

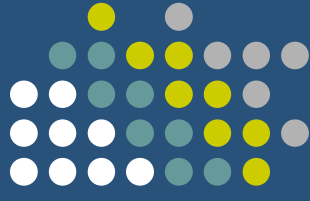
Has NCLB Set Back Science and Social Studies?

Dale Ballou

Jeffrey A. Springer

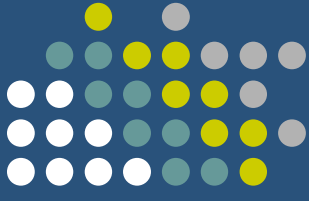
Vanderbilt University

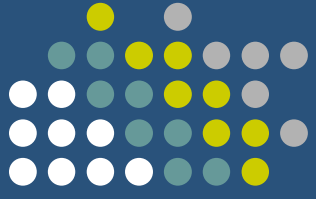
August, 2009



The Concern: Curriculum Narrowing

- NCLB holds schools accountable for student performance in mathematics and reading/English language arts.
- This creates an incentive to neglect other subjects.
- Surveys of districts, principals, and teachers indicate time devoted to other subjects has decreased.





However, the case may be overstated:

- Reading & math are complementary with other academic subjects.
- Survey responses blaming NCLB for distortions to the curriculum may be self-serving.
- Low levels of achievement in science, social studies by non-college bound may put NCLB in a position to do little damage.



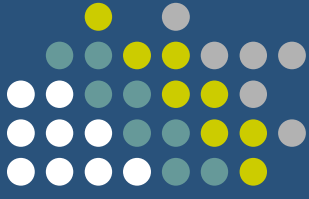
Hard evidence is missing.

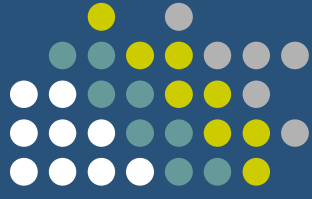
This study attempts to determine whether NCLB has reduced science and social studies achievement in South Carolina and Virginia.

Data from School Report Cards: percent proficient and percent advanced in reading/ELA, math, science, social studies.

South Carolina Testing & Accountability

- Science and social studies tested in grades 3-8
- Testing began in 2003.
- Results are used in state accountability system. Successful schools are recognized with modest financial rewards. There are no state sanctions for failing, beyond NCLB sanctions based on reading and math.
- No stakes for students.

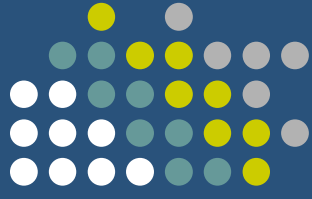




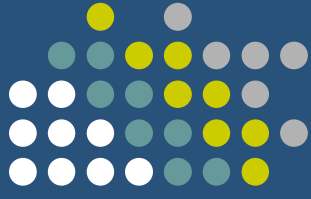
Virginia Testing & Accountability

- Science and social studies in grades 3,5, & 8, 1998-2007
- High School tests in science and social studies, 1998-2000.
- End-of-course exams in reading/ELA, algebra, geometry, earth science, biology, chemistry, world history (I & II), US & VA history, world geography, 2003-2007.

Virginia Testing & Accountability (cont.)



- Results in all four subject areas are used to determine school accreditation.
- For standard high school diploma, students must pass one end-of-course exam in each subject area (two in English).



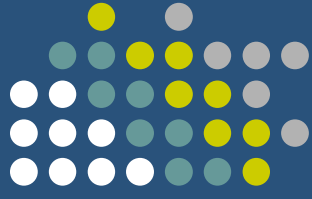
Research Strategy: Phase One

Based on pre-NCLB performance, we classify schools as

- High risk of failing to make AYP.
- Low risk of failing to make AYP.
- Moderate risk of failing to make AYP.

Compare trends in science and social studies across groups.

Contrast that comparison with the same comparison for reading and math.

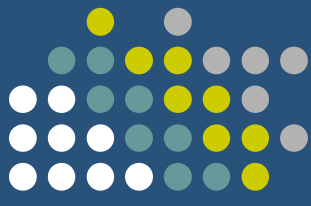


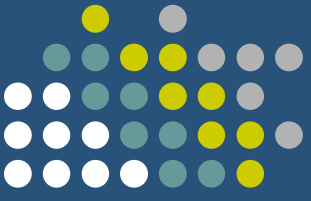
If NCLB Has Led to Curriculum Narrowing, What Do We Expect to See?

