

The economic impact of childcare policy: an empirical analysis

May 2023



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Preface

This report evaluates the impacts of the 2017 expansion of government childcare subsidies on labour market outcomes in England. The research presented in this report is based on an econometric analysis of ONS Annual Population Survey data, designed to compare outcomes in each area that did receive the expansion to a modelled 'counterfactual' in the absence of the expansion.

The analysis finds that the 2017 expansion of childcare had a positive impact on labour force participation for the under-50s, and that almost all of these additional workers were absorbed by the labour market without any negative wage impact.

This work was compiled in association with The Salvation Army, whose 2021 report *Understanding People, Understanding Places* showed that for many people in our most deprived communities, the inability to access affordable childcare was a key factor in hindering them from accessing or progressing in employment.

The authors would like to thank Josh Adcock and Andrew Connell at The Salvation Army for their comments and suggestions throughout. They would also like to thank Office for National Statistics for providing Secure Access microdata for analysis, and colleagues in the PwC Economics team for their helpful thoughts and suggestions.

We hope this research helps to illustrate the benefits that can be generated by providing families with affordable and accessible childcare, and provide a robust evidence base to support future decisions regarding UK childcare policy.





Contents

| | |
|--|----|
| Executive Summary | 01 |
| Introduction | 02 |
| Evolution of UK Childcare Policy | 04 |
| Methodology | 06 |
| Results | 12 |
| <i>Annex 1: Detailed Summary of Key Papers</i> | 15 |
| <i>Annex 2: Rapid Evidence Assessment: Papers Reviewed</i> | 17 |
| <i>Annex 3: Technical Methodology</i> | 20 |
| <i>Annex 4: Table of results</i> | 22 |

Executive summary

In 2017, the UK Government increased the number of hours of state-funded childcare for three and four year olds in England. A similar change was not introduced in Scotland until 2021. As such, there were policy differences between the two countries over this time period, which have acted as the basis for the research included in this report.

The research provides new evidence on the effect of childcare policy on labour market outcomes, using an ex-post analysis of previous changes in state childcare subsidy in the UK. The research exploits the differences in childcare policy between England and Scotland from 2017 to 2021, using quasi-experimental methods to generate the causal effect of the increase in state-funded childcare in England.

The findings presented in the report isolate the impact of the policy change by considering the difference between the observed outcome (what happened after the policy) and the 'counterfactual' outcomes (what would have happened anyway in the absence of the policy change), meaning other influencing factors do not affect the results. Findings show that the increase in childcare subsidy in England increased the labour market participation rate for adults of childbearing age by 1.1 percentage points, and increased the employment rate of the same group by 1.3 percentage points. The research finds no evidence that this increased labour supply would be at the expense of wages.

The research does find a very small increase in the unemployment rate, of 0.03 percentage points. This is likely due to delays in workers becoming absorbed into the labour market. Increases in childcare subsidy encourage individuals to join (or rejoin) the labour market but, in the short-term, appropriate jobs may not be identified or available and the unemployment rate may increase¹.

Further analysis indicates that the 2017 increase in childcare subsidy resulted in hundreds of thousands of people entering the labour force, with around 286,000 of these individuals in employment a year after policy implementation. In addition, our analysis suggests that there was a £22.3bn increase in UK GVA as a result of the policy change.

The findings included in this report show that policies which reduce childcare costs encourage more people to enter into employment. This is a particularly important finding in the current UK economic climate of low growth, low productivity, labour market shortages and gender pay gaps.

1. The unemployment rate measures the share of workers in the labor force who do not currently have a job but are actively looking for work. As such, a policy which encourages individuals who were previously economically inactive to search for work increases the unemployment rate without decreasing the number of people in employment. Economic Policy Institute, [link](#)

Headline results

+1.3 percentage point change in the under 50s employment rate.



Around 286,000 more people in employment.



The policy could have contributed up to £22.3bn to UK Gross Value Added



No reduction in under 50s hourly wage.



Introduction

Finding affordable and accessible childcare has become increasingly challenging as childcare costs have continued to rise across the UK.

The cost of a part-time nursery place for a child under two grew by 60% in cash terms between 2010 and 2021, twice as fast as average earnings and much higher than the 24% growth in general economy-wide prices in the same period². Consequently, many low-income households have simply been unable to afford 'paid-for' childcare. Other, more affluent, families have also faced difficult choices regarding childcare arrangements, with many choosing to take on childcare responsibility themselves.

Taking responsibility of childcare impacts the employment decisions that many parents are willing, or able, to make. Survey evidence from The Centre for Progressive Policy found that approximately 1.7 million UK mothers had been prevented from taking on more hours at work, and 1.3million were prevented from taking a potential job, due to difficulties finding suitable childcare³. The Centre for Progressive Policy estimates this results in a loss of between £27bn and £38bn of economic output every year.

Lower childcare costs can help increase labour supply and reduce the UK's high vacancy rates

Lowering the cost of childcare could generate a variety of economic benefits. The 2019 Council

Recommendation on High-Quality Early Childhood Education and Care Systems recognises that the availability, accessibility and affordability of high-quality childcare are key factors that allow parents to participate in the labour market whilst balancing other commitments⁴. For many parents, the cost of childcare is prohibitive to working, either because childcare costs exceed income from work, or because the additional income from working is so small that it is preferable not to work. Therefore, a reduction in the cost of childcare would allow many economically inactive parents to return to work, increasing domestic labour supply.

Increasing the domestic labour supply would be particularly beneficial in the current UK economic climate. At the beginning of 2023, there were approximately 1,250,000 vacancies in the UK labour market⁵ as a result of labour shortages. These shortages have been driven by several factors, including growing economic inactivity since the Covid-19 pandemic⁶, and a reduction in the number of migrant workers in the UK labour force⁷.

Effective childcare provision can help reduce gender pay gap

The provision of accessible and affordable childcare can also play a pivotal role in minimising gender wage disparity. It is widely evidenced that mothers face a 'motherhood wage penalty'⁸ relative to women who don't have children, with studies suggesting a median penalty of approximately a 45% reduction in

medium-long term earnings⁹. The extent of the motherhood wage penalty is dependent on several factors, including the length of separation from the labour force. Typically, the more years of experience a worker has, the more productive they are in their role. As the key determinant of pay is productivity per hour, this means there are positive but diminishing returns to wage income from each additional year of employment experience^{10,11}. This implies that not only are there productivity benefits to be unlocked by reducing the amount of time new parents are out of the labour force, but an outcome of realising these benefits would likely be a reduction in the gender pay gap.

