Supplementary material for

"Parental job loss and early child development in the Great Recession"

S1. Weighting for loss to follow-up and complete-case analysis

Sample exclusions in our analyses are mainly due to loss to follow-up and to missing values on relevant covariates. To inspect if biases ensued as a result of these sample restrictions, we devised a number of probability weights. First, we built weights for loss to follow-up between, respectively, Waves 1 and 2, and Waves 2 and 3. Let $A_{h,w}$ be a dummy variable for whether households h were lost to follow-up ($A_{h,w} = 1$) or not ($A_{h,w} = 0$) in a given Wave w. We estimated stabilised inverse probability weights swa_h for such sample attrition (Robins et al., 2000; Kühhirt & Klein, 2018) as follows:

$$swa_h = \prod_{w>1} \frac{P(A_{h,w} = 0|A_{h,w-1} = 0)}{P(A_{h,w} = 0|A_{h,w-1} = 0, Z_{i,h,1}, Z_{(i,h,w-1)})} \tag{1}$$

The probability of not being lost to follow-up in a given Wave $P(A_{h,w} = 0)$ is at the numerator and was estimated via an "empty" logistic model with $A_{h,w}$ as the outcome. This is, by default, conditional on being observed in the Wave prior ($A_{h,w-1} = 0$). For Wave 2, we thus estimated our weights using the whole original sample (N = 11,134), whereas for Wave 3 we estimated weights on those who "survived" up to the Wave 2 (N = 9,773). At the denominator, we take the probability of not being lost to follow-up in a given Wave $P(A_{h,w} = 0)$ conditional on a set of covariates. The choice of covariates reflects the observation that loss to follow-up in GUI is disproportionately likely for one-parent households and families with lower socioeconomic background (McCrory et al., 2013). For Wave 2, we estimated a logistic regression for our dummy $A_h, 2$ on the following set of individual and household covariates $Z_{i,h,1}$, measured at Wave 1: dummies for lone-parent household, father not resident, whether the family lives in an urban/rural area, sex of the child, whether the child has siblings, maternal work status prior to birth, maternal age in ten-year bins, housing tenure, current social class (eight-fold classifica-

tion), and whether the primary respondent's family struggled to make ends meet when the primary respondent was 16. For Wave 3, we regressed $A_{h,3}$ on the same set $Z_{i,h,1}$ and on additional variables measured at Wave 2 (i.e. $Z_{i,h,w-1}$), namely: dummies for parental job loss (our exposure), the birth of a new sibling for the study child, whether the family moved, whether parents of the study child separated. Weights for Waves 2 and 3 are then combined via multiplication ($\prod_{w>1}$ in Equation 1) to obtain swa_i.

We followed a similar procedure to estimate inverse probability weights for the inclusion in the analytical sample (Seaman & White, 2013). All in all, 8,712 households were followed across all three Waves of GUI. Yet, mainly due to missing values on relevant covariates, our main analytical sample comprises only 6,303 households. Let I_h denote a dummy variable equal to 1 if a household is included in this main analytical sample and 0 when a household h is only observed up to Wave 3 yet not part of the analytical sample. We then computed the following stabilised inverse probability weight swi_h for inclusion in the main analytical sample:

$$swi_h = \frac{P(I_h = 1|A_{h,2} = 0, A_{h,3} = 0)}{P(I = 1|A_{h,2} = 0, A_{h,3} = 0, W_{i,h,w})} \tag{2}$$

At the numerator, we have the probability of being included in the final sample $P(I_h = 1)$ conditional on being observed up until Wave 3 ($A_{h,2} = 0$, $A_{h,3} = 0$). At the numerator, we modelled the probability of inclusion conditional on a set of individual- and household-level covariates $W_{i,h,w}$, namely: dummies for lone-parent household, father not resident, whether the family lives in an urban/rural area, sex of the child, whether the child has siblings, maternal work status prior to birth, maternal age in ten-year bins, housing tenure, current social class (eight-fold classification), and whether the primary respondent's family struggled to make ends meet when the primary respondent was 16 – all of which are measured at Wave 1 – and parental job loss, measured at Wave 2. All probabilities were estimated via logistic regression.

We then combined weights swa_h and swi_h by means of multiplication and top- and bottom-coded, respectively at the 99th and 1st percentile, our final weight w_h (Mean = .99, SD = .3). Table 1S replicates our main analyses for the analytical sample re-

weighted by w_h. Weighted estimates in Table 1S are close in size and uncertainty to their unweighted counterparts in Table 2. Our substantial conclusions regarding the effects of parental job loss on child outcomes are therefore unaltered.

