

## Appendix: Social and Economic Factors, School Outcomes and School Fundraising

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This appendix reports nine regressions. All regressions use components of a data set of 398 elementary schools from the Toronto District School Board. Annual data from 2009-2010 to 2011-2012 are aggregated to a single school-level observation that reflects funds raised, outcomes and student descriptions from these three years. The 398 schools are the schools where outcomes, funds raised and social and economic descriptors are available.

The first three regressions in Table A-2 estimate relationships between the social and economic variables, as well as school structure, with average funds raised as the dependent variable. The remaining regressions estimate the relationships between school outcomes, structure, social and economic variables and funds raised. The sources and a set of descriptive statistics for each variable are presented in Table A-1. We then make some comments on the details of the regressions.

### ***Fundraising***

The funds raised at each school were provided by the Toronto District School Board. The variable is the sum of school council funds and non-board funds. In the data, the split between school council and non-board funds is not consistent across schools. Total externally raised funds over the three years 2009-10 to 2011-12 were divided by total enrolment at the schools over the same years. Enrolment data are from the Ministry of Education. Table A-1 reports that average funds raised per student per year totaled \$161. The maximum value (the only value over \$1,000 in the 398 schools is that of the Karen Kain School of the Arts). The next largest amount of funds raised was \$786. Only 10 schools raised more than \$500 per student per year.

### ***School Structure Variables***

The EQAO results allow the identification of schools with only Grade 3 assessment results, both Grade 3 and Grade 6 assessment results and only Grade 6 assessment results. The EQAO results in Grade 3 identify schools with substantially more (15 or more) Grade 3 assessment results in mathematics than in either reading or writing. Because the Toronto District School Board chooses not to assess reading or writing in Grade 3 for French immersion students, this difference between total assessments in mathematics and reading identifies French immersion schools in Grade 3.

The most common structure for an elementary school in Toronto is to have both Grade 3 and Grade 6 EQAO results (76 per cent of schools.) Many of these schools (about half) would also have students in Grade 7 and Grade 8. Eight percent of schools with Grade 6 assessment results have only Grade 6 assessment results and are likely to be middle schools. Within schools that have Grade 3 results, 10 percent of schools are French immersion schools.

### ***Variables Describing Adults Living Where the Students at the School Live***

Three variables are drawn from the C.D. Howe Institute “Signposts of Success” database describing Ontario public schools in 2008-2009 and 2009-2010. The percentage of adults with completed university degrees living in the 2006 census dissemination areas in which children at this school live varies from 6.8 per cent to 75.1 per cent. The unemployment rate for the same group of adults varies from 5.5 per cent to 19.7 per cent.

The percent of households in detached homes varies from zero to 92.7 percent. It is important that these are not school catchment areas; student postal codes are used to place students from each school within their dissemination area.

### ***Variables Directly Describing the Assessment Writers***

The EQAO collects counts of students with various characteristics for the students writing each assessment. This allows construction of the following five variables: the percentage of assessment writers who are female; the percentage of assessment writers who are born outside Canada; the percentage of assessment writers currently in an English-as-Second-Language program; the percentage of assessment writers who have been in the TDSB for two years or less and the percentage of students who are receiving special education (not gifted).

TDSB elementary schools vary widely in the percentage of students with these various characteristics. We would expect that some of these characteristics, particularly the percentage of assessment writers who are special education students would strongly predict assessment pass rates.

### ***Academic Outcomes***

The academic outcome is measured as the percentage of students writing the assessment who receive a level three or level four on the assessment (pass in the sense used in the text). Schools are included only when there are at least 15 students in a grade in a year. The pass rate is calculated over the three years 2009-2010 to 2011-2012.

Table A-1 shows that schools vary widely in the percentage of students who pass the EQAO assessments.

### ***The Fundraising Regressions***

For reasons explained later, the fundraising regressions are reported both for all 398 schools and then separately for the schools involved in the Grade 3 and Grade 6 outcome regressions below.

