

# Order Matters: Eliciting Maternal Beliefs on Educational Outcomes

Pablo Brañas-Garza <sup>\*†</sup>   Riccardo Ciacci <sup>\*‡</sup>   Ericka Rascón Ramírez <sup>\*§</sup>

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## Abstract

Subjective expectation data on education has been increasingly used by social scientists to better understand current investments in human capital. Despite its recognised value by scholars, there is little evidence about how the elicitation of such data might be sensitive to questionnaire design. Using a 2x2 between-subjects experimental design, we analyse how sensitive the elicitation of subjective expectation data on educational outcomes is to *question order*. Our study provides *causal* evidence on whether collecting data on parental education before the elicitation of parental beliefs on their children’s educational outcomes anchors the elicitation of the latter; and whether parental expectations on their older offsprings anchors their expectations on their younger children. We find that mothers (main respondents) who have been exposed to the *non-anchored* treatment results in more optimistic parental expectations. When splitting our sample into households with low and high educated mothers, we observe that low educated mothers are more susceptible to anchoring effects. Our findings inform to what extent the collection of subjective expectations data is subject to anchoring and which type of populations might be more sensitive to such phenomenon.

**Keywords:** expectations on education, survey design, order effects, anchoring, beliefs.

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<sup>†</sup>Universidad Loyola Andalucía, *LoyolaBehLAB* & Department of Economics, [branasgarza@gmail.com](mailto:branasgarza@gmail.com).

<sup>‡</sup>Universidad Pontificia Comillas, Faculty of Economics and Business, [rciacci@comillas.edu](mailto:rciacci@comillas.edu).

<sup>§</sup>Middlesex University London, Department of Economics, [e.ramirez@mdx.ac.uk](mailto:e.ramirez@mdx.ac.uk).

# 1 Introduction

Subjective expectation data on educational choices have been increasingly used in experimental (Wiswall and Zafar 2014; Bleemer and Zafar 2018) and observational studies (Attanasio and Kaufmann 2014; Goyette 2008; Reynolds and Pemberton 2001; Wilson et al. 2005; Zafar 2011, 2013; Cunha et al. 2013) to improve our understanding on how parents make choices about human capital investments and to predict educational outcomes. The relevance of these data, as outcome of interest and explanatory variable, is unquestionable. However, little is known about how sensitive these data are to questionnaire design.

*How do people make predictions?* One strategy for predicting or making an assessment about the most likely outcome is to use information one does know and then adjust until an acceptable value or event is reached, also known as anchoring-and-adjustment by Tversky and Kahneman (1974). According to Epley and Gilovich (2001, 2004), people adjust from values they generate themselves as starting points known to be incorrect but close to the target value. Experimental evidence has shown that anchors can affect sentencing decisions (Enough and Mussweiler 2001), willingness-to-pay on a range of products (Ariely et al. 2003), forecasting of sales (Critcher and Gilovich 2008), negotiations about the amount of bonus assigned to employees (Galinsky and Mussweiler 2001), among many other areas (see Furnham and Boo (2011) for a comprehensive review).

In here, we assess whether the elicitation of subjective expectations about educational outcomes vary according to the initial exposure to different sources and levels of anchoring. To do so, we designed a survey experiment where our participants are subject to variations of exposure to self-generated anchors. These anchors are induced by the experimenter by randomly allocating different question order of parental education and educational expectations questions. Our study relates to a recent strand of the literature studying anchoring and biases in decision-making in different settings (see, among others, Jiang and Ma (2019); Ünveren and Baycar (2019); Ifcher and Zarghamee (2020)).

Our experiment constitutes a 2x2 between-subjects design where the variations in order creates four treatments. The *no-anchoring* treatment (the purest one exposed to no anchoring at all) corresponds to the elicitation of educational expectations for the youngest child where the main respondent (the mother) is not anchored with any prior schooling-related information. Conversely, the treatment with *double-anchoring* (the one exposed to the highest level of anchoring in our experiment) ask the main respondent about her level of education first, including her partners', followed by the elicitation of their educational expectations for their oldest child and continues the elicitation in descending order based on the age of the children living in the household. Thus, in this treatment, we finalise the educational module with the elicitation of educational expectations for the youngest child. Our experiment also includes two *single-anchoring* treatments where the educational expectations for the youngest child are exposed to a prior anchor self-generated by either parental education or the educational expectations for older children.

