Economic Inequality and Academic Achievement

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Prepared for the 5th IEA International Research Conference, Singapore, June 25, 2013

Background

Social background has been known to be linked to test scores since Binet and Simon

Sometimes the dependence of test scores on social background leads to relevant variance, sometimes it is irrelevant variance

The relation of social background to individual's test scores has been a major research topic for half a century

This relation has been called the most replicated result in social science

It is a general result, internationally

Background

In the US, especially, there have sometimes been innatist interpretations

There has also been serious work to understand what the causal elements of social class might be (e.g. the Alison Davis tradition, linguistic restrictions)

There has been serious work to understand how home environment factors correlated with social class could explain achievement differences (e.g., Benjamin Bloom)

There has recently been a great deal of more nuanced work focusing on achievement as a function of family income (e.g., Sean Reardon)

We also know that income is related to achievement both within and between countries

Background

There has been a parallel set of work on the impact of economic inequality and its impact on economic growth

The argument is that economic inequality in a society can actually hamper economic growth

That is, countries with greater inequality experience slower economic growth than countries that are more economically egalitarian

The same kinds of theoretical arguments are beginning to be made about education

This Talk

My topic is the relation of economic inequality and the academic achievement of nations

I will draw on IEA data (TIMSS and PIRLS) and UN and World Bank data on economies

I look at average achievement, the fraction of students with (internationally benchmarked) high achievement, and low achievement

How Do We Measure Economic Inequality?

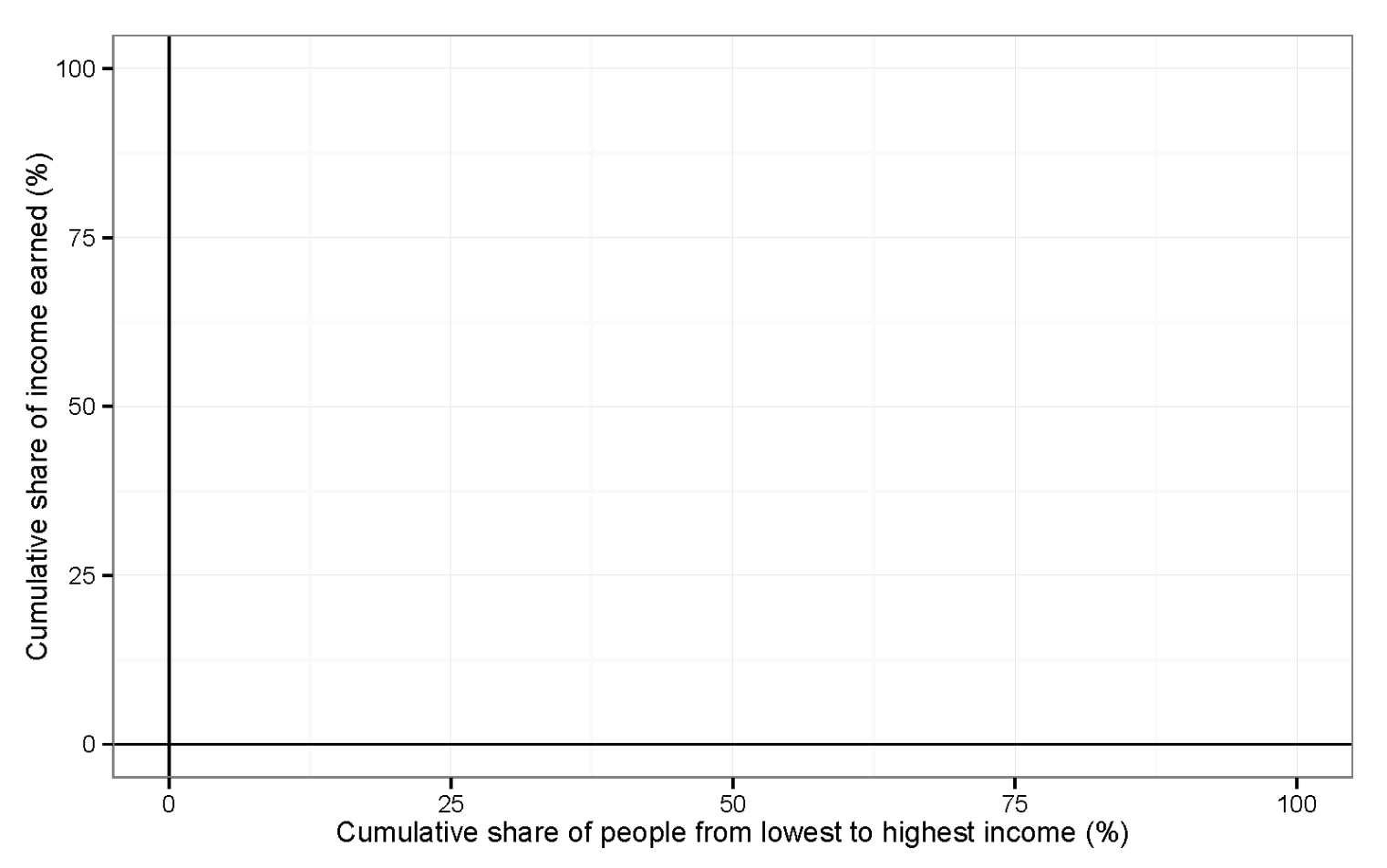
There are lots of ways to do this

One way is the ratio of the income of the top 10% of the population to that of the bottom 10% of the population (the 90/10 ratio)

The problem with this measure is that it focuses on two specific parts of the income distribution

Another measure that takes the entire income distribution into account is the Gini coefficient

Plot the percent of total income against the income percentile, the Lorentz curve



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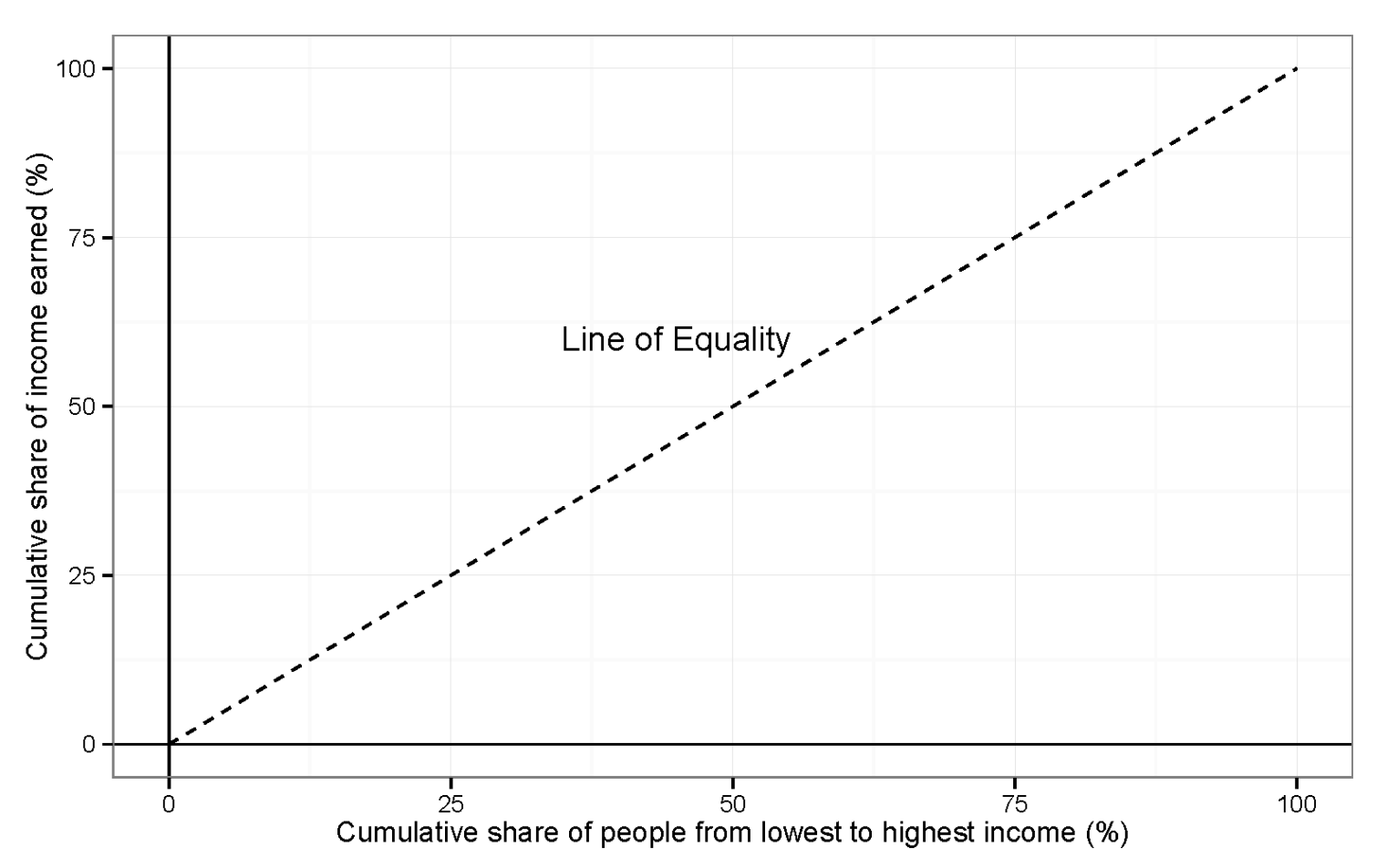
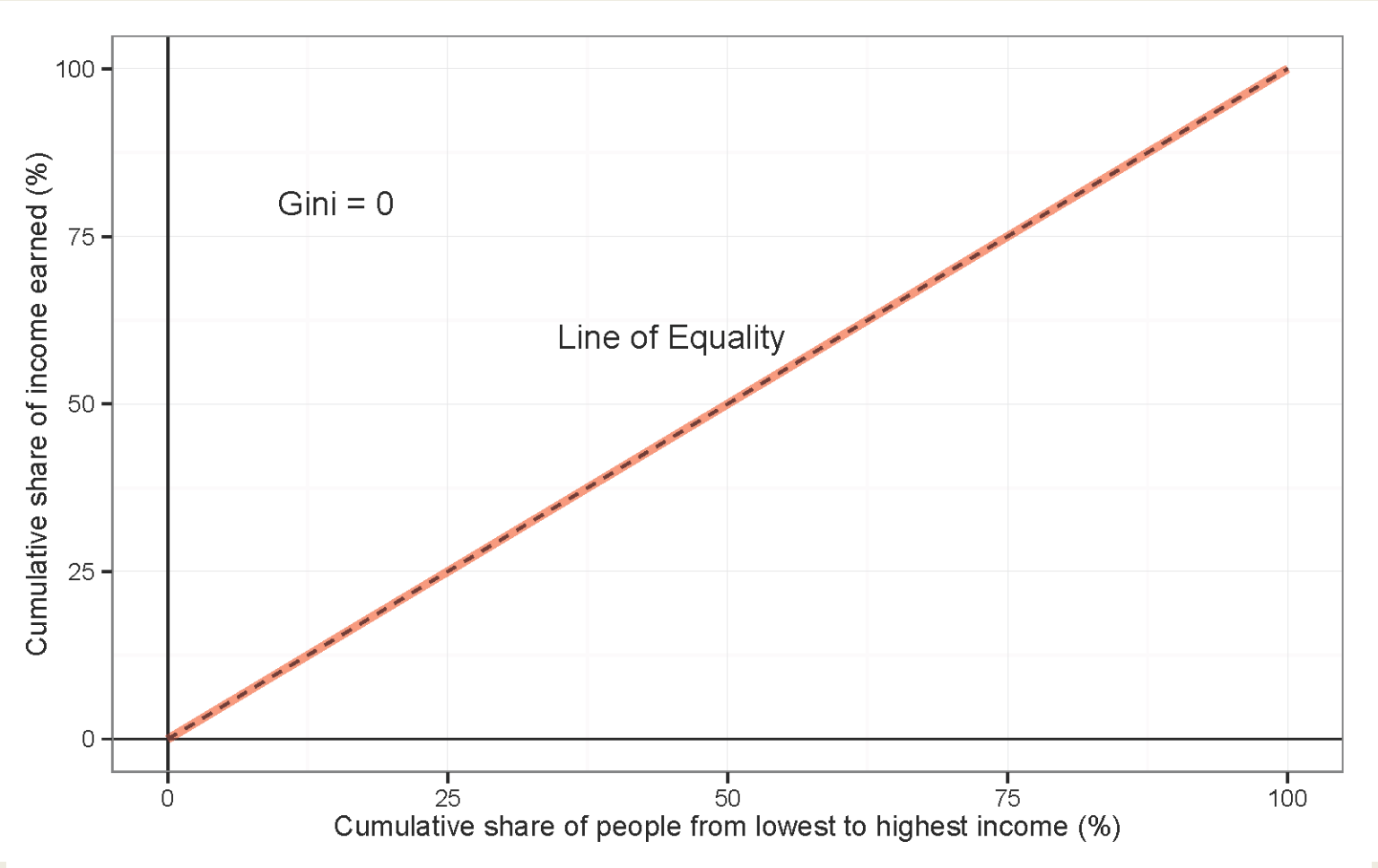
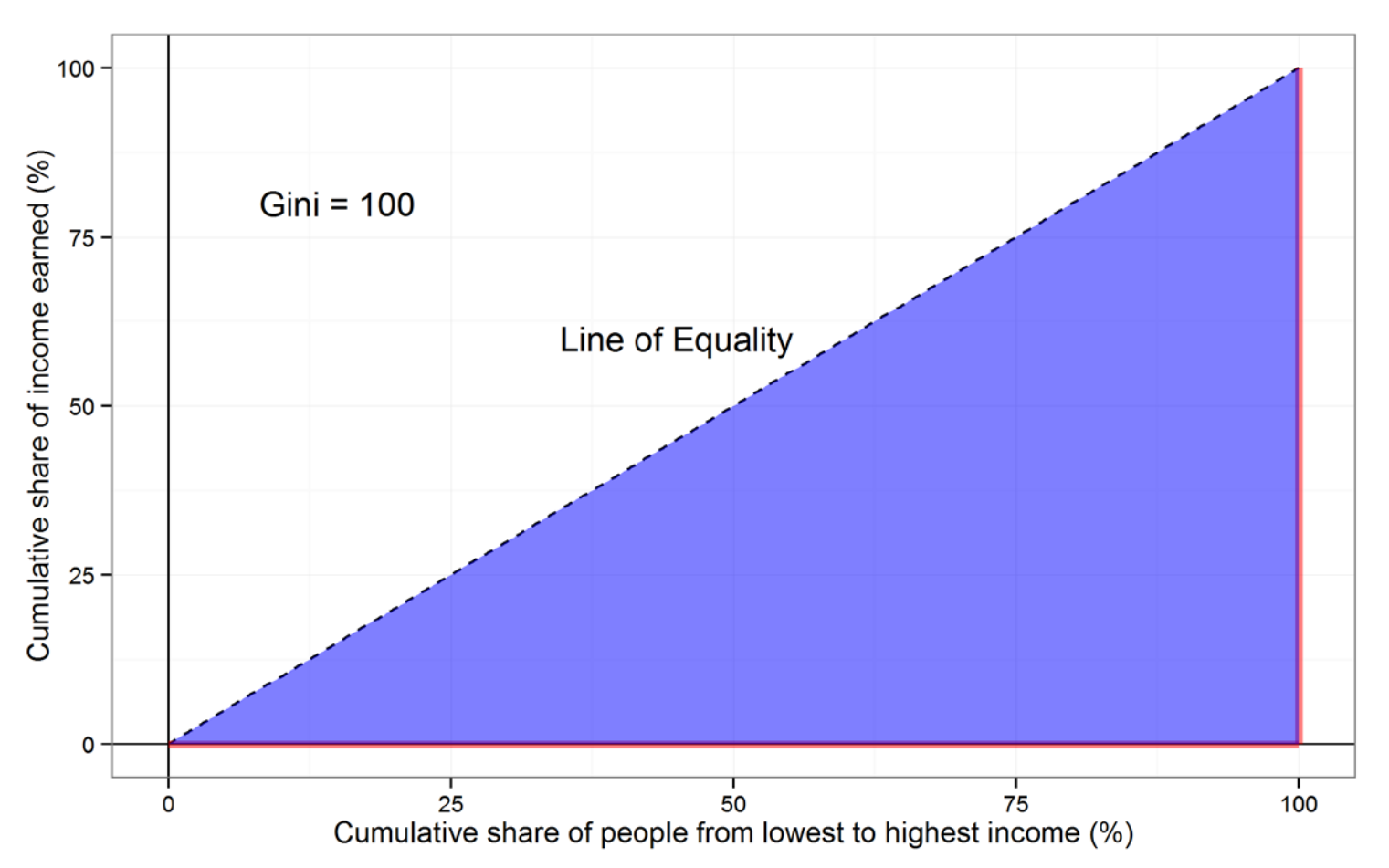