With one exception, the coefficients on variables that predict funds are quite consistent. The equations vary little in explanatory power across these specifications.

It is very clear that schools that only have Grade 6 assessment results raise about \$100 more per student per year than other schools. The two other structural variables – being a school with both Grade 3 and 6 EQAO results versus a school with only a Grade 3 EQAO results, or being a French immersion school – do not predict variation in funds raised.

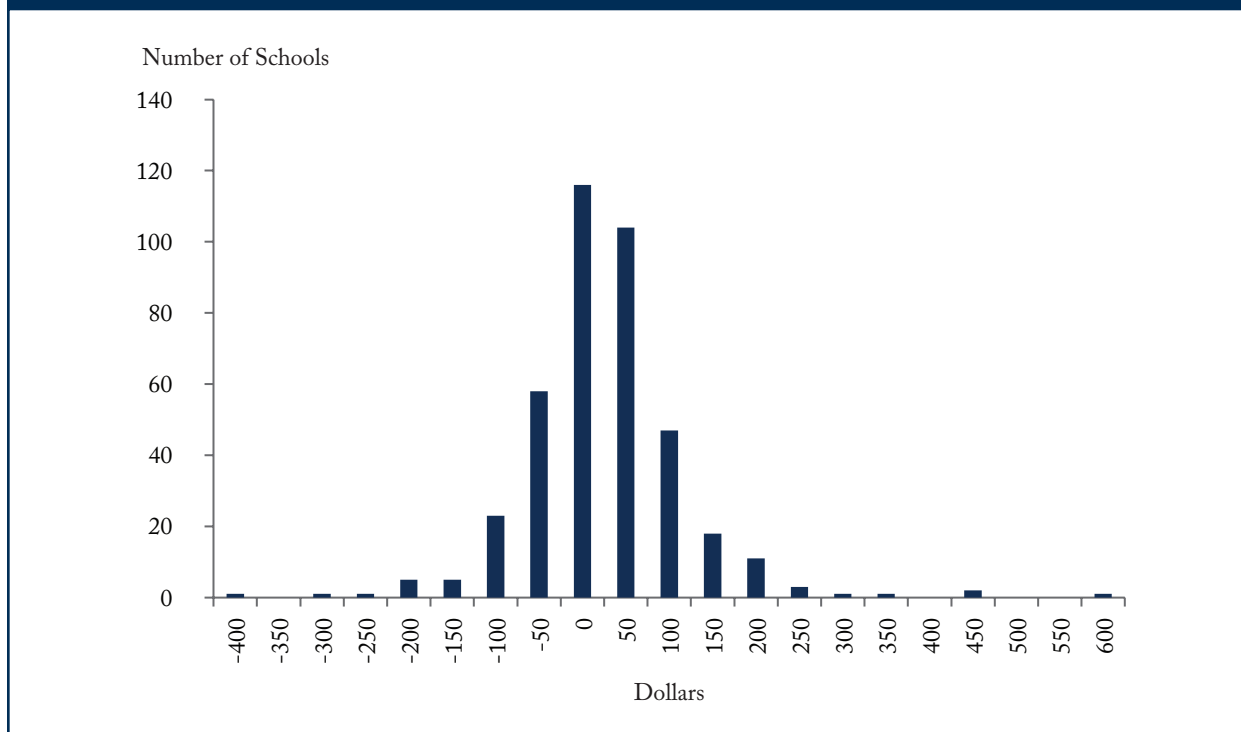
In terms of the variables that describe the social and economic background of all students at a school, all three variables are statistically and economically significant. For example, an additional percentage point of university-degree adults predicts \$3-\$4 more in funds raised per student per year. If we increase the percentage of university adults by 15 percentage points (one standard deviation), funds raised increases by \$45 against the average of \$161. An additional percentage point of unemployment at a school reduces funds by \$5 per student per year. An additional percentage point of households in detached housing increases funds raised by about a dollar. Only one of the effects associated with the directly measured student variables is statistically a significant predictor of school fundraising in the Grade 3 regression – there is a negative effect on funds raised of having more students who did not speak English. The remaining coefficients are not statistically significant.

