

# Beliefs on Children's Human Capital Formation and Mothers at Work\*

C sarine Boinet<sup>1</sup>, Jonathan Norris<sup>1</sup>, Agnese Romiti<sup>1</sup>, Zhan Shi<sup>2</sup>, and  
Paul Telemo<sup>1</sup>

<sup>1</sup>University of Strathclyde    <sup>2</sup>University of Sheffield

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## Abstract

Perceptions that women have an absolute advantage in child-rearing can pressure mothers out of work. Guided by a simple model, we use a survey experiment to equalize earnings potential across gender, finding that women are perceived to hold an absolute advantage in child-rearing. We show that these beliefs have intergenerational roots, predict women's labor supply, and are explained by expectations that mothers will spend more productive time with children than fathers. Our findings add to the motherhood penalty literature by providing novel evidence that helps explain a source of gender labor market differentials.

**JEL-Codes:** D13, D83, J16, J22

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\*Corresponding author: Jonathan Norris ([jonathan.norris@strath.ac.uk](mailto:jonathan.norris@strath.ac.uk)). We wish to thank Jessica Pan, Chris Roth, Hannah Schildberg-H r sch, and Basit Zafar for their time and discussions on an earlier pilot that helped shape our thinking and direction. We also thank participants at the Twenty-Eighth Annual SOLE Meeting 2023, and the Workshop on Socio-Emotional Skills and Education at the University of Trento and seminar participants at Maynooth University, Simon Fraser University, the University of Aberdeen, the University of Alberta, the University of Galway, the University of Strathclyde, and Ume  University for their comments. Ethics approval was obtained from the University of Strathclyde Department of Economics ethics committee. The survey design and experiments were pre-registered in the AsPredicted registry as #182438. We acknowledge financial support from the Department of Economics at Strathclyde. All views or errors are our own.

# 1 Introduction

Across North America and Europe, mothers experience a 25–30% drop in employment after childbirth (Kleven et al., 2024a), contributing to the well-documented gender gap in earnings (Bertrand, 2011, 2020; Goldin, 2006). Moreover, this motherhood penalty has proven resistant to policy interventions (Kleven et al., 2024b) and is particularly pronounced for new mothers (Bertrand et al., 2010; Blau and Kahn, 2017; Cortés and Pan, 2023; Kleven et al., 2019, 2024b). Economic theory offers two main explanations related to child-rearing. The first is that women have a lower earnings potential than men in the labor market, leading to a comparative advantage in child-rearing (Becker, 1985). However, recent empirical studies find limited support for this mechanism (Andresen and Nix, 2022; Kleven et al., 2021; Siminski and Yetsenga, 2022) and the persistence of gender pay gaps within firms, and among highly skilled women, point toward alternative explanations (Blau and Kahn, 2017; Card et al., 2016). The second explanation links traditional gender norms to the belief that women have an absolute advantage in child-rearing relative to men (Cortés et al., 2022). Consider, for instance, policies that reduce gender discrimination in hiring and promotion (e.g., affirmative action) or that facilitate mothers’ return to work after childbirth (e.g., subsidized childcare). Under this second explanation, even if such policies succeed in equalizing earnings potential across genders, their impact on gender inequality in the labor market would be limited if prevailing beliefs continue to pressure women to reduce their labor supply.

In this paper, we study beliefs on absolute advantage in terms of how well children do when mothers maintain careers compared to fathers at similar earnings potentials. We define absolute advantage in child-rearing among women as any combination of factors that result in women’s time away from work leading to greater skill accumulation among children than men’s time away from work. In a model framework, we show why beliefs on absolute advantage will matter for labor supply decisions. We also demonstrate how measurement of these beliefs is obscured by differences in earnings potential across genders. Thus, observing labor supply alone does not reveal whether women are perceived to have an absolute advantage. Motivated by this framework, we designed a survey to isolate beliefs on absolute advantage from expectations on earnings across genders. Empirically, we show that perceptions of women’s absolute advantage in child-rearing exist, have roots in early childhood experiences, and predict mother’s labor supply and the extent of their employment motherhood penalty.

We introduce a new survey design to elicit beliefs on absolute advantage and run it with parents in England recruited through Prolific. From our model, we define a distribution of beliefs on absolute advantage, as a comparison of expectations on a

child’s future human capital accumulation when a mother works long hours in the labor market *versus* a father with equalized earnings potentials. Thus, we present participants with vignettes pinning down the earnings potential across a mother and father, while varying which parent works longer hours in the labor market. We then capture expectations about a mother’s role relative to a father’s in child-rearing without the confounding effect of expectations on earning differentials.<sup>1</sup> Each participant answers multiple scenarios in which the mother works longer hours at different wage rates followed by scenarios in which the father works longer hours. We iterate the wage of the parent working longer hours in exactly the same way across genders and elicit participants’ expectations on two domains: the hypothetical child’s likelihood of graduating from university, as a measure of human capital accumulation, and their earnings rank at age 30, as a measure of long-term economic success.<sup>2</sup>

This design allows us to estimate how beliefs on children’s future outcomes change within-individuals when mothers work long hours relative to fathers. Our first contribution, Result 1 in Section 3.3, is that, on average, people expect worse outcomes for children when mothers work long hours relative to fathers. Participants significantly reduce the expected likelihood of graduation by just under 1 percentage point (pp) and earnings rank by 0.67 percentiles. To put the magnitude of these effects into perspective, we compare them with the motherhood employment penalty that we estimate in our data (19pp).<sup>3</sup> After standardization, the beliefs on absolute advantage in college graduation correspond to about 6% of the size of the motherhood employment penalty, whereas beliefs on absolute advantage in earnings rank correspond to about 4%. Even with the uncertainty of earnings differentials removed, our results show that beliefs on absolute advantage persist. We additionally provide evidence ruling out alternative interpretations, strengthening the validity of our method and interpretation.

Second, we study the childhood roots of beliefs related to motherhood and their link to actual labor supply choices. Theory suggests these may form around family narratives (Akerlof and Rayo, 2020), entrenching perceptions that subsequently affect labor supply decisions. To study this, we assess how beliefs vary based on the employment history of participants’ mothers, and we test whether beliefs predict participants’ own-labor supply and experienced birth employment penalty. We find that

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<sup>1</sup>We abstract from the role played by formal childcare as our primary focus is to provide an additional explanation to the observed motherhood penalty. Therefore, we focus on comparing men and women under the assumption that both face the same outside option in terms of formal childcare. See Boneva et al. (2022) for a study that examines beliefs about the impact of maternal labor supply on children and family outcomes, where the alternative to maternal time for the child is formal childcare.

<sup>2</sup>Attanasio et al. (2022), Boneva and Rauh (2018), and Kiessling (2021) also asked about expected earnings at age 30 for a hypothetical child but in a design related to returns to parenting practice. Additionally, we ask about the probability of graduating college as a measure more directly linked to parental time investment and long-term human capital accumulation.

<sup>3</sup>For comparability, we convert all effects into standard-deviation units.

having a mother who worked full-time while participants were young fully wipes out beliefs on absolute advantage consistent with a theory that family narratives shape children’s perceptions into adulthood. Moreover, this reinforces the literature on the inter-generational transmission of gender norms (Alesina et al., 2013; Fernández and Fogli, 2009; Grosjean and Khattar, 2019). Next, we find that weaker expectations of mothers’ absolute advantage in child-rearing predicts greater labor supply for women and a lower employment motherhood penalty.<sup>4</sup> Altogether, these results form our second contribution, Result 2 in Section 3.4: beliefs on absolute advantage are related with exposure to maternal labor supply and in turn predict labor supply and employment birth penalties among women.

Third, and finally, we study mechanisms that can explain the mental models people have in mind when comparing mothers and fathers. We aim to disentangle whether perceptions on mothers and fathers are rooted in expectations on differences in productivity for the same amount of time spent with children or on expectations for the degree of time spent on skill-building activities. We interpret both under beliefs about absolute advantage, as our framework defines absolute advantage broadly to include any reason why a given unit of a mother’s time at home is perceived to yield higher returns to child skill accumulation than a father’s.

Specifically, we highlight three key dimensions that may shape beliefs. First, people may expect *differences in preferences*, believing that even with equal time available, men are less likely than women to allocate time toward investments into children’s skills. Second, people may hold expectations on *differences in productivity of time investments*, where they perceive mothers as more productive than fathers for an equal amount of time spent on investments. Third, people may hold expectations on *differences in resource allocation*, where they expect mothers to allocate more resources to skill investments. If mothers are expected to have more resource control as they earn a higher share of the household budget, then this expectation would work to offset the beliefs on absolute advantage we just outlined.<sup>5</sup>

To study whether any of these mental mappings matter, we introduce a new series of vignettes and randomize features across participants. Our aim by moving from the within-person design to an across person randomized design is to avoid any concern of anchoring effects from over-use of the within person design and to provide a simple approach with fewer comparisons at this later stage to avoid survey fatigue. The specific details are described in Section 3.5 and the evidence is summarized by Result 3. It

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<sup>4</sup>From life histories, we estimate the motherhood employment penalty for women in our sample. We show in the Appendix, Section C.2 that mothers in our sample have experienced a very similar penalty as documented in the literature by Kleven et al. (2024a).

<sup>5</sup>In practice, our survey design aims to shut this channel down and focus on the preferences and productivity expectation channels. Nevertheless, we still check whether participants have a resource allocation channel in mind.

is differences in expectations on time investments, but not other dimensions, that we find are important. We also show that this is particularly true for those with strong beliefs on absolute advantage. A mental model of differences in time preferences across genders is consistent with beliefs on absolute advantage originating from how women and men form preferences on free time. Differences in these preferences could then put significant pressure on women's labor market decisions, as it suggests a perceived tradeoff between maintaining a career at the expense of time investments to children. The gain in resources from a mother working would then need to offset the expected time loss.

Altogether, our paper provides the first evidence on beliefs about women's absolute advantage in child-rearing. We show that these beliefs have intergenerational links, giving weight to their perceived role in shaping labor market decisions after child-birth, and that they are indeed associated with labor supply and child-rearing choices. Furthermore, we find that people expect mothers to devote more of their free time to children's skill-building, suggesting that the mental model of absolute advantage reflects differences in time preferences between mothers and fathers. Our results help explain why current policies aimed at reducing earnings differentials between men and women have not been effective in reducing the motherhood penalty, and suggest that norms around time allocation may represent policy relevant target for reducing this penalty.

**Related literature.** Our work contributes to the literature on gender gaps and motherhood penalties (Blau and Kahn, 2017; Cortés and Pan, 2023; Kleven et al., 2019). Under-representation of women in the labor market has economic consequences, being costly in terms of economic efficiency (Hsieh et al., 2019). We help understand one driver of mothers' sorting out of the labor market through societal beliefs on absolute advantage, and contribute by effectively estimating these beliefs. Additionally, we demonstrate the mechanisms people have in mind that inform these beliefs and represent targets for correcting potential uncertainty and misinformation.

Thus, we relate to the literature on gender norms and the role that they can play in constraining women's behavior and preferences for work (Fernández and Fogli, 2009; Blau and Kahn, 2017; Andresen and Nix, 2022; Cortés and Pan, 2023; Boelmann et al., 2025). Perceptions of gender norms, however, can be incorrect. Progressiveness in one's country or local area is generally under-estimated (Bursztyn et al., 2023), and information about this misperception can lead to more positive views and an increase in women's labor supply (Bursztyn et al., 2020; Cortés et al., 2022). Moreover, perceptions of the gender pay gap can be inaccurate but responsive to information about the actual size of the gap (Settele, 2022). However, while gender norms considered important

less is known about the form and strength of beliefs on absolute advantage in child-rearing when earnings potential is equalized. We contribute by demonstrating earnings potential alone does not explain expectation gaps on children's human capital and future wages between a mother or father at home. Moreover, we are able to show that these expectations have roots in childhood experiences – supporting theories around narrative and identity formation in families (Akerlof and Rayo, 2020) – and that they predict a significant share of women's experienced motherhood employment penalty.

Our study is also related to a literature examining gender differences in decisions around work and job search. Wage growth in part-time relative to full-time work is often over-estimated and can bias decisions between full-time and part-time work (Backhaus et al., 2023; Blesch et al., 2023). This can be important for gender gaps in labor markets, as women are typically observed to work fewer hours than men and are more likely to work part-time (Cortés and Pan, 2019; Goldin, 2014). Women also tend to sort into less demanding jobs in terms of working time (Wiswall and Zafar, 2017; Maestas et al., 2023), with job amenities important factors that women, more so than men, consider in the decision making about their job (Hotz et al., 2018; Wasserman, 2022). Moreover, women tend to have weaker bargaining power and less optimism about future earnings (Card et al., 2016; Cortés et al., 2023). Our study speaks to this literature, because beliefs on mothers' absolute advantage for children's development can explain why women sort into more flexible jobs requiring shorter hours and why they tend to hold weaker bargaining power. This is particularly salient given the expectations on time preferences that we estimate, where we find that women are expected to spend more time with children when free than men. This may act to pressure mothers out of work without substitutes to alleviate these expectations.

Additionally, we add to some recent work on the impact of paternity leave expansion (Farré et al., 2024) and on how fathers use time during paternity leave (González et al., 2024). These studies show that in Spain children had more developmental delays after paternity leave increased, while fathers spent less time on developmental activities and more time on leisure. Our survey experiment expands this literature, showing that indeed people expect mothers to spend more time on investments than fathers. Thus, beliefs on women's absolute advantage may partly be based on observations of fathers' time-use, putting pressure on mothers to compensate.

We further contribute to a growing literature on parental time investments and parental beliefs about returns to parental time for children's skill development (Boneva and Rauh, 2018; Attanasio et al., 2019, 2022; Kiessling, 2021; Boneva et al., 2022). Parental time with children is increasing in many countries (Aguiar and Hurst, 2007; Borra and Sevilla, 2019), due partially to increasing returns to education and competition in the education market (Ramey and Ramey, 2009). One recent study examines

beliefs about the effects of mothers' decision to work on children's skill development (Boneva et al., 2022). They find that beliefs on children's skills and family outcomes increase when mothers move from no work to part-time work – effects partially driven by increases in income – but decrease when moving into full-time work. Our paper explores a related though different mechanism, focusing on beliefs about absolute advantage thereby intentionally removing a mechanism operating via income effects. We then correlate beliefs with actual labor supply and experienced motherhood penalties and provide evidence on the mechanisms underpinning these beliefs.

The remainder of this paper establishes our conceptual framework in Section 2 and then moves through each of our four main results. In Section 3.1, we describe our sample and, through the rest of Section 3, we describe our survey design and estimation of beliefs on absolute advantage, as well as the mechanisms outlining Results 1 to 3.

## 2 Conceptual Framework

Our first objective is to effectively measure beliefs about women's absolute advantage in child-rearing — referred to throughout the paper as 'women's absolute advantage'. To provide structure for our analysis, we develop a simple Beckerian model of household labor division. The model provides us with an economic framework to interpret these beliefs and guides the development of a target beliefs distribution for estimation. Additionally, the model shows how these beliefs matter for labor supply decisions, and hence for the motherhood penalty.

The model draws on Siminski and Yetsenga (2022) and assumes a household that allocates parental time between the home and the workplace. The home-time of the mother ( $m$ ), the father ( $f$ ), together with earnings ( $e$ ), feed into their child's human capital production function as follows:

$$\text{Child human capital: } HC(m, f, e) = m^{\rho_m} f^{\rho_f} e^{\rho_e}.$$

Here,  $\rho_m$ ,  $\rho_f$ , and  $\rho_e$  represent the household's beliefs regarding the elasticity of maternal time, paternal time, and earnings, respectively, in producing human capital.