To the best of our knowledge, the majority of survey instruments collecting beliefs about educational choices position the collection of parental education *prior* to the elicitation of parental beliefs on future educational outcomes (e.g., Mexico: Jóvenes con Oportunidades – previously known as *Progresá*, Mexican Life Survey (*MxFLS*); US: National Longitudinal Survey of Youth (*NLSY*), Parent and Family Involvement in Education (*PFI*),

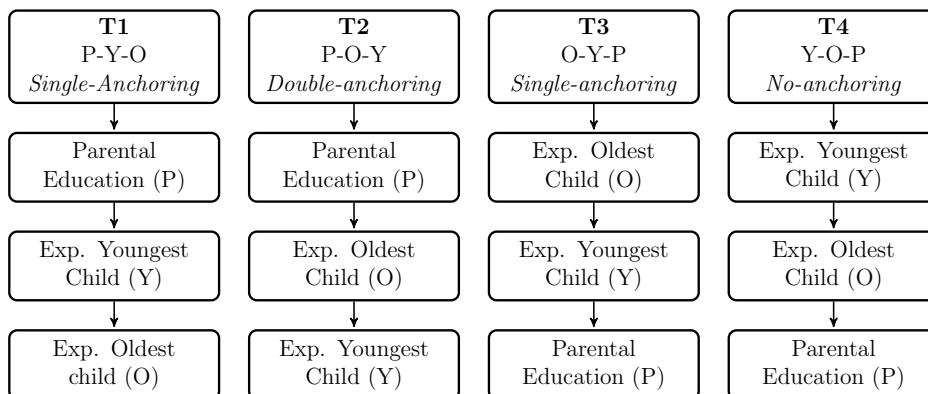
among others). Exceptions are the UK Longitudinal Survey for Young People in England (*LSYPE*) and the US National Education Longitudinal Study (*NELS*) where parental education is collected *after* the set of parental expectations on their teenagers' educational choices. Unfortunately, regarding birth order, most of the surveys do not explicitly specify whether parental expectations were firstly elicited for the oldest or youngest child. An exception is the *LSYPE* where we can identify that the information about siblings aged 16 or over who *completed continuous full-time education* was collected *prior* to the elicitation of parental expectations on the younger siblings.

Understanding how sensitive these data are to questionnaire order allows us to: a) assess comparability of parental schooling and expectations data when collected by different sources following variations in question order, b) assess comparability over time for the same survey, and c) assess which type of elicitation of expectation is more likely to report more realistic outcomes and therefore, more likely to be better predictors of future behaviour. In the next section, we present our experimental design followed by a description of our data. We then discuss our main findings.

## 2 Experimental Design

Our survey design allows us to evaluate whether self-anchoring affects data collection on **subjective expectations on educational outcomes**. In our experiment, self-anchoring is induced by randomly allocating different question order of parental education and educational expectations. The respondents were randomly assigned to four treatments which varied on two main features: (i) whether parental education was collected before the expectations on educational outcomes and (ii) whether expectations about young children were collected before the expectations about their older siblings. These two variations generate four treatments shown in Figure 1:

Figure 1: Treatments based on Question Order



The experimenters created four questionnaires which had the same sections and questions, but only varied in *question order* when collecting data on parental education and educational expectations. We also refer to this set of questions as the educational module. In all four questionnaires, the location of this module was the same for everyone, but

the order of parental education and educational expectations varied across all four questionnaires. These questionnaires are identified as  $T1$ ,  $T2$ ,  $T3$  and  $T4$  treatments shown in Figure 1.

After asking about standard sociodemographic characteristics, in the *no-anchoring* treatment ( $T4$ ) respondents are asked about the expected education for the youngest child first, followed by the second oldest, and continues until reaching the oldest child. After eliciting educational expectations for the oldest child,  $T4$  finalises the educational module with the collection of parental education. Conversely, the *the double-anchoring* ( $T2$ ) treatment collects data on parental education first, followed by the oldest child educational expectations, then the second oldest, and so on.  $T2$  finalises the educational module with the highest level of education expected for the youngest child. The rest of *single-anchoring* treatments,  $T1$  and  $T3$ , elicit expectations about the youngest child either after parental education ( $T1$ ) or after the educational expectation about older siblings ( $T2$ ). When analysing our results we consider  $T4$  as the baseline.

Because all four treatments were exposed to the same sociodemographic questions prior to the collection of parental education and educational expectations, any difference across treatments is uniquely explained by the self-anchoring induced by the treatments.