Table 1S: OLS models for parental job loss and child outcomes at age 3 and 5. Model 1 adjusts for child features, Model 2 adds baseline maternal and household features (weighted by w_h, GUI 2008-2013).

	Vocabulary		Internalizing problems		Externalizing problems	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Age 3					
Paternal job loss	-0.087**	-0.023	0.120***	0.076*	0.086**	0.035
	(0.039)	(0.037)	(0.039)	(0.040)	(0.037)	(0.037)
Maternal job loss	0.028	0.036	0.028	0.008	-0.012	-0.029
	(0.052)	(0.048)	(0.046)	(0.046)	(0.047)	(0.046)
	Age 5					
Paternal job loss	-0.101**	-0.034	0.031	0.004	0.054*	0.008
	(0.039)	(0.037)	(0.039)	(0.040)	(0.036)	(0.036)
Maternal job loss	-0.097*	-0.087*	0.014	0.001	0.119**	0.107**
	(0.051)	(0.048)	(0.048)	(0.047)	(0.052)	(0.051)
N	6,303	6,303	6,303	6,303	6,303	6,303

*$p < .10$, **$p < .05$, ***$p < .01$.

S2. Main effects of parental job loss on candidate mediators

Table 2S: OLS models for parental job loss and candidate mediators. All models adjust for child features (unweighted, GUI 2008-2013).

	Parental income	Maternal negative parenting
Paternal job loss	-.176***	0.067**
	(.012)	(0.033)
Maternal job loss	-.153***	0.035
	(0.016)	(0.044)
N	6,303	6,303

*$p < .10$, **$p < .05$, ***$p < .01$.

S3. Crossing mediators and outcomes

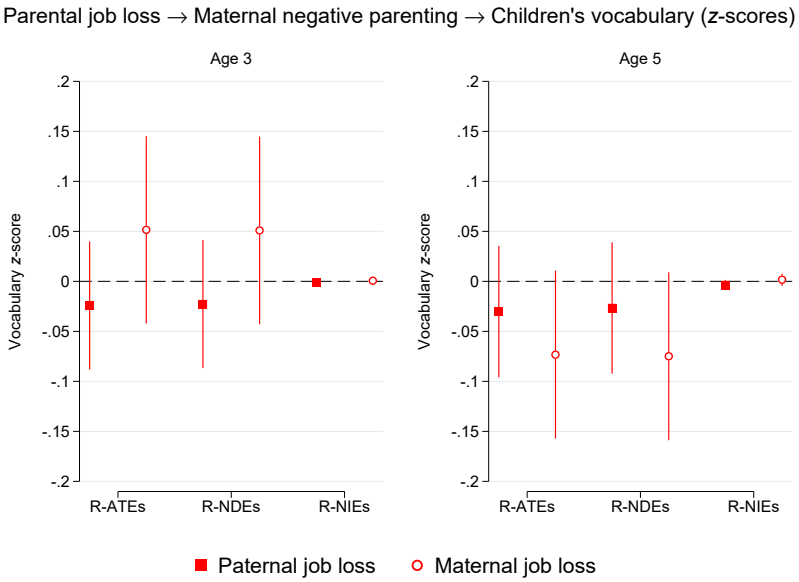

Figure 1S: Mediation analyses for the effects of parental job loss on children's vocabulary via maternal negative parenting. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.

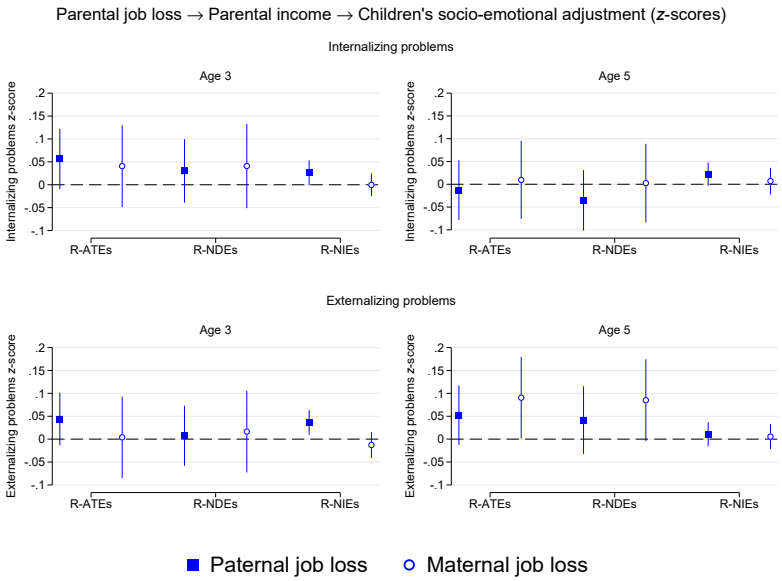

Figure 2S: Mediation analyses for the effects of parental job loss on children's internalizing and externalizing problems, via parental income. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.