**Definition.** We say that the mother has an **absolute advantage in child-rearing** if  $\rho_m > \rho_f$ . Note that this is a broad definition: here absolute advantage for mothers implies they contribute more to their child's human capital accumulation than fathers for a given amount of time spent at home. This can arise either from higher productivity per unit of time or from expectations that mothers allocate a larger share of home time to child investments. In this way, our definition encompasses both efficiency

and preference-based channels. Indeed, in section 3.5 we use our survey design to disentangle expectations on these two sources of absolute advantage.

Each parent has an endowment of one unit of time, which can be allocated either to the home or the workplace. The father earns a wage rate of  $W$ , while the mother earns  $(1 - \gamma)W$ . The parameter  $\gamma \in [0, 1]$  reflects the earnings gap between the mother and father, for instance due to the existence or lack of family-friendly workplace policies. The household's budget constraint is given by:

$$\text{Budget constraint: } e = (1 - m)(1 - \gamma)W + (1 - f)W.$$

The key insight from the model is that household members will specialize in market work or home-production according to *comparative advantage*. This can stem either from differences in market productivity (captured by  $\gamma$ ) or from differences in presumed child-rearing productivity (captured by  $\rho_m$  and  $\rho_f$ ). In Figure 1, we highlight this in two empirically relevant cases, with the formal derivation presented in Appendix A.1. Panel (a) of Figure 1 demonstrates the case where  $\gamma > 0$ , hence the mother faces a wage penalty, or equivalently, fathers have an absolute advantage in market work. In this scenario the mother specializes in home-production even in the absence of gendered beliefs (*i.e.*, when  $\rho_m = \rho_f$ ). In contrast, panel (b) shows the case where  $\gamma = 0$ , so that wage potentials are equalized. Here, the mother will only undertake the majority of home-production responsibility if she is believed to have an *absolute advantage in child-rearing* (*i.e.*, if  $\rho_m > \rho_f$ ). Insofar as people hold beliefs that mothers' have an absolute advantage in child-rearing, policies aimed at closing the earnings potential gap of mothers and fathers (captured by a reduction in  $\gamma$ ) will not be sufficient to equalize labor market outcomes. Thus, beliefs on mothers' absolute advantage are highly relevant for policy outcomes.

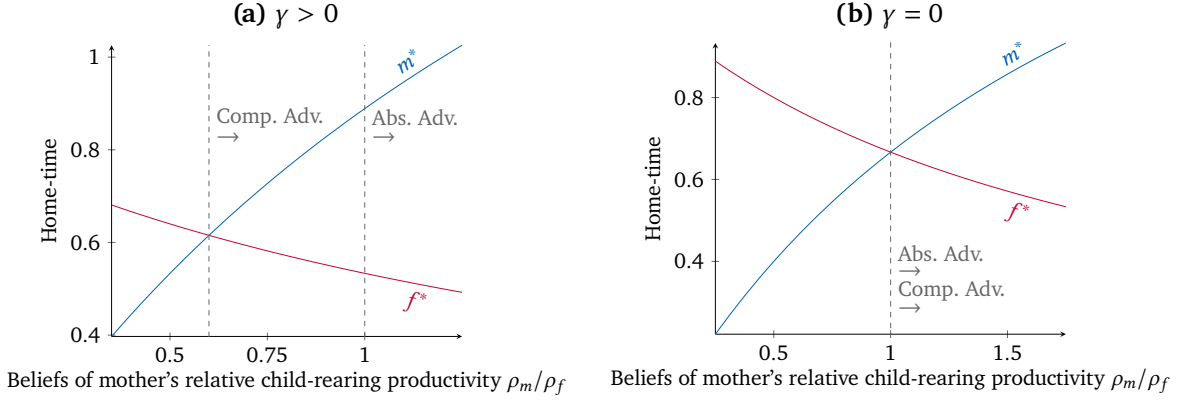
Our survey experiment allows us to isolate beliefs of absolute advantage from beliefs of comparative advantage, by holding earnings fixed in scenarios where we vary whether the mother works longer hours ( $MWL = 1$ ) or the father works longer ( $MWL = 0$ ). Using the language of the model, the beliefs that we target empirically can be written as

$$\theta_{i,e} := \underbrace{\widetilde{HC}_i(h_s, h_\ell, e)}_{MWL=1} - \underbrace{\widetilde{HC}_i(h_\ell, h_s, e)}_{MWL=0}. \quad (1)$$

$\widetilde{HC}_i$  represents person  $i$ 's beliefs of the human capital of a child growing up with family income  $e$  and parental home-time inputs  $h_\ell, h_s$  representing long and short hours respectively such that  $h_\ell > h_s$ . It is easy to show that  $\theta_{i,e} < 0$  if and only if  $\rho_m > \rho_f$ . Hence, empirically testing the sign of  $\theta_{i,e}$  is equivalent to testing whether the mother is believed to have an absolute advantage in child-rearing in the model,



**Figure 1.** Optimal Child-Rearing Allocation under Different Beliefs



Note: *Comp. Adv.* and *Abs. Adv.* refers to the mother's comparative and absolute advantage in child-rearing.

giving our empirical results a close model analogy. In the next section, we describe how our survey experiment is structured to capture these beliefs and to investigate the mechanisms driving them.

### 3 Hypothetical Beliefs Elicitation: Design and Results

In this section, we address five key points. First, we define our sample selection, recruitment, and demographics. Second, we present a hypothetical design through vignettes to elicit beliefs on a child's future outcomes when a mother works longer hours relative to a father. Third, we describe our estimation strategy and results to study within-person average estimates relevant to equation (1). Fourth, we describe how we empirically extract individual perceptions, by approximating an individual-level measure of equation (1), and how these vary across individuals' characteristics. Fifth, we investigate channels that can give rise to these beliefs.

#### 3.1 Sample

We conducted our experiment on the online platform Prolific, recruiting 1,056 participants.<sup>6</sup> We had two main inclusion criteria, requiring participants to be (i) parents of at least one child aged 18 or below, and (ii) currently residing in England. Throughout this paper, we follow our pre-registered analysis plans with some minor deviations on extended results. We point these out where relevant and describe them further in Appendix Section D.

<sup>6</sup>The survey design is browser-based and built using the oTree framework (Chen et al., 2016).

We contrast our participants’ demographics with current parents living in the United Kingdom using the latest wave (2022) of Understanding Society (US 2022). For comparison purposes, we restrict the US 2022 sample to parents of at least one child aged 18 or below and who live in England. We use only the latest wave of Understanding Society to be as close as possible to contemporaries of our respondents. In the Appendix, Table B.1, we show that our sample is similar to Understanding Society on some dimensions but over-sampled on higher education and monthly net earnings. Later, we will also show that our results are not fully driven by those with high education or income. Additionally, we will re-weight some of our key analyses in robustness checks, showing that our evidence and conclusions are unaffected. These weights are constructed with a standard “raking” procedure described in the Appendix, Section B.1. Finally, based on life histories, we show that mothers in our sample have experienced an average 29pp drop in employment probability post-child birth (see Figure C.2 and Section C.2). This is entirely consistent with the 25-30% employment penalties observed across the US and Europe by Kleven et al. (2024a), indicating that our sample looks very similar in terms of employment experiences and parenthood relative to the wider population.

### 3.2 Hypothetical Design

**Framing.** We use six hypothetical scenarios in vignettes to elicit participants’ beliefs on children’s human capital accumulation in response to women *versus* men working longer hours in the labor market. The following is the text participants see to set the stage for the scenarios, and we further provide screenshots of the online survey in the Appendix, Subsection C.3.

We are interested in your beliefs about children’s future outcomes, comparing families with different financial resources and time demands.

**Setup:** Please imagine an average family in your community. Suppose this family consists of a father and a mother who are both employed, and they have a boy (girl, *randomized*) who is aged 10 (4, *randomized*). Suppose household expenditure decisions are made jointly by the father and the mother, and this hypothetical family spends 10% (20%, *randomized*) of their total income on the child’s educational and extracurricular activities such as clubs, tutoring, music, sports, etc.

We will show you different scenarios, and ask your opinion about the likelihood that the child will be successful in education and the labor market. There are no clear right or wrong answers, and we know these questions are difficult. Please try to consider each scenario carefully and tell us what you believe the likely outcomes will be.

**Randomization in the setup.** We randomize several features in the setup. These are whether the participant reads that the family has a boy or a girl, the age of the child (4 years old *versus* 10), and the share of income (10% *versus* 20%) spent on the child’s

educational and extracurricular activities (denoted by  $SSE_i$  below). These randomized features enable us to assess whether participants paid attention to the vignettes, and to later assess whether beliefs differ across these features. Table B.3 in the Appendix confirms that these features are balanced across participants.

**Scenarios and outcomes.** Next, for each participant, we iterate through a set of scenarios (six in total) — presenting three scenarios per page — and varying two components: (i) whether the father or mother works longer hours, and (ii) the hourly wage of the parent who works longer hours. An example scenario is as follows:

The **father** works 35 hours per week at a wage of £12 per hour.

The **mother** works 42 hours per week at a wage of £17 per hour.

We then ask each participant their beliefs on the probability that the hypothetical child will eventually graduate from university, using a 0–100 scale with a slider. Additionally, we ask them for the child’s earnings rank at age 30 relative to other 30-year-olds in terms of percentile rank using a 1–99 scale on a slider.<sup>7</sup> We iterate on the scenarios, and at each, re-collect these expectations/beliefs for those two dimensions. Example images of what the participants see here are presented in the Appendix, Section C, Figures C.6, and C.7.

**Randomization in the scenarios.** Table 1 below contains the design for iterating through scenarios. Participants work through two pages, one for a mother and one for a father working longer hours, with each containing three scenarios. Importantly, the wages they see when a mother works longer hours will be exactly the same as in scenarios with the father. To avoid order effects, we randomize whether each participant starts with the man or woman working longer hours. We also randomly draw the ordering of wages shown within each page so that participants do not move sequentially through lower to higher wage changes. In all cases, we hold constant the wage of the parent working fewer hours.

We further randomize whether the wage profile of the hypothetical parent working longer hours has a lower bound of either £12 or £17 and an upper bound of either £22 or £27. This allows across participants for the overall wage profile to range from £12 to £27. We contrast the distribution of weekly household labor income across wage profiles in our design with the distribution drawn from the 2022 wave of the Family Resources Survey. Overall, Figure C.1, in the Appendix, shows that we have good

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<sup>7</sup>To familiarize participants with the scaling used throughout the survey, we provide them with an “introduction to scale” (see Figure C.4 in the Appendix), common to all participants, before displaying the hypothetical scenarios.

coverage over this distribution in England — although our hypothetical distribution does not cover the top 25% of the earnings distribution.

Finally, the weekly number of hours worked is randomized across participants. Half of the sample sees both parents working full-time with one of them working longer hours (42 *versus* 35 hours per week), and the other half sees a full-time working parent and a part-time working parent (36 *versus* 20 hours per week). The former is referred to as the “FT-FT” design, while the latter is referred to as the “FT-PT” design. We will use this later for heterogeneity.

**Table 1.** Design of Hypothetical Scenarios

	Man Works More		Woman Works More	
	$w_m$	$w_f$	$w_m$	$w_f$
$k = 1$	£17 (£12)	£17 (£12)	£17 (£12)	£17 (£12)
$k = 2$	£22 (£17)	£17 (£12)	£17 (£12)	£22 (£17)
$k = 3$	£27 (£22)	£17 (£12)	£17 (£12)	£27 (£22)

**Notes:** This table presents the design of our hypothetical scenarios, where  $w_m$  is the man’s hourly wage, and  $w_f$  is the woman’s. Participants here are randomized into either the higher or lower wage profile (in parentheses).

**Attention and confidence.** First, we regress each of our collected expectations (graduation likelihood and earnings rank) on the randomized features in the vignette setup and a pre-registered set of controls. Results are reported in Table 2.<sup>8</sup> We see strong responses on a number of design features consistent with our participants paying attention to the design details. Particularly, seeing a large share of the family budget allocated to educational activities for the child or seeing a higher wage profile strongly increases positive expectations. Second, we follow Haaland et al. (2023) to test participants’ attention to the survey and confidence in their answers. Before completing the hypothetical scenarios, we provide participants with a paragraph of text, wherein we ask them to report that their favorite color is “turquoise”. Below this paragraph, we ask participants “what is your favourite colour?”. In our survey, 95% (1,003) of our participants passed this attention check, suggesting strong attention to our survey. Next, after the hypothetical vignettes, we ask participants to what extent they are sure about their answers. 75% of participants (795) reported being at least somewhat sure

<sup>8</sup>Where participants’ characteristics are controlled for in this study, we use the following pre-registered set: participant’s gender, a quadratic in age, an indicator for whether they have at least a university degree, employment status (full-time *versus* part-time or less), and ethnicity (white *versus* non-white).

of their answers.<sup>9</sup> Later, we perform robustness checks (see Subsection 3.3) using these screeners, to test the reliability of our estimates.

**Table 2.** Design Effects Across Participants

	(1) P(graduate)	(2) Earnings Rank
Child is a girl	1.019 (1.06)	1.858* (1.00)
Child is aged 4	-0.107 (1.07)	0.451 (1.02)
SSE <sub>i</sub> : 20%	2.807*** (1.06)	1.370 (1.01)
FT-FT profile	2.107** (1.06)	2.077** (1.01)
High wage profile	7.658*** (1.07)	5.280*** (1.00)
Mother shown first	0.050 (1.06)	0.569 (1.00)
Participants	1056	1056
Observations	6336	6336
Individual Controls	Yes	Yes

**Notes:** \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are in parentheses and clustered on individuals. The probability to graduate (P(graduate)) is scaled between 0 and 100. Earnings Rank is the percentile ranking expected for the child at age 30 among other 30 year-old. SSE<sub>i</sub> is an indicator for seeing the share of budget spent on educational expenditures at 20% instead of the 10% in the vignette setup. The FT-FT design presents both parents as full-time with one working longer hours (42 vs. 35). The “mother shown first” variable is equal to 1 when scenarios with  $MWL = 1$  (mother works longer hours) were shown first or 0 when scenarios with  $MWL = 0$  (father works longer hours) were shown first. Individual controls include the pre-registered set of participants’ characteristics.

### 3.3 Results: Hypothetical Beliefs Elicitation

We now test whether beliefs about children’s future outcomes vary based on whether in a family the mother or the father works longer hours.