If everyone had the same share of income, the Lorentz curve would be a line at 45°



If one person had all the income, the Lorentz curve would be a backwards L shape



The real situation is between these two extremes, so the Lorentz curve looks like this

The Gini coefficient is proportional to the area between the 45 line and the Lorentz curve

The bigger the Gini coefficient, the greater the economic inequality

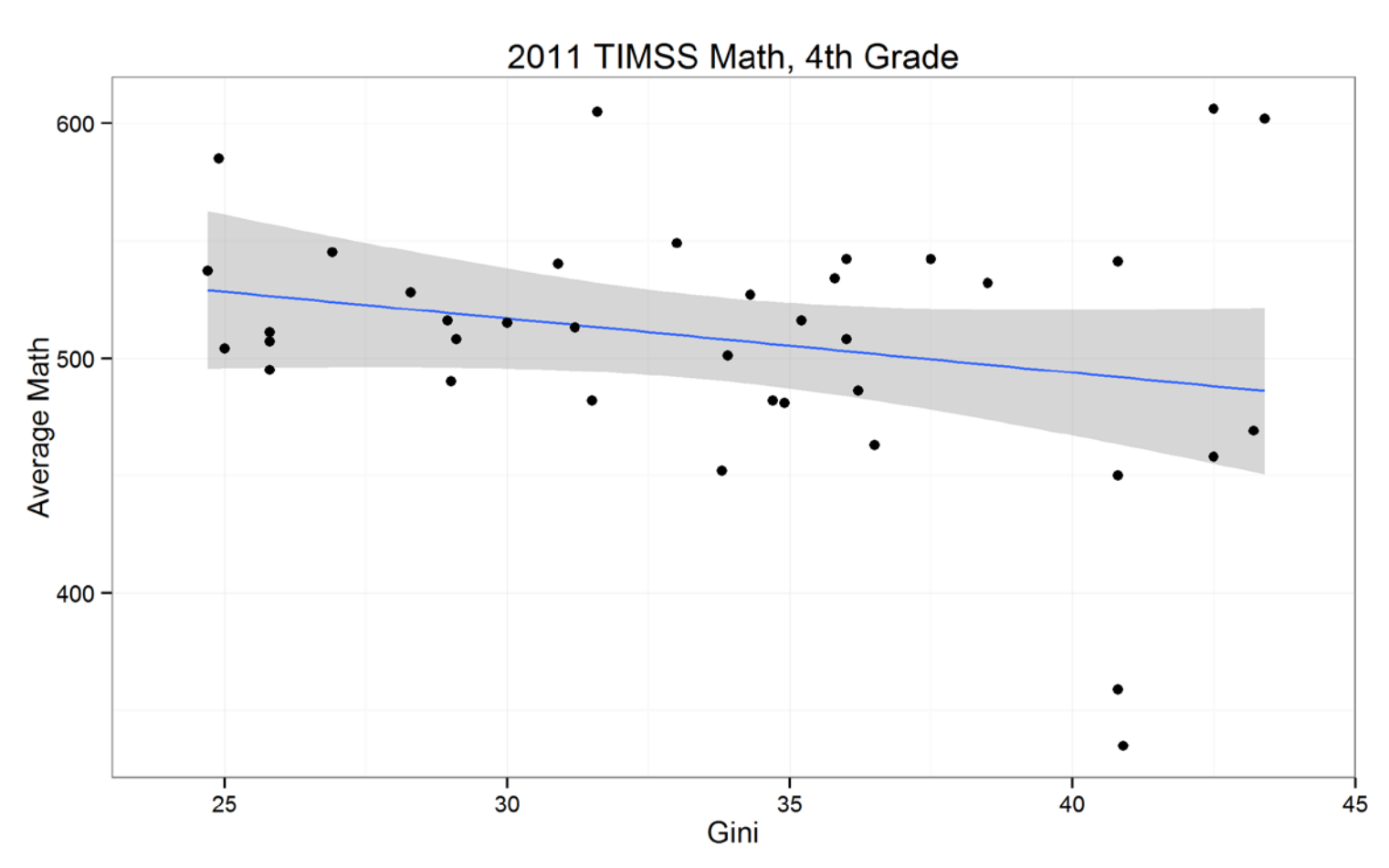
The Gini coefficient is not a perfect measure of economic inequality

It does not reflect:

- resources available to all (e.g., health care in some countries)
- regional differences in income and cost of living
- restrictions on availability of resources