### 3 Sample

Our data was collected in 2016 as part of an impact evaluation on mobile-banking in rural Piura, Peru. The survey was administered to a random sample of women who were beneficiaries of the social programme *JUNTOS* and were living in 5 rural communities. The survey collected socioeconomic characteristics, including an educational module on parental education and subjective expectations about educational outcomes. In total, we interviewed 1,996 individuals and collected parental expectations on 4,040 children. Out of the total, 195 are *one-child* families. For our analysis we use the whole universe of observations. Our results do not change if we drop *one-child* families from the analysis.

The Appendix presents the main descriptive statistics of our sample (Table A). The average and median age of children in our sample is 8 years old, their sex ratio is balanced (50%), 99% of them live at home and 85% are students. About 75% of the households in our sample live in a dwelling with soil floor and 95% with a roof made of calamine. In addition, 79% of such households own a TV but only 2% owns a landline. The respondent's average and median age is 36 years old. Parental education is heavily concentrated on below vocational studies/training (hereafter, *VT*). Only 4% of mothers and 7% of fathers achieved an education level above *VT*. However, the vast majority of parents expect their offsprings to get a college degree (around 69% of them). In the Appendix we show balance tests for treatments  $T1$ ,  $T2$ ,  $T3$  and  $T4$  (Figures A.1 and A.2). In most socioeconomic variables we observe balance across treatments.

## 4 Results

Panel A of Table 1 presents the percentage of mothers reporting *below vocational training* (VT), *vocational training* and *college* as the highest level of education they expect for their children. We also report the percentage of mothers who are uncertain about such expectation (*don't know*). Each treatment follows the definition explained in Figure 1.

This table shows that people report more optimistic expectations under the *no-anchoring* ( $T_4$ ) treatment than under any other  $T_k$  anchored treatment. A higher percentage of mothers report *below VT* as the expected highest level of education when they are *single* or *double-anchored* than when they are not under  $T_4$  (our baseline category). The percentage of mothers reporting *below VT* as the highest educational level expected for their children is approximately 50% higher for any of the anchored ( $T_1/T_2/T_3$ ) treatments. In our experiment, self-anchoring does not facilitate to the respondent the assessment of the most likely outcome in the future, on the contrary, self-anchoring increases the uncertainty of our respondents; see column *Don't know*.

Table 1: Order Effect on Educational Expectations

Panel A					
<i>Anchoring</i>	Abbreviation	Highest level of education that mothers expect			
		Below VT	VT	College	Don't know
<i>Single</i>	T1: P-Y-O	4.52	21.99	65.36	8.13
	T3: O-Y-P	5.19	18.15	70.12	6.54
<i>Double</i>	T2: P-O-Y	4.92	20.37	68.31	6.40
<i>None</i>	T4: Y-O-P	2.91	22.27	71.43	3.38

Notes: Percentages by row add to 100.

Panel B					
VARIABLES	(1)	(2)	(3)	(4)	
	Below VT	VT	College	Don't know	
T1: P-Y-O	0.0194*	0.00529	-0.0703**	0.0455**	
	(0.00854)	(0.0182)	(0.0203)	(0.0104)	
T2: P-O-Y	0.0200*	-0.0129	-0.0357*	0.0287**	
	(0.00867)	(0.0177)	(0.0198)	(0.00942)	
T3: O-Y-P	0.0276**	-0.0293	-0.0295	0.0312**	
	(0.00908)	(0.0176)	(0.0199)	(0.00967)	
Observations	4,040	4,040	4,040	4,040	
Overall sample (%)	4.36	20.74	68.84	6.06	
Ref. category T4: Y-P (%)	2.91	22.27	71.43	3.38	

Notes: VT stands for vocational training. Reference category corresponds to T4, Y-O-P.