S4. Heterogeneous effects by maternal education

In this section, we present analyses split by maternal education. We break down our sample into two groups, one comprising households in which the mother has upper-secondary education or less (2,397 households, 38% of the original sample), the other in which mothers have tertiary education (3,906 households, 62% of the original sample). We ran the same models detailed in the main text on such separate samples, performing our mediation analyses as per Equations 3 to 6. Exposure to parental job loss is as follows: for those with lower maternal education, 1,726 households experienced no job loss ($\approx$ 72%), 475 were affected by paternal job loss ($\approx$ 20%), and 196 by maternal job loss ($\approx$ 8%); for those with higher maternal education, 3,037 households experienced no job loss at all ($\approx$ 78%), 553 were affected by paternal job loss ($\approx$ 14%), and 316 by maternal job loss ($\approx$ 8%). In line with previous studies (Watson et al., 2015; Nolan & Maître, 2017), we find that parental job loss was somewhat more pronounced among, but by no means limited to, more disadvantaged families during the Great Recession in Ireland.

Table 3S displays the associations of our exposure with each mediator, split by maternal education. Concerning parental income, estimates for both paternal job loss and maternal job loss are quite similar across sub-samples and largely in line with those for the whole sample, as per Table 2S. For negative parenting, on the other hand, associations are somewhat more pronounced in the tertiary educated sub-sample. Overall, when it comes to parental job loss and the mediators in this study, households with highly-educated mothers appear equally or even more adversely affected than their relatively lower-educated counterparts.

Table 3S: OLS models for parental job loss and candidate mediators, split by maternal education. All models adjust for child features (unweighted, GUI 2008-2013).

	Parental income		Maternal negative parenting	
	Upper-sec. or less	Tertiary	Upper-sec. or less	Tertiary
Paternal job loss	-.172***	-.179***	.039	.087**
	(.017)	(.016)	(.052)	(.043)
Maternal job loss	-.135***	-.158***	-.044	.079
	(.025)	(.021)	(,075)	(.055)
N	2,397	3,906	2,397	3,906

*$p < .10$, **$p < .05$, ***$p < .01$.

In Figure 3S we turn to the effects of parental job loss on children's verbal ability, via the channel of parental income and separate across levels of maternal education. Similar to our main analyses, we cannot detect total effects (R-ATEs) on verbal ability at age 3 in either sub-group. This holds regardless of which parent was displaced, and net of baseline features of the study child, their mother, and the household they belong to. Among households with lower maternal education, however, we find opposite direct and indirect effects. A positive direct effect (R-NDE = .19, p = .012) of maternal job loss is coupled with a negative indirect effect (R-NIE = –.07, p = .004), via the channel of parental income. Keeping the focus on verbal ability at age 3, the same pattern is not detected for maternal job loss in households where the mother has tertiary education (R-NDE = –.01, p = .873; R-NIE = .02, p = .156).

Turning to paternal job loss, we can only detect negative indirect effects amounting to around .04 SDs for children's vocabulary test scores at age 3. These are similar across sub-samples in Figure 3S and comparable to our findings for the whole sample, as per Figure 1. As for vocabulary test scores at age 5, estimates do not differ substantially across sub-samples or from those for the whole sample. Across groups in Figure 3S, we can only detect a negative indirect effect via parental income for maternal job loss, for mothers with upper-secondary education or less (R-NIE = –.04, p = .040) and not among those with tertiary degrees (R-NIE = .01, p = .478).