**Empirical strategy on gendered beliefs.** Empirically, we provide estimates for the within-person average difference in beliefs, holding constant the earnings potential of the mother and the father. We approximate an average related to the individual

<sup>9</sup>We provide screenshots of the attention check and confidence questions that participants actually see in the Appendix, Section C (see Figures C.5 and C.12).

measure we defined in equation (1) of the conceptual framework. Based on our design, this leads to the following estimation target:

$$\delta = \frac{1}{N} \frac{1}{K} \sum_{i=1}^N \sum_{k=1}^K \theta_{i,k}(MWL),$$

where we look at a within person average difference in a child's future human capital accumulation over  $K$  different levels of earnings potential. In the survey, our collected expectations on a child's future outcomes ( $y_{i,j,k}^o = [y_{i,j,k}^{\text{graduation}}, y_{i,j,k}^{\text{rank}}]$ ) vary within individuals and the wage levels ( $k$ ). These wage levels change in exactly the same way for scenarios with a mother working longer hours ( $MWL_{j=1}$ ) versus a father ( $MWL_{j=0}$ ). We aggregate the within-person difference in these measured beliefs over  $MWL_j$ . If there are no gendered beliefs, then the average change in beliefs will be the same ( $\hat{\delta} = 0$ ), regardless of who works the longer hours. While an estimate of  $\hat{\delta} < 0$  will be consistent with beliefs that women hold an absolute advantage. In this case, average expectations are that it is more harmful for children's human capital accumulation if women work longer hours compared to men. Following our pre-registration the main specification is:

$$y_{i,j,k}^o = \alpha_0 + \delta MWL_j + \tau_k + \mu_i + \epsilon_{i,j,k}. \quad (2)$$

Participant fixed effects are captured by the vector  $\mu_i$  and vignette household income fixed effects by  $\tau_k$ .<sup>10</sup> In some specifications, we replace  $\mu_i$  with the pre-registered set of participant's characteristics, which are the following: gender, a quadratic in age, an indicator for whether they have at least a university degree, employment status (full-time *versus* part-time or less), and ethnicity (white *versus* non-white).<sup>11</sup>

**Average estimates of gendered beliefs.** Results for each outcome (graduation likelihood, earnings rank) based on equation (2) are presented in Table 3.

**Result 1.** *Beliefs on children's future outcomes are on average worse when a mother works longer hours compared to when a father works longer hours for the same wage.*

Our estimates of  $\hat{\delta}$  return significant and negative effects for scenarios with the mother working longer hours. In these scenarios, participants reduced their expected probability that the child will graduate from university by nearly 1 pp and earnings rank at age 30 by about 0.67<sup>th</sup> of a percentile. Beliefs on absolute advantage in college graduation

<sup>10</sup>Note: by construction the  $MWL$  indicator can only vary within individuals, thus including or omitting individual fixed effects will not change the estimates, as we demonstrate in results.

<sup>11</sup>Note: 6 respondents listed "other" or "prefer not to say" for gender. We set these to 0 and control for an indicator flagging them.

**Table 3.** Beliefs About Mothers Working Longer

	(1)	(2)	(3)	(4)
	IP(graduate)	IP(graduate)	Earnings Rank	Earnings Rank
MWL <sub>j=1</sub>	-0.933*** (0.299)	-0.933*** (0.299)	-0.668** (0.268)	-0.668** (0.268)
Mean Dep. Var	56%	56%	49 <sup>th</sup>	49 <sup>th</sup>
Participants	1056	1056	1056	1056
Observations	6336	6336	6336	6336
Individual Controls	Yes	No	Yes	No
Individual Fixed Effects	No	Yes	No	Yes
Scenario Income Fixed Effects	Yes	Yes	Yes	Yes

**Notes:** \*  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are clustered on individuals. Expectations on the child's probability to graduate (IP(graduate)) range between 0 and 100 with a mean of 56 representing a 56% expected likelihood. The expected percentile earnings rank when the child is 30 years old lies between 1 and 99. Individual controls include the pre-registered set of participants' characteristics.

correspond to about 6% of the size of the motherhood employment penalty, whereas beliefs on absolute advantage in earnings rank correspond to about 4%.<sup>12</sup> These magnitudes suggest that even when earnings potential is equalized between mothers and fathers, hesitancy over the mother working longer hours may remain. This is consistent with beliefs that mothers can hold an absolute advantage in child-rearing, and it forms our main result of Section 3.

In the remainder of this section, we further add context to our interpretation of these results and consider some heterogeneity and robustness checks.

**Interpretation and discussion.** While our preferred interpretation of Result 1 is that people hold beliefs of women's absolute advantage in child-rearing, a potential alternative explanation is that participants infer different unobservable characteristics in families where the father, rather than the mother, works longer hours. Primarily, we may worry that where the father works fewer hours than the mother, participants associate this to a family where the father works less *because* he has less education than the mother. If so, responses may not reflect a *ceteris paribus* comparison, and instead, reflect perceived differences in parental human capital rather than beliefs about maternal labor supply. We view this interpretation as unlikely for two reasons.

First, our heterogeneity analysis (Table 4), shows that variation in  $\hat{\delta}$  is strongly correlated with participants' own labor supply histories. Women who reduced their labor supply after childbirth have significantly lower values of  $\hat{\delta}$ , as do those whose mothers worked shorter hours when they were growing up. These patterns suggest

<sup>12</sup>For comparability, we convert all effects into standard-deviation units.



that participants are drawing on internalized beliefs and personal experiences rather than inferring differences across vignette families.

Second, we directly tested whether individuals inferred differences in parental human capital across scenarios. Specifically, we asked participants about the likelihood that the father or mother held a university degree in settings where we varied which parent worked full-time versus part-time. The results, shown in Table 7, indicate that participants generally assign a higher probability of having a university degree to both mothers and fathers when they work full-time. However, this difference is not statistically significant between mothers and fathers, and point estimates suggest that part-time mothers are penalized slightly more than part-time fathers. If anything, such a pattern would bias our estimated effect toward zero rather than away from it.<sup>13</sup> Thus, we find no evidence consistent with an alternative interpretation of our results. In addition, in the Appendix Section B.2.1, we further discuss potential order effects and show that they are unlikely to drive our results.

**Heterogeneity analysis.** The heterogeneity we focus on is an observation of strong persistence in perceptions of absolute advantage: participants whose mothers worked full-time during their upbringing are less likely to hold beliefs of absolute advantage. We will discuss this finding in detail in Section 3.4.

Before turning to this, we briefly highlight a few interesting findings from our pre-registered heterogeneity analysis. First, there is suggestive evidence that the negative effects of mothers working longer hours on expected child outcomes are concentrated in the lowest income quartiles and become statistically insignificant in the top quartile. This is visualized in Figure B.1, which groups scenarios by the hypothetical family's income level. We note however, that these estimates are not significantly different from each other, thus we can only point to them as suggestive.<sup>14</sup> Our interpretation is that people view time and money as substitutable inputs into child human capital. While maternal time is considered an important input at lower income levels, higher earning families are able to substitute for this with pecuniary resources. In Appendix A.2 we make this point formally by showing that an extension to our baseline model where time and monetary inputs are gross substitutes and exhibit decreasing returns to scale successfully replicates the observed pattern: the effect of mothers working longer decreases as household earnings increase.

Furthermore, across participant characteristics (Appendix, Tables B.4), we find that the negative effects in MWL scenarios are somewhat stronger among men, those born

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<sup>13</sup>In this exercise, family income was held constant at £1,312 in scenarios where either the mother or father worked full-time. As shown in Figure B.1, this lies within the range where we find that  $\hat{\delta} < 0$ .

<sup>14</sup>Note that these income levels overlap reasonably well with the actual UK family income distribution, as shown in Figure C.1.



outside the UK, university degree holders, part-time or less employed participants, and those who voted conservative, other, or none, at the last UK General Election. While the university result appears surprising, less surprisingly, beliefs on absolute advantage appear to be strongest within more conservative groups. We caution that these patterns are suggestive as the many tend to have somewhat wide confidence intervals. Finally, in Table B.5, we assess heterogeneity in the MWL effect by design features. For brevity, we provide a discussion in Appendix Section B.2.3.

**Robustness checks.** Finally, we test the robustness of our key finding (Result 1) by implementing different sample restrictions and checks, and report these in the Appendix, Table B.6. First, we exclude those who reported being unsure or very unsure about their answers to the vignette scenarios. Second, we exclude participants who did not pass the attention check. Third, as an additional check against inattention, we exclude participants with the 5% lowest and highest response times. Fourth and last, we re-weight our sample to match the national population distribution (see Subsection B.1). Our main result is robust to all of these checks, with the coefficients on  $MWL_j$  in Table B.6 about the same magnitude as the ones we find in Table 3.

### 3.4 Labor Supply and the Intergenerational Transmission of Beliefs

We now want to explore where beliefs of women’s absolute advantage come from and how they influence individual behavior. In this section, we study whether beliefs of absolute advantage vary with early-life exposure to maternal employment, before turning to whether these beliefs predict individuals’ own-labor supply choices.

#### 3.4.1 Intergenerational link

Beliefs about identity likely form over the life cycle, and theoretically, include the family narrative (Akerlof and Rayo, 2020; Bénabou and Tirole, 2002). In this light, beliefs on absolute advantage may well persist from childhood experiences. Here we correlate beliefs with the labor supply of respondents’ mothers. We asked respondents about their mothers’ labor supply while they were growing up, distinguishing between whether their mother was working full-time or part-time during their childhood and adolescence. Table 4 presents the results from interacting the  $MWL$  indicator with indicators for the exposure to a mother working full-time only while the respondent was an adolescent and another for a mother working full-time while the respondent was a child (<12 years old).

The results are descriptive but informative. Respondents whose mothers never worked full-time during their upbringing hold beliefs of absolute advantage – per the MWL estimate in Table 4 – with lower expectations for both the earnings rank and graduation probability of children. Moreover, having a mother work full-time only during a respondent’s adolescence has no additional bearing on beliefs. In contrast, a full-time working mother during younger childhood does appear to matter. For the graduation expectation, beliefs appear more positive, suggesting no expectation of absolute advantage, though the difference is not significant compared to respondents whose mother never worked full-time. For earnings rank, the difference is strongly significant, with beliefs on absolute advantage fully wiped out among those whose mother worked full-time while they were a child.

These results point to a role model effect, adding to the literature on the inter-generational transmission of gender norms through maternal behavior (Fernández and Fogli, 2009; Alesina et al., 2013; Grosjean and Khattar, 2019). Maternal labor supply during childhood could, of course, proxy a range of factors about the childhood experience, or even reflect the beliefs of the mother. While we cannot isolate whether it is labor supply itself, our evidence shows that childhood experiences – captured by the work decisions of respondents’ mothers – correlate with later beliefs. Building on this intergenerational link, we next look at whether beliefs inform respondents’ own labor supply decisions.

**Table 4.** Beliefs by the Working Status of Respondents’ Mother

	P(graduate)	Earnings Rank
MWL <sub>j=1</sub>	-1.147*** (0.402)	-1.130*** (0.374)
MWL <sub>j=1</sub> × Mother FT only during Adolescence	-0.090 (0.793)	0.009 (0.711)
MWL <sub>j=1</sub> × Mother FT while < 12	0.606 (0.707)	1.370** (0.618)
Observations	6240	6240
Number of Individuals	1040	1040

**Notes:** \*  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are clustered on individuals. There were 16 individuals missing information on their mothers’ past work status. The specification follows our preferred specification with individual and scenario income fixed effects as in Table 3. The level MWL effect here captures beliefs for respondents whose mother never worked full-time will they, the respondent, were growing up.

### 3.4.2 Beliefs and Labor Supply

To correlate beliefs with respondents' labor supply, we construct an individual-level measure of perceptions of women's absolute advantage by aggregating elicited beliefs to individual average perceptions. In our design, this equates to the following formulation:

$$\theta_i = \frac{1}{K} \sum_{k=1}^K \theta_{i,k}(MWL),$$

where we averaged all individual belief measures regarding  $MWL_j$  to the individual level.

For each expectation outcome  $o$ , we label the individual perceptions of mothers working longer hours compared to fathers as  $\theta_i^{\text{graduate}}$  for the probability of the child to graduate from university and  $\theta_i^{\text{rank}}$  for the earnings rank at age 30. For each of these  $\theta_i^o$  measures, the scale is increasing in more positive views about children's future outcomes when women work longer hours relative to fathers, with 0 implying no expected difference. We report the distribution of these measures in the Appendix, Figure B.2, and in the Appendix, Figure B.3, we show that these two measures are consistent with one another.

We now use the estimated individual perceptions and examine how they relate to actual labor supply behavior. Our outcomes consist of self-reported individual information on two current labor supply measures from the end-of-survey questionnaire – weekly working hours and an indicator for working full-time. We also use a continuous measure of the employment motherhood penalty, as described in Subsection C.2, in the Appendix. Results are presented in Table 5, where we first regress each outcome on the individual belief measures (considering  $\theta_i^{\text{grad}}$ , and  $\theta_i^{\text{rank}}$  in separate regressions) including our standard control set (column 1 and 2). Additionally, we follow the method designed by Gillen et al. (2019) to isolate a joint beliefs measure from the two domains and estimate the correlation between this measure and our outcomes (column 3). This method relies on an IV approach to minimize measurement errors arising from estimating regressions on a relatively small sample, as well as leveraging the two distinct domains we consider (college graduation and earning rank) to isolate the common underlying variation.<sup>15</sup>

<sup>15</sup>Kiessling (2021) provides a similar application of this method by relating participants' elicited perceived returns to investments in neighborhood and parenting styles to actual measures of neighborhood assessment and parenting behavior. The IV strategy follows Gillen et al. (2019), and consists in first duplicating the number of observations, then using the estimated  $\theta_i^{\text{grad}}$ , and  $\theta_i^{\text{rank}}$  once as a regressor and once as an instrument. For each of our outcomes, we estimate the following equations, which yields an estimate of  $\delta_1$ .

$$\begin{pmatrix} y_i \\ y_i \end{pmatrix} = \begin{pmatrix} \delta_0^{\text{grad}} \\ \delta_0^{\text{rank}} \end{pmatrix} + \delta_1 \begin{pmatrix} \theta_i^{\text{grad}} \\ \theta_i^{\text{rank}} \end{pmatrix} + \begin{pmatrix} \delta_2^{\text{grad}} X_i \\ \delta_2^{\text{rank}} X_i \end{pmatrix} + v_i \quad (3)$$

**Table 5.** Relationship Between Beliefs and Participants' Labor Supply

	Hours Worked			Full Time			Motherhood Penalty		
<b>Panel A: Women</b>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\theta^{\text{graduate}}$	0.844 (0.541)			0.023 (0.020)			0.026* (0.014)		
$\theta^{\text{rank}}$		1.229** (0.591)			0.040** (0.020)			0.034** (0.014)	
$\theta(IV)$			1.546*** (0.588)			0.047** (0.021)			0.044*** (0.016)
Observations	525	525	1050	525	525	1050	514	514	1028
Mean Dep. Var.	26.12	26.12	26.12	0.39	0.39	0.39	-0.19	-0.19	-0.19
<b>Panel B: Men</b>									
$\theta^{\text{graduate}}$	-0.090 (0.563)			-0.014 (0.017)					
$\theta^{\text{rank}}$		-0.046 (0.441)			0.007 (0.018)				
$\theta(IV)$			-0.123 (0.644)			-0.006 (0.023)			
Observations	525	525	1050	525	525	1050			
Mean Dep. Var.	37.74	37.74	37.74	0.86	0.86	0.86			

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors, in parentheses, are bootstrapped with 1,000 replications.  $\theta$  values are standardized to z-scores. We run OLS regressions of three labor supply measures as indicated in the headings on individual perceived returns over (1) the probability for the child to graduate ( $\theta^{\text{graduate}}$ ), (2) the expected earnings rank of the child at age 30 ( $\theta^{\text{rank}}$ ), and (3) a joint measure from separate IV estimates yielding a measurement error-corrected latent estimate across the two other measures. The implementation of this IV strategy requires duplicating the number of observations. Hours Worked corresponds to the participant's weekly number of hours worked. Full time corresponds to an indicator set equal to one if the participant is currently employed full time. Motherhood Penalty is our continuous measure of motherhood penalty in employment. Panel A reports results for women, and Panel B for men. Individuals controls include a quadratic in age, an indicator for whether they have at least a university degree, and ethnicity (white *versus* non-white). Six participants listed "other" or "prefer not to say" for gender are excluded.

