This online appendix contains supplementary material.

APPENDIX

This is the appendix to the paper

School Meals and Educational Outcomes in Rural Ethiopia

This appendix contains supplementary and additional material, which is of secondary interest to the reader.

This appendix will be made available on the authors' homepage and could also be made available online on the journal's website, if the editor wishes so.
School Meals and Educational Outcomes
in Rural Ethiopia

This appendix provides additional material to the main paper on "School Meals and Educational Outcomes in Rural Ethiopia", mostly in the form of additional descriptive statistics and further empirical results.

As detailed in the accompanying paper, the study used a two-stage stratified sampling design. The first-stage sampling was conducted using program districts as the sampling frame for non-program school catchment areas. This type of program/non-program school catchment area matching procedure was chosen to attain comparable school catchment areas. The second-stage sampling involved randomly sampling ten children aged 7 to 13 years per school catchment area using household lists irrespective of whether the children were enrolled in school at the time of the survey. The advantage of the second-stage sampling design we used is that it offers a richer analysis than selecting study children from sample schools, since it allows investigating relationships within the school service area, thus circumventing potential selection problems of the children already enrolled in school.

The analysis undertaken excluded areas where the program had run in the past, to avoid potential contamination from lingering program effects on learning outcomes, since the focus is on the link between current program and outcome(s). This left us with 146 school catchment areas (program and non-program) in the sample used for analysis (please see Table 1). After dropping approximately 100 children due to inconsistencies, 1891 children were retained. Of these, 439 children were excluded because they came from the pastoralist sample. Of the remaining 1452 children, 1157 children were enrolled in school, while 282 were not enrolled at the time. The analysis of school meals vs. no school meals is based on all 1452 children, whereas the analysis of school meals program modalities is based on 688 children, i.e. those sampled in program school service areas only.

In addition to using a household questionnaire and instrument for the testing of the study children, the survey conducted key informant interviews and focus group discussions. The results from the key informant interviews and focus group discussions are not presented in this paper but they are presented in Haile et al. (2011).

Table A.1 supplements the Tables 1 to 4 of the main paper and provides descriptive statistics on cognitive measurements (reading, writing, math, concentration, Raven’s test) and child labour (works in family business, domestic tasks, caring for others, paid work).

Tables A.2 to A.5 supplement Table 5 of the main paper. In Table 5 we show OLS as well as Propensity Score Matching results for the binary school meals program (SMP) treatment definition, i.e. comparing program schools to non-program schools. Table presents the estimation results on cognitive outcomes (reading, writing, math, concentration, Raven’s test) separately for boys and girls. Table A.2 shows the corresponding estimates separately by age group.
In Table A.3 we show estimates on child labour activities. This table is analogous in structure to Tables 5 and A.2, where the estimates on educational outcomes (reading, writing, and math) had been given.

Finally, Tables A.4 and A.5 show estimates for child labour activities as in Table A.3, but separately for the subsample of low-asset households and high-asset households. The partition into low- and high-asset households is made based on a composite asset holdings index comprising of a livestock index and a land ownership index (with equal weights), with the median value of the composite index as the cut-off point. The livestock index is a weighted index using tropical livestock units (TLU) as weights as follows: cattle are weighted by 0.7 TLU, donkeys or horses are weighted by 0.3 TLU, goats or sheep are weighted by 0.15 TLU and poultry are weighted by 0.05 TLU. The land ownership index varies between 0 and 1, assigning households a value based on the relative position within the sample (1 means that the household's land ownership is the sample maximum, 0 means that the household does not own any land).
Table A.1: Summary statistics of outcomes, by program status