Robust standard errors in parentheses. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

Panel B of Table 1 analyses the main findings of Panel A using linear probability models (LPM). This analysis accounts for the few imbalances shown in Figures A.1 and A.2 of Appendix using the specification  $y_{ih} = \mathbf{X}_{ih}\alpha + \beta_1 d_{1ih} + \beta_2 d_{2ih} + \beta_3 d_{3ih} + \varepsilon_{ih}$ . Our dependent variable  $y_{ih}$  denotes a certain level of expected education for child  $i$  living in household  $h$ .  $\mathbf{X}_{ih}$  represents control variables and a constant, and  $d_{ih}$  denotes our treatments. We define as reference category  $T4$  (baseline). Dependent variables  $y_{ih}$  are represented by dummy variables equal to 1 for each expected educational level: *below VT*, *VT*, *college* or *don't know*; 0 otherwise. To consider the four treatments explained in the previous section,  $d_{1ih}$ ,  $d_{2ih}$  and  $d_{3ih}$  are equal to 1 if the household has been allocated to  $T1$ ,  $T2$  or  $T3$ , and 0 otherwise.

Panel B shows that most of the significant differences are observed in the educational level *below VT*. This means that anchored treatments increase the chances of reporting *below VT* and *don't know*. We summarise our main result here:

*Result 1.* Mothers who are not exposed to self-anchoring report more optimistic educational expectations and less likely to answer *don't know*.<sup>1</sup>

Next, we analyse whether the level of education of the respondent explains the anchoring effect. Asking about parental education prior to the elicitation of educational expectations may induce a downward or upward adjustment of elicited expectations, depending on the level of the anchor. To explore how the level of the anchor affects the elicitation, we split our sample based on the education of the main respondent (mothers). We define households with low educated mothers ( $\leq prim$ ) if their maximum education is below or equivalent to “primary school” and households with high educated mothers ( $> prim$ ) if they have more than primary education. Approximately 44 percent of our respondents belong to the low educated group and 56 percent to the high educated one.

Panel A in Table 2 shows the percentage of respondents reporting *below VT*, *VT*, *college* or *don't know* across treatments for households with low and high educated mothers, respectively. Looking into the two extremes of education, *below VT* and *college*, we observe high educated mothers have more optimistic educational expectations for their children than the low educated ones. The percentages are much higher for *below VT* in the group of low educated mothers, and much higher for *college* in the group of high educated mothers. In addition, anchoring-effects are larger for low educated mothers than for high educated ones. The percentage of low educated mothers reporting *below VT* in  $T2$  is twice as high as in  $T4$  (8.23 vs 3.56), whereas for high educated mothers the percentages are pretty similar under  $T2$  and  $T4$  (2.03 vs 2.42). This means that low educated mothers are more sensitive to *double-anchoring* than their educated counterparts.

Panel B in Table 2 repeats the analysis conducted in Table 1 using LPM for low and high educated mothers. There are two important results: *i*) with regard *below VT*, low educated mothers are significantly more likely to be influenced by anchors than the high

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<sup>1</sup>More optimistic expectations do not mean more or less accurate measures of what we will observe in the future. These expectations refer to higher levels of education reported by the mothers not subject to anchors than those reported by the rest of mothers in the sample. Considering a naive in-sample prediction we identified that the *double-anchoring* treatment  $T_2$  is the measure of expectations that better matches this projection.

educated; and *ii*) with regard *don't know*, we observe the opposite, high educated mothers are significantly more likely to report *don't know* than the low educated.

When both low and high educated mothers are exposed to the *no-anchoring* treatment (*T4*), they are more likely to report *College* as the highest level of education they expect for their children than the mothers allocated to the anchored treatments *T1*, *T2* and *T3*. This is consistent with what we observe for *below VT*. We summarise our second result here:

Table 2: Order Effect on Parental Expectations: By Maternal Education

Panel A		Highest level of education that mothers expect							
<i>Anchoring</i>		Below VT		VT		College		Don't know	
		$\leq prim$	$> prim$	$\leq prim$	$> prim$	$\leq prim$	$> prim$	$\leq prim$	$> prim$
T1: P-Y-O		6.79	2.70	23.98	20.36	63.12	67.03	6.11	9.73
T2: P-O-Y		8.23	2.03	21.52	19.34	63.08	72.74	6.96	5.89
T3: O-Y-P		7.21	3.56	26.28	11.61	60.47	77.90	6.05	6.93
T4: Y-O-P		3.56	2.42	24.05	20.84	67.93	73.51	3.56	3.23

