group in particular as it became apparent that there was a shift in the composition of the lowest decile of the income distribution from pensioners to families of working age and lone parents in particular (Goodman (2001)). Figure 2.1 highlights the differences in income between different family types. Moreover, by looking at the cross country employment rates of lone mothers in Figure 2.2, it is clear that the UK has one of the lowest.

Besides Brewer et al (2005), all of the studies on WFTC have used the differences-in-differences (DID) methodology to evaluate WFTC using single women without children as the control group for the treatment group of lone mothers. This technique relies on the assumption that the comparison group is a sufficiently close match, such that after taking the DID the remaining effect can be considered as the impact of the policy alone on the treated group[2]. However, using single women without children as the comparison group is not entirely convincing, not only because they are obviously observably and unobservably different, but also when one looks closely at the pre-trend differences between the two groups. Figure 2.3 plots the employment rates of single women without children and lone mothers and we can see that there is an increasing trend in the employment rate of lone mothers since the mid-1990s, while the level for single childless women has been high and has remained fairly flat over the same period. In particular, over the period 1996 to 1999[3] employment rates increase by 6.5% for lone mothers and only 1.6% for single childless women. From this we may be concerned that the labour supply estimates are somewhat upward biased. Moreover, there is no noticeable spike with the introduction of WFTC and after 2000, increases in employment flatten even though there were increases in the basic tax credit each year from 2000 to 2003. The changes in the basic rate are shown in Figure 2.4. In particular, on introduction in 1999, the basic rate was £52.30 and this increased to £65.50 by April 2002, however employment rates for lone mothers

[2]Even when using structural model (Brewer et al (2005)) the same assumptions innately apply, since the models are used to simulate the impact of WFTC using data from before the introduction of WFTC. The analysis is done on the assumption that levels of the utility cost of receiving in-work support are constant and, in particular, no attempt is made to estimate the impact of other changes (besides tax and benefits) affect parents.

[3]the period frequently used as the "pre-treatment period".

only increased by 0.8%.

Another question that one may ask is whether the policy induced people to work a certain number of hours or to alter the number of hours they worked. Since WFTC was contingent on working at least 16 hours, we may expect there to be a spike at the 16 hours point. In addition, since the policy offered a bonus if the claimant worked 30 hours or more, we may expect some change here. If we look at Figure 2.5a we notice that there is a small increase around this mark for lone mothers after the policy introduction, while the hours distribution for single women with no children in Figure 2.5b remains relatively unchanged. In addition there seems to be a small increase at the 30 hour point. However, the changes in the distribution are very small and continuous[4]. This continuous movement of working 16 or more hours can be seen more clearly in Figures 2.6b and 2.6c, which show the employment rate of those working 16-29 hours and 30 or more hours, respectively. This again highlights important differences in the treatment and control groups.

The aim of this chapter is to address the concern of the suitability of the control group and to see how the results change when we control for group specific differential trends. Moreover, we look to see where (along the hours distribution) the change occurs and from which labour market states do lone mothers enter into employment. Overall, we find three key results: First, when we allow for differential trends, the effect of WFTC on employment falls to 1.7% points, considerably lower than the literature's estimate of 5% points. Second, we find that this effect is borne solely on those working full time (30 hours or more). Finally, the policy change had no effect on those who were inactive. We extend our analysis to look more closely at the movements in the relative rates of return of important covariates between 1993 and 2003. In particular we focus on the child (treatment) covariates, which confirms the fall in the relative difference between having children and not having children on the probability of entering into employment.

These results offer valuable insight into two key issues: Firstly, the effectiveness of policy and secondly, the design of the policy. In particular, they imply that the increase in participation was greatly exaggerated when the differential trends between treatment and control groups are not accounted for. Moreover, the policy was not as well targeted as initially considered, given that any increase to employment was solely borne on those who work 30 or more hours, while those who were inactive were unaffected by the policy.

The rest of the chapter is structured as follows: Section 2.2 gives a brief description of the tax credit reform, Section 2.3 discusses the difference-in-difference methodology and describes initial concerns with regard to both the treatment and control groups. In Section 2.4 we discuss the data and main descriptive statistics of the treatment and

[4]See Table A1, which shows more clearly the movements in the hours distribution over time.

control groups. Section 2.5 provides the empirical framework of the basic specification and trend specific specification for employment and hours. In Section 2.6 we continue our evaluation by looking at the movements in coefficients over time. Section 2.7 discusses the implications of these results and tries to understand why we observe the increases in lone parent employment rates before WFTC. Finally, Section 2.8 concludes.

2.2 The Structure of the WFTC Reform

Since the early 1970s systems of support for working families with dependent children have operated in the UK. Although there were some structural reforms over the years, the eligibility criteria was generally based on the family income being below a certain level, the presence of children and a low household savings rate. The introduction of the Working Families' Tax Credit (WFTC) in October 1999 was modelled on the US tax credit system, the Earned Income Tax Credit. There were two distinctive features between its predecessor, Family Credit (FC), and WFTC. Firstly, it was much more generous. The four ways in which the generosity of WFTC exceeded FC where that: there was an increase in the credit for children under 11 years old from £12.35 to £14.85 per child; there was an increase in the threshold from £79 to £92.90 per week; there was a reduction in the taper from 70% to 55% and a childcare credit of 70% of actual childcare costs up to £150 per week. Figure 2.7 shows these relative changes. It can be seen that those who would gain the most were those people who were just at the end of the taper under FC, as they were previously ineligible and now eligible. In addition, those with a net income between £79 and £92.90 move from being on the taper to receiving maximum support and those who remain on the taper following the introduction of WFTC see their withdrawal rate fall from 70% to 55%.

Secondly, while Family Credit was paid directly as a cash benefit, WFTC it was paid through the wage packet by the employer (who were reimbursed by the Inland Revenue). This was an attractive move because it became more convenient to distribute and it reduced the stigma attached to the tax credit for being a welfare benefit. In April 2000, the eligible claimant would claim the approximate tax credit from the Inland Revenue, who would work out the amount of tax credit payable. The Inland Revenue would then notify the relevant employer of the amount of tax credit to be paid and the employer would pay the tax credit out of the tax and National Insurance contribution that they would otherwise have forwarded to the Inland Revenue.

2.3 Difference-in-difference Estimation

2.3.1 The Treatment Group: Lone Mothers

The number of lone parents increased from 0.5 million in the early 1970s to 1.5 million by 1997, representing 25% of all families with children (see McKnight (2005)). However, this rise in the number of lone parents was coupled by a fall in their employment rate from 50% to 40% over a similar period. Although some of these changes could be attributed to changes in composition and to demographic factors, there was a need for active support for this group. The number of workless households rose to 3.2 million by 1997, accounting for 18% of the working age households and around a quarter were lone parent households (see Gregg & Harkness (2003)).

The introduction of WFTC was designed to tackle the lack of work incentive amongst this group. The tax credit policy offered a financial incentive for parents to find and remain in employment for over 16 hours a week. The structure of the tax credit was such that it incorporated a basic tax credit of £62.50 (in 2002/3) for those working more than 16 hours, plus an additional supplement per child (£26.45 for children aged under 16 and £27.20 for those aged 16-18). Overall WFTC increased the average benefit payable to lone parents from £58 a week in 1997 to £92 by 2002. By 2002, 737,000 lone parents received WFTC compared with only 341,400 receiving Family Credit in 1997.

Figure 2.8 shows how WFTC changed the budget constraint of a lone mother with one child. The reform clearly unambiguously enhances the probability of participation as the financial returns to working more than 16 hours are greater after the reform. However, the complexity of the budget constraint and the interaction with other taxes and benefits imply that the overall impact of WFTC on the labour participation of lone mothers is not entirely obvious. Blundell et al (2000) highlight the was a potential problem that the increase in net income was small below 25 hours of work due to the interaction of WFTC and Housing Benefit. For higher hour levels, the reduction in the WFTC taper starts to increase the returns to working. For those already working, the labour supply response to the introduction of WFTC was less clear because the marginal tax rate is unambiguously reduced at all hours under the reform, though even with WFTC it remains high (70%). This increased the price of non-market time, causing individuals to consume less non-market time and therefore increase their hours of work (standard substitution effect). The income effect would be negative, however (assuming that non-market time is a normal good).

The second cause for concern arises when we look at the evolution of the lone mother

employment rates at more than zero hours in Figure 2.9. It can be seen that between 1992 and 2002 the employment rate has increased from 42% to 53% and there is no obvious spike after October 1999, which would allow us to attribute the increase in labour supply to be due to the change in tax credit policy. Moreover, the basic tax credit increased every year after its introduction and yet the increases in employment stop in 2000. In particular, the basic rate of WFTC at introduction was £52.30 and by 2003, when WFTC was replaced by the Working Tax Credit and Child Tax Credit, the rate stood at £62.50. Several authors have acknowledged this trend but while some have dismissed it as a temporary phenomena which would not have continued after 1998 (Leigh (2005), Blundell et al (2005)), others claim it was an "anticipation" effect (Francesconi et al (2004)). Neither claims are entirely convincing, in particular there is little evidence (or financial gain) to suggest that lone mothers would benefit from entering into employment almost 2 years prior to the introduction of WFTC. We discuss this in more detail in Section 2.7.

Finally, there were various tax and benefits reforms in the late 1990s that targeted lone mothers and it is, therefore, difficult to say if these policies had more or less impact on the employment rate of lone mothers compared with WFTC. As Gregg and Harkness (2003) point out, the introduction of other policies directed at the low skilled and/or families with children also impacted the employment rates of lone mothers. Moreover, given the timing of these policies it is not possible to disentangle the effects to see if the policies were jointly or separately significant. In particular the two polices most relevant policies, which targeted low skilled groups to enter the labour market, were the National Minimum Wage and the New Deal for Lone Parents. The National Minimum Wage was introduced in April 1999, six months prior to WFTC to reduce the growing dispersion in wages in the UK (Dickens and Manning (2002)). The New Deal for Lone Parents, introduced in 1998, offered job-search assistance[5] to lone parents in receipt of Income Support with children under 16 [6].

Overall, the concern is that it is not clear that WFTC had an unambiguous effect of increasing the employment of lone mothers. In particular, we need to be sure that the methodology used can control for sure complexities. In the analysis that follows we will concentrate on the first two concerns, since trying to disentangle WFTC from other policies in the same period is difficult, if not impossible.

[5]Where the lone parent would meet a personal advisor every two weeks and receive advice on job vacancies, in-work benefit, childcare arrangement, training and job serch techniques.

[6]The government also launged New Deal programs for young people (18-24), those aged over 25 who had been unemployed for more than six months, those in couples whose partner had been unemployed for more than six months, people aged over 50 and those who were disabled.

2.3.2 The Control Group: Single Women without Children

The evaluation problem is to identify the effect of WFTC on the employment of lone mothers. Following Eissa and Leibman (1996), who evaluate the Earned Income Tax Credit (EITC) in the US, all of the literature (with the exception of Brewer et al (2005)), evaluates WFTC using the differences-in-differences methodology.

The simple idea of the differences-in-differences (DID) estimator is to measure the growth in the outcome variable of the treated compared with the non-treated. The estimator compares the pre-programme period, t_0, and post-programme period, t_1 :

$$\hat{\alpha} = (\bar{Y}^{T}_{t_1} - \bar{Y}^{T}_{t_0}) - (\bar{Y}^{C}_{t_1} - \bar{Y}^{C}_{t_0}) \tag{2.1}$$

Where $\bar{Y}^{T}$ and $\bar{Y}^{C}$ are the mean outcome for the treatment and control groups, respectively. However an important assumption (relevant for our evaluation) that must hold is that the macro effect must have the same impact across the treatment and control groups. If there are differential impacts it must be that the two groups have some characteristics that distinguish them and make them react differently to common macro shocks.

It is therefore of key importance what control group is chosen. The control group must be as similar to the treatment group as possible in all dimensions other than that of eligibility. Most of the literature (Blundell et al (2005), Leigh (2005), Francesconi et al (2004), Gregg et al (2003)) use people without children as a comparison group when evaluating WFTC. In particular, the changing employment outcome of lone mothers is compared with single, childless women. The assumption made, as pointed out by Eissa et al (1996), is that DID controls for any contemporaneous shocks to labour force participation of single women with children through the changes in participation for the control group.

However by looking at Figure 2.3, we can see that this comparison group violates the DID condition of having the same underlying trend in the pre-treatment period. We can see that while the employment of single women without children is high and has remained steady, the employment rate of lone mothers has been steadily increasing. Table 2.1, which gives the descriptive statistics of these two groups in the period before the introduction, reinforces this concern. One important distinction is that 22% of single women are highly qualified compared with only 6% of lone mothers, where as only 5% of single women have no qualifications, compared with 13% of lone mothers[7].

[7] More description of the descriptive statistics are given in Section 4.

One possibility may be that low educated single childless women would be a better comparison group for lone mothers. However, by close inspection of the movements in the employment rates of low educated single childless women, we find that the trends are very similar to that of all single childless women. In Figures 2.A1 and 2.A2 we plot the employment rates for low educated single childless women against lone mothers and low educated lone mothers, respectively, and find little similarity in pre-WFTC trends.

There are two obvious concerns which must be addressed: (1) the differential trend, which is probably common to all people with children and (2) the big differentials in observable characteristics. In the analysis that follows we tackle these issues using the DID methodology and by close inspection of changes in covariates over time.

2.4 Data

The empirical investigation is done using the UK's Quarterly Labour Force Survey (LFS). The LFS is a representative survey of households in the UK, with sample sizes of around 60,000 per quarter and information on individuals, households and families. We use data from 1993 quarter 1 (March-May) to 2003 quarter 1 (March-May), inclusive. The dataset contains information on hours of work, labour market activity and a variety of control variables needed for the analysis. In particular, the region of residence, age, highest qualification, ethnicity, the presence of children, the number of children and the age of the youngest child in the household[8]. The sample is restricted to single women aged between 18 and 60 years old. Women in full-time education, sick/disabled or on government training programmed are removed from the sample. The resulting sample size, after pooling all 41 quarters, is approximately 366,500.

Table 2.1 presents the summary statistics for single women without children in the first column and for lone mothers in the second column. There are some clear differences between the two groups. Lone mothers tend to be on average younger than single women without children (24.2 years versus 27.7 years), they are more likely to be non-white (7% versus 4%). A particular cause for concern is that lone mothers are less educated, a higher proportion have no qualifications (13% versus 5%) and a smaller proportion are highly qualified (6% versus 22%). Another worrying distinction is the observable differences in the employment behaviour if the two groups. Lone mothers are likely to work on average 24.4 hours of week compared with single childless women who work on average 35.8 hours a week. Compared with single childless women, lone mothers have a higher probability of

[8]The variable used to work out the age of the youngest child in the family is only available from Spring 1995. However, it is possible to construct it from other variables, as we do here.

being unemployed and inactive (10% versus 7.9% and 34.1% versus 8.5%, respectively). Overall, lone mothers are less likely to be employed, 48.8% relative to 82.8% of single childless women. When looking at the hours distribution, lone mothers have a higher probability of working part-time: there are 15.7% of lone mothers working between 0-15 hours compared with only 9% of single childless women and 11.4% working 16-29 hours compared with only 7.2% of single childless women. Finally, only 22.3% of lone mothers work more than 30 hours compared with 66.7% of single childless women.

2.5 Evaluation I

2.5.1 Basic Analysis

The DID approach is commonly used in the literature to evaluate tax credit programmes (see Eissa and Leibman (1996), Blundell et al (2005), Francesconi et al (2004), Leigh (2004)). In addition, it is recognised that it is important to control for demographic characteristics, such that the simple DID analysis is extended to a regression based method. As highlighted by Eissa et al (1996), this method reduces the residual variance of the regression and leads to a more efficient estimate.

Following Eissa et al (1996), we estimate the a probit equation:

$$\Pr(emp_{it} = 1) = \Phi(\beta_0 + \mathbf{X}'_{it}\beta_1 + \beta_2 t + \beta_3 KID_i + \beta_4 Post1999_t + \gamma(KID * Post1999)_{it}) \tag{2.2}$$

Where *emp* is a dummy equal to one if a women reported working at least one hour. The vector of $\mathbf{X}$ characteristics includes the region of residence, age (and higher order age squared and age cubed), highest qualification, ethnicity, the presence of children, the number of children and the age of the youngest child in the household. Following Blundell et al (2005) we use a real deseasonalised GDP series, t, to control for the general economic conditions and so it can be interpreted as acting as a general time trend; we also include seasonal controls. The time trend and the individual characteristics will control for the observable differences in the characteristics of the treatment and control group that affect the level of employment. The KID variable simply denotes a dummy variable that is equal to one if the individual is a lone mother and zero otherwise. Unobservable differences are expected to be picked up here and we would expect that the coefficient, β_3, will be negative if lone mothers have a lower employment rate than single childless

women, even after controlling for children[9]. The *Post*1999 is a dummy equal to one for any quarter after Spring 2000. The coefficient, β_4, reflects the change in employment for both treatment and control groups post-WFTC introduction until Spring 2003[10]. Finally, we construct a variable that will capture the treatment effect by interacting the post-WFTC, *Post*1999, variable with an indicator for the presence of children, KID. We are therefore implicitly testing that γ, the coefficient on the interaction term between *Post*1999 and KID is greater than zero. Our regression results in what follows are obtained from using data from the first quarter of 1993 to the first quarter of 2003. To allow for the individuals to adapt to the introduction of WFTC, we drop observations from Summer 1999 to Spring 2000, as done by Blundell et al (2005).

Table 2.2 presents the marginal effects of the above specifications. Column 1 shows the results for those aged 18 years and over and column 2 presents the results for those aged 21 or over. The estimate of the treatment effect in column 1 suggests that WFTC raised employment by 3.6% points. This result is identical to that of Blundell et al (2005) who run a similar specification using LFS data from 1996 to 2002, inclusive. When looking at those aged over 21, the result is stronger at 4.2% points. These results are significant at the 1% level and comply with the results in the literature, which average at 5% points[11].

The other covariates in this regression strongly suggest that having children are an important factor in determining the probability of working. For example, having three or more children reduces the probability of working by 39% relative to those with no children. In addition, having children under the age of 5 years reduces the probability of working by 22%. Finally, the probability of working monotonically falls as the level of qualifications fall and non-whites are less likely to work.

However the specification used here makes two very big assumptions. Firstly, it assumes that the coefficient on the child dummy variable remains constant before the introduction of WFTC. Secondly, it assumes that the coefficients on other key covariates remain the same before *and* after the introduction of WFTC. In other words, we do not allow for any relative changes in the rates of return of covariates between lone mothers and single women without children. In effect, a violation of these two assumptions would lead to the interaction term (between the child dummy variable and the post WFTC period) picking up the effect of these changes in the coefficients and would bias our estimates of treatment effect.

In the analysis that follows we look carefully at both of these possibilities. In addition,

[9] In the analysis we break out this KID category even further by using the number of children. The omitted category is no children and we include the categories:1 child, 2 children and 3 or more children.

[10] In April 2003, WFTC was replaced by The Working Tax Credit and Child Tax Credit.

[11] See Brewer et al (2006) for more details.

we look closely to see *who* is affected by the policy change. More specifically, we look to see where along the hours distribution the strongest impact of WFTC lies. We also look at the impact of WFTC on different labour market states to see if lone mothers are being drawn from inactivity and/or if they are increasing overall participation (with increases in unemployment).

2.5.2 Controlling for Differential Trends

In Section 2.3.1, we looked at the time-series movements in the employment rates of lone mothers relative to single childless mothers and it was clear that there were differential trends in employment rates. The traditional DID analysis fails to allow for these differences. We therefore extend our DID analysis to allow for the possibility of differential trends between women with children and those without children:

$$\Pr(emp_{it}=1) = \Phi(\beta_0+\mathbf{X}'_{it}\boldsymbol{\beta}_1+(\eta_1+\eta_2 KID_i)t+\beta_3 KID_i+\beta_4 Post1999_t+\gamma(KID*Post1999)_{it}) \tag{2.3}$$

We allow for differential trends between our control and treatment groups by interacting the KID with the time trend, t. It can be seen that without controlling for this difference, the treatment effect would be biased upwards:

$$E[\gamma|X,.] = \gamma + \eta_2(k+k') > \gamma \tag{2.4}$$

Where $(k+k')$ represents the average number of periods between the post-WFTC and pre-WFTC period observations[12].

The results presented in Table 2.3 show that once we control for differential trends for women with children and women without children, the impact of WFTC on employment fall to 1.7-1.8% points. All other covariates give a quantitatively similar picture as Table 2.2, when we do not include the differential trend.

These results are of paramount importance as they imply that the effectiveness of WFTC have been exaggerated. The acclaimed increase of 5% points in employment induced by WFTC is very much reflective of the changes in the trend of lone mothers increased

[12]Francesconi et al (2004) also control for differential trends, however they use the British Household Panel Survey which is annual data and so quarterly changes cannot be incorporated.

attachment to the labour market. In Section 2.6 we look closer at the effect of the presence of children on employment over the period 1993 to 2003.

2.5.3 Hours Distribution Effect

Another important concern relates to our understanding of which part of the hours distribution was affected by the introduction of WFTC. Given that there was a 16 hour minimum work requirement for WFTC, one would expect that the impact of WFTC falls on those working at least 16 hours. We look closer at this possibility by looking at the employment probability to work less than 16 hours (0-15 hours); to work part-time (16-29 hours) and to work full-time (30 hours or more).

We run the same specification as we did for employment in Section 2.5.2 and the results are reported in Table 2.4. The first column of each group of hours reports the results without controls for differential trends. As one might expect, there are no significant effects on those working less than 16 hours (the hours threshold), there is a 3.8% points increase in the probability of working between 16 and 29 hours and there is a 1.8% points increase in the probability of working more than 30 hours.

When we control for the differential trends, the only treatment effect that remains significant is on those working more than 30 hours. We find that there is a 1.3% points effect on working full-time, at the 10% significance level. This is a very interesting result as it is consistent with the predictions laid out in Section 2.3.1, which reported that the net income increase from WFTC was small below 25 hours of work due to interactions of WFTC with other taxes and benefits.

These results questions whether the policy was designed well. Given that the policy targeted those with no labour market attachment, one would expect that this group would be more attracted to working part-time. In addition one might expect that those who chose to work 30 hours were probably those in work before and may have simply increased their number of hours of work. In the next section we look to see whether WFTC induced an increase into employment by those previously inactive.

2.6 Evaluation II

2.6.1 Changes in Coefficients over time

The results in the previous section imply that once we control for the differential trends between single childless women and lone mothers, the effect of WFTC falls from 4.2% to 1.7% points, moreover by looking along the hours distribution we find that the impact is solely attributed to those working full-time.

These results raise questions relating to how the child (treatment) coefficient has changed over period 1993 to 2003. In conjunction with this, it is also important to look closer at the movements of the other (relative) covariates over the same time period. By doing so we can increase our insight into exactly how people have been affected by the introduction of WFTC.

2.6.1.1 Child Coefficient

To observe how the relative employment probabilities for those with children versus no children changed between 1993 and 2003 we run the following equation for each year:

$$\Pr(emp_{it} = 1) = \Phi(\beta_{0t} + \mathbf{X}'_{it}\boldsymbol{\beta}_{1t} + \beta_{3t}KID_{it}) \tag{2.5}$$

The movements in the coefficient on the presence of children over the period 1993-2003 in Table 2.5, clearly implies a closing gap between women with children to those without children. This is shown very clearly in Figure 2.10 which plots the coefficient. The initial gap in employment probability between lone mothers and single women without children is -36%. The coefficient starts falling from 1994 and then after a small a blip in 1998, it continues to fall to -0.27. One may argue that this reflects an anticipated WFTC effect. However, there is no reason to believe that almost 2 years before the introduction, people would react to the policy as it would mean giving up a number of entitled benefits. Another pressing concern is that there were increases to WFTC in 2001 and 2002, above the rate of inflation, and yet the child coefficient flattens in 2000. We discuss these issues in more detail in Section 2.7.

2.6.1.2 Other Covariates

To look at the changes in other covariates, we estimate the following:

$$\Pr(emp_{it} = 1) = \Phi(\beta_{0t} + \mathbf{X}_{it}'\beta_{1t} + \beta_{3t}KID_{it} + \delta_t(KID * \mathbf{X})_{it}) \tag{2.6}$$

In Tables 2.6 to 2.8, we look at the effect of the age of children, the number of children and the relative returns to education between lone mothers and single women, respectively. Firstly, in Table 2.6 (and more clearly in Figure 2.11) when looking at the different age of children, we find that the biggest increases are for those with children aged 0 to 5 years old. Although, over the 10 years there is continuous growth, the biggest increase happens between 1998-2000 and then stagnates. Again, it is puzzling that the impact occurs before the introduction of WFTC.

Table 2.7 (and Figure 2.12) look at the effect of the number of children. There seems to be an increase over time for all number of children groups, however, the largest spike is for those with only one or two children. This may due to the fact that both WFTC and it's predecessor, Family Credit, only offer small supplements per extra child in the household, reducing the incentive to work. In particular if there are two or more children in the household who are aged less than 5.

Finally, in Table 2.8 (and Figure 2.13) we look at the changes in the relative returns to qualifications/education for the lone mother group. By holding highest education as the control group, there seems to have been little systematic (relative) change between the different education groups.

2.6.2 Hours of Work

Another question of interest is to ask what happened to the hours distribution before and after the introduction of WFTC? Figures 2.6a, 2.6b and 2.6c show the average fraction of people working 0-15 hours, 16-29 hours and 30 hours or more, respectively. It is clear that, while the distributions have remained constant from 1993 to 2003 for single childless women, fewer lone mothers are working less than 16 hours and there has been a significant increase in those working between 16 and 29 hours. This change does not show up in our analysis of WFTC, which from Figure 2.6b is obvious, because the increase has been continuous since 1993 and there is no noticeable spike in October 1999. The average number of lone mothers working 30 hours or more has remained fairly constant since

1996, with only slight increases during the WFTC introduction period. This corresponds with the small increases we observe in the regression results.

Changes in Coefficients When we look at the change in the child coefficient for each group of hours (0-15 hours, 16-29 hours and 30 or more hours), the patterns correspond well to the patterns seen in Figures 2.6a-2.6c. In particular, looking at Figure 2.14a we can see that although the relative effect of working 0-15 hours has been higher for lone mothers than for single childless women, the coefficient falls after 1995 and then falls again after 2000. In Figure 2.14b we can see that effect of being a lone mother on working between 16 hours and 29 hours is always relatively higher than for single women, however this is a continuously growing pattern, with no acceleration in October 1999. Finally, Figure 2.14c looks at the change in the child dummy on working more than 30 hours. Here the pattern seems quite similar to the overall employment pattern in Figure 2.10. We can see that, although single childless women are always more likely to work full-time, the relative difference (after 1995) is falling and after 1998 the gap closes significantly. However, after 2001 the gap begins to widen again. If the increase in probability for lone mothers to work more than 30 hours was due to WFTC, one may question its long term effectiveness. See Appendix Tables 2.A2a-2.A2d, Tables 2.A3a-2.A3d and Tables 2.A4a-2.A4d for the annual child coefficient and changes in other covariates for those working 0-15 hours, 16-29 hours and 30 or more hours, respectively.

2.6.3 Labour Market States

In Table 2.9 we look at the effect of WFTC on entering other labour market states. The results imply that when we control for trends, the probability of entering unemployment falls 1.7% points. One may interpret this result in many ways. On the one hand, we would expect that WFTC increases all labour market participation. Thus, it not only increase employment but, given labour market friction, it also increases job search. On the other hand, we may expect that the unemployment is falling because people are accepting job offers less reluctantly and/or searching with more intensity for a job.

When looking at the effect of WFTC on inactivity, there seems to be no significant effect. This is very interesting as it suggests that women who were entering work were not coming from inactivity but from unemployment or that they were already in employment and now simply increasing the number of hours worked.

Changes in Coefficients Further analysis in Figures 2.15a and 2.15b, which looks at the time series movement of the presence of children coefficient for those unemployed and inactive, respectively, suggests that unemployment for lone mothers, relative to single childless women has been increasing substantially since 1993, fall between 1998 to 2000 and then increases again after 2001. This is analogous to the employment story and suggests that female participation increased throughout the 1990s. The dip in 1998 may be explained by other labour market policies introduced, such as the New Deal for Lone Mothers, which assisted lone mothers to search more effectively for jobs and required that their welfare receipt became contingent on the search.

Looking at Figure 2.15b, which plots the time series changes in the presence of children coefficient, implies that inactivity rates of lone mothers relative to single childless women was falling consistently during the 1990s but by 2000 the rate remained constant at 25%.

See Appendix Tables 2.A5a-2.A5d and Tables 2.A6a-2.A6d for the annual child coefficient and changes in other covariates for those unemployed and those inactive, respectively.

2.7 Why did the Child Coefficient Increase?

One of the key point made in this chapter is that once we control for the group specific trend, the effectiveness of WFTC falls. We have shown that over the period 1993 to 1999, before the introduction of WFTC, the employment rate of lone mothers increased by 7.8% points and that the relative employment probability of lone mothers to single childless women (Cetus paribus) have increased from -0.38 to -0.27 over the same period. It is important to understand why we observe this increasing trend and to ask if this trend would have continued in the absence of WFTC.

By 1992, the number of lone mothers increased fivefold since the 1970s to just under 500,000. However, some of this change was related to changes in attitude. For example, in 1971, a third of couples who conceived outside marriage then had a "shot-gun" wedding, whereas in 1991, less than 1 in 10 did so. Moreover, for teenagers who conceived outside marriage, almost a half married in 1971 compared with only 1 in 20 1991[13]. Other characteristic changes included that fewer single mothers were in their teens in the 1990s compared with the 1980s. Overall composition changes and changes in attitudes towards lone mothers explains some of the observed changes in employment.

One argument proposed to explain the increasing trend in employment rates for lone

[13]See "Single lone mothers: Problems, Prospects and policies" by Louie Burghes with Mark Brown (1995).

mothers was that WFTC was anticipated (See Francesconi et al (2004)). In the March 1998 Budget speech, the New Labour Government announced the introduction of WFTC and other reforms targeted to "make work pay" for low income families with children. However, there are three important reasons to question the plausibility that lone mothers would react to this announcement that was made almost two years prior to the actual policy change. Firstly, we observe increases in employment for lone mothers before 1998. Secondly, there were no financial incentives (and more likely income losses) to enter the labour market before the introduction of WFTC. Finally, there were other policy changes between 1998 and 1999 that affected lone mothers. We discuss each separately.

There have been a huge number of policies over the last two decades motivated towards helping lone mothers, and more generally women and/or the low skilled, into employment. From the introduction of the Equal Pay Legislation in 1970 to the increased flexibility in the labour market, which promoted part-time work. In addition, the improved nature and quality of non-parental care also promoted work amongst this group of women. Moreover, the 1994 change to Family Credit, which made it more generous and introduced a bonus amount for working 30 hour or more, also increased participation (See Duncan (1996)). All of these changes took place before 1998.

A report published by M. Nobles et al (1998) looks at the period 1993 to1997 and shows that there was an increase in the number of lone parents moving from Income Support, in part due to changes in Family Credit. They observed that of the lone mothers observed on Income Support in July 1993, only 20% remained on Income Support for the whole period. In particular, young lone mothers (aged 25 or under) were most likely to come off Income Support and they tended to be better qualified. In their qualitative analysis they observed a positive orientation towards work amongst lone mothers and that most women had worked (at least for some time) since they first had children. The main reasons given for not working were related to childcare (because of the marginal nature of the work they undertake: short-term, low paid, with unsocial hours) and the loss of benefits. Neither of which were addressed until after WFTC was introduced.

Secondly, the interactions between Housing Benefit, Income Support and Child Support (as well as Income Tax and National Insurance Contribution) imply that lone mothers would have incurred a great deal of additional costs, if they were not previously in the labour market, to enter the labour market with the anticipation of future payment. In particular, Blundell and Walker (2001) show that although in-work benefits (before WFTC) provided some financial incentives to work, the combined effect of the 55% reduction rate together with the impact of Housing Benefit and the personal tax rates and National Insurance Contributions in the UK resulted in implicit tax rates close to 100%. The

WFTC increased incentives by increasing the generosity and the reduction rate. It also incorporated a new childcare credit of 70% of eligible childcare costs up to a limit of £100 (and £150 for two children). None of these additional benefits were available until after October 1999.

It is important to point out that although WFTC was more active towards "making work pay", the interactions with other benefits, which strongly offset the effectiveness of the increased generosity of WFTC meant that most of the gainers were concentrated in the middle or top of the hours distribution for single parent households. For example, Housing Benefit was computed after WFTC and so WFTC was counted as income in determining Housing Benefit entitlement and hence overall income. The results in this chapter highlight this effect.

Thirdly, the introduction of the New Deal for Lone Parents in 1998 and the National Minimum Wage in 1999, which targeted low income people and, in particular, families with children, imply that they played an important role in increasing employment amongst this group in the pre-WFTC period. In which case, it was not an anticipation to WFTC that increased employment after 1998 but a reaction to the range of policies around at that time. It is of critical importance to encapsulate these policies into the analysis to avoid overestimating the true effect of WFTC. Besides Gregg and Harkness (2004), the literature discount the importance of these policies and any post-1998 increase in employment is attributed to WFTC.

Finally, it is important to question whether the increase in employment observed before October 1999 would have continued in the absence of WFTC. Given the interaction of different policy introductions, the effect of WFTC is not easy to disentangle, making this a tough question to answer. There were, however, increases in the generosity of WFTC between 2000 and 2002 and changes in income tax and National Insurance rules (such that a 10% income tax band was introduced and the 2% National Insurance entry fee was abolished), which meant that there should have been improved incentives for part-time workers and low earning workers. In projections done by Gregg and Harkness (2004), they found that the effects, although moderate on the lone mother working[14], the increase in net income should have been very good. However, in actual fact we observe that over that period, employment flattens and the child coefficient is stable. Although this may shed some light on the lack of effectiveness of WFTC, the effects may have been dampened due to increase in Income Support over the same period and the Housing Benefit loss.

Overall, it seems that although WFTC and even perhaps its anticipation were not without an effect on the employment of lone mothers, the effects have been exaggerated because the

[14] Working at the National Minimum Wage of £4.20 for 35 hours with two children under 11.

lack of attention given to other policies and changes of the 1990s and perhaps differential contemporaneous shocks between people with and without children. In addition, we are not only interested in whether WFTC increased employment but also in whether the government succeeded in increasing the participation and hours of work of their target group. By looking at the changes in the hours distribution and the labour market states, it is not clear that those with the least labour market attached were encouraged into the labour market.

2.8 Conclusion

The increase use of tax credits as a method of "in work benefits" have raised a great deal of popular interest in the UK and in many other countries where they have been initiated. In particular, the success of the programme was acclaimed to lie mainly with the increase in the employment of lone parents. This chapter looks closely at the effectiveness if WFTC on employment, hours of work and movements from different labour market states. The evidence suggests that once we control for the differential trends in employment between lone mothers and single childless women, who are used as the control group, the employment effect from WFTC falls considerably. This is confirmed when we look at the movements of the coefficients over time. Moreover, we find that the policy does not induce people from out of the labour market (i.e. from inactivity) - the main target group. Instead, we find that any effect of WFTC is solely borne on those working 30 hours or more.

Overall, it is apparent that the complexity of WFTC and/or its interactions with other taxes and benefits are a good explanation for why the policy did not have a greater impact on its target groups.

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2.10 Tables and Figures

Table 2.1: Descriptive Statistics - Before WFTC

Variable	Single Childless Women	Lone Mothers
Age	27.065	23.928
	[8.881]	[7.541]
White	0.956	0.922
	[0.205]	[0.267]
Black	0.021	0.048
	[0.142]	[0.214]
Asian	0.018	0.024
	[0.135]	[0.153]
Other Ethnicity	0.005	0.005
	[0.071]	[0.073]
High Qualifications	0.195	0.055
	[0.396]	[0.227
Medium Qualification	0.375	0.300
	[0.484]	[0.458]
Low Qualifications	0.363	0.516
	[0.481]	[0.500]
No Qualifications	0.067	0.130
	[0.251]	[0.336]
Hours of Work	34.926	25.167
	[12.600]	[14.475]
Work 0-15 Hours	0.090	0.157
	[0.286]	[0.363]
Work 16-29 Hours	0.072	0.114
	[0.258]	[0.317]
Work 30+ Hours	0.668	0.223
	[0.471]	[0.416]
Employed	0.828	0.488
	[0.378]	[0.500]
Unemployed	0.079	0.101
	[0.269]	[0.301]
Inactive	0.085	0.341
	[0.278]	[0.474]

One Child		0.712 [0.453]
Two Children		0.221 [0.415]
Three or More Children		0.068 [0.251]
Youngest Child (0 to 5 years)		0.377 [0.485]
Youngest Child (6 to 11 years)		0.301 [0.459]
Youngest Child (12 to 16 years)		0.314 [0.464]
Observations*	**163812**	**49907**

Notes.
1. These are the observations when restricted to being work. When looking at Activity rates, there are 197,941 for single women with no children and 102,223 for lone mothers.