In Table 5, we find that more positive perceptions of women working is associated with heterogeneous predictions across women and men: they predict higher labor supply only for women, with point estimates much smaller and generally close to zero for men. The results are qualitatively consistent across the graduation and earnings rank domains, but these correlations for women are stronger when we use beliefs on earnings rank. Also, the correlation is generally stronger when we account for potential measurement errors in the IV exercise. In terms of magnitude, if we focus on the joint estimate in column (3), a one-standard-deviation increase in positive perceptions

$$\text{instrumenting } \begin{pmatrix} \theta_i^{\text{grad}} \\ \theta_i^{\text{rank}} \end{pmatrix} \text{ with } Z = \begin{pmatrix} \theta_i^{\text{rank}} & 0_N \\ 0_N & \theta_i^{\text{grad}} \end{pmatrix}.$$

of women working corresponds to a 1.546-hour increase in weekly worked hours – equivalent to about a 6 percent increase relative to the average.<sup>16</sup> Similarly, the same increase in perceptions is associated with about 5pp increase in the likelihood of working full-time – equivalent to 13 percent relative to the average – and a 4pp reduction in the employment motherhood penalty equivalent to 21 percent relative to the average.

While our evidence here is descriptive, we believe it provides a coherent and novel empirical picture relating beliefs with labor supply for women. Bringing this together with the previous picture on the intergenerational link with beliefs, it suggests that beliefs about mothers working are influenced through early life experiences and then impact women’s labor supply when grown. This impact in particular emerges after child-birth given our evidence in columns (7) - (9) on the link between beliefs and the experienced motherhood employment penalty by female respondents. While we cannot rule out all forms of potential biases, overall our results speak to a link between our elicited measure of beliefs and actual labor market choices after childbirth.

Moreover, we find it sensible that men’s labor supply is unresponsive to these beliefs. Despite substantial labor market convergence, men still exhibit stronger labor market attachment than women (Olivetti and Petrongolo, 2024), both in terms of labor force participation and working time. Gender gaps in wage rates largely favor men, and women – especially married women – exhibit higher labor supply elasticity than men (Eissa and Hoynes, 2004; Keane, 2011; Chetty et al., 2013). All of these factors may lead men’s labor supply to be less sensitive to changes in beliefs. Additionally, men are already largely sorted into full-time jobs, leaving less margin for adjustment. Women, however, may respond more strongly to changes in beliefs in terms of observed labor supply behavior both because of their different position in the labor market and because these beliefs are more salient and directly apply to women’s labor supply choices.

For men, even without changes in labor supply, beliefs could affect how they allocate their time through substituting leisure for time invested into children’s skill development. To test whether this is the case, we estimate the same specification as in Table 5, examining how perceptions of women working relate to parents’ self-reported time spent on skill-enhancing and outdoor activities. We report these results in Table B.7 in the Appendix. Results point to a link between more positive views on mothers’ working and the time fathers spend in skill-enhancing activities and complement the results on mothers’ labor supply: a one-standard-deviation increase in positive perceptions of women working corresponds to almost half an hour increase in time spent

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<sup>16</sup>Hours worked include those reporting zero hours (8% of the sample). Results remain qualitatively consistent and similarly significant when we restrict the sample to observations with positive working hours.

in activities helping children develop their skills – equivalent to about an 11 percent increase relative to the average.

**Summary.** We find that respondents own mother’s labor supply predict beliefs of absolute advantage, and that beliefs of absolute advantage in turn are predictive of women’s labor supply. Taken together, this suggests that beliefs of women’s absolute advantage in child-rearing can be an important driver of the intergenerational persistence in labor supply from mother to daughter. We summarize these findings in Result 2 below. Next, we turn to elicit views on the channels that may explain these beliefs on absolute advantage.

**Result 2.** *Beliefs of women’s absolute advantage in child-rearing are driven by individuals whose own-mothers did not work or worked only part-time during their upbringing. Furthermore, when these beliefs are weaker (stronger) they predict higher (lower) labor supply among women and the extent of their motherhood employment penalty.*

### 3.5 Mechanisms for Variation in Beliefs

Now, we consider what channels may give rise to variation in the beliefs distribution we outlined in equation 1 and document in Result 1. We propose three main possibilities. First, people may hold beliefs about differences in *preferences*. This would imply that people believe mothers and fathers hold different valuations for time spent outside of work, whereby they expect women value spending more of their free time investing in a child’s skills than do men. Second, people may hold beliefs about differences in the *productivity* of time investments. In this case, they may presume mothers have an absolute advantage because they believe mothers are more productive in producing a child’s skills than a father for the same amount of time spent. Third, people may believe that for a given budget, the parent who works longer, or earns more, makes the *resource allocation* decisions for monetary investments to a child. A presumption that mothers will allocate more of the budget to these monetary investments would push in the opposite direction of the other two channels.<sup>17</sup> Here, we investigate each of these potential mechanisms to understand the mental models informing beliefs about absolute advantage.

To quantify the importance of these mechanisms, we introduced new vignettes where key features were randomized across participants to target each of the proposed channels. We take this approach rather than include similar questions in the

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<sup>17</sup>Evidence from the literature generally rejects the income pooling hypothesis, indicating that when mothers are in charge of resources (as opposed to fathers), expenditures on children tend to increase (Hoddinott and Haddad, 1995; Lundberg et al., 1997; Bobonis, 2009).

main vignettes to avoid over-use of the same design that could raise a risk of anchoring (Charness et al., 2012). Rather, now we switch to look at features randomized across participants instead of a within-person design. For each channel, we briefly describe the experimental setup below, while the full survey details are in the Appendix, Subsection C.3 – in particular, see pages 5 to 8.

We will also assess heterogeneity for each of these based on beliefs of absolute advantage. To do this parsimoniously, we define a collapsed belief measure,  $\theta_i$ , as the simple average of the individual-level beliefs in expected graduation likelihood ( $\theta_i^{\text{grad}}$ ) and expected earnings rank ( $\theta_i^{\text{rank}}$ ). That is,

$$\theta_i = \frac{1}{2}(\theta_i^{\text{grad}} + \theta_i^{\text{rank}}).$$

This measure captures an individual’s overall belief about whether children fare worse when mothers, rather than fathers, work longer hours, and is used throughout this section to split participants into those holding more negative views ( $\theta_i < 0$ ) versus those who do not ( $\theta_i \geq 0$ ).<sup>18</sup>

Finally, we close the section by providing more evidence in contrast to the alternative interpretation of Result 1, which we previously discussed. In that case, we test the possibility that people react to the scenarios based on different expectations about the likelihood of mothers and fathers holding a university degree based on who works longer hours rather than expectations about different working arrangements within the couple.

**Expectations on time preferences: design.** Beliefs on differences in preferences imply people will expect a mother to spend more time on activities with their child than a father given the same free time. To investigate this, we present respondents with a child aged 11 who will soon take the Key Stage 2 national test.<sup>19</sup> We randomize across participants whether both (*versus* neither) hypothetical parents have a university education and, importantly, whether the father (mother) has a busy week ahead with only the mother (father) free to help. We then ask how much time they expect will be spent helping the child study for the test and how much time they expect will be spent on extracurricular activities.<sup>20</sup> All participants are informed of the average time (30

<sup>18</sup>This approach simplifies the presentation, as the two components are conceptually aligned and highly correlated (Appendix Figure B.3).

<sup>19</sup>A key stage refers to a level within the education systems of England, whereby a certain level of educational knowledge is expected from students. Key Stage 2 concerns pupils aged 7 to 11 who take SATs, and is particularly well known by English parents. See the UK Government [website](#) for more information.

<sup>20</sup>Both are answered by moving a slider in 10-minutes increments that can range from 0 to 10 hours.



minutes) spent per week on teaching activities by parents in the 2014-2015 UK Time Use Survey to give them a common contextual reference.<sup>21</sup>

**Table 6.** Expectations on Time

	(1) All Participants	(2)	(3)	(4) By $\theta$	(5)	(6)
				< 0		$\geq 0$
<b>Panel A:</b> Time spent on test help						
Mother ( <i>father</i> ) free to help	12.945* (6.816)	6.299 (9.467)	18.492* (9.747)	-1.266 (13.856)	5.301 (9.872)	10.901 (13.549)
Both parents ( <i>neither</i> ) have a university education	37.728*** (6.890)	30.843*** (9.957)	32.876*** (9.823)	11.545 (14.143)	42.964*** (9.870)	48.532*** (14.101)
Both parents have a uni education $\times$ Mother free to help		13.603 (13.615)		42.239** (19.256)		-11.006 (19.420)
Mean Dep. Var	149.242	149.242				
<b>Panel B:</b> Time spent on extracurricular						
Mother ( <i>father</i> ) free to help	2.962 (6.760)	-8.204 (9.303)	4.998 (9.700)	-12.234 (13.052)	-0.448 (9.667)	-4.990 (13.492)
Both parents ( <i>neither</i> ) have a university education	38.096*** (6.857)	26.528*** (9.755)	33.010*** (10.012)	14.406 (14.000)	41.961*** (9.719)	37.445*** (13.869)
Both parents have a uni education $\times$ Mother free to help		22.855* (13.601)		36.840* (19.389)		8.927 (19.326)
Mean Dep. Var	161.061	161.061	157.157	157.157	164.805	164.805
Participants	1056	1056	517	517	539	539
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . OLS results for the expectations on time spent on test help (panel A) in minutes per week, and time spent on extracurricular activities (panel B) in minutes per week, with the hypothetical child. Italicized words in parenthesis correspond to the reference category. All specifications include controls for the pre-registered set of participants' characteristics. Robust standard errors in parentheses.

**Expectations on time preferences: results.** We regress the expectations for time spent studying and on extracurricular activities on an indicator for seeing the scenario with the mother free instead of the father, and an indicator for seeing the scenario with university educated parents, while controlling for participants' characteristics. These are reported in column (1) of Table 6 and in column (2) we add an interaction between these two randomized features. Respondents expect mothers to dedicate more time than fathers, particularly for study help (about 13 minutes more) and in scenarios where the presented parents are university educated. While in column (2), results are not significant, we find that the marginal effect of a mother having free time in the university educated scenarios is significant and about 20 minutes longer in study time than fathers (6.3 + 13.6).<sup>22</sup> Finally, looking beyond our pre-registered plans in

<sup>21</sup>Currently, this is the last edition of this survey, and the sample is restricted to parents who have at least one child in the 10 to 14 age range. We further inform participants of this.

<sup>22</sup>We have not reported these calculations but can make them available on request.



columns (3) to (6), these results appear stronger for those with more negative views about women working longer hours as captured by our  $\theta_i$  measure. We view this last step as exploratory, as it is beyond our pre-defined plans, but suggestive that those holding strong views on absolute advantage do have in mind different time preferences between mothers and fathers. Altogether, these results are consistent with beliefs on time preferences where mothers are expected to spend more time on educational activities than fathers.<sup>23</sup>

**Expectations on productivity: design.** Now, we aim to explore beliefs on differences in the productivity of a given time investment over mothers relative to fathers. After answering the expected time questions, participants move to the next survey page where we continue the setup of the previous question. Now, however, we fix the time the parent who is free spends helping the child prepare for the test. For instance, if a participant was randomized to see that the “mother” was free on the previous question, this continues here and we pin down the time spent. We also randomize this between 30 minutes (shorter time) or 1 hour 30 minutes (longer time). Participants are asked how well they think the child will do compared to other students in terms of percentile rank on the Key Stage 2 test. To answer, they drag a slider ranging from the 1<sup>st</sup> to the 99<sup>th</sup> percentile.

**Expectations on productivity: results.** We regress participants’ expected percentile rank for the child at the Key Stage 2 national test on the three randomized features and participants’ characteristics. The features include an indicator for the mother being free instead of the father, an indicator for the scenario where both parents have a university education, and an indicator for seeing the time spent on studying help as 1.5 hours (longer time) instead of 0.5 hour. These are reported in column (1) of Table 7, and in column (2), we add an interaction between the mother being free and two additional randomized features.<sup>24</sup> Remember that the amount of the time investment is pinned down in the scenario here, thus the comparison is between a mother being free versus a father for a given time investment. We do not see strong evidence for disparate beliefs on the productivity of time investments when mothers are free relative fathers. The point estimates in columns (2) and (4) do suggest that

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<sup>23</sup>We abstract from discussing whether individual perceptions of differential time use across mothers and fathers are accurate. However, as a reference, our descriptive analysis from the 2014-2015 UK Time Use Survey, shows that, when comparing full-time working mothers and fathers—controlling for household income, education, number of children, and whether the diary was completed on a weekday or weekend—mothers with at least one child aged 5 to 10 spend, on average, about 30 more minutes per week on reading and teaching to the child(ren). This difference, however, is not statistically significant.

<sup>24</sup>For transparency, we did not mention these interactions in the pre-registration plan directly, although we had noted we would analyze results by design features this was directly about the previous section. Thus, we put these forward with caution along with the splits by the  $\theta_i$  measures.

**Table 7. Expectations on Performance**

	(1)	(2)	(3)	(4)	(5)	(6)
	All Participants	By $\theta$				
			< 0		$\geq 0$	
<b>Panel C: Expected rank at test</b>						
Mother ( <i>father</i> ) free to help	0.002 (0.012)	-0.017 (0.020)	-0.009 (0.017)	-0.032 (0.029)	0.012 (0.016)	-0.003 (0.029)
1h30 ( <i>30 minutes</i> ) of help	0.101*** (0.012)	0.084*** (0.017)	0.090*** (0.017)	0.066*** (0.024)	0.113*** (0.016)	0.101*** (0.023)
Both parents ( <i>neither</i> ) have a university education	0.072*** (0.012)	0.071*** (0.017)	0.053*** (0.017)	0.055** (0.024)	0.089*** (0.016)	0.087*** (0.023)
Mother free to help $\times$ 1h30 of help		0.035 (0.024)		0.047 (0.034)		0.024 (0.033)
Mother free to help $\times$ Both parents have a uni education		0.003 (0.024)		-0.003 (0.035)		0.004 (0.033)
Mean Dep. Var	42 <sup>nd</sup>	42 <sup>nd</sup>	42 <sup>nd</sup>	42 <sup>nd</sup>	42 <sup>nd</sup>	42 <sup>nd</sup>
Participants	1056	1056	517	517	539	539
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . OLS results for the expectations on the child's test performance (rank among his peers). Italicized words in parenthesis correspond to the reference category. All specifications include controls for the pre-registered set of participants' characteristics. Robust standard errors in parentheses.

when the time spent is 1.5 hours participants expect small gains when it is the mother helping, but these estimates are insignificant. Overall, the evidence does not support expectations around differences across genders in the productivity of time spent.

**Expectations on resource allocation.** Another possibility is that people expect more resources to be allocated to a child's educational activities when the mother earns a larger share of the household budget. If so, we think this would work in the opposite direction of beliefs about absolute advantage potentially offsetting them when a mother works longer hours. Yet, we find no evidence for this in column (1) of Table 8. We randomize participants to see a mother (father) earning a larger share of the family budget and ask them for the expected share of the family budget spent on the child's educational and extracurricular activities.<sup>25</sup> Regressing this expectation on an indicator for those who see the mother earns more, and controlling for respondents' characteristics, returns a tight null. Additionally, we show in the Appendix, Table B.9, that the results are also null when we further split by negative and positive values of  $\theta_i$ .<sup>26</sup> Thus, differences in resource allocation do not appear to drive beliefs.

