

Unpaid Lunch Debt in Durham, NC

Julia Donheiser

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Introduction

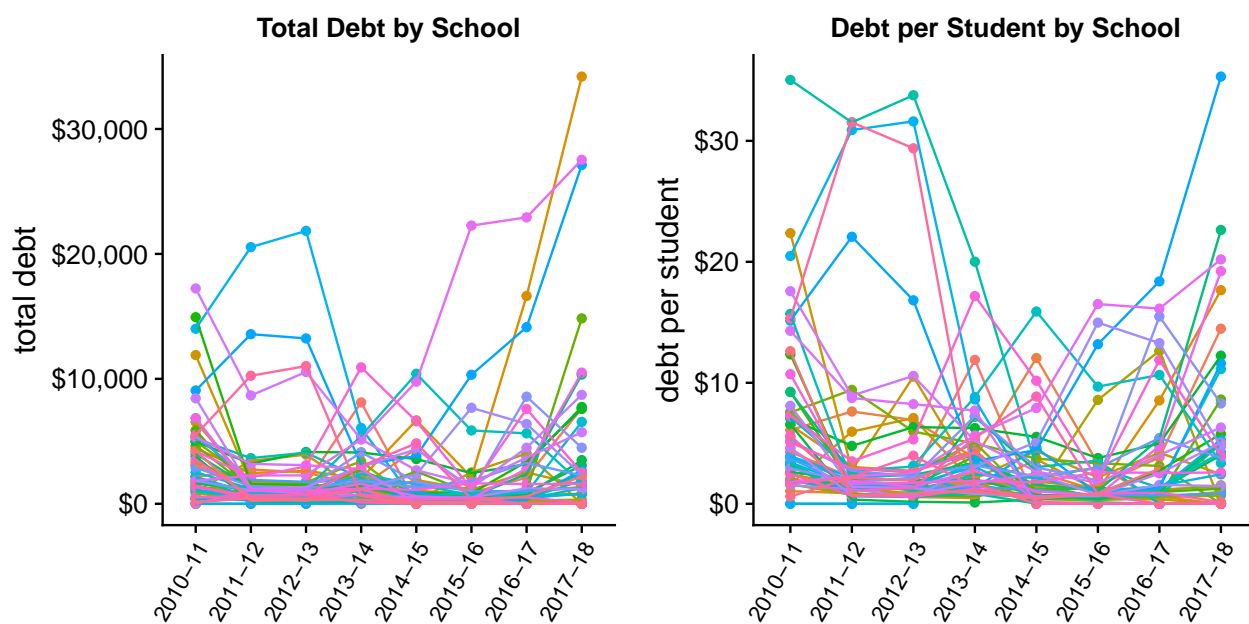
When families can't afford to pay for student lunches, school districts foot the bill. But with major cuts to educational funding in North Carolina—where some schools don't even have enough funds to pay for students' textbooks—this means school districts can wrack up tens of thousands of dollars in debt. In Durham, students with five or more unpaid lunches only receive a juice and a sandwich instead of a hot lunch. This lends its way to “lunch shaming”, where students who can't afford pay skip the meal altogether to avoid the embarrassment of eating a cold lunch. This is a major issue, since student performance in school is directly tied to access to quality food.

Data Sources

- End-of-Year unpaid meal data from James Keaton, director of child nutrition services at DPS.
- All free/reduced price lunch data was obtained from ncpublicschools.org
- 2010-11 through 2015-16 demographic data was obtained from the [NCES ELSI table generator](#), code 91803
- 2017-18 ADM data from ncpublicschools.org's [Average Daily Membership and Membership Last Day by School](#)
- 2016-17, 2017-18 demographic data from [Durham Public Schools](#)