Table 2.2: Employment - Basic Regression Results (1993-2003)*

	18 years +	21 years +
Treatment Effect	**0.036**	**0.046**
	[0.003]**	**[0.003]****
Age	0.045	0.06
	[0.003]**	[0.004]**
One Child	-0.075	-0.145
	[0.004]**	[0.006]**
Two Children	-0.154	-0.252
	[0.006]**	[0.008]**
3 or more Children	-0.26	-0.389
	[0.008]**	[0.009]**
Medium Qual	-0.035	-0.043
	[0.003]**	[0.003]**
Low Qual	-0.131	-0.141
	[0.003]**	[0.003]**
No Qual	-0.432	-0.434
	[0.003]**	[0.004]**
Youngest Child 0-5	-0.319	-0.223
	[0.005]**	[0.006]**
Youngest Child 6-11	-0.103	-0.07
	[0.005]**	[0.006]**
Black	-0.078	-0.062
	[0.005]**	[0.005]**
Asian	-0.111	-0.121
	[0.006]**	[0.007]**
Other Ethnicity	-0.11	-0.106
	[0.009]**	[0.010]**
Trend	0.006	0.008
	[0.000]**	[0.000]**
Post 2000	-0.026	-0.036
	[0.003]**	[0.003]**
Observations	***367699***	***297908***

Notes.

1. For Tables 2.2 to 2.9, we also control for region of residence, age squared and age cubed and the comparison categories are: No Children, High Qualification, Youngest Child 12-16, White.

Table 2.3: Employment - Differential Trend Control Regression Results (1993-2003)

	18 years +		21 years +	
	No Trend	Trend	No Trend	Trend
Treatment Effect	**0.036**	**0.018**	**0.046**	**0.017**
	[0.003]**	**[0.005]****	**[0.003]****	**[0.006]****
Age	0.045	0.045	0.06	0.06
	[0.003]**	[0.003]**	[0.004]**	[0.004]**
One Child	-0.075	-0.09	-0.145	-0.172
	[0.004]**	[0.006]**	[0.006]**	[0.007]**
Two Children	-0.154	-0.171	-0.252	-0.283
	[0.006]**	[0.007]**	[0.008]**	[0.009]**
3 or more Children	-0.26	-0.278	-0.389	-0.419
	[0.008]**	[0.008]**	[0.009]**	[0.009]**
Medium Qual	-0.035	-0.035	-0.043	-0.044
	[0.003]**	[0.003]**	[0.003]**	[0.003]**
Low Qual	-0.131	-0.131	-0.141	-0.141
	[0.003]**	[0.003]**	[0.003]**	[0.003]**
No Qual	-0.432	-0.432	-0.434	-0.434
	[0.003]**	[0.003]**	[0.004]**	[0.004]**
Youngest Child 0-5	-0.319	-0.32	-0.223	-0.223
	[0.005]**	[0.005]**	[0.006]**	[0.006]**
Youngest Child 6-11	-0.103	-0.104	-0.07	-0.07
	[0.005]**	[0.005]**	[0.006]**	[0.006]**
Black	-0.078	-0.078	-0.062	-0.061
	[0.005]**	[0.005]**	[0.005]**	[0.005]**
Asian	-0.111	-0.111	-0.121	-0.121
	[0.006]**	[0.006]**	[0.007]**	[0.007]**
Other Ethnicity	-0.11	-0.111	-0.106	-0.106
	[0.009]**	[0.009]**	[0.010]**	[0.010]**
Trend	0.006	0.005	0.008	0.005
	[0.000]**	[0.001]**	[0.000]**	[0.001]**
Post 2000	-0.026	-0.019	-0.036	-0.023
	[0.003]**	[0.004]**	[0.003]**	[0.004]**
Trend_Child		0.004		0.007
		[0.001]**		[0.001]**
Observations	***367699***	***367699***	***297908***	***297908***

Table 2.4: Hours Distribution – Regression Results (1993-2003)

	Work 0-15 Hours		Work 16-29 Hours		Work 30+ Hours	
	No Trend	Trend	No Trend	Trend	No Trend	Trend
Treatment Effect	**0.002**	**-0.002**	**0.038**	**-0.001**	**0.018**	**0.013**
	[0.002]	**[0.002]**	**[0.003]****	**[0.004]**	**[0.005]****	**[0.008]+**
Age	-0.014	-0.014	-0.007	-0.008	0.088	0.088
	[0.002]**	[0.002]**	[0.003]**	[0.003]**	[0.005]**	[0.005]**
One Child	0.044	0.041	0.078	0.043	-0.245	-0.249
	[0.003]**	[0.004]**	[0.004]**	[0.005]**	[0.006]**	[0.008]**
Two Children	0.064	0.059	0.066	0.03	-0.393	-0.396
	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.006]**	[0.007]**
3 or more Children	0.04	0.036	0.01	-0.017	-0.462	-0.464
	[0.005]**	[0.005]**	[0.004]*	[0.004]**	[0.006]**	[0.007]**
Medium Qual	0.003	0.003	-0.006	-0.006	-0.025	-0.025
	[0.001]*	[0.001]*	[0.001]**	[0.001]**	[0.003]**	[0.003]**
Low Qual	0	0	-0.01	-0.01	-0.116	-0.116
	[0.001]	[0.001]	[0.001]**	[0.001]**	[0.003]**	[0.003]**
No Qual	-0.01	-0.01	-0.035	-0.035	-0.397	-0.397
	[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.003]**	[0.003]**
Youngest Child 0-5	0.013	0.013	0.032	0.032	-0.33	-0.33
	[0.003]**	[0.003]**	[0.004]**	[0.004]**	[0.006]**	[0.006]**
Youngest Child 6-11	0.024	0.024	0.048	0.048	-0.167	-0.167
	[0.003]**	[0.003]**	[0.004]**	[0.004]**	[0.007]**	[0.007]**
Black	-0.006	-0.006	0.006	0.007	-0.057	-0.057
	[0.002]**	[0.002]**	[0.003]*	[0.003]*	[0.005]**	[0.005]**
Asian	0.017	0.017	0.001	0.001	-0.129	-0.129
	[0.003]**	[0.003]**	[0.004]	[0.004]	[0.007]**	[0.007]**
Other Ethnicity	0	0	0.001	0.001	-0.106	-0.106
	[0.004]	[0.004]	[0.006]	[0.006]	[0.011]**	[0.011]**
Trend	0.001	0	0.005	0.002	0.002	0.002
	[0.000]**	[0.000]	[0.000]**	[0.000]**	[0.001]**	[0.001]**
Post 2000	-0.006	-0.004	-0.017	-0.003	-0.012	-0.011
	[0.001]**	[0.002]**	[0.002]**	[0.002]	[0.004]**	[0.004]*
Trend_Child		0.001		0.007		0.001
		[0.000]		[0.001]**		[0.001]
Observations	***293868***	***293868***	***292088***	***292088***	***297969***	***297969***

Notes.

1. Results for 21 years and over group.

Table 2.5: Employment - Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	**-0.358**	**-0.367**	**-0.365**	**-0.349**	**-0.329**	**-0.343**	**-0.304**	**-0.266**	**-0.268**	**-0.266**	**-0.28**
	[0.007]**	**[0.007]****	**[0.006]****	**[0.006]****	**[0.006]****	**[0.006]****	**[0.005]****	**[0.005]****	**[0.005]****	**[0.005]****	**[0.005]****
Age	-0.047	-0.026	-0.026	-0.004	0.01	0.031	0.007	0.008	0.001	-0.011	0.002
	[0.010]**	[0.010]**	[0.009]**	[0.009]	[0.008]	[0.008]**	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Medium Qual	0.008	-0.01	-0.005	-0.033	-0.053	-0.01	-0.053	-0.055	-0.067	-0.05	-0.044
	[0.010]	[0.011]	[0.009]	[0.009]**	[0.009]**	[0.008]	[0.008]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**
Low Qual	-0.081	-0.103	-0.098	-0.129	-0.164	-0.123	-0.166	-0.184	-0.187	-0.168	-0.171
	[0.011]**	[0.011]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**
No Qual	-0.362	-0.401	-0.4	-0.428	-0.474	-0.439	-0.48	-0.492	-0.483	-0.484	-0.505
	[0.013]**	[0.013]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
Black	-0.118	-0.05	-0.087	-0.109	-0.068	-0.069	-0.076	-0.09	-0.047	-0.067	-0.044
	[0.016]**	[0.015]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**
Asian	-0.047	-0.051	-0.052	-0.098	-0.084	-0.087	-0.136	-0.086	-0.088	-0.094	-0.077
	[0.020]*	[0.020]*	[0.020]**	[0.021]**	[0.019]**	[0.019]**	[0.019]**	[0.018]**	[0.017]**	[0.016]**	[0.016]**
Other Ethn.	-0.245	-0.104	-0.076	-0.144	-0.044	-0.087	-0.108	-0.128	-0.032	-0.124	-0.087
	[0.043]**	[0.042]*	[0.035]*	[0.038]**	[0.034]	[0.031]**	[0.034]**	[0.033]**	[0.018]+	[0.020]**	[0.019]**
Observations	***27322***	***27534***	***36615***	***36975***	***37539***	***38224***	***38382***	***37654***	***40047***	***39137***	***38258***

Table 2.6: Employment – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Youngest Child 0-5	**-0.486**	**-0.469**	**-0.461**	**-0.434**	**-0.419**	**-0.437**	**-0.385**	**-0.353**	**-0.355**	**-0.357**	**-0.373**
	[0.008]**	**[0.008]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****
Youngest Child 6-11	**-0.165**	**-0.183**	**-0.203**	**-0.225**	**-0.218**	**-0.243**	**-0.215**	**-0.194**	**-0.2**	**-0.181**	**-0.222**
	[0.014]**	**[0.013]****	**[0.012]****	**[0.011]****	**[0.011]****	**[0.011]****	**[0.010]****	**[0.010]****	**[0.010]****	**[0.010]****	**[0.010]****
Youngest Child 12-16	**-0.033**	**-0.038**	**-0.015**	**-0.074**	**-0.094**	**-0.098**	**-0.081**	**-0.052**	**-0.056**	**-0.073**	**-0.083**
	[0.013]*	**[0.013]****	**[0.012]**	**[0.012]****	**[0.012]****	**[0.012]****	**[0.012]****	**[0.011]****	**[0.011]****	**[0.011]****	**[0.011]****
Age	-0.004	0.018	0.021	0.028	0.04	0.063	0.035	0.04	0.034	0.018	0.035
	[0.010]	[0.010]+	[0.009]*	[0.009]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]*	[0.008]**
Medium Qual	0.012	-0.011	-0.005	-0.032	-0.052	-0.006	-0.05	-0.054	-0.063	-0.049	-0.038
	[0.010]	[0.011]	[0.009]	[0.009]**	[0.009]**	[0.008]	[0.008]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**
Low Qual	-0.064	-0.092	-0.085	-0.114	-0.15	-0.109	-0.154	-0.172	-0.172	-0.159	-0.16
	[0.011]**	[0.011]**	[0.009]**	[0.008]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**
No Qual	-0.349	-0.386	-0.391	-0.417	-0.467	-0.43	-0.47	-0.48	-0.474	-0.479	-0.498
	[0.013]**	[0.013]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
Black	-0.118	-0.061	-0.097	-0.12	-0.073	-0.062	-0.074	-0.084	-0.037	-0.055	-0.037
	[0.017]**	[0.016]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.013]**	[0.014]**	[0.014]**
Asian	-0.054	-0.041	-0.059	-0.13	-0.093	-0.1	-0.142	-0.099	-0.107	-0.104	-0.061
	[0.020]**	[0.020]*	[0.020]**	[0.022]**	[0.019]**	[0.020]**	[0.019]**	[0.018]**	[0.018]**	[0.017]**	[0.015]**
Other Ethn.	-0.251	-0.101	-0.104	-0.145	-0.038	-0.095	-0.115	-0.15	-0.035	-0.132	-0.089
	[0.043]**	[0.043]*	[0.037]**	[0.038]**	[0.034]	[0.032]**	[0.034]**	[0.033]**	[0.018]*	[0.020]**	[0.019]**
Observations	27322	27534	36615	36975	37539	38224	38382	37654	40047	39137	38258

Table 2.7: Employment - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	**-0.323**	**-0.314**	**-0.319**	**-0.32**	**-0.305**	**-0.314**	**-0.276**	**-0.234**	**-0.241**	**-0.236**	**-0.249**
	[0.009]**	**[0.008]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****	**[0.007]****
Two Children	**-0.471**	**-0.531**	**-0.481**	**-0.429**	**-0.421**	**-0.448**	**-0.398**	**-0.361**	**-0.354**	**-0.356**	**-0.374**
	[0.013]**	**[0.011]****	**[0.010]****	**[0.010]****	**[0.010]****	**[0.009]****	**[0.009]****	**[0.009]****	**[0.009]****	**[0.009]****	**[0.009]****
3+ Children	**-0.518**	**-0.547**	**-0.549**	**-0.575**	**-0.532**	**-0.558**	**-0.539**	**-0.487**	**-0.499**	**-0.506**	**-0.55**
	[0.019]**	**[0.016]****	**[0.013]****	**[0.012]****	**[0.013]****	**[0.012]****	**[0.013]****	**[0.013]****	**[0.012]****	**[0.013]****	**[0.012]****
Age	-0.04	-0.012	-0.014	0.008	0.021	0.047	0.021	0.021	0.013	0.005	0.021
	[0.010]**	[0.010]	[0.009]	[0.009]	[0.009]*	[0.008]**	[0.008]*	[0.008]**	[0.008]+	[0.008]	[0.008]**
Medium Qual	0.009	-0.006	-0.003	-0.031	-0.05	-0.005	-0.05	-0.052	-0.063	-0.046	-0.035
	[0.010]	[0.011]	[0.009]	[0.009]**	[0.009]**	[0.008]	[0.008]**	[0.008]**	[0.008]**	[0.007]**	[0.007]**
Low Qual	-0.079	-0.098	-0.094	-0.124	-0.159	-0.114	-0.158	-0.175	-0.178	-0.157	-0.154
	[0.011]**	[0.011]**	[0.009]**	[0.009]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**
No Qual	-0.353	-0.383	-0.385	-0.409	-0.456	-0.417	-0.461	-0.472	-0.464	-0.461	-0.481
	[0.013]**	[0.013]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.010]**	[0.011]**	[0.011]**
Black	-0.106	-0.042	-0.09	-0.102	-0.064	-0.068	-0.074	-0.084	-0.046	-0.065	-0.041
	[0.017]**	[0.015]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**
Asian	-0.038	-0.041	-0.051	-0.086	-0.075	-0.078	-0.129	-0.085	-0.083	-0.091	-0.073
	[0.020]+	[0.020]*	[0.020]*	[0.021]**	[0.019]**	[0.019]**	[0.019]**	[0.018]**	[0.017]**	[0.016]**	[0.016]**
Other Ethn.	-0.251	-0.107	-0.085	-0.145	-0.035	-0.083	-0.101	-0.131	-0.023	-0.125	-0.09
	[0.043]**	[0.042]*	[0.036]*	[0.038]**	[0.033]	[0.031]**	[0.034]**	[0.033]**	[0.018]	[0.020]**	[0.019]**
Observations	***27322***	***27534***	***36615***	***36865***	***37391***	***38092***	***38245***	***37449***	***39791***	***38881***	***37996***

Table 2.8: Employment – Differential Qualifications Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	-0.14	-0.153	-0.167	-0.178	-0.172	-0.236	-0.238	-0.167	-0.185	-0.168	-0.18
	[0.039]**	[0.039]**	[0.025]**	[0.022]**	[0.021]**	[0.018]**	[0.018]**	[0.017]**	[0.016]**	[0.016]**	[0.016]**
Medium Qual	0.011	-0.014	-0.008	-0.031	-0.039	-0.004	-0.046	-0.037	-0.052	-0.029	-0.023
	[0.011]	[0.011]	[0.010]	[0.009]**	[0.009]**	[0.009]	[0.009]**	[0.009]**	[0.009]**	[0.008]**	[0.008]**
Low Qual	-0.048	-0.065	-0.044	-0.073	-0.105	-0.067	-0.126	-0.135	-0.137	-0.12	-0.118
	[0.011]**	[0.011]**	[0.009]**	[0.009]**	[0.010]**	[0.009]**	[0.010]**	[0.010]**	[0.010]**	[0.009]**	[0.009]**
No Qual	-0.356	-0.391	-0.38	-0.407	-0.479	-0.453	-0.501	-0.512	-0.514	-0.508	-0.535
	[0.014]**	[0.014]**	[0.013]**	[0.013]**	[0.013]**	[0.013]**	[0.013]**	[0.013]**	[0.012]**	[0.013]**	[0.013]**
Med Qual*Child	**-0.168**	**-0.138**	**-0.096**	**-0.093**	**-0.123**	**-0.068**	**-0.047**	**-0.095**	**-0.077**	**-0.102**	**-0.102**
	[0.045]**	**[0.044]****	**[0.028]****	**[0.025]****	**[0.025]****	**[0.020]****	**[0.019]***	**[0.021]****	**[0.019]****	**[0.019]****	**[0.019]****
Low Qual*Child	**-0.276**	**-0.284**	**-0.279**	**-0.248**	**-0.231**	**-0.183**	**-0.114**	**-0.153**	**-0.141**	**-0.149**	**-0.161**
	[0.044]**	**[0.044]****	**[0.029]****	**[0.026]****	**[0.025]****	**[0.022]****	**[0.021]****	**[0.021]****	**[0.020]****	**[0.020]****	**[0.020]****
No Qual*Child	**-0.191**	**-0.199**	**-0.186**	**-0.158**	**-0.089**	**-0.038**	**-0.002**	**-0.025**	**0**	**-0.018**	**-0.005**
	[0.045]**	**[0.045]****	**[0.031]****	**[0.028]****	**[0.025]****	**[0.021]+**	**[0.020]**	**[0.021]**	**[0.019]**	**[0.019]**	**[0.019]**
Age	-0.045	-0.022	-0.019	0.003	0.016	0.034	0.01	0.012	0.004	-0.007	0.004
	[0.010]**	[0.010]*	[0.009]*	[0.009]	[0.008]+	[0.008]**	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Black	-0.119	-0.053	-0.089	-0.114	-0.068	-0.071	-0.078	-0.09	-0.045	-0.066	-0.045
	[0.017]**	[0.015]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**	[0.014]**
Asian	-0.051	-0.048	-0.053	-0.102	-0.082	-0.086	-0.135	-0.085	-0.089	-0.094	-0.075
	[0.020]*	[0.020]*	[0.020]**	[0.021]**	[0.019]**	[0.019]**	[0.019]**	[0.018]**	[0.017]**	[0.016]**	[0.016]**
Other Ethn.	-0.245	-0.109	-0.083	-0.145	-0.046	-0.088	-0.106	-0.131	-0.033	-0.125	-0.088
	[0.043]**	[0.042]**	[0.036]*	[0.038]**	[0.034]	[0.031]**	[0.034]**	[0.033]**	[0.018]+	[0.020]**	[0.019]**
Observations	***27322***	***27534***	***36615***	***36975***	***37539***	***38224***	***38382***	***37654***	***40047***	***39137***	***38258***

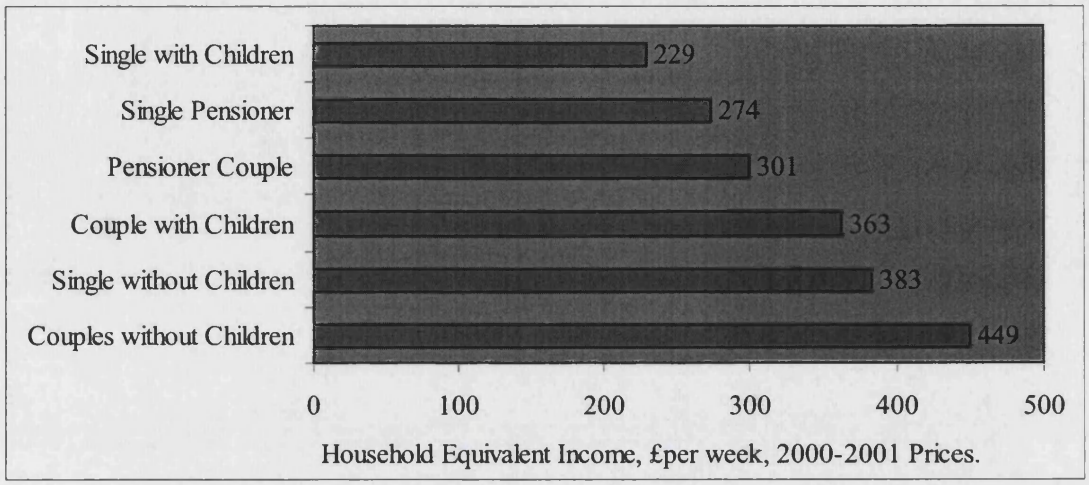
Table 2.9: Other Labour Market Outcome – Regression Results (1993-2003)

	Unemployment		Inactivity	
	No trend	Trend	No Trend	Trend
Treatment Effect	**0.002**	**-0.017**	**-0.037**	**0.006**
	[0.002]	**[0.002]****	**[0.002]****	**[0.005]**
Age	-0.023	-0.023	-0.03	-0.029
	[0.002]**	[0.002]**	[0.003]**	[0.003]**
One Child	0.029	0.013	0.113	0.158
	[0.003]**	[0.003]**	[0.005]**	[0.007]**
Two Children	0.023	0.007	0.208	0.263
	[0.004]**	[0.004]+	[0.007]**	[0.009]**
3 or more Children	0.024	0.007	0.32	0.38
	[0.004]**	[0.004]+	[0.009]**	[0.010]**
Medium Qual	-0.002	-0.002	0.073	0.074
	[0.001]	[0.001]+	[0.003]**	[0.003]**
Low Qual	0.015	0.014	0.154	0.154
	[0.001]**	[0.001]**	[0.003]**	[0.003]**
No Qual	0.022	0.022	0.447	0.447
	[0.002]**	[0.002]**	[0.004]**	[0.004]**
Youngest Child 0-5	-0.009	-0.009	0.225	0.226
	[0.002]**	[0.002]**	[0.006]**	[0.006]**
Youngest Child 6-11	0.015	0.014	0.057	0.058
	[0.003]**	[0.003]**	[0.005]**	[0.005]**
Black	0.062	0.063	-0.013	-0.014
	[0.003]**	[0.003]**	[0.003]**	[0.003]**
Asian	0.054	0.054	0.046	0.046
	[0.004]**	[0.004]**	[0.006]**	[0.006]**
Other Ethnicity	0.053	0.052	0.046	0.046
	[0.006]**	[0.006]**	[0.009]**	[0.009]**
Trend	-0.004	-0.006	-0.001	0.003
	[0.000]**	[0.000]**	[0.000]**	[0.001]**
Post 2000	-0.001	0.007	0.027	0.005
	[0.002]	[0.002]**	[0.003]**	[0.003]
Trend_Child		0.004		-0.01
		[0.000]**		[0.001]**
Observations	***297969***	***297969***	***297969***	***297969***

Notes.

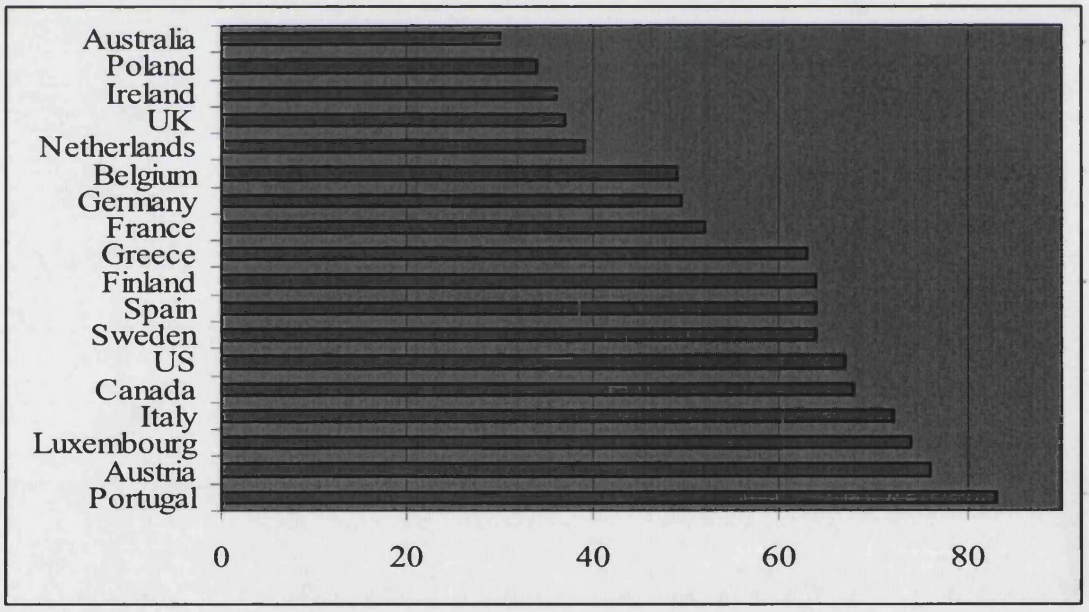
1. We restrict the sample to people aged 21 years or more.

Figure 2.1: Average Income by Family Type



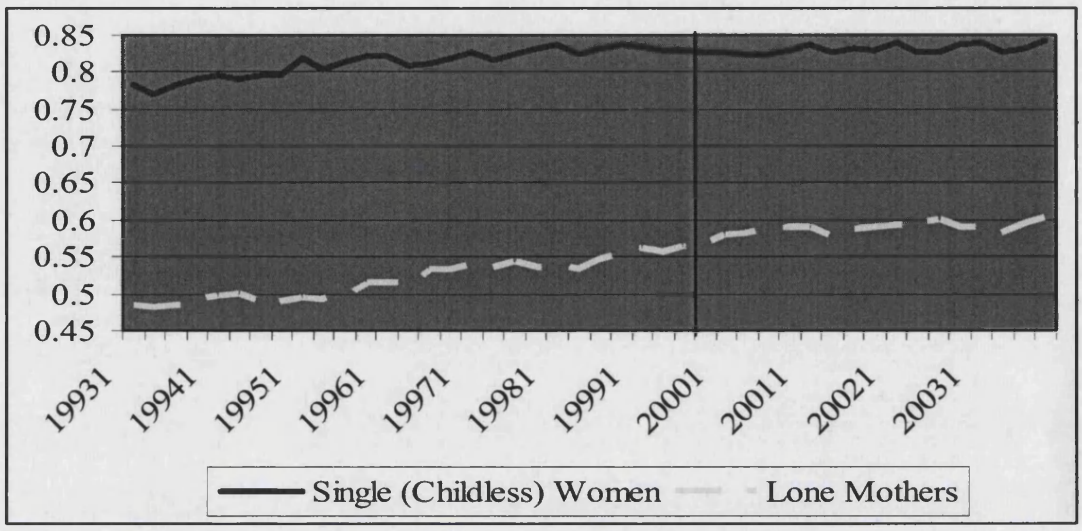
Notes.
1. Source- Goodman & Shephard (2002)

Figure 2.2: Cross-Country Lone Parent Employment Rates



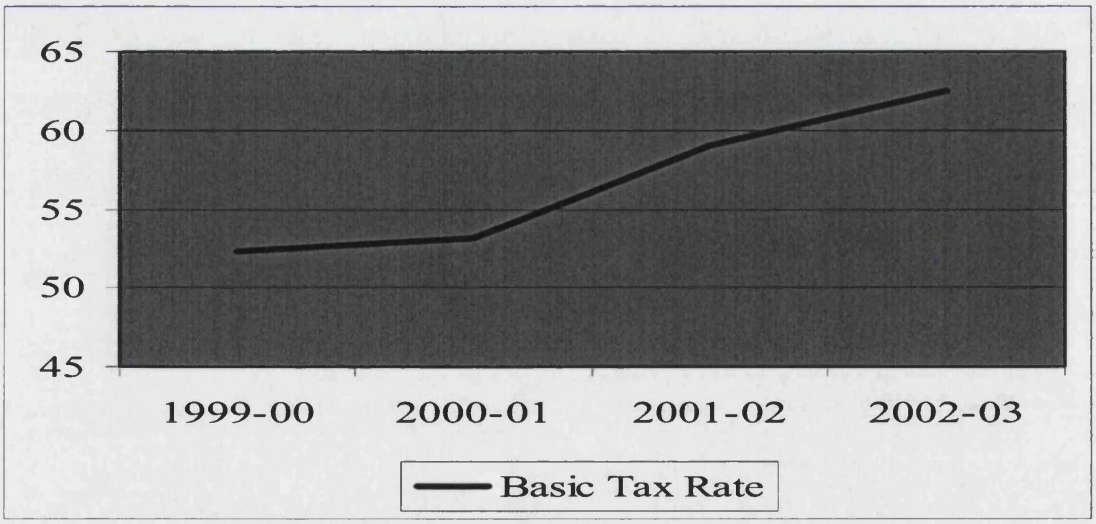
Notes.
1. Source - Gregg & Harkness (2004), OECD Economic Outlook 2001.

Figure 2.3: Employment Rate of Single Childless Women and Lone Mothers



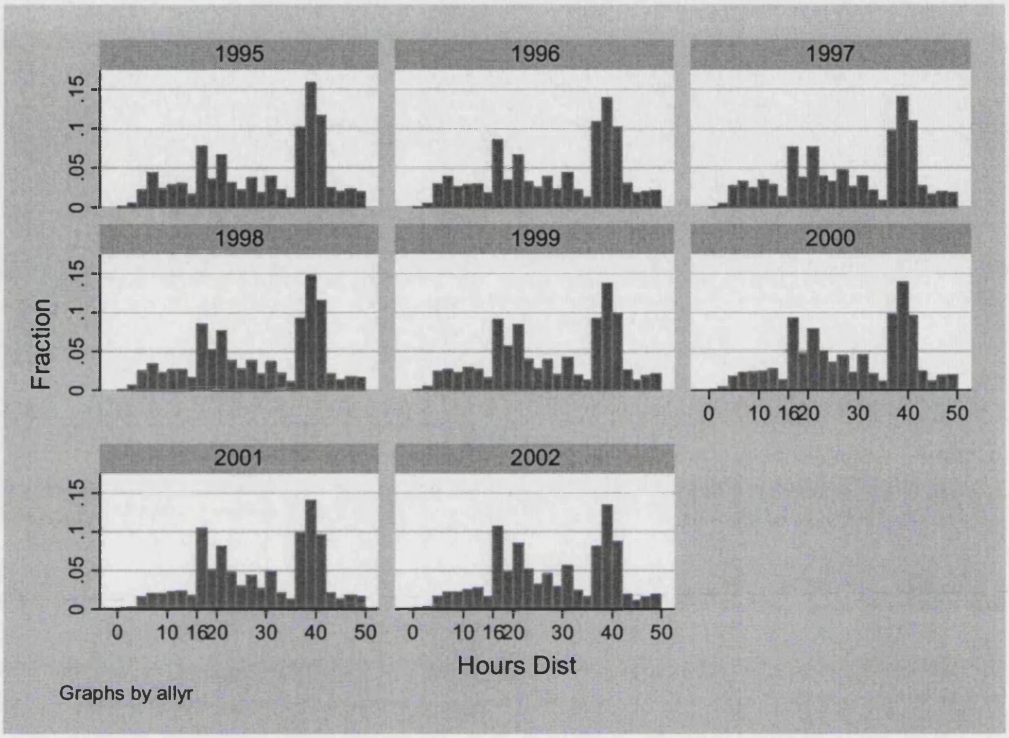
Notes.
1. Source - UK Labour Force

Figure 2.4: Basic Tax Credit Rates, 1999-2003



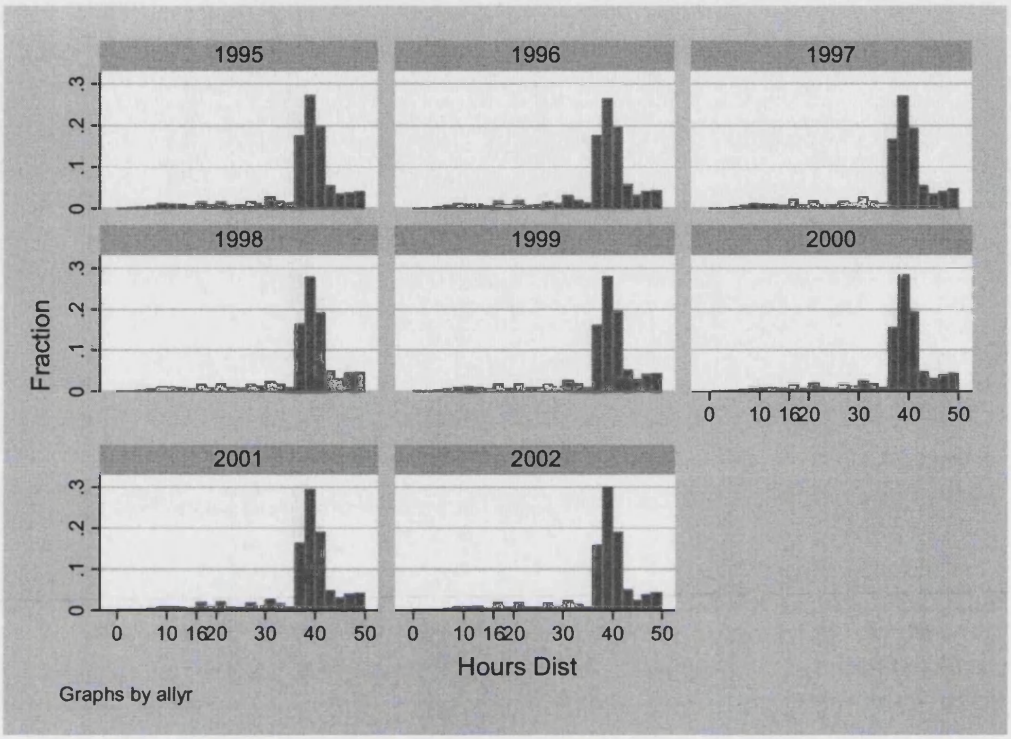
Notes.
1. Source - Working Families' Tax Credit Statistics, Inland Revenue Summary Statistics (Feb 2003)