Figure A-1 illustrates the residuals from the first regression with 398 schools in the first line of Table A-2. These residuals are that portion of funds raised at a school not associated with school structure or the social and economic background of students at the school. What is important is that the variance of these residuals is quite small. After taking into account the social and economic variation across schools, almost all schools raise between \$200 less than predicted by their background and structure and \$200 more. This means that the \$300 movement in funds raised used in the text is an enormous movement across the range of funds raised by schools.

Table A1: Descriptive Statistics for the Group of Schools Studied

| Variable                                                                                               | Average | Standard Deviation | Minimum | Maximum |
|--------------------------------------------------------------------------------------------------------|---------|--------------------|---------|---------|
| <b>Fundraising Variable</b>                                                                            |         |                    |         |         |
| Funds raised per student per year (dollars)                                                            | 161     | 130                | 0       | 1038    |
| <b>School Structure Variables</b>                                                                      |         |                    |         |         |
| Dummy for JK to Grade 6                                                                                | 0.67    | NA                 | NA      | NA      |
| Dummy for Grade 6 and above                                                                            | 0.08    | NA                 | NA      | NA      |
| Dummy for French Immersion (Grade 3 only)                                                              | .10     | NA                 | NA      | NA      |
| <b>Variables that Describe All Students at the School</b>                                              |         |                    |         |         |
| Percentage of adults with a university degree                                                          | 33.3    | 14.9               | 6.8     | 75.1    |
| Unemployment rate                                                                                      | 9.0     | 2.4                | 4.5     | 19.7    |
| Percentage of detached homes                                                                           | 31.0    | 21.5               | 0.1     | 92.7    |
| <b>Variables that Describe Students Writing Assessments at Schools</b>                                 |         |                    |         |         |
| Percentage female                                                                                      | 48.9    | 4.3                | 36.6    | 81.5    |
| Percentage immigrant                                                                                   | 21.5    | 13.2               | 3.0     | 69.0    |
| Percentage in ESL                                                                                      | 4.0     | 6.4                | 0.0     | 77.9    |
| Percentage non-English speaking                                                                        | 45.8    | 22.8               | 1.8     | 95.2    |
| Percentage less than 2 years at Board                                                                  | 8.6     | 4.9                | 1.0     | 32.6    |
| Percentage in Special Education                                                                        | 20.5    | 7.8                | 0.1     | 92.6    |
| <b>Assessment Results – Percentage of Students Who Are Participating that Pass (Number of Schools)</b> |         |                    |         |         |
| Grade 3 Mathematics (353)                                                                              | 70.0    | 14.6               | 24.4    | 100     |
| Grade 3 Reading (344)                                                                                  | 63.5    | 14.9               | 26.8    | 98.7    |
| Grade 3 Writing (344)                                                                                  | 73.8    | 12.9               | 35.2    | 98.7    |
| Grade 6 Mathematics (283)                                                                              | 63.4    | 17.0               | 25.9    | 98.3    |
| Grade 6 Reading (283)                                                                                  | 73.5    | 13.0               | 41.3    | 100     |
| Grade 6 Writing (283)                                                                                  | 74.7    | 12.1               | 42.8    | 98.3    |

Source: Authors' assessments.

**Figure A1: Unexplained Variation in Funds Raised per Student per Year for All Schools**

Source: Authors' calculations.

### ***The Outcome Regressions***

As indicated in the lower portion of Table A-2, the outcome regressions use the set of variables available to describe the school, the structure of the school, the social and economic background of students at the school, as well as the characteristics of the students.