Since the Global Financial Crisis (GFC), hourly productivity in the UK has struggled to recover. As measured by GDP per capita, the UK had a lower hourly productivity growth rate than Germany, France, the United States, and the OECD average between 2008 and 2020¹². As illustrated in Figure 1,

2. The changing cost of childcare. IFS (2022); [link](#)
3. Growing Pains: The economic costs of a failing childcare system. CPP (2023); [link](#)
4. Council Recommendation on High-Quality Early Childhood Education and Care Systems. Official Journal of the European Union (2019); [link](#)
5. Vacancies and jobs in the UK, ONS (2023), [link](#)
6. Economic inactivity, ONS (2023), [link](#)
7. Portes and Springford (2023) using ONS data, [link](#)
8. PwC 2023 Women in Work index; [link](#)
9. Vagni, Giacomo, and Richard Breen. "Earnings and Income Penalties for Motherhood: Estimates for British Women Using the Individual Synthetic Control Method." *European Sociological Review* 37, no. 5 (2021): 834-48.
10. Strittmatter, Anthony, and Conny Wunsch. "The Gender Pay Gap Revisited with Big Data: Do Methodological Choices Matter?". *Institute of labour economics* (2021)
11. Dustmann, Christian, and Costas Meghir. "Wages, Experience and Seniority." *IDEAS Working Paper Series from RePEc*, 2001, *IDEAS Working Paper Series from RePEc*, 2001.
12. UK Whole Economy: Output per hour worked. ONS (2023); [link](#)

Introduction (continued)

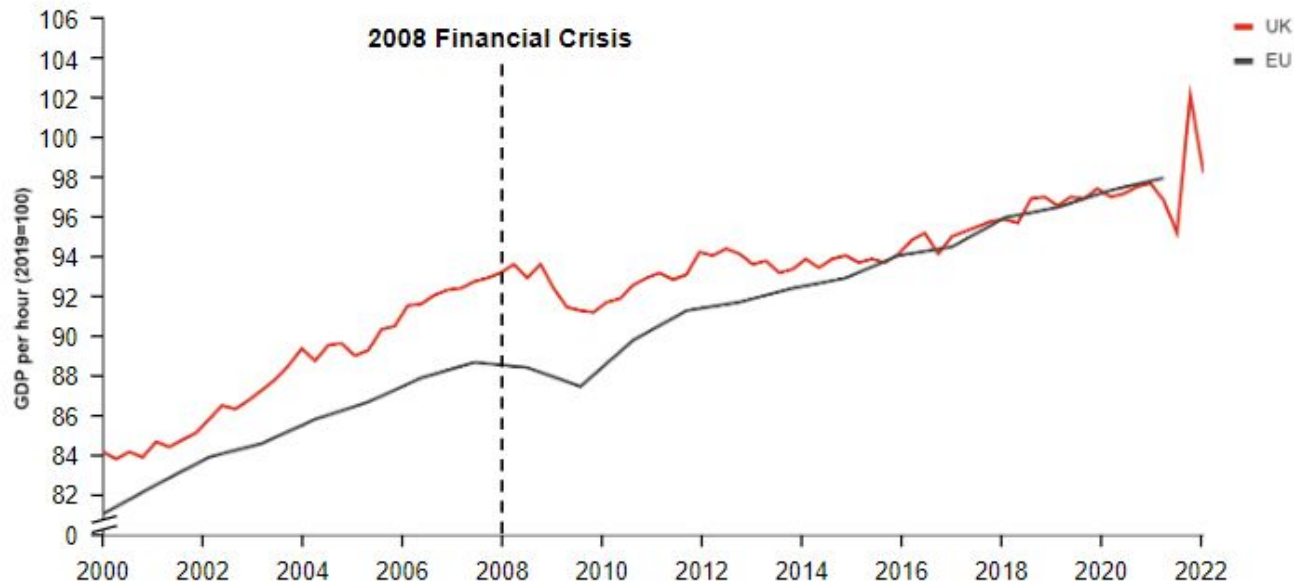


Figure 1: UK and EU productivity trends

prior to the GFC the UK consistently outperformed the EU average in terms of productivity; however post-GFC the UK has converged to the EU average.

Childcare provision could also stimulate UK hourly productivity growth, which has stagnated since the 2008 Global Financial Crisis

However, it should be acknowledged that when re-entering the labour market, the nature of work chosen will also affect maternal wage rate and career prospects. It has been shown that women

who return to work part-time may face additional career and pay penalties as a result of lost hours of work¹³, limited career progression¹⁴ and marginalisation within organisations, as part-time workers are more likely to be assigned less important or demanding tasks¹⁵.

Effective childcare provision has the potential to increase the accessibility of suitable childcare, encourage the uptake of externally provided childcare, reduce the longevity of maternal separation from the labour market and minimise the negative earnings penalty through productivity gains.

In the context of the labour market shortages the UK has experienced since its exit from the European Union and its comparatively poor performance in terms of productivity since the GFC, there is potential for childcare policy to play a key role in the UK's economic recovery.

This report serves to provide a robust evidence base for the impact of subsidised childcare on the UK labour market. We use counterfactual econometric analysis, on data provided to us by the Office for National Statistics, to estimate the impact of the 2017 expansion of subsidised childcare in England on labour market outcomes.

We find that the 2017 expansion in subsidies increased the under-50s employment rate by approximately 1.3 percentage points, compared to a statistical counterfactual in the absence of the policy. We find that this increase is driven by increased labour market participation, despite which, we do not identify a negative impact on hourly wages.

This provides strong suggestive evidence that further revisions to childcare provision would have a positive impact on labour supply, labour market outcomes, and economic growth.

13. Costa Dias, Monica, Robert Joyce, and Francesca Parodi. "The Gender Pay Gap in the UK: Children and Experience in Work." *Oxford Review of Economic Policy* 36, no. 4 (2020): 855-81.

14. Harkness, Susan, Magda Borkowska and Alina Pelikh (2019). Employment pathways and occupational change after childbirth; [link](#)

15. Golden, Lonnie. "The Economics of Worktime Length, Adjustment, and Flexibility." *Review of Social Economy* 54, no. 1 (1996): 1-45.

Evolution of UK Childcare Policy

In this section, we discuss the evolution of UK childcare policy since the launch of the National Childcare Strategy in 1998. Whilst we do not discuss every subsequent policy change, we highlight interventions which are relevant to our analysis.

All employees in the UK are entitled to some form of parental leave following the birth of a new child. While this varies in length by employer, statutory maternity leave is paid for between 6 – 39 weeks. As children in the UK don't usually start full-time, state provided, education until after their fourth birthday, there are approximately three and a half years for which parents must make decisions regarding childcare arrangements for each child.

Parental decisions regarding childcare arrangements are heavily dependent on state-funded childcare subsidies

State subsidies lower the cost of childcare for families, meaning more parents are willing and able to purchase 'paid-for' provision. As illustrated in Figure 2, the availability of state subsidies for children in the UK has evolved over the last 25 years, with changing levels of provision and noteworthy differences between UK countries.

Contemporary funding policy began in 1998 with the launch of the National Childcare Strategy and the Sure Start initiative. In 2010, state-subsidised childcare in England was extended to 15 hours per week (across 38 weeks) for eligible three and four

year olds. A broadly equivalent change was not replicated in Scotland until 2014, when state-subsidised childcare was extended to 16 hours per week.

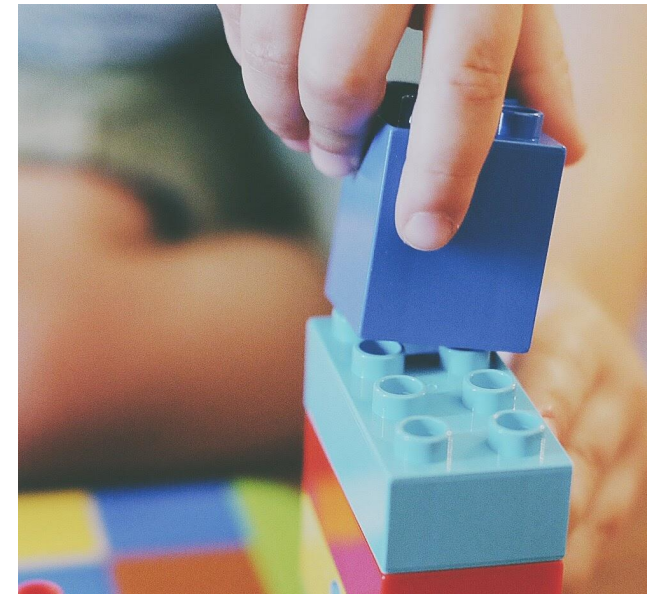
In 2017, state-subsidised childcare in England was extended again from 15 hours per week to 30 hours per week (for eligible children). This position has remained unchanged since 2017, with eligible three and four-year-olds in England having access to 1,140 hours of free childcare each year¹⁶, as subsidised by the Government.