Figure 2.5a: Hours Distribution: Lone Mothers



Notes.
1. Source - UK Labour Force Survey

Figure 2.5b: Hours Distribution: Single (Childless) Women



Notes.
1. Source - UK Labour Force Survey

Figure 2.6a: Proportion Working 0-15 Hours

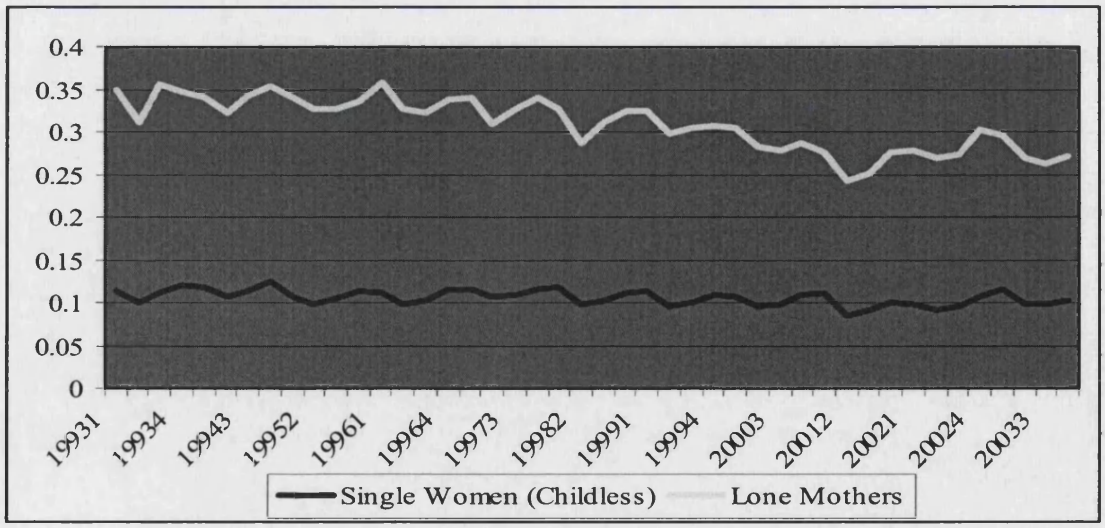


Figure 2.6b: Proportion Working 16-29 Hours

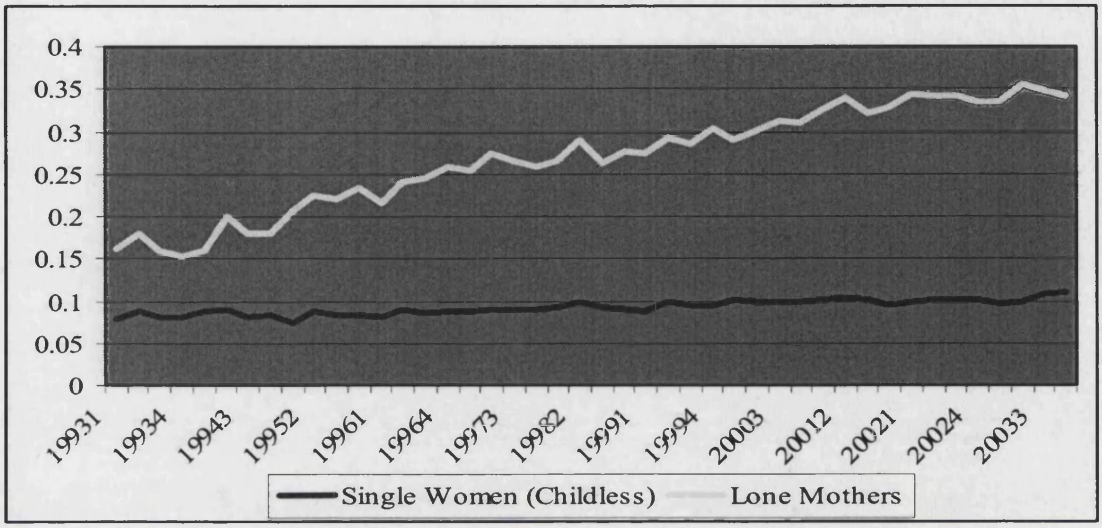


Figure 2.6c: Proportion Working 30+ Hours

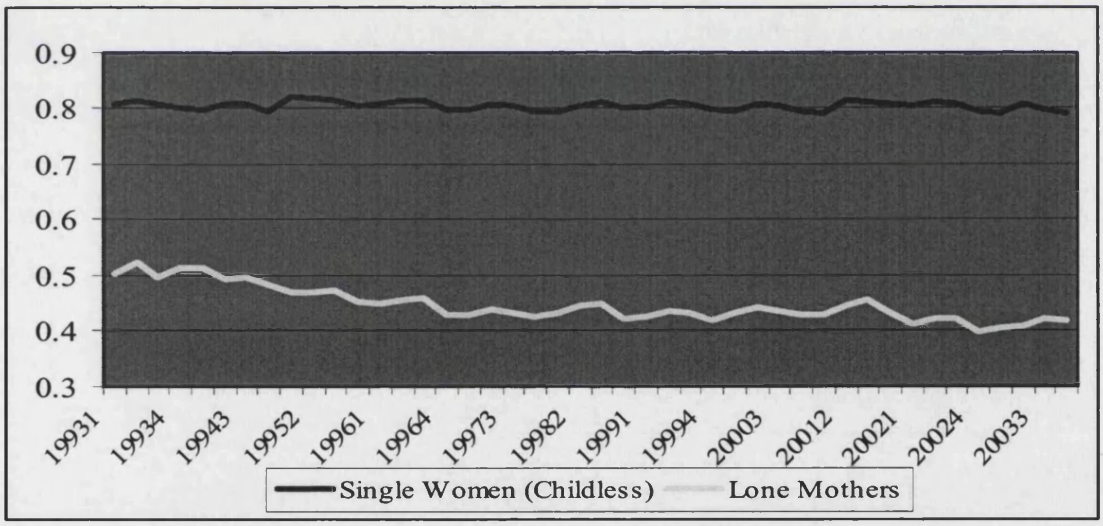
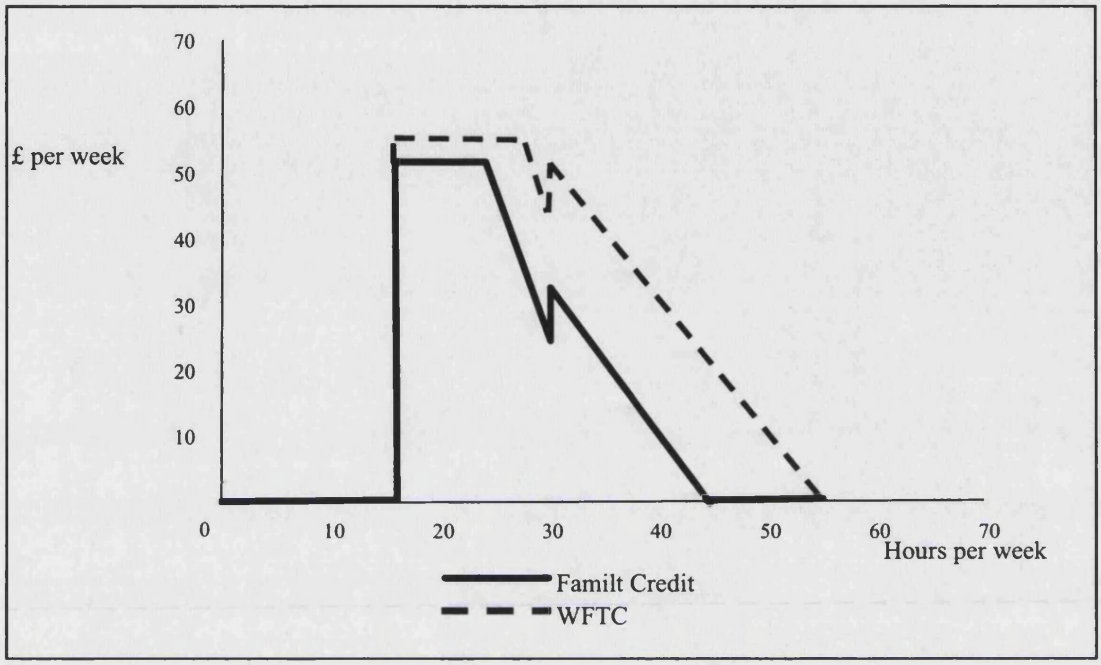
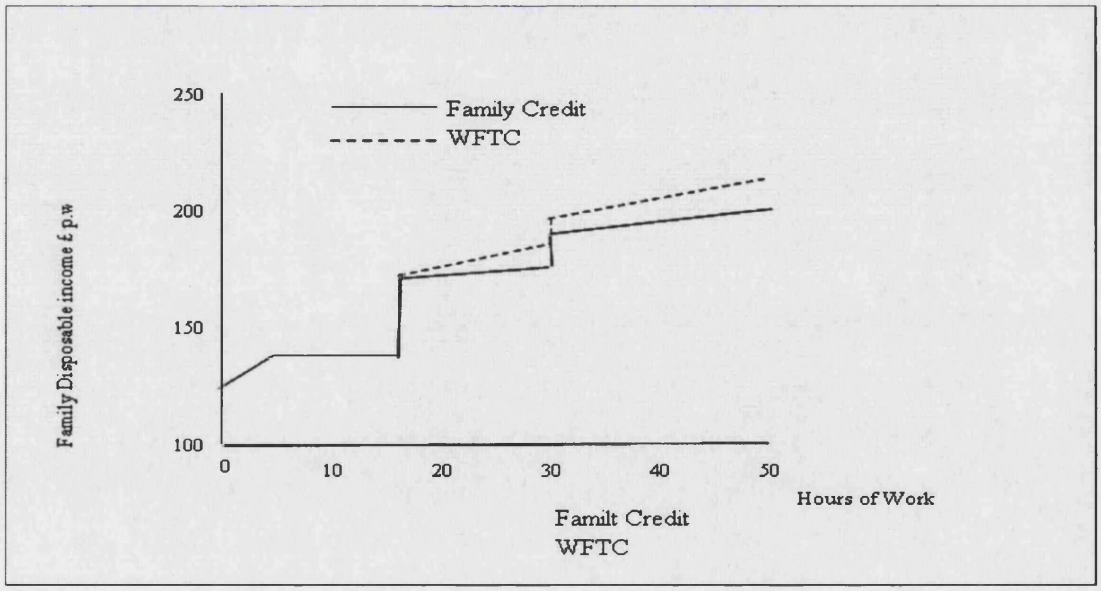


Figure 2.7: Generosity Change from Family Credit to WFTC



Notes.
1. Source - Blundell & Walker (2001)

Figure 2.8: Budget Constraint for Lone Parents



Notes.
1. Source - Blundell et al (2000)One child aged under 11. Hourly wage £4.39 (median for lone parent), rent £41.10p.w. (median for social renters with children). No childcare costs.

Figure 2.9: Employment Rates for Lone Mothers

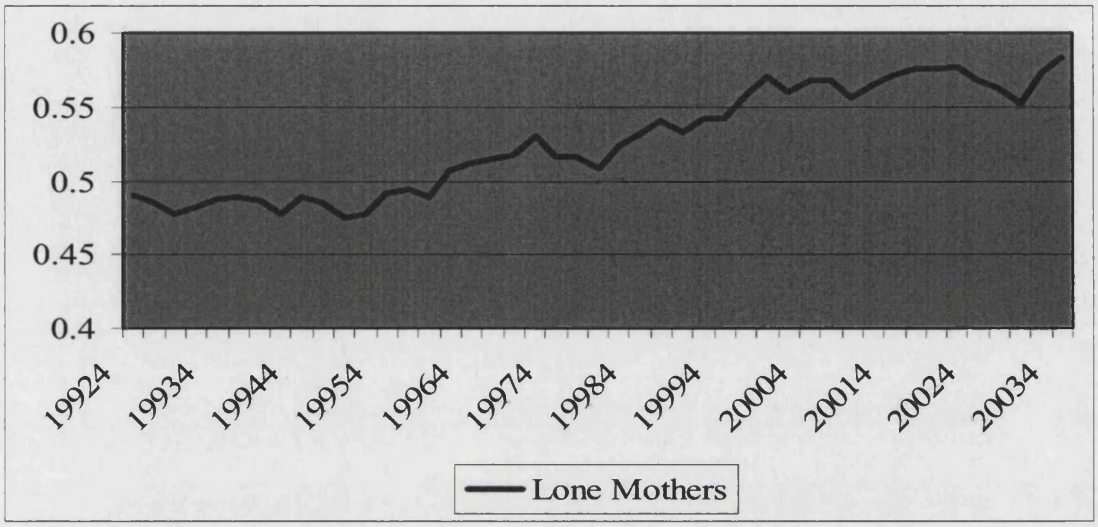


Figure 2.10: Employment - Child Marginal Effect

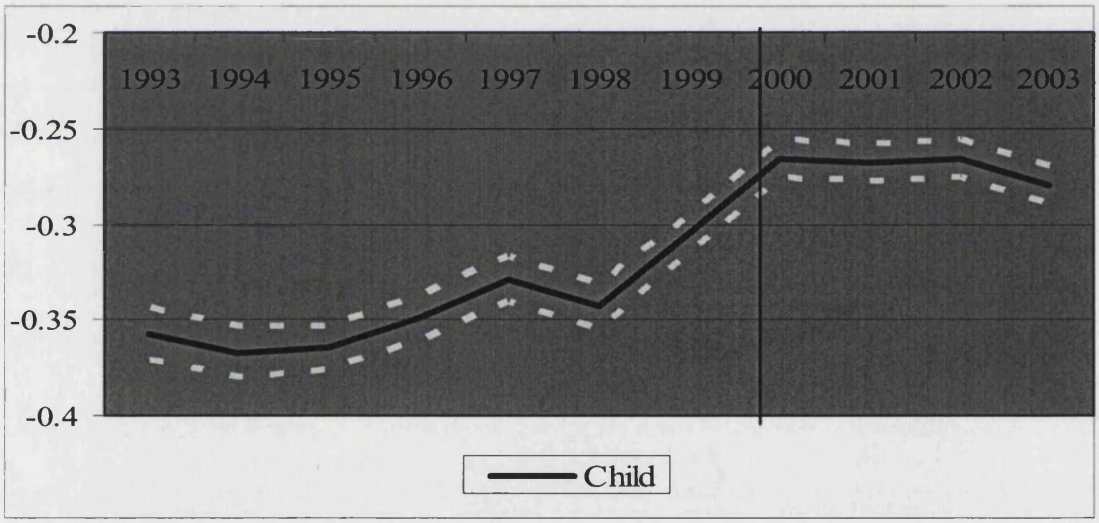


Figure 2.11: Employment - Age of Youngest Child Marginal Effect

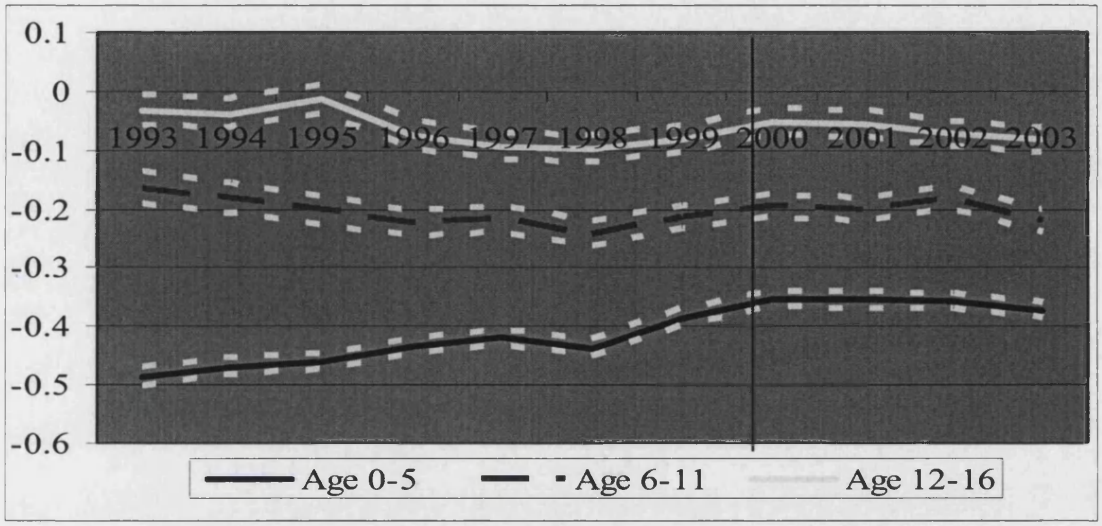


Figure 2.12: Employment - Number of Children Marginal Effect

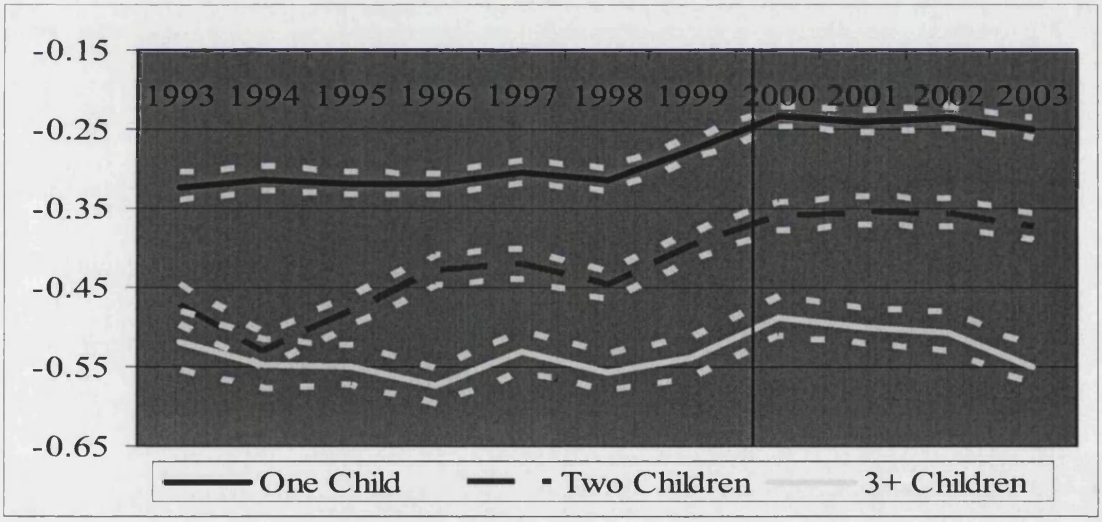


Figure 2.13: Employment - Highest Qual. (Interacted with Child) Marginal Effect

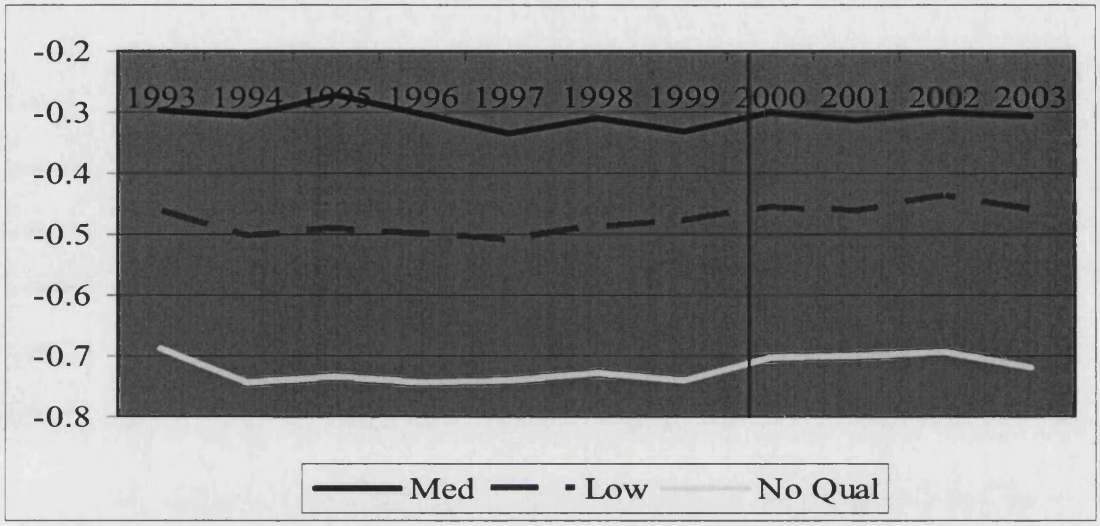


Figure 2.14a: Work 0-15 Hours – Child Marginal Effect

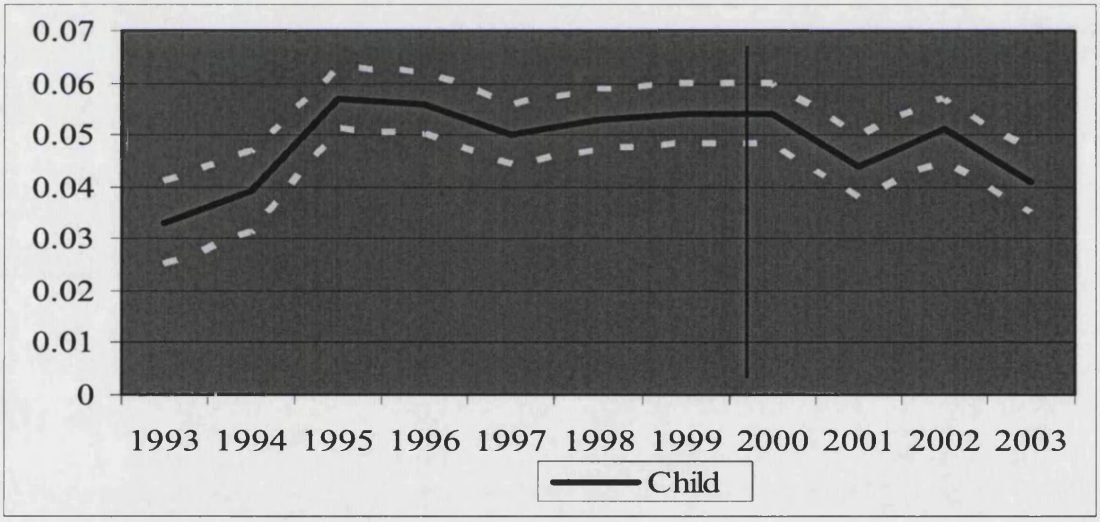


Figure 2.14b: Work 16-29 Hours – Child Marginal Effect

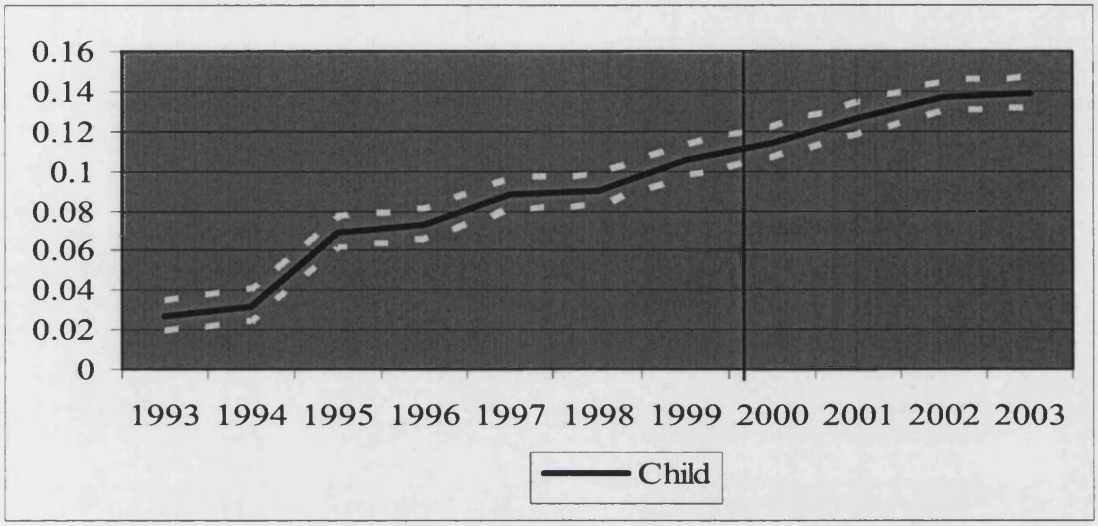


Figure 2.14c: Work 30+ Hours – Child Marginal Effect

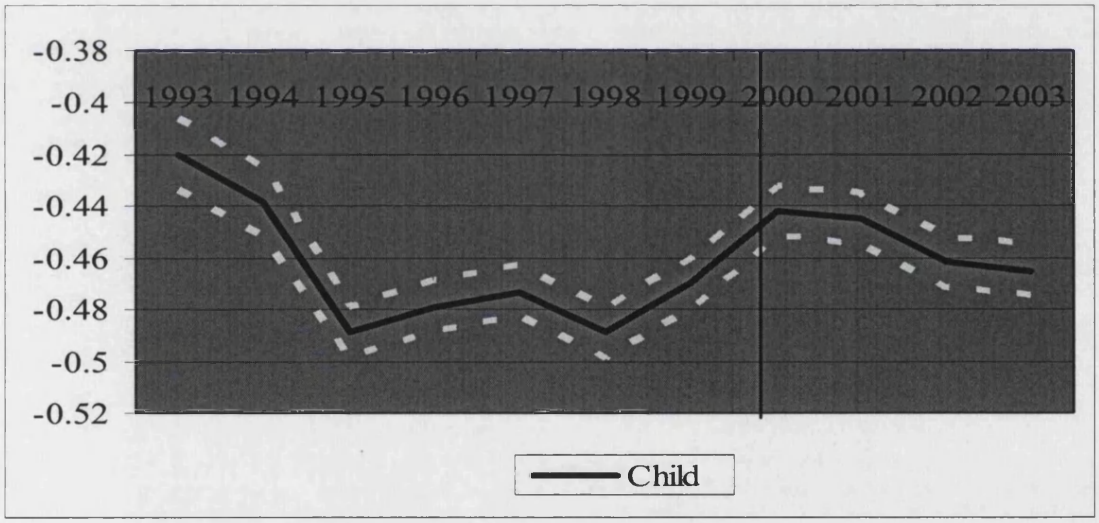


Figure 2.15a: Unemployment – Child Marginal Effect

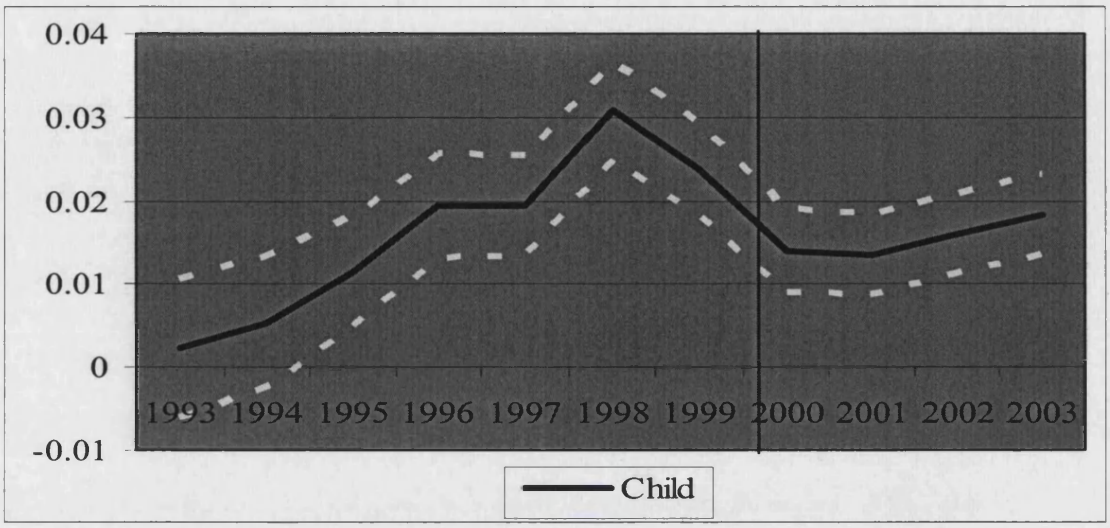
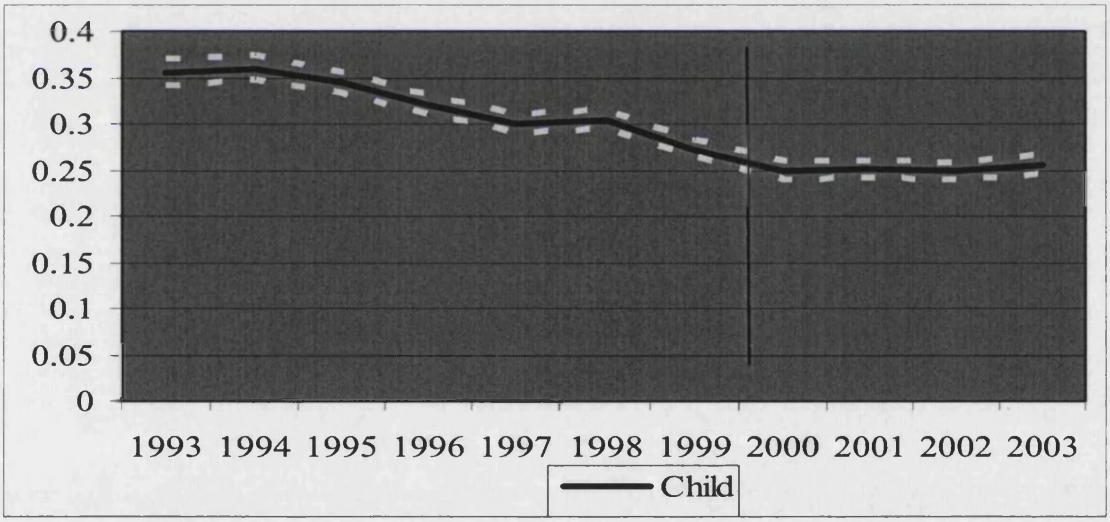


Figure 2.15b: Inactivity – Child Marginal Effect



Appendix 2.A: Additional Tables & Figures

Table 2.A1: Average Hours Worked (% in each group) (1995-2003)

	Lone Mothers										Single (Childless) Women								
Hours	1995	1996	1997	1998	1999	2000	2001	2002	2003	Hours	1995	1996	1997	1998	1999	2000	2001	2002	2003
0-1	0.13	0.04	0.06	0.09	0.06	0.03	0.07	0.03	0.01	0-1	0.03	0.03	0.06	0.01	0.03	0	0.02	0.01	0.01
2-3	0.49	0.47	0.46	0.65	0.5	0.45	0.29	0.26	0.17	2-3	0.17	0.11	0.14	0.13	0.14	0.11	0.08	0.06	0.05
4-5	2.21	2.95	2.73	2.53	2.45	1.84	1.59	1.67	1.61	4-5	0.44	0.4	0.39	0.32	0.39	0.33	0.28	0.35	0.41
6-7	4.43	3.86	3.33	3.51	2.72	2.33	2.09	2.18	2.17	6-7	0.72	0.68	0.63	0.6	0.6	0.46	0.56	0.54	0.65
8-9	2.36	2.6	2.43	2.34	2.29	2.36	2.06	2.25	2.08	8-9	1.16	1.08	1.13	1.04	0.89	0.98	0.98	0.9	0.98
10-11	2.85	2.85	3.49	2.7	3	2.44	2.29	2.54	2.54	10-11	0.96	0.99	1	1.04	1.07	0.94	0.91	0.96	0.85
12-13	2.97	2.91	2.83	2.69	2.68	2.87	2.33	2.75	2.3	12-13	1.02	0.98	1.03	0.98	0.98	0.99	0.97	1.08	1.23
14-15	1.65	1.76	1.32	1.65	1.63	1.35	1.8	1.6	1.71	14-15	0.55	0.58	0.65	0.61	0.71	0.75	0.65	0.61	0.77
16-17	**7.8**	**8.66**	**7.64**	**8.52**	**9.15**	**9.35**	**10.47**	**10.69**	**10.16**	**16-17**	**1.59**	**1.69**	**2.07**	**1.77**	**1.97**	**1.89**	**1.93**	**2.19**	**2.39**
18-19	3.54	3.45	3.81	5.27	5.66	4.83	5.13	4.89	5.02	18-19	0.79	0.87	0.89	0.95	0.91	0.98	1.02	0.91	0.94
20-21	6.67	6.65	7.73	7.71	8.47	7.92	8.18	8.51	8.51	20-21	1.52	1.79	1.88	1.93	1.8	2.22	2.04	1.91	2.15
22-23	3.14	3.24	3.94	3.86	4.02	5.01	4.76	5.15	5.18	22-23	0.67	0.74	0.79	1.01	0.89	1.02	0.92	0.98	0.94
24-25	2.26	2.56	3.23	2.88	2.85	3.55	3.02	3.23	4.05	24-25	0.75	0.78	0.86	0.77	0.89	0.76	0.85	0.88	0.89
26-27	3.8	3.96	4.72	3.83	3.99	4.52	4.4	4.64	4.91	26-27	1.74	1.61	1.66	1.75	1.73	1.97	1.75	1.79	1.8
28-29	1.86	2.28	2.58	2.16	2.07	2.32	2.69	2.96	2.63	28-29	1.15	1.17	1.12	1.26	1.17	1.2	1.14	1.03	1.02
30-31	**3.94**	**4.39**	**3.96**	**3.72**	**4.29**	**4.55**	**4.9**	**5.65**	**6**	**30-31**	**2.88**	**2.99**	**2.77**	**2.64**	**2.68**	**2.78**	**2.67**	**2.57**	**3.07**
32-33	2.26	2.26	2.04	2.23	2	2.17	2.17	2.46	2.28	32-33	1.76	1.79	1.63	1.82	1.87	2.01	1.69	1.66	1.54
34-35	1.14	1.19	0.82	1.12	1.25	1.16	1.32	1.55	1.36	34-35	1.26	1.24	1.12	0.93	0.95	1.01	0.91	0.88	1.01
36-37	10.19	10.91	9.74	9.24	9.26	9.76	9.85	8.16	9.4	36-37	17.38	17.53	16.51	16.47	16.07	15.57	16.34	16	16.5
38-39	15.92	13.91	14.09	14.77	13.76	13.95	14.07	13.48	13.18	38-39	27.21	26.46	26.99	27.71	27.88	28.16	29.32	29.87	28.82
40-41	11.66	10.24	10.95	11.59	9.95	9.61	9.6	8.77	8.66	40-41	19.68	19.51	19.22	19.11	19.55	19.15	18.96	19.04	19.14
42-43	2.47	2.99	2.7	2.11	2.58	2.48	2.17	1.89	1.79	42-43	5.39	5.63	5.43	5.09	5.22	4.9	4.81	5.06	4.37
44-45	2.02	1.8	1.64	1.39	1.28	1.25	1.28	1.21	1.02	44-45	3.47	3.16	3.38	3.05	3.08	3.17	2.96	2.57	2.47
46-47	2.32	1.99	1.95	1.76	1.92	1.89	1.82	1.57	1.66	46-47	3.65	4.03	3.93	4.43	4.24	4.2	4.07	3.88	3.55
48-49	0.97	1.19	0.99	0.76	1.07	1	0.77	0.93	0.78	48-49	1.92	1.79	1.99	2.11	1.95	1.99	2.04	1.89	2.02
50+	0.95	0.9	0.82	0.95	1.09	1.03	0.91	1	0.82	50+	2.16	2.38	2.72	2.47	2.36	2.5	2.12	2.38	2.42

Table 2.A2a: Work 0-15 Hours- Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.033	0.039	0.057	0.056	0.05	0.053	0.054	0.054	0.044	0.051	0.041
	[0.004]**	[0.004]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**
Observations	***27130***	***27309***	***36244***	***36522***	***37069***	***37712***	***37796***	***37054***	***39240***	***38276***	***37496***

Table 2.A2b: Work 0-15 Hours – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Age 0-5	0.026	0.036	0.049	0.056	0.052	0.046	0.053	0.063	0.049	0.048	0.039
	[0.004]**	[0.005]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**
Age 6-11	0.037	0.071	0.123	0.093	0.083	0.095	0.083	0.081	0.053	0.088	0.074
	[0.007]**	[0.009]**	[0.010]**	[0.008]**	[0.008]**	[0.008]**	[0.007]**	[0.007]**	[0.006]**	[0.007]**	[0.007]**
Age 12-16	0.028	0.029	0.058	0.034	0.05	0.04	0.04	0.055	0.05	0.053	0.037
	[0.006]**	[0.006]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.006]**
Observations	***27130***	***27309***	***36244***	***36522***	***37069***	***37712***	***37796***	***37054***	***39240***	***38276***	***37496***

Table 2.A2c: Work 0-15 Hours - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	0.033	0.039	0.053	0.052	0.047	0.049	0.05	0.048	0.038	0.049	0.033
	[0.004]**	[0.005]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**
Two Children	0.046	0.047	0.091	0.094	0.081	0.085	0.083	0.102	0.083	0.084	0.076
	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.006]**	[0.007]**	[0.006]**
3+ Children	0.012	0.048	0.072	0.067	0.054	0.067	0.081	0.073	0.044	0.067	0.056
	[0.011]	[0.013]**	[0.012]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.009]**	[0.010]**	[0.010]**
Observations	***27130***	***27309***	***36244***	***36412***	***36921***	***37581***	***37661***	***36849***	***38986***	***38021***	***37235***

Table 2.A2d: Work 0-15 Hours – Differential Qualification Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.017	0.028	0.054	0.031	0.061	0.054	0.062	0.07	0.059	0.057	0.063
	[0.018]	[0.018]	[0.014]**	[0.012]**	[0.012]**	[0.011]**	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**
Med Qual	0.017	0.016	0.032	0.029	0.038	0.037	0.029	0.034	0.041	0.03	0.04
	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.004]**	[0.005]**
Low Qual	-0.015	-0.019	-0.02	-0.019	-0.009	-0.006	-0.009	-0.009	0.01	-0.006	0.004
	[0.005]**	[0.005]**	[0.004]**	[0.004]**	[0.004]*	[0.005]	[0.005]+	[0.005]*	[0.005]*	[0.004]	[0.005]
No Qual	-0.014	-0.027	-0.018	-0.01	-0.006	-0.001	-0.003	-0.005	0.004	-0.016	0.006
	[0.005]**	[0.005]**	[0.005]**	[0.006]+	[0.006]	[0.007]	[0.007]	[0.007]	[0.007]	[0.006]**	[0.007]
Med Qual*Child	0.007	-0.013	-0.017	0.001	-0.023	-0.014	-0.017	-0.025	-0.023	-0.021	-0.025
	[0.018]	[0.013]	[0.008]*	[0.011]	[0.007]**	[0.007]+	[0.007]*	[0.005]**	[0.005]**	[0.006]**	[0.006]**
Low Qual*Child	0.021	0.025	0.019	0.053	0.012	0.02	0.015	0.01	0.001	0.02	-0.002
	[0.021]	[0.020]	[0.013]	[0.016]**	[0.011]	[0.011]+	[0.010]	[0.009]	[0.008]	[0.010]*	[0.008]
No Qual*Child	0.012	0.025	0.006	0.011	-0.011	-0.005	-0.02	-0.007	-0.003	0.004	-0.026
	[0.020]	[0.022]	[0.013]	[0.013]	[0.010]	[0.010]	[0.008]**	[0.009]	[0.009]	[0.011]	[0.007]**
Observations	***27130***	***27309***	***36244***	***36522***	***37069***	***37712***	***37796***	***37054***	***39240***	***38276***	***37496***

