## Comparison with Effects of other Early Childhood Interventions

Our main results in Tables 3 and 4 indicate that the parental leave reform significantly raised test scores by about 22% of a standard deviation for children of mothers with higher educational attainment. The significant subgroup effects for boys of more educated mothers correspond to about 0.34 and 0.44 standard deviations (for reading and science test scores, respectively). To put the magnitude of the effects in context, we compare our estimates to performance gaps in PISA by parental background as well as to effect sizes in early intervention studies and quasi-experimental evidence on the role of parental versus non-parental child care. First, the performance gap between students of mothers with completed tertiary education and students of mothers with completed primary or lower secondary education lay between 0.72 (science) and 0.63 (mathematics) standard deviations in the Austrian PISA test 2006 (OECD, 2007). The average performance of students from a less advantaged economic, social and cultural background (bottom quarter of the PISA index of economic, social and cultural status) was about 0.96 standard deviations lower than the performance of students from a more advantaged economic, social and cultural background (top quarter of the PISA index of economic, social and cultural status) (OECD, 2007).[[1]](#footnote-1) Furthermore, the gender gap in PISA scores in our sample corresponds to 0.28, -0.37 and 0.16 standard deviations in mathematics, reading and science respectively (male-female gap). One more year of schooling is associated with an increase in PISA performance in the order of 0.22, 0.21 and 0.10 standard deviations for mathematics, reading and science.[[2]](#footnote-2)

Second, several randomised trials of early educational intervention programmes in the United States point towards substantial and long-lasting effects on cognitive skills as well as schooling and social outcomes (Barnett, 2011). For instance, the Perry Preschool programme in Michigan in 1962 increased math and reading achievements by 0.33 standard deviations at age 14 (positive effects were found through age 27); the Abecedarian Early Intervention Project in North Carolina in 1972 raised IQ by 0.33 standard deviations (at ages 15 and 21) and maths and reading achievements by 0.4 standard deviations (averaged between the ages 8 to 21) (Barnett, 2008, 2011). A meta-analysis of 123 U.S. early educational interventions finds long-lasting cognitive effects of about 0.35 standard deviations (averaged between the ages 5 and 10) and of almost 0.3 standard deviations measured at ages 11 and above on average (Barnett, 2011). Similarly, an international meta-analysis of high-quality studies (with either quasi-experimental or randomised study designs) on 30 interventions from 23 low- to high-income countries (excluding the U.S.) reveal average effect sizes of early educational interventions of 0.35 standard deviations for cognitive achievements, 0.41 standard deviations for improvements in schooling outcomes, 0.27 standard deviations for behavioural change and 0.23 standard deviations for health gains (Nores and Barnett, 2010). These averages hide a substantial variation in study-specific effect sizes which range, for instance, between -0.05 and 1.43 standard deviations for cognitive achievements (Nores and Barnett, 2010). The meta-analysis also reveals that long-term effects (measured at age 7 and above) are not significantly smaller than short-term effects. However, effect sizes tend to be larger for programmes aimed at very young children (younger than 3 years). This evidence is in line with the notion that interventions administered very early in life are generally more effective than those at older ages (Cunha *et al.*, 2006). Bearing in mind that the Austrian parental leave reform affected the life of children most intensively at a very young age, the size of the estimated reform effect appears well in the order of magnitude of early life intervention programmes in the literature.

Another relevant study for comparison is Carneiro *et al.* (2015) which shows that the Norwegian parental leave reform raised earnings at age 30 by about 6% among children from more educated mothers. This corresponds to about 7% of a standard deviation of the earnings distribution at age 30. As the reform increased paid parental leave take-up by 4 months, this implies an increase in earnings by 2% of a standard deviation for each additional month of maternal leave. For Sweden, Liu and Skans (2010) conclude that one additional month of parental leave raises test scores at age 16 by about 1.6% of a standard deviation. These effects are smaller than what we find for Austria. In contrast, Cools *et al.* (2015) find that an introduction of a *paternal* leave quota in Norway in 1993 increased final exam scores from lower secondary school by 4.5% of a standard deviation (intention-to-treat effect). The reform raised paternal leave by about 7 days. Scaling up the effect to one month yields an average effect of (4.5 x 4.3 weeks) 19.35% of a standard deviation. For the subsample of fathers actually taking the leave, however, the effect is much larger and corresponds to about 1/8 of a standard deviation for seven additional days of paternal leave (or 0.125 x 4.3 weeks = 0.538% of a standard deviation for a month). Bettinger *et al.* (2014) evaluate the introduction of a Norwegian family policy which granted cash benefits to mothers staying at home with their under-3-year-old children as of 1998. The authors show that while the effect of stay-at-home-mothers on tenth-grade GPA is about 0.02% of a standard deviation (ITT), the effect amounts to 150% of a standard deviation in the small group of compliers. For the U.S., Bernal and Keane (2011) estimate negative effect of non-parental child-care on child development: one year of non-parental child-care by relatives reduces cognitive achievement test scores at ages 4–6 by about 0.16 standard deviations. The results by Herbst (2013) also point at a substantial negative effect of non-parental child-care on early cognitive ability tests measured at 9 and 24 months of about 0.29 standard deviations. However, in contrast to Bernal and Keane (2011), Herbst’s results suggest that this negative effect is mainly caused by formal and non-relative child care arrangements and that it is larger for children from an economically advantaged background.[[3]](#footnote-3) Taking this evidence together, the magnitude of our results is sizeable, albeit not out of reasonable range when compared to the quasi-experimental literature on the effect of parental versus non-parental child-care.

1. The PISA index of economic, social and cultural status for 2006 was calculated based on the highest educational level and occupational status at home and accounted for cultural and wealth possessions and educational resources at home (e.g., books). [↑](#footnote-ref-1)
2. The comparison is based on children born in August and September who are in grade levels 9 and 10. [↑](#footnote-ref-2)
3. Using the variation in kindergarten-entry-age cut-off dates across U.S. states and over time, Fletcher and Kim (2016) show that a one month earlier cut-off increases average state standardised test results by 21.7 and 13.6% of a standard deviation in grade 4 for reading and math respectively. By the eighth grade, the effects are slightly smaller (12.9% of a standard deviation in math, 18.9% in science, and 5.1% in reading). [↑](#footnote-ref-3)