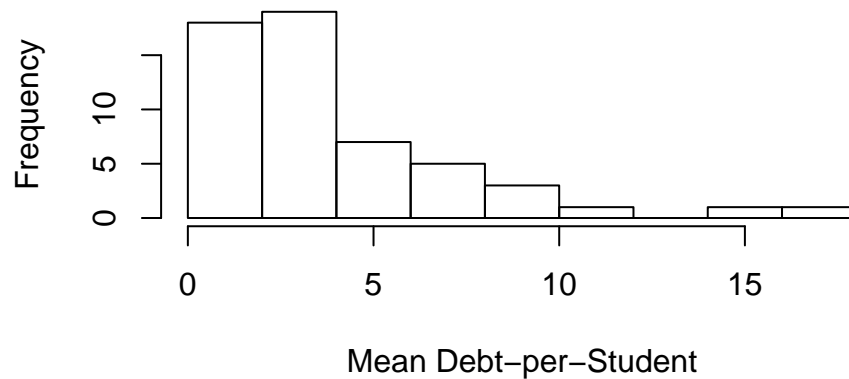
Exploratory Data Analysis

Longitudinal look at debt from 2010-11 through 2017-18



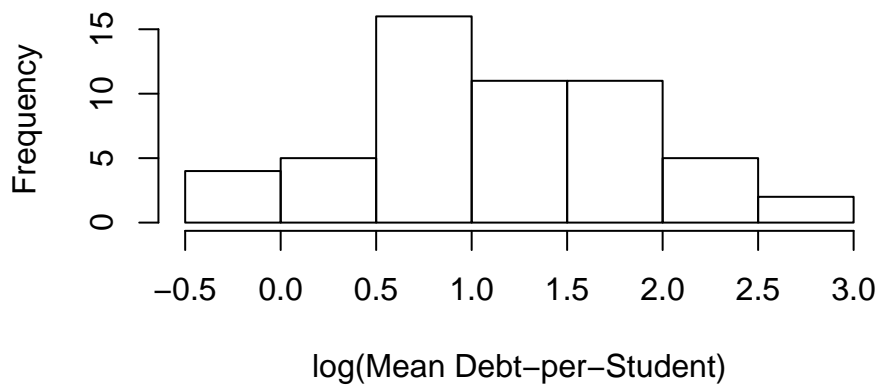
There's a lot of fluctuation in total debt and debt-per-student across all schools, so I'll try to find the "most extreme" schools using a few measures. The first is simple: Let's see which schools, on average, have the highest debt.

Histogram of Mean Debt-per-Student



The data is not normally distributed. Let's try a log transformation.

Histogram of log(Mean Debt-per-Student)



A log transformation makes this data much more normalized. Let's use this to grab find outliers in the data based on Z-scores.

```
## # A tibble: 1 x 5
##   school_no mean_debt log_debt log_z outlier
##   <chr>      <dbl>    <dbl> <dbl>    <dbl>
## 1 353          0    -6.91 -6.03      1
```

After normalizing the data with a log transformation, there aren't any schools that seem to be outliers in terms of their mean debt-per-student, except for 353 (Middle College High School), which typically has *less* debt than the rest of public schools. What's different about this school?

```
##   year adm unpaid free reduced cep
## 1 2010-11 92 0.0 0 0 0
## 2 2011-12 101 0.0 2 0 0
## 3 2012-13 104 0.0 0 0 0
## 4 2013-14 NA 4.3 NA NA NA
## 5 2014-15 NA 0.0 NA NA NA
## 6 2015-16 NA 0.0 NA NA NA
```

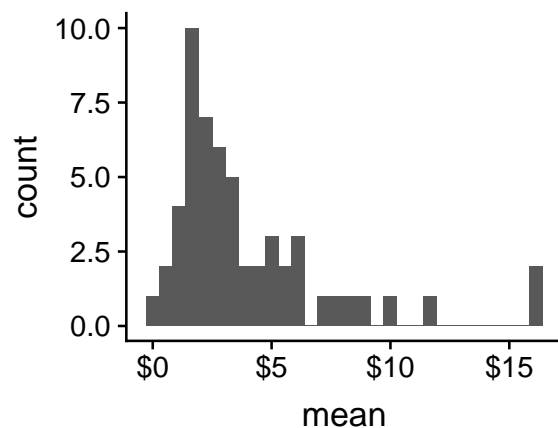
```
## 7 2016-17 NA 0.0 NA NA NA
## 8 2017-18 192 0.0 NA NA NA
```

Hm. Seems like we're missing a lot of data.