But any national measure of inequality must oversimplify to some extent

Results that follow would be qualitatively equivalent with 90/10 ratio used in place of Gini coefficients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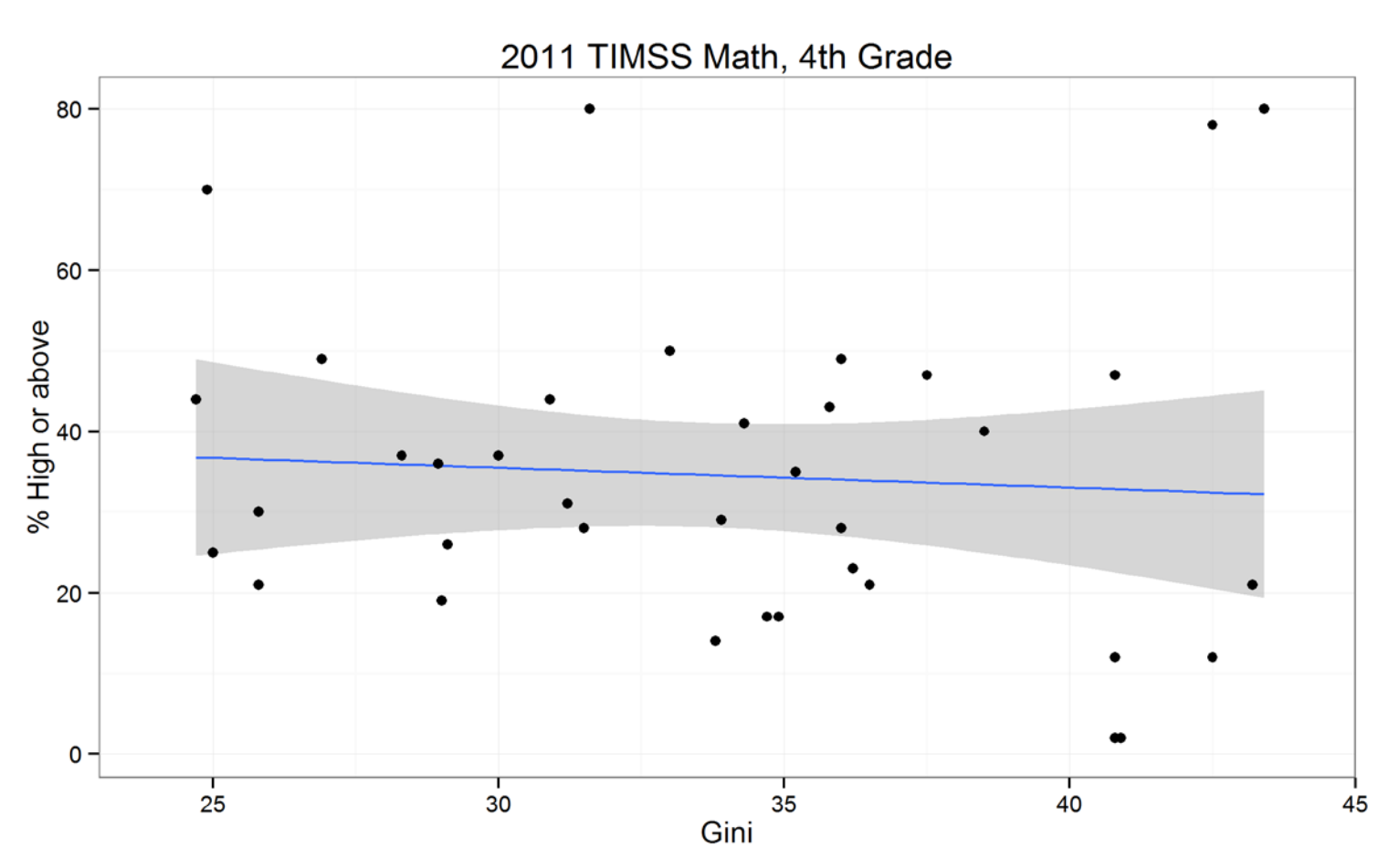
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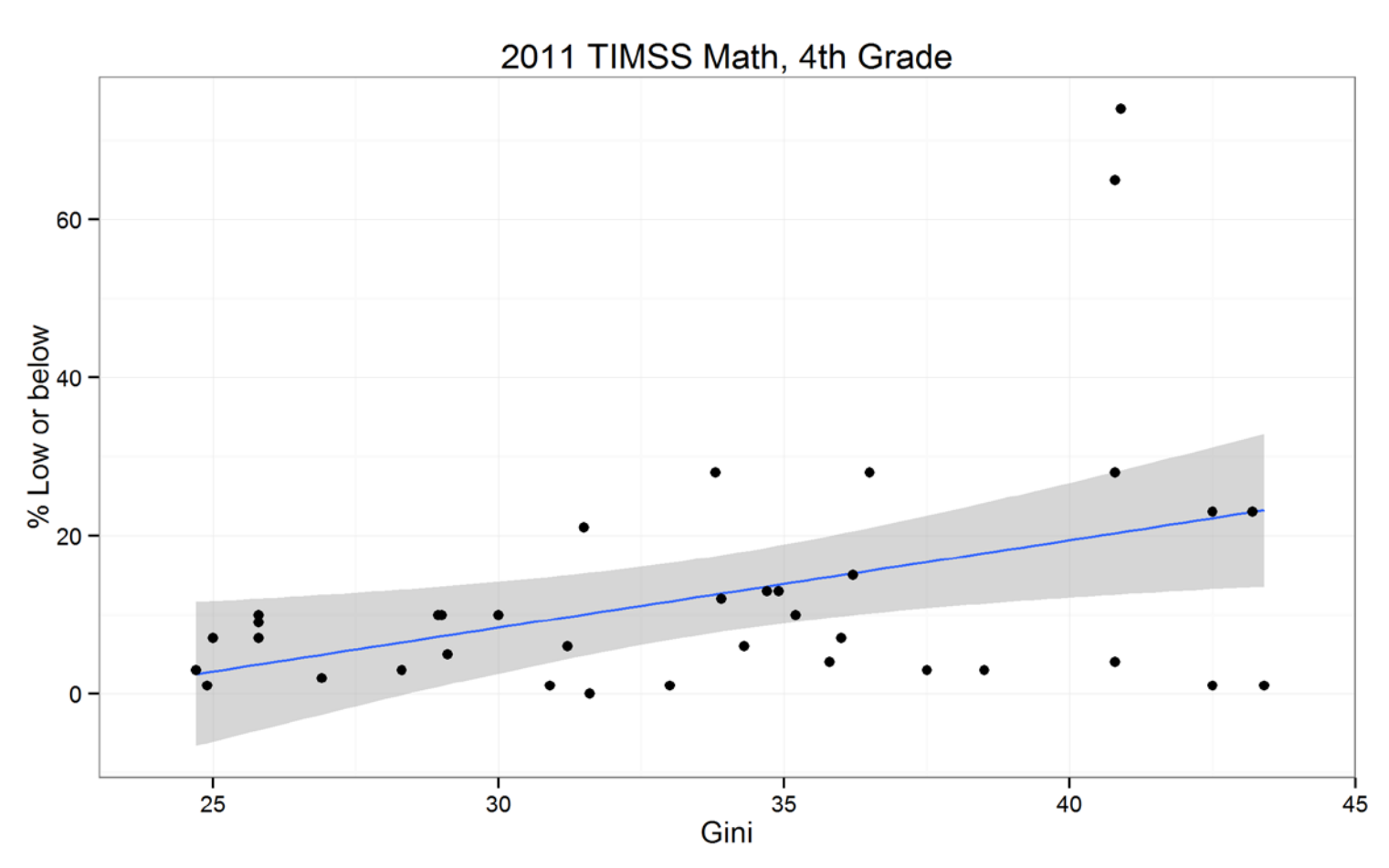
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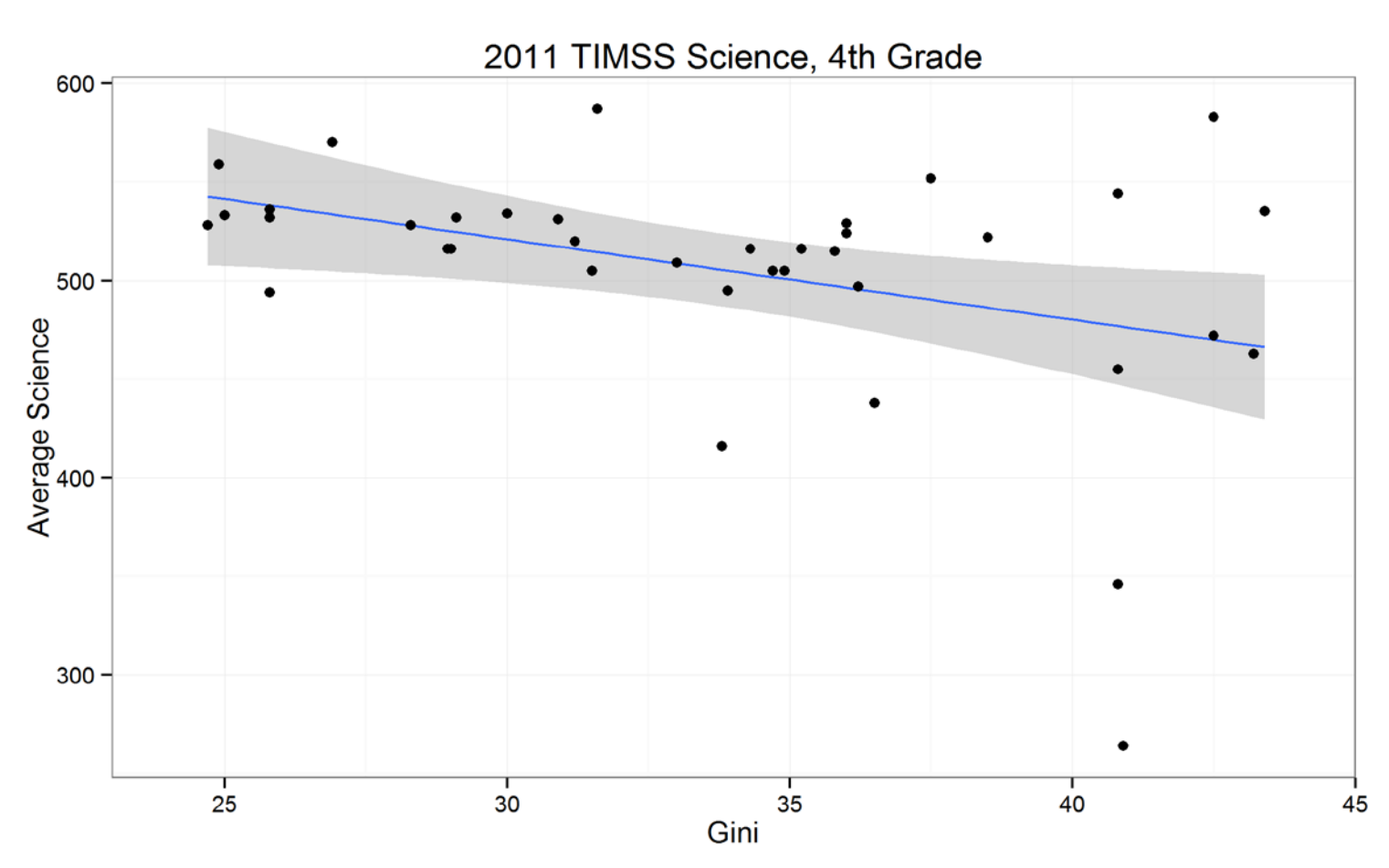
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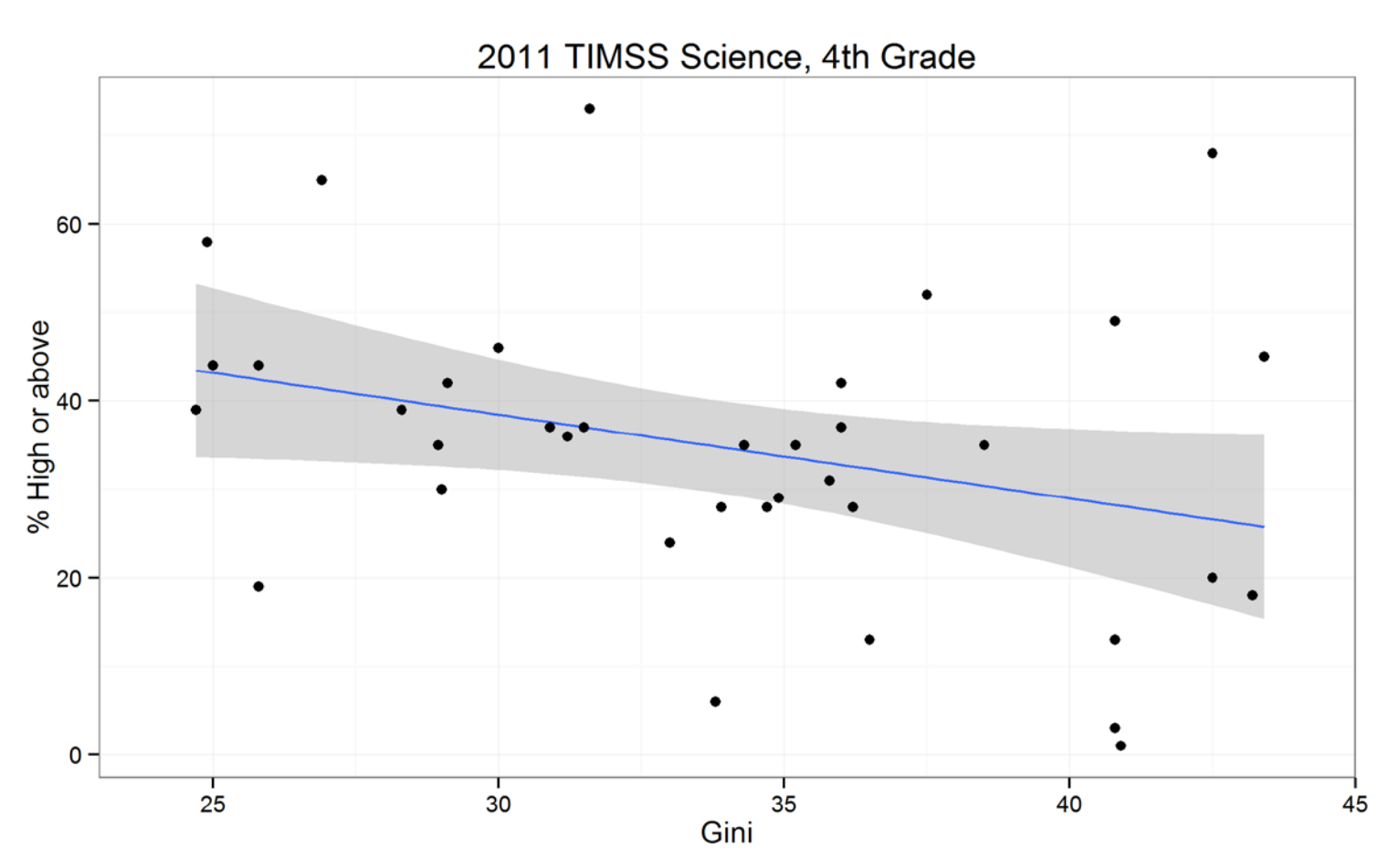
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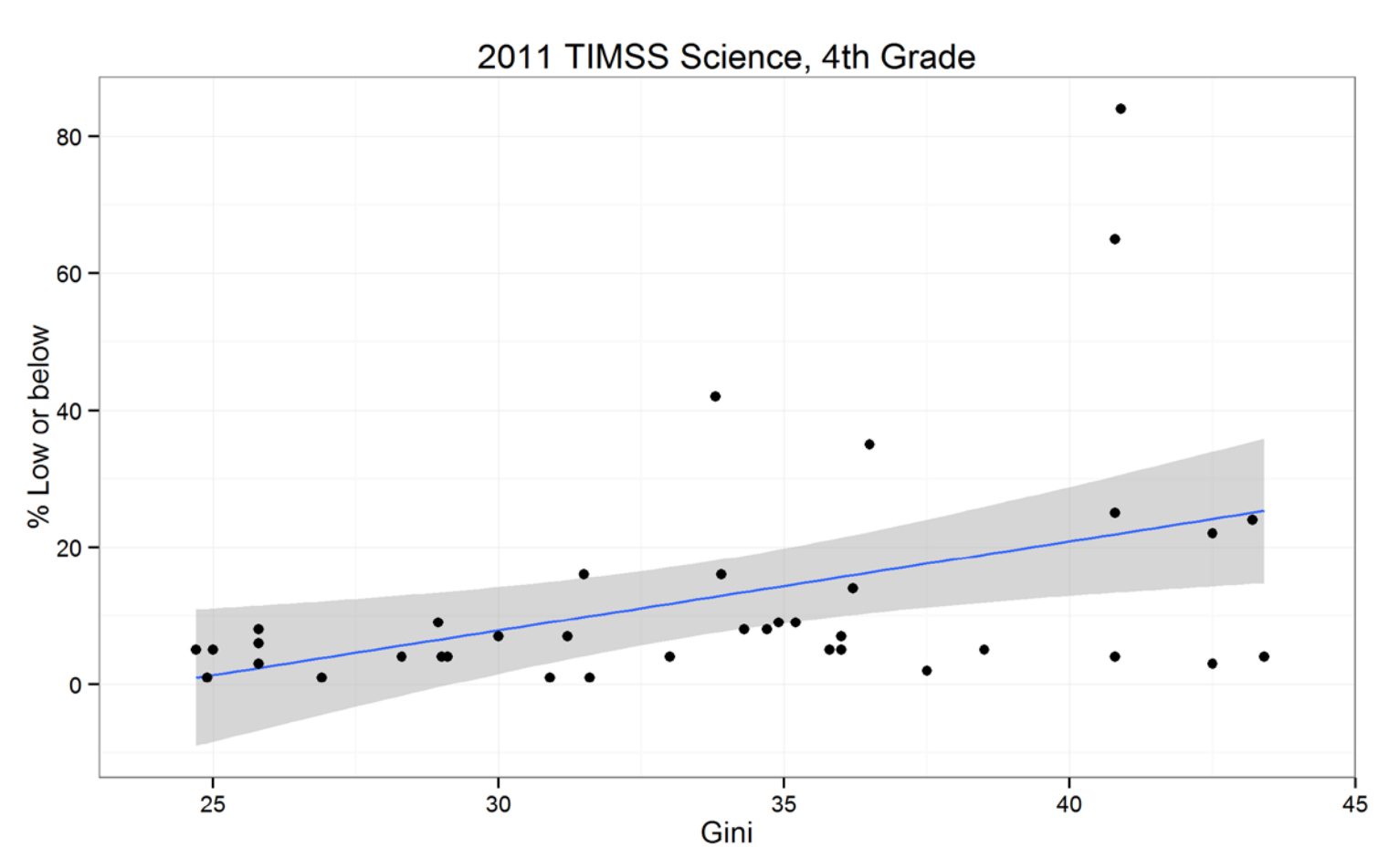
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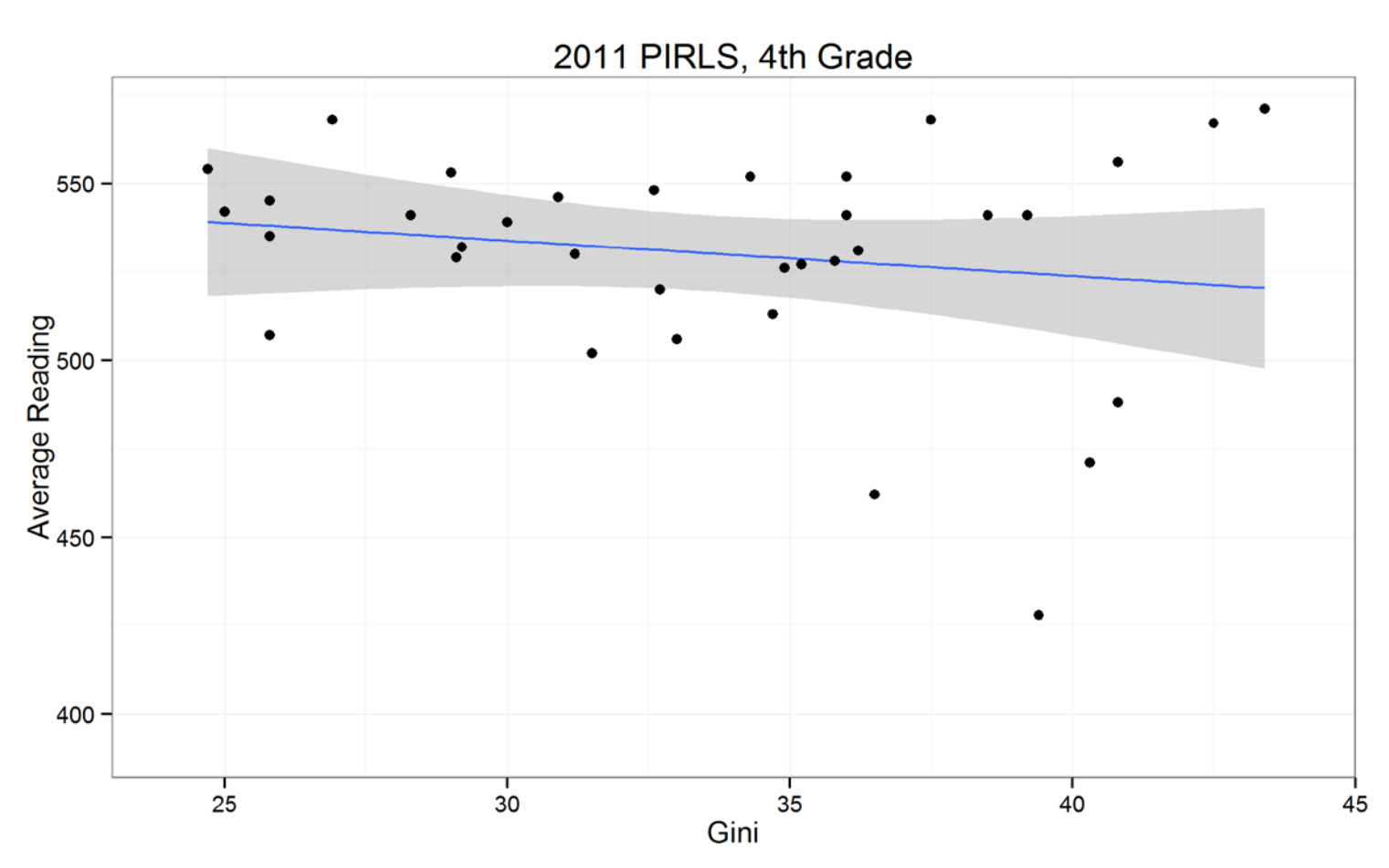
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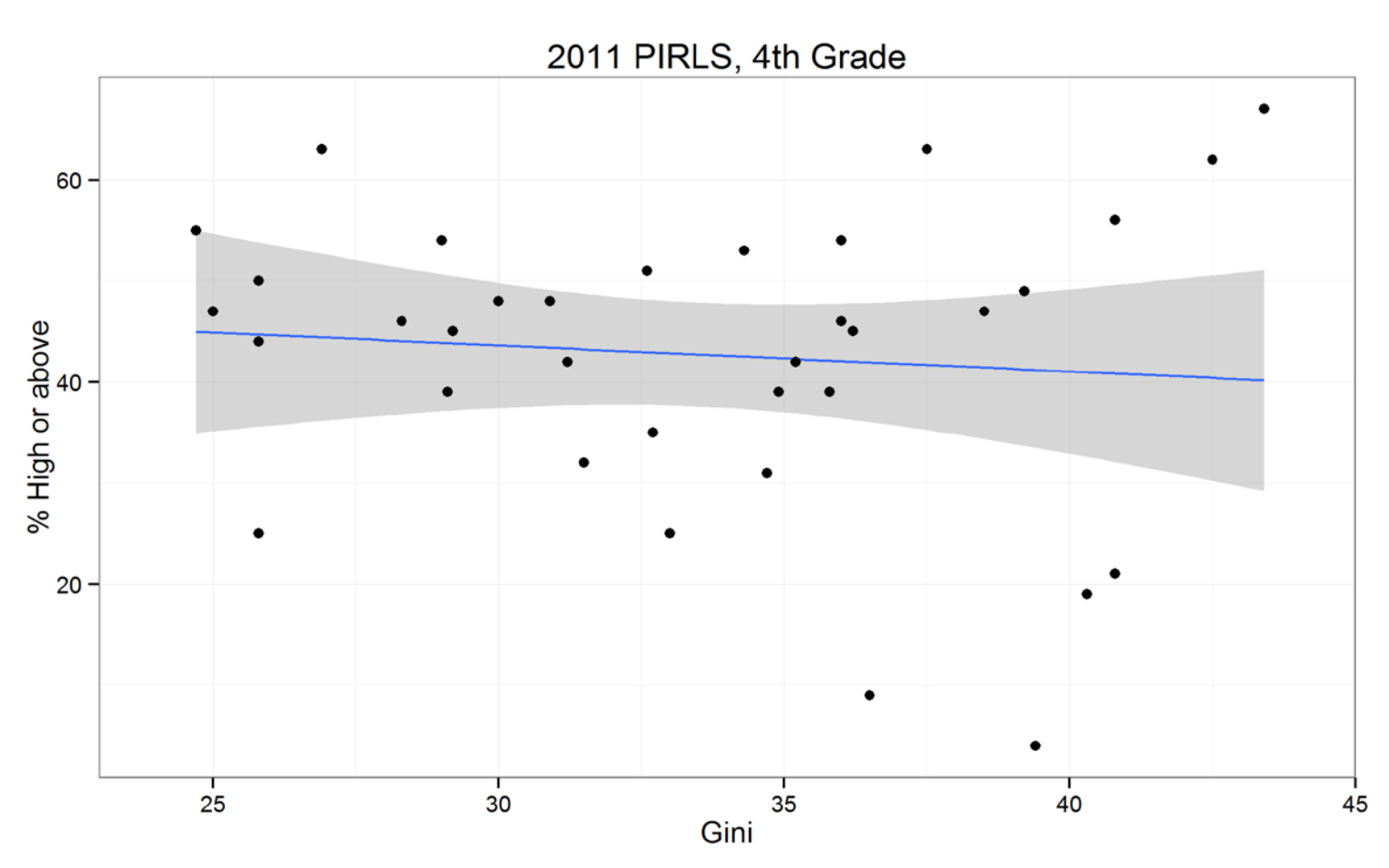
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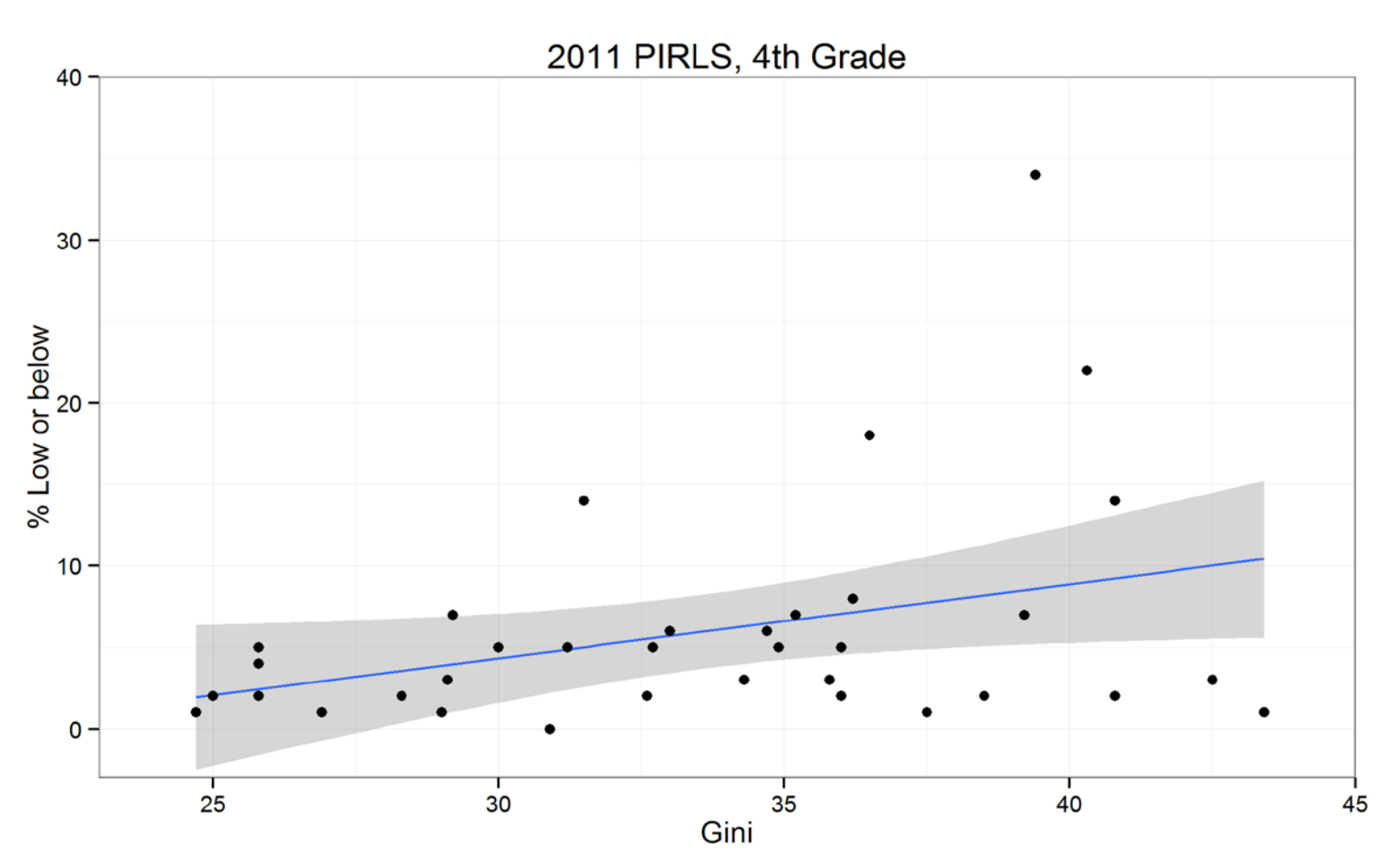
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Gini
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Overall, It Appears That There Is