- A decline in science and social studies in high-risk compared to moderate- and low-risk schools (or less of an improvement).
- A more pronounced decline in higher grades and later cohorts, where students have been exposed to NCLB the longest.
- Greater gains in high-risk vis-à-vis low-risk schools in math and reading, compared with science and social studies.

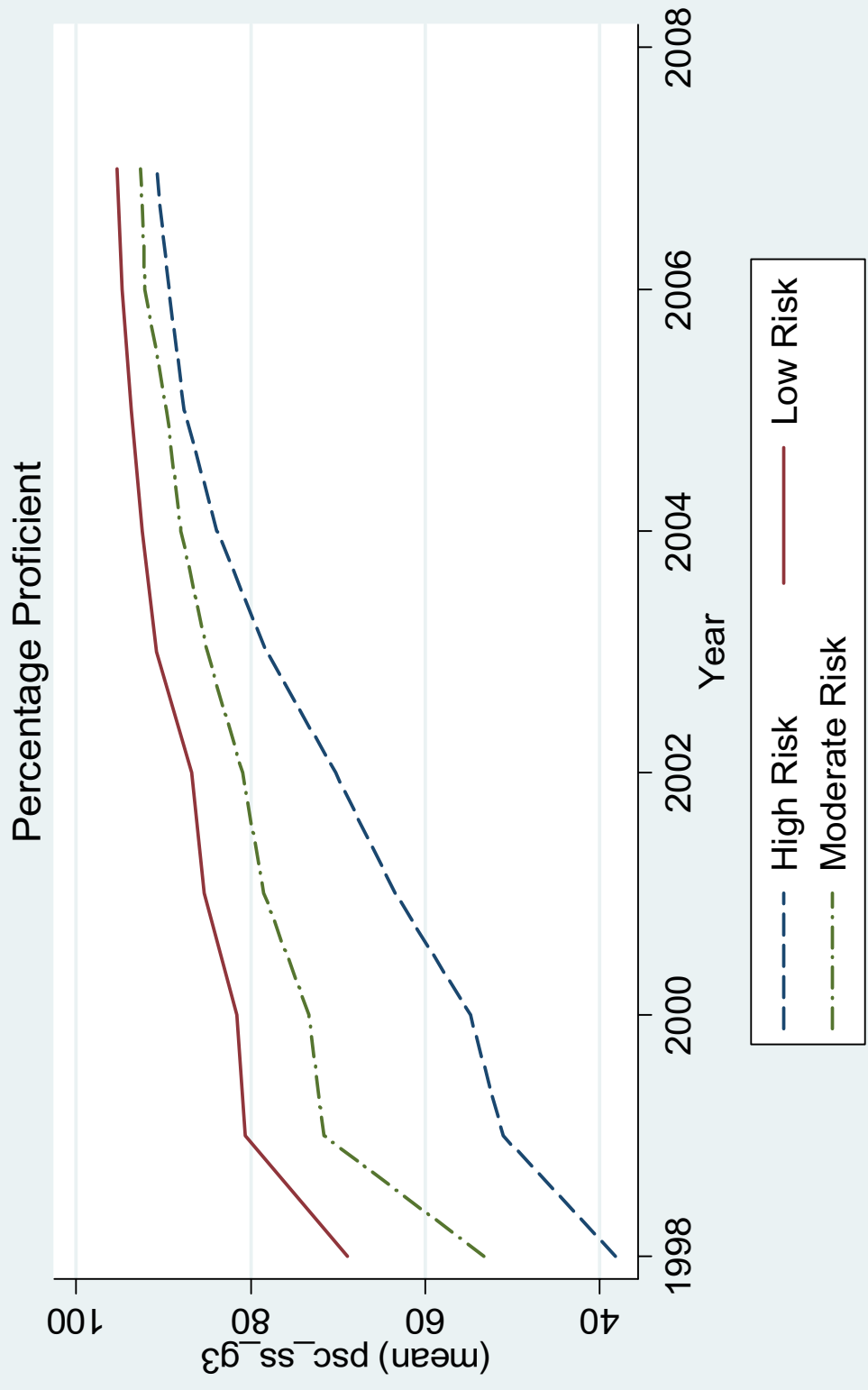
In Virginia, we see virtually none of these effects.

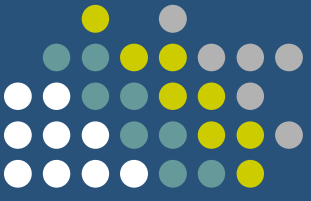
- The percent proficient has generally risen in science and social studies, with the gap between low risk and high risk schools closing.
- At the elementary level, this process started before NCLB. There has been a tendency to plateau at high levels of proficiency in recent years.