<sup>25</sup> Participants read a scenario again with a child aged 11 that reports the father (mother) earning a net monthly income of £1,500 and the mother (father) earning £2,500, randomizing which parent earns more. Participants are then asked what share of income they expect to be spent on the child's educational and extracurricular activities.

<sup>26</sup> This analysis was not pre-registered. See Section D in the Appendix for more details.

**Table 8.** Expectations on Resource Allocation and Parental Education

	(1)	(2)		
	Resource Allocation	P(University Graduate)		
		Mother	Father	Difference
Mother ( <i>father</i> ) earns more	0.007 ( 0.009)			
Works full-time ( <i>part-time</i> )		0.114*** ( 0.013)	0.082*** ( 0.013)	0.032 ( 0.023)
Participants	1056	1056	1056	1056
Individual Controls	Yes	Yes	Yes	Yes

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . OLS results for the expectations on (1) resource allocation, and (2) parental education. Italicized words in parenthesis correspond to the reference category. All specifications include controls for the pre-registered set of participants' characteristics. Robust standard errors in parentheses.

**Expectations on parental education.** Finally, people may expect part-time working fathers to be much less skilled than part-time working mothers. If so, this could explain expectations on children's future outcomes when a mother relative to a father works full-time. To explore this, we present a mother (*father*) working 36 hours per week for £27 per hour, while the father (*mother*) works 20 hours per week for £17 per hour. We then ask respondents the likelihood for each parent to hold a university degree and regress these answers on an indicator for having seen that parent working full-time in the scenario, including respondents' characteristics. The results show that there is a part-time to full-time expected education gradient. Respondents expect that a university degree is more likely for either the mother or father when they work full-time relative to part-time (columns 2 and 3 of Table 8). However, the difference in this expectation across mothers and fathers is negligible and not significant. Results further split by negative and positive values of  $\theta_i^o$  (Appendix, Table B.9) also remain negligible.<sup>27</sup> Thus, we see no evidence that differences in skill expectations drive beliefs when comparing mothers working longer hours relative to fathers.

**Summary.** Our evidence points to beliefs on time preferences. It is suggestive that people expect mothers to invest more time in developing a child's skills than fathers with similar free time. This would be consistent with a version of absolute advantage, where different beliefs originate from how parents form preferences in allocating their free time. In this case, mothers are believed to hold an absolute advantage because

<sup>27</sup>Transparency: we pre-registered this design but only realized after the survey collection the best way to use the information to address the question at hand.

people expect them to allocate more of their time at home to productive inputs for children’s human capital.

**Result 3.** *Respondents expect mothers to spend more time on investments to a child’s skills relative to a father with the same free time, especially when a parent has higher education.*

Together our evidence in Section 3 can be summarized through three results. First, we find strong evidence of beliefs on absolute advantage (Result 1), suggesting that even with earnings potentials equalized gender gaps may remain. Second, role model effects during childhood are important for shaping later beliefs, and beliefs then impact women’s labor supply and motherhood penalties (Result 2). Third, a mental model of differences in preferences across mothers and fathers for time investments into children appears an important element of comparisons informing participants’ beliefs (Result 3).

## 4 Conclusion

In this paper, we study beliefs about children’s skills when mothers work. Beliefs that mothers have an absolute advantage in child-rearing relative to fathers imply that gender gaps in labor markets will persist even if earnings potential is equalized across genders. We define a target belief distribution as one that equalizes earnings potential between a mother and father while capturing differences in expectations for a child’s future human capital depending on whether the mother or the father works longer hours in the labor market. With a survey designed around vignettes of a family with a mother or father working longer hours, we elicit these beliefs on absolute advantage and show they are present and vary substantially across respondents’ characteristics.

Beliefs about women’s absolute advantage are particularly predicted by those whose own-mother did not work full-time while they were growing up and among women who themselves had a strong employment motherhood penalty. Therefore, our evidence demonstrates that beliefs on absolute advantage are shaped by role model effects during formative childhood years, are highly correlated with labor market trajectories after childbirth and are predictive of higher labor supply for women – consistent with gender norms and beliefs having an important effect on gender gaps in the labor market.

Individuals’ beliefs about the impact of mothers working can stem from a mental model of mothers relative to fathers time use and productivity with children. To investigate these channels, we introduced new vignettes but randomized participants across features that let us test whether respondents have in mind expectations on differences

in preferences between mothers and fathers for time investments into children's skills, differences in the productivity of investments, or differences in resource allocation or parental skill when mothers relative to fathers work longer hours.

The evidence points toward differences in preferences where participants expect that with equivalent time mothers will spend more time on skill investments with children than will fathers. An important implication, is that mothers who are deciding whether to maintain a career may face pressure from expectations that their children will suffer from lower time investments. This is likely the most salient for families without the resources to pay for costly high quality childcare as a substitute, consistent with our evidence that beliefs on absolute advantage dissipate when we show respondents vignette scenarios with overall higher household resources.

Taken together, this paper provides a broad profile of evidence on beliefs about children when mothers work. It offers empirical support for the idea that such beliefs influence gender gaps in labor markets, using a new approach to elicit them. We also show how these beliefs vary across the population and the mental models that can inform them. Our findings are consistent with evidence that policies focused solely on equalizing earnings potential are ineffective in closing gender gaps, and point to mental models as important targets for policy design. They also relate to recent empirical work showing that mothers underestimate the returns to investment in their children's skills (Attanasio et al., 2019). Further research could explore whether these misconceptions differ by gender, and how they are linked to gender differences in parental beliefs, parental inputs, and labor market choices, thereby shedding light on the role of relevant policies.

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## Appendix Map

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## A Theoretical Appendix

### A.1 Model Solution

This appendix shows how our two results illustrated in figure 1 holds generally in our model framework. Specifically, we solve the model and show that (i) when  $\gamma > 0$  and  $\rho_m = \rho_f$ , mothers supply less labor due to a comparative advantage in child-rearing, and (ii) when if  $\gamma = 0$  and  $\rho_m > \rho_f$ , mothers supply less labor due to an absolute advantage in child-rearing.

Substituting in the budget constraint, we write the household's optimization problem as

$$HC(m^*, f^*, e^*) = \max_{m, f} m^{\rho_m} f^{\rho_f} [(1 - \gamma)W(1 - m) + W(1 - f)]^{\rho_e}.$$

Taking logarithms and solving the first-order conditions gives:

$$\begin{aligned} \frac{\partial \log HC}{\partial m} = 0 &\iff \frac{\rho_m}{m} = \frac{\rho_e(1 - \gamma)}{(1 - \gamma)(1 - m) + (1 - f)}, \\ \frac{\partial \log HC}{\partial f} = 0 &\iff \frac{\rho_f}{f} = \frac{\rho_e}{(1 - \gamma)(1 - m) + (1 - f)}. \end{aligned}$$

Combining these gives:

$$\frac{f^*}{m^*} = \frac{\rho_f}{\rho_m}(1 - \gamma).$$

The two results follow directly from this optimality condition.

### A.2 Model Extension

This section presents an extended version of our conceptual framework, adjusting the child human capital production function to allow for different substitutability between time and financial inputs and for differential returns to scale. Unlike our baseline model, this augmented version can capture the empirical observation that the effect of mothers working longer hours on child development diminishes as household earnings increase.

We start by showing the limitations of the baseline model in replicating this observation. Specifically, we demonstrate that models where time and money inputs are *q-complements* – such as our baseline model – cannot replicate the observed negative effect. A general child human capital production function featuring time inputs from each parent and earnings as inputs can be written as  $HC = f(T(m, f), e)$  where  $T(m, f)$  represents the aggregation of parental time inputs in domestic work, and  $e$

is earnings. We assume that  $f$  is increasing in both inputs. Time and earnings are considered  $q$ -complements if the marginal productivity of one input rises with the level of the other, i.e.  $\frac{\partial^2 f}{\partial T \partial e} > 0$ .

Let  $h_\ell$  and  $h_s$  represent long hours and short hours at-home, respectively. As before, we define our empirical target  $\theta$  as

$$\theta := f(T(\underbrace{h_s, h_\ell}_{MWL=1}), e) - f(T(\underbrace{h_\ell, h_s}_{MWL=0}), e).$$

Since  $f$  is increasing in  $T$ , we have  $\theta < 0$  if and only if  $T(MWL = 1) < T(MWL = 0)$ . Our empirical finding is that for cases with  $\theta < 0$  we observe  $\frac{\partial \theta}{\partial e} > 0$ . However, in the model

$$\frac{\partial \theta}{\partial e} = \frac{\partial f(T(MWL = 1), e)}{\partial e} - \frac{\partial f(T(MWL = 0), e)}{\partial e}$$

which is *negative* if  $\frac{\partial^2 f}{\partial T \partial e} > 0$ .

To reconcile the model with the data, we propose an augmented model incorporating a CES (Constant Elasticity of Substitution) aggregator for time and earnings inputs, with a parameter to control returns to scale. The revised human capital function is given by:

$$HC = ((m^{\rho_m} f^{\rho_f})^\sigma + e^\sigma)^{\alpha/\sigma},$$

where  $\sigma \in (-\infty, 1)$  governs the substitutability between  $T$  and  $e$  while  $\alpha \in (0, \infty)$  governs the returns to scale with respect to  $T$  and  $e$ . Using this definition, we derive:

$$\frac{\partial \theta}{\partial e} = \alpha \left( (h_s^{\rho_m} h_\ell^{\rho_f})^\sigma + e^\sigma \right)^{\frac{\alpha}{\sigma}-1} e^{\sigma-1} - \alpha \left( (h_\ell^{\rho_m} h_s^{\rho_f})^\sigma + e^\sigma \right)^{\frac{\alpha}{\sigma}-1} e^{\sigma-1}.$$

Thus,  $\frac{\partial \theta}{\partial e} > 0$  if and only if

$$\left( (h_s^{\rho_m} h_\ell^{\rho_f})^\sigma + e^\sigma \right)^{\frac{\alpha}{\sigma}-1} > \left( (h_\ell^{\rho_m} h_s^{\rho_f})^\sigma + e^\sigma \right)^{\frac{\alpha}{\sigma}-1}.$$

After some manipulation it is clear that three parameter ranges are relevant for evaluating this inequality.

$$\begin{cases} \text{If } \sigma < 0 \text{ or } 0 < \sigma < \alpha & \text{we require } h_s^{\rho_m - \rho_f} > h_\ell^{\rho_m - \rho_f}. \\ \text{If } \sigma > \alpha & \text{we require } h_s^{\rho_m - \rho_f} < h_\ell^{\rho_m - \rho_f}. \end{cases}$$

Since  $h_\ell > h_s$  and  $\rho_f > \rho_m$  (indicating  $\theta < 0$  — women hold an absolute advantage in domestic work), only the second inequality holds. We conclude that  $\theta$  is increasing in earnings if and only if  $\sigma < \alpha$ , i.e. if the degree of substitutability between time and earnings is greater than the degree of returns to scale. Since  $\sigma$  is bounded above

by 1 this requires that  $T$  and  $e$  are both gross substitutes ( $\sigma > 0$ ) and that there is decreasing returns to scale ( $\alpha < 1$ ).

## B Hypothetical Beliefs Elicitation: Additional Results

### B.1 Sample

**Table B.1.** Sample Representativeness

	National Population		Sample		Sample	
	Mean	SE	Unweighted Mean	SE	Weighted Mean	SE
Gender*						
Man	0.46	0.01	0.50	0.02	0.48	0.02
Woman	0.54	0.01	0.50	0.02	0.52	0.02
Age	43.69	0.22	38.46	0.22	40.98	0.35
Born in the UK	0.90	0.12	0.82	0.01	0.91	0.01
Ethnicity						
Asian	0.10	0.01	0.08	0.01	0.06	0.01
Black	0.04	0.00	0.10	0.01	0.04	0.01
Mixed	0.02	0.00	0.02	0.00	0.02	0.01
White	0.83	0.01	0.80	0.01	0.86	0.02
Other	0.01	0.00	0.01	0.00	0.01	0.00
Education						
No qualification	0.03	0.00	0.00	0.00	0.00	0.00
Other	0.05	0.01	0.01	0.00	0.05	0.01
GCSE or equivalent	0.19	0.01	0.10	0.01	0.22	0.02
A-levels or equivalent	0.21	0.01	0.23	0.01	0.22	0.02
Degree or higher	0.52	0.01	0.66	0.01	0.51	0.02
Monthly net income (£)						
0-500	0.12	0.01	0.08	0.01	0.13	0.02
500-1000	0.09	0.01	0.06	0.01	0.10	0.01
1000-1500	0.16	0.01	0.12	0.01	0.15	0.02
1500-2000	0.17	0.01	0.19	0.01	0.18	0.02
2000-2500	0.16	0.01	0.20	0.01	0.15	0.02
2500-3000	0.11	0.01	0.12	0.01	0.11	0.02
3000+	0.18	0.01	0.09	0.01	0.07	0.01
Single parent	0.17	0.01	0.12	0.01	0.20	0.02
Number of children aged 0-16*	1.52	0.02	1.78	0.03	1.83	0.04
Participants	6237		1056		1056	

**Notes:** Means and standard errors (SE) of the key demographic information for a nationally representative sample (column 1) as well as for our survey participants (column 2). The national population figures are drawn from the relevant population of respondents to the 2022 Understanding Society wave, and weighted using the corresponding cross-sectional weight. The \* indicates variables targeted through our sampling approach. See paragraph below for the description of our sample's weighting approach.

**Weighting approach.** For some dimensions, our sample is different from the corresponding national population distribution of parents in England. In particular, those who hold a degree or higher are over-represented in our sample, and lower income categories are under-represented. Also, we find that our sample's average age, the shares of individuals born in the UK, and the share of single parents are somewhat lower than the national distribution. For all categories, we construct respective initial weights corresponding to the national population proportion divided by that in the sample. For instance, the weight for holding a degree or higher is equal to  $w_{degree} = \frac{0.5248}{0.6553}$ , while

the weight for no qualification is  $w_{none} = \frac{0.0275}{0.009}$ , etc., and we use 4-digit proportions to avoid zeros. As age is a continuous variable, we normalize its weight to lay on a scale from 0 to 1. Finally, we combine these initial weights for participants by multiplying all initial weights  $w_d$ .