Table 2.A3a: Work 16-29 Hours- Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.027	0.032	0.069	0.073	0.088	0.09	0.105	0.114	0.126	0.137	0.139
	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**
Observations	***26828***	***27034***	***35941***	***36222***	***36814***	***37519***	***37624***	***36862***	***39189***	***38254***	***37272***

Table 2.A3b: Work 16-29 Hours – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Age 0-5	0.015	0.03	0.07	0.075	0.088	0.097	0.111	0.121	0.144	0.148	0.152
	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.006]**	[0.006]**
Age 6-11	0.075	0.067	0.108	0.104	0.153	0.141	0.161	0.183	0.174	0.179	0.208
	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**
Age 12-16	0.012	0.03	0.061	0.071	0.08	0.047	0.088	0.088	0.097	0.096	0.093
	[0.007]+	[0.008]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.010]**	[0.010]**	[0.009]**	[0.010]**	[0.010]**
Observations	***26828***	***27034***	***35941***	***36222***	***36814***	***37519***	***37624***	***36862***	***39189***	***38254***	***37272***

Table 2.A3c: Work 16-29 Hours - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	0.036	0.045	0.081	0.081	0.098	0.103	0.122	0.132	0.144	0.157	0.165
	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**
Two Children	0.014	-0.001	0.066	0.098	0.108	0.107	0.135	0.144	0.158	0.177	0.17
	[0.008]+	[0.007]	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**
3+ Children	-0.014	0.013	0.051	0.032	0.048	0.058	0.041	0.084	0.102	0.094	0.086
	[0.010]	[0.011]	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.012]**	[0.012]**	[0.012]**	[0.012]**
Observations	***26828***	***27034***	***35941***	***36114***	***36668***	***37392***	***37490***	***36663***	***38942***	***38006***	***37023***

Table 2.A3d: Work 16-29 Hours – Differential Qualification Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.032	-0.018	0.103	0.11	0.126	0.104	0.099	0.116	0.136	0.187	0.14
	[0.020]	[0.019]	[0.015]**	[0.014]**	[0.014]**	[0.013]**	[0.012]**	[0.012]**	[0.012]**	[0.013]**	[0.012]**
Med Qual	-0.018	-0.014	-0.021	-0.003	0.003	0.006	0.008	0.02	0.036	0.04	0.034
	[0.005]**	[0.005]**	[0.004]**	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]**	[0.006]**	[0.006]**	[0.006]**
Low Qual	-0.028	-0.028	-0.027	-0.018	-0.006	-0.005	0.003	0.007	0.002	0.027	0.022
	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]	[0.005]	[0.006]	[0.006]	[0.006]	[0.007]**	[0.007]**
No Qual	-0.03	-0.022	-0.033	-0.032	-0.019	-0.014	-0.018	-0.019	-0.001	0.033	-0.01
	[0.005]**	[0.006]**	[0.005]**	[0.006]**	[0.007]**	[0.008]+	[0.008]*	[0.008]*	[0.009]	[0.011]**	[0.010]
Med Qual*Child	-0.003	0.071	-0.014	-0.03	-0.028	-0.007	0.01	-0.001	-0.016	-0.033	0.016
	[0.017]	[0.035]*	[0.010]	[0.008]**	[0.009]**	[0.011]	[0.012]	[0.011]	[0.010]+	[0.009]**	[0.012]
Low Qual*Child	0	0.071	-0.023	-0.02	-0.023	-0.007	0.011	0.004	0.012	-0.035	-0.011
	[0.017]	[0.032]*	[0.009]*	[0.010]*	[0.009]*	[0.011]	[0.012]	[0.012]	[0.012]	[0.009]**	[0.011]
No Qual*Child	-0.012	0.027	-0.048	-0.042	-0.046	-0.043	-0.026	-0.023	-0.038	-0.071	-0.033
	[0.016]	[0.027]	[0.007]**	[0.008]**	[0.008]**	[0.009]**	[0.011]*	[0.012]+	[0.011]**	[0.008]**	[0.012]**
Observations	***26828***	***27034***	***35941***	***36222***	***36814***	***37519***	***37624***	***36862***	***39189***	***38254***	***37272***

Table 2.A4a: Work 30+ Hours- Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	-0.42	-0.438	-0.489	-0.479	-0.473	-0.489	-0.47	-0.442	-0.445	-0.462	-0.465
	[0.007]**	[0.007]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A4b: Work 30+ Hours – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Age 0-5	-0.515	-0.518	-0.554	-0.538	-0.532	-0.549	-0.521	-0.507	-0.518	-0.519	-0.522
	[0.007]**	[0.007]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**
Age 6-11	-0.258	-0.289	-0.362	-0.357	-0.382	-0.398	-0.386	-0.386	-0.361	-0.376	-0.414
	[0.013]**	[0.012]**	[0.010]**	[0.009]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.008]**	[0.007]**
Age 12-16	-0.076	-0.093	-0.138	-0.165	-0.209	-0.165	-0.184	-0.175	-0.178	-0.198	-0.186
	[0.013]**	[0.013]**	[0.013]**	[0.012]**	[0.012]**	[0.012]**	[0.012]**	[0.012]**	[0.011]**	[0.011]**	[0.011]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A4c: Work 30+ Hours - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	-0.378	-0.375	-0.418	-0.417	-0.421	-0.425	-0.413	-0.382	-0.391	-0.404	-0.405
	[0.008]**	[0.007]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**
Two Children	-0.496	-0.527	-0.546	-0.528	-0.522	-0.542	-0.522	-0.515	-0.504	-0.522	-0.516
	[0.009]**	[0.008]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**	[0.006]**
3+ Children	-0.487	-0.543	-0.556	-0.564	-0.537	-0.56	-0.549	-0.528	-0.541	-0.547	-0.556
	[0.014]**	[0.009]**	[0.006]**	[0.006]**	[0.007]**	[0.006]**	[0.006]**	[0.007]**	[0.006]**	[0.006]**	[0.005]**
Observations	***27328***	***27542***	***36627***	***36874***	***37407***	***38101***	***38255***	***37451***	***39801***	***38885***	***38001***

Table 2.A4d: Work 30+ Hours – Differential Qualification Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	-0.176	-0.133	-0.322	-0.303	-0.332	-0.357	-0.353	-0.321	-0.337	-0.372	-0.339
	[0.040]**	[0.040]**	[0.023]**	[0.021]**	[0.019]**	[0.018]**	[0.017]**	[0.017]**	[0.016]**	[0.015]**	[0.015]**
Med Qual	0.004	-0.021	-0.023	-0.055	-0.076	-0.046	-0.072	-0.085	-0.118	-0.092	-0.09
	[0.011]	[0.011]+	[0.010]*	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**
Low Qual	0.006	-0.001	0.017	-0.021	-0.071	-0.041	-0.095	-0.11	-0.124	-0.119	-0.118
	[0.011]	[0.011]	[0.010]+	[0.010]*	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
No Qual	-0.287	-0.311	-0.291	-0.323	-0.399	-0.39	-0.414	-0.427	-0.446	-0.45	-0.457
	[0.013]**	[0.013]**	[0.012]**	[0.012]**	[0.011]**	[0.011]**	[0.011]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
Med Qual*Child	-0.17	-0.188	-0.037	-0.054	-0.062	-0.062	-0.075	-0.077	-0.058	-0.055	-0.13
	[0.042]**	[0.041]**	[0.028]	[0.025]*	[0.024]**	[0.022]**	[0.021]**	[0.021]**	[0.020]**	[0.019]**	[0.019]**
Low Qual*Child	-0.314	-0.397	-0.283	-0.31	-0.271	-0.27	-0.238	-0.235	-0.24	-0.202	-0.228
	[0.038]**	[0.033]**	[0.025]**	[0.022]**	[0.022]**	[0.021]**	[0.020]**	[0.020]**	[0.019]**	[0.019]**	[0.019]**
No Qual*Child	-0.298	-0.373	-0.254	-0.257	-0.162	-0.166	-0.107	-0.145	-0.102	-0.089	-0.087
	[0.040]**	[0.035]**	[0.029]**	[0.026]**	[0.027]**	[0.026]**	[0.026]**	[0.025]**	[0.025]**	[0.026]**	[0.026]**
Observations	***26828***	***27034***	***35941***	***36222***	***36814***	***37519***	***37624***	***36862***	***39189***	***38254***	***37272***

Table 2.A5a: Unemployment - Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.002	0.005	0.012	0.019	0.019	0.031	0.024	0.014	0.014	0.016	0.018
	[0.004]	[0.004]	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**	[0.002]**	[0.002]**	[0.002]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A5b: Unemployment – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Age 0-5	-0.001	-0.003	0.006	0.009	0.014	0.022	0.019	0.01	0.006	0.011	0.011
	[0.005]	[0.005]	[0.004]+	[0.004]**	[0.004]**	[0.003]**	[0.003]**	[0.003]**	[0.003]*	[0.003]**	[0.003]**
Age 6-11	0.011	0.029	0.03	0.035	0.042	0.061	0.05	0.036	0.033	0.029	0.04
	[0.008]	[0.008]**	[0.007]**	[0.007]**	[0.006]**	[0.007]**	[0.006]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**
Age 12-16	0.008	-0.004	-0.006	0.023	0.016	0.018	0.026	0.006	0.017	0.023	0.027
	[0.007]	[0.007]	[0.006]	[0.007]**	[0.006]**	[0.006]**	[0.006]**	[0.005]	[0.005]**	[0.005]**	[0.006]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A5c: Unemployment - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	0.005	0.007	0.015	0.024	0.018	0.036	0.027	0.013	0.015	0.021	0.024
	[0.005]	[0.005]	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.004]**	[0.003]**	[0.003]**	[0.003]**	[0.003]**
Two Children	-0.007	0.002	0.003	0.015	0.027	0.026	0.021	0.019	0.018	0.011	0.012
	[0.007]	[0.007]	[0.005]	[0.005]**	[0.006]**	[0.005]**	[0.005]**	[0.005]**	[0.004]**	[0.004]**	[0.004]**
3+ Children	0.002	0.005	0.014	0.005	0.02	0.039	0.036	0.02	0.008	0.015	0.015
	[0.012]	[0.011]	[0.008]+	[0.008]	[0.008]*	[0.008]**	[0.008]**	[0.007]**	[0.006]	[0.006]*	[0.006]*
Observations	***27328***	***27542***	***36627***	***36874***	***37407***	***38101***	***38255***	***37451***	***39801***	***38885***	***38001***

Table 2.A5d: Unemployment – Differential Qualification Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.034	0.054	0.017	0.035	0.037	0.04	0.035	0.029	0.023	0.014	0.025
	[0.024]	[0.024]*	[0.014]	[0.012]**	[0.011]**	[0.010]**	[0.010]**	[0.008]**	[0.008]**	[0.008]+	[0.008]**
Med Qual	-0.024	-0.017	-0.022	-0.004	0.003	-0.012	0.008	0	0.004	-0.002	0
	[0.006]**	[0.006]**	[0.005]**	[0.005]	[0.005]	[0.004]**	[0.004]+	[0.004]	[0.004]	[0.004]	[0.004]
Low Qual	0.006	0.007	-0.008	0.009	0.016	-0.001	0.018	0.022	0.019	0.023	0.018
	[0.006]	[0.006]	[0.005]+	[0.005]+	[0.005]**	[0.004]	[0.005]**	[0.005]**	[0.004]**	[0.004]**	[0.004]**
No Qual	0.046	0.066	0.035	0.034	0.062	0.055	0.069	0.058	0.047	0.03	0.034
	[0.009]**	[0.010]**	[0.008]**	[0.008]**	[0.009]**	[0.008]**	[0.009]**	[0.009]**	[0.008]**	[0.008]**	[0.008]**
Med Qual*Child	0.007	-0.023	-0.006	-0.009	-0.01	-0.006	-0.006	0.001	-0.003	0.012	0
	[0.024]	[0.017]	[0.014]	[0.011]	[0.010]	[0.009]	[0.009]	[0.008]	[0.007]	[0.009]	[0.008]
Low Qual*Child	-0.024	-0.027	0.011	-0.011	-0.008	0.006	-0.001	-0.015	-0.008	-0.001	-0.008
	[0.018]	[0.016]	[0.014]	[0.010]	[0.010]	[0.010]	[0.009]	[0.007]*	[0.007]	[0.008]	[0.007]
No Qual*Child	-0.059	-0.069	-0.038	-0.029	-0.039	-0.035	-0.035	-0.034	-0.022	-0.012	-0.019
	[0.012]**	[0.009]**	[0.009]**	[0.009]**	[0.007]**	[0.005]**	[0.005]**	[0.004]**	[0.006]**	[0.007]+	[0.006]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A6a: Inactivity - Child Dummy Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.355	0.360	0.344	0.320	0.300	0.304	0.272	0.249	0.250	0.248	0.255
	[0.007]**	[0.007]**	[0.006]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**	[0.005]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.A6b: Inactivity – Age of Youngest Child Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Age 0-5	0.496	0.479	0.453	0.425	0.407	0.415	0.366	0.349	0.353	0.353	0.365
	[0.009]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.006]**	[0.007]**	[0.006]**	[0.006]**	[0.007]**
Age 6-11	0.167	0.163	0.188	0.207	0.183	0.191	0.17	0.167	0.175	0.157	0.183
	[0.013]**	[0.013]**	[0.011]**	[0.011]**	[0.010]**	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**
Age 12-16	0.033	0.051	0.03	0.047	0.073	0.083	0.044	0.046	0.03	0.047	0.054
	[0.011]**	[0.012]**	[0.011]**	[0.011]**	[0.011]**	[0.012]**	[0.010]**	[0.010]**	[0.009]**	[0.010]**	[0.010]**
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Table 2.6c: Inactivity - Number of Children Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
One Child	0.343	0.332	0.323	0.31	0.298	0.291	0.258	0.236	0.237	0.228	0.233
	[0.009]**	[0.008]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.007]**	[0.006]**	[0.007]**	[0.007]**
Two Children	0.501	0.557	0.502	0.433	0.409	0.439	0.392	0.357	0.348	0.36	0.372
	[0.014]**	[0.013]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**
3+ Children	0.542	0.569	0.555	0.593	0.526	0.536	0.506	0.483	0.502	0.506	0.546
	[0.021]**	[0.018]**	[0.014]**	[0.014]**	[0.015]**	[0.014]**	[0.014]**	[0.014]**	[0.013]**	[0.014]**	[0.013]**
Observations	***27328***	***27542***	***36627***	***36874***	***37407***	***38101***	***38255***	***37451***	***39801***	***38885***	***38001***

Table 2.A6d: Inactivity – Differential Qualification Marginal Effect (1993-2003)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Child	0.14	0.111	0.207	0.184	0.167	0.219	0.223	0.16	0.184	0.191	0.171
	[0.037]**	[0.037]**	[0.024]**	[0.021]**	[0.020]**	[0.018]**	[0.017]**	[0.016]**	[0.016]**	[0.015]**	[0.015]**
Med Qual	0.022	0.048	0.061	0.054	0.047	0.034	0.04	0.039	0.052	0.052	0.03
	[0.010]*	[0.011]**	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**	[0.008]**	[0.008]**
Low Qual	0.048	0.074	0.085	0.09	0.11	0.093	0.123	0.13	0.141	0.119	0.119
	[0.010]**	[0.011]**	[0.010]**	[0.009]**	[0.010]**	[0.009]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.009]**
No Qual	0.353	0.392	0.429	0.441	0.487	0.459	0.492	0.515	0.533	0.548	0.56
	[0.016]**	[0.017]**	[0.016]**	[0.016]**	[0.015]**	[0.015]**	[0.015]**	[0.015]**	[0.014]**	[0.014]**	[0.014]**
Med Qual*Child	0.151	0.186	0.058	0.073	0.115	0.061	0.046	0.089	0.073	0.057	0.094
	[0.046]**	[0.051]**	[0.024]*	[0.023]**	[0.024]**	[0.019]**	[0.017]**	[0.020]**	[0.018]**	[0.017]**	[0.018]**
Low Qual*Child	0.274	0.314	0.18	0.191	0.178	0.124	0.07	0.128	0.101	0.097	0.127
	[0.050]**	[0.053]**	[0.029]**	[0.027]**	[0.025]**	[0.021]**	[0.018]**	[0.021]**	[0.019]**	[0.018]**	[0.019]**
No Qual*Child	0.126	0.198	0.073	0.066	0.045	0.01	-0.016	0.012	-0.023	-0.03	-0.019
	[0.042]**	[0.051]**	[0.025]**	[0.023]**	[0.021]*	[0.016]	[0.014]	[0.017]	[0.014]+	[0.013]*	[0.014]
Observations	***27328***	***27542***	***36627***	***36984***	***37555***	***38233***	***38392***	***37656***	***40057***	***39141***	***38263***

Figure 2A1: Employment Rate of Lone Mothers and Single (Childless Low Edu) Women

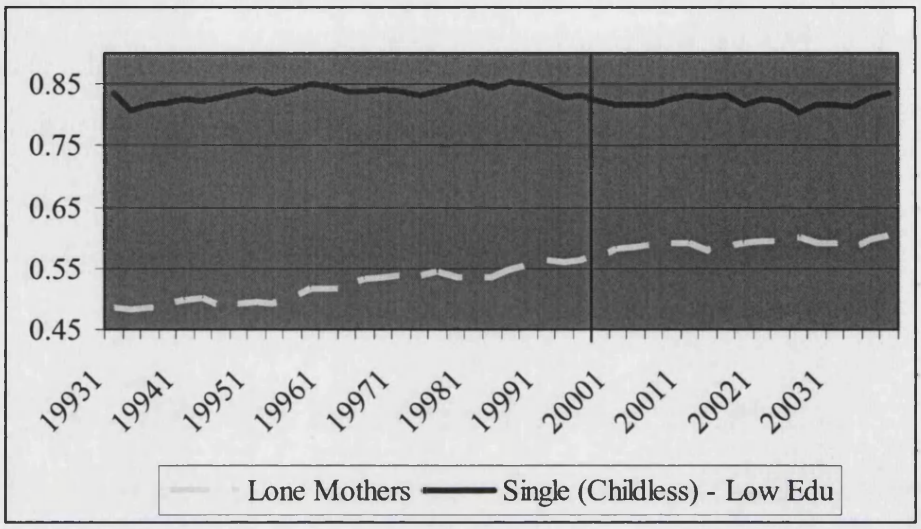
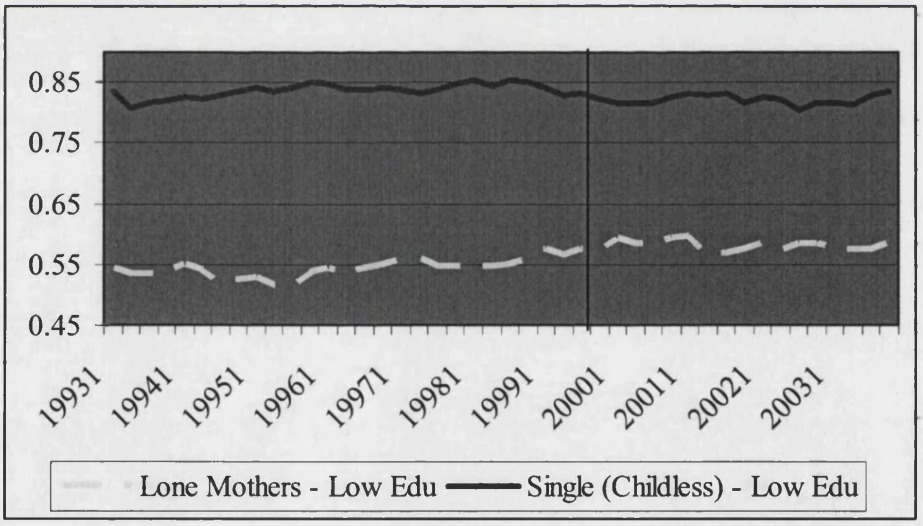


Figure 2.A2: Employment Rate of Lone Mothers (Low Edu) and Single (Childless Low Edu) Women



Part II

Chapter 3

Gender Gaps In Unemployment Rates in OECD Countries.

3.1 Introduction

There is an enormous literature on gender gaps in pay and a vast literature on gender gaps in labour force participation rates (see Altonji and Blank (1999) for an overall survey and Blau and Kahn (2003) for a recent international comparison). Yet, there is very little recent literature on gender gaps in unemployment rates. There was a literature on the subject in the US in the 1970s and early 1980s (see, for example, Barrett and Morgenstern (1974); Niemi (1974); Johnson (1983)) but few recent papers perhaps because the female and male unemployment rates in the US have converged. But this convergence has not happened in all OECD countries. Table 3.1 shows that, while the gender gap in unemployment rates (measured as the female minus the male) is small (or even negative) in some countries, there are others in which it is very large. For example in the UK, the prime-age female unemployment rate is 1.1 percentage points below the male while in Spain it is 11.8 percentage points above. It should be emphasized that the unemployment rates in Table 3.1 are all computed using the standardized ILO definition so are meant to be comparable across countries[1]. One can identify several distinct groups of countries in Table 3.1. First, the highest gender gaps in unemployment rates are to be found in the Mediterranean countries (Spain, Greece, Italy and France). Next come the Benelux countries (Belgium, Netherlands and Luxembourg), then the 'Germanic' countries (Germany, Austria and Switzerland), then the 'Nordic' countries (Sweden, Finland and Norway)

[1]To be unemployed according to the ILO definition, one must not be currently in employment, one must have looked for work in the last 4 weeks and be available to start work within 2 weeks.

and, finally the 'Anglo-Saxon' countries (US, UK, Ireland, Australia, Canada and New Zealand). In a number of the Mediterranean countries the 'unemployment problem' is largely a problem of female unemployment[2] . For future use we will refer to the countries in which the female unemployment rate is much higher than the male as the 'high-gap' countries and those in which the female-male gap in unemployment rates is small or even negative as the 'low-gap' countries. Figure 3.1 shows that the cross-country variation in the gender gap in unemployment rates has changed over time. Most of the countries that now have large gaps used to have small or non-existent gaps and the gap only emerged in the 1960s and 1970s whereas some countries like the US used to have a gender gap but now do not (although it was always much smaller than seen in some countries today).

The aim of this chapter is to understand the cross-country variation in the gender gap in the unemployment rate. One should emphasize that the question we are interested in answering is not 'why are women less likely to be in employment than men?' (either measured as the employment-population ratio or the labour force participation rate) for which there are fairly obvious answers in terms of the allocation of domestic responsibilities and a large literature on the subject but the question 'why, once they have decided they want a job, are women in some countries much less likely to be in employment than men?'. Of course, it may not be so easy to separate participation from unemployment decisions in practice as there are likely to be feedback between the two e.g. the expectation of higher future unemployment is likely to deter human capital accumulation and discourage labour supply in the same was as other anticipated interruptions to market work (see Weiss and Gronau (1981)) for a model of this. We do discuss where we think the most important linkages might be but, to keep the chapter to a manageable size, we do draw some essentially arbitrary lines around the issues we discuss and those we do not.

The structure of the chapter is as follows. In the next section we discuss human capital, institutions and discrimination as the likely determinants of the gender gap in unemployment rates to act as a framework for the empirical evidence that follows. Section 3.3 investigates the variation in the gender gap in unemployment rates: we find that the gender gap in unemployment rates tends to be larger for the young, married women and those with young children, a pattern that is consistent with the predictions of human capital theory.

Section 3.4 then looks at gender differences in labour market dynamics, the flows into and out of employment, unemployment and inactivity. Women have higher flows than men into inactivity in all countries but, in the "high gap" countries there are large gender differentials in the flow out of employment into unemployment and unemployment into

[2]Typically these countries also have very high youth unemployment rates though we do not consider this issue here.

employment. The rest of the chapter then explores these gender differences in flows in more detail.

Section 3.5 investigates in more detail flows from employment into unemployment. We find evidence that the gender gap in these flows is larger for groups with weaker labour market attachment. However, we show that domestic responsibilities (primarily child care) only account for a small fraction of job endings that result in unemployment (most job endings for these reasons end up in inactivity). The gender gap in the flow from employment to unemployment seems to be larger in countries with a two-tier employment structure in which the jobs of permanent workers are protected by firing costs and there are large numbers of temporary workers with little job protection. Women with low levels of labour market attachment are much less likely to be in one of the protected permanent jobs.

Section 3.6 investigates the flow from unemployment to employment. We find no evidence that the female unemployed are less 'serious' about wanting work than their male counterparts in the 'high-gap' countries. The gender gap in reported search activity seems similar in both 'high-gap' and 'low-gap' countries and the receipt of welfare benefits by women in 'high-gap' countries is typically quite low.

Section 3.7 considers the hypothesis that the demand for women is relatively low in the "high gap" countries. We do find some evidence that wage compression increases the gender gap in unemployment rates. But we also find evidence that there is a correlation (even within countries) between attitudes to the employment of women and the gender gap in unemployment rates. We present evidence consistent with the view that high unemployment makes it easier for employers to indulge any residual discriminatory behaviour towards women.

Our overall conclusion is that human capital theory and institutions can explain a large part (though probably not all) of the gender gap in unemployment rates. In addition there is some evidence that attitudes towards male and female unemployment may be important in explaining the gap in countries where unemployment is high.

3.2 Explanations of the Gender Gap in Unemployment Rates

In this section we review a number of possible theories for why there might be a gender gap in unemployment rates. There is not much written on this aspect of the differences between men and women but a good starting-point is the very large literature on the gender pay gap.

Part of the pay gap between men and women is undoubtedly the result of differences in labour market attachment that lead to differences in human capital accumulation. There remains some debate about how much of the gender pay gap can be explained by differences in human capital but there is no longer any debate (as there once was) that this hypothesis has considerable explanatory power (see Altonji and Blank (1999) or Polachek (2004)). It is also true that differences in unemployment rates across demographic groups other than gender are related to differences in human capital e.g. more education is associated with lower unemployment (see, for example, Ashenfelter and Ham (1979)). The most plausible reason for this relationship between unemployment rates and human capital is that the gap between marginal product when in work and the reservation wage is smaller for those with low levels of human capital. There are other reasons for why differences in labour market attachment may result in differences in unemployment rates: for example, Johnson (1983) suggested that the female unemployment rate is likely to be higher than the male because women wanting to move from home production into market work are likely to go through a period of intervening unemployment while men who want to change jobs are likely to remain in employment.

Hence, human capital theory predicts higher unemployment rates for women than for men and, among women, higher unemployment rates for women who are likely to have accumulated less human capital like married women and those with children. And, across countries, those with lower levels of female labour market attachment would be expected to have higher unemployment rates[3]. And over time we would expect to see rising female labour market participation associated with changes in the gender gap in unemployment rates[4].

The relationship between gender differences in human capital and gender differences in unemployment rates is also likely to be influenced by labour market institutions. First, institutions that compress the distribution of wages like minimum wage laws and trade unions may reduce the incentives to employ workers with lower levels of human capital leading to higher unemployment rates for these groups. Blau and Kahn (2003) find that these institutions have an important impact on the gender pay gap so we should not be too surprised if they also have an important impact on the gender gap in unemployment rates (Bertola, Blau and Kahn (2002) find evidence that high gender gaps in unemployment rates are associated with wider union coverage).

[3]There is one factor that works in the opposite direction. In countries with a low level of female labour market participation, it tends to be the higher-skilled women who are in the labour force. This selection effect will tend to reduce the measured gender gap in unemployment rates if unemployment rates are negatively related to skill.

[4]Although this relationship may not be monotonic if increasing female labour market participation initially takes the form of the entry of women into the labour market with low levels of accumulated experience; see Polachek (2004) for this argument applied to the gender pay gap.

Secondly, institutions that reduce the turnover of labour like firing costs or those that make it difficult for groups of workers who are less firmly attached to the labour force to stay in employment (like the widespread use of temporary contracts) are also likely to increase the gap in unemployment rates between workers with high and low levels of labour market attachment. For example, firing costs seem to reduce the involuntary part of the flow out of employment especially for workers with long job tenures but also seem to be associated with it reductions in the hiring rate. If women have a higher outflow rate from employment than men this will tend to magnify the gender gap in the unemployment rate

Finally part of the gender pay gap may be the result of discrimination against women. In the presence of equal pay legislation (that all the OECD countries have) the only way for employers to exercise any prejudice may be through differential hiring rates, something that may be easier when labour markets are slack. Algan and Cahuc (2003) suggest that a 'male breadwinner' mindset, associated with the Catholic religion, can explain the cross-country variation in gender differences in employment-population ratios.

In what follows we will use this discussion as a framework for interpreting the results that we find and the hypotheses we investigate.

3.3 Variations in the Gender Gap in Unemployment Rates

For the European countries, the main data used in this chapter comes from the first six waves of the European Community Household Panel Survey (ECHPS) that cover the period 1994-1999[5] and, for the United States, we use data from the Current Population Survey (CPS) from 1996-2000 (to have an approximately comparable period). Description of the data can be found in more detail in Azmat, Guell and Manning (2004).

We first check that the pattern of gender gaps in unemployment rates in the ECHPS mirrors that presented in Table 3.1. We first estimate a probit model for the probability of being unemployed (conditional on being in the labour force so that we are looking at unemployment rates) including a dummy variable for being female as the only explanatory variable i.e. the estimated model is of the form:

[5]For details of the ECHPS see Peracchi (2002) and Nicoletti and Peracchi (2002) who discuss, among other things, sample attrition. Because there may be concerns about the representativeness of the ECHPS we have checked the results for the UK and Spain using their respective Labour Force Surveys: these results are very similar and are available on request from the authors.

$$\Pr(U = 1) = \Phi(\beta_0 + \beta_1 female) \tag{3.1}$$

The first column of Table 3.2 reports the marginal effect of being female where countries are ordered by the gender gap in unemployment rates among prime-age workers as reported in Table 3.1 (we also follow this practice in all subsequent Tables). These marginal effects should be comparable to the gender gaps in aggregate unemployment rates presented in Table 3.1. They are similar though not identical, the reason being that the data come from different sources and refer to different periods.

The gender gaps in unemployment rates observed in Table 3.1 and the first column of Table 3.2 could be explained by gender gaps in characteristics that vary across countries. To investigate this hypothesis we simply modified (3.1) to:

$$\Pr(U = 1) = \Phi(\beta_0 + \beta_1 female + \beta_2 x) \tag{3.2}$$

where x is a variety of characteristics - age, education, marital status, and the presence of children in the household. The results are reported in the second column of Table 3.2. Although there is a very slight tendency for the gender gap in unemployment rates to fall in the 'Mediterranean' countries, little of the gender gap that can be explained using these characteristics is small and substantial gender gaps in unemployment remain in the countries where they exist in the aggregate data[6].

The model estimated so far assumes that all the gender gap in unemployment rates is constant across all segments of the labour force. But, it may be the case that the gender gap varies with characteristics. So, we then estimate a model in which all the characteristics are interacted with a female dummy i.e. a model of the form:

$$\Pr(U = 1) = \Phi(\beta_0 + \beta_1 female + \beta_2 x + \beta_3 female * x) \tag{3.3}$$

The marginal effects of these interactions are reported in the third through twelfth column of Table 3.2. Because the probit model is non-linear one cannot exactly read off the gender gaps in unemployment rates for different sorts of workers from this part of Table 3.2 but, to a first approximation, one can work out the gap in unemployment rates between men

[6]We do not make any attempt to correct for the selection of women into the labor force. In countries where female labour participation is low (like many of the Mediterranean countries), the higer-skilled women are more likely to be in the labour force so that the gender gaps in unemployment rates are probably understated when we do not correct for selection on observables.

and women with a given set of characteristics, x, by adding the coefficients that apply to them. So, to work out the gender gap for married people with young children one would add the marginal effects for having young children and being female, the marginal effect for being married and female and the marginal effect for being female. There is obviously a lot of information but certain broad patterns emerge.

First the gender gap in unemployment rates is larger for those who are married and those who have young dependent children. This is consistent with human capital theory as these groups are likely to have larger gender differences in human capital. These results also mirror the finding in earnings functions that gender pay gaps are typically larger for the married and those with young children. However, the variation in the gender gap in unemployment rates over the life-cycle does not seem to mirror so obviously the gender gap in pay – in the 'high-gap' countries the gender gap in unemployment rates seems highest among the young while the other countries seem to show little consistent pattern of variation. It should also be noted that in most of the 'high-gap' countries there remains a gender gap in unemployment rates for single childless individuals though there are some countries where the gender gap in unemployment rates for these groups are very small.

All of the discussion so far has been about whether differences in observed characteristics can explain the gender gap in unemployment rates. But, it is possible that differences in unobserved characteristics might also be important, especially in countries where the female participation rate is low and selection into the labour force by women is an important question. But, it seems plausible to think that these unobservable characteristics related to labour market participation would actually exacerbate the gender gap in unemployment rates, not explain them away. To illustrate this suppose that individuals differ in their 'employability', denoted by z, and that the unemployment rate is a negative function of z (denote it by $u(z)$). Further, assume that, in the population, z is equally distributed across men and women so that the 'true' gender gap in unemployment rates is zero. If all men participate in the labour market then we will have $p_m(z) = 1$ where $p_m(z)$ is the labour force participation rate for a man with characteristics z[7] . For women in countries where female labour force participation is low (e.g. Spain), we have $p_f(z) < 1$ and it seems likely that $p_f\prime(z) > 0$ so there is a positive relationship between 'employability' and labour market participation. In this example we would observe the female unemployment rate to be below that of the male simply because the women in the labour force are more positively selected than the men in terms of their employability. This means we would tend to underestimate the true gender gap in the unemployment rate that, in this example, is zero.

[7]The conclusion will also go through if we assume that male participation rates are a function of z as long as the sensitivity to z is weaker than for women.

A natural next question is whether the gender gap in unemployment rates that we observe in some countries is the result of gender differences in flows into unemployment or flows out of unemployment: this is the subject of the next section.

3.4 Gender Gaps in Labour Market Dynamics

Most labour economists are familiar with the following formula for the steady-state unemployment rate:

$$u = \frac{h_{eu}}{h_{eu} + h_{ue}} \tag{3.4}$$

where h_{eu} is the rate at which workers leave employment for unemployment and h_{ue} is the rate at which they leave unemployment for employment. But, the formula in (3.4) assumes there are only two labour market states- employment and unemployment. Given the importance of inactivity for women (and increasingly for men in many countries) using this formula to understand gender differences in unemployment rates might be thought to be a bit limiting. If one introduces the extra state of inactivity then one can show that the steady-state unemployment rate (note – not the unemployment-population ratio) can be written as:

$$u = (1-\alpha)\frac{h_{eu}}{h_{eu} + h_{ue}} + \alpha\frac{\frac{h_{ei}}{h_{ui}}}{\frac{h_{ei}}{h_{ui}} + \frac{h_{ie}}{h_{iu}}} \tag{3.5}$$

where

$$\alpha = \frac{h_{ie}h_{ui} + h_{iu}h_{ei}}{h_{ie}(h_{ui} + h_{eu} + h_{ue}) + h_{iu}(h_{ei} + h_{eu} + h_{ue})} \tag{3.6}$$

The interpretation of (3.5) is the following. It says that the overall unemployment rate can be thought of as a weighted average of two 'component' unemployment rates. The first term on the right-hand side of (3.5) is the unemployment rate if there were never any flows into or out of inactivity (it is simply the formula in (3.4)). The second term on the right-hand side of (3.5) is what the unemployment rate would be if there were never any direct flows between employment and unemployment only indirect flows via inactivity[8].

[8]Note that, for this unemployment rate, it is the relative size of flows from employment/ unemployment

The weight α is then a measure of the relative importance of flows via inactivity in generating unemployment though it is hard to give an intuition for its exact functional form.