|                                | Program schools (Children in program school catchment areas) | Non-Program schools (Children in non-program schools catchment areas) |
|--------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|
|                                | Mean             | Std.dev          | Mean             | Std.dev          |
| All children                   |                  |                  |                  |
| Raven’s test                   | 12.61            | 3.44             | 12.88            | 3.62             |
| Concentration                  | 137.42           | 55.49            | 152.54           | 57.87            |
| Reads words                    | 0.38             | 0.49             | 0.44             | 0.50             |
| Reads sentence                 | 0.25             | 0.43             | 0.31             | 0.46             |
| Writes                         | 0.60             | 0.49             | 0.66             | 0.47             |
| Math                           | 0.44             | 0.50             | 0.49             | 0.50             |
| Family business                | 2.78             | 2.65             | 2.40             | 2.55             |
| Domestic tasks                 | 2.22             | 1.73             | 2.10             | 1.69             |
| Čing for others                | 0.86             | 1.49             | 0.89             | 1.49             |
| Paid work (hours/day)          | 0.13             | 0.86             | 0.19             | 1.11             |
| **Girls**                      |                  |                  |                  |
| Raven’s test                   | 12.79            | 3.45             | 12.90            | 3.62             |
| Concentration                  | 138.31           | 54.19            | 151.84           | 57.19            |
| Reads words                    | 0.32             | 0.47             | 0.40             | 0.49             |
| Reads sentence                 | 0.20             | 0.40             | 0.29             | 0.45             |
| Writes                         | 0.55             | 0.50             | 0.65             | 0.48             |
| Math                           | 0.42             | 0.49             | 0.48             | 0.50             |
| Family business                | 1.99             | 2.34             | 1.77             | 2.21             |
| Domestic tasks                 | 2.44             | 1.77             | 2.44             | 1.78             |
| Čing for others                | 1.22             | 1.73             | 1.11             | 1.62             |
| Paid work (hours/day)          | 0.15             | 0.94             | 0.12             | 0.93             |
| **Boys**                       |                  |                  |                  |
| Raven’s test                   | 12.47            | 3.43             | 12.87            | 3.62             |
| Concentration                  | 136.74           | 56.63            | 153.24           | 58.72            |
| Reads words                    | 0.44             | 0.50             | 0.47             | 0.50             |
| Reads sentence                 | 0.30             | 0.46             | 0.33             | 0.47             |
| Writes                         | 0.64             | 0.48             | 0.66             | 0.47             |
| Math                           | 0.45             | 0.50             | 0.50             | 0.50             |
| Family business                | 3.42             | 2.71             | 2.97             | 2.70             |
| Domestic tasks                 | 2.05             | 1.67             | 1.79             | 1.54             |
| Čing for others                | 0.57             | 1.19             | 0.68             | 1.33             |
| Paid work (hours/day)          | 0.11             | 0.78             | 0.26             | 1.25             |

Note: Descriptive statistics of children outcome variables (reading, writing, math, concentration, as well as child labour activities) separately for program school catchment areas and non-program school catchment areas.
Table A.2: Cognitive skills, concentration and learning achievement – by age

|                | (1) Raven’s test | (2) Concentration | (3) Reads words | (4) Reads sentence | (5) Writes | (6) Math |
|----------------|------------------|-------------------|-----------------|-------------------|------------|----------|
| **Aged 7-10 years** |                  |                   |                 |                   |            |          |
| OLS Coefficient | -0.43            | -10.907           | -0.035          | -0.029            | -0.045     | -0.032   |
| Std. error      | (0.349)          | (7.494)           | (0.034)         | (0.033)           | (0.031)    | (0.036)  |
| Observations    | 853              | 354               | 927             | 927               | 928        | 927      |
| Matching ATT    | -0.481           | -13.126           | -0.038          | -0.029            | -0.063     | -0.037   |
| Std. error      | (0.391)          | (8.894)           | (0.049)         | (0.050)           | (0.045)    | (0.042)  |
| Observations    | 853              | 354               | 927             | 927               | 928        | 927      |
| **Aged 11-13 years** |                |                   |                 |                   |            |          |
| OLS Coefficient | 0.278            | -19.296**         | -0.04           | -0.037            | -0.037     | -0.055   |
| Std. error      | (0.374)          | (9.532)           | (0.049)         | (0.045)           | (0.048)    | (0.043)  |
| Observations    | 412              | 209               | 429             | 429               | 432        | 431      |
| Matching ATT    | 0.298            | -16.293           | -0.078          | -0.060            | -0.037     | -0.058   |
| Std. error      | (0.401)          | (10.561)          | (0.055)         | (0.057)           | (0.056)    | (0.040)  |
| Observations    | 412              | 209               | 429             | 429               | 432        | 431      |