A broadly equivalent policy was not introduced in Scotland until 2021, when state-subsidised childcare was extended to 30 hours per week for all 3 and 4 year olds. The difference in policy timing meant that eligible families in England received an additional 14 hours of free childcare each week than equivalent Scottish families between 2017 and 2021. This difference has acted as the foundation for our analysis, providing variation across two countries which are in close proximity and share similar labour market characteristics.

Families in England and Scotland were entitled to substantially different quantities of state-funded childcare between 2017 and 2021

In the March 2023 budget, it was announced that state childcare subsidies would be extended to eligible one and two year olds in England. Such subsidies would be phased in over a course of

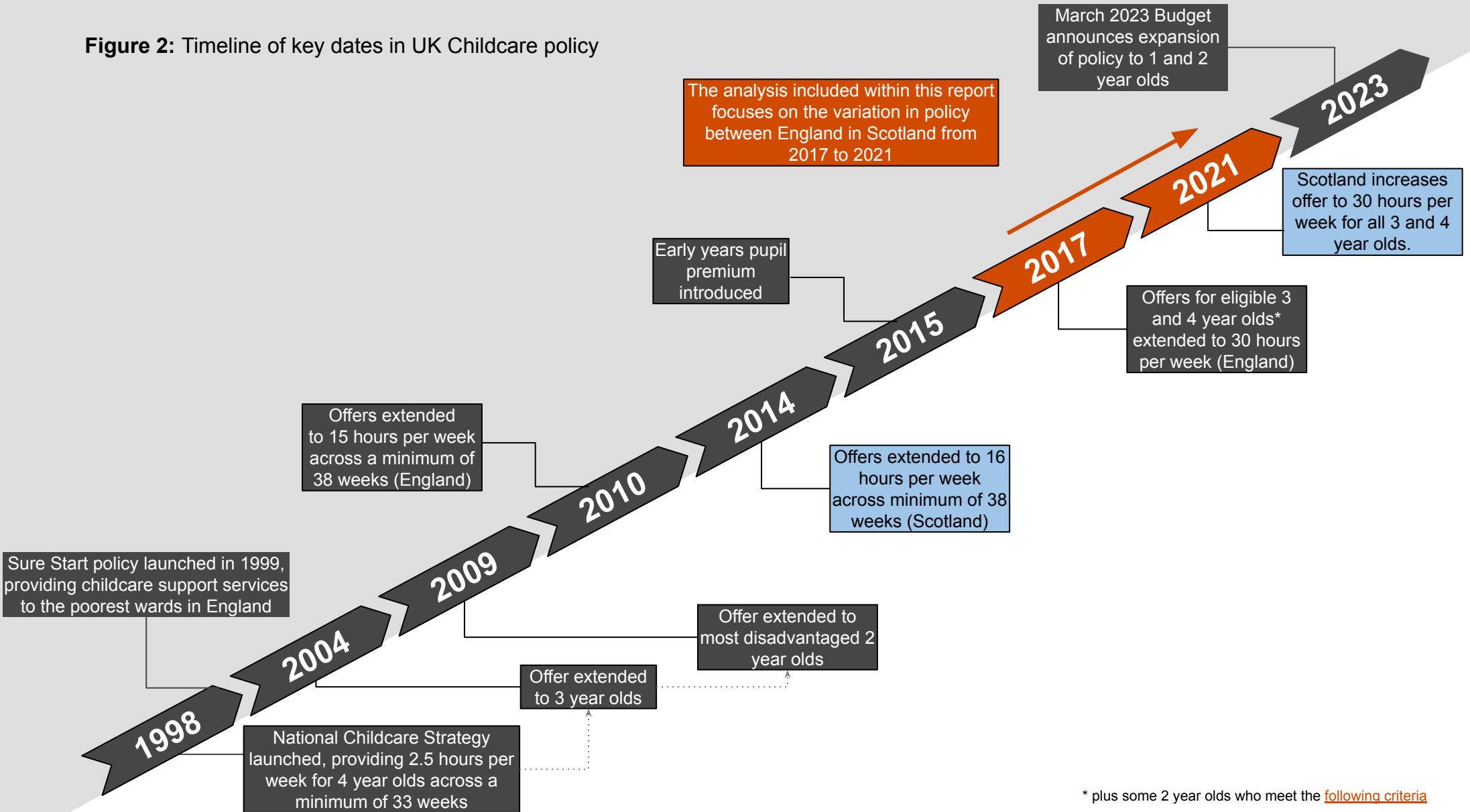
almost three years, with full rollout by September 2025. Based on the recency of this announcement, no consideration of this policy has been included within this report.



16. Typically 30 hours per week for 38 weeks of the year

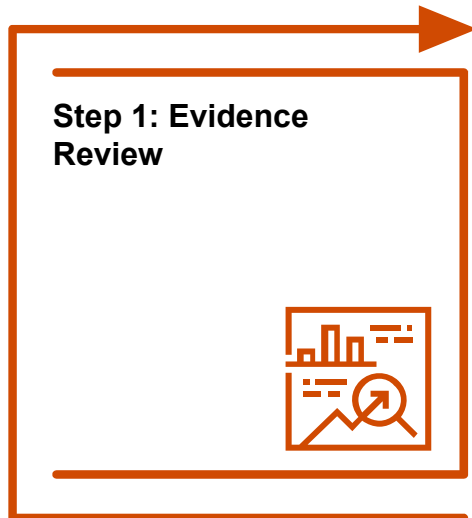
Evolution of UK Childcare Policy

Figure 2: Timeline of key dates in UK Childcare policy

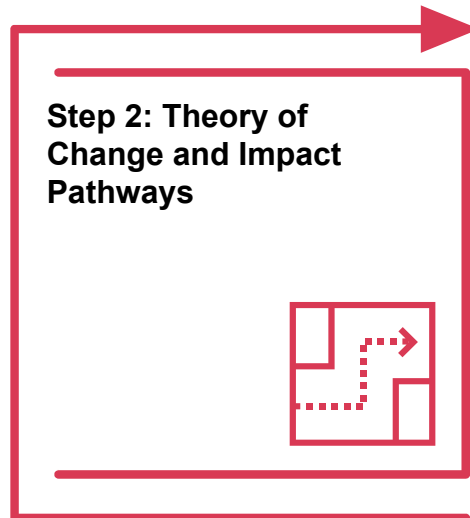


* plus some 2 year olds who meet the [following criteria](#)

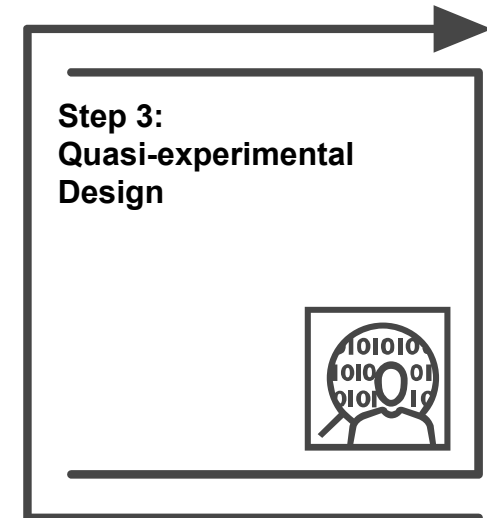
Methodology: Overview



We complete a Rapid Evidence Assessment to understand existing evidence on the relationship between childcare policy and labour market outcomes.