Panel B		Highest level of education that mothers expect							
<i>Anchoring</i>		Below VT		VT		College		Don't know	
		$\leq prim$	$> prim$	$\leq prim$	$> prim$	$\leq prim$	$> prim$	$\leq prim$	$> prim$
T1: P-Y-O		0.0401*** (0.0151)	0.00258 (0.00964)	0.00699 (0.0289)	0.00490 (0.0235)	-0.0627** (0.0319)	-0.0757*** (0.0264)	0.0156 (0.0147)	0.0683*** (0.0145)
T2: P-O-Y		0.0417*** (0.0156)	-0.00512 (0.00841)	-0.0247 (0.0279)	-0.00475 (0.0232)	-0.0469 (0.0311)	-0.0188 (0.0259)	0.0299** (0.0145)	0.0286** (0.0125)
T3: O-Y-P		0.0429*** (0.0151)	0.0103 (0.0107)	0.0326 (0.0295)	-0.0743*** (0.0212)	-0.0994*** (0.0319)	0.0255 (0.0250)	0.0239* (0.0145)	0.0385*** (0.0128)
Observations		1,790	2,250	1,790	2,250	1,790	2,250	1,790	2,250
Freq. in %		6.48	2.67	23.97	18.18	63.85	72.8	5.7	6.36
Baseline freq. in %		3.6	2.42	24.27	20.84	68.54	73.51	3.6	3.23

Notes: VT stands for vocational training. Reference category corresponds to T4, Y-O-P.

Robust standard errors in parentheses. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

*Result 2.* Anchoring differently affects low and high educated mothers: the former become more pessimistic while the later are more likely to report *don't know*.

This finding is in line with the evidence provided by [Wilson et al. \(1996\)](#) about knowledgeable people being less susceptible to anchoring effects. Highly educated mothers might be less susceptible to anchoring effects because of their knowledge about the most likely educational outcome for their children. Mothers who have already experienced high levels of education have more information about what the process of acquiring further education involves, whereas mothers without this experience may have less infor-

mation. However, despite high educated mothers may have more information, anchoring increases the level of uncertainty (*don't know*) reported by both low and high educated mothers.

Finally, in the Appendix we split our analysis by gender. Tables B and C of Appendix show LPM for sons and daughters, separately. Despite most differences are not statistically different from zero, we identify that parents tend to report lower levels of education for daughters than for sons in  $T1/T2/T3$  when comparing with  $T4$ ; Table D of Appendix reports the p-values of coefficient differences. However, parents are more likely to report *Don't know* in  $T1/T2/T3$  than in  $T4$  when asked about their sons. This suggests that our main anchoring effects on the chances of reporting *don't know* are primarily driven by sons, but on reporting lower levels of education, in contrast, might be driven by the expectations on their daughters' educational outcomes.

## 5 Discussion and Conclusions

We study anchoring effects when eliciting the highest level of education that parents expect their children will achieve in the future. To do so, we use a 2x2 between-subjects survey experiment where we randomly allocate survey respondents to one of four possible treatments. Treatments vary according to whether parental education was asked before parental expectations, and whether parental expectations about the oldest child was elicited before the youngest. Our study supports two relevant results:

i) Expectations are sensitive to experimental design. Inducing the respondent to think first about her own education and/or her oldest child expected education, makes the respondent to downwardly adjust their expectations. Moreover, self-anchoring when eliciting subjective expectations may induce item non-response which translates into information loss and monetary costs. Indeed, when mothers were self-anchored (i.e.  $T1$ ,  $T2$ , and  $T3$ ), 7.02% of mothers answered *do not know* when asked about the expected highest education for their offsprings. In contrast, only 3.38% of mothers reported *do not know* under the *no-anchoring* treatment.

ii) We also find that the level of *self-anchoring* matters. When we split the sample between households with low educated mothers (low anchor) and high educated mothers (high anchor), respondents subject to a low anchor are more likely to report lower levels of expected education than those respondents subject to a high anchor. Likewise, high educated mothers ( $>$  primary) are more likely to report *don't know*.

Our findings suggest experimental and observational studies should consider potential anchoring effects when the elicitation of beliefs are priority or correspond to the main outcomes of interest in research or policy projects. Based on the results discussed in here, the authors recommend piloting questionnaire order prior to the scale-up of any survey data collection involving the elicitation of beliefs. We hope our study encourages other researchers to explore how sensitive the elicitation of expectations data might be to survey design.



