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Child Care Services and Female Labour Force Participation; Did Sure Start increase Female Labour force participation in the most deprived areas in the United Kingdom 2003-2007?

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Abstract: In 1997 the UK government launched the Sure Start early year's intervention scheme, offering early years education, health services, adult employment advice and free or highly subsidised child care located in one convenient service available to the most deprived areas. The aim was to improve the life chances of the most disadvantaged children, but also to increase employment for mothers of young children. Through logistic regression this paper examines the employment outcomes for mothers in Sure Start areas compared to a nationally representative sample of mothers of children of the same age. The findings show a small increase in the odds of employment in comparison to the national sample however the magnitude is small and tensions central to the concept of the scheme may potentially have hampered delivery of the Sure Start employment agenda.

Key words: Female Labour Force Participation, Childcare

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1 Introduction

“Still to this day I get questions about did Sure Start lose its soul because it got interested in women working? Well, tell me how else you’re not going to be poor? So I was a great believer and still am a great believer in the employability agenda. I think the only way not to be poor is to have a job”

Naomi Eisenstadt Head of Sure Start Services 1999-2006

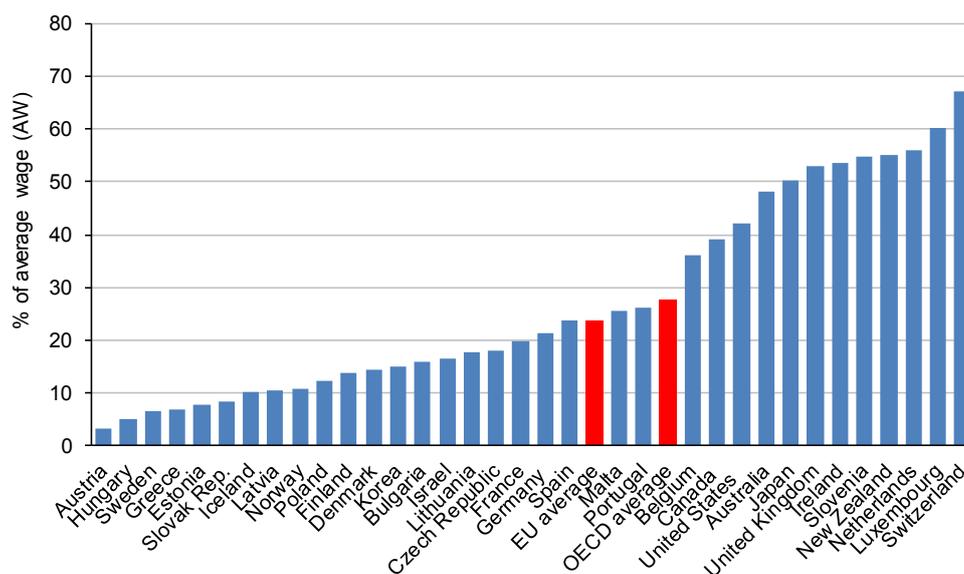
Effective, widely available and affordable childcare policies have long been associated with increased female labour force participation (FLFP) due to their role in resolving the conflict between work and family (Andre’ 2003, Berlinski and Galiani 2004, Blau 2004, Blau & Hagy 1998, Cascio 2006, Chevalier and Viitanen 2002, , Del Boca 2002, Del Boca, Locatelli, and Vuri 2003, Fugazza, Minez, and Pucci 2002, Hank and Kreyenfeld 2000, Henau et al 2010 ,Hofferth and Collins 2000, Lundin 2008, Ribar 1995, Schlosser 2005 Tarja K. Viitanen 2005, Tekin 2002). Likewise, if effective, they can theoretically contribute to reductions in poverty, increased living standards for families and improvements in child welfare and educational attainment (Blau 2004, Eisenstadt 2011). In addition, good cost effective childcare infrastructure can have a positive role to play in the broader position of reducing welfare spending and increasing tax receipts from higher employment (Gupta et al 2006). This is particularly important in light of the current fiscal positions of many OECD developed states where problems of population ageing and worsening worker to dependent ratios make it vital to find cost effective ways of increasing long term labour force participation across the economy (Gupta et al 2006).

The potential benefits of good child care infrastructure aside, the form such services take across different countries and also the FLFP outcomes are diverse and complex, as can be seen from figures one to five. In Scandinavian countries services are low cost, if not free, and labour force participation is high and closer to full time, however in contrast to this, countries such as Belgium, Italy or Spain have low provision of services, at times which are potentially incompatible with work and consequently much lower participation (Henau et al

2010). In addition, countries such as the Netherlands and the United States appear to fall between the two, with broad market provided coverage and high labour force participation, however the costs are also relatively high and the form of participation is more likely to be part time (Henau et al 2010).

Figure 1.0: Gross childcare fees for two children (aged 2 and 3) attending typical accredited early-years care and education services, 2012

Gross childcare fees as a percentage of average wage



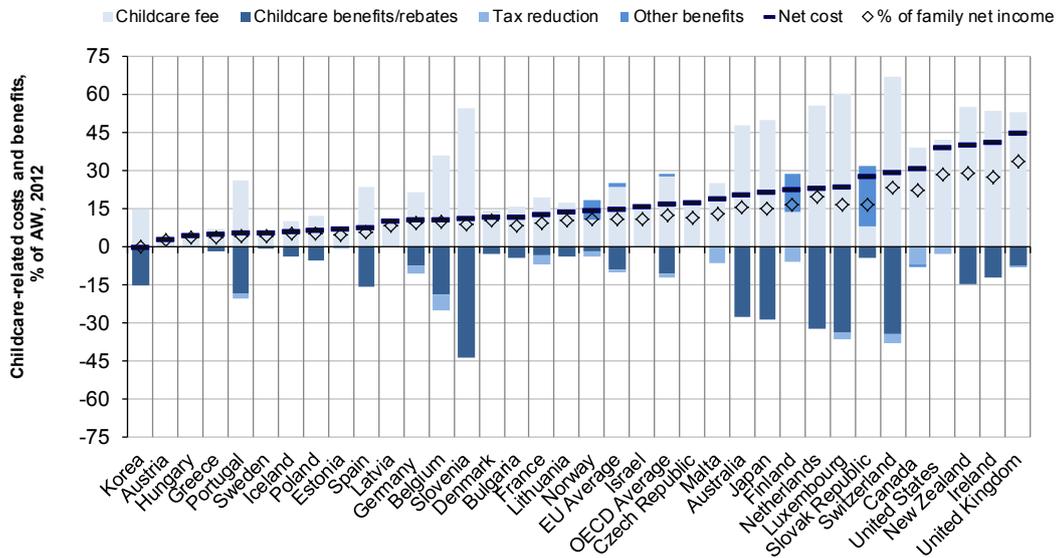
Note: The average wage reflects the earnings of an "average worker"; see OECD (2007) pp. 186-7 for detail.

Source : OECD Tax-Benefit model 2014

The United Kingdom sits with the latter group and from a theoretical perspective is somewhat complex. On the one hand, participation overall is relatively high, as can be seen from figure 4, but costs are expensive and the form of such participation is typically part-time as can be seen from figure two and five. The implication from this is that the high costs are the major factor contributing to low participation, with the unused FLFP representing a potential loss of overall economic output due to lower participation, human capital depreciation and in some cases lower family welfare.

Figure 2.0: Net childcare costs for a dual-earner family with two children (aged 2 and 3) and with full-time earnings at 150% of the average wage, 2012

Out-of-pocket childcare costs for a dual-earner family: full-time care at a typical childcare centre
 Full-time earnings = 100+50% of average earnings (AW)



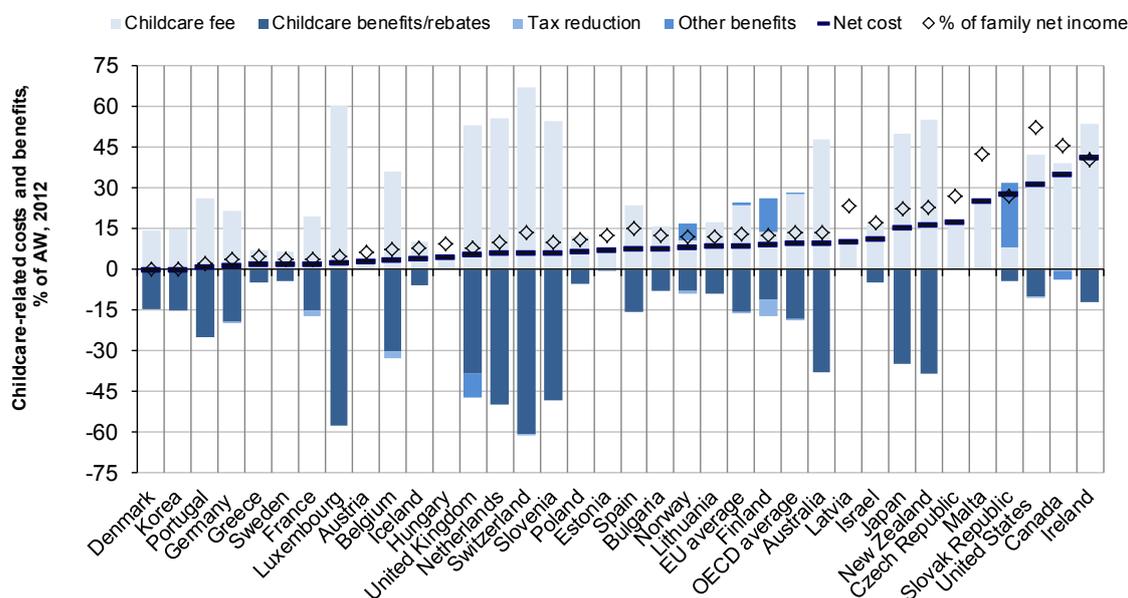
Net cost	0	3	5	5	6	6	7	7	7	8	11	11	11	12	12	13	14	15	15	16	17	18	19	21	22	23	24	24	28	29	31	40	40	42	45	
% of family net income	0	3	4	4	4	4	5	5	5	6	8	10	10	9	11	9	10	11	11	11	11	13	12	13	16	15	17	20	17	24	22	29	29	29	27	34

Note: The average wage reflects the earnings of an "average worker"; see OECD (2007) pp. 186-7 for detail.
 Source: OECD Tax-Benefit model 2014

The United Kingdom sits with the latter group and from a theoretical perspective is somewhat complex. On the one hand, participation overall is relatively high, as can be seen from figure 4, but costs are expensive and the form of such participation is typically part-time as can be seen from figure two and five. The implication from this is that the high costs are the major factor contributing to low participation, with the unused FLFP representing a potential loss of overall economic output due to lower participation, human capital depreciation and in some cases lower family welfare.

Figure 3.0: Net childcare costs for a sole-parent family with two children (aged 2 and 3) and with full-time earnings at 50% of the average wage, 2012

Out-of-pocket childcare costs for a sole parent: full-time care at a typical childcare centre
 Full-time earnings = 50% of average earnings (AW)



Net cost	0	0	1	2	2	2	2	3	4	4	5	6	6	6	7	7	7	8	8	8	9	9	9	9	10	10	10	11	12	16	17	18	25	28	32	35	42
% of family net income	0	0	2	4	5	4	4	5	6	7	8	9	8	10	14	10	11	12	15	12	12	13	13	14	14	14	23	17	23	23	27	42	27	52	46	41	

Note: The average wage reflects the earnings of an "average worker"; see OECD (2007) pp. 186-7 for detail.
 Source : OECD Tax-Benefit model 2014

But does this explain the full story of FLFP in the UK? When considering the variation in policies between countries it is important to consider the implications of the different ideologies and family practices which inform the demand and development public policies.