Note: This table supplements Table 5 of the main paper. Analogously to Table 5 it shows OLS and propensity score matching estimates for the binary treatment variable school meals program (SMP) versus non-SMP. While Table 5 showed the estimates separately for boys and girls, this table provides separate estimates by age group.
### Table A.3: Children’s child labour activities

|                | (1)                      | (2)                      | (3)                       | (4)                       |
|----------------|--------------------------|--------------------------|---------------------------|---------------------------|
|                | Family business          | Domestic tasks           | Caring for others         | Paid work                 |
| Boys OLS       |                          |                          |                           |                           |
| Coefficient    | 0.459**                  | 0.280**                  | -0.099                    | -0.130*                   |
| Std. error     | (0.232)                  | (0.133)                  | (0.092)                   | (0.074)                   |
| Observations   | 766                      | 766                      | 765                       | 765                       |
| Matching ATT   | 0.350                    | 0.238                    | -0.091                    | -0.108                    |
| Std. error     | (0.298)                  | (0.159)                  | (0.093)                   | (0.074)                   |
| Observations   | 766                      | 766                      | 765                       | 765                       |
| Girls OLS      |                          |                          |                           |                           |
| Coefficient    | 0.045                    | 0.083                    | 0.083                     | 0.067                     |
| Std. error     | (0.18)                   | (0.151)                  | (0.145)                   | (0.081)                   |
| Observations   | 656                      | 655                      | 655                       | 656                       |
| Matching ATT   | 0.090                    | 0.001                    | 0.099                     | 0.062                     |
| Std. error     | (0.241)                  | (0.173)                  | (0.149)                   | (0.073)                   |
| Observations   | 656                      | 655                      | 655                       | 656                       |
| Aged 7-10 years OLS |                     |                          |                           |                           |
| Coefficient    | 0.263                    | 0.185                    | -0.019                    | -0.068**                  |
| Std. error     | (0.187)                  | (0.131)                  | (0.107)                   | (0.034)                   |
| Observations   | 961                      | 960                      | 959                       | 960                       |
| Matching ATT   | 0.268                    | 0.146                    | -0.010                    | -0.057*                   |
| Std. error     | (0.227)                  | (0.153)                  | (0.118)                   | (0.032)                   |
| Observations   | 961                      | 960                      | 959                       | 960                       |
| Aged 11-13 years OLS |                     |                          |                           |                           |
| Coefficient    | 0.26                     | 0.223                    | 0.041                     | 0.04                      |
| Std. error     | (0.225)                  | (0.168)                  | (0.115)                   | (0.157)                   |
| Observations   | 451                      | 451                      | 451                       | 451                       |
| Matching ATT   | 0.167                    | 0.118                    | 0.016                     | 0.015                     |
| Std. error     | (0.344)                  | (0.198)                  | (0.118)                   | (0.154)                   |
| Observations   | 451                      | 451                      | 451                       | 451                       |

Note: This table supplements Table 5 and A.2. While Table 5 and A.2 show estimates on educational outcomes (reading, writing, maths), this table presents the estimates on child labour activities, separately by gender and age group.
Table A.4: Children’s child labour activities, subsample of low asset households