A slight negative relation between average achievement and inequality

A negligible relation between inequality and proportion of high achieving students

A weak positive relation between inequality and proportion of low achieving students

Results are quite similar in 8th grade Math and Science

How Does National Wealth Affect These Results?

We might measure national wealth by GDP per capita

Fit a regression model like

$$\text{Achievement} = \beta_0 + \beta_1 \text{Gini} + \beta_2 \text{GDP/C} + \beta_3 \text{Gini*GDP/C} + \varepsilon$$

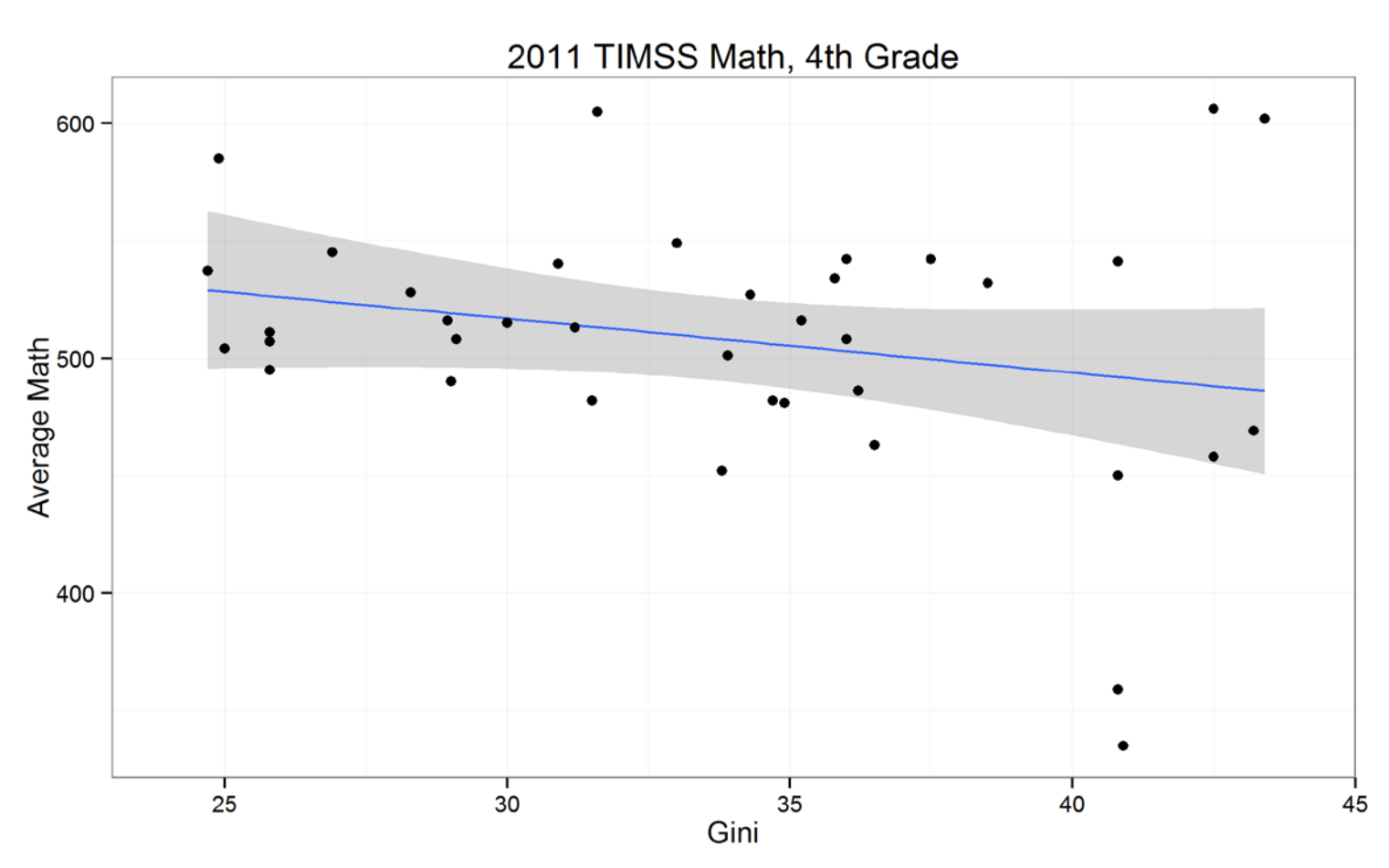
The interaction is significant in every analysis

(Deleting apparent outliers does not change results much)

It is easiest to summarize the analyses by using a simple dichotomization of countries by GDP per capita