It is well established that differing familial gender roles vary and inform public policies towards family policies, such as childcare in different contexts and with differing implications for the level of FLFP and also the public policies on offer (Andreß 2003). In this framework there are two important family types with implications for labour force participation, but also the development of public policies towards childcare. In Scandinavia, typically familial gender roles are much more equal with both partners typically much more likely to work, but also to work full time. In addition it is relatively less likely for one partner to take a junior role, for instance working part-time (Andreß 2003, Andreß et al 2006). In contrast to this, in the UK the familial model is relatively more traditional, with a

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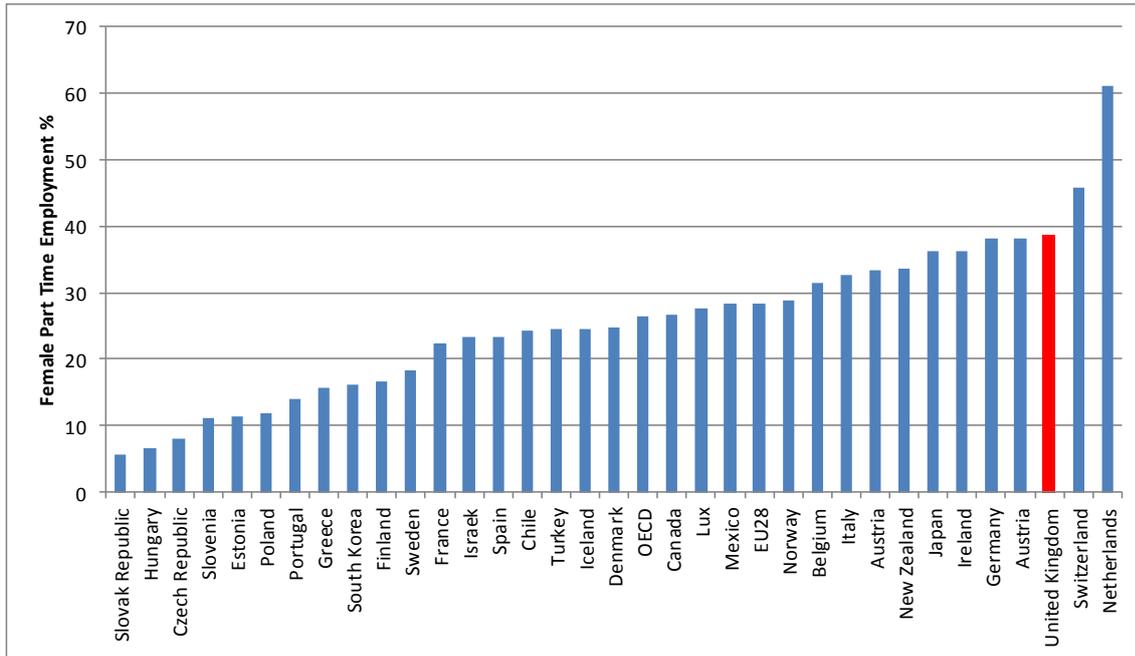
breadwinner, typically male and a junior economic partner, classically female, working part time or not at all.

This has important implications for any analysis of FLFP in the UK, namely; is low FLFP or a function of the lack of supply of effective low cost high quality child care or in fact a lack of demand due to a more traditional ideology of familial roles?

In answering this question developments in early year's education under New Labour from 1997 are potentially useful. Whilst costs remained relatively high for UK families on the whole, for low income families and single mothers this was not the case. As can be seen from figure 5.0 the costs for low incomes single families are comparatively low and provision of high quality low costs services for deprived areas was expanded heavily under the Sure Start Early Years education program from 1997 onwards (Eisenstadt 2011, Glass 1999, Melhuish et al 2010).

Sure Start was an area based scheme targeted, at least initially, at the most deprived areas offering a range of services including outreach services and home visiting, primary and community health care but, also and most importantly, welfare to work, employment support and high quality play, learning and childcare (Gladd 1999, Eisenstadt 2011). The childcare was available universally to all within the local area where a centre was based, giving access to 51% of children in families with incomes 60% or less than the national median income from the 20% most deprived areas (Melhuish et al 2010). What this means is that a study of such an area based schemes is in many ways a good natural experiment to test the hypothesis that the barrier to higher FLFP in the UK is due the high costs experienced. Areas with a Sure Start centre receive childcare infrastructure which is both high quality, widely available and cheap or free in contrast to other areas where provision is largely private and relatively or more expensive.

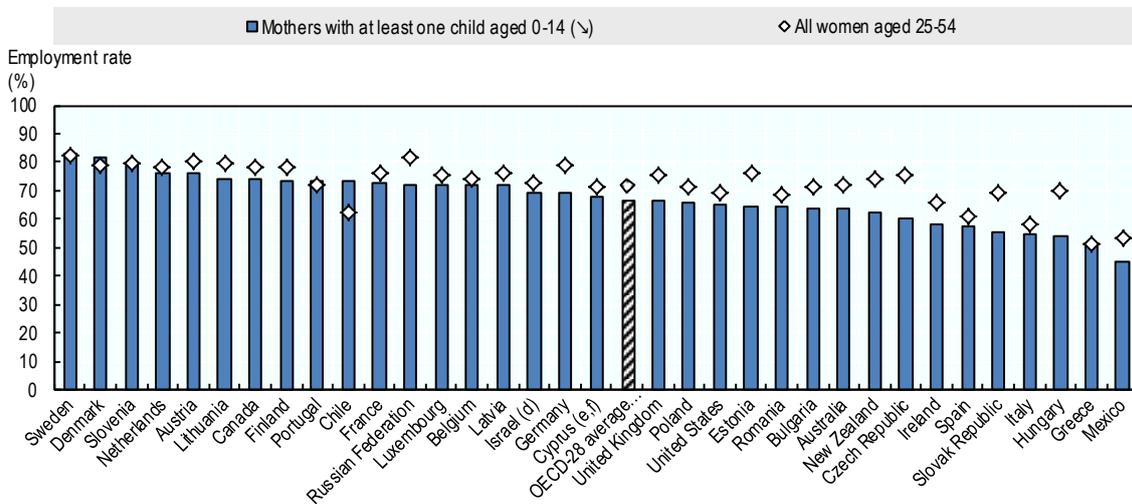
Table 4.0 OECD Female Part time employment rate



Source: OECD 2013

Table 5.0.A Maternal employment rates, 2013^a

Employment rates (%) for women (15-64 year olds^b) with at least one child aged 0-14^c and for all women aged 25-54



Source: OECD 2013 The labour market position of families

It is this central hypothesis which this paper will seek to assess, namely, if the lack of cost effective, high quality childcare is the real barrier to higher maternal employment. If this is the case it is expected that participation will be higher in Sure Start areas then comparable non-sure start areas or that the gap between the two will narrow over the sample.

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This paper will use logistic regression to estimate employment of mothers of children ages nine months, three years and 5 years of age, whilst controlling for relevant characteristics. It will use both a national panel and also a panel of areas where a Sure Start centre is based, representing a control and treatment group respectively for the presence of publicly available free or highly subsidised childcare in order to test the central hypothesis that the high price is a barrier to increased labour force participation of mothers. In addition to this any outcome will also assess the organisation procedures of sure start with regards to female labour force participation, namely that the joining of services in one location for mothers in providing both childcare, child health services, adult education and employment support has positive effects on maternal labour force participation.

Chapter two will discuss the development of Sure Start, its aims, history and also key evaluative research already conducted on its outcomes. Chapter three will discuss previous literature on the relationship between childcare and employment. Chapter four will discuss the theoretical background and mechanisms of how family policies alleviate the burden between work and family. Chapter 5 will discuss data and methodologies. Chapter 6 results and chapter 7 a final discussion of the implications of this paper's findings for future debates and policy developments.

2. What is Sure Start and why was it created?

“And we will attack child poverty too with our new Sure Start Programme for the under three's, an extra 3000 pounds per child. A Sure Start in Health Care, a Sure Start in Childcare, a Sure Start in Education, a Sure-Start for the children of the poorest families in our country”

Gordon Brown, Chancellor of the Exchequer 1999

Sure start emerged as part of the package of social reforms enacted by the New Labour government from 1997 onwards. It represented a radical break from previous social policy orthodoxy, which was typically characterised as anti-intervention. Within this previous context economic support was low, means tested and targeted and predominantly targeted at most vulnerable (Andreß 2003, Andreß 2006, , Assave et al 2007, De Wilde 2003, Jarvis & Jenkins 1999, Thane, 1978, Uunk 2004). Sure Start would seek to tackle social exclusion head on by being universally available in the most deprived areas and offering key services in one easily accessible location regardless of ability to pay;

Sure Start Services

- Outreach services and home visiting
- Support for families and parents
- Good quality play, learning and child care
- Primary and community healthcare and advice about child health and development
- Support for those with special needs.
- Skills training for parents, personal development courses
- Practical advice and support such as debt counselling, language or literacy training.

The typical mantra of the policies pursued by New Labour was “a hand up, not a handout”, which characterises Sure Start well. Its employment aims fitted directly into the then employability agenda and typical Anglo-Saxon model of the welfare state; where work is seen as the predominant source of financial support for single parents and low income families (Andreß 2003, Andreß 2006, , Assave et al 2007, De Wilde 2003, Jarvis & Jenkins, Viitanen 2005, Gregg & Harkness 2003). In this framework government intervention is simply a means to support this and not a source of economic support alone, as seen in more corporatist welfare states such as Belgium (Andreß 2003, Andreß 2006).

It aimed to tackle poverty in the most deprived areas by offering universal free childcare as well as support for training, skills and personal development in order to both improve human capital, employment prospects and subsequently family living standards (Glass 1997, Eisenstadt 2011). In addition to this Sure Starts focus was also on early years intervention in the life of the child in order to stop what they regard as the cycle of poverty, whereby a parents disadvantage is passed on to their children (Glass 1999, Eisenstadt 2001). It sought to intervene early in the areas of health and education in order to ensure that children from deprived areas had not already fallen behind developmentally by the time schooling began.

The program is an area based initiative where all services are freely available to residents of the area, in order to avoid stigma potentially associated with public service access or welfare. It is community led and can include much beyond the core services listed above dependent on what the community decides (Eisenstadt 2011, Glass 1999). It is also cross agency with multiple government services, including health, education and employment located in one location, as well as involvement of third sector and community organisations.

The theoretical benefit of this combination is primarily of convenience for mothers, with multiple beneficial services in one location instead of in different places across the locality. The accessibility offers benefits to all, but particularly low income families who may lack transport or who are traditionally difficult to reach through social intervention programs. Having convenient adult education and employment support in the same location is also theoretically beneficial for employment, reaching mothers early in the child's life and offering support and guidance on re-entering the work place. The same applies to those who may not have been in the labour force for some time, offering an access point to a group which could otherwise have been difficult to reach from a policy perspective (Eisenstadt 2011, Glass 1999).

It began by being aimed at the 20% most deprived areas. It was available to all children under 4 years old and their parents free of charge and covered 51% of children in families with 60% of the national income, which is the UK national poverty line (Eisenstadt 2001, Melhuish et al 2010). In fact the areas first covered by Sure Start and included in this study had the lowest levels of income, employment and educational attainment of the 20% most deprived areas in England; indeed almost half of children within Sure Start areas came from

families where no one was working, almost twice as high as national proportion in the UK (Eisenstadt 2011).

The scheme had a budget within in England of £452 million between 2001 and 2002 covering 250 Sure Start centres and potentially 187,000 children with eligibility (Melhuish et al 2010). Each program was to include coverage of roughly 800 children per year, but with key services potentially oversubscribed at certain times. Funding was planned for 10 years with funding initially coming from national government before gradually being changed to a statutory service provided by local authorities (Eisenstadt 2011, Melhuish et al 2010). From 2004 the catchment area was removed meaning anyone could use Sure Start services removing the geographic eligibility (Eisenstadt 2011). One benefit of this was the often very arbitrary boundaries were removed, however it does mean many people in the control group of this study may have been able to have access to sure start centres and services, however at this point there were still no national Sure Start infrastructure and it only covered some of the most deprived areas. What this means is that though there may be some cross over in the samples, it is unlikely to have a pronounced effect due to the size of the national control group. If anything it is likely to down play the association of any sure start centre on employment by matching the association seen in both groups.

One perceived benefit of Sure Start is its freedom to adapt and innovate with regard to local dynamics and local demand for services. The core services are prescribed, but how they are delivered and also additional services or community programs are open to interpretation by the communities receiving and directing the services (Eisenstadt 2011, Glass 1999). This means the project can be resilient and adaptive to local concerns and circumstances with flexibility to innovate.

Whilst this approach has some advantages, it is not without problems. One such problem is in assessing quantitatively the impact of sure start centres on employment and poverty. The variation in quality or experience for service users may mean that any potential association is muted by the variation of inputs across sure start centres. Those adhering more fully to core programs or focussing much more strongly on employment may have better work outcomes; however this relationship may be muted by others who focus more on community activities for children and mothers (Eisenstadt 2011). It is an important point for

consideration of any outcomes as though these are core services, the precise delivery or even emphasis may be varied and therefore could be a potential reason for any understatement of any statistical relationship. Additionally the schemes deliver is also in contrast to the evidence of previous schemes used to justify sure start, such as Head Start in America, which had a much more proscribed set of services and procedures for their delivery on offer (Reynolds AL 2001, Ramsey 1999).