|                | (1)          | (2)          | (3)          | (4)          |
|----------------|--------------|--------------|--------------|--------------|
|                | Family business | Domestic tasks | Caring for others | Paid work    |
| **Boys**       |              |              |              |              |
| OLS            |              |              |              |              |
| Coefficient    | 0.571        | 0.550***     | -0.091       | -0.096       |
| Std. error     | (0.378)      | (0.199)      | (0.138)      | (0.14)       |
| Observations   | 360          | 360          | 360          | 360          |
| Matching       |              |              |              |              |
| ATT            | 0.544        | 0.587***     | -0.104       | -0.120       |
| Std. error     | (0.428)      | (0.202)      | (0.147)      | (0.136)      |
| Observations   | 360          | 360          | 360          | 360          |
| **Girls**      |              |              |              |              |
| OLS            |              |              |              |              |
| Coefficient    | -0.008       | 0.138        | 0.04         | 0.149        |
| Std. error     | (0.242)      | (0.219)      | (0.204)      | (0.129)      |
| Observations   | 336          | 336          | 336          | 336          |
| Matching       |              |              |              |              |
| ATT            | 0.035        | 0.155        | 0.035        | 0.181        |
| Std. error     | (0.290)      | (0.250)      | (0.225)      | (0.124)      |
| Observations   | 336          | 336          | 336          | 336          |
| **Aged 7-10 years** |          |              |              |              |
| OLS            |              |              |              |              |
| Coefficient    | 0.184        | 0.451**      | -0.088       | -0.092*      |
| Std. error     | (0.239)      | (0.179)      | (0.147)      | (0.048)      |
| Observations   | 498          | 498          | 498          | 498          |
| Matching       |              |              |              |              |
| ATT            | 0.256        | 0.472***     | -0.139       | -0.089***    |
| Std. error     | (0.274)      | (0.195)      | (0.163)      | (0.045)      |
| Observations   | 498          | 498          | 498          | 498          |
| **Aged 11-13 years** |         |              |              |              |
| OLS            |              |              |              |              |
| Coefficient    | 0.302        | 0.127        | 0.265        | 0.351        |
| Std. error     | (0.407)      | (0.266)      | (0.175)      | (0.308)      |
| Observations   | 193          | 193          | 193          | 193          |
| Matching       |              |              |              |              |
| ATT            | 0.256        | 0.271        | 0.277        | 0.295        |
| Std. error     | (0.490)      | (0.268)      | (0.197)      | (0.319)      |
| Observations   | 193          | 193          | 193          | 193          |

Note: This table is analogous to Table A.3 in that it shows effects of the school meals program on child labour activities, using only the subsample of low-asset households.
|                  | (1) | (2) | (3) | (4)       |
|-----------------|-----|-----|-----|-----------|
|                 | Family business | Domestic tasks | Caring for others | Paid work |
| **Boys**        |     |     |     |           |
| OLS             |     |     |     |           |
| Coefficient     | 0.117 | 0.096 | -0.011 | -0.066    |
| Std. error      | (0.261) | (0.163) | (0.12) | (0.064) |
| Observations    | 406  | 406  | 405  | 405       |
| Matching        |     |     |     |           |
| ATT             | -0.047 | -0.034 | -0.025 | -0.066 |
| Std. error      | (0.354) | (0.186) | (0.119) | (0.075) |
| Observations    | 406  | 406  | 405  | 405       |
| **Girls**       |     |     |     |           |
| OLS             |     |     |     |           |
| Coefficient     | 0.058 | 0.079 | 0.138 | -0.037    |
| Std. error      | (0.235) | (0.181) | (0.162) | (0.085) |
| Observations    | 320  | 319  | 319  | 320       |
| Matching        |     |     |     |           |
| ATT             | 0.049 | -0.139 | 0.198 | -0.048    |
| Std. error      | (0.320) | (0.185) | (0.175) | (0.091) |
| Observations    | 320  | 319  | 319  | 320       |
| **Aged 7-10 years** |     |     |     |           |
| OLS             |     |     |     |           |
| Coefficient     | 0.112 | -0.006 | 0.113 | -0.034    |
| Std. error      | (0.233) | (0.151) | (0.128) | (0.043) |
| Observations    | 463  | 462  | 461  | 462       |
| Matching        |     |     |     |           |
| ATT             | 0.105 | -0.125 | 0.149 | -0.028    |
| Std. error      | (0.287) | (0.170) | (0.141) | (0.048) |
| Observations    | 463  | 462  | 461  | 462       |
| **Aged 11-13 years** |     |     |     |           |
| OLS             |     |     |     |           |
| Coefficient     | 0.069 | 0.233 | -0.078 | -0.065    |
| Std. error      | (0.265) | (0.212) | (0.146) | (0.11)   |
| Observations    | 258  | 258  | 258  | 258       |
| Matching        |     |     |     |           |
| ATT             | -0.074 | -0.001 | -0.121 | -0.104    |
| Std. error      | (0.396) | (0.238) | (0.159) | (0.123) |
| Observations    | 258  | 258  | 258  | 258       |

Note: This table is analogous to Table A.3 in that it shows effects of the school meals program on child labour activities, using only the subsample of high-asset households.