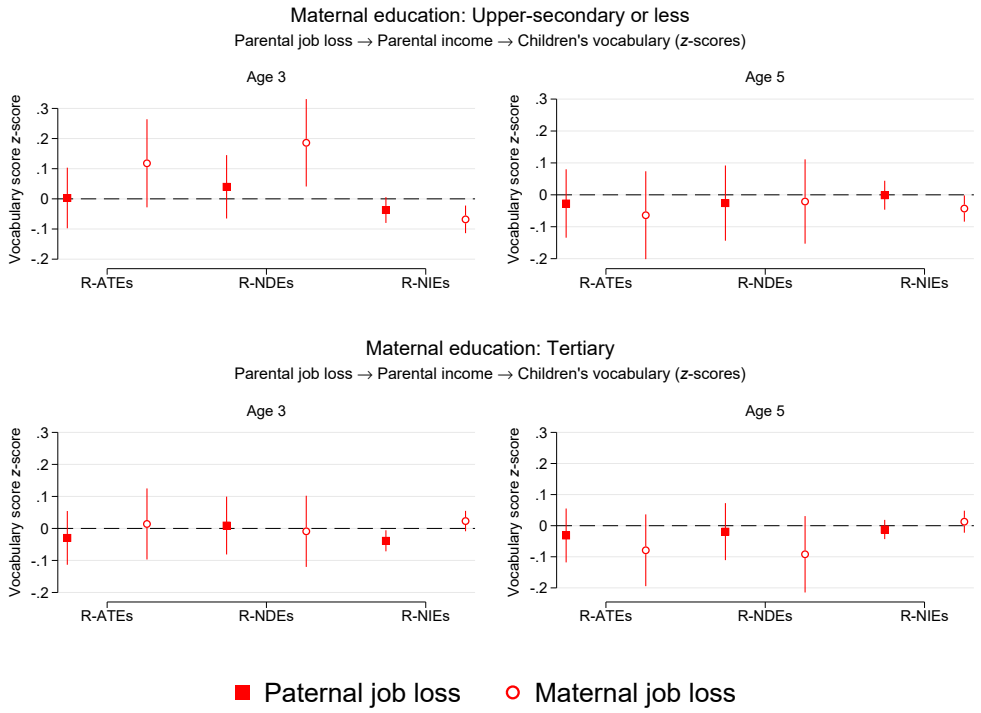

Figure 3S: Mediation analyses for the effects of parental job loss on children's vocabulary scores, via parental income and split by maternal education. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.

In Figures 4S and 5S, we examine problem behaviour. Similar to Figure 2 in the main text, we focus on its association with parental job loss via maternal negative parenting. Overall, estimates are often comparable across sub-samples and suggest at most a limited role of maternal negative parenting in contributing to behavioural problems, at least in response to parental job loss. If anything, we find that total and direct effects are larger in size for households in which mothers have a tertiary degree rather than high school or less. For example, among the former households, we detect sizeable ($\approx$ .1 SDs) total effects of both paternal job loss and maternal job loss on externalizing problems at age 5, as per Figure 5S. This does not hold for the relatively lower educated sub-sample, although, focusing on maternal job loss, estimates are closer to each other across the two sub-samples. Throughout, indirect effects via maternal negative parenting are never larger than $\approx$ .02 SDs and, differently from total effects, differences across sub-samples are statistically and substantially negligible.

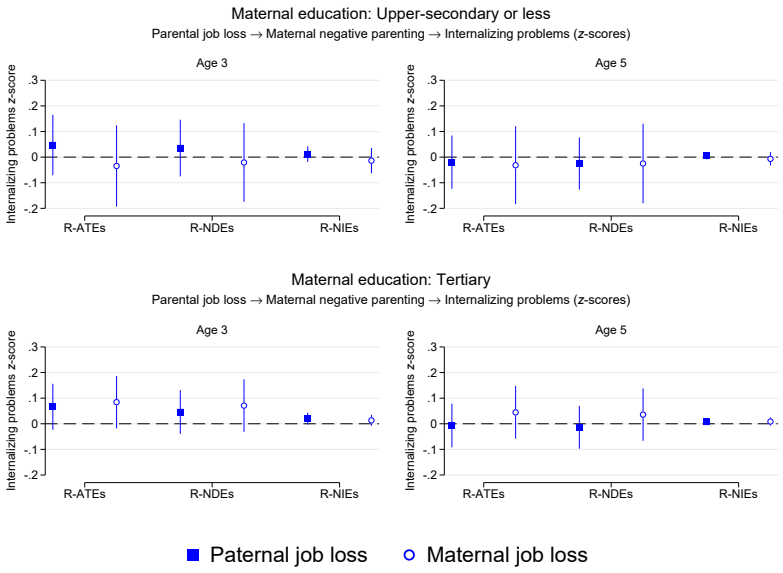

Figure 4S: Mediation analyses for the effects of parental job loss on children's internalizing problems, via maternal negative parenting and split by maternal education. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.