In some sense this can be seen in the evaluations of sure start which have subsequently been carried which have, at least in health and education, found mixed results.¹ This is partly due to government decisions around implementation which effectively ruled out a randomised controlled trial. As a result most studies looking at the impact of Sure Start have used a quasi-experimental study design which will be replicated here (Melhuish et al 2010, Eisenstad 2011). This has involved using a panel study of families in sure start areas and those of the millennium cohort study, which is a similar study, as a control group.²

The theory behind Sure Start and area based intervention was that communities and individuals could be affected by the program, through access to its services directly, but also indirectly by changes which the program caused within the local vicinity (Melhuish et al 2010, Eisenstadt 2011). What evidence there is on employment from the studies evaluation shows a decline in workless households, irrespective of gender, from 45% in 2000-2001 to below 40% by 2010. There is also evidence that sure start areas employment levels improved relative to comparable deprived areas without a Sure Start centre with a reduction in workless households, irrespective of gender (Eisenstadt 2010, NESS 2008, 2010). In addition In terms of indirect change within the community it appears that crime and disorder improved, including a reduction in burglary, exclusion from school and unauthorised absences from school (Melhuish et al 2010). None of these studies has looked specifically at the focus of this paper, however, maternal employment.

Education also appears to have shown results with children who had been through the scheme assessed at age 11 achieving better grades. As well as this it appears emergency

¹ For full range of government reviews of Sure Start please see <http://www.ness.bbk.ac.uk>

² For full range of government reviews of Sure Start please see <http://www.ness.bbk.ac.uk>

hospitalisations decreased for infants including for severe injuries and also respiratory related conditions, potentially due to a decline in smoking (Melhuish et al 2010). Other positive benefits appear to be more comprehensive screening for special educational needs and also disability benefits due to greater receipt and classification (Melhuish et al 2010).

Other studies looking specifically at health effects found some good results, but with mixed outcomes by subgroups suggesting something else could have been going on. They found less negative parenting for children of non-teen mothers and fewer child behavioural problems (Melhuish et al 2010, Eisenstadt 2011). That said, it appears adverse effects emerged for children of non-teen mothers including lower verbal ability and social competence. Not only this but children of unemployed parents and also single parent families (40% and 33 % of sample respectively), scored lower for verbal ability than non-sure start areas with equivalent deprivation (Melhuish 2010).

These mixed outcomes and the area based theoretical background are indicative of potential difficulties in any study of sure starts effects. Being an area based study examining the outcomes in areas with a sure start centre in comparison to those nationally or equivalent communities without sure start centres allows for a whole swathe of other factors to influence outcomes. This could be anything from other government employment schemes, businesses moving in and out of different areas, variation in sure start schemes which is potentially big, and other pre-school care schemes available to name just a few. Unfortunately due to available data on those who have had access to Sure Start centres this is the best available source. These concerns will be addressed as far as possible in the data and methods section.

On health specifically there is evidence that the variation in services has had an impact on outcomes with likely potential similarities to the employment sphere (Melhuish et al 2010). Melhuish et al (2010) highlight that those rated better by health professional appeared to have stronger link to better area outcomes, giving support to the notion that the variation in services, whilst being good for innovation, could lead to inconsistent standards and outcomes. Indeed Naomi Eisenstadt the head of the roll out of sure start highlighted this point in her 2011 review of the scheme noting that at the beginning this was much more of a problem owing to the community led nature of the scheme (Eisenstadt 2001). From

around 2002 the scheme became much more prescriptive in the services offered and their delivery, however the effectiveness of each centre still had potential to vary greatly. On this topic a study found that spending per child varied from anything in-between £800 to £1200 as well as an apparent difficulty in getting the programs running (Eisenstadt 2011).

Much of the rush to implement sure start was due to the lack of attention which had historically been placed on publicly available child care, early years intervention, teenage pregnancy, low and part time female labour force participation and single parenthood within the UK; indeed Norman Glass MP one of the treasury officials involved in the creation of sure start described children's ages from 0-4 as "a policy free zone" (Glass 1999). The funding at the beginning was so high only 6% was spent in the first year and it was quickly, by 2005, embedded within the welfare state by statute in order to ensure it would become a permanent service local authorities were mandated to provide. One important aspect of analysis then will be if employment improves over time following these changes.

The placing of Sure Start firmly within the welfare state marked a significant change in the economic history of the UK, placing child care infrastructure right at the heart of the British welfare state and establishing it for the first time as a national economic institution (Glass 1999). Indeed one of the founding ministers, Yvette Cooper has long called for childcare to be recognised as important as roads and railways in terms of economic infrastructure calling it "an essential infrastructure of a modern economy" (Cooper 2015).

This placing of Sure Start firmly within the welfare state also made it much more politically secure against a sceptical opposition who were unsure of the level of expenditure, feasibility of promised outcomes and even the very agenda of social intervention and public provision of childcare (Eisenstadt 2011). By 2010 however all three major political parties carried manifesto pledges to protect and expand Sure Start, representing a major success for the program via becoming electorally damaging to proposing anything other than its maintenance and expansion (Eisenstadt 2011).

Ball & Vincent (2005) make clear how important Sure Start was, but emphasise how it was a central part of a broader package of child care market policies which were launched by New Labour from 1997 and how different this was in terms of government policy to the past. New Labour's aim was to increase female labour force participation through provision of

high quality, free or subsidised child care, as well as targeting unemployment and child poverty generally (Ball & Vincent 2005). Not only was this a new key aim at the universal level but specifically in the most deprived areas, representing a sharp change in economic policy orthodoxy towards intervention in the labour market (Ball & Vincent 2005). This included a national childcare strategy, the employment “New Deal” and a ten year child care strategy aimed at massively increasing subsidised and private provision through day cares and private child minders (Ball & Vincent 2005).

These reforms were positively received however even today provision in the UK still remains largely provided by private childcare and remains highly costly as can be seen in figures 1-5 (Ball & Vincent 2005). Between 1990 and 2000 the private childcare market in terms of private day care centres increased by 30%, representing an industry of £2.66 billion by 2004 (Ball & Vincent 2005). Nor was it cheap, with 75%-85% of the costs in the mid-2000s, at the time of peak sure-start roll out, being covered by parents. This works out at £134 a week, or £7000 per year, rising £8730 for inner London and a massive cost to families (see figures 1-3).

The point here is that whilst New Labour rolled out massive childcare reforms to the services available which, in contrast to Sure Start Areas, remained expensive and largely from private providers. Some partial funding was made available through the working tax credits system to refund the cost for the lowest earners, however for the majority the cost remained. Another problem was that the schemes, and to a lesser extent sure start too, suffered from recruitment problems with a lack of high quality staff. This led to frequent reports citing a gap between the rhetoric for high quality services and actual practice (Ball & Vincent 2005, Eisenstadt 2011, Melhuish 2009).

It is in this respect in which Sure Start is as interesting as a study with employment, representing a test of the cost of childcare services in relation to female labour force participation. If one of the barriers to employment and full time employment for mothers is the lack of available childcare, then its increasing and affordable supply in sure start areas should have had an equivalent impact of female labour force participation. In these areas a publically provided free or highly subsidised services was offered in contrast to other areas.

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It is this central premise which this paper will seek to address by modelling employment and labour force participation levels nationally and in sure start areas.

3. Previous Research

“In the UK the typical cost of a nursery place is more than the average household spends a year on either food or housing”

Tarja K. Viitanen 2005

The rationale and evidence behind increasing or accommodating female labour force participation through, both increasing the supply and reducing the cost of childcare infrastructure, is not something which is new or novel (Andre´ 2003, Berlinski and Galiani 2004, Blau 2004, Blau & Hagy 1998, Cascio 2006, Chevalier and Viitanen 2002, , Del Boca 2002, Del Boca, Locatelli, and Vuri 2003, Fugazza, Minez, and Pucci 2002, Hank and Kreyenfeld 2000, Henau et al 2010 ,Hofferth and Collins 2000, Lundin 2008, Ribar 1995, Schlosser 2005 Tarja K. Viitanen 2005, Tekin 2002). As highlighted by Lundin et al (2008), already in the 1970s the Swedish government responded to the increasing female labour supply which had burgeoned during the economic boom of the 1960s by increasing the supply of childcare places by 100,000. This change occurred at the same time as FLFP increased from 30% to 70%, leading many to attribute a level of causal relationship (Lundin et al 2008, OECD 2007). That said, whilst many have found evidence to support decreasing childcare costs with higher FLFP, the range and scope of service provision varies significantly both within and between countries in much the same way as participation.

Looking specifically at the UK Viitanen (2005) found that the high cost of childcare was a significant barrier to higher female labour force participation. She found that the average cost of a nursery place was more than the average UK household spent on either food or housing and, as such acted as a barrier to potential employment and access to child care services (Viitanen 2005). She also found that childcare price subsidies, the predominant way childcare is provided by the state in the UK, had a modest effect both on labour force participation and also on the use of formal childcare (Viitanen 2005). Childcare subsidies are the predominant way the UK government alleviates the costs of childcare for families, however this is only for lower income families and the take up of these schemes has been relatively low (Brewer 2003).

In the UK childcare is based on market provision and a first come first served ability to pay basis (Viitanen 2005). There has been a massive increase in childcare within the UK from 1998; however the majority of high quality expansion has been in the early year's education sector and not for older children already attending school (Lewis 2003). For them care normally exists through independent childminders or wrap around childcare provided by schools which is, however, not subject to minimum quality standards such as child-staff ratios, which the 1989 children's act imposes on other childcare providers (Viitanen 2005). The clear implication is here that there is potential for lower quality which could influence a mother's decision to participate in the labour market and, subsequently, induce lower overall labour force participation (Viitanen 2005, Lewis 2003).

When modelling this in the UK looking at the purchasing of childcare by all groups, not at free schemes such as Sure Start, Viitanen (2005) found that a 25% childcare price subsidy would increase the participation rates and purchasing of childcare by married mothers of pre-school children by three percentage points. This is important because previous studies looking at already available childcare subsidies reported little take up of the schemes (Brewer 2003). They found specifically that, even in spite of tax credit schemes to encourage greater female labour force participation, three quarters of working parents admitting being unhappy with their provision due to lack of local provision and an inability to afford the better quality care (La Valle et al 200)

They found that increases in wages had a positive association with employment and also the propensity to access childcare services, but also that the contrary increasing childcare costs had a negative effect on employment and childcare access. The exact amount was a 10% increase in wages leading to a 4.2% increase in employment participation for mothers (Viitanen 2005). For childcare it showed a 10% increase in costs led to a 1.4% increase in employment (Viitanen 2005). An equivalent model looking not at employment but at childcare use as the dependent variable found a 10% reduction in price leading to a 4.6% increase in use (Viitanen 2005). This is indeed similar to other results looking at childcare elasticity in other countries such as the United States (Viitanen 2005, Ribat 1992, 1995)

Many studies utilised a research design, similar to this particular one, which have sought to exploit the conditions created by the rollout of a new service of childcare to estimate its

association with female labour supply. These studies are akin to natural experiments where the regional or time differences in the roll out of a policy allow for a study of its potential impact. One study of this type has been conducted in Israel looking at the launch of public pre-school education infrastructure specifically for Arab mothers (Schlosser 2005). The scheme was universally available to three and four year olds. The author found a statistically significant increase in FLFP of 7%, overall, but an even more pronounced effect for the most educated mothers (Schlosser 2005).

Another example is provided by Berlinski and Galiani (2004) in the context of Argentina where child care infrastructure was expanded to three and five year olds. Utilising the variation in childcare services during the gradual roll out they were able to study the difference in FLFP which occurred in areas that received and did not receive the service and found a statistically significant positive relationship with FLFP (Berlinski and Galiani 2004).

Another example studying the varied roll out of childcare support can be seen in a study which examines the expansion of highly subsidised childcare for ages 0-4 in Quebec in 1997 (Barker et al 2005). The roll out is compared to the rest of Canada as a control group where the cost was not reduced and found a significant relationship between increasing female labour supply and reducing childcare costs (Barker et al 2005).

Results contrary to this pattern have been found in an American context by Cascio (2006) who exploits similar differences in the time pattern of the roll out of public kindergarten infrastructure to measure any changes in the levels of FLFP that may be associated. Using a difference in differences estimator her results show a different picture with no significant responses detected for the majority of mothers except single mothers with specifically five year old children and no other children younger than five (Cascio 2006).

In Sweden Lundin (2008) analyses changes which occurred following the introduction of a price cap on child care which led to varying reductions in costs across different regions. He compares families with identical characteristics, but experiencing differing reductions in the prices of childcare. They find significant results for mothers with children over 5, but otherwise no significant relationship between the price fall which occurred in 2002 and female labour force participation (Lundin 2008). In some respects this is to be expected, unlike the previous natural experiments occurring in Argentina, Canada and Israel, where

the infrastructure was new, childcare services have been around for a long time in Sweden, are well established and there is already a high level of female labour force participation. In this sense this research may suggest a limit to which decreasing prices can increase FLFP (Lundin 2008).