The school structure variables are different in Grade 3 and Grade 6. When Grade 3 schools with both Grade 3 and Grade 6 results are compared to schools with just Grade 3, there is no difference in results across these types of schools. In mathematics, controlling for the other social and economic variables, there is no difference in results between schools with and without French immersion. All students in Grade 3 at a French immersion school write the mathematics assessment. However in schools with French immersion, the French immersion students do not participate in the reading and writing assessment. The dummy variable on a school being a French immersion school has fairly tightly estimated value of negative 5.7 (5.8). This value indicates that the average pass rate in reading (writing) at these schools is 5.7 percentage points lower than the pass rate predicted by the school's social and economic composition compared to other schools simply because it is a French immersion school. This suggests that the immersion students are, within that school for the all-school social and economic characteristics, the students whose characteristics predict better results. This is very strong evidence that classes within French immersion schools are heavily sorted by student background and ability.

The all-school variables are all strongly associated with better results. More educated parents, parents with less unemployment and parents who live in detached homes are all strongly associated with higher pass rates. Females have higher pass rates in reading and writing.

Table A2: Regression Results

| Structure Variables           |                    |             | All-school Variables (%) |               |             |                   | Assessment Writer Variable (%) |            |                     |            |                      | Funds In Dollars | Fit R <sup>2</sup> |                                |
|-------------------------------|--------------------|-------------|--------------------------|---------------|-------------|-------------------|--------------------------------|------------|---------------------|------------|----------------------|------------------|--------------------|--------------------------------|
| Regression Dependent Variable | JK to 6 or JK to 8 | FI          | Grades 3 and 6 only      | Grade 6 only  | With Degree | Unemployment Rate | In a Detached Home             | Girl       | Born Outside Canada | ESL        | Non-English Speaking |                  |                    | Less than 2 years at the Board |
| Funds Raised                  |                    |             |                          |               |             |                   |                                |            |                     |            |                      |                  |                    |                                |
| All schools (398)             | NA                 | NA          | 6.6 (9.5)                | 104.9 (24.4)* | 3.86 (.52)* | -5.28 (1.7)*      | 1.16 (.26)*                    | 2.76 (2.8) | -1.2 (.72)          | .05 (.56)  | -.40 (.26)           | 1.76 (1.61)      | -1.14 (.72)        | NA 0.48                        |
| Grade 3 Schools (353)         | 13.6 (9.0)         | -1.7 (19.8) | NA                       | NA            | 3.25 (.52)* | -5.4 (1.7)*       | 0.98 (.27)*                    | -.57 (1.0) | -.21 (.70)          | -.07 (.53) | -.57 (.27)*          | .03 (1.73)       | -1.21 (.73)        | NA 0.45                        |
| Grade 6 Schools (283)         | NA                 | NA          | NA                       | 97.9 (23.8)   | 4.1 (.64)*  | -3.9 (2.1)*       | 1.26 (.33)*                    | 5.2 (4.1)  | -1.2 (.88)          | -1.4 (1.2) | -.50 (.32)           | 2.86 (2.0)       | -1.64 (1.0)        | NA 0.48                        |
| Grade 3 EQAO Outcomes         |                    |             |                          |               |             |                   |                                |            |                     |            |                      |                  |                    |                                |
| Reading                       | -2.7 (1.2)*        | -5.7 (1.6)* | NA                       | NA            | .48 (.05)*  | -1.2 (.26)*       | .05 (.03)                      | .28 (1.0)* | -.20 (.09)*         | -.01 (.14) | .10 (.03)*           | -.39 (.19)       | -.62 (.07)*        | .012 (.005)* .64               |
| Writing                       | -3.8 (1.2)*        | -5.8 (1.6)* | NA                       | NA            | .33 (.05)*  | -1.2 (.29)*       | .08 (.03)*                     | .44 (.09)* | -.14 (.09)          | -.09 (.15) | .15 (.03)*           | -.18 (.19)       | -.53 (.08)*        | .007 (.005) .52                |
| Math                          | -.88 (1.3)         | -.55 (1.4)  | NA                       | NA            | .50 (.05)*  | -1.6 (.27)*       | .06 (.03)*                     | .17 (1.0)  | -.23 (.08)*         | .01 (.13)  | .22 (.03)*           | -.23 (.18)       | -.63 (.08)*        | .010 (.005)* .66               |
| Grade 6 EQAO Outcomes         |                    |             |                          |               |             |                   |                                |            |                     |            |                      |                  |                    |                                |
| Reading                       | NA                 | NA          | NA                       | -5.0 (1.2)*   | .38 (.04)*  | -.89 (.21)*       | .02 (.02)                      | -.01 (.08) | -.03 (.06)          | -.13 (.10) | -.08 (.03)*          | -.46 (.10)*      | -.54 (.05)*        | .014 (.004)* .73               |
| Writing                       | NA                 | NA          | NA                       | -5.4 (1.3)*   | .30 (.04)*  | -1.1 (.26)*       | .05 (.02)*                     | .07 (.08)  | -.03 (.06)          | -.19 (.11) | .16 (.03)*           | -.28 (.11)*      | -.53 (.06)         | .007 (.003)* .64               |
| Math                          | NA                 | NA          | NA                       | -6.6 (1.6)*   | .53 (.05)*  | -1.3 (.33)*       | .10 (.03)*                     | -.13 (.10) | -.08 (.08)          | .08 (.17)  | .29 (.04)*           | -.48 (.16)*      | -.61 (.08)*        | .018 (.004)* .70               |