GDP per Capita is an Imperfect Measure of National Wealth

GDP/Capita does not account for the distribution of wealth within countries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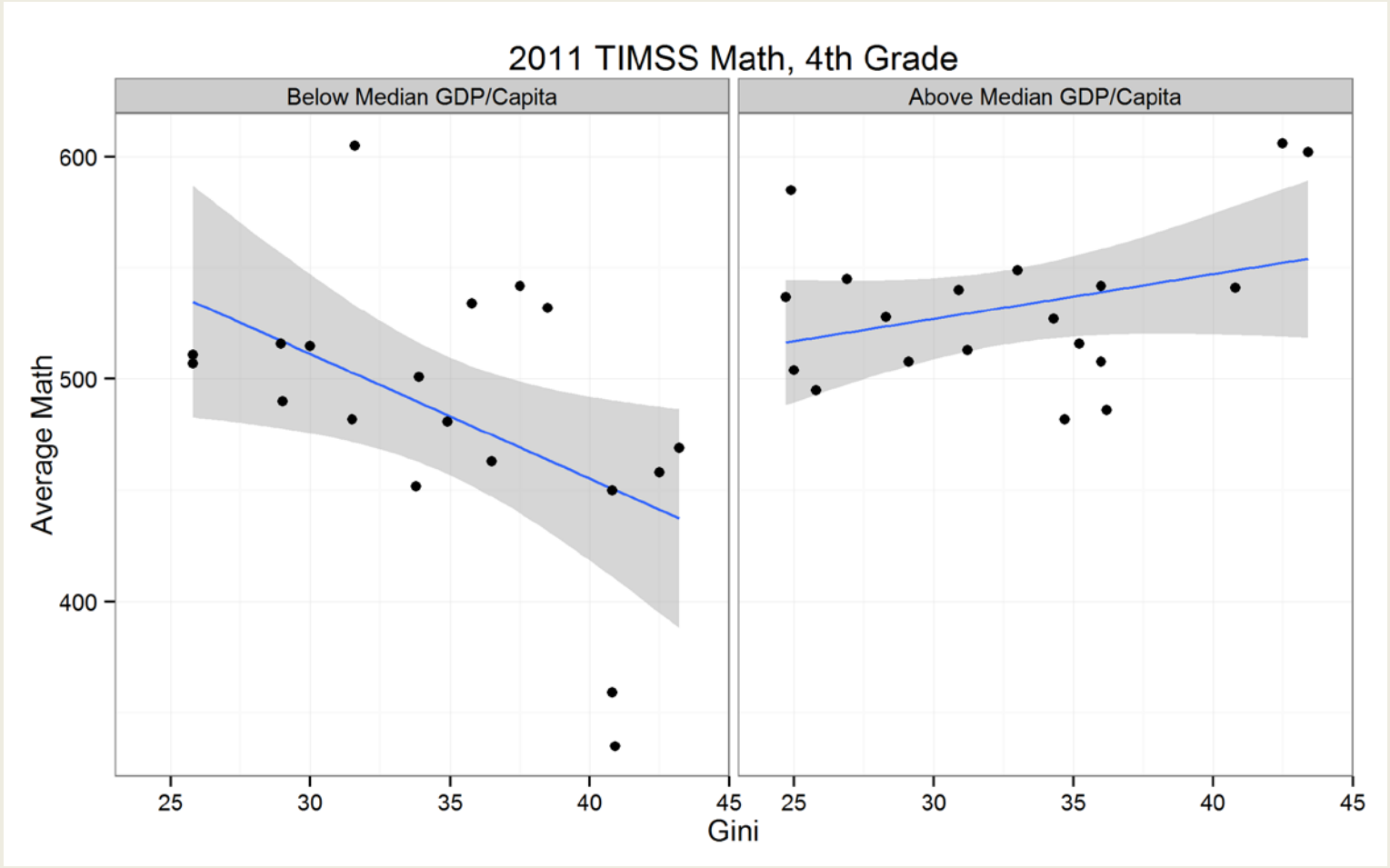
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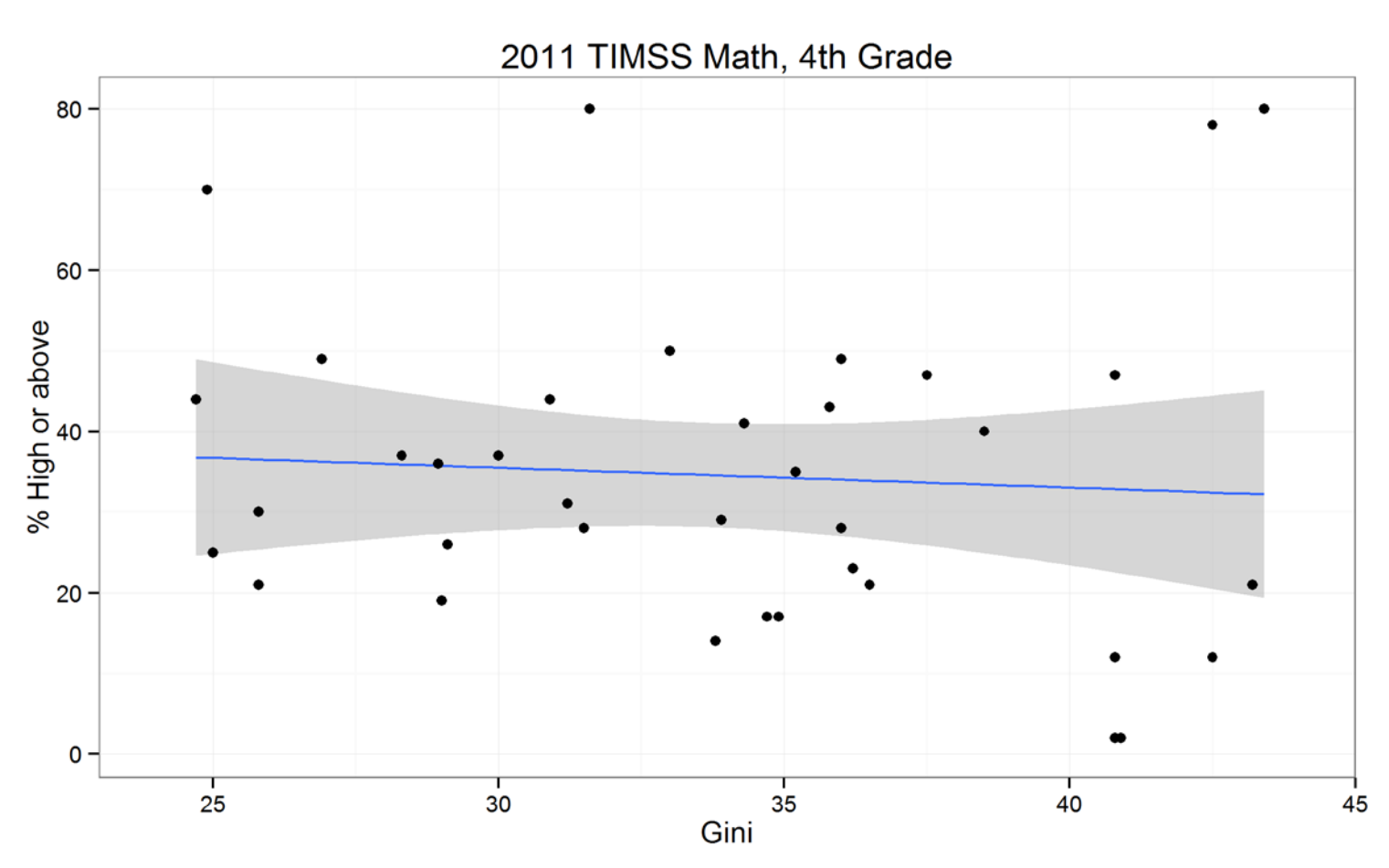
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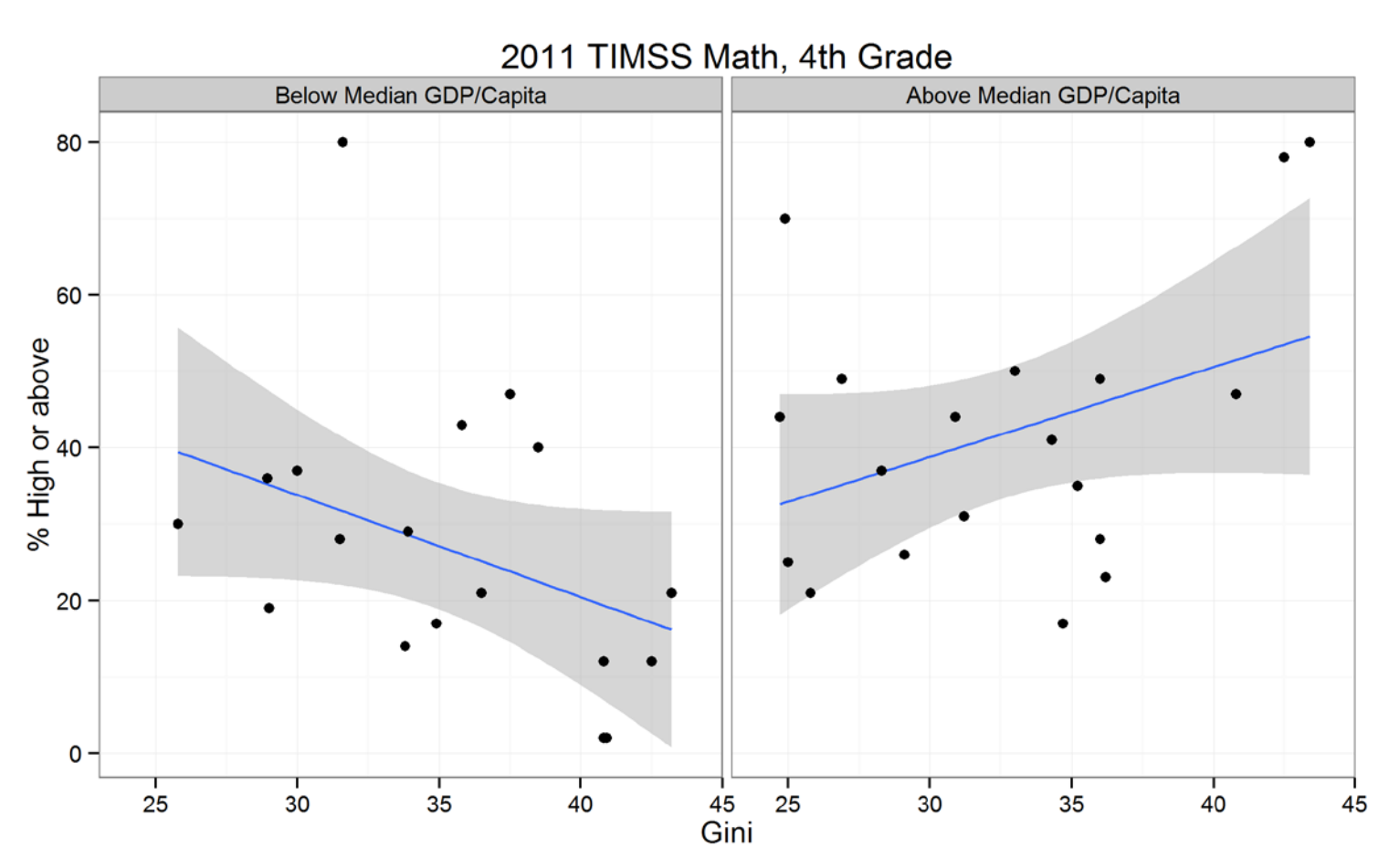
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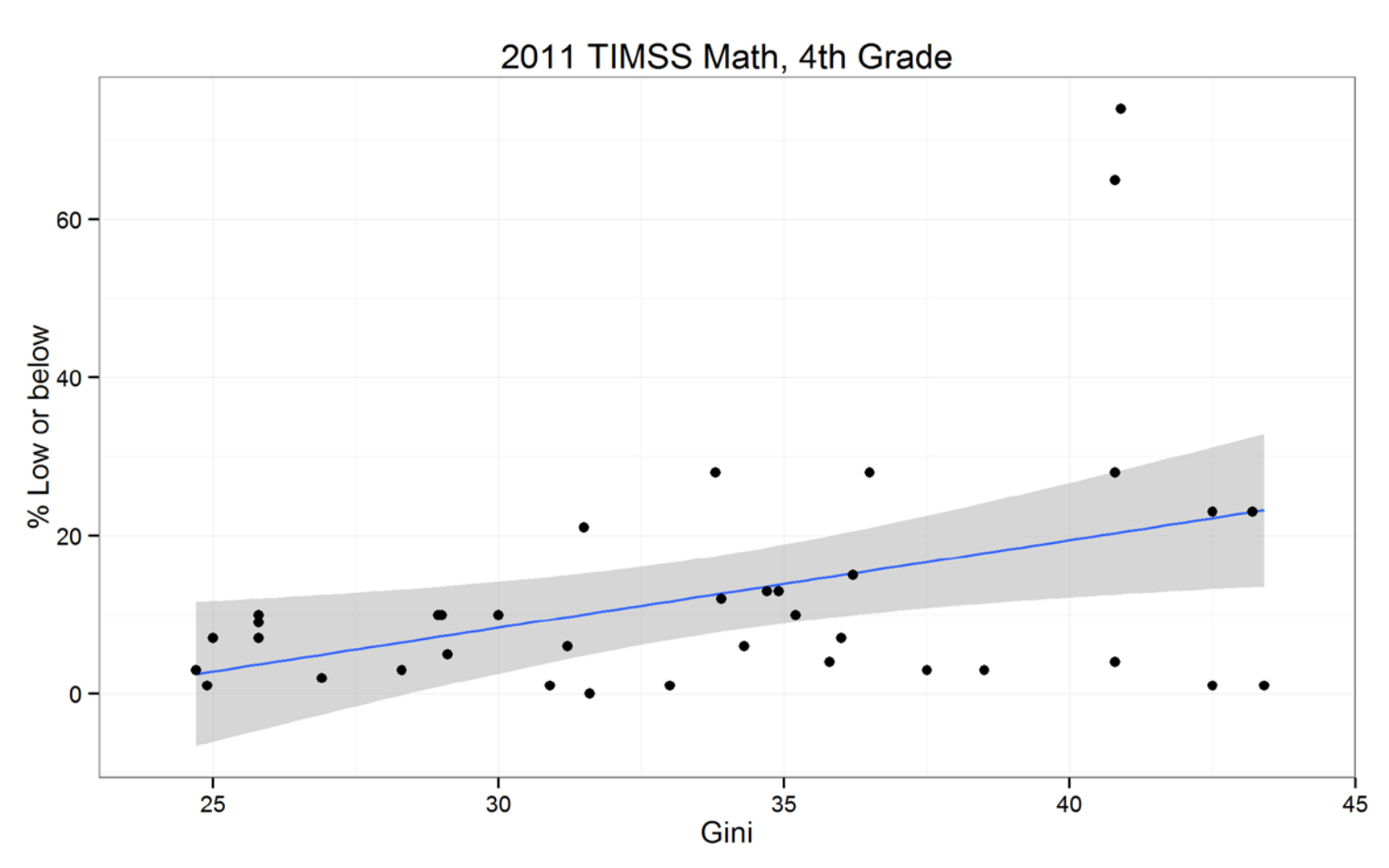
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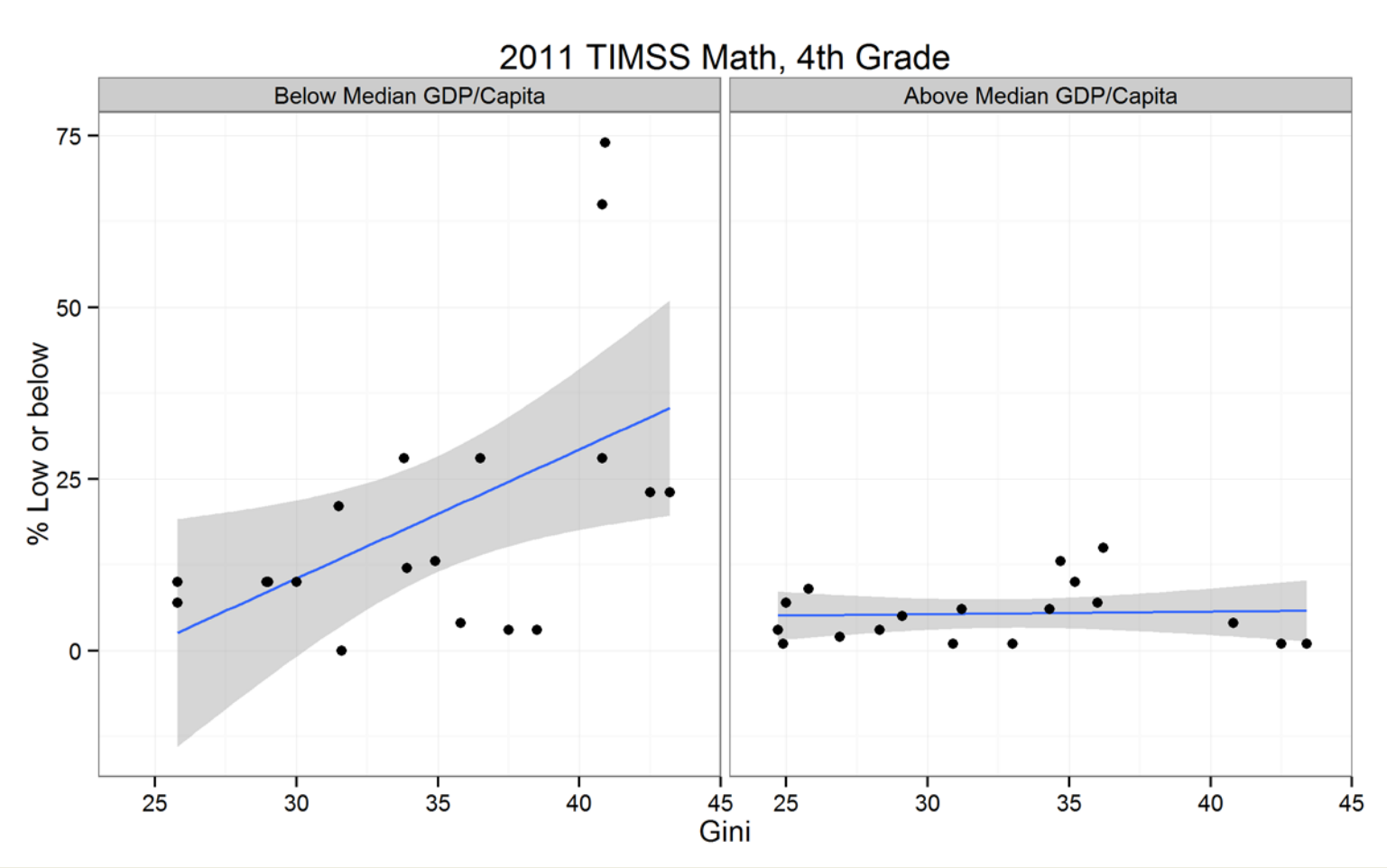
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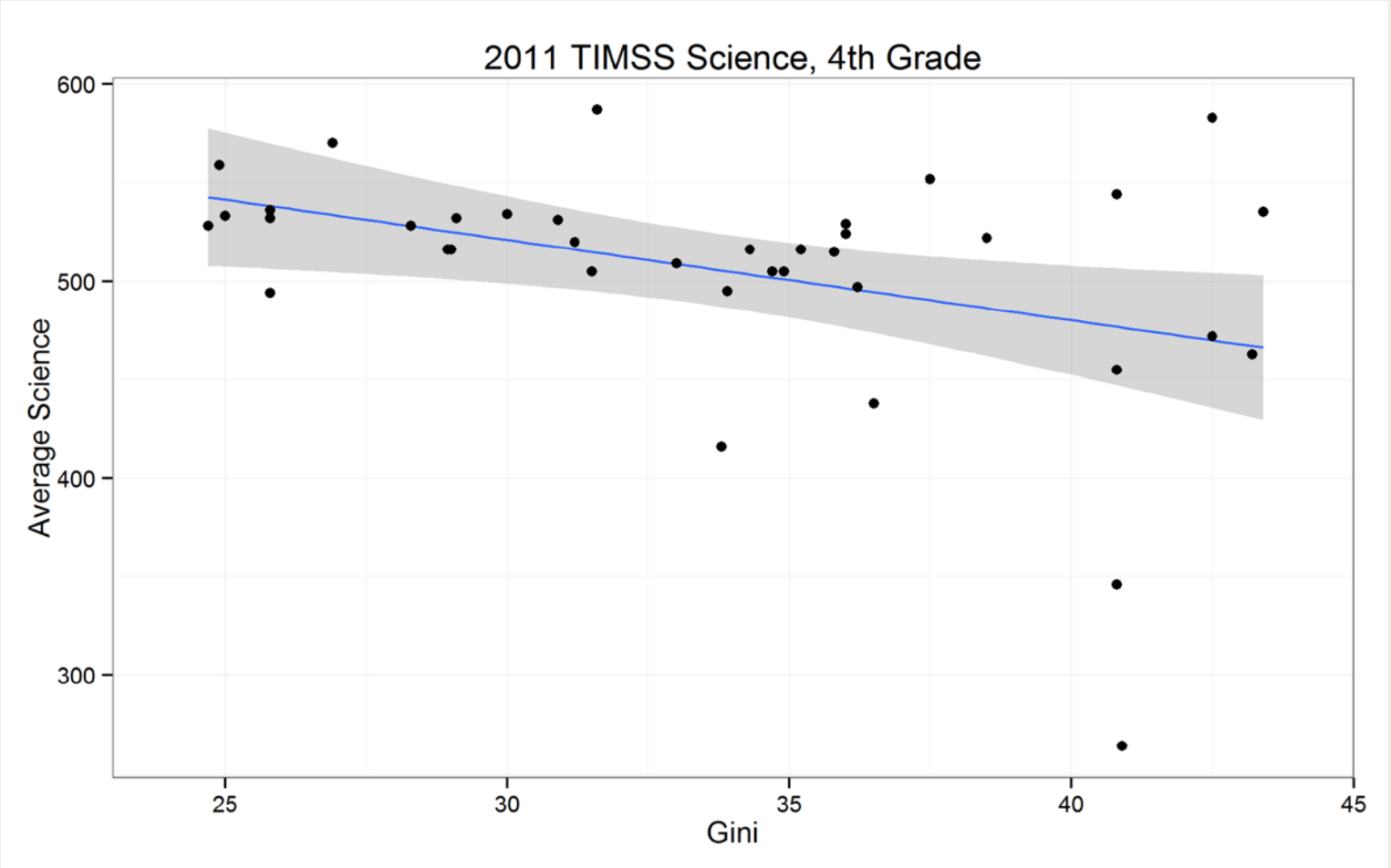