We develop a Theory of Change then examined the pathways between changes in childcare policy and labour market outcomes; formalising the findings of the REA.



We use a Synthetic Control Method to develop a counterfactual to evaluate the causal impact of the 2017 childcare policy intervention.

Step 1: Evidence Review

The first step of any empirical research should be a review of existing evidence. Information gathered from the review should provide a comprehensive understanding of the topic in question, supporting the development of empirical models which are appropriately specified.

A Rapid Evidence Assessment (REA) is a form of evidence review designed to gather information in a targeted and efficient way, focussing on quality of evidence and its relevance. In the context of this report, the REA was designed to understand the relationship between childcare policy and labour market outcomes, considering previous literature from the UK and worldwide.

Of the literature reviewed, the following sources provided the most applicable findings. The key findings from each source have been summarised below, while a detailed description of each is included in Annex 1.

Does more free childcare help parents work more? (Brewer et al. 2022)

Findings established in this paper suggest that the provision of free part-time childcare has little impact on the labour supply decisions of parents. However, doubling the offer of free care from part-time to full-time increases the probability of mothers whose youngest child is eligible for free full-time care being in the labour force by 3.6 percentage points, and the probability of being in paid work by 1.3 percentage points.

This paper provides robust evidence that an extension of full-time childcare subsidies is likely to increase labour force participation rates at the extensive margin¹⁷, increasing the employment rate.

Free Childcare and Parents' Labour Supply: Is More Better? (Brewer et al. 2016)

The findings of this paper suggest that an increase in the provision of subsidised full-time childcare has the potential to increase maternal labour supply at the extensive margin. All else held equal, this would increase the employment rate, and generate a short-term increase in the unemployment rate as more women enter the labour force.

Results from the paper also suggest that increases in childcare subsidies have the potential to generate positive distributive impacts, helping typically disadvantaged groups (e.g. lone mothers) to access employment opportunities.

Childcare subsidies and labour supply — Evidence from a large Dutch reform (Bettendorf et al. 2015)

Using a differences-in-differences strategy, this research identified an increase in maternal labour force participation at both the intensive¹⁸ and extensive margin following the introduction of the 2005 Law on Childcare in the Netherlands¹⁹.

A full list of the academic papers and grey literature²⁰ assessed as part of the REA are set out in Annex 2.

To ensure the review of existing literature was comprehensive, a wide selection of childcare factors²¹ and labour market outcomes²² were considered when searching for relevant sources.

The existing empirical literature finds that full-time free childcare has a significant positive impact on labour market participation for mothers at the extensive margin



17. **Extensive Margin:** An increase in labour supply at the extensive margin refers to a greater number of people accessing employment (e.g. people starting jobs who were not previously in the labour market).

18. **Intensive margin:** An increase in labour supply at the intensive margin refers to an increase in the number of hours worked by individuals already in employment.

19. It should be noted that the Law on Childcare was passed at a similar time to an increase in the Earned Income Tax Credit, which has likely caused somewhat confounded results.

20. **Grey literature:** Publicly available information which is not controlled by commercial publishing (e.g. where publishing is not the dominant activity of the producer). Examples include government reports, conference proceedings and research reports

21. **Childcare factors:** The factors which affect how readily childcare can be accessed, including: level of state subsidy, other cost reduction, availability, and household demographics

22. **Labour market outcomes** generated by changes in childcare factors, including: Maternal labour force participation, paternal labour force participation, hours worked, hourly wage and annual earnings.

Step 2: Theory of Change and Impact Pathways

The findings of the REA have been used to construct a Theory of Change (ToC) framework, as illustrated in Figure 3. A Theory of Change is used to illustrate how and why a change is expected to happen in a particular context. It is focused on mapping out the “missing middle” between what a programme or initiative does and the impacts generated. In this context, the ToC examines the pathways between changes in childcare policy and labour market outcomes; formalising the findings of the REA.

Key Findings

- State subsidies successfully lower the effective cost of childcare for families.
- The quantity of childcare consumed by families increases when childcare costs are lowered.
- At a household level, an increase in the quantity of childcare consumed increases maternal labour force participation at both the intensive and extensive margin.
- The extent to which maternal labour force participation changes is dependent on several characteristics, including demographics, family structure and the nature of employment.
- Increased maternal labour force participation generates various secondary benefits, including higher wage rates and an increase in annual earnings.
- No relationship was identified between childcare factors and paternal labour force participation, at either the intensive or extensive margin.

These findings, as illustrated in Figure 3, provide the framework for our econometric approach. By understanding the impact pathways that have been well substantiated in existing literature, it has been possible to define an econometric methodology which allows the quantification of causal impacts on appropriate outcomes of interest.

Of the key findings, particular note should be taken of the strong evidence base affirming a relationship between the quantity of childcare consumed and the labour force participation rate at both the intensive and extensive margins. Establishing this relationship provides a solid foundation on which to form our causal impact analysis.

The labour market outcomes which have been considered within the subsequent analysis based on the findings of the REA are:

- Labour force participation rate
- Employment rate
- Unemployment rate
- Wage rate

While a direct relationship between childcare policy and wage rates has not been identified through the REA, we consider it appropriate to include the wage rate as a variable of interest in the empirical analysis. Through the REA, we have identified a relationship between childcare policy and the unemployment rate. A relationship between the unemployment rate and the wage rate is well established in wider economic literature²³ and, as such, it is reasonable to

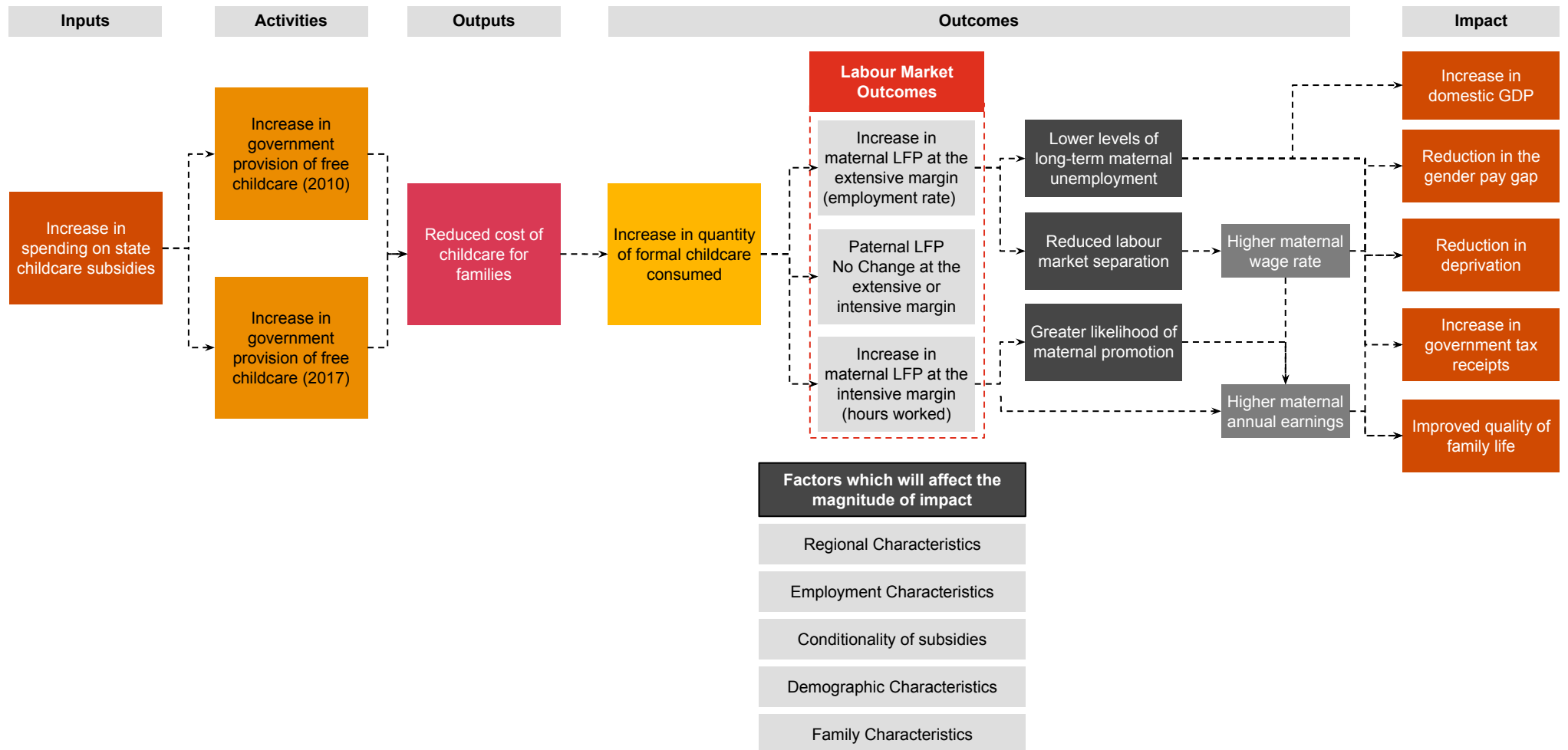
infer there will be some form of causal relationship between childcare policy and wage rates.