Note: Robust standard errors in parentheses. \* indicates statistically different from zero at 5% level of significance.

There are either three or four variables associated with immigration and mobility. These are strongly interrelated variables.<sup>1</sup> Being born outside Canada lowers reading and math results but has no effect on writing results.<sup>2</sup> In Grade 3, controlling for the other variables, not speaking English as the first language is associated with slightly better results, and being in the Board less than two years with slightly lower results. Immigrants have a complicated interaction between the problem of overcoming language difficulties and the resourcefulness they have shown by being persons from their home country who had the “get up and go” to get up and go – a form of self selection.

Finally, a designation as Special Education has a very strong relationship to the pass rate. One percentage point more of students in Special Education reduces the pass rate by almost one percentage point.

Controlling for the other variables discussed to date, a school that raises \$100 more in funds than predicted by the variables in the Grade 3 regression, is predicted to have a 1.0 percentage point higher pass rate. Since the effective variation in funds raised is about \$400, the largest plausible association of funds on pass rates is only 4 percentage points in Grade 3.<sup>3</sup>

The regressions predicting Grade 6 outcomes are similar in most respects to the Grade 3 regressions. There is no estimated French immersion effect since both immersion and non-immersion students write all the assessments.

There is a very strong effect on academic outcomes for students who are writing Grade 6 assessments in a school where only Grade 6 assessments are written, in other words, a middle school. Middle schools have pass rates that are 5 percentage points lower.

The remaining variables have very similar coefficients to their counterparts in the Grade 3 regressions already discussed. Students who come from homes with more educated adults who are employed, do better. The female effect is weaker in Grade 6 and no longer statistically significant. The coefficient mix on immigration and language variables is similar. An additional percentage of Special Education students reduce predicted pass rates by a large amount.

The coefficients on the fundraising variables across the three equations are similar, about 0.015 in reading and mathematics and zero in the writing equation. Thus, the additional \$100 of funds in a Grade 6 prediction equation is associated with a 1.5 percentage point improvement in pass rates in reading and mathematics and no change in the predicted pass rate in writing. These results could be scaled as follows: Grade 6 writing assessments in a school where only Grade 6 assessments are written (a middle school) drops pass rates by 5 percentage points. In a school where \$300 more per student is raised, a vast change in fundraising between similar schools, the model would predict a roughly 4.5 percentage point increase in pass rates.

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1 Results are not sensitive to the inclusion or exclusion of one of these variables.

2 The writing assessment does have a higher mean pass rate with a smaller standard deviation and a lower minimum. It seems that the writing assessment provides less differentiation between students across schools than the reading or mathematics assessment.

3 When the exact same variables are in the fundraising regression as in the outcome equation, the coefficient on funds raised in the outcomes equation is interpreted as the effect of one additional dollar of funds not predicted by the fundraising equation.