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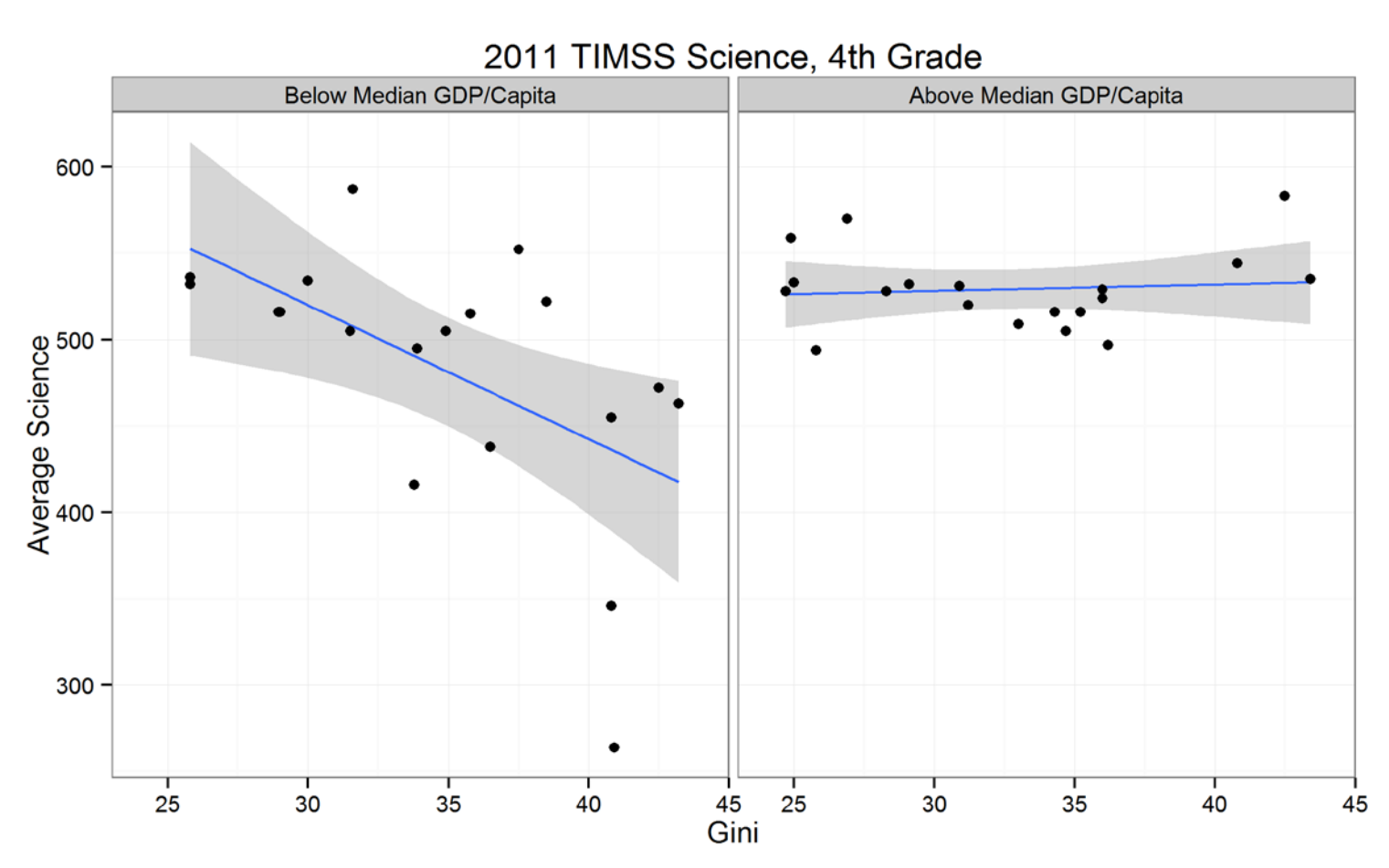
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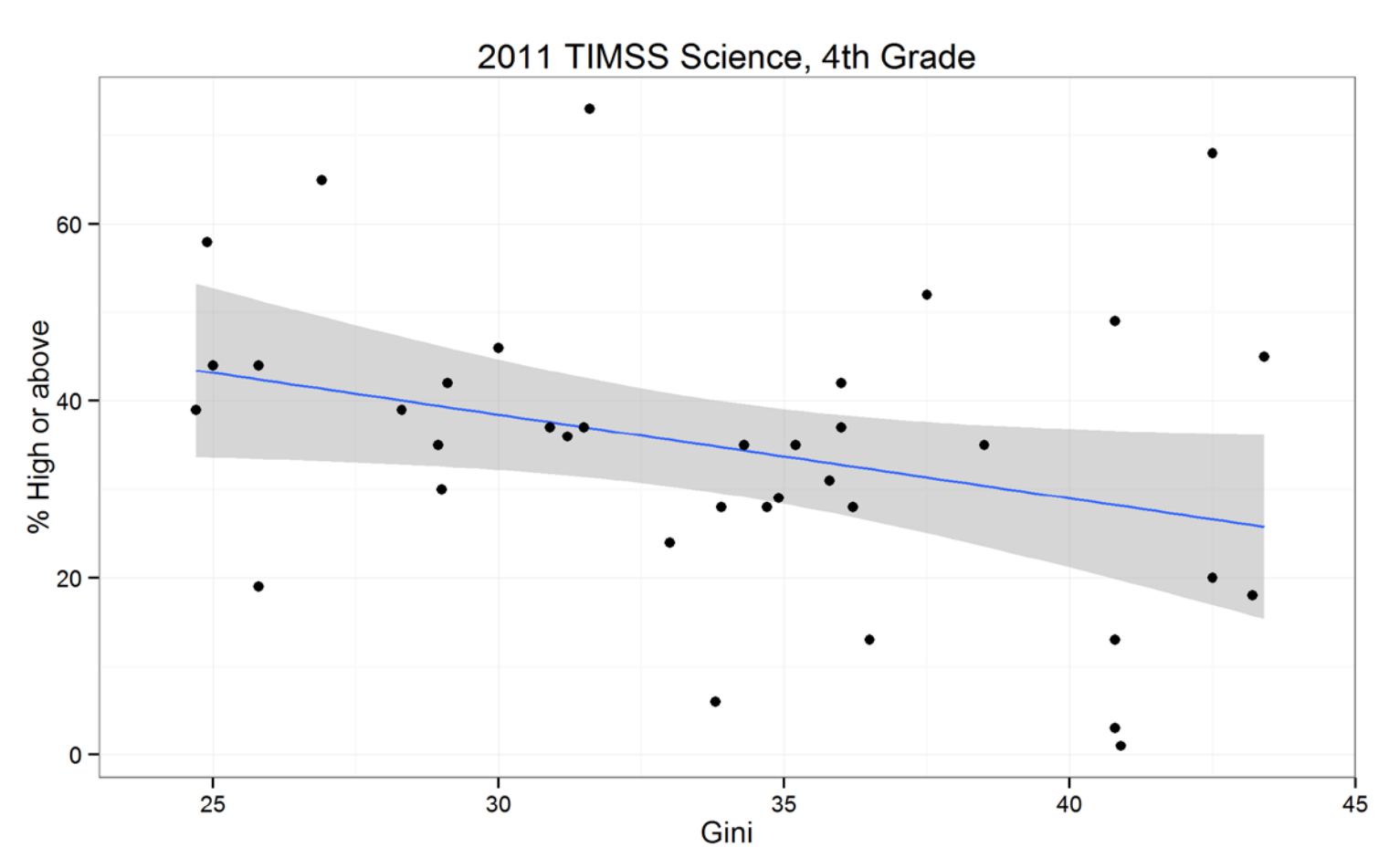
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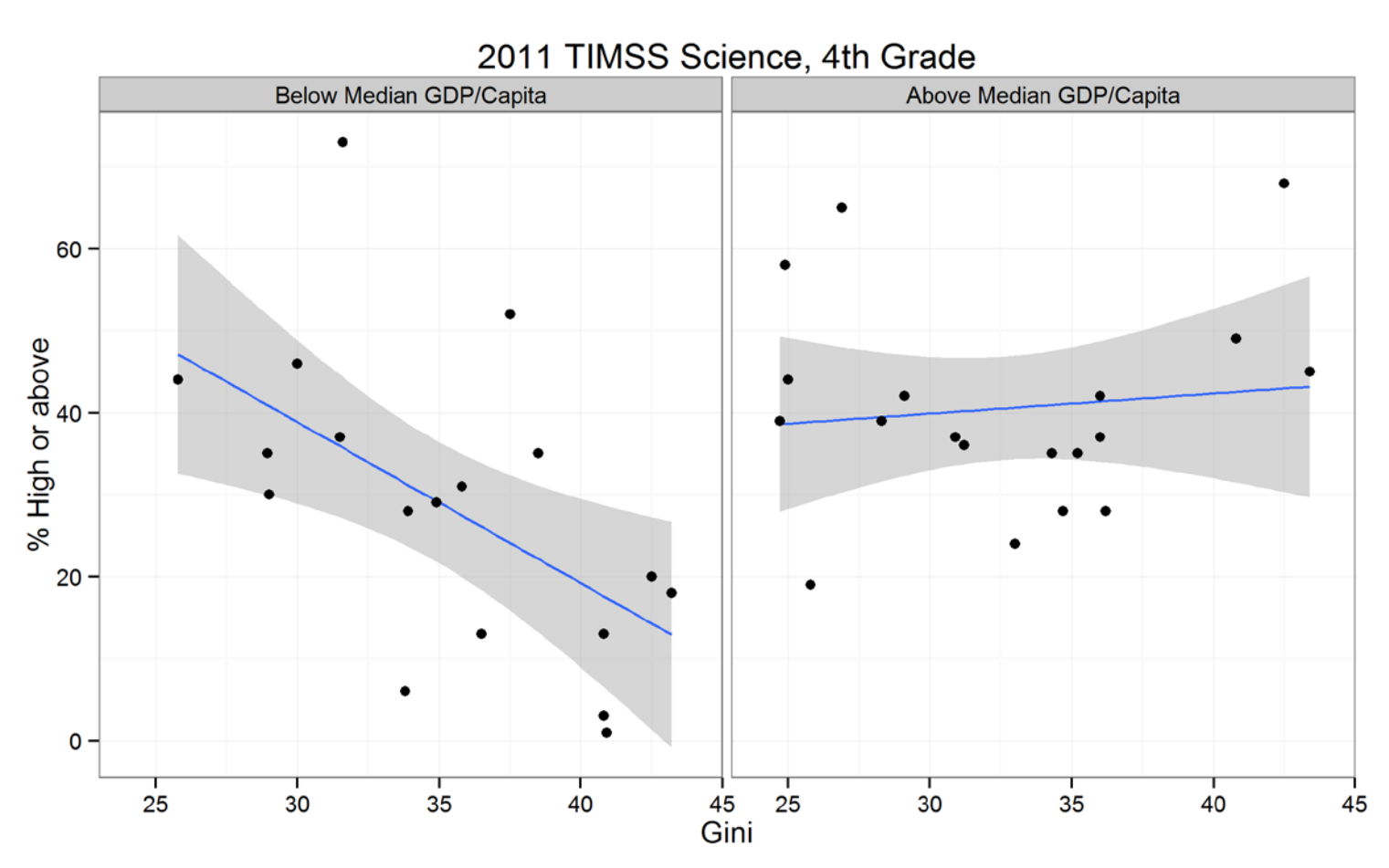
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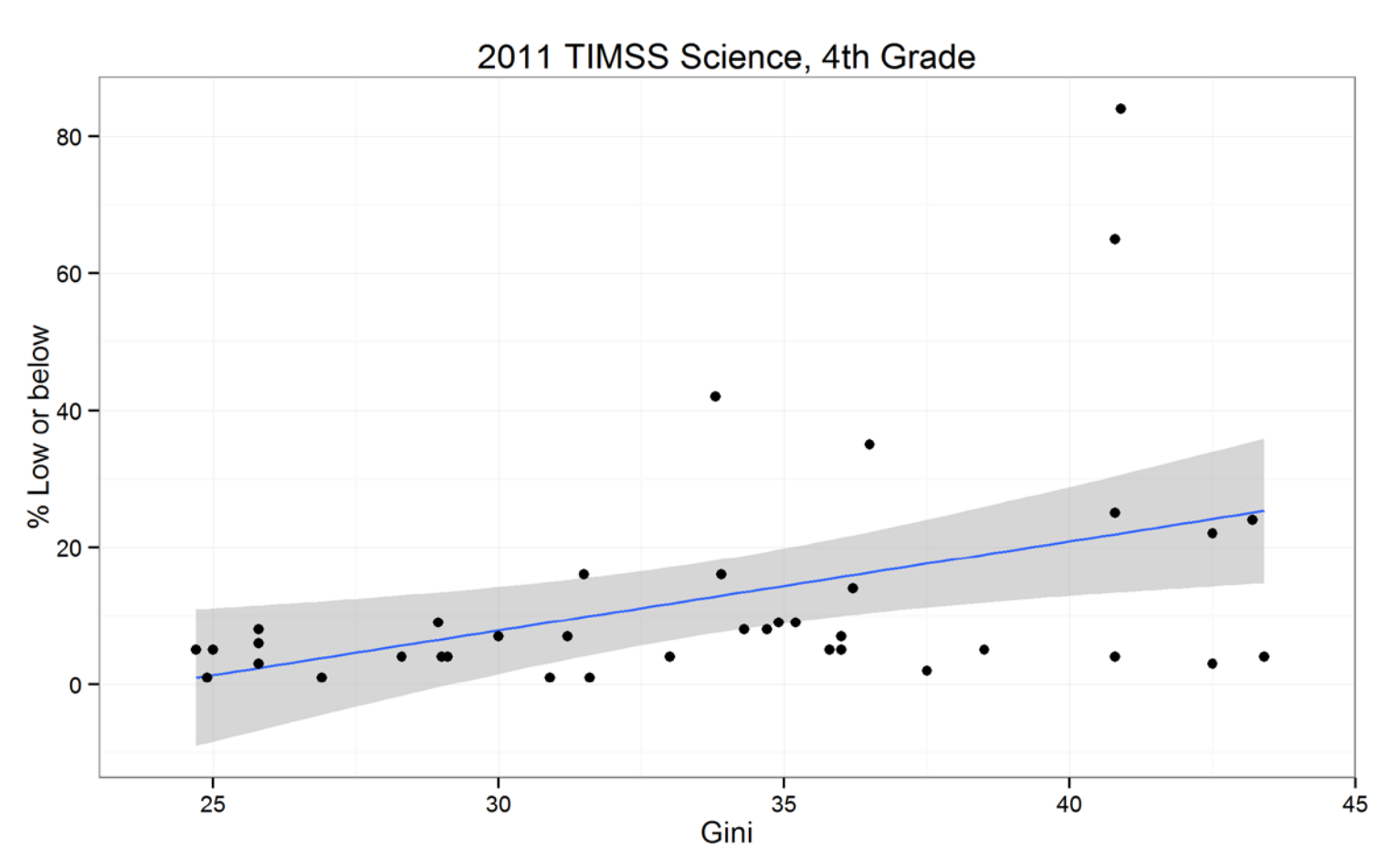
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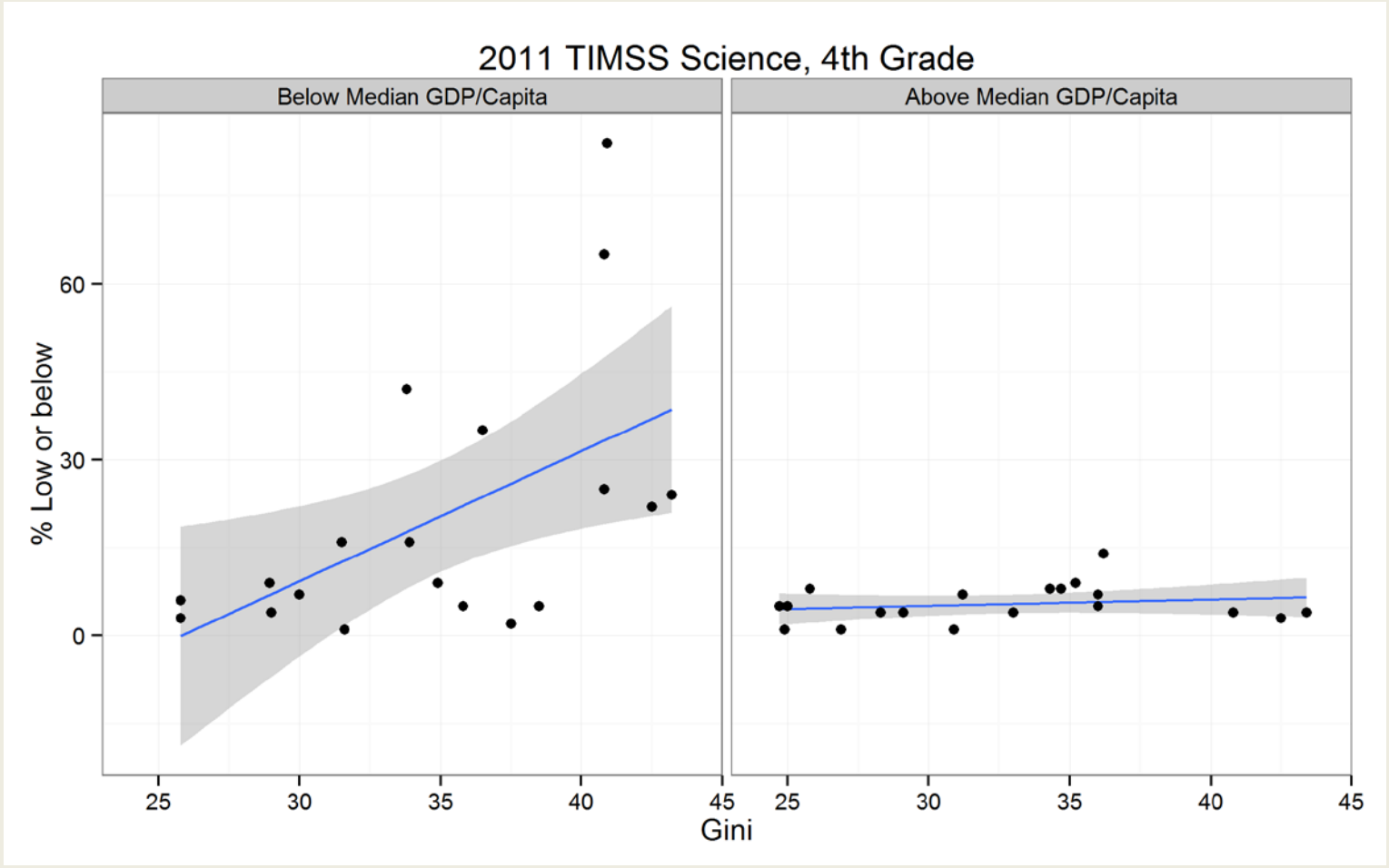
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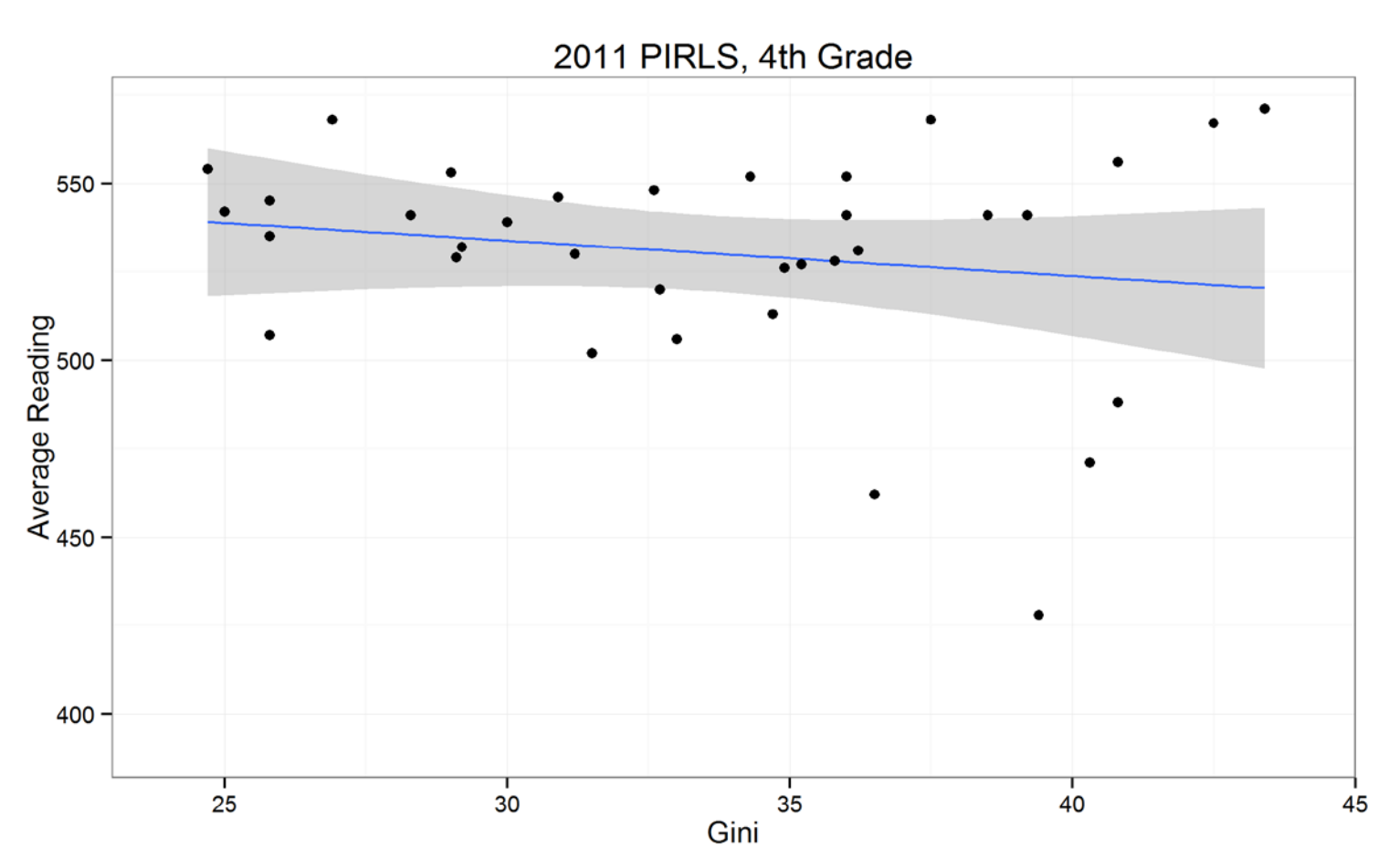
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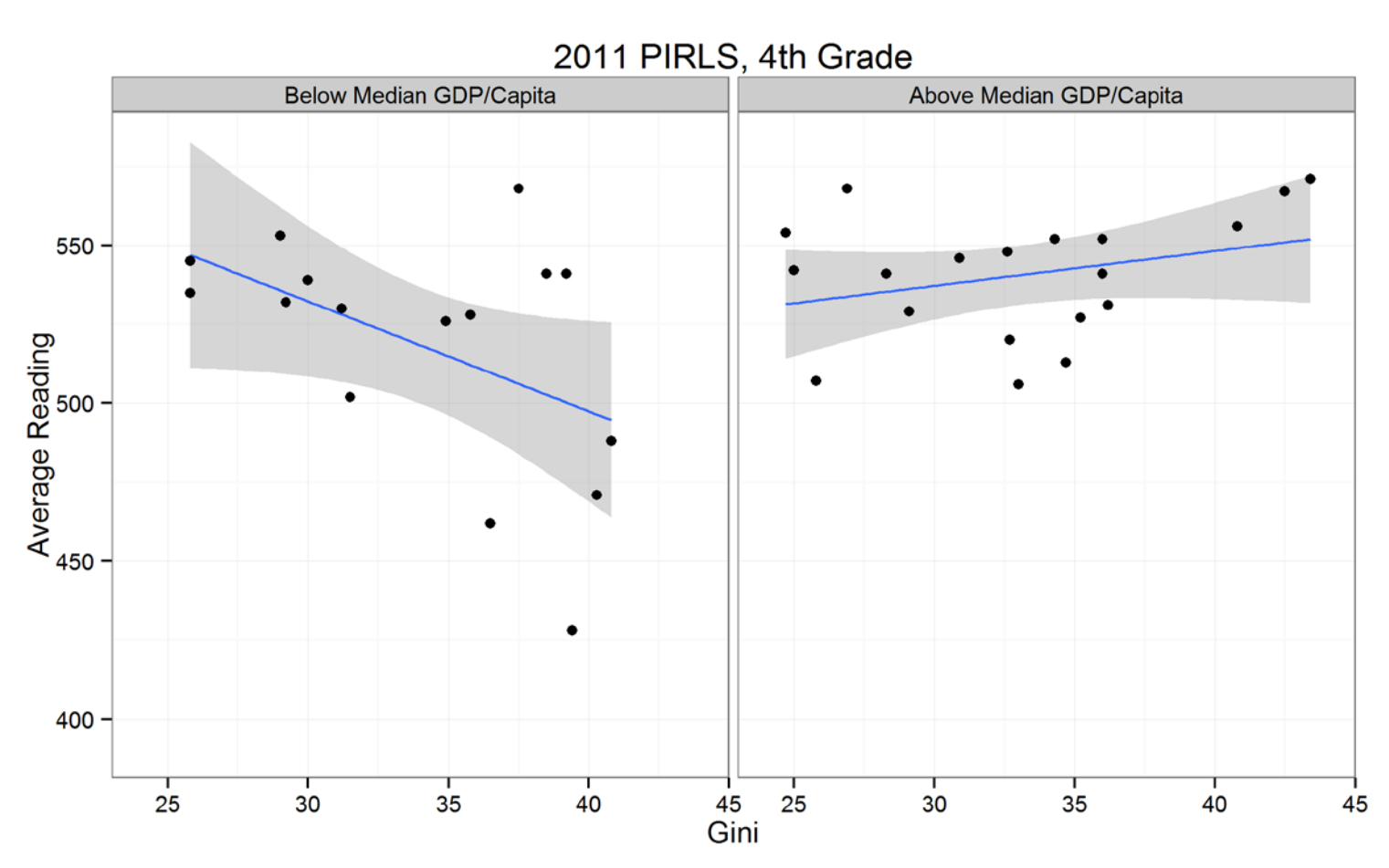