23. Blanchflower, David G., and Andrew J. Oswald. "An Introduction to the Wage Curve." *The Journal of Economic Perspectives* 9, no. 3 (1995): 153-67.

Step 2: Theory of Change and Impact Pathways (continued)

Figure 3: Theory of Change Framework illustrating the pathways between childcare policy change, labour market outcomes and wider impacts



Step 3: Quasi-experimental Design

Between 2017 and 2021, there were notable differences in childcare policy between England and Scotland. We utilise these differences to compare outcomes of individuals in receipt of different levels of childcare subsidy using the Synthetic Control Method.

Synthetic Control Method

The construction of a definitive counterfactual is key to evaluating the impacts of any policy change. A robust counterfactual allows a comparison between ‘what happened after the policy change’²⁴ to ‘what would have happened in the absence of the policy change’²⁵. This is challenging as it is not possible to observe both treated and untreated outcomes for the same set of individuals over the same time period.

This report utilises the Synthetic Control Method (SCM) as developed in Abadie, Diamond, and Hainmueller (2012)²⁶, and extended by Wiltshire (2022)²⁷ to allow the application of SCM across multiple “treated” units. For each parliamentary constituency in England, this paper builds a ‘synthetic’ counterfactual using a weighted combination of Scottish constituencies, such that each English constituency and its synthetic counterpart are not statistically different in terms of (a) pre-treatment trends, and (b) labour market characteristics (known as ‘predictors’). This means that deviations in outcomes after the 2017 policy change in England can be causally linked to the policy. Further detail and mathematical derivation

of the methodology is provided in Annex 3. The remainder of this section focuses on how the SCM has been applied in the context of this work.

i. Identifying policy variation

Childcare policy differed significantly between England and Scotland from 2017 to 2021. In 2017, state-subsidised childcare in England increased from 15 hours per week to 30 hours per week for eligible three and four year olds, while the equivalent policy²⁸ was not introduced in Scotland until 2021. As such, parents in England had access to more affordable childcare across this period than parents in Scotland.

ii. Dataset development

We use Secure Access Annual Population Survey (APS) data²⁹, collecting individual-level data on labour market participation and outcomes, education, other economic characteristics, demographics, health, and social outcomes.

Data on key outcomes variables:

- Employment rate: the proportion of the population who are employed.
- Unemployment rate: Proportion of the labour force who are not employed but are actively seeking employment.
- Labour force participation rate: the proportion of the population who are in the labour force (i.e. those who are in work, or are seeking work).

- Wage rate: Pay per hour for those in employment. This is a standard metric for income which is used in economics, predominantly for meaningful comparison in outcomes between part-time and full time employees.

The dataset used in the analysis has been restricted to adults of parental age, as this is the group most likely to be affected by changing childcare policy. In doing so, we consider that men are far less constrained than women in terms of age distribution of fertility. Using the distribution of ages of new parents in the UK³⁰, we defined this sample to be individuals between 16 and 49 years of age (inclusive). Therefore, all outcome variables described are reflective of this portion of the population only and we hereby suffix the outcomes with the word “under 50s” to signify that it is the 16-49 year old group of the population we are referring to.

24. The outcomes observed following the policy change. Otherwise known as the ‘treated’ outcome.

25. The outcomes observed had there been no change in policy. Otherwise known as the ‘counterfactual’ outcome.

26. Alberto Abadie, Alexis Diamond & Jens Hainmueller (2010) Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California’s Tobacco Control Program

27. Wiltshire, Justin: Walmart Supercentres and Monopsony Power: How a Large, Low-Wage Employer Impacts Local Labour Markets (2022)

28. Extending subsidised childcare to 30 hours per week for all children.

29. An annual survey of 0.5% of the UK population (approximately 330,000 individuals).

30. Birth characteristics in England and Wales: 2020. ONS (2022); [link](#)

Step 3: Quasi-experimental Design (continued)

Beyond focussing on those of parental age, it is important to note that we do not restrict the sample by any other demographic factor (e.g. gender, parents, etc.). This is partly for economic reasons: parents and non-parents, and men and women, compete with each other in the labour market, and as such any impact measured at the constituency level will capture the overall effect of the policy. For instance, if a 27 year old new mother with five years of experience and a degree enters the labour market as a result of the policy, she will likely be competing with other workers with similar levels of education and experience who may, or may not, have children. In this sense, our analysis captures any displacement effects that might occur as a result of the policy. In addition, there is statistical motivation for not restricting the sample further, as these restrictions would reduce the sample size, increase within-constituency variance and decrease the power of results.

Time period:

The time period spans from 2012 to 2021. The period between 2012 and 2017 is used as the pre-treatment period due to the similarity in policy between Scotland and England. The period 2017 to 2021 is used as the post-treatment period, as Scotland increased childcare provision to 30 hours per week and altered the eligibility criteria in 2021.

Aggregation:

Individual level APS data is aggregated to the

Parliamentary Constituency level across England and Scotland. Constituencies are used because they are granular enough to generate suitable synthetic regions with common pre-treatment trends, but also contain a sufficiently large, representative, sample for the purposes of analysis.

iii. Evaluation of Impact

For each of the 533 parliamentary constituencies in England, a synthetic counterfactual is built that is statistically identical in terms of pre-treatment trends in employment, unemployment, labour force participation, wage rate, and population density.

These counterfactuals for English constituencies are built using a weighted combination of Scottish constituencies. Weights are determined by a data-driven process that considers (a) the extent to which each Scottish constituency is similar to the English constituency in question, and (b) the relative importance of the chosen pre-treatment predictor variable for predicting the outcome of interest. As we are measuring impacts across four outcomes, the weighted combination used will vary slightly for each outcome. For each constituency, and for each outcome measured, this process generates (a) a trend in observed post-treatment outcomes in the constituency in question, and (b) a trend in observed post-treatment outcomes in that constituency's synthetic counterfactual. By comparing the difference between the two trends, we can infer the 'treatment effect' of the policy at the constituency level.