Other evidence of the price mechanism between care and FLFP is provided by Blau (2004) when reviewing who uses care within the USA. He found that the propensity to use publically available child care had a distinct U shape in relation to income (Blau 2004). What this means is that there is a high propensity for working mother to use childcare at the low income scale, at the top of the income scale, but not in the middle (Blau 2004). The theoretical mechanism behind this is related to the price, where those at the top are able to pay for the service fully and those at the bottom of the income distribution receive the greatest subsidy for childcare services (Blau 2004). Indeed when modelling this to take into account preferences for care by either other family members or paid care Blau (2004) found that a higher price had a negative effect on seeking employment and utilising paid for care.

When reviewing the literature including 20 studies on US data Blau (2004) finds significant variation in the elasticity of employment in relation to the price of childcare. The estimates range from .04 to -1.26 showing significant variation (Blau 2004). These studies are specific to the actual price of care or subsidy received and not, as in the studies above, looking at or quasi natural experiments. Much of the variation is likely due to differences in estimating the price of childcare, with some using estimates from CPI data, others using the wages of childcare workers and some even simply the number and ages of children in care (Blau 2004). Another major reason for the differences is, as Blau (2004) argues, due to ignoring the potential for mothers to choose unpaid care, such as the provided by grandparents or other family members which is an important, but difficult potential form of childcare to estimate (Blau 2004).

His own study and also three others are more complex using a multinomial choice model between full, part-time employment and unemployed (Blau 2004). They model the price of childcare as a conditional influence on the type of care which is used, either paid or unpaid and use of child care and childcare subsidies conditional on employment (Blau & Hagy 1998, Ribar 1995, Tekin 2002). These models which take into account this greater degree of the

theoretical choice available to mothers find elasticity for female labour supply with respect of employment at the bottom end of the estimates of all of the literature reviewed by Blau (2004). This indicates the importance of taking into account the potential for alternative forms of care when modelling maternal employment, such as the presence of grandparents (2004). The most important point however from the summary provided by Blau is that these studies suggest a low elasticity between FLFP and the price of child care (Blau 2004).

Other studies looking at a broader European comparison have found strong positive relationships between public childcare and FLFP. Indeed there are a number of European studies which have supported this theoretical relationship between lower FLFP and a lack of childcare infrastructure (Hank and Kreyenfeld 2000; Hofferth and Collins 2000; Chevalier and Viitanen 2002; Del Boca, Locatelli, and Vuri 2003). They study the differences between countries with lower FLFP and a correlation between the lacks of available services and lower FLFP.

Henau et al (2010) examine the gaps in full time employment rates between mothers and none mothers who are in a couple as the dependent variable. They then model as independent variables the differences in public policies with regards to childcare and family leave in order to try to explain the variation in gaps between countries. They find that the absence of effective public childcare means that even the most highly educated mothers appeared to have reduced levels of labour force participation then countries where services were widely available and cheap (Henau et al 2010)

Other studies also look at the whole package of family policies on offer including parental leave as well as childcare (Henau et al 2010). They find that countries such as France, Belgium and the Nordic countries appear to show a correlation between higher FLFP and their package of family policies which appears to have reduced the conflict between family and work (Gornick, Meyers, and Ross 1997, 1998). In these countries policies support labour market attachment through paid parental leave, publically available and subsidised childcare and legal protections for employees on leave. The picture is slightly different in countries such as Austria and Germany where typically one partner reduces the level of FLFP or ceases to be employed, typically the mother (Gornick, Meyers, and Ross 1997, 1998 et al 2010). As Henau (2010) comments, to some extent in these countries the state recognises

domestic work as labour and it is paid for through family benefits, legal protection and lengthy family leave policies (Henau et al 2010). In the UK they find the picture is slightly different with little state intervention and only in cases of family failure or acute poverty, leading to many mothers to exit the labour market or reduce labour supply (Gornick, Meyers, and Ross 1997, 1998, Henau et al 2010). In Southern Europe the picture is starker still with low levels of state support, largely though lack of fiscal ability then through any conviction about appropriate support leading to a greater reliance on family networks (Gornick, Meyers, and Ross 1997, 1998, Henau et al 2010).

The above is also true with regards to a relationship within the European context between FLFP and the price of childcare covering France, Italy, Sweden and the United Kingdom (Fugazza, Minez, and Pucci 2002, Del Boca 2002, Del Boca, Locatelli, and Vuri 2003, Andre' 2003, Tarja K. Viitanen 2005). These studies seek to assess the role of the price of childcare in relation to variation in labour force participation by different sections of society and find that an increase in price leads to lower overall FLFP.

Indeed to some extent this has been seen in the reversal of the fertility and FLFP correlation to positive; where countries with higher fertility in Europe, such as Scandinavian countries, also have higher female labour force participation and better childcare infrastructure than those who do not such as Spain and Italy (Henau et al 2010, Del Boca, Pasqua Pronzato & Wetzels 2004). In these cases poor public policies with regards to childcare may not only hold back greater FLFP but also peoples preferred fertility decisions

What is clear is that there appears to be ample evidence that childcare infrastructure supports increasing FLFP in multiple contexts, but that there is disagreement with regards to its magnitude. In the United Kingdom where this study is based FLFP is modest, but typically part time and typified by low public support and high costs (viitanen 2005, Henu 2010). In this respect this makes sure start an interesting natural experiment to test these theories. Sure start is both low cost and either freely available or at a highly subsidised cost to all within the area. If the costs and low quality provision is actually a barrier then theoretically it would be expected for FLFP to be greater in these areas where a Sure Start centre is based.

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4. Theoretical Framework

In Britain and in the majority of other OECD countries child care has become a fundamental economic institution with a significant proportion of children, if not a majority, receiving care from someone other than their parents at some point or other during their childhood (Blau 2004). Provision comes in two forms and with two purposes which often overlap; that of early year's education and that of child care to support employment. The provision of purchasable care has the theoretical function of allowing both parents, and the lone parent also to participate in the labour market whilst substituting their own care for that provided by the market or state (Blau 2004, Klareven 2011). Indeed this has become increasingly significant as previous notions that able bodied mothers should not work when their children are at certain ages have become outmoded (Blau 2004, Klareven 2011). In addition, schemes like Sure Start not only provide childcare, but also early years education with the theoretical purpose of supporting child development and preventing the effects of a disadvantaged background taking effect early on (Blau 2004).

From a governmental perspective the theoretical framework justifying the provision of childcare is twofold. On the one hand low cost provision theoretically removes a barrier to higher employment which has benefits for governments but may also increase household welfare through increased household income (Blau 2004). In addition, high quality childcare, such as early interventions like Sure Start, provide greater economic benefits by equalising future economic opportunities of children whose initial economic endowment in terms of their families, may have been unequal and may potentially inhibit their life chances (Eisenstadt 2011, Blau 2004). This leads, theoretically, to better education and therefore better outcomes in later life. If childcare contains both of these two purposes it may also encourage potentially encourage greater use with worries about the quality of care allayed. This thesis is focused on the former however in seeing whether such childcare available at free or low cost, in the knowledge that they are high quality because they are designed to be educational, is associated with any difference in employment in areas where they were initially based.

Theoretically a decision to seek employment for a mother therefore necessitates some decisions around the purchasing of childcare services. This does not necessarily have to be in the form of paid childcare, indeed the support of extended family members such as grandparents is common and also stay at home fathers are becoming increasingly common. That said, typically it involves some decision to purchase childcare and this decision is theoretically sensitive to the cost, the availability and the quality of provision. What this means in practice is that cheap, high quality and available childcare will act as a positive influence on a mothers decision to participate in the labour market, whereas expensive, poor quality or lack of supply will limit participation (Viitanen 2005, Henau et al 2010).

The decision to purchase childcare and enter the labour market for a mother is then a function of the expected wage, the price and quality of formal childcare, its availability and to a lesser extent the availability of alternative sources of care such as grandparents and other personal characteristics (Blau 2004, Henau et al 2010, Lundin 2008, Viitanen 2005). If the expected wage is not sufficient to afford the cost of childcare or sufficient to generate the preferred level of income after the subtraction of childcare fees, then it could lead to a decision against labour force participation.

To some extent it can also be seen as a choice between home vs market labour and choice concerning which brings the greatest level of household welfare. What this means is that any decision to purchase childcare is in fact a substitution to home care and therefore dependent to an extent also on the quality of said purchased care in a trade-off (Henau et al 2010, Viitanen 2005). If the child care is both high quality, the cost low and the potential wage sufficient to generate the preferred level of household welfare then this would theoretically lead to a greater likelihood of maternal labour force attachment (Henau et al 2010).

This is particularly relevant for non-sure start areas, where the childcare market is largely private and expensive, with some subsidies for low income families provided by the government in the form of tax credits, but largely not for other families. It is expected that if the cost of childcare is the predominant barrier to greater participation then the availability of cheap and high quality educational sure start childcare would be expected to be associated with higher participation.

Furthermore with regards to the quality of childcare there are circumstances in which low quality will deter labour force participation (Viitanen 2005, Eisenstadt 2011). An alternative to female labour force participation and the purchasing of childcare is for a parent to undertake the domestic labour involved personally. This is not simply an economic relationship but one which involves love, care and a nurturing; it is this relationship which high quality care is theoretically supposed to substitute (Viitanen 2005). In this respect if the child care offered is low quality or does not provide equivalent or sufficient value to compensate for what is lost by not doing it personally, it may be that a decision is made against labour force participation. Unfortunately this is something very difficult to measure and does not include any appropriate approximate variables for use in this sample. Incidentally it is true that both sectors, private provision and Sure Start have had problems recruiting quality staff and so as much as this could be an alternative barrier to provision, it is one that to some extent applies to both sectors (Viitanen 2005, Eisenstadt 2011, Penn 2007, Ball & Vincent 2005)

Another important theoretical consideration when considering the determinants of maternal employment is a partner's income but also how the family functions as an economic unit (Van Klaveren 2011). In the traditional Becker theory (1991) of the family, marriage is an economic partnership in which maximising household utility is the aim. Within this traditional Becker theory of the family one partner is expected to specialise in domestic work whilst the other specialised in market work allowing them to maximise earnings growth.

As time has passed however with increasing wages for female labour the ability to purchase care has increased for those with the highest incomes allowing household utility to be maximised further through greater total household income and substituting parental care for that provided by the market which enables maternal employment. That said however, the level of a partners income can theoretically influence a decision to participate in the labour market through increasing the reservation wage required to decide to enter the labour market (Van Klaveren 2011). Additionally for the highest incomes, should a partner choose to spend more time on domestic work; theoretically they are more able to through the greater household income resulting from the high income from their partner. In this sense there is a transfer affect where when one partner, often the male, partner has a

significantly higher income this is transferred into less labour supply from another partner who spends more time theoretically on domestic labour (Van Klaveren 2011). Van Klaveren (2011) found this to be true amongst Belgian families where an increase in the wage rate for the husband leads to a reduction in the labour supply of the wife.

Additionally for those at the bottom of the income distribution this relationship is somewhat different. For families where neither partner can earn individually enough to satisfy the preferred level of household income there is an incentive for both partners to work (Van Klaveren 2011). As far as possible this will try to be estimated within the models, as explained in the data and methods section. Unfortunately no income data is available for each mother's partner and so father's education, if in a married or unmarried couple will be substituted by education whereby those with the highest education are expected to have the highest incomes. This is an imperfect substitution but not an unreasonable one considering the correlation between education level and higher income (Van Klaveren 2011)

With education this is also true whereby the mothers with the highest education are theoretically more capable of commanding higher wages and therefore have a greater propensity to enter the labour market (Van Klaveren 2011). This is expected to be the case in this data set also, whereby mothers with higher education, being able to command higher wages in the labour market are more likely to work owing to greater ability to pay for child care services to substitute domestic care. In addition it is also expected however that those mothers in a relationship where their partner has a high level of education and theoretically therefore a higher wage are likely to reduce labour supply and therefore show a correlation with lower employment.

5. Data and Methodology

There are two data sets which have been used in this study, but also in previous studies looking at the evaluation of the Sure Start centre initiative. These are the National Evaluation of Sure Start from 2003 to 2011 and also the Millennium cohort 2001-2012. Both of these studies have been used previously to assess the impact of Sure Start, but predominantly from an early year's intervention perspective and not from a maternal labour force participation perspective, as in this study.³

The National Evaluation of Sure start is a panel data set including over 9000 families who live in areas where a Sure Start centre is based. The data set includes families who lived in the 150 initial Sure Start centre areas who were eligible to use their services. The areas targeted are some of the most economically deprived areas in the country including, as mentioned previously, the lowest levels of income, employment and educational attainment of the 20% most deprived areas in England (Eisenstadt 2011). It samples families when the child is aged 9 months, 3 years and 5 years old; representing different stages when they could have had access to Sure Start services and eventually upon starting school. All of these families are in an area where a sure start centres is based and so are therefore considered the treatment group.