**Table B.2.** Participants' Descriptive Statistics

	Treated	Control	Diff.	Overall
Gender				
Man	0.48	0.51	-0.03	0.50
Woman	0.52	0.47	0.05	0.50
Age	38.14	38.79	-0.65	38.46
Born in the UK	0.83	0.82	0.01	0.82
University graduate	0.66	0.65	0.00	0.66
Ethnicity				
Asian	0.06	0.09	-0.03	0.08
Black	0.11	0.09	0.02	0.10
Mixed	0.03	0.02	0.01	0.02
White	0.79	0.80	-0.00	0.80
Other	0.01	0.01	0.01	0.01
Vote at last UK General Election				
Conservative	0.10	0.10	0.00	0.10
Labour	0.46	0.48	-0.02	0.47
Liberal Democrat	0.11	0.10	0.02	0.10
Green Party	0.07	0.07	-0.00	0.07
Reform UK	0.09	0.08	0.01	0.09
Other	0.02	0.03	-0.02	0.02
None	0.16	0.14	0.01	0.15
Full-time employment	0.60	0.64	-0.04	0.62
Weekly hours worked	31.05	32.68	-1.63	31.86
Monthly net income (£)				
Low	0.46	0.45	0.02	0.45
Medium	0.33	0.31	0.02	0.32
High	0.21	0.25	-0.04	0.23
Single parent	0.12	0.13	-0.02	0.12
Number of children aged 0-16	1.78	1.78	-0.00	1.78
Partner's monthly net income (£)				
No partner	0.06	0.09	-0.03	0.07
Low	0.43	0.44	-0.00	0.43
Medium	0.32	0.31	0.01	0.31
High	0.25	0.26	-0.01	0.25
Participants	525	531		1056

**Notes:** This table displays the means of the key demographic information for our survey participants, by treatment status. Differences are statistically significant at the following levels: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Note that six respondents listed “other” or “prefer not to say” for gender. For the participant's and the partner's (if any) monthly net income, we group the categories into tertiles. For the participant's income, “Low” encompasses income between 0 and £2,000, “Medium” considers income between £2,000 and £3,000, while “High” corresponds to monthly net income greater than £3,000. For the partner's, we construct tertiles of the original variable and for those who have a partner. The “Low” category corresponds to incomes between 0 and £1,500, the “Medium” category corresponds to incomes between £1,500 and £3,000, while the “High” category is for incomes above £3,000.



## B.2 Hypothetical Beliefs Elicitation

**Table B.3.** Randomization in Set-Up

	Mean	SD	N
Child is a girl (vs. boy)	0.49	0.50	517
Child is aged 4 (vs. 10)	0.51	0.50	542
$SSE_i$ : 20% (vs. 10%)	0.51	0.50	540

**Notes:** Total number of participants = 1056. This table presents descriptive statistics for the randomization in set-up. For instance, 49% of our sample (*i.e.*, 517 participants) got displayed, in the hypothetical scenarios, a boy child.  $SSE_i$  refers to the share of income spent on the child's educational and extracurricular activities.

### B.2.1 Alternative Interpretations of Main Result

**Order effects.** We find that the effects are more substantial when participants saw the father working longer hours on the first page (and thus mothers on the second page). Because we randomize the order, meaning that the page order is orthogonal to the *MWL* indicator, then an order effect whereby people simply change beliefs based on the page number will not bias our  $\hat{\delta}$ -estimate in equation 2. For instance, if participants always downgrade their expectations on the second-page, then when mothers are shown first as working longer hours, expectations with fathers on the second-page will be pushed up by any beliefs on absolute advantage but pushed down by this order effect hiding the true degree of beliefs on absolute advantage. While for those randomized to first see fathers working longer hours, then on the second-page with mothers, both beliefs on absolute advantage and the order effect can widen the differences in expectations. Importantly, because we randomize the order, the net effect over all participants removes any order effect leaving the beliefs we are after.<sup>28</sup> Alternatively, this heterogeneity may arise because the gender difference in the two hypotheticals becomes more salient when participants encounter first the normative family arrangement with the father working longer hours priming attention to their core beliefs. In any case, we find no reason to be concerned.

### B.2.2 Heterogeneity by participants' characteristics

<sup>28</sup>Indeed, when we include a scenario order as a control variable in our regression, estimates remain unchanged.

**Table B.4. Heterogeneity in Beliefs by Participants' Characteristics**

	Median Age		Gender		Ethnicity		Born in the UK		University Degree		Working Hours		Participant's Income		Number of Children		Vote at last UK General Election		
	≥ 38	< 38	Female	Male	White	Non-white	Yes	No	Yes	No	FT	PT or none	≥ Median	< Median	< 2	≥ 2	Conservative	Liberal	Other or None
$P(\text{graduate})$ ; $MW_{I_j=1}$	-1.11*** (0.39)	-0.73 (0.46)	-0.86* (0.45)	-1.02** (0.40)	-0.59* (0.32)	-2.26*** (0.79)	-0.63** (0.31)	-2.37*** (0.88)	-1.15*** (0.37)	-0.52 (0.51)	-0.87** (0.37)	-1.04** (0.50)	-0.51 (0.39)	-1.48*** (0.46)	-0.97** (0.40)	-0.89** (0.44)	-0.94 (0.74)	-0.73* (0.38)	-1.69*** (0.63)
Earnings Rank: $MW_{I_j=1}$	-0.64* (0.36)	-0.70* (0.40)	-0.36 (0.40)	-0.97*** (0.36)	0.48* (0.28)	-1.40* (0.73)	-0.48* (0.28)	-1.56** (0.78)	-0.69** (0.33)	-0.63 (0.45)	-0.44 (0.33)	-1.04** (0.46)	-0.19 (0.35)	-1.29*** (0.41)	-0.74** (0.37)	-0.57 (0.39)	-1.14* (0.67)	-0.24 (0.32)	-1.76*** (0.66)
Participants	563	493	525	525	840	216	871	185	692	364	657	399	596	460	613	443	194	679	183
Observations	3378	2958	3150	3150	5040	1296	5226	1110	4152	2184	3942	2394	3576	2760	3678	2658	1164	4074	1098
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scenario Income Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:** \*  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are clustered on individuals. Each coefficient is obtained from separate OLS regressions estimating equation (2) on the subsample defined by the displayed label and for our two expected outcomes: (i) the probability for the child to graduate ( $P(\text{graduate})$ ), and (ii) the earnings rank of the child at age 30 (Earnings Rank). “FT” stands for full-time, while “PT” stands for part-time.

### B.2.3 Heterogeneity by design features.

We report heterogeneous effects for the MWL effects stratified by the randomized hypothetical design features in Table B.5. First, we observe stronger negative effects in scenarios with a boy (as opposed to scenarios with girls). The results, based on the gender of the vignette child, point toward different expectations on the needs of children and the role of mothers. While beyond the scope of this paper, this finding aligns with evidence that boys, especially in disadvantaged families, are more responsive to parental inputs (Bertrand and Pan, 2013; Autor et al., 2019; Lei and Lundberg, 2020). If boys are viewed as less resilient than girls and maternal time is perceived as ‘higher-quality’ time, then we should indeed expect stronger beliefs that their development and educational outcomes may suffer more from reduced parental input quality when mothers work longer.

Second, the effects are stronger in scenarios with, on average, lower hypothetical household incomes and scenarios with a lower allocation of resources (10% instead of 20%) to the child’s educational activities. We already showed, in Section 3.3, that in fact beliefs only fade out at quite high family incomes. Thus, these beliefs are not merely related to expectations on low income families. These results do suggest that beliefs on absolute advantage may place pressure on mothers who have less disposable resources to invest in the child (lower share of the budget allocated to the child) when deciding whether to continue careers.

Third, the effects are more substantial when participants saw the father working longer hours on the first page (and thus mothers on the second page). Because we randomize the order, meaning that the page order is orthogonal to the *MWL* indicator, then an order effect whereby people simply change beliefs based on the page number will not bias our  $\hat{\delta}$ -estimate in equation 2. For instance, if participants always downgrade their expectations on the second-page, then when mothers are shown first as working longer hours, expectations with fathers on the second-page will be pushed up by any beliefs on absolute advantage but pushed down by this order effect hiding the true degree of beliefs on absolute advantage. While for those randomized to first see fathers working longer hours, then on the second-page with mothers, both beliefs on absolute advantage and the order effect can widen the differences in expectations. Importantly, because we randomize the order, the net effect over all participants removes any order effect leaving the beliefs we are after.<sup>29</sup> Alternatively, this heterogeneity may arise because the gender difference in the two hypotheticals becomes more salient when participants encounter first the normative family arrangement with the father

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<sup>29</sup>Indeed, when we include a scenario order as a control variable in our regression, estimates remain unchanged.

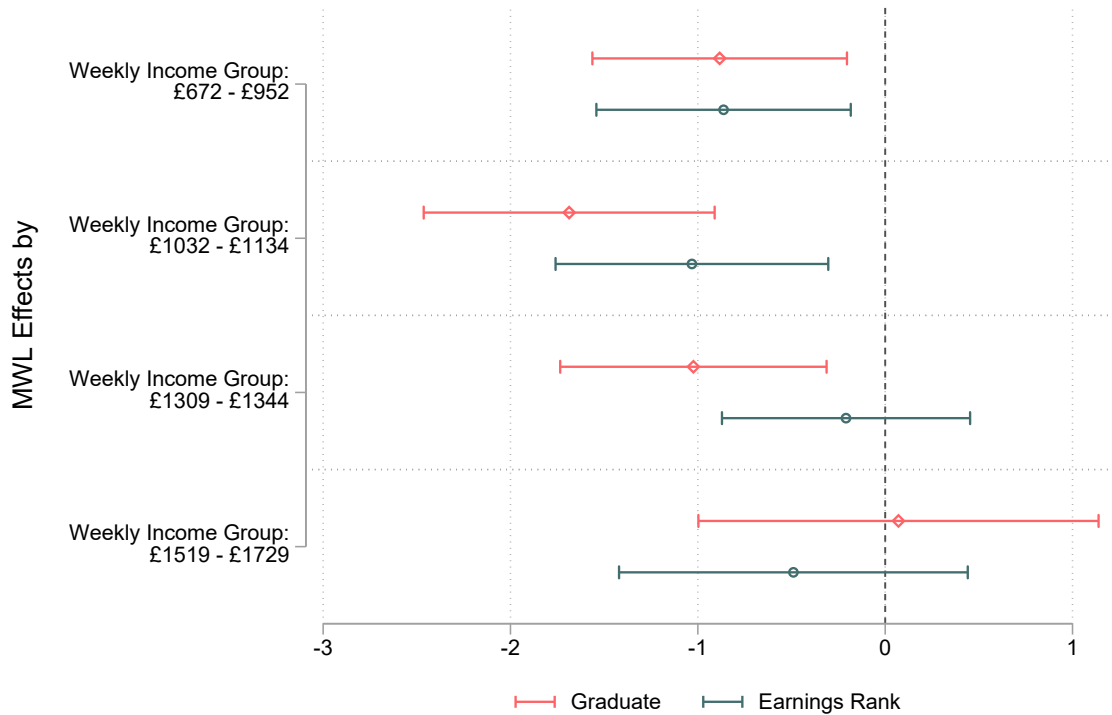
working longer hours priming attention to their core beliefs. In any case, we find no reason to be concerned.

**Table B.5.** Heterogeneity in Beliefs by Design Features

	Child's Gender		Child's Age		SSE		Working Hours Profile		Wage Profile		First Shown	
	Girl	Boy	4	10	SSE: 20%	SSE: 10%	FT-FT	FT-PT	Higher	Lower	Mother	Father
IP(graduate): $MWL_{j=1}$	-0.57 (0.43)	-1.28*** (0.41)	-1.11*** (0.41)	-0.75* (0.44)	-0.53 (0.41)	-1.36*** (0.44)	-0.57 (0.42)	-1.30*** (0.42)	-0.45 (0.40)	-1.50*** (0.45)	-0.29 (0.43)	-1.59*** (0.41)
Earnings Rank: $MWL_{j=1}$	-0.41 (0.37)	-0.91** (0.38)	-0.66* (0.37)	-0.68* (0.39)	-0.59 (0.36)	-0.75* (0.39)	-0.56 (0.38)	-0.78** (0.38)	-0.34 (0.34)	-1.05** (0.43)	-0.34 (0.39)	-1.00*** (0.36)
Participants	517	539	542	514	540	516	533	523	567	489	532	524
Observations	3102	3234	3252	3084	3240	3096	3198	3138	3402	2934	3192	3144
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scenario Income Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:** \*  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are clustered on individuals. We estimate equation (2) for each feature, *i.e.*, when the hypothetical child is a girl, a boy, is 4, etc. and report here the  $\hat{\delta}$  associated with  $MWL_{j=1}$  for each of those regressions. The FT-FT design presents both parents as full-time with one working longer hours (42 vs. 35), while the FT-PT design presents a full-time parent *versus* a part-time parent (36 vs. 20). The “first shown” column corresponds to the set of scenarios shown first to the participant — either  $MWL = 1$  (mother works longer hours) or  $MWL = 0$  (father works longer hours) in the beliefs elicitation survey.

**Figure B.1.** Heterogeneity by Hypothetical Family Income



**Notes:** Error bars represent 90% confidence intervals. We group scenarios by four equally sized bins of the weekly income for the hypothetical family.

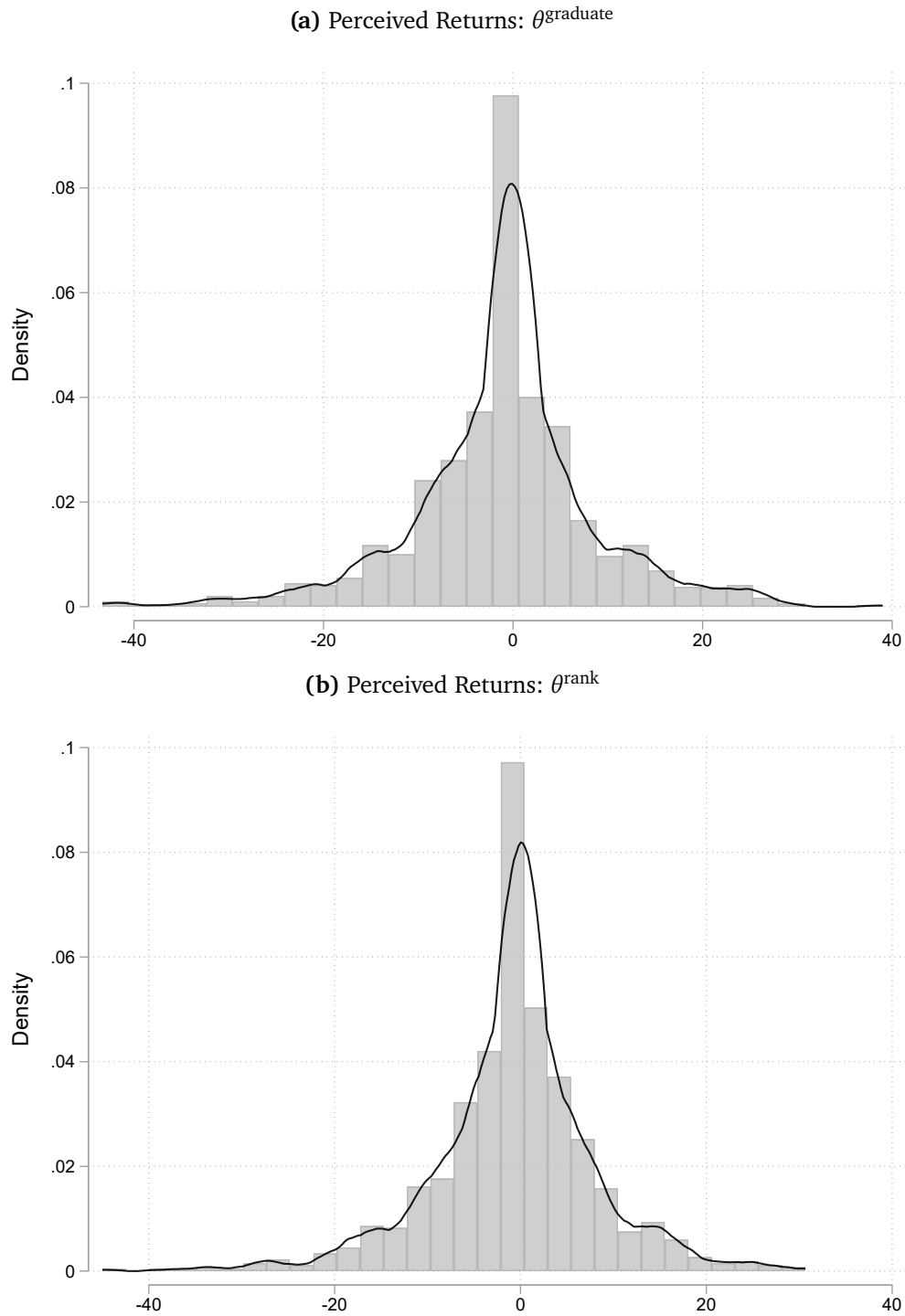
**Table B.6.** Robustness — Beliefs about Mothers Working Longer

	(1) At Least Somewhat Certain		(2) Screener		(3) Response Time		(4) Re-Weighting	
	P(graduate)	Earnings Rank	P(graduate)	Earnings Rank	P(graduate)	Earnings Rank	P(graduate)	Earnings Rank
MWL <sub>j=1</sub>	-1.230*** (0.360)	-0.870*** (0.322)	-0.717** (0.300)	-0.556** (0.270)	-0.925*** (0.313)	-0.736*** (0.283)	-0.788** (0.377)	-0.840** (0.356)
Mean Dep. Var	56 <sup>th</sup>	47 <sup>th</sup>	56 <sup>th</sup>	52 <sup>nd</sup>	56 <sup>th</sup>	49 <sup>th</sup>	55 <sup>th</sup>	49 <sup>th</sup>
Participants	795	261	1003	53	950	950	1056	1056
Observations	4770	1566	6018	318	5700	5700	6336	6336
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scenario Income Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:** \*  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . OLS results for equation (2) — including individual and scenario income fixed effects — on the expected probability for the child to graduate (P(graduate)), and the percentile ranking expected for the child at age 30 among other 30 year olds (Earnings Rank). Standard errors are clustered on individuals. We present results for four checks in four distinct blocks of columns. In (1), we restrict the sample to participants at least somewhat certain about their answer to the hypothetical scenarios, while in (2), we keep participants who passed the “turquoise” screener discussed in Subsection 3.2. In (3), we drop participants with the lowest and highest 5% response times, and in (4) we re-weight our sample to match the national population distribution (see Subsection B.1).