In order to aggregate findings from each of the 533 constituencies to generate a single policy impact for the entire country, we utilise a recent development in the academic literature by Wiltshire (2022) to "pool" these estimates and infer statistical significance. This is non-straightforward, as the process of aggregation needs to consider (a) the quality of fit of the model in each constituency, and (b) the relative size of each constituency. For a technical description of this process we refer readers to Annex 3.



Results

+ 1.1 percentage point change in the under 50's labour market participation rate



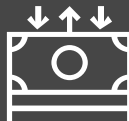
+ 1.3 percentage point change in the under 50's employment rate



Small increase in the number of under 50s looking for work



No significant impact on under 50s hourly wage



A full table of results is included in Annex 4

We find that the 2017 expansion in childcare subsidy for 3 and 4 year olds had a large and significant impact on labour force participation, and that the labour market absorbs the overwhelming majority of these additional workers.

In other words, there was a significant increase in both participation and employment, and only a small residual increase in unemployment (likely to be as a result of short term frictions in job seeking). We do not find any evidence of a statistically significant impact (be that positive or negative) on hourly wages. Detailed results are included in Annex 4.

To contextualise the empirical results, we use data from the ONS to estimate absolute changes in employment and GVA. An important caveat of this contextualisation is that the estimates are calculated relative to UK data from 2017, rather than relative to the counterfactual baseline used in the synthetic control.

Implication of findings

Around **286,000 more people** in employment one year after the intervention, compared to the modelled employment level in the absence of the policy.

An increase of **£22.3bn to UK GVA**, which far outweighs the total government spend of implementing the policy in 2017³¹.

Results (continued)

We find that the 2017 increase in childcare provision for three and four year olds in England increased the labour force participation rate for under 50s by 1.08 percentage points in the first full year post-intervention (compared to the modelled participation rate in the absence of this change). We also find that the increase in childcare provision resulted in a higher employment rate by 1.29 percentage points, compared to the modelled position in the absence of the policy. There was, however, a small but statistically significant increase in the unemployment rate of 0.03 percentage points.

The impacts on labour market outcomes identified are relative to a counterfactual scenario where the 2017 childcare expansion didn't take place

It is intuitive that more workers will enter the labour force following an increase in subsidised childcare provision. Parents on extremely low incomes, for whom the costs of childcare exceeds the returns from work, are given a straightforward incentive to return to work. This similarly holds true for parents who can command higher wages, for whom the opportunity cost of working has decreased. This finding is reassuringly similar to the academic literature. Brewer et al (2016)³² find mothers are 5.7 percentage points more likely to join the labour force, and 3.5 percentage points more likely to be in work, when childcare provision increases from part-time to full-time. Similar to our findings, they also find

The economic impact of childcare policy: an empirical analysis

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evidence for a small short-run increase in the unemployment rate.

While the rationale for the increased labour supply decision of households is straightforward, the labour market's ability to absorb these additional workers warrants some discussion. A simplistic view of economics would suggest that a significant increase in labour supply should either increase unemployment, decrease wages, or both. Instead, we find that the overwhelming majority of these workers find employment, and that there is no impact on wages.

The results provide evidence about the UK labour market and its ability to absorb new workers, without causing downward pressure on wages

UK's labour market. The UK, like most developed economies, has a remarkable ability to absorb new workers³³. This is thought to be largely due to general equilibrium spillover effects, i.e. the increased domestic consumption by newly employed workers generates economic growth and residual labour demand. The ONS estimates that, on average, each job induces the creation of an additional 2.6 jobs in the UK due to the residual domestic demand generated by people spending their earnings³⁴.

It is important to note that the findings of this report do not imply that all additional workers are parents. This is for two reasons. First, the increased provision of

subsidised childcare is likely to create increased demand for workers to provide that childcare. Second, increased consumption (both by workers in jobs created by the subsidy and parents with increased surplus income as a result of entering the labour force) is likely to create increased residual demand for labour.



31. Education Spending, Early Years Spending, IFS estimates (2023); [link](#).

32. Brewer, Mike, Sarah Cattan, Claire Crawford and Birgitta Rabe. Free Childcare and Parents' Labour Supply: Is More Better? IZA Discussion Paper, no.10415 (2016)

33. Dustmann, Fabbri and Wadsworth (2003), Dustmann, Glitz and Frattini (2008), Lemos and Portes (2008), Fingleton et al (2019).

34. PwC analysis, ONS 2019 GVA and employment data.

Results (continued)

We additionally include results for the entire post-treatment period (2017 – 2021) for robustness. These results are broadly in alignment with those one full year after the intervention: the participation impact is slightly stronger; the employment rate impact is of similar magnitude, and there is a slightly larger unemployment rate impact. However, we note that these results include 2020 and 2021, during which period (a) the labour market was significantly affected by the Covid-19 pandemic and associated policy instruments (including furlough), and (b) there was a differential policy response to the pandemic in England and Scotland.



The economic impact of childcare policy: an empirical analysis

It is not possible to include post-pandemic years in this analysis as the provision of childcare increased in Scotland in 2021. Hence, we consider the results for the first full year post-intervention to be the most robust available, recognising that the possibility for longer term impacts exists as the labour market adjusts. The results for labour market participation, employment and unemployment rates are interpreted as the percentage point change in the rates which have been defined in the methodology section. For hourly wage, we present the percentage change in the hourly level.

The findings of this report suggest that extending the provision of childcare can be effective in unlocking productive capacity in the UK economy. Our analysis indicates that the 2017 increase in state childcare subsidy resulted in hundreds of thousands of people entering the labour force, and around 286,000 of these individuals were in employment a year after policy implementation. This illustrates the extent to which childcare policy can effectively boost the labour force and drive GDP growth³⁵.

To further contextualise the empirical results, we use 2017 labour market data³⁶ to estimate the potential increase in UK Gross Value Added (GVA)³⁷ a year after the increase in childcare provision. This approach uses ONS data on the average GVA each worker contributes in a year of work and the empirical estimates of how many more people were in employment as a result of the 2017 policy. Overall, we estimate that there was a £22.3bn increase in UK GVA as a result of the policy change³⁸.



35. Delivering a labour market that supports growth. CBI (2022); [link](#)

36. A05 SA: Employment, unemployment and economic inactivity by age group (seasonally adjusted). ONS (September 2017); [link](#)

37. Gross Value Added is the value of output created by factors of production in the economy.

38. An important caveat of the numbers relating to employment and GVA is that they are calculated relative to 2017 UK data instead of the counterfactual baseline used in the synthetic control. Hence, caution should be taken when interpreting these results.

Annex 1 – Detailed Summary of Key Papers

Free childcare and parents' labour supply: is more better?



Brewer, M., Cattan, S., Crawford, C., and Rabe, B. (2016). Free Childcare and Parents' Labour Supply: Is More Better? IZA Discussion Paper no. 10415.

This paper exploits discontinuities in entitlement to free part-time and full-time preschool education places to evaluate the impact of extending childcare subsidies on parental labour supply in the UK. The paper uses a panel data approach, solely considering individual-level longitudinal data to control for the effect of time-invariant parent characteristics on labour supply. This effectively forms an individual-level difference-in-differences strategy which allows the comparison of changes in parental labour market outcomes as their children's entitlement to free childcare changes.

The individual-level longitudinal data included in this paper is sourced from the United Kingdom Labour Force Survey (2012). The sample includes any mother with at least one child aged 0 to 6 at the time of the interview, interviewed between 2000 and 2013. The dataset was cleaned to remove families with missing data, such as labour market outcomes of interest.