The millennium cohort study is a similar panel study of families and their children analysing families when their children are at the same ages of 9 months, 3 years of age and also 5 years, but this sample covers the entire country. It follows 19,000 families whose child was born from year 2000 and whose cohort child was 9 months old between September 2001 and September 2002. It represents all regions of the United Kingdom.

This allows for a control group which is more representative of the national picture and can therefore be used to judge any association between the presence of a Sure Start centre and maternal labour force participation. Clearly a better control group would be to identify all areas receiving a Sure Start centre and match those to similar centres not receiving a sure start centre, however neither the data nor documentation for the Sure Start dataset give

³ For full range of government reviews of Sure Start please see <http://www.ness.bbk.ac.uk>

information on the specific locations of these Sure Start Centres making it impossible to eliminate these areas from the national sample. Some information is available from the government but there is nothing to confirm which are included in the actual panel data set. Contact had been made with previous researchers in order to gather this exact information of the regions and Sure Start centres included in the study, but it was not obtained.

What this means is that some within the national control group may also have had access to a sure start centre and its services. The likelihood of this will have increased particularly by the time the children were 5 years old, as catchment area eligibility applied to Sure Start centres was removed. This means that any association between the presence of a Sure Start centre and higher FLFP may potentially be hidden through the presence of some in the national sample who have had access to sure start area services. That said, for the most part this is less important for the following reasons; firstly this could mean that any association found could potentially have been greater had it been possible to completely separate the treatment and control groups, but also that the numbers who may have had access are likely small in comparison to the actual treatment group. The national sample is much larger and the number of Sure Start centres at 150 is relatively small on a national scale.

Another flaw caused by the lack of regional data also introduces the inability to include any regional level unemployment or child care price data. This would have been useful in measuring likely regional differences, particularly in light of the deprived nature of many Sure Start areas and assumed higher costs of childcare at the national level (as seen in figures 1-5).

It is also necessary to be aware of the picture of childcare availability and subsidies to families in areas where no Sure Start centre is located. As can be seen from figures 1-5 in the introduction, the UK has some of the highest prices in Europe and, with the exception of the most deprived families, is highly expensive and with little subsidies. A new deal for parents and families was introduced in the early 2000s, increasing private provision and subsidies for the very poorest nationally, which is likely to have impacted maternal employment at the national level (Eisenstadt 2005, Ball & Vincent 2005, Glass 1999, Vitaanen 2005). That being said however, as confirmed by the study by Vitaanen (2005), the take up of these subsidies by those eligible has been relatively small and so should

theoretically mean that any association between the presence of a Sure Start centre and increased FLFP should not be too greatly affected.

Additionally another imperfection which sadly is unavoidable when using these two data sets is the mismatch in the timing of the sampling of two data sets, with the interviews as part of the millennium cohort study occurring one year before the interviews of the Sure Start study. This could mean that cyclical or trend changes in employment could also play a part in differences observed and needs to be considered with any conclusions. This gives the potential for employment to either increase or decrease with any trend in the time since the national dataset interviews.

The data will be analysed using logistic regression on three cross sections of the combined data sets when the child is aged 9 months, 3 years and also 5 years of age. It will look specifically at female labour force participation as a binary variable of unemployed or employed whilst taking into account relevant demographic characteristics to employment as well as the presence of a Sure Start centre using the following logistic equation;

$$\begin{aligned}
 \textit{Employment}_{it} = & \beta_1 + \beta_{\textit{maritalstatus}_{it}} + \beta_{\textit{age}_{it}} + \beta_{\textit{Education}_{it}} \\
 & + \beta_{\textit{number of children}_{it}} + \beta_{\textit{Ethnicity}_i} + \beta_{\textit{Fathers Education}_{it}} \\
 & + \beta_{\textit{Unpaid Care}_{it}} + \beta_{\textit{Sure Start Area}} u_{it}
 \end{aligned}$$

Using logistic regression is relatively common in similar studies and allows the possibility to test the likelihood of employment by relevant demographic and employment characteristics, as well as the treatment variable identifying eligibility to use Sure Start services.

The above model will be run over the following data sets and subsetting samples for each cross sectional year covering ages 9 months, 3 years and 5 years.

Age 9 months; two cross sections of mothers with children of 9 months old originating from both the national and Sure Start Centres. The first is unrestricted by income and the second restricted to those mothers whose total household income is below £30,000 in order to try

take into account the large variation in deprivation between the Sure Start and the National sample.

Age 3 years; exactly the same as above

Age 5 years; only one sample is available which is unrestricted by income as the income data collected in the Sure Start dataset is unsatisfactory. The majority are missing and the only way around this would be to use income data from when the child was three years of age which is theoretically difficult as it rules out any changes within the two years since.

The decision was taken to restrict the sample at £30,000 due to the quality of the income data. The Sure Start data set only included income bands with no information in between and so the national sample was specified in the same format. There was no information within the Sure Start sample for between £20, 0000 and £30,0000 and at £20,000 it was considered too low and too restrictive on sample size. A separate model was run on this sample below £20, 0000 and the coefficients and significance levels were largely the same however. Using £30,000 allowed a larger sample and was therefore thought to be beneficial as all independent variables had enough observations.

One other complication with these income bands within the Sure Start data set is missing information and the potential for that to be clearly to be correlated with those who are unemployed. What this means is that, whilst there are advantages to this income restricted sample in allowing to a greater extent a comparison between like for like, it has the potential to bias estimates towards higher employment if unemployment is correlated with missing income information.

The descriptive statistics can be seen in appendix one. Each variable included in the model is included for each cross section of 9 months, 3 years of age and also 5 years of age. It is also split across each sample, national and Sure Start. Each will be discussed below with all expectations of behaviour once included in the model discussed.

The total sample size is 62,588 observations across the three data points with 22,047 coming from the Sure Start data set and 40,541 coming from the national dataset. Observations were removed from the following criteria and will be discussed with the variables in question below. Age was restricted to those between 22-44 to take account of

the potential of the greater propensity to be in Education before age 22 and also the argument that births over 44 represent something of an outlier and therefore may have different labour market behaviour to those below. This removed a total of 5349 observations in total from all three cross sections. Those passing 44 will also leave the sample and cease to be observed and those reaching 22 will then appear in the cross sections for their respective years.

The dependent variable, employment status, also had a missing and N/A category in the Sure Start sample. These were removed as they were unusable. The total number of missing employment observations removed was 2106 observations of a total of 25,464 observations of employment status. The majority of these at 1972 came from the third year of observation. This has clearly affected the proportions employed and unemployed in that year as they are the best of the three sure start cross sections and the total count unemployed is lower than the previous year suggesting these missing values are likely those previously labelled as economically inactive. This is important to take into account when considering any coefficients resulting from this third cross section as it will upwardly bias these estimates. No information in the sample documentation is able to confirm what happened here or whether there was a change in procedure to account for this and so it was decided to remove them as in previous years.

Employment Status

The dependent variable, employment status can be seen at the top of the table. It shows higher employment in all cross sections for the national sample than in the Sure start sample but with increasing employment across both samples as time passes.

As discussed above however, the missing values in the Sure Start sample almost all come from the third year meaning this will likely upwardly bias any estimates of employment in that year.

The differences in the proportions of employment indicate that the likelihood of the Sure Start variable indicating the presence of a Sure Start are will likely be negative when compared to the national sample. To some extent this is expected considering the economic

differences between the two areas, but will depend on the association of the other control variables with employment, but also the restriction of the samples by income group.

Marital Status

The marital status variable shows that a greater proportion are married within the national sample than the Sure Start sample across all three cross sections. Across these groups in both data sets the proportion employed is greater for those who are married than those who are single mothers. In addition even between groups within the samples, the proportions employed in the national sample are higher even when employing like for like. Though this is expected, as has already been said in light of the poorer economic situation of these areas.

That single parents earn less is largely as expected from conventional theory, with single parents either being a) less likely to be married due to unseen characteristics correlated between employment and marriage or b) the difficulties in seeking employment as a single parent in light of childcare costs and a potentially unfair distribution of the labour and economic costs of raising children associated with being a single parent (Lewis and Kiernan 1996).

Single parents typically face employment barriers and difficulties mentioned above and, as such it is expected to negatively impact the prospects of employment when compared to the reference category of married mothers.

Ethnicity

Ethnicity is typically negatively associated with employment theoretically due to employment barriers and association with living in deprived areas, often with poorer public services such as schools which can therefore influence educational outcomes and later employment potential.

This can be seen in the descriptive statistics here in which for all cross sections and both data sets the proportions of employed is much greater for those of the majority than minority categories. In addition there are also greater numbers of mothers from an ethnic minority in the Sure Start areas than in the national sample as a whole and again the

employment outcomes for minorities in the Sure Start are worse than those in the national sample for each cross section.

Mothers Education

The pattern of all of the previous variables is consistent with mothers education also whereby those in the national sample have greater proportions with better qualifications, but also that even when comparing those with the same qualifications in the Sure Start sample with the National sample, there are more employed in the national sample than those in the Sure Start sample.

It is expected that education will be positively associated with the odds of employment with the chances declining by level of qualification.

Fathers Education

Father's education has been included in this estimation as a proxy for partner's income which has been shown to influence maternal labour supply (Van Klaveren 2011). Education has been used as no partner income data was available in the Sure Start sample (though it was in the national sample).

Unlike what was potentially expected from the theoretical discussion above, the relationship between partner's education and maternal employment appears much the same as with mothers education with the highest proportions of employed in the highest educational categories. This runs some risks of being correlated with mother's education and so the model will be tested without father's education to ensure that the directions and significance of other coefficients remain the same.

Number of Children

It is expected that with increasing numbers of children the costs of childcare increases and so it is expected that the probability of employment will also decrease.

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Both samples show increasing levels of unemployment with the number of children, but also the proportion of unemployed for each group is higher in the Sure Start sample when comparing like for like indicating again a negative association between employment and residence in a Sure Start area.

Grandparents

As discussed in the previous research section, it is important to try and estimate the potential to use alternative forms of care, such as grandparents. Unfortunately there is little in this dataset to use, however both include the presence of a grandparent within the household and so this has been included in the model. The numbers are however very small and the relationship not clear across all cross sections or even between samples.

6. Results and Discussion

The results can be seen in the appendix showing the coefficients, significance, standard errors and odds ratios for each dependent and independent variable as well as the pseudo R squared. Below each of the coefficients will be discussed and any pattern described as to whether it matches on contrasts with expectations.

6.1 Control Variables

For the control variables the results show mostly what was expected from all five models, including both ages 9 months, 3 and 5 years of age in both the restricted and unrestricted income datasets. Indeed the direction and significance of these coefficients is as expected bearing in mind information from previous research but also the descriptive statistics.

With regards to the number of children in all five models the odds of employment decrease with each additional child. The coefficients are negative with each additional child and statistically significant beyond 0.001 levels. This is as expected as with each child the costs of childcare increases, therefore decreasing the amount of income gained from employment after childcare costs and therefore closer to any theoretical reservation wage. This could mean mothers decide that the amount gained is not sufficient to provide the expected level of welfare after taking into account childcare costs (Viitanen 2005, Henau et al 2010). This cost at maximum will likely be double per child, but may be reduced through potential rebates for a second child in care, but regardless the cost will indeed be more for those with more than one child.

With regards to marital status the coefficients and significance levels were also largely the same as the pattern seen from the descriptive statistics, whereby the proportion of unemployed is greater for single parents than those married or in a couple. Theoretical reasons for this could be the ability to share the costs of having children in a partnership, such as the costs of childcare, but also having two people capable of the manual work of collecting children etc, whereas in a single parent family this is often disproportionately placed on the single parent. In addition, we know that single parents typically earn less (De Wilde & Uunk 2008, Eamon 2011, Lewis and Kiernan 1996) meaning there is indeed quite

likely less to spend on childcare. This could theoretically mean single parents potentially hold out for a higher individual wage than those in a couple due to the inability to share childcare costs.

The coefficients for age are also as expected from conventional theory with income, with the chances of employment increasing with age, as greater experience is gained. The coefficient is both significant beyond the 0.001 level and its direction is positive with each increase in year of age.

The direction and significance of education's association with maternal employment is also in line with conventional theory (Henau et al 2010). The odds ratios of employment decrease with each level of education from post graduate qualification to no qualifications. In addition at all levels of the coefficient are statistically significant beyond the 0.001 level, with the exception of graduate. With graduate level there appears little difference between post-graduate and graduate, which is theoretically reasonable.

The coefficient for belonging to an ethnic minority group is also significant at the 0.001 level and negative. This is in line with other studies where people of ethnic minorities often face employment barriers such as discrimination, but also often come from disadvantaged backgrounds correlated with lower education and urban deprivation.