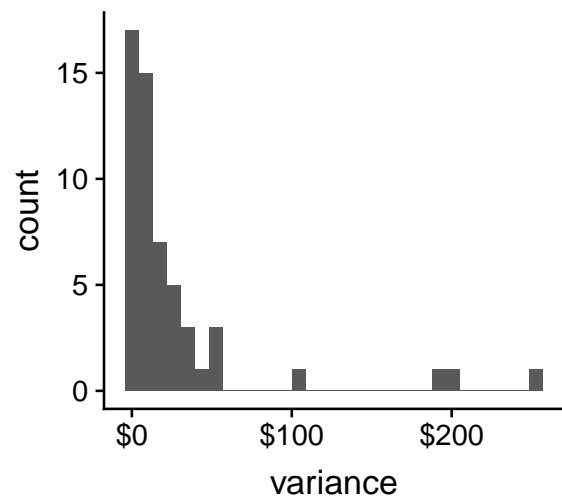
I also looked at the mean and variance of debt per student by school. This gives us a sense of *how* much debt per student fluctuates within in each school. Schools with a high variance should be looked into—perhaps fluctuations in debt are tied to CEP status? Or someone bailing a school out of debt? Similarly, schools with a generally high mean debt per student are of interest. Why are these schools struggling more than others?

Mean and variance of debt within schools

Mean Debt-per-Student



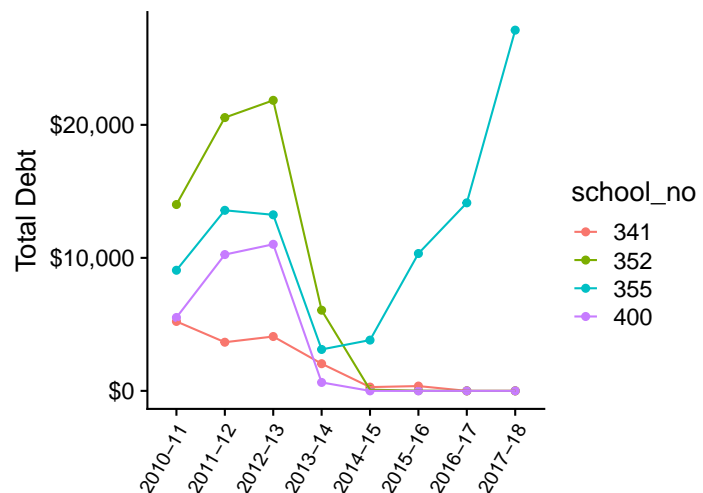
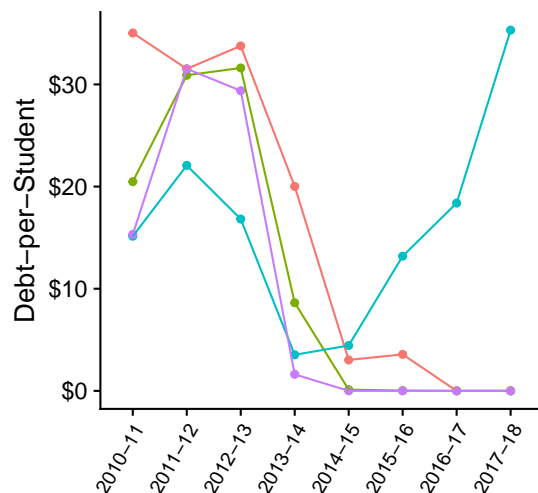
Within-School Variance



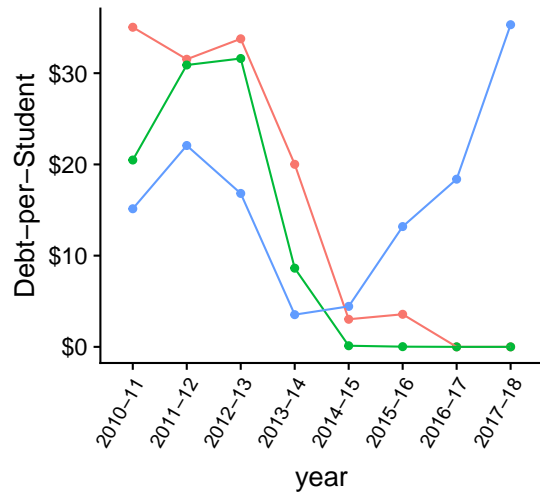
There are definitely some outliers in our data when it comes to variance of within-school debt per student and mean debt-per-student. Let's pull any schools that fall greater than 2 standard deviations from the mean (proper outliers) and see what their debt-per-student looks like longitudinally.