If there are gender differences in unemployment rates this must be because of gender differences in some (or all) of the hazard rates in (3.5). Which differences are most important is likely to be helpful in understanding gender differences in unemployment rates. Table 3.3a presents estimates of the hazard rates and computation of the different components in (3.5) for men and Table 3.3b the corresponding information for women. The data we use for this comes from the retrospective monthly employment history that all individuals in the ECHPS are asked to complete and from consecutive monthly CPS files matching those individuals who are in the sample in consecutive months[9]. Our method for estimating the labour market transition rates is the following. We have observations on the labour market state an individual is in one month (denote this by S_0 that can take the values e, u, i) and then again a month later (denote this by S_1). As the interval between the two observations is a month it is a reasonable approximation to assume that individuals cannot make two transitions in that period. Then the simplest way to estimate a hazard rate (h_{eu} say) is to note that:

$$\Pr(S_t = e | S_0 = e, S_t \neq i) = e^{-h_{eu}t} \tag{3.7}$$

The left-hand side of (3.7) is readily computed using our data and we take the negative of the log to compute the hazard rate[10]. The hazard rates in Table 3.3 are multiplied by 100 so can be interpreted as the percentage of individuals in one labour market state moving to another in the course of a month.

As well as the hazard rates, Tables 3.3a and 3.3b also reports the three components of the steady-state unemployment rate as presented in (3.5) – the steady-state unemployment rate one would calculate ignoring inactivity (the eighth column), that one would calculate

to inactivity and vice versa that is important. So, if workers flow at a faster rate from employment to inactivity than from unemployment to inactivity this will tend to raise the unemployment rate.

[9] One noticeable feature of this data is that flows between different labour market states are much higher in the US than in the European countries. While this is probably true, the differences are probably over-stated in our data as the European data comes from retrospective information that probably tends to 'forget' transitions and the US data is known to have misclassification problems (see Abowd and Zellner (1983) or Abraham and Shimer (2002)) that tend to over-state transitions. However, the main interest here is not the comparison of the levels of transition rates across countries but the gender differences in transition rates across countries. As these are likely to be less affected by measurement issues, we do not attempt to correct the data in any way.

[10] When the interval between observations is small the estimated hazard rate will be very similar to a simple-minded estimate of the probability of moving states. For example h_{eu} as defined in (3.7) is the probability of moving from employment to unemployment given there is not a move to inactivity.

ignoring direct flows between employment and unemployment (the ninth column), and the 'share' of the two components using the formula in (3.5) and (3.6) (the tenth column). Finally, the penultimate column presents the steady-state unemployment rate computed using the hazard rates and the final column the actual unemployment rate in the data as a check on the internal consistency. The last two columns are similar, differences arising from the fact that the labour markets are not in a steady state[11].

Looking at the results for men in Table 3.3a one can see that the α is small, implying that flows into and out of inactivity are relatively unimportant in explaining the male unemployment rate. Also, the two component unemployment rates are very similar. This implies that the difference in the steady-state unemployment rates computed using the formulae in (3.4) and (3.5) are small so that, to a first approximation, one can ignore inactivity. Given the high labour force participation rates for men this is probably not that surprising.

What might be found more surprising are the results for women in Table 3.3b. It is true that 'α' is larger for women than for men, implying a more important role for inactivity but, in many countries, it is still very low. This is quite consistent with a low female participation rate if inactivity is a very stable state. And, again the two component unemployment rates tend to be quite similar with the conclusion that the use of (3.4) rather than (3.5) will not lead to seriously misleading conclusions.

Given the results in Tables 3.3a and 3.3b we will, in the interests of keeping the chapter to a manageable length, concentrate in the rest of this chapter on gender gaps in flows between employment and unemployment and ignore gender differences in flows involving inactivity. One must be careful here: the results in Tables 3.3a and 3.3b do not suggest that gender gaps in flows involving inactivity are non-existent, it is simply that they (for some reason) mirror gender gaps in flows that do not involve inactivity. This needs to be borne in mind.

The results in Tables 3.3a and 3.3b can also shed light on the whether the hypothesis of Johnson (1983) can explain the cross-country variation in the gender gap in unemployment rates. She argued that there is a gender gap in unemployment rates because women wanting to move from inactivity to employment often go through a period of intervening unemployment. However, the result that 'turning off' the flows involving inactivity results in very similar cross-country variation in unemployment rates suggests this cannot be the whole story. There are sizeable gender gaps in direct flows between employment and

[11] It is worth noting that the gap between the computed steady-state and actual unemployment rates is noticeably larger for women than for men, especially in the "high gap" countries. This is what one would expect when labour market participation of women is increasing markedly as is the case in many of these countries.

unemployment in the "high gap" countries and it is not clear that Johnson's arguments can explain this.

We now estimate the gender differences in hazard rates controlling for other relevant variables. As the hazard rates must be non-negative a convenient empirical model is:

$$h_{eu} = e^{\beta_{eu} x} \tag{3.8}$$

where x is a vector of characteristics (that will include female dummies). Substituting (3.8) into (3.7) suggests that a simple way to estimate β_{eu} is to restrict the sample to those who are initially in employment and not subsequently in inactivity and then use a complementary log-log model to estimate the probability that the individual is in employment. Table 3.4 reports the coefficients on a female dummy when controls for personal characteristics are included[12].

Note that the coefficient estimates will be the extent to which the hazard rate for a particular labour market transition is proportionately different for women. So, when we see in the column headed that the coefficient on the female dummy for Germany is 0.067 this means that women are 6.7% more likely to leave employment for unemployment than men[13].

There is a lot of information in Table 3.4 but the most important points are the following. If we consider direct flows between employment and unemployment, the 'high-gap' countries seem to have large gender gaps in both the flows from employment to unemployment and the flows from unemployment to employment than 'low-gap' countries (read down a column to see this). Both of these gender gaps need to be understood to get a good understanding of the source the gender gap in unemployment rates.

If we consider flows involving inactivity, women in all countries tend to have higher flows into inactivity both from employment and unemployment. But, as the discussion of (3.5)

[12] Because we want a common specification for all the hazard rates, the controls do not include any variables that are 'state-specific' e.g. characteristics of a job if one is in employment. But, Tables 3.6 and 3.12 do provide information on the importance of these characteristics. The discussion paper version also includes estimates without controls – these are very similar.

[13] One might wonder whether proportionate or absolute differences in hazard rates are the more important: we think proportionate differences for the following reason. To keep things simple, consider the formula for the steady-state unemployment rate in (3.4). Then simple, differentiation shows that:

$$\frac{\partial u}{\partial \ln(h_{eu})} = u(1-u) = -\frac{\partial u}{\partial \ln(h_{ue})}$$

so that a proportionate change in h_{eu} will have the same impact on unemployment (though with the opposite sign) as an equal proportionate change in h_{ue}. This means that we can, more or less, compare the coefficients on the female dummy for different transition rates.

above made clear, it is the proportional difference in the hazard rates from employment and unemployment to inactivity that is important for the unemployment rate so that one should look at the difference between the female dummy on the EI transition and the UI transition in Table 3.4. In the 'high-gap' countries there is some indication that the gender gap in the flow from employment to inactivity is larger than the gender gap in the flow from unemployment to inactivity: this will tend to increase the unemployment rate. There is a less systematic pattern in the gender gap in flows from inactivity to employment or unemployment.

Given the evidence in Table 3.4 we focus first on the flows from employment to unemployment, then on the flows from unemployment to employment.

3.5 Gender Differences in Flows from Employment to Unemployment

As Table 3.4 has shown, women in the 'high-gap' countries leave employment for unemployment at a higher rate than do men. The flow from employment to unemployment is investigated further in Table 3.5. These regressions are similar to the one estimated in Table 3.4 except that, in some specifications, we include some characteristics of the job as extra controls[14]. Also, because the information on the characteristics of the job held are only available for jobs held at the annual interview, these equations are estimated on annual data.

The first column of Table 3.5 reports estimates of models for the transition from employment to unemployment that include only a female dummy. The qualitative pattern of these coefficients that are based on annual data is the same as those in Table 3.4 (that were based on monthly data) with women having higher rates of transition from employment to unemployment than men in the 'high-gap' countries. The second column then introduces personal characteristics as extra controls: this has only marginal effects on the coefficient on the female dummy. The next four columns then report results when we interact the female dummy with marital status and the number of children to see whether there is significant variation in the gender gap in the flow from employment to unemployment. The sign of these interaction terms do suggest that married women and women with children have higher rates of leaving employment for unemployment (as would be predicted by the human capital model) but most of the coefficients are insignificantly different from zero

[14]We did not do this in Tables 4a and 4b because we wanted to adopt a common specification for all the hazard rates so could only include covariates that are defined in all labour market states.

and these coefficients are not noticeably higher in the high-gap countries[15].

This suggests that domestic responsibilities do not play a big role in transitions from employment to unemployment. This is not to say that domestic responsibilities do not play an important role in women's flows out of employment, just that women with children are more likely to leave employment for inactivity than unemployment. This conclusion is consistent with information on the reasons given for why jobs end that is tabulated in Table 3.6 both for those who are currently unemployed and those who are currently inactive. With the exception of a couple of countries, reasons connected with 'caring' account for a very small fraction of jobs ending where the individual is currently unemployed[16]. This is not surprising: most women leaving employment to have children go directly into inactivity.

In many countries men are more likely than women to be laid-off. In countries like the UK this difference is extreme – 45% of male jobs end because the worker is laid-off compared to 23% of women. In the 'high-gap' countries, the most striking feature of Table 3.6 is that there is not a large gender difference in the fraction of jobs ending in lay-off. A plausible explanation of this is that men in the "high gap" countries are much more likely to be in long-term permanent jobs in which the right of employers to fire worker sis severely restricted. Women are less likely to be in these jobs because they are more likely to have had interruptions in their work histories.

This hypothesis is explored further in the final column in Table 3.5 where we report the coefficient on the female dummy when job characteristics (industry, occupation, public/private size of firm, full-/part-time, permanent/temporary, job tenure) are also included in a model of the transitions from employment to unemployment. Petrongolo (2004) has documented how female workers are over-represented in temporary and part-time jobs that are generally at more risk of ending. In some of the "high-gap" countries notably France and Spain (which are heavy users of temporary contracts) the introduction of these variables does significantly reduce the coefficient on the female dummy suggesting that the "two-tier" labour market operated in these countries which protects the jobs of some workers at the expense of others works to the disadvantage of women.

Now, let us turn to flows in the opposite direction, from unemployment to employment.

[15]This result is a little different from that in the literature on education and unemployment where the high unemployment rate of the less-educated is primarily due to a higher incidence and not a longer duration.

[16]In fact, Table 3.7 probably overstates the proportion as women who had children and left employment for inactivity but are now trying to get a job again will be included in the 'currently' unemployed category.

3.6 Flows from Unemployment to Employment: The Behaviour of Workers

The actions of both individuals and employers are likely to affect the flow from unemployment to employment. In this section we consider the actions of the unemployed themselves and the following section considers the actions of employers.

The unemployment rate is meant to measure the fraction of people who want a job but do not have one. The ILO definition of unemployment uses evidence that people have looked for work in the recent past and are available to start work in the near future to determine whether people without work currently want it. But some economists think that, while there is a meaningful distinction between employment and non-employment, the distinction between unemployment and inactivity is meaningless. On this view the fact that fewer women want paid work (largely because of domestic responsibilities) 'spills over' into a higher unemployment rate and does not simply show up in a lower labour force participation rate. If this is true then, in some sense, the female unemployed in 'high-gap' countries may be less serious about wanting a job and taking steps to get one than the male unemployed. There are a number of ways in which one might test this hypothesis.

Whether unemployment and inactivity are distinct labour market states was a question first posed by Flinn and Heckman (1983) and subsequently also addressed by Jones and Riddell (1999). The basis of their tests is to see whether there is a significant difference between the probability of entering employment between those who are unemployed and those who are inactive.

Table 3.7 reports results for this exercise for the countries in the ECHPS. The sample is those who are either unemployed or inactive in the initial observation and the dependent variable is binary according to whether the individual is subsequently in employment or not. We report the marginal effect of being in employment in a month's time of being unemployed rather than inactive. We also interact a female dummy with this variable to see whether there are significant gender differences. In all countries the unemployed are more likely to get a job than the inactive. The extent of this is similar in 'high-gap' and 'low-gap' countries. Further, the interaction of the 'initially unemployed' variable with the female dummy is not noticeably smaller in the 'high-gap' countries as one would expect if the female unemployed are less serious about getting work than their male counterparts: indeed the interaction term is largest in some of the 'high-gap' countries. There is no evidence here that, in the 'high-gap' countries, the difference between the unemployed and the inactive is more blurred than in the 'low-gap' countries.

Another way to consider the hypothesis that the female unemployed in some countries are less serious about getting work is to look at evidence on job search intensity. Measuring search intensity is problematic and the only available evidence is on numbers and types of job search methods that the unemployed report using (though it should be noted that those who report using more search methods do typically have lower durations of unemployment). Table 3.8 presents evidence for the three countries for which we have been able to obtain it – Spain, the UK and the US. There are sizeable and well-known differences in the use of different search methods across countries with, for example, the unemployed in the US being much less likely to report use of the public employment service and to report the use of personal contacts and the UK unemployed report the use of more search methods than those in the US and Spain (see Pellizzari (2003), for a cross-country comparison of search methods used to get jobs and the wage premia associated with them)[17]. In all countries men report using slightly more search methods than women but this gap is similar in Spain (a 'high-gap' country) and the US/UK (both 'low-gap' countries). The limited evidence presented provides no support for the view that the women in 'high-gap' countries are much less serious in their desire for work as evidenced by their search effort.

Another variant of this hypothesis is that the level and availability of welfare benefits affects exit rate from unemployment through an effect on the reservation wage. Table 3.9 presents some data on the fraction of the unemployed of different genders who report receiving any form of welfare benefit associated with unemployment. In most countries women are less likely to receive welfare benefits than men, primarily because their weaker employment history makes them less likely to have established entitlement and because unemployed women may be living with employed men so are not eligible for means-tested benefits. Looking at this table it is very hard to see how it could possibly form the basis of an explanation as to why, in some countries, there is such a large gender gap in unemployment rates. For example, virtually no-one, male or female, in Italy receives any benefits and the proportions of men and women doing so in Spain and the UK are very similar even though they have very different gender gaps in unemployment rates.

However, while we might expect reservation wages to be influenced by welfare benefits, there are other factors that might be important in determining the minimum level of wages acceptable to the unemployed. The ECHPS directly asks the unemployed about the minimum acceptable wage at which they would work. The female unemployed unsurprisingly report lower reservation wages than the male unemployed[18] and a more pertinent

[17] One should not make too much of this as the different countries allow respondents a different maximum number of search methods to be listed and this may influence responses although very few report the maximum allowed.

[18] This gender difference in reservation wages probably reflects the gender pay gap but may also reflect

question is whether the gap between reservation wages and the average level of wages is higher for women than for men. We used the ECHPS to compute gender gaps in both wages and reservation wages corrected for personal characteristics (note that to maintain comparability with our measure of the gender gap in unemployment rates as the female minus the male we measure all gender gaps in this way even though the gender gap in wages is normally measured the other way round). We then computed a gender gap in the log of the reservation wage minus the log of the wage (we will call this, with some abuse of terminology the gender gap in the replacement ratio) and, in Figure 3.2, plot this against the gender gap in unemployment rates. The gender gap in the replacement ratio is generally positive indicating a smaller gender gap in reservation wages than in actual wages. But, there is no indication that the countries with a large gender gap in replacement ratios have a large gender gap in unemployment rates: indeed the regression line (shown on Figure 3.2) is negatively sloped albeit with a t-statistic of only 1.1.

This section has explored the hypothesis that, for some reason, women in some countries who are classified as unemployed are not as serious about wanting work as the male unemployed or are more selective about the jobs they will take. But, we have found little evidence for this hypothesis.

Another possible hypothesis about why women in the "high gap" countries take longer to find a job than men is from the 'demand' side. The next section considers this.

3.7 Flows from Unemployment to Employment: The Behaviour of Employers

There are a number of possible reasons why the demand for women may be lower than for men and why such a difference in demand might get reflected in differential unemployment durations and not just wages.

The human capital hypothesis predicts that workers with low levels of human capital will find it harder to get jobs because it is harder to find jobs paying above the reservation wage. If this is the case we would expect to see larger gender gaps in the flows from unemployment to employment for groups where the gender gap in accumulated human capital is likely to be larger like those who are married and those with young dependent children. Table 3.10 presents estimates from annual data on the transition rates from unemployment to employment. The first four columns estimate interactions of the female

the fact that they may attach greater importance to non-wage attributes of jobs.

dummy with marital status and dependent children. As predicted by the human capital hypothesis there is a larger gender gap in flows from unemployment to employment for the married and those with dependent children. There is also however a sizeable estimated gender gap in this transition rate in the "high gap" countries among the single and childless.

This evidence on the importance of human capital is rather indirect so the second part of Table 3.10 investigates whether more direct measures also help to explain the gender gap. The ECHPS contains limited information on work history but we do include a dummy variable for whether the individual has ever worked before and a measure of how long it is since the individual last worked. These variables are themselves significant in explaining the transition rate but they make relatively little difference to the coefficients on the other gender variables as can be seen by comparing the coefficients in the two panels of Table 3.10[19].

As emphasized in the theoretical section it may be that it is the interaction of human capital differences with labour market institutions that is important in explaining the high gender gap in unemployment rates in some countries. Blau and Kahn (2003) have suggested that cross-country differences in the gender pay gap can be explained by gender-unspecific labour market institutions like the minimum wage and collective bargaining. Figure 3.3 shows that there is a weak positive relationship between the gender pay gap and the gender gap in unemployment rates (the t-statistic is 1.2) suggesting that pay compression may lead to divergence in unemployment outcomes[20]. But, this evidence is hardly overwhelming and the decision to employ a man rather than a woman may not be based on a comparison of wages alone.

One source of a difference in the employment costs of men and women comes from maternity leave legislation. But, as Table 3.11 shows, the differences in maternity leave regulations across EU countries are relatively small and the Nordic countries which have generous maternity provisions also have small gender gaps in unemployment rates. Ruhm (1998) found that maternity leave was positively associated with female employment to population ratios (he did not consider unemployment rates).

Another hypothesis is that differing attitudes towards male and female employment may affect the gender gap in unemployment rates (see Algan and Cahuc (2004) for a similar idea that these attitudes are associated with Catholicism). Any such link may come from the supply side with women in some countries being less concerned about getting jobs or from

[19]This is true whether the work history variables are included on their own (as is the case with the estimates presented in Table 10) or interacted with gender.

[20]These gender gaps come from a regression in which personal characteristics are also included.

the demand side with employers thinking that women are less deserving of employment than men and make their hiring decisions accordingly. We can get some idea as to how widespread are discriminatory attitudes from the 1996 Eurobarometer survey that asks respondents whether they agree with the statement "when jobs are scarce, men should have more right to a job than women". In all countries men are more likely than women to think that women are less deserving of employment. But, there are also substantial differences across countries with, crudely, the Nordic countries being less discriminatory and the Mediterranean countries more so. There are also differences across regions within countries e.g. Southern Italy is more discriminatory than Northern Italy. Figure 3.4 plots the proportion against the gender differential in the unemployment rate at regional level, marking the observations with a two-letter code for the country to which they refer. There is a clear positive relationship between the two variables that the first column of Table 3.12 shows is significantly different from zero. One might think that all of this is driven by differences across countries but, while the inclusion of country fixed effects reduces the size of the 'attitudinal' variable it remains significantly different from zero.

However, a problem with this hypothesis is that the discriminatory attitudes have been around for a long time (as can be confirmed by examination of the 1973 and 1986 Eurobarometer surveys that contain similar questions) but, as Figure 3.1 showed, large gender gaps in unemployment rates are a relatively recent phenomenon. One way to reconcile this is the following idea. When overall unemployment rates are high and there are many applicants for most jobs, employers may be faced with a large number of job applicants who are more or less equivalent. In this situation they are more or less free to indulge any slight discriminatory preferences they may have without suffering any loss in profits from doing so (Becker's (1957) model of discrimination would predict this). In contrast, in tight labour markets, waiting for a male job applicant rather than hiring a female one may be a much more costly strategy. Hence, putting prejudices into practice is easier when unemployment is high and there are long queues for jobs as has been the situation in most of the 'high-gap' countries in the 1980s and 1990s[21]. We investigate this hypothesis in the third column of Table 3.11 including the interaction of the male unemployment rate with the attitudinal variable (as well as the level of the male unemployment rate). The interaction term is positive and significantly different from zero.

[21]This does not mean that the exercise of such prejudice is costless: to the extent that certain groups are protected from competition for jobs from other groups, the result is likely to be higher wage pressure and a higher natural rate of unemployment. This conclusion is usually derived in the context of prejudice against the long-term unemployed (see, for example, the 'ranking' model of Blanchard and Diamond, 1994) but the same principles apply to other sorts of prejudice.

3.8 Mismatch

The previous two sections have explored the hypotheses that the female unemployed in some countries might be less serious about getting work than men (a supply side explanation) and that the demand for female workers might be lower (a demand side explanation). Another possibility is that there is simply a mismatch between the types of jobs wanted by the female unemployed and the jobs that employers are offering. Perhaps the most plausible form of mismatch is that women may want part-time jobs but these are very rare in some countries.

We do have some way of investigating this mismatch hypothesis as a number of surveys ask the unemployed whether they are looking for full- or part-time employment. Table 3.13 presents the raw data. There is not much evidence here that there is a large disparity between the type of jobs that women report they want and the type of jobs that are available. For example in Spain the desire for part-time employment among the unemployed is lower than the incidence of part-time working in the employed population (see also Petrongolo (2004) for evidence that, in 'high-gap' countries a higher proportion of women working part-time report that they would prefer a full-time job which is also consistent with this). It seems more likely that, if there is a deficit of part-time jobs in some countries, this results primarily in lower female labour force participation and not in higher unemployment rates.

3.9 Conclusion

In many of the European countries with high unemployment rates, the female unemployment rate is substantially above the male. This important gender gap has hardly been studied: remedying that deficiency is the purpose of this chapter. We show that, in the countries with a large gender gap in unemployment rates, there tends to be a large gender gap in both flows from employment into unemployment and from unemployment into employment. It does not seem necessary to study the flows involving inactivity to understand the gender gap in unemployment rates.

There is a tendency for the gender gap in unemployment rates to be smaller in countries with higher levels of female labour market attachment, to be larger within countries for demographic groups where we would expect the largest gender differences in labour market experience and to fall over time in countries with rapid growth in female labour market attachment. This points to the importance of human capital differences as an important

explanation of the gender gap in unemployment rates.

But this is not perhaps the whole story. Gender gaps in unemployment rates have risen in the past 20 years in many European countries even as the attachment of women to the labour market has risen. It is likely that labour market institutions can explain part of the difference. Institutions that compress wages (like minimum wages or trade unions) or act to the disadvantage of groups with lower levels of labour market attachment (like firing costs and the widespread use of temporary contracts) may magnify the impact of human capital differences on unemployment rates. As the overall level of unemployment is high in many European countries employers may have long queues of workers for jobs and this acts to the disadvantage of women as it makes it easier to indulge any residual prejudice against women.

3.10 Bibliography

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3.11 Tables and Figures

Table 3.1: Gender Gaps in Unemployment Rates Among OECD Countries

	All Working Age (15-64)				Prime-Age (25-54)			
Country	**Male**	**Female**	**Difference**	**Ratio**	**Male**	**Female**	**Difference**	**Ratio**
Spain	11	22.91	11.91	2.08	9.2	21	11.8	2.28
Greece	7.56	17.92	10.36	2.37	6.2	15.2	9	2.45
Italy	8.67	15.71	7.04	1.81	6.6	12.7	6.1	1.92
France	9.66	12.96	3.3	1.34	9	12.6	3.6	1.4
Belgium	.	.			6.1	9	2.9	1.48
Netherlands	2.74	4.49	1.75	1.64	2.1	3.8	1.7	1.81
Luxembourg	1.77	2.68	0.91	1.51	1.4	2.9	1.5	2.07
Germany	8.15	9.22	1.07	1.13	7.2	8.5	1.3	1.18
Denmark	4.69	6.54	1.85	1.39	3.7	4.9	1.2	1.32
Portugal	3.84	5.05	1.21	1.32	3.4	4.6	1.2	1.35
Finland	9.58	10.73	1.15	1.12	7.9	9	1.1	1.14
Switzerland	2.52	3.68	1.16	1.46	2.2	3.2	1	1.45
Japan	4.82	4.46	-0.36	0.93	3.7	4.4	0.7	1.19
Sweden	7.5	6.76	-0.74	0.9	5.2	5.9	0.7	1.13
USA	4.05	4.33	0.28	1.07	3	3.4	0.4	1.13
Austria	3.69	3.85	0.16	1.04	3.4	3.6	0.2	1.06
Australia	7.13	6.64	-0.49	0.93	5.5	5.3	-0.2	0.96
Canada	7.78	7.25	-0.53	0.93	6.5	6.3	-0.2	0.97
NZ	6.94	6.58	-0.36	0.95	5.5	5.3	-0.2	0.96
Norway	3.36	3.05	-0.31	0.91	2.6	2.2	-0.4	0.85
Ireland	5.9	5.5	-0.4	0.93	5.7	4.8	-0.9	0.84
UK	6.75	5.07	-1.68	0.75	5.4	4.3	-1.1	0.8
New OECD Countries								
Hungary	7.52	6.26	-1.26	0.83	6.7	5.6	-1.1	0.84
Turkey	7.49	7.5	0.01	1	5.9	5.5	-0.4	0.93
Mexico	1.78	2.58	0.8	1.45	1.6	2.1	0.5	1.31
Czech Rep	7.27	10.5	3.23	1.44	5.9	9.5	3.6	1.61

Notes.

1. Source: OECD Labour Market Statistics (OECD Statistical Compendium), 1999.

Table 3.2: The Marginal Effects of Characteristics on Gender Gaps in Unemployment Rates

	A Female	B Female	C Female	F*Age(15-24)	F*Age(35-44)	F*Age(45-54)	F*Low Edu	F*High Edu	F*Married	F*Div/Sep	F*Kids(0-12)	F*Kids(13-15)
Spain	0.087 [0.001]**	0.086 [0.001]**	0.052 [0.003]**	0.078 [0.004]**	-0.06 [0.003]**	-0.017 [0.003]**	-0.004 [0.003]	-0.012 [0.003]**	0.075 [0.003]**	-0.075 [0.004]**	0.035 [0.003]**	-0.013 [0.004]**
Greece	0.112 [0.001]**	0.102 [0.001]**	0.067 [0.003]**	0.054 [0.004]**	-0.03 [0.002]**	0.004 [0.003]	0.002 [0.003]	0.002 [0.002]	0.03 [0.003]**	-0.011 [0.005]*	0.026 [0.003]**	0.038 [0.004]**
Italy	0.062 [0.001]**	0.056 [0.001]**	0.045 [0.002]**	0.028 [0.003]**	-0.06 [0.002]**	0.002 [0.002]	0.025 [0.004]**	-0.011 [0.002]**	0.036 [0.002]**	0.006 [0.005]	0.007 [0.002]**	-0.011 [0.003]**
France	0.053 [0.001]**	0.053 [0.001]**	0.042 [0.002]**	0.004 [0.003]	-0.03 [0.002]**	-0.019 [0.002]**	-0.023 [0.002]**	-0.001 [0.002]	0.039 [0.002]**	-0.005 [0.003]	0.043 [0.002]**	0.026 [0.004]**
Belgium	0.084 [0.001]**	0.079 [0.001]**	0.058 [0.003]**	0.017 [0.005]**	-0.03 [0.002]**	-0.001 [0.003]	-0.066 [0.002]**	0.003 [0.003]	0.058 [0.004]**	0.086 [0.006]**	0.043 [0.004]**	-0.024 [0.004]**
Netherlands	0.036 [0.002]**	0.033 [0.002]**	-0.004 [0.005]	0.016 [0.009]	0.001 [0.006]	0.009 [0.006]	-0.006 [0.006]	-0.001 [0.004]	0.045 [0.009]**	0.029 [0.013]*	0.028 [0.008]**	0.028 [0.010]**
Luxembourg	0.007 [0.001]**	0 [0.001]	-0.015 [0.001]**	0.013 [0.002]**	0.02 [0.003]**	0.002 [0.002]	0.014 [0.003]**	-0.004 [0.001]**	0.044 [0.003]**	0.014 [0.003]**	0.002 [0.002]	-0.009 [0.002]**
Germany	0.035 [0.001]**	0.028 [0.001]**	-0.009 [0.002]**	0.01 [0.003]**	0.02 [0.002]**	0.015 [0.002]**	-0.024 [0.002]**	-0.026 [0.001]**	0.05 [0.002]**	0.003 [0.003]	0.048 [0.002]**	0.019 [0.003]**
Denmark	0.046 [0.001]**	0.045 [0.001]**	0.043 [0.002]**	-0.023 [0.003]**	-0.02 [0.003]**	-0.023 [0.002]**	-0.022 [0.002]**	0.032 [0.003]**	0.011 [0.003]**	-0.011 [0.003]**	0.059 [0.004]**	0.046 [0.007]**
Portugal	0.049 [0.001]**	0.053 [0.001]**	-0.008 [0.003]**	0.054 [0.003]**	-0.01 [0.002]*	-0.008 [0.002]**	0 [0.005]	0.022 [0.002]**	0.043 [0.002]**	-0.013 [0.003]**	0.041 [0.002]**	0.01 [0.003]**
Finland	0.019 [0.001]**	0.032 [0.001]**	0.007 [0.003]*	-0.009 [0.004]*	-0.01 [0.003]**	-0.003 [0.003]	0.002 [0.003]	-0.007 [0.003]*	0.044 [0.004]**	0.024 [0.005]**	0.021 [0.003]**	-0.003 [0.004]
USA	0.002 [0.000]**	0.002 [0.000]**	-0.002 [0.001]**	0.004 [0.001]**	-0.01 [0.001]**	0.001 [0.001]	0.007 [0.001]**	-0.001 [0.001]*	0.012 [0.001]**		0 [0.001]	
Austria	0.01 [0.001]**	0.005 [0.001]**	-0.006 [0.002]**	0.016 [0.003]**	0.01 [0.003]**	0.011 [0.003]**	-0.002 [0.004]	0.005 [0.002]*	-0.008 [0.002]**	0.023 [0.004]**	0.024 [0.002]**	0.031 [0.005]**
Ireland	-0.049 [0.001]**	-0.035 [0.001]**	-0.006 [0.003]*	0.038 [0.004]**	-0.04 [0.003]**	-0.027 [0.003]**	0.021 [0.004]**	0.005 [0.003]*	-0.042 [0.002]**	-0.06 [0.002]**	-0.027 [0.002]**	-0.019 [0.003]**
UK	-0.037 [0.001]**	-0.036 [0.001]**	-0.044 [0.002]**	0.016 [0.002]**	0 [0.002]	0.012 [0.002]**	0.018 [0.002]**	0 [0.002]	-0.004 [0.002]*	0.004 [0.002]	-0.003 [0.001]*	-0.002 [0.002]

Notes:
1. Data for European countries come from ECHPS, data for US from CPS. The sample is restricted to to those aged 15-54 inclusive. Dependent variable is whether individual is unemployed conditional on being in the labour force. The reported coefficients are the marginal effects.
2. Coefficient in Column marked A is that on female dummy in probit model of (1). Coefficient in Column marked B is that on female dummy in probit model of (2) where the controls are age, education (high being college graduates, ISCED 5-7, and low being less than second stage of secondary education, ISCED 0-2), marital status and number of children aged 0-12 and 13-15. Coefficient in Column marked C and subsequent columns is that on female dummy and female dummy interacted with characteristics in probit model of (3).
3. Standard errors in parentheses. ** denotes 1% significance level and * denotes 5% significance level.

Table 3.3a: Flows between Labour Market States and Implied Steady-State Unemployment Rates (Men)

country	E→U	E→I	U→E	U→I	I→U	I→E	u-rate (no inactivity)	u-rate (only inactivity)	α	Implied Steady-State U-Rate	Actual U-Rate
Spain	1.5	0.37	7.43	0.85	0.72	1.16	16.8	21.3	0.07	17.1	17.8
Greece	0.63	0.21	9.4	0.61	0.44	0.99	6.3	13.4	0.05	6.6	9.4
Italy	0.52	0.32	3.93	0.71	0.64	0.73	11.7	28.6	0.11	13.5	12.6
France	0.61	0.29	8.43	1.85	0.86	1.33	6.7	9.2	0.12	7	10.1
Belgium	0.35	0.23	5.19	0.68	0.46	0.99	6.3	13.7	0.09	6.9	6
Luxembourg	0.21	0.29	10.69	0.72	0.3	1.82	2	6.1	0.06	2.2	2.6
Germany	0.57	0.29	7.42	1.44	0.42	1.72	7.1	4.7	0.13	6.8	6.1
Denmark	0.69	0.38	10.65	1.72	0.81	2.07	6.1	7.9	0.11	6.3	8.7
Portugal	0.43	0.23	7.44	0.84	0.35	1.14	5.5	7.9	0.08	5.7	5.2
Finland	0.92	1.01	9.06	2.63	0.97	3.44	9.3	9.8	0.19	9.3	11.2
USA	1.26	1.37	51.35	29.22	6.11	10.7	2.4	2.6	0.27	2.5	3.4
Austria	0.61	0.37	14.12	1.35	0.31	1.52	4.1	5.2	0.07	4.2	3.1
Ireland	0.57	0.38	4.57	0.54	0.76	2.54	11.2	17.5	0.09	11.7	12.5
UK	0.61	0.25	7.7	1.49	0.96	1.7	7.4	8.8	0.11	7.5	6.7

Notes.

1. Data for European countries are from retrospective monthly work history data in ECHPS. Retrospective monthly data from Sweden and Netherlands is missing. US data from successive monthly CPS. Sample restricted to those aged between 25 and 54.
2. Hazard Rates are estimated using the methodology described in (7) and refer to monthly percentage transition rates.
3. U-rate (no inactivity) is the formula of (3.4). U-rate (only inactivity) is the second part of the formula of (3.5). α is as defined in (6).

Table 3.3b: Flows between Labour Market States and Implied Steady-State Unemployment Rates (Women)

country	E→U	E→I	U→E	U→I	I→U	I→E	u-rate (no inactivity)	u-rate (only inactivity)	α	Implied Steady-State U-Rate	Actual U-Rate
Spain	1.9	0.89	5.62	1.49	0.37	0.55	25.3	28.7	0.14	25.8	31.9
Greece	1.05	0.79	5.75	1.1	0.25	0.55	15.5	24.9	0.13	16.7	23
Italy	0.74	0.7	3.62	1.11	0.3	0.45	17	29.5	0.18	19.2	24.2
France	0.76	0.44	6.29	1.99	0.49	0.79	10.7	12.1	0.17	11	16.2
Belgium	0.56	0.65	3.19	0.96	0.33	0.92	14.8	19.3	0.19	15.7	9.7
Luxembourg	0.23	0.66	8.61	2.13	0.09	0.83	2.6	3.3	0.18	2.7	5.9
Germany	0.61	0.45	5.03	1.46	0.23	0.97	10.8	6.8	0.18	10	9.6
Denmark	0.93	0.65	7.11	2.54	0.83	1.97	11.6	9.7	0.2	11.2	9.3
Portugal	0.62	0.43	5.85	1	0.21	0.66	9.6	12.1	0.12	9.8	10.5
Finland	1.14	1.59	8.74	3.45	0.91	3.22	11.5	11.6	0.24	11.5	12
USA	1.09	2.69	51.09	46.41	3.59	7.25	2.1	2.8	0.38	2.4	3
Austria	0.59	0.65	9.23	2.11	0.18	0.77	6	6.6	0.16	6.1	5.4
Ireland	0.62	1.24	8.63	2.32	0.18	1.15	6.7	7.6	0.19	6.9	12.4
UK	0.39	0.85	10.27	4.06	0.39	1.64	3.6	4.7	0.24	3.9	4

Notes.