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# A Appendix

## A.1 Sample and balance

Table A: Descriptive statistics

	Mean	Stand. dev	Median	Min	Max
Child age	8.13	4.26	8.00	0.40	15.00
Child is male =1	0.50	0.50	1.00	0.00	1.00
Child lives at home =1	0.99	0.12	1.00	0.00	1.00
Child is a student =1	0.85	0.36	1.00	0.00	1.00
Floor made of tiles =1	0.02	0.14	0.00	0.00	1.00
Floor made of concrete =1	0.23	0.42	0.00	0.00	1.00
Floor made of ground =1	0.75	0.43	1.00	0.00	1.00
Roof made of concrete =1	0.04	0.20	0.00	0.00	1.00
Roof made of mat =1	0.01	0.07	0.00	0.00	1.00
Roof made of calamine =1	0.95	0.21	1.00	0.00	1.00
# of bedrooms	1.91	0.82	2.00	1.00	5.00
Dwelling has electricity =1	0.90	0.30	1.00	0.00	1.00
Dwelling has drinking water =1	0.80	0.40	1.00	0.00	1.00
Dwelling has a radio =1	0.52	0.50	1.00	0.00	1.00
Dwelling has a TV =1	0.79	0.40	1.00	0.00	1.00
Dwelling has landline phone =1	0.02	0.15	0.00	0.00	1.00
Age of respondent	35.97	7.70	36.00	19.00	97.00
Number of children	3.66	1.70	3.00	0.00	12.00
Number of grandchildren	0.57	1.75	0.00	0.00	22.00
Number of children who live with respondent	3.24	1.38	3.00	0.00	10.00
Number of grandchildren who live with respondent	0.15	0.60	0.00	0.00	9.00
Mother's education below VT =1	0.96	0.18	1.00	0.00	1.00
Mother's education is VT =1	0.03	0.16	0.00	0.00	1.00
Mother's education is university =1	0.00	0.05	0.00	0.00	1.00
Father's education below VT =1	0.93	0.26	1.00	0.00	1.00
Father's education is VT =1	0.04	0.20	0.00	0.00	1.00
Father's education is university =1	0.01	0.07	0.00	0.00	1.00
# of days couldn't buy food	3.02	2.21	3.00	0.00	10.00
Expect. educ. below VT	0.04	0.20	0.00	0.00	1.00
Expect. educ. is VT	0.21	0.41	0.00	0.00	1.00
Expect. educ. is college	0.69	0.46	1.00	0.00	1.00
Expect. educ. is unknown	0.06	0.24	0.00	0.00	1.00

Note: There are no mothers reporting their education as unknown.

## A.2 Effects by sex

Table B: Order Effect on Parental Expectations for Sons (2X2), LPM

VARIABLES	(1) Below VT	(2) VT	(3) College	(4) Don't know
T1	0.0156 (0.0120)	0.00348 (0.0266)	-0.0739* (0.0289)	0.0548*** (0.0145)
T2	0.0141 (0.0120)	-0.0268 (0.0257)	-0.0241 (0.0285)	0.0367*** (0.0133)
T3	0.00828 (0.0116)	-0.0433 (0.0249)	-0.00261 (0.0278)	0.0376*** (0.0132)
Observations	2,031	2,031	2,031	2,031
Freq. in %	4.360	20.74	68.84	6.060
Baseline freq. in %	2.940	24.08	69.85	3.130

Notes: VT stands for vocational training. Treatment variables are: T1, P-Y; T2, P-O; and T3, O-P. Reference category corresponds to T4, Y-P. Robust standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table C: Order Effect on Parental Expectations for Daughters (2X2), LPM

VARIABLES	(1) Below VT	(2) VT	(3) College	(4) Don't know
T1	0.0220 (0.0124)	0.00630 (0.0251)	-0.0655* (0.0287)	0.0372* (0.0147)
T2	0.0223 (0.0126)	0.00209 (0.0246)	-0.0451 (0.0277)	0.0208 (0.0133)
T3	0.0481** (0.0141)	-0.0137 (0.0253)	-0.0582* (0.0287)	0.0238 (0.0140)
Observations	2,009	2,009	2,009	2,009
Freq. in %	4.360	20.74	68.84	6.060
Baseline freq. in %	2.880	20.38	73.08	3.650