The researchers found that the provision of free part-time childcare has little causal impact on the labour market outcomes of mothers or fathers. However, extending free childcare provision to cover a full school day was shown to generate significant increases in the labour supply of mothers with eligible children. By the end of the first year of full-time eligibility, mothers whose youngest child was eligible for free full-time care were 5.7 percentage points more likely to be in the labour force and 3.5 percentage points more likely to be in work than mothers whose youngest child was ineligible for full-time funding. The findings of the paper suggest these impacts are strongest for lone mothers, while it is concluded that the effect on the labour supply of fathers is negligible.

Does more free childcare help parents work more?



Mike Brewer, Sarah Cattan, Claire Crawford, Birgitta Rabe. Labour Economics, Volume 74, 2022, 102100, ISSN 0927-5371

This paper builds upon the work of (Brewer et al, 2016) as summarised above, to estimate the impact of children's eligibility for free part-time and full-time childcare on parental labour market outcomes. This updated paper uses two separate empirical strategies, both of which exploit birthday-based eligibility rules.

The first strategy is a standard Regression Discontinuity (RD) design that uses point-in-time cross-sectional data restricted to children born just before and just after relevant cut-off dates. Regressions have been estimated using data from the 2011 UK Census, aggregated at the day of birth level. As individual-level Census data was not accessible, the researchers used customised extracts of the data (the number of men and women in different labour market statuses tabulated by the date of birth of their youngest child and by marital status). This data was obtained for mothers and fathers whose youngest child was born between 1 April 2003 and the 2011 Census date.

The second strategy followed a similar approach to the 2016 iteration of the paper, developing a panel data approach using individual-level longitudinal data from the United Kingdom Labour Force Survey (2014). This strategy sought to estimate the causal effect of free part-time and full-time childcare on parental labour supply, while controlling as far as possible for unobservable differences between parents.

Similarly to the 2016 iteration, the researchers established that offering free part-time childcare does not have any significant effect on the labour force participation and employment of mothers or fathers. However, the findings of the paper indicate that roughly doubling the offer of free care from part-time to full-time increases the probability of mothers whose youngest child is eligible for free full-time care being in the labour force by 3.6 percentage points, and the probability of being in paid work by 1.3 percentage points two terms after becoming eligible for this greater offer.

Annex 1 – Detailed Summary of Key Papers (continued)

Childcare subsidies and labour supply — Evidence from a large Dutch reform



Bettendorf, Leon; Jongen, Egbert; Muller, P. Childcare subsidies and labour supply — Evidence from a large Dutch reform. *JO – Labour Economics*, 2015.

This paper uses a differences-in-differences strategy to evaluate the change in maternal labour force participation at both the intensive and extensive margin, following the introduction of the Law on Childcare in 2005. This revised legislation meant childcare subsidies in the Netherlands became much more generous, with public spending on childcare increasing from €1 billion to €3 billion over the period 2004–2009.

The research used cross-sectional data for the period 1995–2009, collected from the Dutch Labour Force Survey of Statistics Netherlands. This is an annual survey which includes approximately 80,000 individuals per year.

Results established in the paper indicate that policy changes increased the maternal employment rate by 2.3 percentage points (3.0%) and maternal hours worked by 1.1 hours per week (6.2%). It should be noted that the results established in this paper are likely to be somewhat confounded. At a similar time to the introduction of the Law on Childcare, there was a coincident increase in the EITC for parents with young children. This is likely to have caused at least part of the increase in labour supply seen in the results.

Regardless, the findings of this paper indicate that more generous childcare subsidies have the potential to increase labour force participation at both the intensive and extensive margins of labour supply. Further research is required to determine the potential magnitude of this change, particularly in a UK context.

Annex 2 – Rapid Evidence Assessment: Papers Reviewed

| Citation | Geography |
|--|----------------|
| Brewer, Mike, Sarah Cattan, Claire Crawford, and Birgitta Rabe. "Does More Free Childcare Help Parents Work More?" <i>Labour Economics</i> 74 (2022): 102100. | England |
| Hansen, Kirstine, Heather Joshi, and Georgia Verropoulou. "CHILDCARE AND MOTHERS' EMPLOYMENT: APPROACHING THE MILLENNIUM." <i>National Institute Economic Review</i> 195, no. 195 (2006): 84-102. | England |
| Blundell, Richard, Alan Duncan, Julian McCrae, and Costas Meghir. "The Labour Market Impact of the Working Families Tax Credit." <i>Fiscal Studies</i> 21, no. 1 (2000): 75-104. | United Kingdom |
| Cagliesi, Gabriella, and Denise Hawkes. "Are We All in This Together? Alleviating the Childcare Constraint for Women in Economic Crises." <i>International Journal of Social Economics</i> 48, no. 9 (2021): 1245-263. | United Kingdom |
| Viitanen, Tarja K. "Cost of Childcare and Female Employment in the UK." <i>Labour (Rome, Italy)</i> 19, no. S1 (2005): 149-70. | United Kingdom |
| Duncan, Alan, Gillian Paull, and Jayne Taylor. "Mothers' Employment and the Use of Childcare in the UK." <i>IDEAS Working Paper Series from RePEc</i> , 2001, IDEAS Working Paper Series from RePEc, 2001. | United Kingdom |
| Brewer, Mike, and Claire Crawford. "Starting School And Leaving Welfare: The Impact of Public Education on Lone Parents' Welfare Receipt." <i>IDEAS Working Paper Series from RePEc</i> , 2010, IDEAS Working Paper Series from RePEc, 2010. | United Kingdom |
| Brewer, Mike, Sarah Cattan, Claire Crawford and Birgitta Rabe. Free Childcare and Parents' Labour Supply: Is More Better? <i>IZA Discussion Paper</i> , no.10415 (2016) | United Kingdom |

Annex 2 – Rapid Evidence Assessment: Papers Reviewed (continued)

| Citation | Geography |
|--|--------------------------|
| Guner, Nezih, Remzi Kaygusuz, and Gustavo Ventura. "Child-Related Transfers, Household Labour Supply, and Welfare." <i>The Review of Economic Studies</i> 87, no. 5 (2020): 2290-321. | United States of America |
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| Ha, Yoonsook, and Daniel P. Miller. "Child Care Subsidies and Employment Outcomes of Low-income Families." <i>Children and Youth Services Review</i> 59 (2015): 139-48. | United States of America |
| Gelbach, Jonah B. "Public Schooling for Young Children and Maternal Labor Supply." <i>The American Economic Review</i> 92, no. 1 (2002): 307-22. | United States of America |
| Hofferth, Sandra, and Nancy Collins. "Child Care and Employment Turnover." <i>Population Research and Policy Review</i> 19, no. 4 (2000): 357-95. | United States of America |
| Koll, David, Dominik Sachs, Fabian Stuermer-Heiber, and Helene Turon. "The Fiscal Return to Childcare Policies." <i>IDEAS Working Paper Series from RePEc</i> , 2019, IDEAS Working Paper Series from RePEc, 2019. | Germany |
| Givord, Pauline, and Claire Marbot. "Does the Cost of Child Care Affect Female Labor Market Participation?" <i>Labour Economics</i> 36, no. October (2015): 99-111. | France |
| Felfe, Christina, Michael Lechner, and Petra Thiemann. "After-school Care and Parents' Labor Supply." <i>Labour Economics</i> 42, no. October (2016): 64-75. | Switzerland |
| H. Bettendorf, Egbert L.W. Jongen, Paul Muller, Childcare subsidies and labour supply — Evidence from a large Dutch reform, <i>Labour Economics</i> , Volume 36, 2015, Pages 112-123, ISSN 0927-5371, | Netherlands |