1. As for Table 3.3a.

Table 3.4: Gender Gaps in Labour Market Transition Rates (With Controls)

Country	E→U	U→E	U→I	E→I	I→U	I→E
Spain	0.275 [0.045]**	-0.354 [0.038]**	0.575 [0.066]**	0.884 [0.060]**	-0.366 [0.067]**	-0.574 [0.061]**
Greece	0.538 [0.067]**	-0.47 [0.058]**	0.551 [0.133]**	1.312 [0.067]**	-0.002 [0.103]	-0.608 [0.081]**
Italy	0.394 [0.064]**	-0.138 [0.057]*	0.359 [0.081]**	0.849 [0.056]**	-0.263 [0.066]**	-0.641 [0.080]**
France	0.266 [0.061]**	-0.341 [0.059]**	-0.008 [0.088]	0.422 [0.065]**	-0.497 [0.111]**	-0.525 [0.085]**
Belgium	0.466 [0.100]**	-0.49 [0.115]**	0.424 [0.187]*	1.059 [0.095]**	-0.245 [0.158]	-0.343 [0.123]**
Luxembourg	-0.189 [0.128]	-0.195 [0.111]	0.94 [0.287]**	0.93 [0.086]**	-0.698 [0.266]**	-0.641 [0.114]**
Germany	0.012 [0.043]	-0.425 [0.046]**	0.05 [0.075]	0.395 [0.053]**	-0.519 [0.110]**	-0.34 [0.059]**
Denmark	0.371 [0.071]**	-0.432 [0.068]**	0.387 [0.116]**	0.609 [0.080]**	-0.064 [0.114]	0.026 [0.075]
Portugal	0.446 [0.073]**	-0.3 [0.068]**	0.16 [0.122]	0.69 [0.069]**	-0.257 [0.111]*	-0.56 [0.069]**
Finland	0.344 [0.066]**	-0.068 [0.060]	0.28 [0.088]**	0.629 [0.061]**	-0.341 [0.093]**	-0.179 [0.048]**
USA	-0.114 [0.013]**	-0.012 [0.012]	0.474 [0.014]**	0.474 [0.014]**	-0.463 [0.015]**	-0.436 [0.011]**
Austria	-0.05 [0.093]	-0.511 [0.102]**	0.578 [0.168]**	0.527 [7.12]**	-0.408 [0.176]*	-0.509 [0.079]**
Ireland	0.062 [0.080]	0.401 [0.079]**	1.058 [0.164]**	1.174 [0.077]**	-0.687 [0.129]**	-0.22 [0.057]**
UK	-0.473 [0.054]**	0.292 [0.053]**	1.019 [0.078]**	1.206 [0.051]**	-0.76 [0.084]**	-0.111 [0.050]*

Notes.

1. Data as for Table 3a. Controls are age, education, marital status and number of children.

Table 3.5: Gender Differences in Flows from Employment to Unemployment

	No Controls	Controls on Personal Characteristics	Controls on Personal Characteristics and Interactions				Controls on Personal and Job Characteristics
Country	Coefficient on Female dummy	Coefficient on Female dummy	Coefficient on Female Dummy	Coefficient on Female* married	Coefficient on Female* kids0-12	Coefficient on Female* kids13-15	Coefficient on Female dummy
Spain	0.222 [0.052]**	0.239 [0.054]**	0.199 [0.080]*	0.01 [0.116]	0.071 [0.141]	0.167 [0.194]	0.141 [0.060]*
Greece	0.531 [0.074]**	0.549 [0.076]**	0.516 [0.114]**	0.01 [0.169]	0.061 [0.214]	0.364 [0.285]	0.554 [0.084]**
Italy	0.056 [0.070]	0.136 [0.071]	0.1 [0.098]	-0.134 [0.160]	0.254 [0.195]	0.205 [0.277]	0.018 [0.077]
France	0.357 [0.096]**	0.432 [0.097]**	0.158 [0.152]	0.394 [0.207]	0.358 [0.232]	-0.393 [0.422]	0.279 [0.118]*
Belgium	0.717 [0.132]**	0.803 [0.134]**	0.449 [0.207]*	0.348 [0.284]	0.677 [0.391]	0.039 [0.657]	0.729 [0.162]**
Netherlands	0.597 [0.133]**	1.007 [0.118]**	0.168 [0.202]	0.527 [0.305]	0.172 [0.353]	0.592 [0.443]	1.152 [0.150]**
Luxembourg	0.334 [0.296]	0.28 [0.302]	-0.43 [0.515]	1.511 [0.688]*	-0.069 [0.796]	-0.014 [1.491]	0.149 [0.394]
Germany	0.153 [0.053]**	0.083 [0.054]	-0.374 [0.090]**	0.486 [0.115]**	0.289 [0.135]*	0.468 [0.213]*	0.108 [0.065]
Denmark	0.612 [0.118]**	0.636 [0.120]**	0.238 [0.173]	0.206 [0.249]	0.586 [0.323]	13.362 [363.531]	0.502 [0.140]**
Portugal	0.448 [0.078]**	0.543 [0.080]**	0.243 [0.136]	-0.006 [0.169]	0.681 [0.191]**	0.427 [0.275]	0.49 [0.086]**
Finland	0.358 [0.124]**	0.435 [0.127]**	0.204 [0.214]	0.405 [0.271]	0.011 [0.290]	-0.071 [0.421]	0.451 [0.153]**
Sweden	0.014 [0.093]	0.205 [0.125]	0.117 [0.169]	0.095 [0.196]	-0.36 [0.211]	-0.02 [0.280]	0.367 [0.151]*
Austria	0.29 [0.122]*	-0.011 [0.111]	0.271 [0.197]	-0.691 [0.260]**	0.712 [0.279]*	0.211 [0.498]	-0.202 [0.131]
Ireland	-0.103 [0.108]	-0.223 [0.089]*	0.12 [0.175]	-0.232 [0.235]	-0.048 [0.271]	-0.521 [0.413]	-0.234 [0.103]*
UK	-0.188 [0.089]*	0.028 [0.094]	-0.211 [0.131]	-0.129 [0.187]	0.091 [0.245]	0.314 [0.341]	0.032 [0.104]

Notes.

1. Data is from ECHPS. The sample is all those who are employed at one interview and employed or unemployed subsequently. Model estimated is a cloglog model where the dependent variable takes the value one if the individual is still employed.
2. Standard errors in parentheses.
3. The ILO main activity status is used for Sweden as the Self-Defined main activity status question, used for the other countries, is not asked.
4. Controls are age, education, marital status and number of children.

Table 3.6: Reasons for leaving Previous Job (%)

Country	Sex	Currently Unemployed				Currently Inactive			
		Obliged by Employer	End of Contract	Child Birth/ Care	Sick/ Disabled /Retired/ Other	Obliged by Employer	End of Contract	Child Birth/ Care	Sick/ Disabled /Retired/ Other
Spain	M	22	63	0	15	20	20	0	60
	F	17	64	5	14	12	30	16	41
Greece	M	38	37	0	26	10	5	0	85
	F	38	39	5	18	16	13	22	49
Italy	M	39	36	1	23	16	6	0	78
	F	28	46	4	22	13	12	21	53
France	M	41	44	0	15	33	5	1	60
	F	34	44	6	17	17	11	21	51
Belgium	M	55	18	0	27	37	2	0	61
	F	43	22	8	26	21	8	16	55
Netherlands	M	30	15	2	53	8	4	1	86
	F	12	12	42	35	7	8	38	47
Germany	M	59	20	0	21	46	10	0	45
	F	54	22	1	23	27	8	19	47
Denmark	M	42	26	1	31	10	11	0	79
	F	36	29	7	29	12	14	5	70
Portugal	M	24	40	0	37	4	5	0	91
	F	24	44	4	29	6	12	11	71
Finland	M	28	57	0	14	10	31	0	58
	F	22	60	4	14	9	34	9	48
Austria	M	43	10	1	47	12	2	0	86
	F	33	15	18	34	9	3	36	53
Ireland	M	41	33	1	25	18	7	1	73
	F	26	33	3	38	11	10	36	43
UK	M	45	18	1	37	22	6	4	68
	F	23	16	16	45	12	6	36	46

Notes:

1. Data from ECHPS. Question only asked of those who have worked within the last two years.
2. Other reasons includes: Marriage, Move for partner's job, Closure of own business & Study/National service.

Table 3.7: Are the Unemployed More Likely than the Inactive to Get a Job?

	Female		Female& Unemployed in t=0		Unemployed in t=0
Spain	-0.124 [0.164]		0.418 [0.069]**		1.702 [0.047]**
Greece	-0.302 [0.253]		0.426 [0.105]**		1.985 [0.074]**
Italy	-1.04 [0.324]**		0.611 [0.100]**		1.452 [0.070]**
France	-0.269 [0.196]		0.19 [0.100]		1.557 [0.077]**
Belgium	-0.836 [0.347]*		-0.513 [0.169]**		1.396 [0.131]**
Luxembourg	-0.203 [0.325]		0.317 [0.159]*		0.793 [0.112]**
Germany	-0.093 [0.157]		0.094 [0.070]		1.392 [0.051]**
Denmark	-0.428 [0.219]		-0.434 [0.104]**		1.78 [0.081]**
Portugal	-0.346 [0.227]		0.289 [0.097]**		1.724 [0.070]**
Finland	0.059 [0.196]		0.137 [0.078]		0.911 [0.059]**
USA	-0.035 [0.026]		0.266 [0.016]**		1.145 [0.012]**
Austria	-0.45 [0.303]		0.171 [0.129]		2.149 [0.092]**
Ireland	-0.341 [0.265]		0.491 [0.104]**		0.972 [0.067]**
UK	-0.179 [0.138]		0.235 [0.073]**		1.579 [0.055]**

Notes.

1. The sample is all those who are not in employment in an initial month and the dependent variable is whether they are still not in employment a month later. The other controls included are: age, education level, gender, presence and age of children and the gender dummy interacted with the other controls.
2. Data for European countries from ECHPS retrospective work history data; data for US from successive monthly CPS files.

Table 3.8: Methods of Job Search Among the Unemployed (%)

	US (CPS) method mentioned		UK (LFS) method mentioned		Spain (LFS) method mentioned	
	Men	Women	Men	Women	Men	Women
contacted public employment service or other public body	22.2	19.9	83.9	63.0	88.6	86.0
applied directly to employers	66.2	62.8	57.4	49.1	25.4	20.0
placed or answered advertisements	16.5	16.4	65.0	60.6	14.2	16.7
sent out resumes/applications	39.0	44.4	47.1	45.2	5.7	7.1
looked at advertisements	20.9	21.6	90.9	91.7	14.8	17.4
contacted friends/ relatives/unions	19.8	13.9	70.1	60.4	51.2	48.0
private employment agency	6.5	6.5	24.1	18.4	3.2	4.0
other	8.6	9.0	9.3	7.5	5.1	7.1
Average number of search methods	2.00	1.94	4.70	4.08	1.98	1.96
Number of observations	92,001	92,001	117,941	70,152	284,684	328,296

Notes.

1. Data from the CPS is from the period 1/97-12/98; from the UK and Spanish LFS is for 3/1992-2/2003.
2. The classification of search methods is different in the three countries and some re-classification has been done.
3. For Spain, data on the method "looked at advertisements" is only available after 1999.
4. For Spain, until 1998, the maximum number of methods respondents could answer was 3. From 1/1999 to 3/2002, the fraction of unemployed answering "4 or more methods" was 15.9% for males and 15.7% for females.

Table 3.9: Benefit Receipt Among the Unemployed

Country	Male	Female
Spain	34.56	15.86
Greece	13.62	9.41
Italy	4.29	3.28
France	51.01	40.55
Belgium	79.85	73.99
Luxembourg	22.22	17.86
Germany	68.7	69.44
Denmark	85.8	83.72
Portugal	26.92	23.37
Finland	79.66	75.43
Austria	59.45	43.5
Ireland	87.86	44.9
UK	33.25	17.21

Notes.

1. Source: ECHPS. The question asked is "Do you receive unemployment benefit or assistance?"

Table 3.10: Gender Differences in Flows from Unemployment to Employment

	Controls on Personal Characteristics and Interactions				Controls on Personal Characteristics, Work History and Interactions			
Country	Coefficient on Female Dummy	Coefficient on Female* married	Coefficient on Female* kids0-12	Coefficient on Female* kids13-15	Coefficient on Female Dummy	Coefficient on Female* married	Coefficient on Female* kids0-12	Coefficient on Female* kids13-15
Spain	-0.24	-0.066	-0.195	0.048	-0.206	-0.139	-0.148	0.062
	[0.064]**	[0.101]	[0.115]	[0.162]	[0.064]**	[0.101]	[0.116]	[0.163]
Greece	-0.412	-0.123	-0.455	-0.239	-0.401	-0.117	-0.445	-0.243
	[0.089]**	[0.150]	[0.192]*	[0.230]	[0.089]**	[0.150]	[0.193]*	[0.230]
Italy	-0.34	-0.059	-0.17	0.13	-0.328	-0.06	-0.234	0.081
	[0.072]**	[0.147]	[0.174]	[0.216]	[0.073]**	[0.148]	[0.175]	[0.216]
France	-0.213	-0.015	-0.438	-0.057	-0.211	-0.051	-0.323	-0.072
	[0.130]	[0.199]	[0.222]*	[0.399]	[0.130]	[0.199]	[0.222]	[0.400]
Belgium	-0.349	-0.367	0.076	0.022	-0.396	-0.325	0.125	-0.175
	[0.190]	[0.289]	[0.343]	[0.627]	[0.191]*	[0.289]	[0.344]	[0.632]
Netherlands	-0.284	-0.164	-0.819	0.742	-0.31	-0.158	-0.708	0.668
	[0.165]	[0.223]	[0.251]**	[0.400]	[0.164]	[0.223]	[0.253]**	[0.404]
Luxembourg	-0.051	-0.111	-0.238	-0.128	-0.053	-0.111	-0.241	-0.125
	[0.098]	[0.125]	[0.148]	[0.237]	[0.098]	[0.125]	[0.148]	[0.237]
Germany	-0.521	0.245	0.336	0.437	-0.506	0.245	0.381	0.385
	[0.173]**	[0.246]	[0.305]	[0.629]	[0.174]**	[0.247]	[0.306]	[0.630]
Denmark	-0.241	0.043	-0.123	0.191	-0.227	0.025	-0.107	0.19
	[0.110]*	[0.148]	[0.170]	[0.248]	[0.111]*	[0.149]	[0.170]	[0.248]
Portugal	0.04	-0.159	-0.058	0.192	-0.047	-0.105	0.064	0.063
	[0.194]	[0.256]	[0.267]	[0.446]	[0.196]	[0.258]	[0.269]	[0.448]
Finland	-0.21	-0.098	0.194	0.244	-0.21	-0.098	0.194	0.244
	[0.138]	[0.269]	[0.267]	[0.399]	[0.138]	[0.269]	[0.267]	[0.399]
Sweden	0.638	-0.108	-0.836	-1.164	0.655	-0.223	-0.627	-0.888
	[0.214]**	[0.311]	[0.317]**	[0.575]*	[0.218]**	[0.312]	[0.320]	[0.587]
Austria	0.103	0.811	0.311	0.218	0.121	0.433	0.353	0.312
	[0.131]	[0.255]**	[0.222]	[0.362]	[0.132]	[0.258]	[0.224]	[0.369]
Ireland	0.244	0.473	0.473	0.076	0.179	0.437	0.416	0.074
	[0.119]*	[0.193]*	[0.238]*	[0.363]	[0.121]	[0.195]*	[0.239]	[0.366]
UK	-0.24	-0.066	-0.195	0.048	-0.206	-0.139	-0.148	0.062
	[0.064]**	[0.101]	[0.115]	[0.162]	[0.064]**	[0.101]	[0.116]	[0.163]

Notes.

1. Data is from ECHPS. The sample is all those who are unemployed at one interview and employed or unemployed subsequently. Model estimated is a cloglog model where the dependent variable takes the value one if the individual is still unemployed.
2. Standard errors in parentheses.
3. The ILO main activity status is used for Sweden as the Self-Defined main activity status question, used for the other countries, is not asked.

Table 3.11: Maternity Leave Legislation, 1999-2000

	Maternity Leave			Parental Leave		
Country	Length (weeks)	Payment (% earnings)	Continuation of payment by employer	Length (months)	Maximum child age (years)	Payment
Austria	16	100	low wage workers	3 –24	2	410 euros/month
Netherlands	16	100	No	6	8	unpaid
Spain	16	100	No	-	3	unpaid
Luxembourg	16	-	No	6	5	1487 euros/month
Germany	14	100	No	-	3	306 euros/month
Greece	14	100	No	3.5	3.5	unpaid
Italy	18	80	No	10	3	30%earnings
France	16-26	84	Yes	-	3	461 euros/month
UK	14	90	No	3.25	5	unpaid
Portugal	12.5	100	No	6	3	unpaid
Denmark	18	67	Yes	2-12	8	920 euros/month
Finland	17.5	66	Yes	6.5	3	10 euros/day
Belgium	15	82 first month, 75 rest	No	3	4	505 euros/month
Ireland	14	70	No	3.5	5	unpaid
Sweden	12	80	-	18	8	80%earnings
USA	12	unpaid	No	-	-	-

Notes.

1. The Council Directive 92/85/EEC of 19 October 1992 sets a minimum of period of 14 weeks (including the two weeks before and after birth) of maternity leave. The amount of maternity pay is fixed by the national legislation of the country and should be at least equal to the value of sick pay.
2. There is no EU regulation regarding paternity leave. In most countries this is, at most, just a few days after birth.
3. Council Directive 96/34/EC of 3 June 1996 sets a minimum period of 3 months of parental leave. Both parents have a three months entitlement, but one parent cannot transfer the right to parental leave to the other. Payment is legislated at country level. Directive 97/75/EC extends the scope of Directive 96/34/EC to the United Kingdom.
4. For the USA, maternity leave is regulated within the Family and Medical Leave Act (1993). It allows eligible employees (tenure >1year) of a covered employer (number of employees> 50) to take unpaid leave (or to substitute paid leave if the employee has earned or accrued it) because birth/care of a child as well as for health conditions of the employee or family member.
5. In Denmark, payments are based on unemployment benefits.
6. In the UK, only employees with tenure of more than 26 weeks are eligible for maternity pay. Employees with more than 1 year of employment with the same employer have the right of "additional" maternity leave.
7. In France, parental leave is paid only for workers having 2 or more children.
8. In Germany, parental leave is paid until the child is 2 years old and for workers below a certain household income.

Table 3.12: The Impact of Attitudes on the Gender Gap in Unemployment Rates

	(1)	(2)	(3)
Preference for male employment	11.91 [2.56]	5.71 [1.99]	5.76 [1.99]
Preference for male employment* (male unemployment rate-9.6)			1.29 (0.27)
male unemployment rate			-0.16 (0.12)
constant	0.43 [0.92]	2.47 [0.69]	2.47 [0.69]
Country fixed effects	No	Yes	Yes
Number of observations	139	139	139

NOTES:

1. The dependent variable is the gap between female and the male unemployment rate. Each observation is a region in a country in 1996.
2. The variable 'preference for male employment' is the fraction agreeing with the statement "when jobs are scarce, men should have more right to a job than women" – this comes from a 1996 Eurobarometer survey.

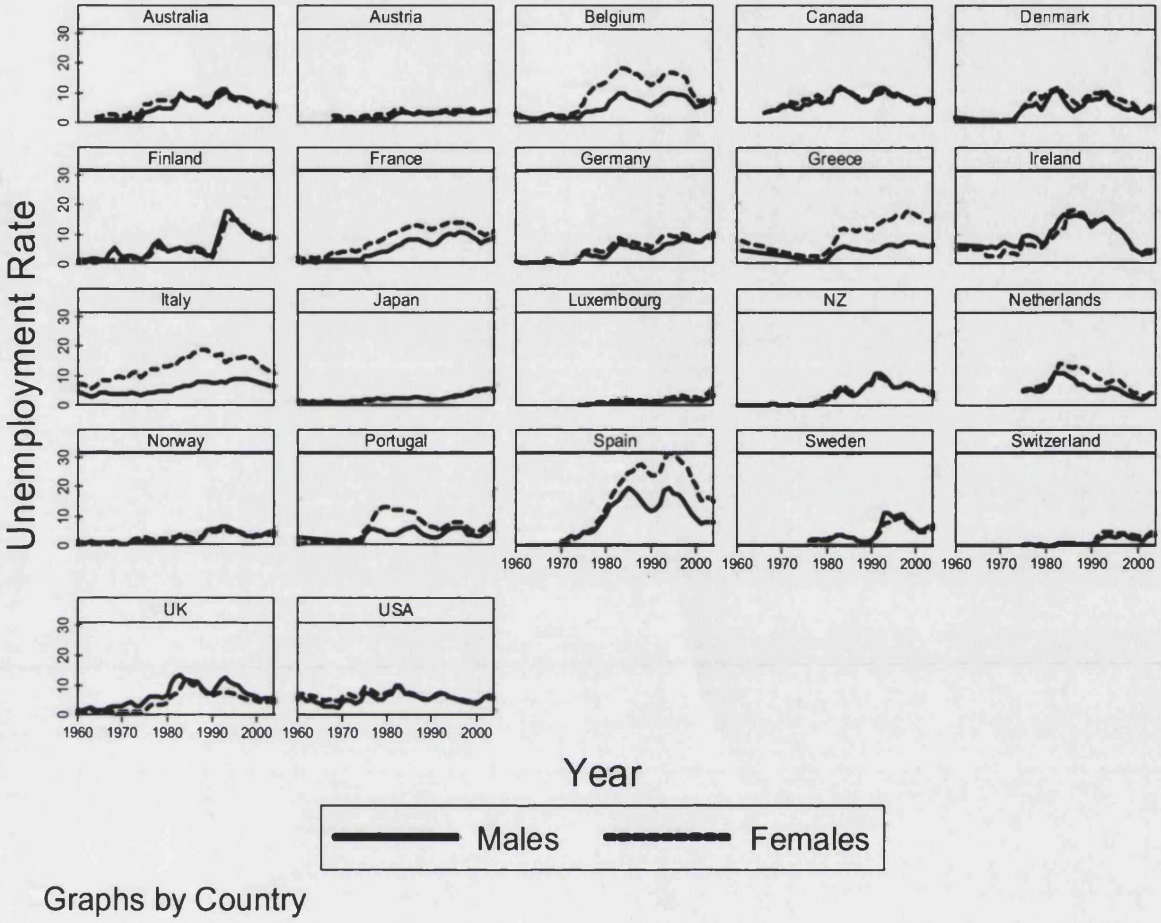
Table 3.13: Part-time Employment

	Female		Male	
	Unemployed wanting PT work (%)	Employed Working Part-Time (%)	Unemployed wanting PT work (%)	Employed Working Part-Time (%)
Spain	7.8	16.5	1.3	2.6
Greece	6.8	5.7	0	2.6
Italy	34.4	12.4	3.7	2.8
France	23.2	30	2.7	5.3
Belgium	20.1	34	2.1	3.2
Netherlands	72.4	68.7	15.3	16.7
Luxembourg	36.1	18.1	0	1.3
Germany	23.7	33.6	3.2	3.3
Denmark	16.3	35.1	0	11.4
Portugal	0	8.3	0	1.6
Finland	7.1	15.2	0	6.5
Sweden	19.4	42.6	2.9	8.3
Austria	44.8	28.7	3.8	3
Ireland	47.2	22.2	0	5.7
UK	55.1	44.2	5.2	7.5

Notes.

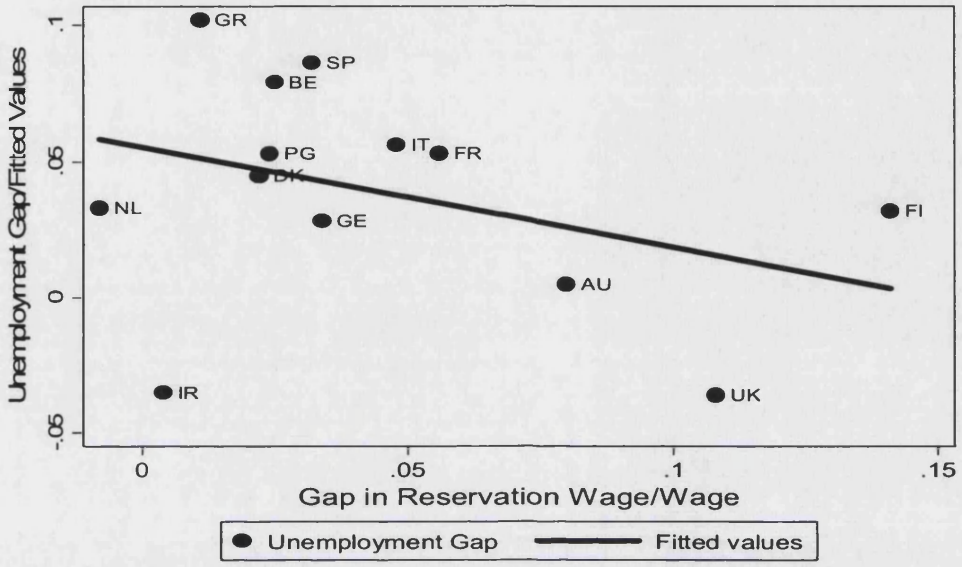
1. Source: Eurostat Labour Force Survey, 1996.

Figure 3.1: Unemployment Rates by Gender Over Time



Source: OECD. Figures relate to population of working age.

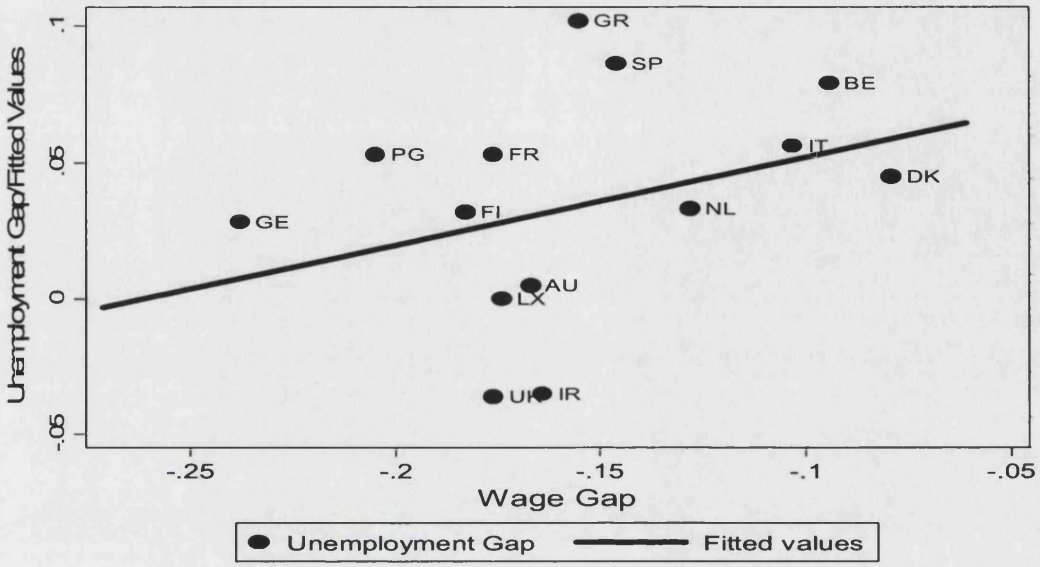
Figure 3.2: The Gender Gap in Unemployment Rates and Reservation Wage/Wage Ratios



Notes.

1. The gender gaps in unemployment rates come from the coefficient on a female dummy in a probit regression for being unemployed where personal characteristics are included as controls (this is column B of Table 3.2). The gender wage gaps come from a similar regression where the dependent variable is the log of the hourly wage and the gender gap in reservation wages from a similar regression where the dependent variable is the log of the hourly reservation wage.

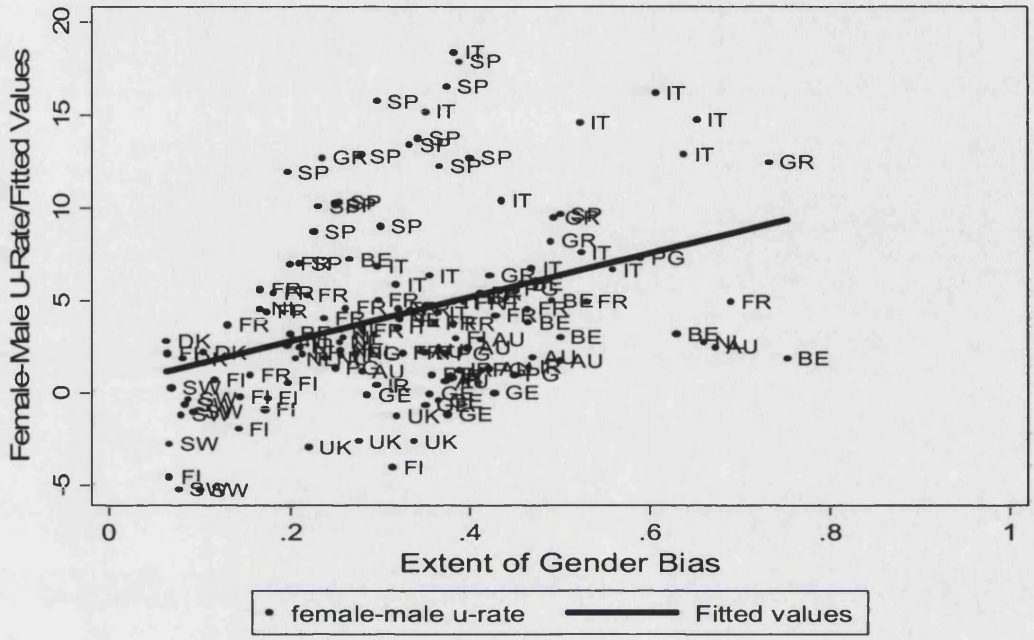
Figure 3.3: The Gender Gap in Unemployment Rates and in Wages



Notes

1. Data sources as for Figure 3.2.

Figure 3.4: Prejudice and the Gender Gap in Unemployment Rates



Notes.

1. The vertical axis is the average of the gap between female and male unemployment rates over the period 1996-2000 inclusive.
2. The horizontal axis is the fraction agreeing with the statement "when jobs are scarce, men should have more right to a job than women".

Chapter 4

Is Privatisation Behind the Rise in the Profit Share? A Cross Country Industry Panel Data Analysis.

4.1 Introduction

It is unusual to see a leader in the Economist Magazine declaring "Capitalist are grabbing a rising share of national income at the expense of workers"[1]. But it is a fact that the share of profits in national income in the Eurozone area and Japan are at their highest for 25 years. After tax profits are at their highest share in the US for 75 years. The Economist attributes these changes to globalisation, but (as we show below) these changes have taken place in many non-traded sectors of the economy[2]. By contrast economists have tended to attribute the fall in the labour share to deregulation in both labour and product markets.

The deregulation of product and labour markets has been a mantra of economic policy advice for many years and has been taken up in earnest over the last two decades. Supporters claim two main benefits. First, deregulation may have benefits in lowering unemployment which has remained high in many of the large European countries since the early 1980s (e.g. Nickell (2003)). Second, deregulation has more recently been advocated as a way of spurring European productivity growth in the light of recent evidence that

[1] "Breaking Records" The Economist Februray 12th 2005.

[2] Although there could be general equilibrium effects that affect the non-traded sectors.

the United States ended its 20 year productivity slowdown sometime in the mid 1990s (e.g. Stiroh (2002)). Much discussion focuses on labour market regulation but there is a growing feeling that product market regulation may be equally important and this chapter focuses on the impact of two aspects of product market regulation, privatisation and barriers to entry.

Since there is no 'standard' way in which to think about the effect of privatisation, we consider three possibilities: first, the affect it has on competition in the product market. Second, the changes in the objective function of the employer. Third, the effect that privatisation has on the bargaining power over wages of workers. The theoretical model in the chapter includes all three elements and although there are contrasting predictions, we find that when we consider a change in the objective function of the employer, specifically a reduction in the extent to which they value employment, this lead to a reduction in the wage bill share, an increase in wages and a reduction in employment. In particular, it is likely that productivity will increase as the private sector is assumed to more aggressive in seeking out cost reductions and because of the impact of more competition. With regard to wages, it is likely that as private firms find it more difficult to indulge in preferences for jobs by over-employing unskilled workers, leading to a higher average wage.

When considering the theoretical reductions in barriers to entry in the product market, we would expect there to be an impact in reducing price cost margins and therefore to increase the share of labour in value added. If there is any bargaining over the wage then wages will partly be a function of the quasi-rents earned in the industry. Falling barriers to entry reduces the availability of these rents and therefore the nominal industry wage is likely to fall (in the long-run aggregate prices will also fall so the real wage in the economy as a whole will increase from a reduction in the entry barriers throughout the economy).

We focus on testing the effects that deregulation have on the wage bill share, employment and wage which come directly out of most models with imperfect competition in the product and labour markets. The mechanisms are germane to models which predict improvements in employment as a result of product market deregulation.

Despite this interest in deregulation, the empirical work in the area is rather disappointing. Most authors work with aggregate data of one sort or another using cross-country panel regressions (Nicoletti and Scarpetta (2003a,b), Nickell (2003)). Results tend to be rather fragile (see Baker et al (2003)). In our view the main reason for this fragility is that there are many events occurring simultaneously at the macro-level and disentangling the impact of product market deregulation from these other events is a formidable task.

This problem can be illustrated with a simple example from our dataset. There is a clear

theoretical prediction from most models that reducing public ownership and barriers to entry in the product market should increase the share of labour in value added (price costs margins are squeezed because of increased competition arising from actual or potential entry). This in turn should lower the long-run equilibrium rate of unemployment. Consider an aggregate cross country panel OLS regression of the $SHARE$ of the wage bill in GDP. In our data estimating this equation delivers the following encouraging results (standard errors in brackets):

$$SHARE = 0.006(0.001)PO - 0.029(0.003)BTE + timedummies.$$

(Observations = 327, R^2=0.35)

Consistently with the theory an increase in the barriers to entry (BTE) index is associated a fall in the labour share of value added. This is significant at the 1% level. Similarly an increase in the public ownership index (PO) is associated with a significant increase in the share of labour in value added. Unfortunately, using a fixed effect estimator by including a set of country dummies completely destroys the results.

$$SHARE = -0.001(0.164)PO - 0.001(0.206)BTE + time\ dummies + country\ dummies.$$

(Observations = 327, R^2=0.93)

Both variables have standard errors with orders of magnitude larger than the point estimates. Some researchers respond to these findings by attempting to control for the unobserved country effects by including observed country-wide variables instead of fixed effects. But this is likely to be difficult because of the wide range of other unobserved nation-specific factors. Other researchers attempt to estimate much more sophisticated models including country-specific time trends, longer lags, interactions between policies and so on. But this is likely to make the identification problem worse, not better (see Baker et al (2003), for a strong criticism of the robustness of the empirical cross country unemployment and regulation literature). Our proposal in this chapter is to use some of the inter-industry variation within countries (and over time) to identify the effects. We find that better data helps a lot.

A second problem with the existing literature on the macro-effects of regulatory change is that product market deregulation tend to be focused in particular sectors so a sector specific approach is more attractive. There is a significant line of research focusing on single sectors[3]. Although enlightening, the disadvantage of this very micro approach is that it is hard to generalise to other sectors or across the economy as a whole. In this

[3]For example, Rose (1987) on trucking; Roller et al (2003) on Airlines or Olley and Pakes (1996) on telecommunications equipment.

chapter we take an intermediate approach using panel data from sectors across several OECD countries. These are the "network industries" that have seen the greatest degree of regulatory reform – telecoms, post, gas, electricity, airlines, railways and roads. The timing of reform and the extent of reform vary significantly between countries. We exploit this differences as quantified in some new OECD data on public ownership and barriers to entry to explicitly test some key economic mechanisms[4]. First, does public ownership matter? Second, do falls in entry barriers change labour's position? Finally, what is the role of labour market institutions?

Our results suggest that disaggregation and controls for unobserved heterogeneity are vital in order to find results that are consistent with the economic theory of imperfect competition in product and labour markets. We find that falling public ownership is associated with a higher wage bill share and this is driven by the positive effect of public ownership on employment. Thus strongly suggests that privatisation is an important reason for the falling wage bill share in the network industries in the OECD. Barriers to entry also appear to matter, in that higher barriers to entry are generally associated with lower labour share. This result is, however, less robust than the public ownership result.

These findings that privatisation tended to reduce labour's share helps to answer the question of why labour's share tended to fall in the OECD despite falling entry barriers (see Torrini (2005) or Blanchard and Giavazzi (2003)). The impact of privatisation does exert a strong downward pressure on labour's share and this is only partially offset by the increase in product market competition. As a consequence labour's share has fallen. Other things equal, the fall in public ownership may account for a majority of the fall in labour's share in our sample. An alternative explanation may be that deregulation on the labour market side could labour's share through declines in worker bargaining power. However, in our analysis we do not find support for the labour market deregulation hypothesis.

The structure of the chapter is as follows: Section 4.2 lays out some basic theory and Section 4.3 details the econometric modelling approach. Section 4.4 describes our data and Section 4.5 discusses our results. We offer some concluding remarks in Section 4.6.

4.2 Basic Model

This section will present some simple models to enable us to think about the likely impact of barriers to entry and privatisation on the variables of interest. In modelling the impact

[4]The only other paper that uses regulation data in a cross country industry level panel setting is Alessini et al (2003). They find evidence that entry barriers reduce investment.

of barriers to entry we simply follow others (e.g. Blanchard and Giavazzi (2003)) and think about it as a change in competition in the product market.