The presence of grandparents in the household as a proxy for an alternative source of care positive with employment, but is not at the same level of significance across all models suggesting some problems. In addition, as mentioned in the descriptive statistics section, this is an imperfect estimation for an alternative source of care, simply not having a grandparent in the house does not in any way suggest they would not be an alternative source of care. The presence in the household just makes it somewhat potentially theoretically more likely and is why it was included here, as the best possible way with the limits of this data set to estimate alternative forms of care.

Fathers Education which was used in place of partner's income shows an interesting pattern where the lower education levels show a higher likelihood of employment. This is both positive for employment at lower education levels and statistically significant at the 0.001 level. This variable was included because it is theoretically important, both due to the

theoretically greater combined ability to purchase childcare, but also the potential not to seek work at higher incomes if the preferred level of household income is already achieved through a partners income (Van Klaveren 2011). What this suggests is that mothers whose partners have lower qualifications, such as only GCSE or A level (aged 16 and 18 levels respectively) are more likely to be employed than those whose partners are more qualified. This either suggests a greater propensity to share the division of labour or the necessity for two incomes to reach the greatest satisfactory level of household income.

As was mentioned in the descriptive statistics the accounts appeared to show a similar relationship with employment to that of mother's education, however in the model the outcomes appear more in line with the theory provided by Van Klavaren (2011) that with that those whose partners earn the largest amount appear to have a lower odds of employment than those with lower qualifications of GCSE and A levels. The models were re-run to check that the other coefficients were the same even without this variable and the directions and significance stayed the same. Running the models with just father's education showed the same relationship as within the descriptive statistics; however after controlling for other relevant statistics it showed the pattern and significance levels within the model.

6.2 Sure Start Variables

The geographic variable representing the presence of a Sure Start centre in the area is statistically significant beyond the 0.001 level in all 5 models and is negative in direction.

6.2.1 Age 9 Months

In the two samples, Model 1 and Model 2, when the child is aged 9 months the coefficient for the presence of a Sure Start centre is negative and statistically significant beyond the 0.001 level indicating reduced odds of employment in these areas. This is in spite of the presence of a Sure Start centre offering cheap or, free high quality childcare and also adult education and employment support the service offers.

In some respects, however this is not unexpected, as this is still in the early stages of Sure Start implementation and it is also at the young age of 9 months when the child may still be too young for mothers who do not have employment already to decide seek employment.

It is also important to reiterate, as mentioned in the descriptive statistics section, those who are currently on leave, be that sick, holiday or maternity are included in the employment variable.

In addition as has already been discussed the 150 sure start centres here were placed in the most deprived areas in the UK with some of the highest levels of unemployment and lowest levels of educational attainment of the 20% worst areas in the UK and so a gap is to some extent expected, at least on the unrestricted sample due to the vast difference between sure start areas and the national level (Eisenstadt 2011).

On the income restricted sample, model 2, however where it has been ensured that as far, given the constraints of the data sets, the comparison is like for like the coefficient is also negative and statistically significant at the 0.001 level. Not only is this the case but the odds ratios of employment are also actually less for those in a sure start area within the income restricted sample than those in the unrestricted sample. What this suggests is that, holding all else constant those mothers on total household incomes below £30,000 were less likely to be employed, even in areas where a Sure Start centre with services targeted at providing child care and employment advice.

6.2.2 Age 3 years

In the two models from the samples where the child is 3 years of age, Model 3 and Model 4, the coefficient is both negative and significant beyond the 0.001 value indicating again reduced odds of employment for those residing in a Sure Start area whilst holding all other variables constant. This is the case for both the full national sample unrestricted by age and the sample where both the Sure Start and National sample have been restricted to below £30,000 to offset some of the vast economic differences between the two areas.

Arguably at three years of age theoretically enough time has passed and the child is at an age where many mothers may consider returning to work. Again it needs to be pointed out that those who went on maternity leave were not included in the unemployed category, but in the employed category. In addition two years have passed which should supposedly mean Sure Start services are better established and embedded with their respective communities. All of these things being said, the coefficients and odds ratios of employment are still both

negative and statistically significant for both models for mothers of children aged 3 years in Sure Start areas within this sample.

What are partially different are the odds themselves, which have narrowed to some small degree since the age of 9 months. The odds ratios of employment for those in a Sure Start area when the cohort child is 3 years of age are both 0.791 and also 0.752 for both the unrestricted and restricted samples respectively, compared to 0.705 and 0.690 from aged 9 months restricted and unrestricted respectively.

It is difficult to read too much into this as clearly these are separate models and there are numerous other factors to consider beyond the fact that the magnitude of change is relatively small. For one thing the information from the national data set is collected a year earlier which could potentially impact the coefficients. Additionally sample attrition is typically higher amongst those whom are economically disadvantaged and particularly the unemployed, which would upwardly bias any estimates here and could account for this very small change in the odds of employment in Sure Start areas.

6.2.3 Aged 5 years

In model 5, the unrestricted model for mothers where the cohort child was aged 5 the Sure Start variable is negative in direction and significant at the 0.001 level. In addition the odds ratio of employment is still negative when compared to those of the national sample at 0.845. What this mean is that those mothers of children aged 5 years old living within a Sure Start area remained less likely to be employed in spite of the childcare and employment services Sure Start offered.

As discussed previously, only one model is available at age 5 due to the poor quality of the income data which prohibited restricting the sample to make the comparison to a greater extent like for like. This means that it is unfortunately only realistically possible to compare across the full samples and not by those within similar income brackets. The problem is that it rules out the opportunity to try to counter any potential association with the disadvantaged areas where Sure Start is placed by matching the samples on income. Though it is necessary to say that the two previous samples at aged 3 and 9 months had worse odds

rations when restricted by income and so there is little to suggest the pattern would be different at age 5.

That being said, whilst the results are negative compared to mothers in the national sample with children aged 5, they are slightly better than had been the case when the cohort child had been aged 3 and also 9 months with an increase in the odds ratio of employment.

Firstly whilst this does represent an improvement, as with the previous narrowing of the odds of employment, one particularly important factor is the likely potential correlation propensity to leave sample and unemployment. Typically those with lower incomes are more likely to leave a sample and the same is true of those who may be unemployed meaning that there is likely some potential correlation between those leaving the sample and unemployment which could feasibly have upwardly biased the estimates of employment.

In addition, as previously mentioned these are separate models and so it is difficult to compare the outcomes from separate models.

Conclusions

The final results then for the association between employment and the presence of cheap and affordable childcare are therefore difficult to interpret. In all three years the odds of employment are less for those residing in a Sure Start centre area than those represented by the national sample.

To some extent there is a narrowing in the odds of employment as the age of the child increases in the three cross sections. This is intuitively reasonable as we know that the implementation of Sure Start took time as it was a completely new infrastructure, not built on anything previously existing. In addition reforms were made during the time covered in this sample to improve delivery (Eisenstadt 2011). An example is in 2003 when specific guidelines were issued for the delivery of services following a review and a move away from the initial community led nature of the scheme (Eisenstadt 2011). In addition it was just one part of a number of services on offer and so it seems reasonable that there may be a delay in reaching out to the communities where they were based (Eisenstadt 2011).

The lack of comparability between the control and the treatment groups in terms of levels of urban deprivation is also problematic in that, theoretically, employment growth could have been faster in those areas already better off, therefore eliminating the visibility of any potential absolute employment gains within the Sure Start areas. This is an intriguing idea as, from the descriptive statistics we can see that absolute increase in employment in the Sure Start areas did indeed occur.

The lack of regional data in the Sure Start dataset prevented the ability to select areas from the national sample which share similar characteristics to Sure Start areas such as levels of deprivation. This was attempted to be managed by restricting the income levels present in the sample, but again the results were largely similar and is still not theoretically as sound as matching by area characteristics.

Had it been possible, a within differences model would have been much better at fixing this problem, however this would ideally require information on employment for the families covered before Sure Start was open in their areas in order to measure the change. It would make the comparability much more reasonable than that in the current analysis and help to provide an answer to how Sure Start centres interacted with FLFP in the areas they resided rather than in relation to the national level which would also have been changing at the same time.

There are, however, many other factors which are likely at play here which need to be considered. For one thing the final sample in the Sure Start dataset has significant data problems in relation to the employment variable with a majority of missing observations coming from the final sample when the child is aged 5. This means the greater change in the odds of the final sample are highly likely to be as a result of this difference to the earlier cross sections. There is some narrowing of the odds even before this, but again this is small. This is likely due to the potential for sample attrition to be associated with employment meaning it is again difficult to interpret. An analysis on sample attrition would be beneficial to answering this; however it has not been possible to complete this.

What does this mean then if there was no real change in female labour force participation between the two groups in spite of the presence of a Sure Start Centre? If not the data problems previously discussed then an important alternative possibility is the Sure Start

centres themselves. Whilst employment was one of the purposes of Sure Start centres it was not its only aim. They were designed as an early intervention scheme aimed at improving parenting behaviour, child health, child education and also employment. In addition they were also community led, much more so at the beginning, with potential variation in how the Sure Start centres were ran (Eisenstadt 2011). The community led nature meant that many other services were offered, including leisure groups for mothers and their children ran during the day.

Within this there is a central tension between the first four aims and the latter which has even been commented on by the then Head of Sure start services Naomi Eisenstadt (2011). If many of the community, health, leisure and mother and child services are ran during the day, but these mothers were helped into work, they would not be able to attend any of the other things offered by Sure Start (Eisenstadt 2011). She believes that organisers recognising this paid much more attention to the former aims, particularly in light of how a focus on the latter might impact reports of parent satisfaction with the service (Eisenstadt 2011).

Eisenstadt (2011) believes this was a real potential problem in the early years of Sure Start owing to its intra government departmental ownership. The departments of health and Education both wanted the scheme to focus on early interventions in health and education and so were insistent that sure focused on creating a space for mothers where advice on parenting and health care could be given. In addition they wanted to focus to be on services for mothers, but with the mothers input leading the services development. In contrast for this the department for work and pensions saw the focus as adult education and employment but the achievement of its aims was, as Eisenstadt argues, in tension with the aims of the other two departments. She believes that many of the organisers of the Sure Start centres were happy to provide services for the first two, receive high satisfaction surveys and focus less with regards to the employment aspect part (Eisenstadt 2011).

In short, it appears that two conclusions are important. There is evidence of some improvement, in relation to the national sample, but also in terms of absolute levels; however a different data source and research design would massively improve the ability to test this. Had regional data been available it would have been possible to use a different panel study and select regions from within it. This would allow comparisons between before

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and after services were established in areas. The second is that the problems with implementation and delivery reported by Naomi Eisenstadt do fit with what is found here.

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OECD Family data base

- Children in Households Employment Status
- Maternal Employment by partnership status
- OECD Part Working
- OECD Childcare Support

<http://www.oecd.org/els/family/database.htm>

Appendix 1: Descriptive statistics

Table 1: Summary Mother's employment for National and Surestart databases

Dataset	Childs' age	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
		No.	%			No.	%	
National	< 9 months	12943	31.93	31	emp.	6853	52.95	31
					unemp.	6090	47.05	30
	3 years	13508	33.32	32	emp.	7052	52.21	33
					unemp.	6456	47.79	31
	5 years	14090	34.75	34	emp.	8124	57.66	35
					unemp.	5966	42.34	33
National		40541	100.00					
Surestart	< 9 months	7500	34.02	29	emp.	2845	37.93	30
					unemp.	4655	62.07	28
	3 years	8178	37.09	30	emp.	3308	40.45	31
					unemp.	4870	59.55	29
	5 years	6369	28.89	32	emp.	3012	47.29	33
					unemp.	3357	52.71	31
Surestart		22047	100.00					
Total		62588						