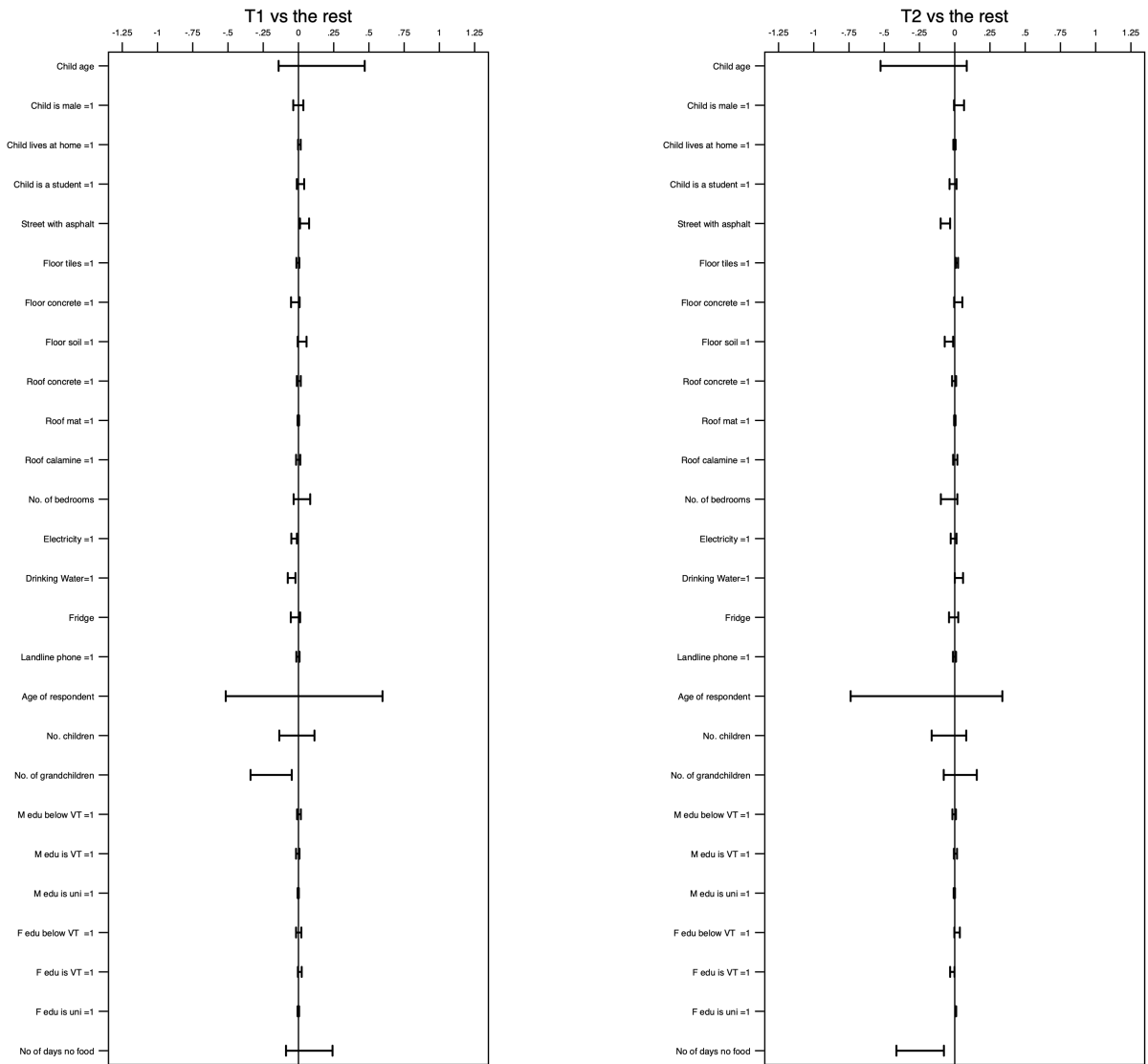
Notes: VT stands for vocational training. Treatment variables are: T1, P-Y; T2, P-O; and T3, O-P. Reference category corresponds to T4, Y-P. Robust standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table D: Order Effect on Parental Expectations (2x2), Sons vs Daughters *p-values* of T-Tests

	Below VT	VT	College	Don't know
T1: P-Y	0.71	0.94	0.84	0.39
T2: P-O	0.64	0.42	0.59	0.39
T3: O-P	0.03	0.40	0.16	0.47
T1/T2	0.88	0.67	0.76	0.57
T1/T2/T3	0.16	0.74	0.40	0.74

Notes: VT stands for vocational training. Reference category corresponds to T4, Y-P. Robust standard errors in parentheses.