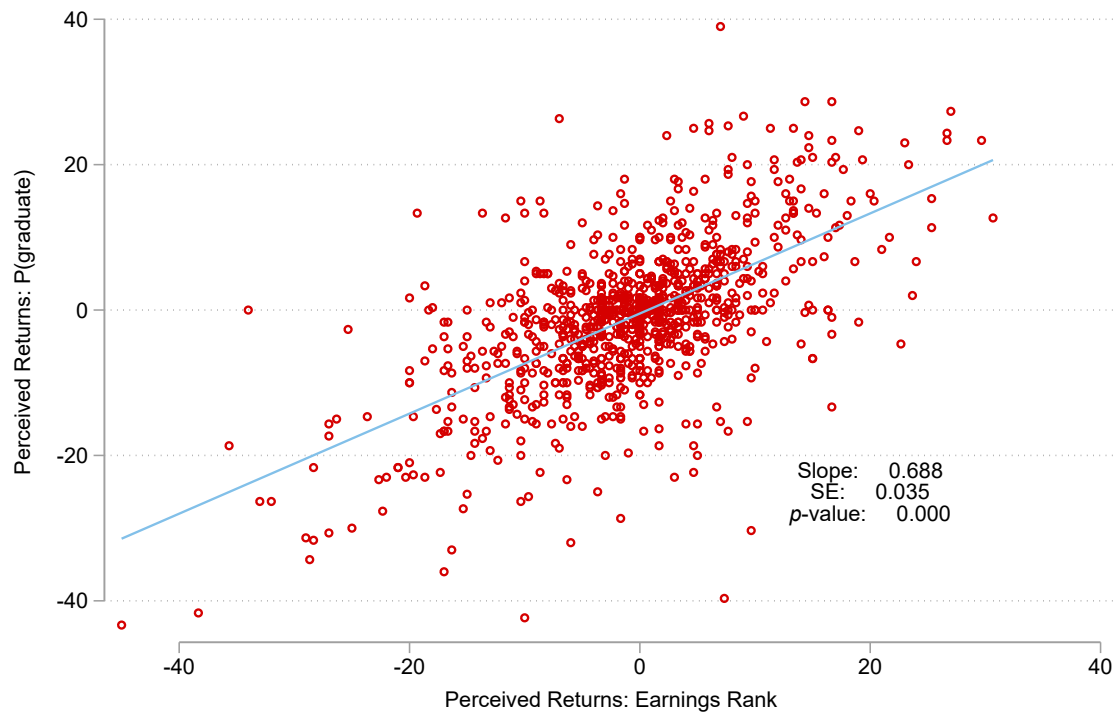
### B.3 Individual Perceptions

**Figure B.2.** Distribution of Perceived Returns



**Notes:**  $N = 249$ . Distribution of our two perceived returns with kernel density plot over (a) the probability for the child to graduate from university ( $\theta^{\text{graduate}}$ ), and (b) the expected earnings rank of the child at age 30 ( $\theta^{\text{rank}}$ ).

**Figure B.3.** Relationship of Individual-Level Beliefs Measures



**Notes:** This figure presents a scatter plot with a line of best fit for our individual-level perceptions over the probability of graduating from university ( $\theta^{\text{graduate}}$ ) on the y-axis, and the earnings rank of the child at age 30 ( $\theta^{\text{rank}}$ ) on the x-axis.

**Table B.7.** Relationship Between Beliefs and Participants' Behavior: Time With Children

	Skills Time			Outdoor Time		
<b>Panel A: Women</b>	(1)	(2)	(3)	(1)	(2)	(3)
$\theta^{\text{graduate}}$	-0.140 (0.137)			0.099 (0.119)		
$\theta^{\text{rank}}$		-0.152 (0.129)			-0.016 (0.114)	
$\theta(IV)$			-0.218 (0.140)			0.063 (0.118)
Observations	525	525	1050	525	525	1050
Mean Dep. Var.	4.97	4.97	4.97	4.94	4.94	4.94
<b>Panel B: Men</b>						
$\theta^{\text{graduate}}$	0.300** (0.135)			0.084 (0.131)		
$\theta^{\text{rank}}$		0.198 (0.139)			0.031 (0.123)	
$\theta(IV)$			0.450** (0.181)			0.104 (0.163)
Observations	525	525	1050	525	525	1050
Mean Dep. Var	4.20	4.20	4.20	4.32	4.32	4.32

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors, in parentheses, are bootstrapped with 1,000 replications. We run OLS regressions on three main outcomes reflecting participant's behavior with their child(ren) and on the labor market for the control group only. Specifically, these regressions look at the associations between the participant's behavior and (1) their perceived returns over the probability for the child to graduate ( $\theta^{\text{graduate}}$ ), (2) the expected earnings rank of the child at age 30 ( $\theta^{\text{rank}}$ ), and (3) both dimensions. Skills Time (resp., Outdoor Time) corresponds to the number of hours spent per day by the participant helping their child(ren) develop their skills (resp., doing outdoor activities with them).  $\ln(\text{Hours Worked})$  corresponds to the log of the participant's weekly number of hours worked. Individuals controls include participant's gender (for Panel A), a quadratic in age, an indicator for whether they have at least a university degree, employment status (full-time *versus* part-time or less), and ethnicity (white *versus* non-white). Six participants listed "other" or "prefer not to say" for gender. We code these as 0 and control for an indicator flagging them in Panel A, and exclude them in Panels B and C. The number of participants does not vary between panels as those six participants belong to the treatment group.



## B.4 Mechanisms for Variation in Beliefs

**Table B.8.** Outcomes Descriptive Statistics

	Mean	SD	Min	Max	N
Minutes spent helping the child					
Prepare for the test	149.24	116.05	0.00	600.00	1056
Doing extracurricular activities	161.06	112.01	0.00	600.00	1056
Expected rank at the test	0.42	0.20	0.01	0.99	1056
Mother: $\mathbb{P}(\text{University Graduate})$	0.51	0.22	0.00	1.00	1056
Father: $\mathbb{P}(\text{University Graduate})$	0.46	0.22	0.00	1.00	1056
Share of income spent on extracurricular activities	0.18	0.15	0.00	0.97	1056

**Notes:** This table displays descriptive statistics for the outcomes collected to investigate the mechanisms in variation in beliefs, introduced in Subsection 3.5.

**Table B.9.** Expectations on Resource Allocation and Parental Education by Elicited Beliefs

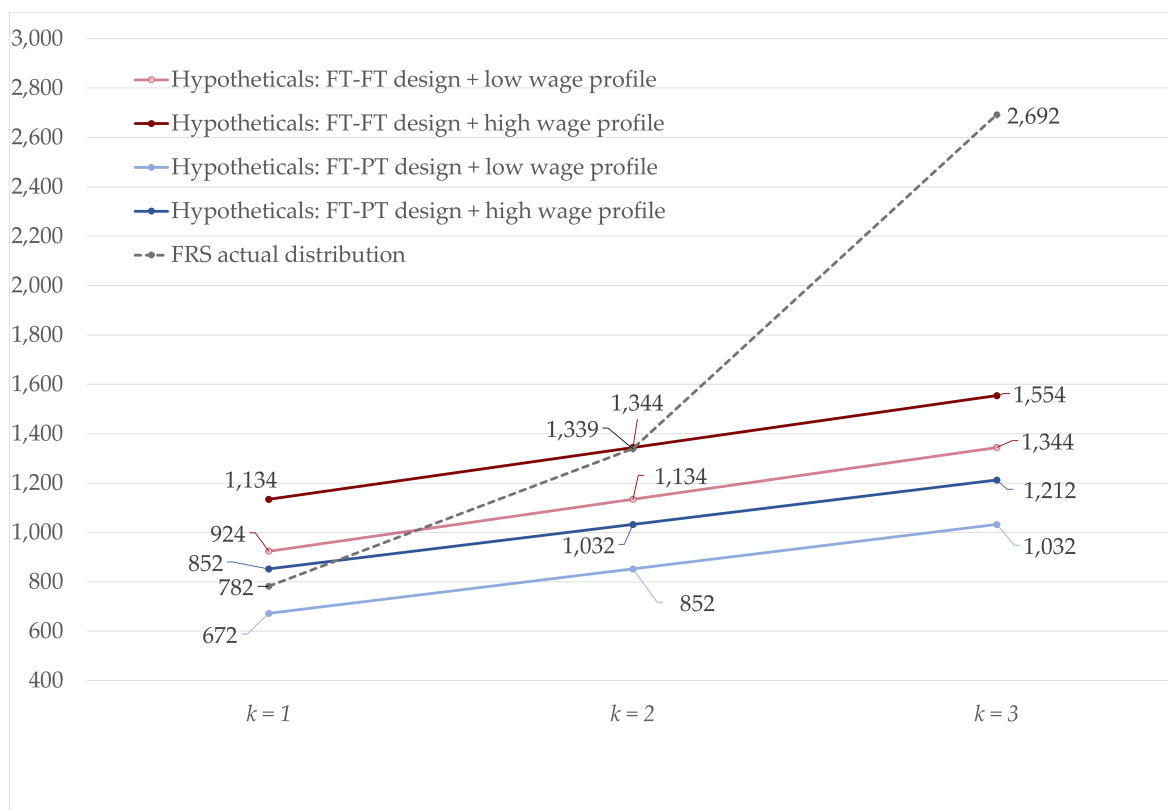
	(1)	(2)
	By $\theta$	
	< 0	$\geq 0$
<b>Panel A: Resource Allocation</b>		
Mother Earns More	0.006 (0.013)	0.008 (0.012)
<b>Panel B: <math>\mathbb{P}(\text{University Graduate})</math></b>		
Difference (Mother – Father)	(1)	(2)
Works Full-Time	0.066 ( 0.034)	-0.001 ( 0.032)
Participants	517	539
Individual Controls	Yes	Yes

**Notes:**  $p < 0.10$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Robust standard errors in parentheses. All specifications include controls for the pre-registered set of participants' characteristics.

## C Survey Technical Details and Questionnaires

### C.1 UK Weekly Household Labor Income Distribution

**Figure C.1.** Weekly Household Labor Income Distribution (£)



**Notes:** This table presents the distribution of weekly household labor income across the hypothetical wage profiles introduced in Table 1, contrasted with tertiles of the weekly household income distribution (dashed-line), drawn from the Family and Resources Survey (FRS) 2022-2023. To be consistent with our survey sample selection, we restrict the FRS data to dual-parent families in England in which both parents work.

## C.2 Motherhood Penalty

In order to produce the heterogeneity results by participant's past experiences, we present below how we construct an indicator for women above the median motherhood penalty (e.g., Kleven et al., 2019).

**Information collection.** At the end of the survey, after collecting the demographic information, we ask information about the personal employment history of the participant from age 16 up to their current age. This enables us to construct a yearly panel of participants, with updated information (from years 1972 to 2024) on whether they were (i) in education, (ii) employed full-time, (iii) employed part-time (iv) unemployed, (v) retired, (vi) stay-at-home parent, or (vii) in any other type of activity. Specifically, participants are shown a table, presented in Figure C.17 in the Appendix.

**Sample.** We keep participants who experienced the first childbirth during the standard reproductive period, between the ages of 18 and 45. We end up with a sample of  $N = 1,025$  participants, and 23,951 observations.

**Event study analyses.** We first conduct the event-study methodology proposed by Kleven et al. (2019), and present below, in Figure C.2, a graphical representation of these regressions, for men and women, which aligns with previous results from the literature (e.g., Kleven et al., 2021; Kleven et al., 2024a). These results clearly show that men's likelihood of being employed does not seem to be affected by the first childbirth, while women's employment likelihood in the 10 years after the first childbirth reduces by a significant margin of  $\approx 29\%$  with respect to men.

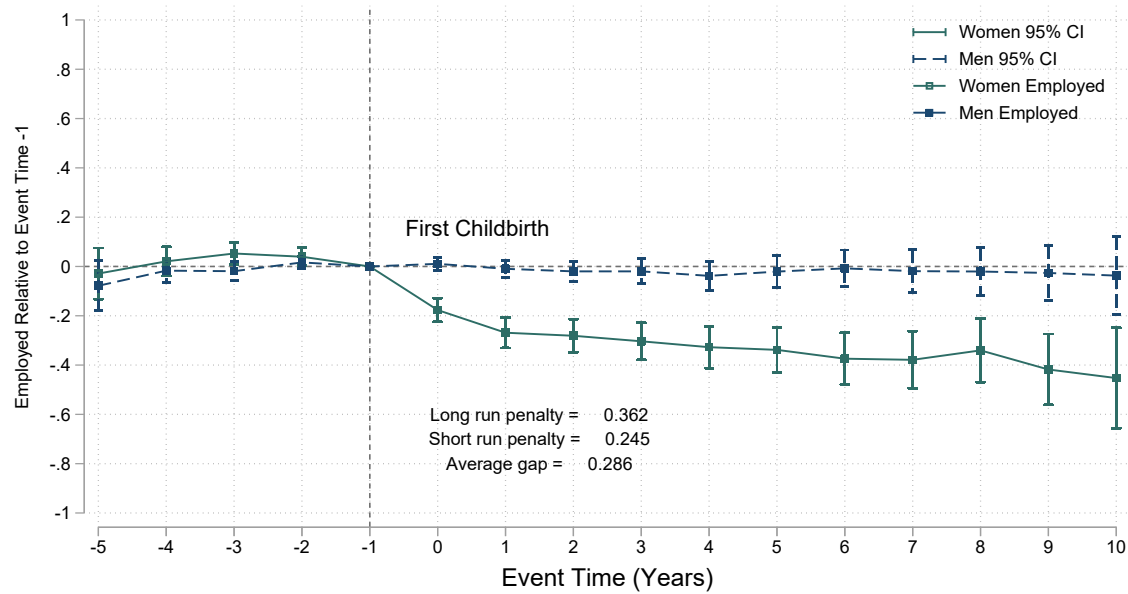
**Indicator construction.** Our aim is to construct a binary indicator flagging women who experienced a motherhood employment penalty above the median of the sample.<sup>30</sup>

To do this, we estimate each woman's motherhood employment penalty – the change in the likelihood of being employment after childbirth relative to men controlling for age and post-birth fixed effects. Specifically, we interact a post-birth indicator with individual fixed effects for women treating men as the reference group. This specification yields a woman-specific estimate of the change in employment likelihood relative to men following the birth of her first child. We further create a binary indicator for women whose penalty is above the sample median ( $\approx -19\%$ ). We present below in Figure C.3 a histogram of their calculated penalties.