Table 2: Descriptive statistics for Marital status

Dataset	Childs' age	Marital status	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age	
			No.	%			No.	%		
National	< 9 months	Married	8707	21.48	31	emp.	4967	57.05	32	
						unemp.	3740	42.95	31	
		Missing	12	0.03	30	emp.	9	75.00	30	
						unemp.	3	25.00	34	
		Single	1463	3.61	28	emp.	414	28.30	29	
						unemp.	1049	71.70	28	
		Unmarried	2761	6.81	29	emp.	1463	52.99	29	
						unemp.	1298	47.01	28	
		3 years	Married	9061	22.35	33	emp.	5166	57.01	34
							unemp.	3895	42.99	33
	Missing		50	0.12	28	emp.	14	28.00	26	
						unemp.	36	72.00	28	
	Single		2110	5.20	29	emp.	696	32.99	30	
						unemp.	1414	67.01	29	
	Unmarried		2287	5.64	30	emp.	1176	51.42	31	
						unemp.	1111	48.58	29	
	5 years		Married	8970	22.13	35	emp.	5664	63.14	36
							unemp.	3306	36.86	34
		Missing	4	0.01	25.5	emp.	0	0.00	-	
						unemp.	4	100.00	25.5	
Single		2575	6.35	31	emp.	1058	41.09	33		
					unemp.	1517	58.91	29		
Unmarried		2541	6.27	31	emp.	1402	55.18	32		
					unemp.	1139	44.82	29		
National			40541	100.00						
Surestart		< 9 months	Married	3618	16.41	30	emp.	1529	42.26	31
	unemp.						2089	57.74	29	
	Single		1945	8.82	27	emp.	454	23.34	30	
						unemp.	1491	76.66	27	
	Unmarried		1937	8.79	27	emp.	862	44.50	29	
						unemp.	1075	55.50	27	
	3 years		Married	3895	17.67	32	emp.	1765	45.31	33
							unemp.	2130	54.69	31
			Single	2209	10.02	28	emp.	622	28.16	29
							unemp.	1587	71.84	28
		Unmarried	2074	9.41	28	emp.	921	44.41	29	
						unemp.	1153	55.59	27	
		5 years	Married	3425	15.53	34	emp.	1784	52.09	34
							unemp.	1641	47.91	33
			<NA>	4	0.02	36.5	emp.	1	25.00	42
							unemp.	3	75.00	36
	Single		1648	7.47	31	emp.	593	35.98	32	
						unemp.	1055	64.02	30	
	Unmarried		1292	5.86	30	emp.	634	49.07	31	
						unemp.	658	50.93	29	
Surestart			22047	100.00						
Total			62588							

Table 3: Descriptive statistics for Mothers' ethnicity

Dataset	Childs' age	Mothers' ethnicity	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
National	< 9 months	Majority	10991	27.11	31	emp.	6301	57.33	31
						unemp.	4690	42.67	30
		Minority	1929	4.76	30	emp.	543	28.15	32
						unemp.	1386	71.85	29
	<NA>	23	0.06	29	emp.	9	39.13	30	
					unemp.	14	60.87	28.5	
	3 years	Majority	10942	26.99	33	emp.	6248	57.10	33
						unemp.	4694	42.90	32
		Minority	1942	4.79	31	emp.	601	30.95	33
						unemp.	1341	69.05	31
	<NA>	624	1.54	31	emp.	203	32.53	33	
					unemp.	421	67.47	30	
5 years	Majority	12069	29.77	34	emp.	7383	61.17	35	
					unemp.	4686	38.83	33	
	Minority	1993	4.92	33	emp.	730	36.63	35	
					unemp.	1263	63.37	32	
<NA>	28	0.07	33.5	emp.	11	39.29	38		
				unemp.	17	60.71	31		
National			40541	100.00					
Surestart	< 9 months	Majority	5835	26.47	29	emp.	2445	41.90	30
						unemp.	3390	58.10	28
		Minority	1665	7.55	29	emp.	400	24.02	31
						unemp.	1265	75.98	28
	3 years	Majority	6460	29.30	30	emp.	2860	44.27	31
						unemp.	3600	55.73	29
		Minority	1718	7.79	31	emp.	448	26.08	32
						unemp.	1270	73.92	30
	5 years	Majority	5032	22.82	32	emp.	2586	51.39	33
						unemp.	2446	48.61	31
Minority		1337	6.06	32	emp.	426	31.86	33	
					unemp.	911	68.14	32	
Surestart			22047	100.00					
Total			62588						

Table 4: Descriptive statistics for Mothers' education for the National database

Dataset	Childs' age	Mothers' education	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
National	< 9 months	Post graduate	519	1.28	34	emp.	393	75.72	34
						unemp.	126	24.28	33
		Degree	3995	9.85	32	emp.	2798	70.04	32
						unemp.	1197	29.96	32
		A-level	1879	4.63	30	emp.	1124	59.82	30
						unemp.	755	40.18	29
		GCSE	4468	11.02	30	emp.	2159	48.32	30
						unemp.	2309	51.68	29
	None of these	1704	4.20	30	emp.	287	16.84	31	
					unemp.	1417	83.16	29	
	Overseas qualification	363	0.90	30	emp.	89	24.52	31	
					unemp.	274	75.48	30	
	<NA>	15	0.04	33	emp.	3	20.00	33	
					unemp.	12	80.00	33	
	3 years	Post graduate	560	1.38	35	emp.	419	74.82	36
						unemp.	141	25.18	35
		Degree	3974	9.80	34	emp.	2769	69.68	34
						unemp.	1205	30.32	34
		A-level	1988	4.90	31	emp.	1180	59.36	32
						unemp.	808	40.64	30
		GCSE	4784	11.80	31	emp.	2249	47.01	32
						unemp.	2535	52.99	30
	None of these	1732	4.27	31	emp.	339	19.57	33	
					unemp.	1393	80.43	31	
Overseas qualification	430	1.06	31	emp.	90	20.93	31.5		
				unemp.	340	79.07	31		
<NA>	40	0.10	35	emp.	6	15.00	33		
				unemp.	34	85.00	35		
5 years	Post graduate	744	1.84	37	emp.	614	82.53	37	
					unemp.	130	17.47	36.5	
	Degree	4222	10.41	36	emp.	3078	72.90	36	
					unemp.	1144	27.10	35	
	A-level	2136	5.27	33	emp.	1377	64.47	34	
					unemp.	759	35.53	31	
	GCSE	4878	12.03	33	emp.	2534	51.95	34	
					unemp.	2344	48.05	31	
None of these	1690	4.17	33	emp.	406	24.02	35		
				unemp.	1284	75.98	32		
Overseas qualification	394	0.97	33.5	emp.	109	27.66	35		
				unemp.	285	72.34	33		
<NA>	26	0.06	32	emp.	6	23.08	31.5		
				unemp.	20	76.92	32		
National			40541	100.00					

Table 4 Continued: Descriptive statistics for Mothers education for Surestart database

Dataset	Childs' age	Mothers' education	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
Surestart	< 9 months	Degree	1570	7.12115	31	emp.	991	63.121	31
						unemp.	579	36.879	30
		A-level	2078	9.42532	27	emp.	975	46.9201	28
						unemp.	1103	53.0799	27
		GCSE	1681	7.62462	29	emp.	570	33.9084	30
						unemp.	1111	66.0916	28
	None of these	1888	8.56352	28	emp.	245	12.9767	30	
					unemp.	1643	87.0233	28	
	Overseas qualification	283	1.28362	29	emp.	64	22.6148	30	
					unemp.	219	77.3852	29	
	3 years	Degree	1634	7.41144	33	emp.	1064	65.1163	33
						unemp.	570	34.8837	32
		A-level	2501	11.3439	29	emp.	1199	47.9408	29
						unemp.	1302	52.0592	28
		GCSE	2177	9.87436	29	emp.	724	33.2568	31
						unemp.	1453	66.7432	29
	None of these	1519	6.88983	30	emp.	200	13.1666	30	
					unemp.	1319	86.8334	29	
	Overseas qualification	338	1.53309	31	emp.	117	34.6154	32	
					unemp.	221	65.3846	31	
	<NA>	9	0.04082	34	emp.	4	44.4444	31.5	
					unemp.	5	55.5556	34	
	5 years	Degree	1340	6.07792	35	emp.	955	71.2687	35
						unemp.	385	28.7313	34
A-level		1967	8.92185	31	emp.	1064	54.0925	32	
					unemp.	903	45.9075	30	
GCSE		1729	7.84234	31	emp.	703	40.6593	33	
					unemp.	1026	59.3407	31	
None of these	1051	4.76709	32	emp.	165	15.6993	32		
				unemp.	886	84.3007	32		
Overseas qualification	269	1.22012	33	emp.	119	44.2379	34		
				unemp.	150	55.7621	33		
<NA>	13	0.05896	31	emp.	6	46.1538	37		
				unemp.	7	53.8462	27		
Surestart		22047	100.00						
Total		62588							

Table 5: Descriptive statistics for Granparents present in the household

Dataset	Childs' age	Grandparent s in HH	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
National	< 9 months	Present	655	1.62	27	emp.	273	41.68	28
						unemp.	382	58.32	26
		Absent	12288	30.31	31	emp.	6580	53.55	31
						unemp.	5708	46.45	30
	3 years	Present	578	1.43	29	emp.	267	46.19	30
						unemp.	311	53.81	28
		Absent	12930	31.89	33	emp.	6785	52.47	33
						unemp.	6145	47.53	32
	5 years	Present	586	1.45	31	emp.	304	51.88	32
						unemp.	282	48.12	30
		Absent	13504	33.31	34	emp.	7820	57.91	35
						unemp.	5684	42.09	33
National			40541	100.00					
Surestart	< 9 months	Present	437	1.98	26	emp.	132	30.21	26
						unemp.	305	69.79	26
		Absent	7063	32.04	29	emp.	2713	38.41	30
						unemp.	4350	61.59	28
	3 years	Present	410	1.86	27	emp.	149	36.34	28
						unemp.	261	63.66	27
		Absent	7768	35.23	30	emp.	3159	40.67	32
						unemp.	4609	59.33	29
	5 years	Present	244	1.11	30	emp.	97	39.75	32
						unemp.	147	60.25	29
		Absent	6125	27.78	32	emp.	2915	47.59	33
						unemp.	3210	52.41	31
Surestart			22047	100.00					
Total			62588						

Table 6: Descriptive statistics for fathers' education for National database

Dataset	Childs' age	Fathers' education	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
National	< 9 months	Post graduate	630	1.55	33	emp.	420	66.67	34
						unemp.	210	33.33	32
		Degree	3176	7.83	32	emp.	2041	64.26	32
						unemp.	1135	35.74	32
		A-level	1589	3.92	30	emp.	986	62.05	31
						unemp.	603	37.95	30
		GCSE	3374	8.32	30	emp.	1908	56.55	30
						unemp.	1466	43.45	30
	None of these	1196	2.95	30	emp.	416	34.78	32	
					unemp.	780	65.22	29	
	Overseas qualification	329	0.81	30	emp.	124	37.69	31	
					unemp.	205	62.31	30	
	<NA>	2649	6.53	29	emp.	958	36.16	31	
					unemp.	1691	63.84	29	
	3 years	Post graduate	669	1.65	35	emp.	432	64.57	36
						unemp.	237	35.43	35
		Degree	3142	7.75	34	emp.	2030	64.61	34
						unemp.	1112	35.39	34
		A-level	1522	3.75	32	emp.	955	62.75	33
						unemp.	567	37.25	31
		GCSE	3429	8.46	32	emp.	1985	57.89	32
						unemp.	1444	42.11	31
	None of these	1260	3.11	32	emp.	436	34.60	33	
					unemp.	824	65.40	31	
Overseas qualification	441	1.09	32	emp.	157	35.60	33		
				unemp.	284	64.40	30		
<NA>	3045	7.51	30	emp.	1057	34.71	31		
				unemp.	1988	65.29	29		
5 years	Post graduate	880	2.17	37	emp.	616	70.00	37	
					unemp.	264	30.00	36	
	Degree	3084	7.61	36	emp.	2139	69.36	36	
					unemp.	945	30.64	36	
	A-level	1592	3.93	34	emp.	1058	66.46	35	
					unemp.	534	33.54	32	
	GCSE	3475	8.57	34	emp.	2167	62.36	34	
					unemp.	1308	37.64	33	
None of these	1264	3.12	33	emp.	501	39.64	34		
				unemp.	763	60.36	32		
Overseas qualification	455	1.12	33	emp.	207	45.49	34		
				unemp.	248	54.51	32		
<NA>	3340	8.24	31	emp.	1436	42.99	33		
				unemp.	1904	57.01	30		
National			40541	100.00					

Table 6 Continued: Descriptive statistics for fathers' education for Surestart database

Dataset	Childs' age	Fathers' education	Total Obs.		Median age (dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
Surestart	< 9 months	A-level	1154	5.23427	30	emp.	592	51.2998	30
						unemp.	562	48.7002	29
		Degree	1133	5.13902	31	emp.	642	56.6637	32
						unemp.	491	43.3363	30
		GCSE	1370	6.214	28	emp.	644	47.0073	29
						unemp.	726	52.9927	27
		<NA>	1958	8.88103	28	emp.	460	23.4934	30
						unemp.	1498	76.5066	27
		None of these	1503	6.81725	29	emp.	390	25.9481	30
						unemp.	1113	74.0519	28
		Overseas qualification	382	1.73266	29	emp.	117	30.6283	29
						unemp.	265	69.3717	28
	3 years	A-level	1383	6.27296	31	emp.	685	49.53	32
						unemp.	698	50.47	30
		Degree	1162	5.27056	33	emp.	683	58.778	33
						unemp.	479	41.222	32
		GCSE	1520	6.89436	30	emp.	718	47.2368	31
						unemp.	802	52.7632	29
		<NA>	2261	10.2554	28	emp.	634	28.0407	29
						unemp.	1627	71.9593	28
		None of these	1457	6.60861	30	emp.	435	29.8559	30
						unemp.	1022	70.1441	30
		Overseas qualification	395	1.79163	31	emp.	153	38.7342	32
						unemp.	242	61.2658	30
5 years	A-level	1129	5.12088	33	emp.	641	56.7759	34	
					unemp.	488	43.2241	31	
	Degree	962	4.36341	35	emp.	617	64.1372	35	
					unemp.	345	35.8628	34	
	GCSE	1204	5.46106	32	emp.	655	54.402	33	
					unemp.	549	45.598	31	
	<NA>	1640	7.43865	30	emp.	571	34.8171	32	
					unemp.	1069	65.1829	30	
	None of these	1123	5.09366	32	emp.	386	34.3722	33	
					unemp.	737	65.6278	32	
	Overseas qualification	311	1.41062	33	emp.	142	45.6592	34	
					unemp.	169	54.3408	32	
Surestart		22047	100.00						
Total		62588							