However, there is no 'standard' way to think about the effect of privatisation and we discuss a number of possibilities here. First, it may affect the degree of competition in the product market. Secondly, it may change the objective function of the employer from whatever it is that a public-sector firm maximizes to profit-maximization. Thirdly, it may affect the bargaining power over wages of workers – it is common to hear the view that public-sector unions are more powerful than their private-sector counterparts. We present a model which has all three elements.

First consider the specification of the preferences of a public-sector employer. We assume that the public sector firm cares not only about profits (Π) but also about total employment (N). This may be due to political pressure, or to the desire of (weakly monitored) managers to build empires. Whatever the cause we assume that the value function of the firm is $U(\Pi, N)$ where $\frac{\partial U}{\partial \Pi} \geq 0, \frac{\partial U}{\partial N} \geq 0$ and U is a concave function. In this case we can write the first order condition as:

$$VMPL = W - (\frac{\partial U}{\partial N} / \frac{\partial U}{\partial \Pi}) \tag{4.1}$$

where $VMPL$ is the value of the marginal product of labour. This implies that, for a given wage, the firm will have an employment level higher than would be the case if the firm simply maximized profits. In what follows we assume that the utility function of the public-sector employer has the particular functional form:

$$U = \Pi^{1-\phi} N^{\phi} \tag{4.2}$$

where $0 \leq \phi < 1$. Privatisation can be thought of as a reduction in ϕ.

To give more intuition over the determinants of the wage bill share we consider some specific functional forms. A representative organisation has surplus

$$\Pi = PQ - WN \tag{4.3}$$

where P is price, Q is value added, W is the wage rate and N is employment. The product market is imperfectly competitive so the firm faces the inverse demand curve

$$P = BQ^{-\eta} \tag{4.4}$$

where B is a demand index. Output is produced with the production function

$$Q = CN^{\alpha} \tag{4.5}$$

Substituting (4.3)-(4.5) into (4.2) we have that:

$$\log U = (1-\phi)\log[BC^{1-\eta}N^{\alpha(1-\eta)} - WN] + \phi \log N \tag{4.6}$$

If we choose N to maximize this given the wage this leads, after some re-arrangement to the following expression for log employment:

$$\log N = \frac{1}{1-\alpha(1-\eta)}[-\log W + \log B + \log C^{1-\eta} + \log(\alpha(1-\eta)(1-\phi) + \phi] \tag{4.7}$$

There are several points worth noting about this 'labour demand curve'. First, the stronger the preference of the employer over employment the higher will be employment for a given wage. Secondly, the 'labour demand curve' slopes downwards with an elasticity that does not depend on the wage. The easiest way to understand this is to think about the case where the employer only cares about employment ($\phi = 1$). Then employment will be chosen to make profits zero, but the higher is the wage the lower the level of employment that delivers zero profits.

One can also derive a simple expression for the labour share from this maximization. One can write $VMPL$ as:

$$VMPL = \alpha P(1-\eta)\frac{Q}{N} \tag{4.8}$$

Substituting these into the first order condition (4.1) gives

$$\alpha P(1-\eta)\frac{Q}{N} = w - (\frac{\phi}{1-\phi})(\frac{PQ}{N} - W) \tag{4.9}$$

Re-arranging and solving for the wage bill share:

$$s = \frac{WN}{PQ} = \alpha(1-\eta)(1-\phi) + \phi \tag{4.10}$$

So that the wage bill share is independent of the wage – of course, this derives from the assumption that all functions are iso-elastic. (4.10) shows the key relationships we will focus on in the chapter. In the standard case of perfect competition (i.e. ϕ =0 and η = 0), equation (4.10) shows that the wage bill share will be equal to the technological parameter, α. However, if there is some degree of public ownership then as ϕ >0 the wage bill share will be higher all else equal. Second, the greater the degree of monopoly power (a lower η) the lower will be the wage bill share all else equal. We focus on higher barriers to entry (BTE), such as those caused by legal or bureaucratic rules as a source of market power.

One further result that will be useful in what follows is the elasticity of employer utility with respect to the wage. By differentiating (4.6) and using the envelope condition we can show that the elasticity of utility with respect to wages is:

$$\varepsilon_{Uw} = -\frac{\partial \log U}{\partial \log W} = (1-\phi)\frac{s}{1-s} = \frac{\alpha(1-\eta)(1-\phi)+\phi}{1-\alpha(1-\eta)} \tag{4.11}$$

Note that this elasticity is increasing in so that an employer who cares a lot about employment will find their utility reduced more by a given wage increase than one who does not. The simplest way to understand this is to think of the two extreme cases $\phi = [0, 1]$ in which the employer either only cares about employment or profits. If it only cares about employment, a rise in the wage then reduces employer utility as it reduces employment with an elasticity that is the elasticity of the labour demand curve which, with the assumptions made is greater than the elasticity of profits with respect to the wage[5].

Now consider the determination of the wage. We consider Nash bargaining between the workers which has the form:

$$\Omega = \beta \log V + (1-\beta)\log U \tag{4.12}$$

Where V is the utility of the workers and β is the bargaining power of workers. We assume that the preferences of the workers can be written as:

[5]Note this result may not be robust to alternative assumptions about technology so should be thought of as a possibility rather than a certainty.

$$\log V = \log(W - A) + \gamma \log N \tag{4.13}$$

where A is the present value of the alternative "outside" wage and γ is the union's preferences over employment. Differentiating Ω with respect to wages and re-arranging delivers the "wage equation":

$$W = \frac{\beta\gamma\varepsilon_{Nw} + (1-\beta)\varepsilon_{Uw}}{\beta\gamma\varepsilon_{Nw} + (1-\beta)\varepsilon_{Uw} - \beta} A = (1+\mu)A \tag{4.14}$$

Where:

$$\mu = \frac{\beta[1-\alpha(1-\eta)]}{\beta\gamma + (1-\beta)\alpha(1-\eta)(1-\phi) + \phi} \tag{4.15}$$

μ can be thought of as a wage mark-up over the outside option. With these results we can develop our predictions about the effects of various changes on the wage bill share, wages, employment, and productivity.

First consider an increase in product market competition, modelled as a lower sensitivity of price to output i.e. a reduction in η . This will raise the wage bill share – from (4.10), reduce wages – from (4.14) (as it makes the labour demand curve more elastic) and increase employment.

Second, consider a decrease in worker bargaining power. This will reduce wages, raise employment but leave the labour share unchanged[6].

Third, consider a change in the objective function of the employer, specifically a reduction in the extent to which they value employment per se. From (4.10) this will lead to a reduction in the labour share, from (4.14) this will lead to an increase in wages, and a reduction in employment.

These predictions are summarized below:

	[1]	[2]	[3]
Labour Share	+	0/-	-
Employment	+	+	-
Wages	-	-	+

[6]This result obviously depends on the assumptions of an iso-elastic demand curve and a Cobb-Douglas technology.

Where [1] is the increase in Product Market Competition, [2] is the decrease in Worker Bargaining Power and [3] is the decrease in Employer Concern about Employment.

We will use these contrasting predictions to try to understand the empirical effects of privatisation that we find.

This analysis is solely in partial equilibrium and there are other effects present in general equilibrium settings as described by Blanchard and Giavazzi (2003).

There are other possible important effects at work. For example, Andrews and Simmons (1995) argue that one can understand the experience in large unionized workplaces in the UK in the 1980s which had big reductions in employment but modest changes in wages as the result of a model in which unions negotiate wages and effort but their influence over effort declined. One would get similar results if one assumed that the nature of bargaining changed from an "efficient bargain" over both wages and employment to a right-to-manage model in which only wages are negotiated.

Another extension is to heterogeneous labour. Assume that there are two types of labour, skilled (denoted by a subscript "S") and unskilled labour (denoted by a subscript "U"). They have different market wages but we still assume that it is total employment that the public sector cares about. In this case the relative marginal product can still be written

$$\frac{VMPL_s}{VWPL_U} = \frac{W_s - (\frac{\partial U}{\partial N}/\frac{\partial U}{\partial \Pi})}{W_U - (\frac{\partial U}{\partial N}/\frac{\partial U}{\partial \Pi})} \tag{4.16}$$

In the public sector there will be an over employment of unskilled workers relative to skilled workers (as it is cheaper to indulge the preference for larger employment size by employing more low-wage workers). If we consider the case of total privatisation (a change to ϕ=0) this will lead to a reduction in the employment of unskilled workers. Consequently privatisation will lead not only to a fall in employment to an increase in the observed average wage as there is a compositional shift to the more skilled.

In summary, models of imperfect competition suggest that increased barriers to entry (BTE) will decrease the wage bill share of labour but increase wages and reduce employment.

The effect of public ownership depends on how one's view of the consequences of public ownership for product and labour markets and the objectives of the employer. We have shown how different views have different predictions about what should happen to the

labour share, wages and employment. Hence, the empirical study can shed light on the mechanisms at work.

4.3 Econometric Models

Our basic equation of interest is

$$SHARE_{ijt} = \alpha_i^S PO_{ijt} + \beta_i^S BTE_{ijt} + \eta_{ij}^S + v_{it}^S + \varepsilon_{jt}^S + u_{ijt}^S \tag{4.17}$$

where $SHARE$ is the share of the wage bill in value added for industry i in country j at time t. PO is an index of the degree of public ownership and BTE is an index of barriers to entry. There are two key predictions from the theory. First, labour's share should be increasing in the importance of public ownership ($\alpha_i^S > 0$). Second, that high entry barriers will reduce labour's share of value added ($\beta_i^S < 0$).

We consider a number of additional controls to deal with unobserved heterogeneity. First we include a full set of industry-country fixed effects (η_{ij}^S) which turn out to be very important control variables. Second, we include industry-specific time trends (v_{it}^S) – these are generally significant. Thirdly, we consider country-specific time trends (ε_{jt}^S) as a robustness test. The final error term is taken to be uncorrelated with the regressors (u_{ijt}^S) although we allow it to be non-spherical. In our basic regressions we will pool over industries setting α_i^S=α^S and β_i^S=β^S but in our extended regressions we look separately by industry and allow BTE and PO to have industry-specific coefficients.

Our models also have predictions over the behaviour of employment and wages. Consequently we decompose the effects of PO and BTE on the wage bill into the wage and employment effects. To be precise we estimate employment equations of the form:

$$\ln(N_{ijt}) = \alpha_i^N PO_{ijt} + \beta_i^N BTE_{ijt} + \eta_{ij}^N + v_{it}^N + \varepsilon_{jt}^N + u_{ijt}^N \tag{4.18}$$

Our basic model clearly predicts α_i^N>0 and β_i^N<0.

Finally, we consider using average wages, WAGES, as the dependent variable

$$\ln(WAGE)_{ijt} = \alpha_i^W PO_{ijt} + \beta_i^W BTE_{ijt} + \eta_{ij}^W + v_{it}^W + \varepsilon_{jt}^W + u_{ijt}^W \tag{4.19}$$

Under the extension of the model where we allow for heterogeneous workers we would expect $\alpha_i^W < 0$ as the public firm finds it easier to indulge its preference for jobs by over-employing unskilled workers leading to a low average wage. Under the extension of the basic model where we allow for wage bargaining we would expect $\beta_i^W > 0$ because workers in protected industries can capture some of the monopoly rents in the form of higher wages.

4.4 Data

4.4.1 General Trends

In order to understand the declining share of labour's share, we need to highlight where the changes are taking place. By focusing on the business sector, where most of the change took place in the 1980s and 1990s, we can decompose the total change in share for each of the (groups of) industries into the "within industry" and "between industry" changes.

To be precise, for any country j denote the wage bill share as S_i for industry i. For this exercise we divided the business sector into four broad industries – network industries, manufacturing, financial and wholesale, retail and hotel – but in the main empirical work we focus on sub-sectors within the network industries (Where there has been significant time series variation in public ownership and entry barriers). The total change in the aggregate share can be decomposed into two components, one due to reallocation of production between industries with different levels of wage bill share and the other due to changes in the level of share within industries:

$$\Delta S = \sum_i \Delta V_i \bar{S}_i + \sum_i \Delta S_i \bar{V}_i$$

Where V_i denotes the value added of industry i as a fraction of the total value added in the business sector and $\bar{S}_i$ and $\bar{V}_i$ represent a simple average of the wage bill share and value added for industry i over time, respectively.

Table 4.1 reports the results for the change in the business sector between 1980 and 2000 for each country. We only report the results for the countries for which we have continuous data from 1980 onwards[7]. Column (1) shows the stylized fact that has been noted elsewhere: the share of value added going to workers has fallen in every country we

[7]Although we use STAN for most of the analysis, here we use the data from the Gronnigen Industry Productivity Database since it has a continuous dataset from 1980. The datasets are explained in more detail in Section 4.4.2.

consider, on average by over five percentage points (or 8 percent of the 65% share in 1980). This ranges from an 8.83% point fall in the US to a 1.85% point fall in (West) Germany. Given the historical stability of the wage bill share, this represents a substantial change and demands an explanation.

In the Appendix, Table 4.A1 gives the complete between and within changes for each industry included in the business sector. In Table 4.1 we report the results for the two most important contributions: the between changes in manufacturing and the within changes in the network industries. It can be seen that the fall in manufacturing share, weighted by the deviation of the initial period wage bill share from the average, can account for a great deal of the fall in the wage bill share. Figure 4.1 shows this more clearly. This is interesting by itself as it suggests that the decline of manufacturing is an important factor in the falling wage bill share. Part of the greater fall is in the US rather than in Germany, therefore, is due to the faster rate of de-industrialization in America relative to Germany.

Nevertheless, Table 4.1 and Figure 4.1 also show that a substantial component of the aggregate fall in the wage bill share is attributable to changes occurring within the network industries. These include telecom, post, gas, electricity, airlines and roads and we focus on these industries in the empirical analysis. On average, changes in the network industries account for a quarter of the aggregate change in the wage bill share (even though they contribute, on average, only 17 percent of aggregate value added).

The impact of the network industries in further highlighted in Figures 4.2, 4.3, 4.4 and 4.5. Figure 4.2 plots the time series variation of the wage bill share in these industries, Figure 4.2 plots the time series variation of the wage bill share in the network industries, Figure 4.4 plots the change in the (mean) public ownership index and Figure 4.5 plots the mean barriers to entry variables in these industries. Although there is variation across countries at the macro-level, only a few selected industries, namely the network industries, have time series variation at the industry level. The network industries have, in some countries, witnessed substantial regulatory reform over the last two decades in many OECD countries. For this reason we focus on these sectors in the chapter. Figures 4.2 through 4.5 shows that there is substantial heterogeneity between countries and industries in the change in the wage bill share and the pace of reform.

4.4.2 Data Sources

We obtained our data on product market data form the OECD's regulation database version (see Data Appendix 4.A). These were kindly supplied at a greater degree of

disaggregation than is available in the standard OECD publications by Giuseppe Nicoletti (for an in depth discussions see Nicoletti and Scarpetta (2000), (2003)). The main variable of interest to us is Public Ownership (PO) which is scaled between 0 (no public sector involvement) to 6 (complete public ownership and control). This captures a combination of government ownership, control and interference in the running of the industry. These measures area developed from in-depth analysis of the country specific regulation working with the relevant departments in each OECD country. Barriers to Entry (BTE) which is an index on the scale of 0 (lowest barriers to entry) to 6 (highest barriers to entry).

The second dataset we draw on is the OECD's STAN database (STAN has been used by many authors – e.g. Machin and Van Reenen (1998)). This includes information on wage bills (including all employer costs) and value added that we use to calculate SHARE (the proportion of wages in industry GDP). It also includes information on employment that we use to calculate average wages (wage bills divided by employment)[8]. There are some missing values on employment in STAN and we drew on a third database, the Gronnigen Industry Productivity Database (downloaded from http://www.euklems.net/) to supplement STAN. STAN also has information on gross output, investment and R&D (ANBERD dataset) that we drew on for the production function analysis.

In combining the datasets we had to aggregate somewhat to obtain consistent series. This left us with five sectors across eighteen countries between 1970 and 2001 (it is an unbalanced panel – see Table 4.A2). The Data Appendix gives more information and descriptive statistics on the construction of the database. Table 4.2 gives some basic descriptive statistics of the key variables used in the dataset. All values are expressed in real US 1996 dollars evaluated at PPPs from the OECD.

We also draw on two datasets to obtain sociopolitical variables, which are used as instrumental variables for deregulation. The first is the World Values Survey (WVS) and the second is Database of Political Institutions (DPI). WVS is a worldwide investigation of sociocultural and political change. It is conducted by a network of social scientists at leading universities all around the world and provides a broad range of variables for analysing the impact of the values and beliefs of mass public on political and social life. For the purpose of our study, the variables of most interest are: (1) Self positioning in the political scale (which ranges from 1 (Left) to 10 (Right), (2) Private vs state ownership of business (1 (Private ownership increased) to 10 (Government ownership increased)), (3) Government responsibility to provide for all (1 (People take more responsibility) to 10 ((Government take more responsibility)).

[8] In a few cases this can exceed unity (if the industry is making losses). We "windsorized" the variable to take a maximum value of unity in these cases, but the results are robust to using the raw data.

The DPI provide details about elections, electoral rules, types of political systems, party compositions of the opposition and government coalition and the extent of military influence on the government. For the purpose of our study we look at the cross-country time series of the party orientation (See Data Appendix 4.A for more details).

A drawback of the dataset is that we do not have detailed information on the human capital characteristics of the workers. We attempt to capture these in the empirical work by including fixed effects specific to an industry-country pairing (e.g. the German airlines industry has a separate dummy), time dummies, industry specific time trends and, in some specifications country specific time trends. We also turn to looking at some micro datasets from the Labour Force Surveys particular countries where there have been large changes in a later part of the analysis.

4.5 Results

4.5.1 Main Results

Table 4.3 contains our main results from pooling the sectors across industries and countries. We divide the results into three panels. Our main results are for the wage bill share (panel A) and we consider employment in Panel B and wages in panel C

The first two columns of each panel include just public ownership (and the controls), the third and fourth columns include just barriers to entry and the final two columns include both public ownership and barriers to entry. For each dependent variable we first present results without fixed effects then results with a full set of fixed effects (industry*country) in the next column. All specifications include a full set of time, country and industry dummies and separate time trends for each sector.

Turning first to the wage bill share regressions in Panel A we find that the two key predictions of the basic model appear to be strongly supported by the data. Public Ownership (PO) has a positive effect on the share of value added accruing to labour. This relationship is stronger when we include the fixed effects (e.g., the coefficient increases from 0.11 to 0.65 between columns (1) and (2)). The magnitude suggests the results (with fixed effects) are economically as well as statistically significant. Moving from the highest to the lowest PO (i.e. from 6 to 0) is predicted to reduce the wage bill share by six percentage points (note that the entire average time series change in labour's share between 1980 and 2000 was 5.3%).

The barrier to entry (BTE) variable appears to have a negative and statistically significant impact on the wage bill share as theory predicts. When we also control for public ownership the BTE variable coefficient rises to -0.87 but is insignificant at the 5% level.

Panel B of Table 4.3 show the ln(average employment) regression results. The coefficient on PO in the first column is very negative (which is contrary to our theoretical predictions). When we include fixed effect in column (2), however, the effect of public ownership (PO) becomes positive and highly significant as we would predict from our model. privatisation is predicted to reduce employment, as is consistent with other evidence (See Green & Haskel (2004)). A one point increase in the public ownership index is predicted to increase employment by 4% in column (2). The BTE variable is negative (but insignificant) which is consistent with our theoretical model.

The final panel looks at average wages. Wages appear to be significantly lower in industries that are more subject to public ownership whether or not we control for fixed effects. In the final column, for example, a one point increase in PO is associated with a 2% fall in average wages. This is consistent with our model when we allow for heterogeneous workers, but inconsistent with a model where public sector workers are, on average, earning significant wage rents. In the preferred model of the final column the BTE variable is negative which is inconsistent with our model where workers gain rents from the firm's market power. This coefficient is not significant at conventional levels, however.

Table 4.4 breaks down the results by the four network industries. As before, the main wage bill share results are in Panel A. The employment equations are in Panel B and the average wage results in panel C. Note for roads the database has information on BTE, but not public ownership so we include a dummy variable for roads in the Table 4.3 results. All estimates include a full set of fixed effects and time dummies.

Looking at the share equations in Panel A, PO has a positive impact on the wage bill regressions in all sectors, although this is not significant for telecoms. The point estimates are largest in transport and smallest in telecoms. We find a negative association between wage bill shares and BTE in every industry except transport (although this is only significant in electricity and gas at 10% level).

The middle panel (B) has the employment regressions. Public ownership is positive and significant at the 10% level in all sectors. In magnitude the largest effects are in electricity and gas and the smallest effects are in telecom which is consistent with the wage bill share results. The barriers to entry results do not show a consistent picture across sectors, one is significantly negative (roads) consistent with theory, two are insignificant and one is significantly positive (electricity) which is inconsistent with the theory.

Finally, the lower panel (C) of Table 4.4 contains the ln(wage) regressions. There is a consistent picture for the public ownership coefficient that is negative in all industries (except for transport). This is consistent with the heterogeneous workers version of the model and consistent with the findings in the pooled results. The BTE variable is positive in two of the four industries as predicted by the extended model with wage bargaining, but is not significant at conventional levels.

In summary, the results in Table 4.4 when we disaggregate by industry show a very clear pattern for the public ownership variable, which is similar to that in the pooled results of Table 4.3. PO is associated with a higher wage bill share and this is driven by the positive effect of public ownership on employment (since the wage effect is actually negative). This strongly suggests that privatisation is an important reason for the falling wage bill share in the network industries in the OECD and (given their importance as shown in Table 4.1) for the business sector as a whole. Barriers to entry also appear to matter – in the higher BTE is generally associated with lower labour shares.

4.5.2 Instrumental Variable Results

In the econometric section we discussed reasons why there may be endogeneity bias for the privatisation (and barriers to entry) indicators. We investigate this issue in Table 4.5 where we use sociopolitical variables as instrumental variables. Note that these are country and time period specific (we show below that there is not evidence for country specific time trends conditional on our covariates). First, column (1) shows the baseline OLS results in the preferred specification of column (6), Panel A Table 4.3. The sample is slightly smaller because we have a few missing observations on the political variables, but the results are very similar to those reported for the full sample.

Column (2) presents the first stage where we regress public ownership on the four instruments (and the other exogenous covariates including fixed effects) simultaneously. In the Appendix we show the results are qualitatively similar when we just use each instrument one by one so that the second stage equation is just identified. Three of the instruments are individually significant and the four instruments are jointly significant as indicated in Table 4.5. The signs of the variables are as expected. Countries whose median voters are more likely to position themselves as right wing on a political scale, who believe in private rather than state ownership and that "people rather than government" should take more responsibility are more likely to subsequently introduce privatisation than those who do not. Furthermore, right wing governments are, unsurprisingly, more likely to introduce privatisation.

The third column presents the IV results. The public ownership variable remains statistically significant with a larger coefficient than those in Table 4.1. This is reassuring as it suggests that the results reported earlier are robust and not due to a spurious endogeneity bias . The next three columns allow barriers to entry to also be endogenous. We present the new reduced forms for PO (column (4)) and BTE (column (5)). The pattern of coefficients is not so clear for the first stage BTE regressions as they are for PO. The IV results in the final column support the interpretation under the OLS results – both PO and BTE and correctly signed and significant.

4.5.3 Robustness

We also conducted a variety of other robustness tests on the results.

First, we investigated in some detail whether labour market regulations could also play a role in understanding the falling share of labour in value added. We augmented our specifications to include various OECD measures of the regulation of labour markets such as hiring and firing costs, replacement rates, bite of the minimum wage, the coverage and co-ordination of collective bargaining, etc. These were all statistically insignificantly different from zero (see Appendix).

A disadvantage of the labour market measures compared to the product market measures is that they have do not have variation at the industry level over time (only at the country level over time). Consequently, it may be hard to identify their effect separately from the time and country dummies. An exception is union density that does have within industry variation - we include union density in Table 4.6 as an additional regressor. Our key results remain robust, but the union variable is insignificant in specifications with or without fixed effects. Indeed in the fixed effects specification the coefficient is negative, suggesting that, if anything, the fall in union power should have lead to an increase in the wage bill share of workers.

Second, we allowed some longer dynamics on the policy variables by including an extra lag of public ownership and barriers to entry (see Appendix). There does not some to be additional dynamics of adjustment as the additional lags were statistically insignificant.

4.5.4 Quantification

Table 4.7 examines how well our simple model performs in accounting for some of the trends in wage bill shares between 1980 and 1998 in the network industries as a whole.

The first column shows the empirical fall in the wage bill share between these years, which were, on average, over ten percentage points – much larger than the change for the whole business sector as shown in Table 4.1 (5.3 percentage points). Although every country experienced some fall in labour's share of value added in the network industries, it was obviously much more rapid in some countries than in others. The large fall in Italy is mainly post 1995 (the 1980-1994 fall was 16 percentage points) which coincided with a major utility privatisation in 1995.

These falls in the wage bill share have coincided with a fall in barriers to entry and public ownership in every country. We make a back of the envelope calculation of how much privatisation can account for the change in the wage bill of the network industries. Using our preferred estimates of the effect of privatisation (-.0099) and the empirical fall in public ownership (on average the index fell by 1.583 points) we account for, on average 16% of the fall. This is a significant, although not overwhelming fraction of the change. Note though, that there is much heterogeneity by country. Whereas we can only account for 2% of the change in the US (which had very little privatisation) we can account for almost 60% of the change in France and Britain. In addition, the IV estimates suggest that we may be under-estimating the importance of privatisation.

In the absence of any changes in PO we predict that labour's share should have risen in every country due to the decrease in barriers to entry enabling stronger competition to erode firm margins. Column (5) shows that BTE fell on average by 2.2 points.

Therefore, our story is essentially that falls in BTE were outweighed by the role of privatisation in accounting for some of the fall in labour's share. However, this still leaves a lot of the story unexplained in some of the countries with large falls in labour's share.

4.6 Conclusion

In this chapter we show that there is robust empirical evidence that privatisation has been a cause of the fall of labour's share of value added over the past two decades. We set up a simple model that showed how privatisation might do just this because of the preference for employment over profits displayed in the objectives of publicly owned firms. By contrast, falling barriers to entry should increase the wage bill share of income as competition erodes profit margins.

We exploit a number of policy experiments across several "network" industries in many OECD countries in order to identify these effects. These relationships are very difficult to

estimate from solely macro-economic data as the product market deregulations are very industry specific and the aggregate data will be swamped by many events that are taking place simultaneously in the economy.

We find evidence that after controlling for unobserved heterogeneity that, consistently with theory, falling entry barriers increase labour's share of value. On the other hand, declining state control tends to reduce labour's share. These results are robust to a number of controls including adding a full set of fixed effects and using sociopolitical variable to tackle the endogeneity problem.

Quantitatively, we find that the wave of privatisation in OECD countries is part of the story of the declining share of labour in the network industries – accounting for only 16% on average, but up to 60% in Britain and France. However, the within sector change of the network industries only accounts for a quarter of the overall fall in the wage bill share. Consequently, privatisation does not seem to be the dominant factor in explaining what is going on at the macro level. A caveat to this is that there are many other forms of privatisation – public sector outsourcing, manufacturing privatisation, quasi-market reforms in health and education, etc. – that we are not considering.

If not privatisation, then what are the other factors that could account for the fall in labour's share? Labour market liberalisation is an obvious culprit, but we did not find compelling evidence that this was a major factor. "Globalization" may be a possibility but this may be difficult to tackle with micro-economic data. Indeed a large component of the change (See Table 4.1) may simply be the shift of the economy out of manufacturing which may be related to trade, but may also be driven by technology and tastes.

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4.8 Tables and Figures

Table 4.1: Changes in the Wage Bill Share, 1980-2000

Country	Change in Business Sector	Wage Bill Share 1980	Wage Bill Share 2000	Within Network Industries Change	Between Manufacturing Change	All Other Components
Austria	-4.02	60.87	56.86	-0.269	-1.890	-1.856
				6.70%	47.07%	46.23%
France	-5.60	65.71	60.11	0.323	-5.645	-0.277
				-5.77%	100.81%	4.96%
Germany	-1.85	69.17	67.32	-1.908	-4.330	4.389
				103.19%	234.20%	-237.39%
Italy	-6.22	65.75	59.53	-4.077	-5.904	3.758
				65.52%	94.87%	-60.39%
Netherlands	-7.02	62.54	55.52	-1.016	-3.528	-2.476
				14.47%	50.26%	35.27%
Spain	-4.37	54.07	49.70	-1.164	-8.418	5.210
				26.63%	192.55%	-119.18%
USA	-8.83	70.17	61.34	-1.234	-6.544	-1.052
				13.98%	74.11%	11.91%
United Kingdom	-4.34	69.45	65.12	-1.572	-8.308	5.544
				36.25%	191.60%	-127.85%
Average	-5.28	64.72	59.44	-1.365	-5.571	1.655
				25.84%	105.50%	-31.34%

Notes.

1. Data from Gronnigen Industry Productivity Database.
2. Coefficients are multiplied by 100.

Table 4.2: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
Barriers to Entry	1160	4.2867	1.816085	0	6
Aggregate PO	1160	3.424	2.27364	0	6
Wage Bill Share of Value added	1160	0.5378	0.1922786	0.195	0.958
Employment	1442	251,475	485,425	1,000	2,834,000
Value Added($m)	1160	20,767	39,759	52	299,851
Wage Bill ($mi)	1160	10,475	21,091	23	176,899
Wages($)	1085	34,322	9,736	11,362	91,747

Notes.

1. Means and standard deviations from sample (see Data Appendix for a full description).
2. The Barriers to Entry, Aggregate PO, Wage Bill and Value Added are all restricted to when Value Added is not missing. Employment is restricted to when it is not missing. Wages are restricted to when real wages are not missing.
3. Employment data comes from Gronnigen Industry Productivity Database due to a large number of missing values in STAN. Although for most part the STAN and Groningen data on employment is compatible, there are three discrepancies for UK in the late 1990s, which we drop from our analysis.
4. The number of observations for real wages falls because we calculate real wages using the wage bill divided by employment and there are missing values in each.
5. All values are expressed in real US 1996 dollars evaluated at PPPs from the OECD.

Table 4.3: Pooling Over Industries

Panel A - Wage Bill Share

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable	Wage Bill Share					
Public Ownership	0.111	0.648			0.335	0.992
	[0.382]	[0.321]*			[0.384]	[0.340]**
Barriers to Entry			-0.940	-0.741	-1.002	-0.870
			[0.363]**	[0.314]*	[0.368]**	[0.325]
Trend*Telecom	-0.825	-0.765	-0.833	-0.732	-0.839	-0.774
	[0.163]**	[0.109]**	[0.162]**	[0.107]**	[0.162]**	[0.108]**
Trend*Electricity	-0.057	-0.086	0.010	0.008	0.007	-0.015
	[0.153]	[0.082]	[0.155]	[0.087]	[0.155]	[0.086]
Trend*Roads	0.884	0.622	0.893	0.690	0.863	0.600
	[0.258]**	[0.189]**	[0.255]**	[0.184]**	[0.256]**	[0.187]**
Fixed Effects	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1160	1160	1160	1160	1160	1160
Number of fixed effects	69	69	69	69	69	69

Panel B - Employment

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable	Ln(Employment)					
Public Ownership	-11.763	3.562			-10.020	4.038
	[1.883]**	[1.001]**			[2.012]**	[1.090]**
Barriers to Entry			-7.579	-0.631	-5.415	-1.184
			[1.783]**	[0.910]	[1.910]**	[0.943]
Trend*Telecom	0.437	-0.271	0.345	-0.173	0.473	-0.273
	[0.928]	[0.154]	[0.941]	[0.157]	[0.928]	[0.155]
Trend*Electricity	0.402	-0.670	0.523	-0.462	0.797	-0.594
	[0.934]	[0.198]**	[0.954]	[0.227]*	[0.953]	[0.219]**
Trend*Roads	-0.361	-2.474	-1.286	-2.133	-0.445	-2.506
	[1.070]	[0.382]**	[1.023]	[0.377]**	[1.058]	[0.379]**
Fixed Effects	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1442	1442	1442	1442	1442	1442
Number of fixed effects	76	76	76	76	76	76

Table 4.3: Pooling Over Industries (Continued)

Panel C – Wages

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable	Ln(Wage)					
Public Ownership	-5.653	-2.032			-5.845	-2.018
	[1.336]**	[0.793]*			[1.485]**	[0.819]*
Barriers to Entry			-0.482	-0.319	0.732	-0.033
			[0.891]	[0.478]	[1.017]	[0.488]
Trend*Telecom	0.102	0.821	-0.002	0.725	0.108	0.820
	[0.592]	[0.235]**	[0.612]	[0.233]**	[0.588]	[0.236]**
Trend*Electricity	0.745	0.767	0.612	0.711	0.701	0.769
	[0.510]	[0.197]**	[0.574]	[0.202]**	[0.533]	[0.199]**
Trend*Roads	0.527	0.494	0.029	0.294	0.541	0.493
	[0.607]	[0.378]	[0.649]	[0.365]	[0.605]	[0.381]
Fixed Effects	No	Yes	No	Yes	No	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1085	1085	1085	1085	1085	1085
Number of fixed effects	69	69	69	69	69	69

Notes.

1. All coefficients and standard errors are multiplied by 100.
2. The coefficients are from separate OLS regressions.
3. The sample is pooled across four industries (electricity/gas, telecom, roads and transport). There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
4. "Share" is the Wage Bill Share of Value Added.
5. We include a full set of time dummies and time trends interacted with industry dummies (the base trend is Trend*Transport).
6. The Newey-West standard errors (in parentheses under coefficients) correct for first order serial correlation.

Table 4.4: Results Separately by Industry

Panel A: Wage Bill Share of Value Added

Sector	[1] Electricity and Gas	[2] Telecom and Post	[3] Transport	[4] Roads
Public Ownership	0.889	0.427	1.870	
	[0.469]	[1.186]	[0.521]**	
Barriers to Entry	-1.313	-0.858	0.068	-1.268
	[0.719]	[0.536]	[0.231]	[0.955]
Country Dummies	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes
Observations	372	268	304	216

Panel B: ln(Employment)

Sector	[1] Electricity and Gas	[2] Telecom and Post	[3] Transport	[4] Roads
Public Ownership	4.949	1.749	2.901	
	[1.633]**	[1.199]	[1.106]*	
Barriers to Entry	3.993	1.086	-0.193	-6.512
	[1.421]**	[0.781]	[1.165]	[2.222]**
Country Dummies	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes
Observations	372	328	370	372

Panel C: ln(Wages)

Sector	[1] Electricity and Gas	[2] Telecom and Post	[3] Transport	[4] Roads
Public Ownership	-3.424	-2.451	1.074	
	[0.959]**	[2.289]	[1.202]	
Barriers to Entry	0.152	0.787	-0.238	-0.747
	[1.096]	[0.962]	[0.853]	[1.169]
Country Dummies	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes
Observations	319	257	297	211

Notes.

1. Coefficients and standard errors are multiplied by 100; these are coefficients and standard errors (in brackets) for separate OLS regressions for each specified industry.
2. There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
3. We include a full set of time dummies in all regressions. The Newey-West standard errors (in parentheses under coefficients) correct for first order serial correlation

Table 4.5: Wage Bill Share Regressions – Instrumental Variable Estimates

	[1]	[2]	[3]	[4]	[5]	[6]
	OLS	First Stage OLS	IV	First Stage OLS	First Stage OLS	IV
Dependent variable	Wage Bill Share	Public Ownership	Wage Bill Share	Public Ownership	Barriers to Entry	Wage Bill Share
(lagged) IV1 Positioning on the political scale		-10.776		-3.99	45.859	
		[6.205]		[5.62]	[14.221]*	
(lagged) IV2 support for public ownership		12.359		12.826	3.152	
		[5.498]*		[4.543]**	[14.403]	
(lagged) IV3 Government responsibility		10.348		10.474	0.856	
		[3.965]**		[4.17]**	[6.595]	
(lagged) IV4 Right party in power		-7.416		-7.888	-3.185	
		[2.252]**		[2.372]**	[4.452]	
Public Ownership	0.97		4.851			4.818
	[0.348]**		[1.664]**			[2.15]*
Barriers to Entry	-0.914	14.798	-1.428			-1.482
	[0.331]**	[3.133]**	[0.386]**			[1.643]
Trend*Telecom	-0.749	4.199	-0.917	4.348	1.012	-0.915
	[0.109]**	[0.977]**	[0.139]**	[0.968]**	[1.856]	[0.15]**
Trend*Electricity	-0.011	2.141	-0.1	3.446	8.82	-0.094
	[0.089]	[1.162]	[0.113]	[1.077]**	[1.71]*	[0.227]
Trend*Roads	0.606	9.026	0.247	9.142	0.786	0.251
	[0.19]**	[0.793]**	[0.261]	[0.808]**	[2.335]	[0.315]
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1120	1120	1120	1120	1120	1120

Notes.