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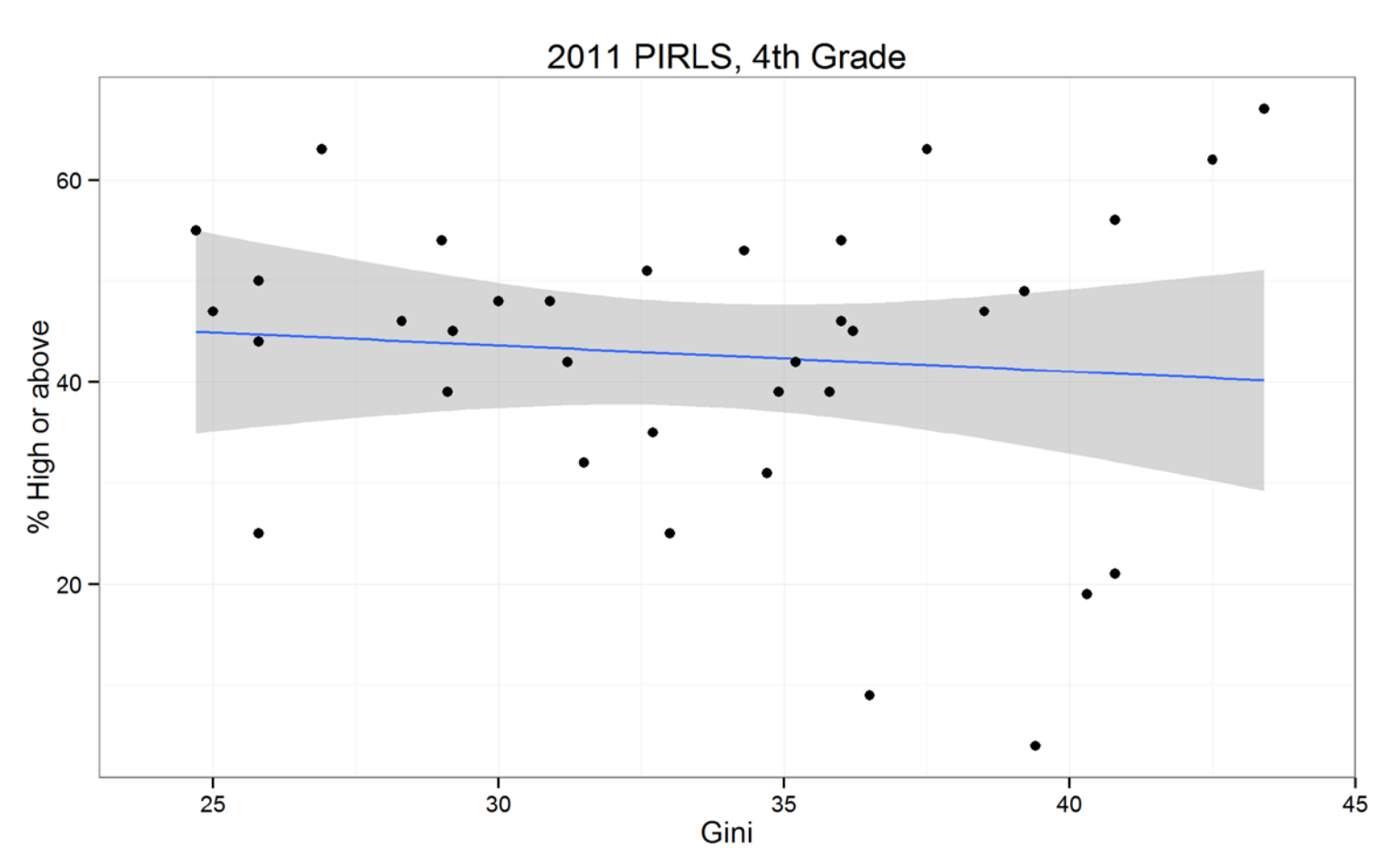
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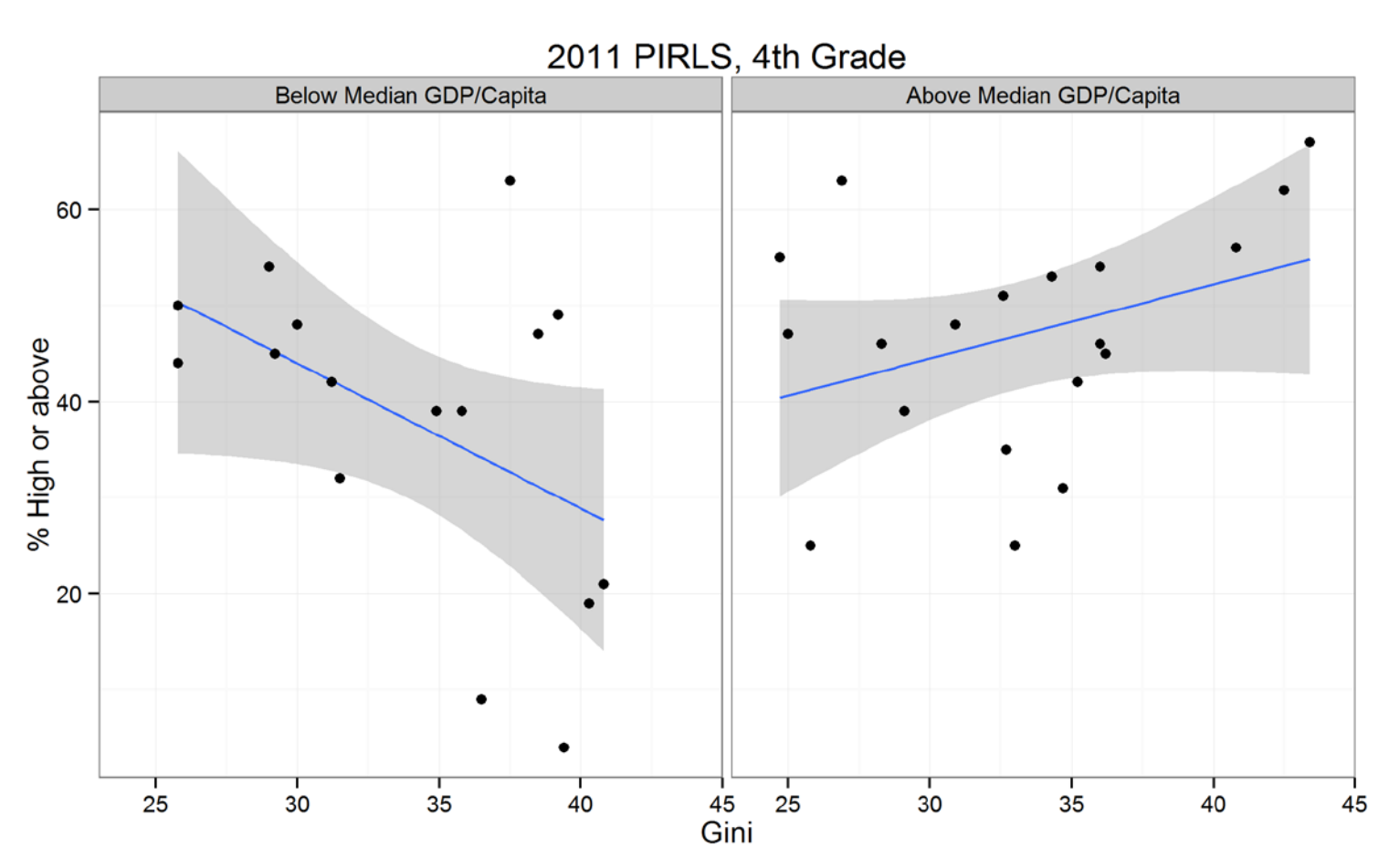
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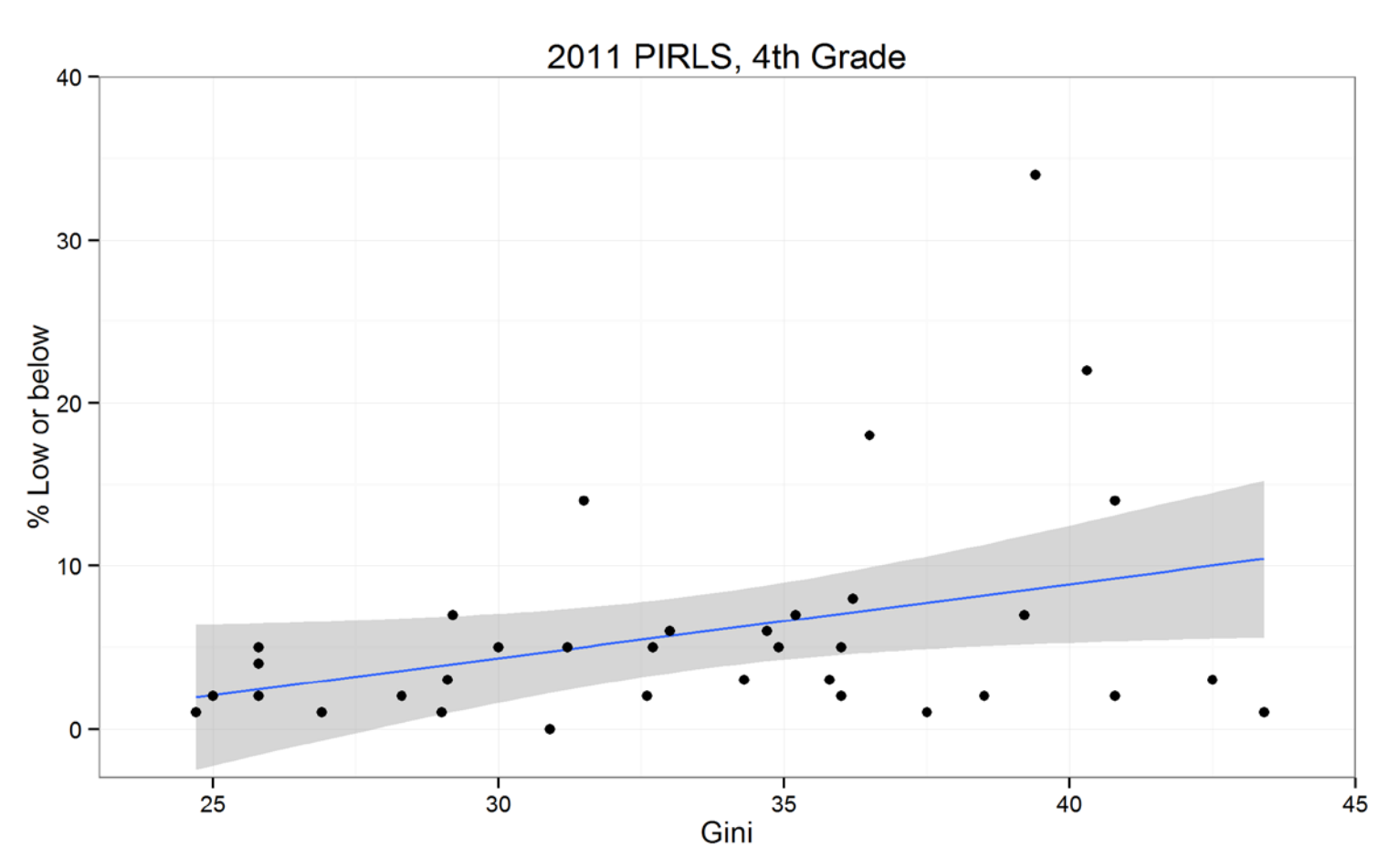
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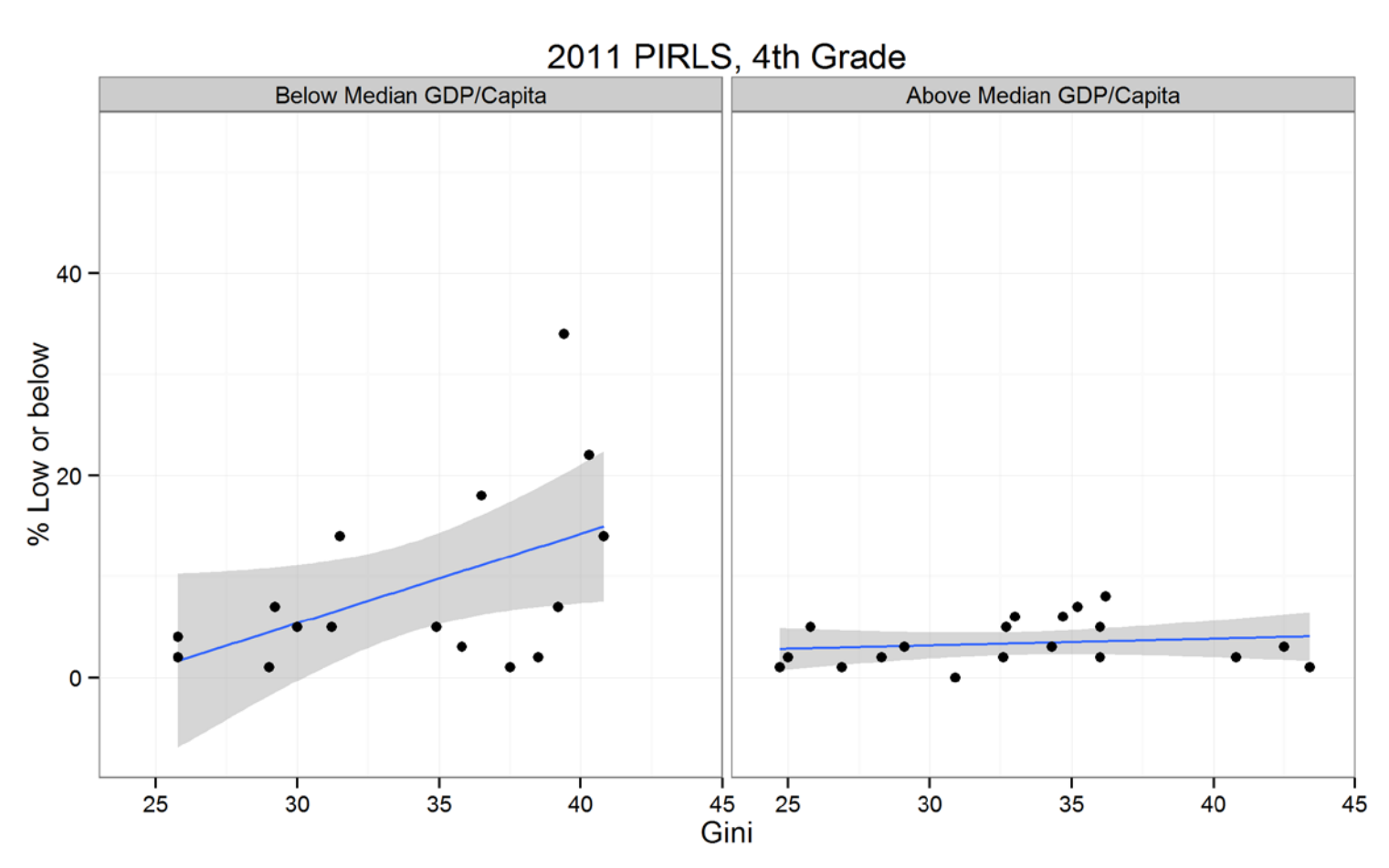
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Conclusions

The relation between inequality and achievement is very different in richer versus poorer countries

In poorer countries

- Inequality is negatively related to average achievement
- Inequality is negatively related to proportion of high achieving students
- Inequality is positively related to proportion with low achieving students

Conclusions

In richer countries

- Inequality is weakly related to average achievement
- Inequality is positively related to proportion of high achieving students
- Inequality is unrelated to proportion with low achieving students

But

Important Limitation

These are all associations

We'd like to know if they are causal

A difference in differences analysis (differences in Gini versus difference in achievement) would be more persuasive

There is too little variation to make these analysis credible (countries change slowly)

Thank You!