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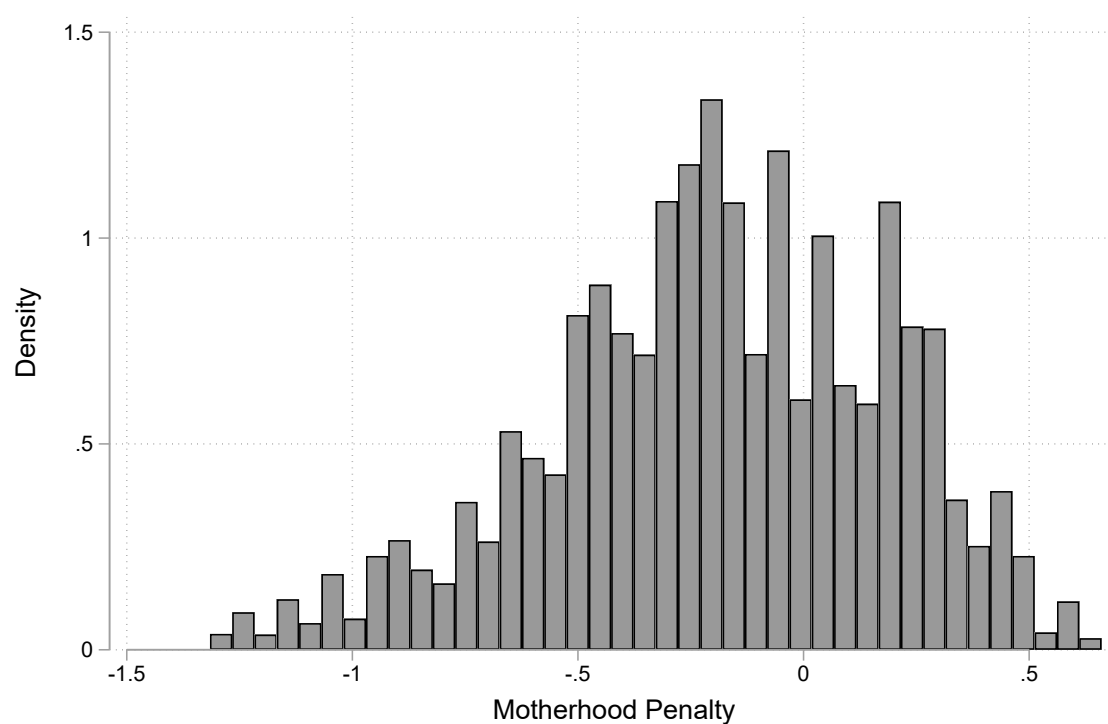
<sup>30</sup>Given that men are unaffected by parenthood (see Figure C.2), we focus on women only.

**Figure C.2. Impact of Parenthood on Employment**



**Notes** This figure presents the impact of having a child on a binary variable set to one for being employed at time  $t$ , by gender. It further indicates the percentage by which women are falling behind men (1) in the long-run ('long run penalty'), *i.e.*, between seven and ten years post-parenthood, (2) in the short-run ('short run penalty'), *i.e.*, in three years after the first childbirth, and (3) on average ('average gap'), *i.e.*, in the ten years following parenthood.

**Figure C.3.** Distribution of Motherhood Penalties



**Notes:** This figure presents an histogram of women's motherhood penalties, *i.e.*, the impact of motherhood on the likelihood of being employed with respect to men.

## C.3 Survey Screenshots and Questionnaires

Figure C.4. Page 1/18

### Introduction to Scale

To answer some of the following questions, we will ask you to provide an answer on a scale. Before you start, we want to give you an intuition on the concept of scales that we will use.

Imagine that there is a hypothetical child and another 99 children, for a total of 100 children.

**Example 1:** As an example of expectations in probabilities, suppose we believe the child in this example has a 30 percent probability of scoring better than half of the other students. This means that on a scale of 0 to 100 selecting 30 will reflect a 30% chance/probability. Please select 30% using the slider below for this example.



Now to get used to a scale with relative comparisons, we ask you to compare this hypothetical child with these 99 other children in terms of school performance.

**Example 2:** For instance, a value of 60 means that a student scored better than 60% of the other students. For this example, please select the value representing that a student scored better than 70% of the other students.



Next

Figure C.5. Page 2/18

The next question is about the following problem. In questionnaires like ours, sometimes there are participants who do not carefully read the questions and just quickly click through the survey. This means that there are a lot of random answers which compromise the results of research studies. To show that you read our questions carefully, please enter turquoise as your answer to the next question.

What is your favourite colour?

Next

**Notes:** This figure shows the “turquoise” screener.

## Figure C.6. Page 3/18



**We are interested in your beliefs about children's future outcomes, comparing families with different financial resources and time demands.**

▼ **Setup:**



Please imagine an average family in your community. Suppose this family consists of a father and a mother who are both employed, and they have a **boy** who is aged **4**. Suppose household expenditure decisions are made jointly by the father and the mother, and this hypothetical family spends **10%** of their total income on the child's educational and extracurricular activities such as clubs, tutoring, music, sports, etc.

We will show you different scenarios, and ask your opinion about the likelihood that the child will be successful in education and the labour market. There are no clear right or wrong answers, and we know these questions are difficult. Please try to consider each scenario carefully and tell us what you believe the likely outcomes will be.



**Scenario 1:** The **father** works **42** hours per week at a wage of **£17** per hour.  
The **mother** works **35** hours per week at a wage of **£12** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

**Scenario 2:** The **father** works **42** hours per week at a wage of **£12** per hour.  
The **mother** works **35** hours per week at a wage of **£12** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

**Scenario 3:** The **father** works **42** hours per week at a wage of **£22** per hour.  
The **mother** works **35** hours per week at a wage of **£12** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

[Next](#)



**Notes:** Bolded words correspond to our randomized survey features.

Figure C.7. Page 4/18



We are interested in your opinion on children's future outcomes, comparing families with different financial resources and time demands.

► Setup:



**Scenario 4:** The **father** works **35** hours per week at a wage of **£12** per hour.  
The **mother** works **42** hours per week at a wage of **£17** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

**Scenario 5:** The **father** works **35** hours per week at a wage of **£12** per hour.  
The **mother** works **42** hours per week at a wage of **£12** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

**Scenario 6:** The **father** works **35** hours per week at a wage of **£12** per hour.  
The **mother** works **42** hours per week at a wage of **£22** per hour.

- What do you think is the probability that this child will eventually graduate from university?  
0%  100%
- When the child is 30 years old, how do you think this child's earnings will compare to other 30 years old?  
1%  99%

Next

**Notes:** Bolded words correspond to our randomized survey features.



## Figure C.8. Page 5/18

For context, in the 2013 edition of the British Time Use Survey, parents of at least one child aged 10-14 on average spent 30 minutes per week teaching their children.

Imagine a family whose child aged **11** has the **Key Stage 2** national test upcoming. **Both parents** have a University education. The **father** is very busy this week and only the **mother** has time to help over the week ahead.

How many hours do you expect will be spent helping the child study for the test over the week ahead?

0  time

Next, how many hours do you expect will be spent with the child in extracurricular activities such as sports, art, reading for fun, etc.?

0  time

Next

## Figure C.9. Page 6/18

### ▼ Scenario:

Imagine a family whose child aged 11 has the Key Stage 2 national test upcoming. Both parents have a University education. The **father** is very busy this week and only the **mother** has time to help over the week ahead.

Now, suppose that the **mother** will dedicate **30 minutes** in the upcoming week to help the child prepare for the test.

How well do you think the child will do compared to other students?

1%  99%

Next

## Figure C.10. Page 7/18

Imagine a family where:

- The **father** works **36** hours per week, earning an hourly wage of **£27**.
- The **mother** works **20** hours per week, earning an hourly wage of **£17**.

How likely do you think it is that each parent has a University education?

**Mother** 0  100%

**Father** 0  100%

Next

## Figure C.11. Page 8/18

Imagine a family with one child aged **11**, where the **mother's** monthly net income is **£1,500** and the **father's** monthly net income is **£2,500**.

What percentage of income do you believe the family will spend on the child's educational and extracurricular activities such as clubs, tutoring, music, sports, etc?

0  100%

Next

**Figure C.12.** Page 9/18

How sure are you about your answers to the previous questions under the hypothetical setting?

- ☐ Very sure
- ☐ Sure
- ☐ Somewhat sure
- ☐ Unsure
- ☐ Very unsure

Next

**Note:** pages 10-15 covered an information experiment. This came after the survey vignettes and the survey questions for the mechanism analysis. We have omitted these and any analysis of them as ultimately we decided it was distracting for the paper not clearly fitting into the research questions we set out to answer through Results (1) - (3) in the paper.

**Figure C.13.** Page 16/18 — Part 1

## Next, we are going to ask some questions about yourself.

What is your age?

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Other
- ☐ Prefer not to say

To which of these ethnic groups do you consider you belong?

- ☐ Asian or Asian British
- ☐ Black, Black British, Caribbean or African
- ☐ Mixed or multiple ethnic groups
- ☐ White
- ☐ Other ethnic group

Are you born in the UK?

- ☐ Yes
- ☐ No
- ☐ Prefer not to say

Which is the highest qualification you have?

- ☐ No Qualification
- ☐ Other Qualification
- ☐ GCSE or equivalent
- ☐ A-levels or equivalent
- ☐ Degree or Higher

### Figure C.14. Page 16/18 — Part 2

Which party did you choose as your primary vote in the last UK General Election?

- ☐ Conservative
- ☐ Labour
- ☐ Liberal Democrat
- ☐ Green Party
- ☐ Reform UK
- ☐ Other
- ☐ None

Which of this best describes your current employment situation?

- ☐ Self-employed
- ☐ Employed
- ☐ Unemployed
- ☐ Retired
- ☐ On maternity leave
- ☐ Family care or home
- ☐ Full-time student
- ☐ Long-term sick or disabled
- ☐ On apprenticeship
- ☐ Other

What was your (main) job in the week ending last Sunday? Please write your job title below.

Do you work part-time or full-time?

- ☐ Part-time
- ☐ Full-time
- ☐ Not Applicable

How many hours do you typically work per week?

**Figure C.15.** Page 16/18 — Part 3

What is your personal typical monthly net income?

What is your current marital status?

- ☐ Married
- ☐ Living as couple
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Single, never married
- ☐ Civil partnership
- ☐ Other

What is your partner's gender?

- ☐ Male
- ☐ Female
- ☐ Other
- ☐ Prefer not to say
- ☐ I do not have a partner

Does your partner work part-time or full-time?

- ☐ Part-time
- ☐ Full-time
- ☐ Not Applicable

What is your partner's typical monthly net income?

How many children (aged 0-16) do you have in your family?

Figure C.16. Page 16/18 — Part 4

What is the year of birth of your first (eldest) child (adopted or biological)?

How many hours per week do you spend helping your child(ren) develop their skills (e.g. helping with homework/checking workbooks, reading books/telling stories, playing board or card games, etc)? If you have more than one child, please report the overall number of hours.

How many hours per week do you spend doing outdoors activities with your child(ren) (e.g. going to the playground, taking a walk, bringing your child to any sporting activity, going to museums/galleries, etc)? If you have more than one child, please report the overall number of hours.

Thinking back to when you were...

was your mother working?

was your father working?

less than 12 years old

between 12 and 18 years old

Figure C.17. Page 16/18 — Part 5

We would now like to ask you for some information about your personal history starting at age 16.

Please fill out the table below as follows:

Please state what has happened in your life since you were 16. It is important that you give some answer for every year of your life up to your current age. If you are over 60, please provide your responses up to age 60. If more than one answer applies in a particular year, please select all answers that apply.

At the age of...	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
I was...																										
in education (e.g., GCSEs, A-levels, college, university)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
employed full-time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
employed part-time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unemployed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
retired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
stay-at-home parent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next

## Figure C.18. Page 17/18

If you had to guess, what was the purpose of this study?

Next

## Figure C.19. Page 18/18

### Thanks for completing all our questions!

**Children's GCSE pass rate results:**

Your answer about the share of students passing five or more GCSEs with a C/4 or higher does not fall within the range.

**Children's behavioural problems results:**

Your answer about the number of children out of 100 having abnormal behavioural problems does not fall within the range.

**To be paid, please redirect back to Prolific to confirm your participation:** <https://app.prolific.com/submissions/complete?cc=C8L708C0>. **Your total payment is: £2.50.**

This consists of your base pay, which is £2.50, plus any bonuses if you won them. Bonus payments will be processed after the base payment.

If you want to keep track of your payment, please keep your completion code.

**Contacts & Final Report:**

If you have questions or concerns about the study, you can contact the researchers at [jonathan.norris@strath.ac.uk](mailto:jonathan.norris@strath.ac.uk) and [agnese.romiti@strath.ac.uk](mailto:agnese.romiti@strath.ac.uk). Please be aware that you will break the confidentiality protocol. For more information and findings of the project, please visit <https://sites.google.com/view/svyresults>.

## D Departures from Pre-Registered Analysis Plan

We list below figures and tables that were not pre-registered in the analysis plan, and explain our motivation behind conducting such analyses.

### Section 3.5. Mechanisms for beliefs, extended analyses.

- We did not pre-register the splits by values of  $\theta$ s (columns 3 to 10) of Tables 6 or 7, nevertheless we deemed it important to understand how expectations about time investments and productivity of inputs varied by our measures of beliefs on absolute advantage.
- In Table 7, we did not pre-register the interactions between “Mother is free to help” and the additional two randomized features: (i) 1h30 *versus* 30 minutes of help, and (ii) both parents *versus* neither have a university education. These dimensions as randomized features were important for understanding variation in the effect of our key feature “mother is free to help”.
- Table 8, expectations on parental education. We pre-registered the design, but only realized afterwards that looking at the full-time to part-time expected education gradient was the best way to analyze our question on parental education.
- Appendix, Table B.9, extended analysis on expectations about resource allocation. We did not pre-register the splits by values of  $\theta$ s, but we performed these to be consistent with Tables 6 and 7.

**Omitted information treatment.** We conducted an information treatment in the original survey (at the end), which was pre-registered. This information treatment provided respondents with information on school performance outcomes in the UK when mothers work full-time relative to mothers who work part-time or not at all. We ultimately decided that this part of the survey did not fit coherently enough with the rest of the paper making it distracting and the paper too long. We have therefore omitted it.