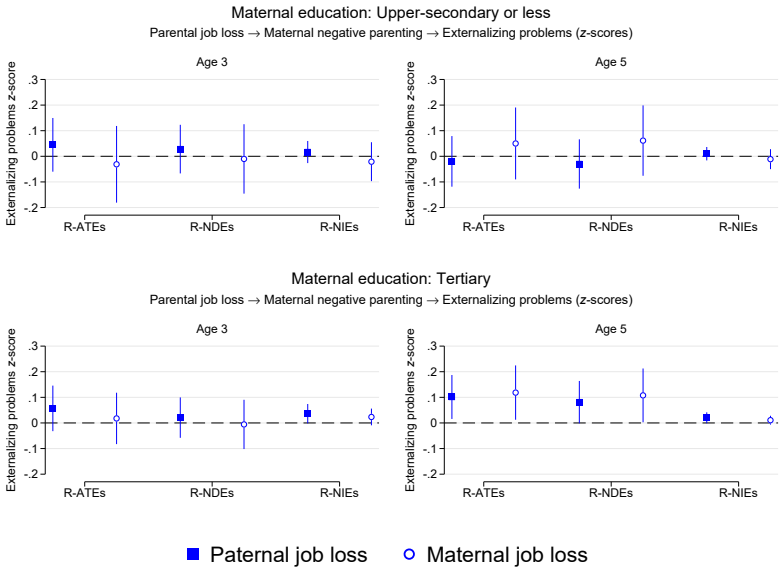

Figure 5S: Mediation analyses for the effects of parental job loss on children's externalizing problems, via maternal negative parenting and split by maternal education. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.

Finally, we turn to whether job and income losses impaired parental investment in formal childcare. As mentioned in the main text, we find that maternal job loss has the largest

total effect among households with lower maternal education. Yet, we also detect a negative total effect of paternal job loss among households in which mothers have tertiary qualifications (R-ATE = –.07, p = .002). Indirect effects via parental income are similar in size and always negative across sub-group, and regardless of which parent experiences job loss.

All in all, this sub-group analyses do not provide evidence of a clear-cut stratification of the costs of job loss across households, at least for this Irish cohort. Rather, early child development might be negatively affected by parental job loss, but not always directly, and not only among the least well-off households. Findings for childcare investments, in particular, underscore that support to ease childcare costs – in response to job loss – could be effective if inclusive of households in different socioeconomic strata. This speaks to the importance of considering the specific distributional impact of a given recession or wave of job loss. Previous studies pointed to a significant rise in economic vulnerability among the middle class in Ireland after the Great Recession (e.g. Whelan & Maître, 2014). We find echoes of that in the intergenerational costs of job loss among households with higher maternal education in our analyses.

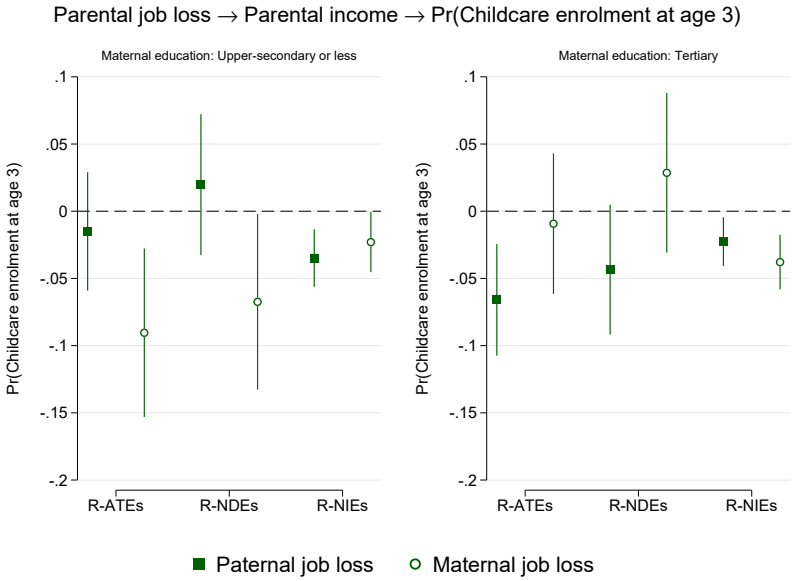

Figure 6S: Mediation analyses for the effects of parental job loss on children's chances of enrolment in formal childcare, via parental income and split by maternal education. *Notes*: R-ATEs = Randomized Average Total Effects; R-NDEs = Randomized Natural Direct Effects; R-NIEs = Randomized Natural Indirect Effects. Standard errors are bootstrapped with 200 replications.