Table 7: descriptive statistics for number of children in the household (HH)

Dataset	Childs' age	No. children in HH	Total Obs.		Median age (total dataset)	Emp. Status	Obs.		Median age
			No.	%			No.	%	
National	< 9 months	1	4737	11.68	30	emp.	3208	0.68	30
						unemp.	1529	0.32	28
		2	4832	11.92	31	emp.	2521	0.52	32
						unemp.	2311	0.48	29
		3+	3374	8.32	32	emp.	1124	0.33	34
						unemp.	2250	0.67	31
	3 years	1	3212	7.92	31	emp.	2128	0.66	31
						unemp.	1084	0.34	28
		2	6148	15.16	32	emp.	3423	0.56	33
						unemp.	2725	0.44	31
		3+	4148	10.23	34	emp.	1501	0.36	35
						unemp.	2647	0.64	33
5 years	1	2295	5.66	32	emp.	1572	0.68	33	
					unemp.	723	0.32	28	
	2	6631	16.36	34	emp.	4352	0.66	35	
					unemp.	2279	0.34	32	
	3+	5164	12.74	35	emp.	2200	0.43	36	
					unemp.	2964	0.57	34	
National			40541	100.00					
Surestart	< 9 months	1	2531	11.48	28	emp.	1420	0.56	29
						unemp.	1111	0.44	26
		2	2588	11.74	28	emp.	933	0.36	31
						unemp.	1655	0.64	27
		3+	2381	10.80	31	emp.	492	0.21	33
						unemp.	1889	0.79	30
	3 years	1	1877	8.51	28	emp.	1091	0.58	30
						unemp.	786	0.42	26
		2	3398	15.41	30	emp.	1525	0.45	31
						unemp.	1873	0.55	28
		3+	2903	13.17	32	emp.	692	0.24	34
						unemp.	2211	0.76	31
5 years	1	1015	4.60	31	emp.	678	0.67	32	
					unemp.	337	0.33	29	
	2	2712	12.30	32	emp.	1563	0.58	33	
					unemp.	1149	0.42	30	
	3+	2642	11.98	33	emp.	771	0.29	35	
					unemp.	1871	0.71	32	
Surestart			22047	100.00					
Total			62588						

Appendix 2: Model output

Model 1: Model based on whole dataset for children aged 9 months. Significant values are highlighted in bold.

	Estimate	Std. Error	z value	Pr(> z)
<i>(Intercept)</i>	-0.371	0.168	-2.211	< 0.001
<i>Surestart</i>	-0.350	0.037	-9.514	< 0.001
unmarried couple	-0.039	0.042	-0.931	0.352
<i>Single parent</i>	-0.450	0.087	-5.196	0.000
Missing marital status	-0.544	0.356	-1.529	0.126
<i>2 Child family</i>	-0.744	0.039	-18.848	< 0.001
<i>3+ Child family</i>	-1.368	0.045	-30.390	< 0.001
<i>Degree level (Mother)</i>	-0.238	0.108	-2.198	0.028
<i>A level (Mother)</i>	-0.601	0.112	-5.346	< 0.001
<i>GCSE (Mother)</i>	-0.998	0.110	-9.052	< 0.001
<i>Overseas qualification (Mother)</i>	-1.727	0.144	-12.009	< 0.001
<i>No qualifications (Mother)</i>	-1.903	0.118	-16.089	< 0.001
<i>NA qualifications (Mother)</i>	-2.409	0.479	-5.026	< 0.001
<i>Degree level (Father)</i>	0.278	0.095	2.912	0.004
<i>A level (Father)</i>	0.427	0.101	4.209	< 0.001
<i>GCSE (Father)</i>	0.439	0.098	4.497	< 0.001
Overseas qualification (Father)	0.035	0.124	0.286	0.775
No qualifications (Father)	-0.002	0.105	-0.016	0.987
NA qualifications (Father)	-0.015	0.118	-0.131	0.896
<i>Mothers age</i>	0.062	0.003	18.683	< 0.001
<i>Mothers' ethnicity</i>	-0.653	0.048	-13.592	< 0.001
<i>Mothers' ethnicity NA</i>	-0.609	0.098	-6.217	< 0.001
<i>Grandparent in home</i>	0.154	0.076	2.014	0.044

Model 2: Model restricted to individuals from families earning < £30,000 per annum for children aged < 9 months. Significant values are highlighted in bold.

	Estimate	Std. Error	z value	Pr(> z)
<i>(Intercept)</i>	-1.279	0.255	-5.011	< 0.001
Surestart	-0.372	0.040	-9.224	< 0.001
unmarried couple	-0.066	0.047	-1.415	0.157
Single parent	-0.370	0.094	-3.950	< 0.001
Missing marital status	-0.228	0.383	-0.595	0.552
2 Child family	-0.798	0.044	-18.088	< 0.001
3+ Child family	-1.402	0.050	-27.842	< 0.001
Degree level (Mother)	0.046	0.177	0.257	0.797
A level (Mother)	-0.244	0.178	-1.370	0.171
GCSE (Mother)	-0.663	0.177	-3.754	< 0.001
Overseas qualification (Mother)	-1.330	0.201	-6.606	< 0.001
No qualifications (Mother)	-1.510	0.182	-8.307	< 0.001
NA qualifications (Mother)	-1.665	0.692	-2.406	0.016
Degree level (Father)	0.798	0.183	4.353	< 0.001
A level (Father)	0.951	0.186	5.125	< 0.001
GCSE (Father)	1.011	0.183	5.528	< 0.001
Overseas qualification (Father)	0.655	0.200	3.269	0.001
No qualifications (Father)	0.608	0.187	3.250	0.001
NA qualifications (Father)	0.580	0.197	2.944	0.003
Mothers age	0.060	0.004	16.497	< 0.001
Mothers' ethnicity	-0.703	0.054	-13.126	< 0.001
Mothers' ethnicity NA	-0.647	0.110	-5.867	< 0.001
Grandparent in home	0.188	0.081	2.318	0.020

Model 3: Model based on whole dataset for children aged 3 years. Significant values are highlighted in bold.

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.181	0.164	-1.106	0.269
Surestart	-0.234	0.034	-6.789	< 0.001
unmarried couple	-0.073	0.041	-1.764	0.078
Single parent	-0.450	0.084	-5.327	< 0.001
Missing marital status	-0.640	0.352	-1.818	0.069
Mothers age	0.056	0.003	17.967	< 0.001
2 Child family	-0.709	0.040	-17.774	< 0.001
3+ Child family	-1.382	0.045	-30.789	< 0.001
Degree level (Mother)	-0.221	0.108	-2.041	0.041
A level (Mother)	-0.611	0.112	-5.443	< 0.001
GCSE (Mother)	-1.047	0.110	-9.499	< 0.001
Overseas qualification (Mother)	-1.495	0.138	-10.856	< 0.001
No qualifications (Mother)	-1.940	0.119	-16.305	< 0.001
NA qualifications (Mother)	-1.943	0.391	-4.969	< 0.001
Mothers' ethnicity	-0.711	0.046	-15.345	< 0.001
Mothers' ethnicity NA	-0.640	0.098	-6.543	< 0.001
Grandparent in home	0.267	0.076	3.518	< 0.001
Degree level (Father)	0.297	0.095	3.115	0.002
A level (Father)	0.381	0.101	3.784	< 0.001
GCSE (Father)	0.444	0.098	4.546	< 0.001
Overseas qualification (Father)	0.105	0.122	0.859	0.390
No qualifications (Father)	0.043	0.105	0.407	0.684
NA qualifications (Father)	-0.028	0.117	-0.242	0.808

Model 4: Model restricted to individuals from families earning < £30,000 per annum for children aged 3 years. Significant values are highlighted in bold.

	Estimate	Std. Error	z value	Pr(> z)
<i>(Intercept)</i>	-1.097	0.252	-4.351	< 0.001
<i>Surestart</i>	-0.284	0.039	-7.335	< 0.001
unmarried couple	-0.083	0.046	-1.806	0.071
<i>Single parent</i>	-0.345	0.093	-3.704	< 0.001
Missing marital status	-0.243	0.384	-0.631	0.528
<i>2 Child family</i>	-0.746	0.045	-16.650	< 0.001
<i>3+ Child family</i>	-1.387	0.051	-27.411	< 0.001
Degree level (Mother)	0.046	0.177	0.259	0.796
A level (Mother)	-0.245	0.178	-1.372	0.170
<i>GCSE (Mother)</i>	-0.704	0.177	-3.988	< 0.001
<i>Overseas qualification (Mother)</i>	-1.190	0.199	-5.978	< 0.001
<i>No qualifications (Mother)</i>	-1.516	0.182	-8.314	< 0.001
<i>NA qualifications (Mother)</i>	-1.710	0.691	-2.476	0.013
<i>Degree level (Father)</i>	0.780	0.183	4.257	< 0.001
<i>A level (Father)</i>	0.919	0.185	4.968	< 0.001
<i>GCSE (Father)</i>	1.028	0.182	5.636	< 0.001
<i>Overseas qualification (Father)</i>	0.680	0.200	3.402	< 0.001
<i>No qualifications (Father)</i>	0.658	0.187	3.524	< 0.001
<i>NA qualifications (Father)</i>	0.554	0.197	2.820	0.005
<i>Mothers age</i>	0.054	0.003	15.547	< 0.001
<i>Mothers' ethnicity</i>	-0.734	0.053	-13.924	< 0.001
<i>Mothers' ethnicity NA</i>	-0.662	0.110	-6.017	< 0.001
<i>Grandparent in home</i>	0.326	0.082	3.988	< 0.001

Model 5: Model based on whole dataset for children aged 5 years. Significant values are highlighted in bold.

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.061	0.169	-0.362	0.717
Surestart	-0.163	0.036	-4.517	< 0.001
unmarried couple	-0.131	0.044	-2.967	0.003
Single parent	-0.621	0.067	-9.264	< 0.001
Missing marital status	-10.858	95.056	-0.114	0.909
marital status NA	-1.802	1.390	-1.296	0.195
Mothers age	0.067	0.003	20.828	< 0.001
2 Child family	-0.572	0.049	-11.763	< 0.001
3+ Child family	-1.471	0.051	-28.759	< 0.001
Degree level (Mother)	-0.544	0.107	-5.099	< 0.001
A level (Mother)	-0.891	0.110	-8.077	< 0.001
GCSE (Mother)	-1.302	0.108	-12.064	< 0.001
Overseas qualification (Mother)	-1.700	0.137	-12.419	< 0.001
No qualifications (Mother)	-2.230	0.117	-19.129	< 0.001
NA qualifications (Mother)	-1.653	0.394	-4.194	< 0.001
Mothers' ethnicity	-0.666	0.047	-14.104	< 0.001
Mothers' ethnicity NA	-0.348	0.454	-0.766	0.444
Grandparent in home	0.210	0.082	2.555	0.011
Degree level (Father)	0.266	0.089	2.984	0.003
A level (Father)	0.385	0.095	4.073	< 0.001
GCSE (Father)	0.445	0.091	4.910	< 0.001
Overseas qualification (Father)	0.241	0.118	2.045	0.041
No qualifications (Father)	0.062	0.099	0.630	0.529
NA qualifications (Father)	0.139	0.103	1.348	0.178

Surestart odds ratio for models 1-5 and pseudo R² calculated from the ratio of Residual to the Null deviance

Model No.	Age	Restricted	Odds ratio	Null	Residual	Pseudo R ²
Model 1	< 9 months	No	0.70	29053	23914	0.18
Model 2	< 9 months	Yes	0.69	22206	18742	0.16
Model 3	3 years	No	0.79	30135	25141	0.17
Model 4	3 years	Yes	0.75	22449	19279	0.14
Model 5	5 Years	No	0.85	28201	23451	0.17