Figure A.1: Balance Test for T1 and T2 vs the rest, 95% confidence intervals

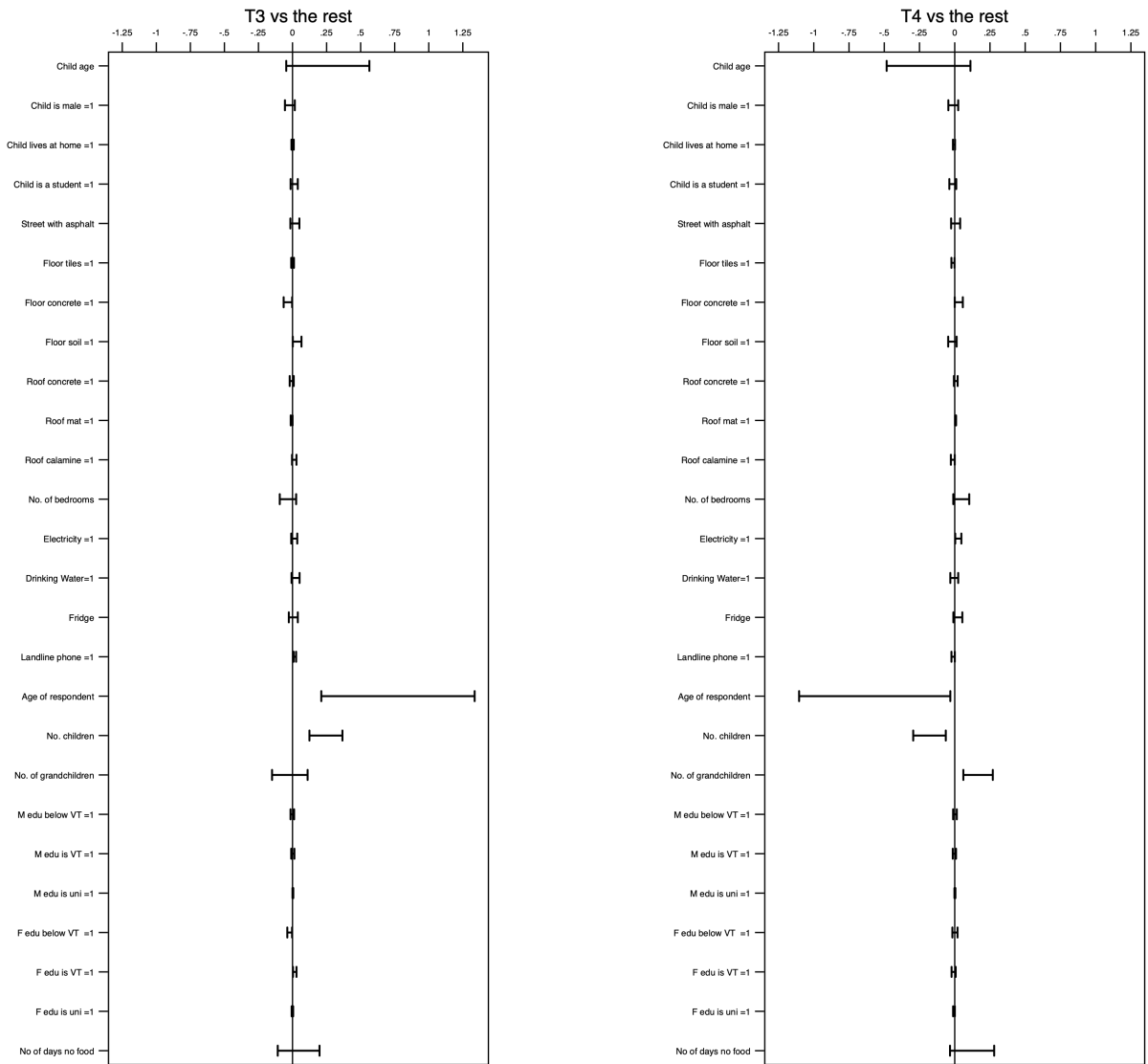


(a) T1 vs the rest

(b) T2 vs the rest

Notes: Balancing test. Confidence intervals that lie to the left imply that treatment group has a higher mean of the corresponding variable. *M edu* stands for mother's education and *F edu* for father's education.

Figure A.2: Balance Test for T3 and T4 vs the rest, 95% confidence intervals



(a) T3 vs the rest

(b) T4 vs the rest

Notes: Balancing test. Confidence intervals that lie to the left imply that treatment group has a higher mean of the corresponding variable. *M edu* stands for mother's education and *F edu* for father's education.