High variance schools

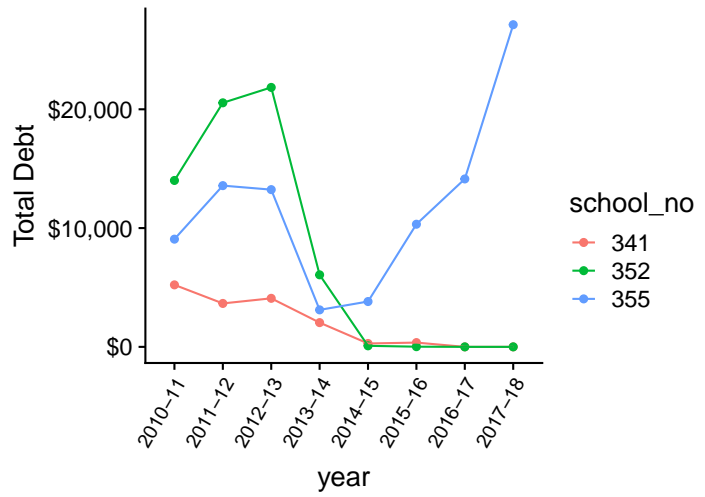
Schools with Most Variance of Debt-per-Student (Var > 100)



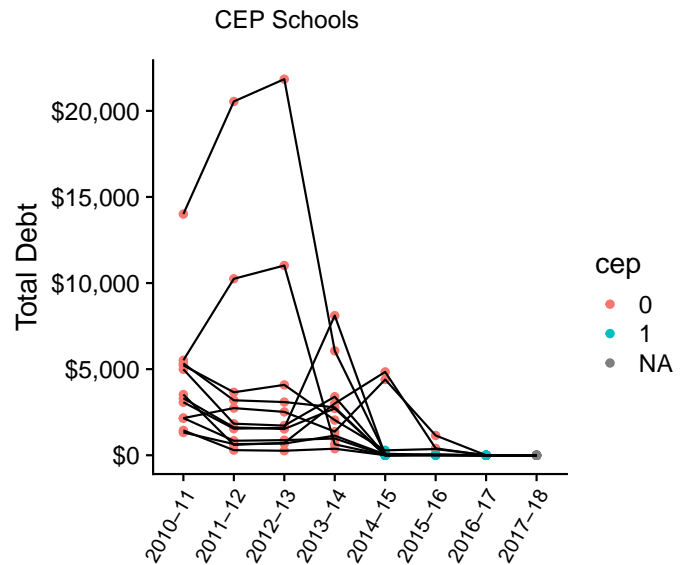
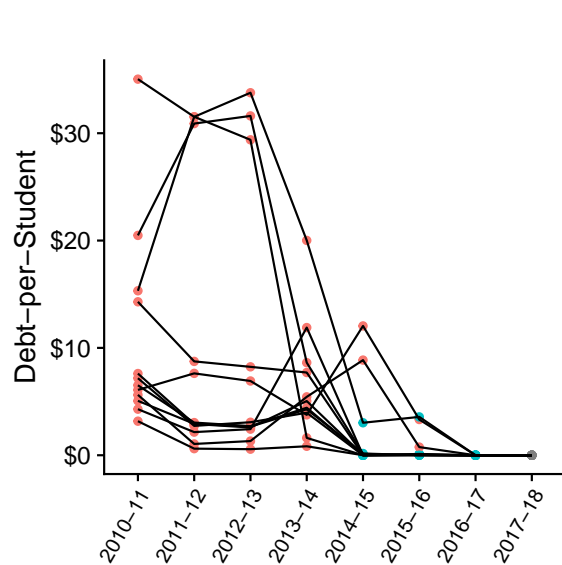
Schools with the most debt



Schools with Outlier Mean Debt-per-Student ($Z > 2$)



CEP Schools



NOTES:

- CEP provisions began in 2010

FOR NEXT WEEK: - get 2010-11, 2011-12, 2012-13, 2013-14 and 2017-18 CEP data - fill missing adm/pct needy data (why missing?) - ask about when school lunch data pulled

- external factors (paying off debt, CEP status)
- how to track people paying off debt/dates?
- think about fairly comparing schools
- LONG TERM: can a student graduate with debt? are they barred from anything? what are consequences besides food?