Annex 2 – Rapid Evidence Assessment: Papers Reviewed (continued)

| Citation | Geography |
|--|---|
| Bick, Alexander, and Nicola Fuchs-Schündeln. "Taxation and Labour Supply of Married Couples across Countries." <i>The Review of Economic Studies</i> 85, no. 3 (304) (2018): 1543-576. | United Kingdom / European Union / United States of America |
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Annex 3 – Technical Methodology

Synthetic Control

The Synthetic Control Method (SCM) was first proposed by Abadie and Gardeazabal (2003)³⁹. The authors investigate the effects of conflict in the Basque Country on GDP per capita. Problematically, the region differed substantially from other Spanish regions in terms of the theoretical determinants of growth, such that there did not exist a valid counterfactual. The authors proposed a ‘synthetic’ control region, constructed using a weighted combination of other regions, which would resemble the Basque country in terms of pre-treatment characteristics. A negative impact on GDP per capita was identified, of a magnitude in keeping with the literature. It has since been adopted as an alternative to Difference in Differences in a variety of social science applications, and is now one of the approved methods for policy evaluation in HM Treasury Magenta Book. The main limitations of using Synthetic Control Methods are essentially data constraints. For the method to produce robust, unbiased estimates there needs to be many donor pool units to fit the synthetic control which matches on pre-treatment trends closely. Also, data availability across time which is consistent across treated and control units is crucial for causal inference.

As we have multiple treated units, we also make use of more recent developments in the academic literature by implementing the ‘allsynth’ extension package for Stata, written by Wiltshire (2022).

Constituency-level impacts

Each English constituency is initially analysed separately. Formally, there exist J Scottish constituencies, and 1 English constituency being analysed in each round; these are denoted $j = 1, 2, \dots, J + 1$.

The ‘treated’ English constituencies are $i = 1, 2, \dots, 533$, and all $j > 1$ are donor control constituencies. The data span T periods, and periods denoted T_0 occur before expansion of childcare provision in England. For each constituency, j, and time, t, we observe the outcome variable Y_{jt} . For each constituency we also observe k predictors of the outcome, $(X_{1j}, X_{2j}, \dots, X_{kj})$, which include pre-treatment observations of Y_{jt} , which are independent of treatment. The same set of predictor variables are used for the estimation of impacts on all outcome variables to avoid the possibility of specification searching, in line with best-practice. These contain (a) the standard labour market outcome measures: employment rate, unemployment rate, labour force participation rate, and hourly wage, and (b) population density. This lattermost variable is included as a proxy for rurality, to ensure local economies of similar nature are compared.

The $k \times 1$ vectors X_1, X_2, \dots, X_{j+1} contain the values of predictors $X_{1j}, X_{2j}, \dots, X_{kj}$ and the $k \times j$ matrix $X_o = [X_2 \dots X_{j+1}]$ therefore collects the values of the predictors for the J untreated Scottish constituencies. Y_{jt}^N is defined as the expected post-treatment outcome in ‘treated’ constituencies in the absence of treatment, and Y_{jt} , the observed post-treatment outcomes in treated constituencies. The effect of the expansion of childcare provision on the outcomes measured is therefore:

$$\tau_{it} = Y_{jt}^I - Y_{jt}^N$$

Clearly Y_{jt}^N is unobserved. The SCM method estimates \hat{Y}_{jt}^N using one or more untreated Scottish constituencies that had similar characteristics to the treated English constituency being analysed in the observed pre-treatment period. The synthetic control group is defined as a weighted average of the 57 Scottish constituencies in the donor pool. A synthetic control can be represented by a $H \times 1$

39. Abadie, Alberto, and Javier Gardeazabal. "The Economic Costs of Conflict: A Case Study of the Basque Country." *The American Economic Review* 93, no. 1 (2003): 113-32.

Annex 3 – Technical Methodology (continued)

vector of weights, $W = (w_2, w_3, \dots, w_{J+1})$ such that: $\hat{Y}_{jt}^N = \sum_{j=1+i}^{J+1} w_j Y_{jt}$ and $\tau_{it} = Y_{it} - \hat{Y}_{jt}^N$
 $\sum_{j=1+i}^{J+1} w_j = 1$ and $w_j \geq 0$, so synthetic control groups are weighted averages of donor constituencies.

Given a set of non-negative constants v_1, v_2, \dots, v_k (the derivation of which is discussed later in this section), optimal weights $W^* = (w_2^*, w_3^*, \dots, w_{J+1}^*)$ are chosen to minimise:

$$\|X_1 - X_0 W\| = \sqrt{\sum_{h=1}^k v_h (X_{h1} - w_2 X_{h2} - w_3 X_{h3} \dots - w_{J+1} X_{hJ+1})^2}$$

subject to $\sum_{j=1+i}^{J+1} w_j = 1$ and. The estimated treatment effect is therefore:

$$\tau_{it} = Y_{it} - \sum_{j=1+i}^{J+1} w_j^* Y_{jt}$$

$V = v_1, v_2, \dots, v_k$ is chosen such that the synthetic control $W(V)$ minimises the mean squared prediction error of the synthetic control with respect to Y_{it}^N :

$$\sum_{t \in \tau_0} [Y_{1t} - w_2(V)Y_{2t} - \dots - Y_{1t} - w_3(V)Y_{3t} - Y_{1t} - w_{J+1}(V)Y_{J+1t}]^2$$

for some $\tau_0 \subseteq \{1, 2, \dots, T_o\}$

Once the synthetic control constituencies are generated, deviations in post-treatment trends between treatment and control are identified as the constituency-level impact of the expansion of government-funded childcare in the UK.

Aggregation

The process described above generates 533 constituency-specific treatment effects, for each constituency in England. These constituency-level treatment effects are aggregated to form a national average treatment effect, $\bar{\tau}_{it}$, following the procedure described in Wiltshire (2022). κ_i is a vector of weights for each English constituency, defined by the relative sample size in that region.

$$\bar{\tau}_{it} = \sum_{i=1}^I \kappa_i (Y_{it} - \hat{Y}_{jt}^N)$$

This serves the dual purpose of (a) ensuring the average treatment effect reported in the headline results is representative of the entire country, and (b) placing greater weight on spatial units with sufficiently large sample size to generate meaningful analysis.

The developments of Wiltshire (2022)⁴⁰ also include a way of producing average placebo gaps to generate p-values consistent with the “stacked” treatment context which we have in this analysis (multiple treated English constituencies). This allows for the calculation of the ratio of the mean squared prediction error (RMSPE) for the average treatment effect and a random sample of average placebo gaps $s = 1, 2, 3 \dots S$. We can then use the empirical distribution of these RMSPE’s to calculate a p-value based on the share of $RMSPE_{S_E} \geq RMSPE_{0_E}$ in each post-treatment period:

$$p_{RMSPE_E} = \frac{\sum_{s=1}^S \mathbb{1} \left[RMSPE_{S_E} \geq RMSPE_{0_E} \right]}{S+1}$$

40. Wiltshire, Justin: Walmart Supercentres and Monopsony Power: How a Large, Low-Wage Employer Impacts Local Labour Markets (2022)

Annex 4 – Table of results

Table of results

| | First full year after 2017 intervention | Average across all years (2017-2021) |
|----------------------------------|---|---|
| Outcome | | |
| Labour market participation rate | +1.08ppts ^{***} | +1.87ppts ^{***} |
| Employment rate | +1.29ppts ^{***} | +1.23ppts ^{***} |
| Unemployment rate | +0.03ppts ^{***} | +0.53ppts ^{***} |
| Hourly wage | +0.80% (n.s.) | +0.45% (n.s.) |

*significant at the 10% level; **significant at the 5% level' *** significant at the 1% level; (n.s.) not significant.

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