1. These regressions estimate IV versions of the wage bill share regressions using socio-political variables as instruments. The first three columns consider treating PO as endogenous whereas the last four columns treat PO and BTE as endogenous.
2. The first stage results are in columns (1), (4) and (5).
3. IV (1), IV (2) and IV (3) are obtained from the World Value Survey and IV (4) is obtained from the Database of Political Institutions,
4. We collapse the data by the median (applying sampling weights).
5. The scaling of each variable is as follows: IV (1) Self positioning in the political scale, which ranges from 1 (Left) to 10 (Right); IV (2) Private vs state ownership of business, which ranges from 1 (Private ownership increased) to 10 (Government ownership increased), IV (3) Government responsibility to provide for all, which ranges from 1 (People take more responsibility) to 10 (Government take more responsibility), (4) where Left=1, Centre=2 and Right=3.
6. All coefficients are multiplied by 100.
7. The Newey-West standard errors correct for first order serial correlation.

Table 4.6: Role of Labour Market Institutions?

(Union Density)

	[1]	[2]
Dependent variable	Share	
Public Ownership	0.285	1.225
	[0.458]	[0.361]**
Barriers to Entry	-1.203	-1.128
	[0.409]**	[0.339]**
Union Density	1.322	-3.656
	[1.903]	[3.234]
Trend*Telecom	-0.744	-0.751
	[0.193]**	[0.132]**
Trend*Electricity	0.080	0.099
	[0.172]	[0.097]
Trend*Roads	1.036	0.598
	[0.281]**	[0.204]**
Fixed Effects	No	Yes
Country Dummies	Yes	Yes
Industry Dummies	Yes	Yes
Time Dummies	Yes	Yes
Observations	989	989
Number of fixed effects	60	60

Notes.

1. All coefficients and standard errors are multiplied by 100.
2. The coefficients are from separate OLS regressions.
3. The sample is pooled across four industries (electricity/gas, telecom, transport, roads). There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
4. "Share" is the Wage Bill Share of Value Added.
5. We include a full set of time dummies and time trends interacted with industry dummies (the base trend is Trend*Transport).
6. The Newey-West standard errors (in parentheses under coefficients) correct for first order serial correlation.

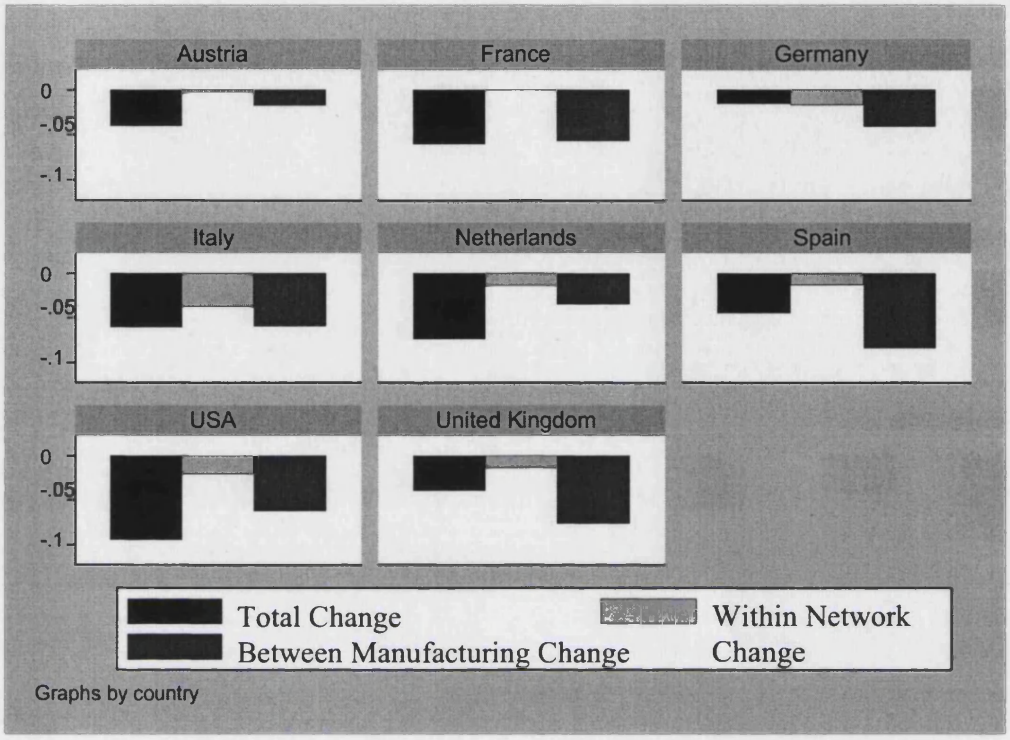
Table 4.7: Quantification of the Role of Privatisation in Changing Labour's Share in the Network Industries, 1980-98

Country	[1] Actual Change in Share	[2] ΔPO	[3] α_{PO} *ΔPO	[4] Proportion [3]/[1]	[5] ΔBTE	[6] α_{BTE}*ΔBTE
Austria	-0.062	-0.75	-0.008	0.122	-2.424	0.019
France	-0.018	-1.053	-0.011	0.589	-2.25	0.018
Germany (1991-98)	-0.057	-0.898	-0.009	0.156	-2.58	0.021
Italy	-0.269	-1.873	-0.019	0.07	-1.885	0.015
Italy (1980-1994)	*-0.161*	*-0.65*	*-0.007*	*0.04*	*-0.81*	*0.006*
Netherlands	-0.143	-1.645	-0.016	0.115	-3.112	0.025
Spain	-0.085	-1.523	-0.015	0.179	-1.99	0.016
USA	-0.094	-0.173	-0.002	0.018	-1.44	0.012
United Kingdom	-0.084	-4.747	-0.047	0.563	-2.063	0.017
Unweighted Average	-0.102	-1.583	-0.016	0.156	-2.218	0.018

Notes.

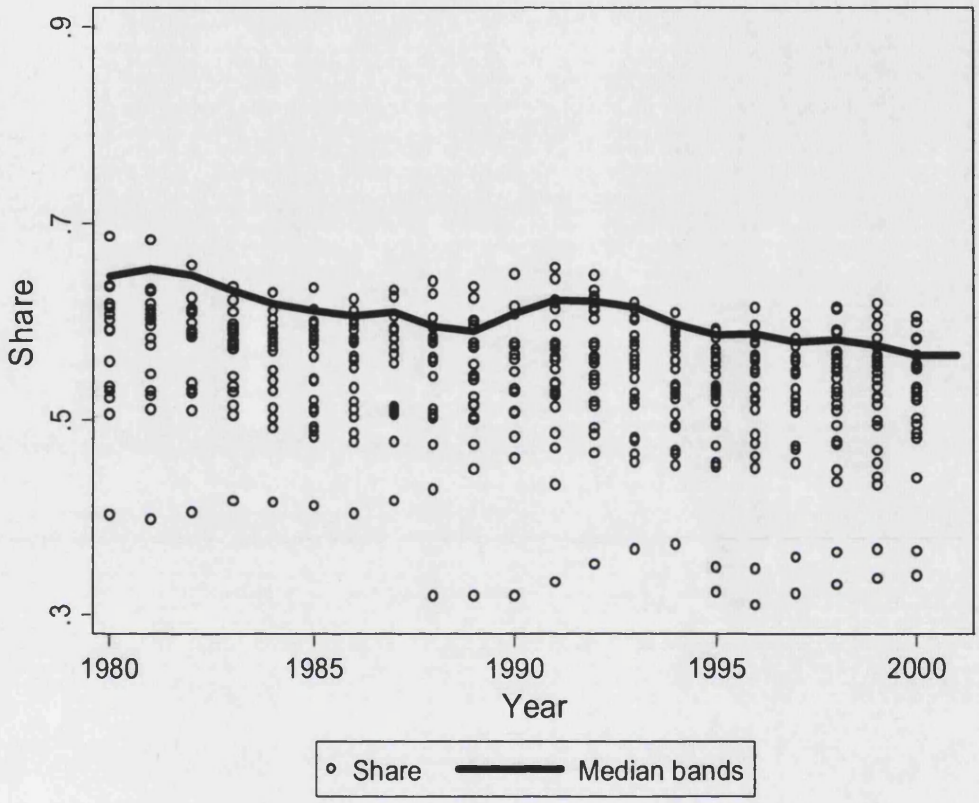
1. These are calculations taken over 1980-1998 using actual empirical changes in shares, BTE and PO. Coefficients are taken from Table 2 (-0.008 on BTE and 0.0099 on PO).
2. There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
3. Although there are more countries included in the analysis, here we report the results for the countries for which we have the most consistent set of data from 1980-1998.
4. Note that there are big privatization-related labour cost reductions in telecommunications and other utilities in Italy in 1995 and this is why we see such big changes in the share for network industries.

Figure 4.1: Changes in the Wage Bill Share, 1980-200



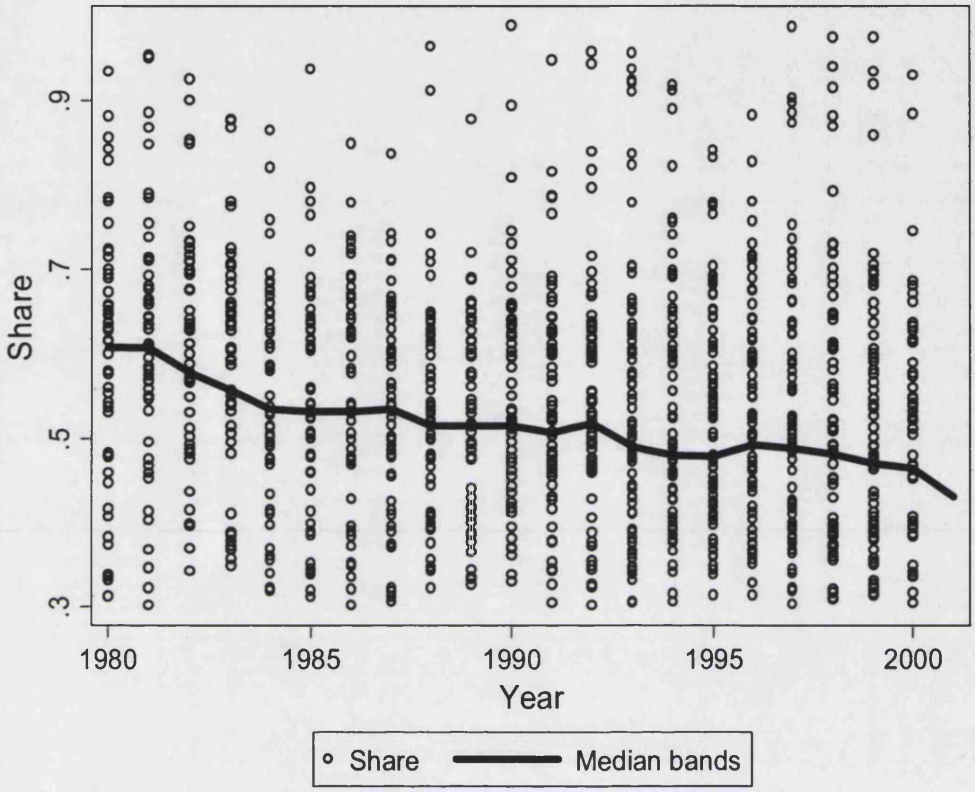
Notes.
1. This figure is derived from the results in Table 1

Figure 4.2: Change in the Aggregate Wage Bill Share Across OECD Countries



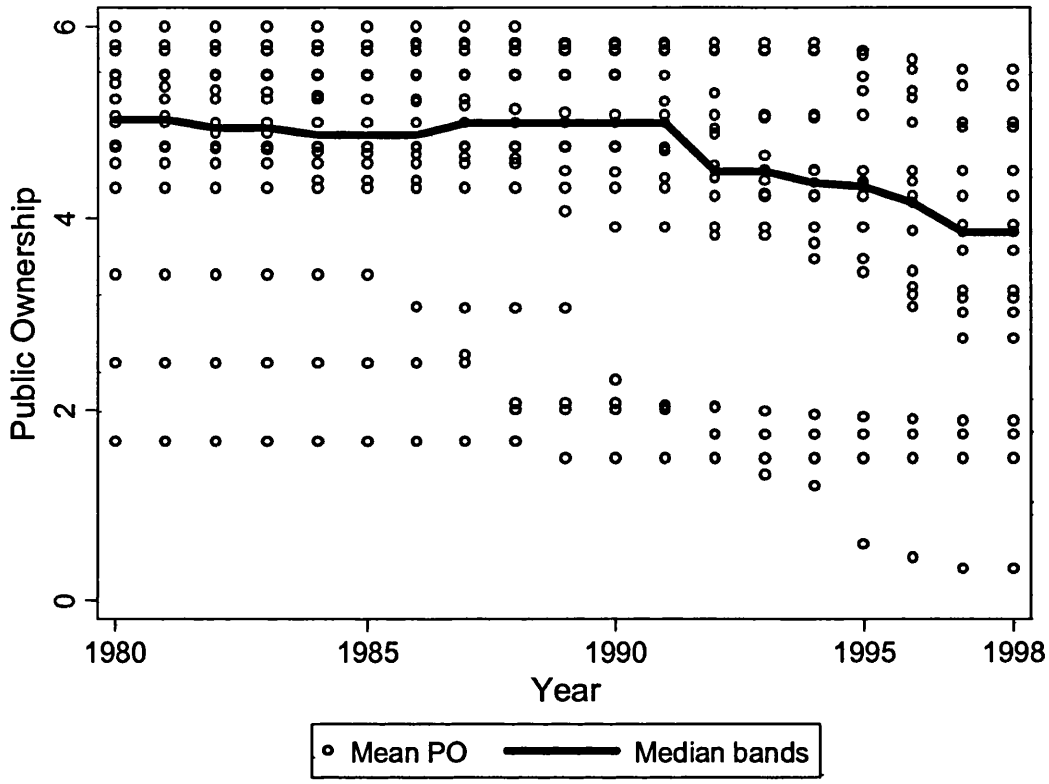
Notes.
1. These are country level values of the wage bill share of value added from the OECD, 1980-2001

Figure 4.3: Change in the Wage Bill Share Across OECD Countries for Network Industries



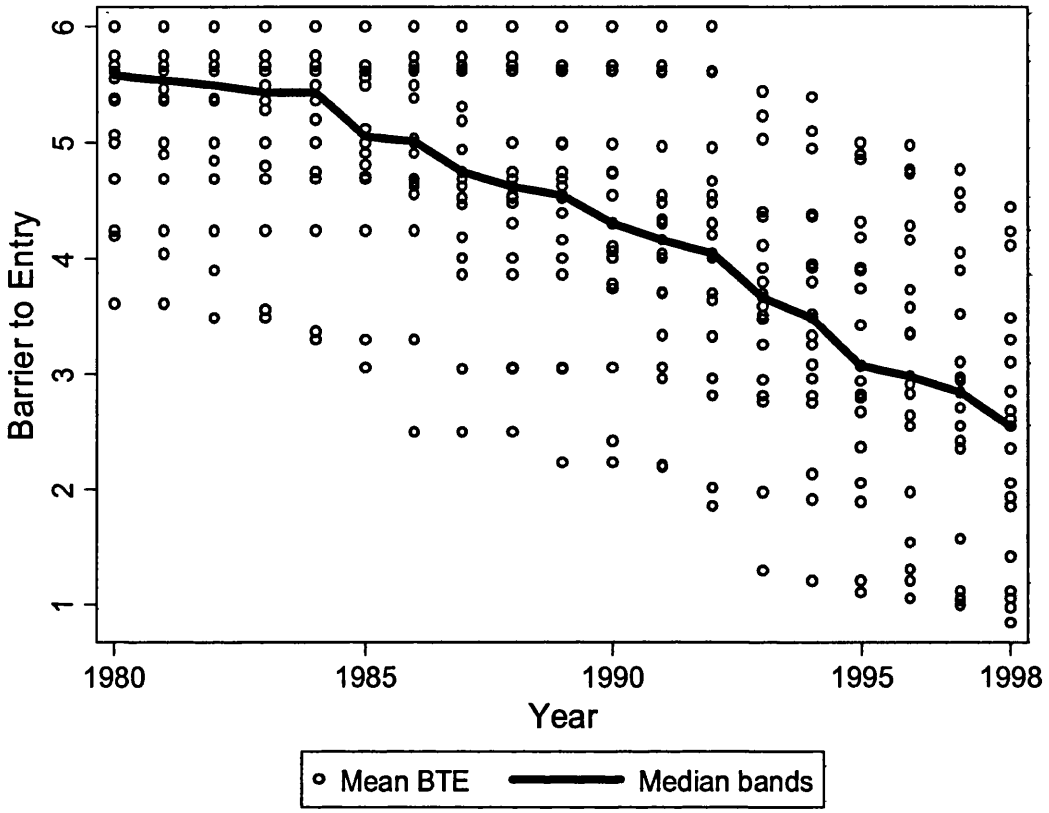
Notes.
1. These are country level values of the wage bill share of value added from the OECD, 1980-2001

Figure 4.4: Average Public Ownership Index Across OECD Countries for Network Industries



Notes.
1. These are country level averages of the public ownership index, 1980-1998.
2. Product market data are drawn from the OECD's regulation database (Nicoletti and Scarpetta (2000, 2003).

Figure 4.4: Average Barriers to Entry Index Across OECD Countries for Network Industries



Notes.

1. These are country level averages of the public ownership index, 1980-1998.
2. Product market data are drawn from the OECD's regulation database (Nicoletti and Scarpetta (2000, 2003))

4.9 Appendix 4.A: Data Appendix

4.9.1 OECD Regulation Database

First we used the OECD Regulation database developed by Nicoletti and Scarpetta (2000, 2003a,b). There are overall country-wide indicators of regulation, barriers to entry and public ownership for 21 countries. There are also specific industry time series for barriers to entry and public ownership for 7 non-manufacturing industries. All of these are on a scale of 0 to 6 (from least to most restrictive).

Entry barriers cover legal limitations on the number of companies in potentially competitive markets and rules on vertical integration of network industries. The barriers to entry indicator takes a value of zero when entry is free (i.e. a situation with three or more competitors and with complete ownership separation of a natural monopoly and a competitive section of the industry) and a value of 6 when entry is severely restricted (i.e. situations with legal monopoly and full vertical integration in network industries or restrictive licensing in other industries). Intermediate values represent partial liberalisation of entry (e.g. legal duopoly, mere accounting separation of natural monopoly and competitive segments).

Public Ownership measures the share of equity owned by municipal or central governments in firms of a given sector. The two polar cases are of no public ownership (PO = 0) and full public ownership (PO = 6). Whenever data are available intermediate values of the public ownership indicator are calculated as an increasing function of the actual share of equity held by the government in the dominant firm.

The construction of the indicators takes the following steps. First the separate indicators are constructed at the finest level of industry disaggregation. Second, these indicators are then aggregated at the industry level using revenue averaged weights. Thirdly, for the country-wide aggregators the industry indices are aggregated using revenue weights again.

For information on the construction, properties and descriptive statistics of this data see Nicoletti and Scarpetta (2000) or Alessini et al (2003).

4.9.2 Sociopolitical Attitudes

4.9.2.1 World Value Survey

The World Values Survey (WVS) is a worldwide investigation of sociocultural and political change. It is conducted by a network of social scientists at leading universities all around the world. Interviews have been carried out with nationally representative samples of the public of more than 80 societies in at least one wave of the survey. A total of 4 waves have been carried out in 1981, 1990-91, 1995-96 and 1999-2001. The coverage has increased over the surveys.

WVS provides a broad range of variables for analysing the impact of the values and beliefs of mass public on political and social life. For example, it is possible to examine cross-level linkages, such as that between public values and economic growth; or between political culture and democratic institutions.

For the purpose of our study, the variables of most interest are: (1) Self positioning in the political scale (which ranges from 1 (Left) to 10 (Right), (2) Private vs state ownership of business (1 (Private ownership increased) to 10 (Government ownership increased)), (3) Government responsibility to provide for all (1 (People take more responsibility) to 10 ((Government take more responsibility)).

The dataset is complete for most of the countries in our sample, however for Greece the first available data points are in 1999 for these questions.

The interviews were conducted with a representative sample of at least 1,000 people from each country of adults aged 18 and over. To ensure that the variables that we use are nationally representative we apply the provided sampling weights. When merging this data with other data we collapse the variables at the median (appropriately weighted). We repeated the analysis by collapsing at the mean, standard deviation and interquartile range and the results do not vary much.

For most countries we only have data for IV (1) in years 1981, 1990 and 1999 and for IV (2) and IV (3) in 1990 and 1999. We therefore interpolate over the period 1975-1998. We do not have data for Greece until 1999 and so it is dropped from the data.

4.9.2.2 Database of Political Institutions: A World Bank Database

The Database of Political Institutions (DPI) contains 106 variables for 177 countries over the years 1975-2004. The variables provide details about elections, electoral rules, types of political systems, party compositions of the opposition and government coalition and the extent of military influence on the government.

For the purpose of our study we look at the cross-country time series of the party orientation. To identify the party orientation with respect to economic policy, they use the criteria: (1) Right: for parties that are defined as conservative, Christian democratic or right-wing, (2) Left: for parties that are defined as communist, socialist, social democratic or left wing, (3) Centre: for parties that are defined as centralist or when the party position can best be described as centralist , (4) 0: for all those cases which do not fit into the other mentioned categories or when there is no information.

4.9.3 Labour Market Regulations

Our labour market regulation measures are drawn from the OECD, Nickell et al (2002), Nickell (2003) and Baker et al (2004). For the union density information we drew on the work of Visser (2003).

4.9.4 Other Data

The main data source for investment, value added, wage bill and employment comes from the OECD STAN database for Industrial Analysis, based on the International Standard Industrial Classification Revision 3 (SIC Rev. 3). We had to aggregate the regulation data to the most disaggregated STAN level available. These were the following five industries: Electricity and Gas; Telecommunications and Post; Airlines; Railways and Road Freight. We supplemented STAN with information on the capital stock from the OECD's International Sectoral DataBase (ISDB). We used ISDB to allocate the capital stock to STAN in the first year and then used the perpetual inventory method to build up the capital stock using gross investment flows from STAN. We used depreciation rate of 8%

We also drew on the Gronnigen Database to supplement employment series that were sometime missing in STAN and ISDB for particular industries in particular years. Table 4.A1 gives the final balance of the panel on the non-missing observations.

Appendix 4.B: Additional Tables & Figures

Table 4.A1: Change in the Wage Bill Share, 1980-2000

Country	Change in Business Sector	Network Industries				Manufacturing				Wholesale, Retail & Hotels				Financial Share			
		$\bar{S}$	$\bar{V}$	Within	Between	$\bar{S}$	$\bar{V}$	Within	Between	$\bar{S}$	$\bar{V}$	Within	Between	$\bar{S}$	$\bar{V}$	Within	Between
Austria	-4.02	62.53	16.98	-0.27	-0.37	62.55	40.02	-5.77	-1.89	55.41	30.94	3.42	0.29	49.80	12.06	-0.96	1.54
France	-5.60	56.25	17.08	0.32	0.21	63.31	46.74	-3.45	-5.65	67.36	26.26	-2.10	4.00	60.60	9.92	-0.52	1.58
Germany	-1.85	57.17	16.01	-1.91	0.04	71.87	50.81	-0.54	-4.33	68.57	24.35	0.18	3.15	66.03	8.84	0.65	0.91
Italy	-6.22	59.19	15.03	-4.08	2.41	64.63	44.84	0.22	-5.90	66.25	29.38	-0.88	2.41	52.56	10.75	-1.15	0.75
Netherlands	-7.02	53.38	17.63	-1.02	-0.21	61.67	39.10	-3.89	-3.53	58.99	31.66	-1.07	2.11	58.21	11.61	-0.89	1.47
Spain	-4.37	46.90	17.22	-1.16	1.23	62.19	42.09	0.12	-8.42	38.93	31.48	0.46	3.66	59.10	9.21	-1.16	0.89
USA	-8.83	56.48	18.63	-1.23	-0.20	70.67	38.31	-2.91	-6.54	70.37	31.18	-0.96	1.46	54.33	11.88	-2.54	4.09
United Kingdom	-4.34	61.27	17.97	-1.57	1.55	74.41	43.35	-2.42	-8.31	66.97	27.52	-1.75	6.26	50.79	11.15	2.27	-0.36
Unweighted Mean	-5.28	56.64	17.07	-1.36	0.58	66.41	43.16	-2.33	-5.57	61.61	29.10	-0.34	2.92	56.43	10.68	-0.54	1.36

Notes. Coefficients and standard errors are multiplied by 100; $\bar{S}$ is the average wage bill share (for each sector) between 1980 and 2000 and $\bar{V}$ is the average value added (for each sector) between 1980 and 2000. The data from Gronnigen Industry Productivity Database.

Table 4.A2: Balance of Panel by Country and Industry

country	Electricity and Gas	Post and Telecom	Transport	Railroads	Total
Australia	32	22	22	0	76
Austria	26	26	26	5	83
Belgium	16	17	17	5	55
Canada	30	20	20	20	90
Denmark	32	32	32	32	128
Finland	32	27	27	9	95
France	31	23	23	23	100
Germany	11	10	10	10	41
Greece	7	7	7	4	25
Italy	32	22	22	20	96
Japan	32	19	19	17	87
Netherlands	32	22	22	0	76
Norway	32	11	11	20	74
Portugal	23	16	16	0	55
Spain	17	15	15	15	62
Sweden	30	20	20	20	90
USA	32	32	32	21	117
United Kingdom	31	9	9	21	70
Total	478	350	350	242	1,420

NOTES: This is the unrestricted sample without controlling for missing values in share, employment and wages.

Table 4.A3: Aggregate Union and Employment Protection Measures

	[1]	[2]
Dependent variable	Share	
Public Ownership	1.572	0.58
	[0.323]**	[(0.426]
Barriers to Entry	-1.468	-0.698
	[0.427]**	[0.316]*
Union Density	-3.321	18.094
	[2.310]	[7.263]*
Employment Protection	-0.135	-1.227
	[1.139]	[3.689]
Trend*Telecom	-0.84	-0.771
	[0.216]**	[0.124]**
Trend*Electricity	0.017	0.02
	[0.198]	[0.096]
Trend*Roads	0.888	0.65
	[0.374]*	[0.216]**
Fixed Effects	No	Yes
Time Dummies	Yes	Yes
Observations	959	959
Number of fixed effects	64	64

Notes.

1. Coefficients and standard errors are multiplied by 100.
2. Labour market regulation measures are drawn from the OECD (Nickell et al (2002)). The base trend is Trend*Transport.
3. There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
4. The Newey-West standard errors correct for first order serial correlation.

Table 4.A4: Dynamic Specification

	[1] SHARE	[2] Ln(Emp)	[3] Ln(Wages)	[4] SHARE	[5] Ln(Emp)	[6] Ln(Wages)
Public Ownership	0.825	2.208	-1.280			
	[0.613]	[1.116]*	[1.237]			
Lagged PO	0.217	2.177	-0.490	0.967	4.194	-1.570
	[0.606]	[1.412]	[1.242]	[0.354]**	[1.183]**	[0.765]**
Barriers to Entry	-0.367]	-0.183	-0.083			
	[0.359]	[1.039]	[0.608]			
Lagged BTE	-0.639	-1.286	0.059	-1.017	-1.404	-0.208
	[0.395]	[1.141]	[0.641]	[0.360]**	[0.997]	[0.532]
Trend*Telecom	-0.749	-0.278	0.836	-0.745	-0.277	0.832
	[0.109]**	[0.157]	[0.236]**	[0.109]**	[0.157]	[0.236]**
Trend*Electricity	-0.009	-0.580	0.786	-0.006	-0.570	0.790
	[0.090]	[0.221]**	[0.200]**	[0.090]	[0.219]**	[0.201]**
Trend*Roads	0.602	-2.545	0.498	0.604	-2.523	0.501
	[0.190]**	[0.382]**	[0.384]	[0.189]	[0.379]	[0.383]
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1138	1435	1081	1151	1454	1095

Notes.

1. All coefficients and standard errors are multiplied by 100.
2. The coefficients are from separate OLS regressions. The sample is pooled across four industries (electricity/gas, telecom, transport, roads). There is no data on public ownership on the roads in the OECD database and so we include a dummy variable for it.
3. "Share" is the Wage Bill Share of Value Added. The base trend is Trend*Transport.
4. The Newey-West standard errors correct for first order serial correlation.

Table 4.A5: Individual Instrumental Variables

1a. IV (1) = Self Positioning in Political Scale (1 to 10)

	[1] 1st Stage	[2] IV	[3] OLS
Dependent variable	Wage Bill Share		
IV(1)_1	-25.974		
	[5.170]**		
Public Ownership		4.318	0.977
		[2.228]	[0.340]**
Barriers to Entry	14.839	-1.312	-0.878
	[3.241]**	[0.406]**	[0.325]**
Trend*Telecom	3.983	-0.914	-0.772
	[0.964]**	[0.154]**	[0.108]**
Trend*Electricity	2.376	-0.087	-0.013
	[1.168]*	[0.112]	[0.086]
Trend*Roads	9.315	0.301	0.605
	[0.747]**	[0.262]	[0.187]**
Fixed Effects	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes
Observations	1144	1144	1144

1b. IV (2) = Privatisation vs State Ownership of Business

	[1] 1st Stage	[2] IV	[3] OLS
Dependent variable	Wage Bill Share		
IV(2)_1	23.664		
	[4.624]**		
Public Ownership		7.161	0.977
		[2.454]**	[0.340]**
Barriers to Entry	13.760	-1.681	-0.878
	[3.118]**	[0.422]**	[0.325]**
Trend*Telecom	4.067	-1.036	-0.772
	[0.964]**	[0.162]**	[0.108]**
Trend*Electricity	1.929	-0.150	-0.013
	[1.206]	[0.135]	[0.086]
Trend*Roads	9.005	0.042	0.605
	[0.805]**	[0.314]	[0.187]**
Fixed Effects	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes
Observations	1144	1144	1144

1c. IV (3) = Government Responsibility

	[1] 1st Stage	[2] IV	[3] OLS
Dependent variable	Wage Bill Share		
IV(3)_1	14.538		
	[3.438]**		
Public Ownership		4.024	0.977
		[2.103]	[0.340]**
Barriers to Entry	13.733	-1.274	-0.878
	[3.153]**	[0.454]	[0.325]**
Trend*Telecom	4.351	-0.902	-0.772
	[0.975]**	[0.146]**	[0.108]**
Trend*Electricity	2.143	-0.081	-0.013
	[1.169]	[0.111]	[0.086]
Trend*Roads	8.804	0.327	0.605
	[0.776]**	[0.303]	[0.187]**
Fixed Effects	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes
Observations	1144	1144	1144

1d. IV (4) = World Bank Survey – Govt (L, C, R)

	[1] 1st Stage	[2] IV	[3] OLS
Dependent variable	Wage Bill Share		
IV(4)_1	-7.090		
	[2.336]**		
Public Ownership		-0.928	0.985
		[3.992]	[0.348]**
Barriers to Entry	12.964	-0.652	-0.905
	[3.082]**	[0.657]	[0.331]**
Trend*Telecom	4.334	-0.669	-0.751
	[0.996]**	[0.208]**	[0.109]**
Trend*Electricity	2.374	0.031	-0.013
	[1.199]	[0.128]	[0.090]
Trend*Roads	9.260	0.778	0.601
	[0.766]**	[0.433]	[0.190]**
Fixed Effects	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes
Observations	1136	1136	1136

Notes.

1. These regressions estimate IV versions of the wage bill share regressions using socio-political variables as instruments.
2. IV (1), IV (2) and IV (3) are obtained from the World Value Survey and IV (4) is obtained from the Database of Political Institutions,
3. We collapse the data by the median (applying sampling weights).
4. The scaling of each variable is as follows: IV (1) Self positioning in the political scale, which ranges from 1 (Left) to 10 (Right); IV (2) Private vs state ownership of business, which ranges from 1 (Private ownership increased) to 10 (Government ownership increased), IV (3) Government responsibility to provide for all, which ranges from 1 (People take more responsibility) to 10 (Government take more responsibility), (4) where Left=1, Centre=2 and Right=3.
5. All coefficients are multiplied by 100.
6. The Newey-West standard errors correct for first order serial correlation.

Conclusion

This thesis has sought to evaluate the impact of institutional reforms on labour market performance. This is done in two parts: firstly, we show the impact of a particular policy change in the UK on both wages and employment and secondly, we offer some insight into the disparities in performance across OECD countries, which have different forms (or levels) of regulations.

In Part 1, we take the policy change in the late 1990s of the introduction of the WFTC in the UK and show that the impact of such a policy is not without externalities. We highlight the importance of the care needed in both the policy design and policy evaluation when trying to evaluate the success of the programme.

In particular, Chapter 1 shows that if it is the case that an employer has some knowledge as to who is claiming the tax credit then there is an incentive for her to share in the incidence of the tax credit. In addition, we show that (given the substitutability between the claimant and other workers) there is a spillover effect which reduces the wage of both the eligible and similarly skilled ineligible workers.

These finding have not been addressed in the previous literature on tax credit evaluation. It is typically assumed that the claimant worker (and claimant household) is fully incident of the tax credit. However, analysis in Chapter 1 incorporates the general equilibrium framework needed to evaluate the effect of the tax credit on the economy as a whole and not solely on the claimant. The results of this analysis are of critical policy importance as we can no longer assume that the person eligible for such a tax credit is the sole beneficiary. Moreover, increase in generosity does not explain the shift in incidence, indicating that the change in payment method played an important role.

Chapter 2 then takes the well known literature, which relates tax credits to labour supply responsiveness and shows that without close inspection of the suitability of the control groups in the difference-in-differences methodology, the effect of WFTC is overestimated. In particular, we show that the observable and unobservable differences between these

groups have important consequences when they are not controlled for properly. Moreover, we highlight the importance to look closely at the hour's distribution and activity states to observe where change is happening and to see if the target groups have been correctly identified.

In Chapter 2, we show that once we control for group specific differential trends, the effect of WFTC falls dramatically. Moreover, the only effect remaining is on those who work 30 hours or more. More importantly, the policy is not successful in drawing people from inactivity. The results of this chapter are important in showing that the policy was not as successful as it is accredited for being. It did not target the least attached to the labour market, i.e. the inactive. Overall, we show that the success of WFTC has been overstated and that interactions with other policies introduced in the 1990s need to be taken into consideration.

In Part 2, we take two different empirical observations and then use time varying cross-country data to disentangle the differences in regulation.

In Chapter 3 we highlight that in many European countries the female unemployment rate is considerably higher than male counterparts. Using transitional analysis we show that in countries with a large gender gap in unemployment rates, there tends to be a large gender gap in both flows from employment into unemployment and from unemployment into employment.

We find that although there is a tendency for the gender gaps in unemployment rates to be smaller in countries with higher levels of female attachment, pointing to the importance of human capital differences as an important explanation of the gender gaps in unemployment rates, this is not the whole story. Since we also observe gender gaps in unemployment rates in countries where the attachment of women has risen, it is likely that labour market institutions can explain part of the differences. In particular, institutions that compress wages or act to the disadvantage of groups with lower levels of labour market attachment may magnify the impact of human capital differences in unemployment rates. In addition, as the overall levels of unemployment is high in many European countries, employers may have long queues of workers for jobs, and this acts to the disadvantage of women, as it makes it easier to indulge in any residual prejudice against women.

Finally, in Chapter 4 we find robust empirical evidence to show that privatisation has been a cause of the fall of labour's share of value added over the past two decades. We set up a simple model that showed how privatisation might do just this because of the preference for employment over profits displayed in the objectives of publicly owned

firms. By contrast, falling barriers to entry should increase the wage bill share of income as competition erodes profit margins. We exploit a number of policy experiments across several "network" industries in different OECD countries in order to identify these effects. These relationships are very difficult to estimate from solely macro-economic data as the product market deregulations are very industry specific and the aggregate data will be swamped by many events that are taking place simultaneously in the economy.

We find evidence that after controlling for unobserved heterogeneity that, consistently with theory, falling entry barriers increase labour's share of value. On the other hand, declining state control tends to reduce labour's share. These results are robust to a number of controls including adding a full set of fixed effects and using sociopolitical variable to tackle the endogeneity problem. Labour market liberalisation, however, does not seem to have had a substantial effect one way or the other.