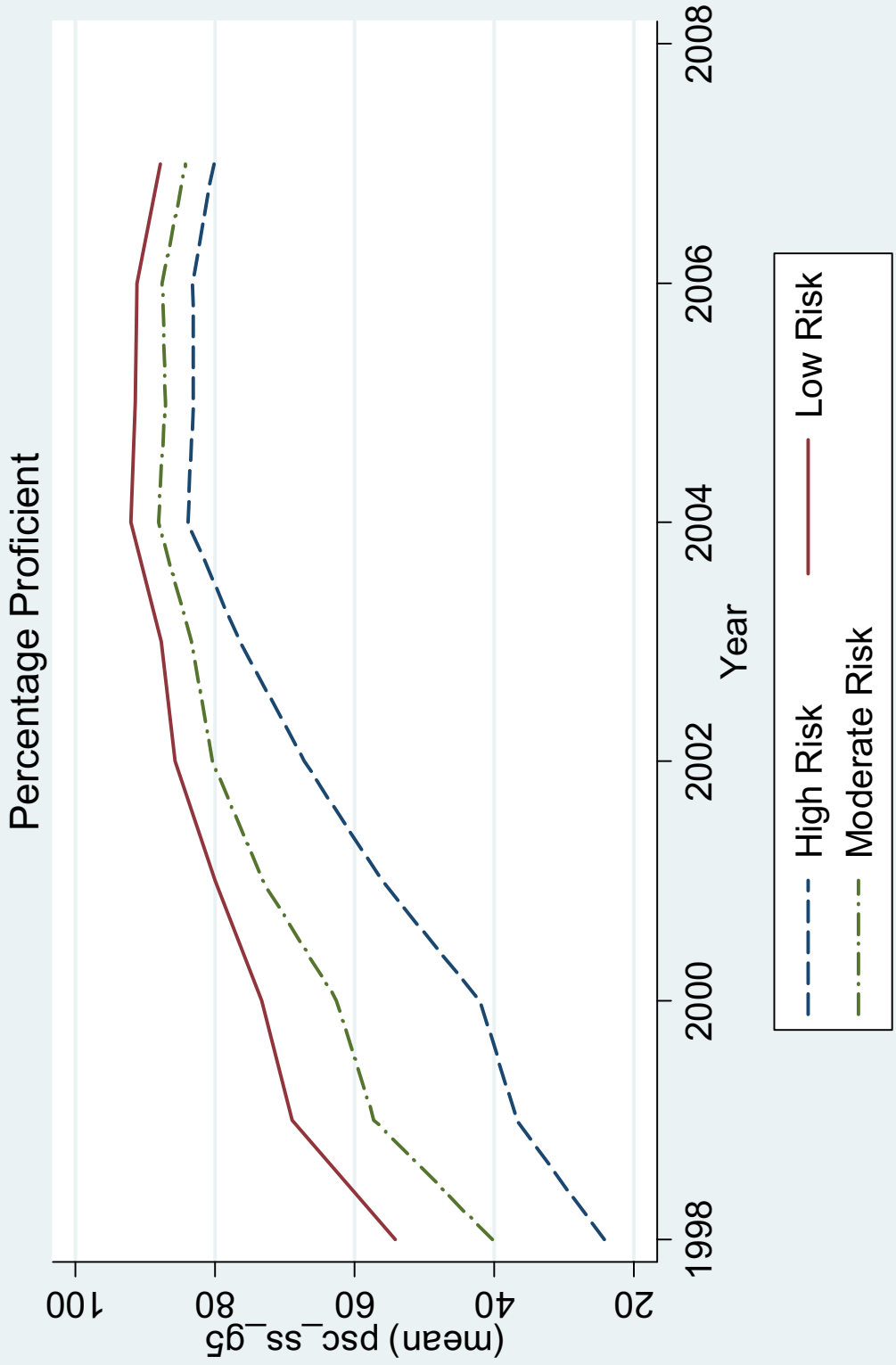


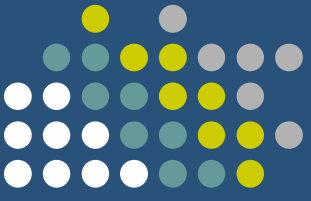
VA Achievement Trends for Social Studies, Grade 3



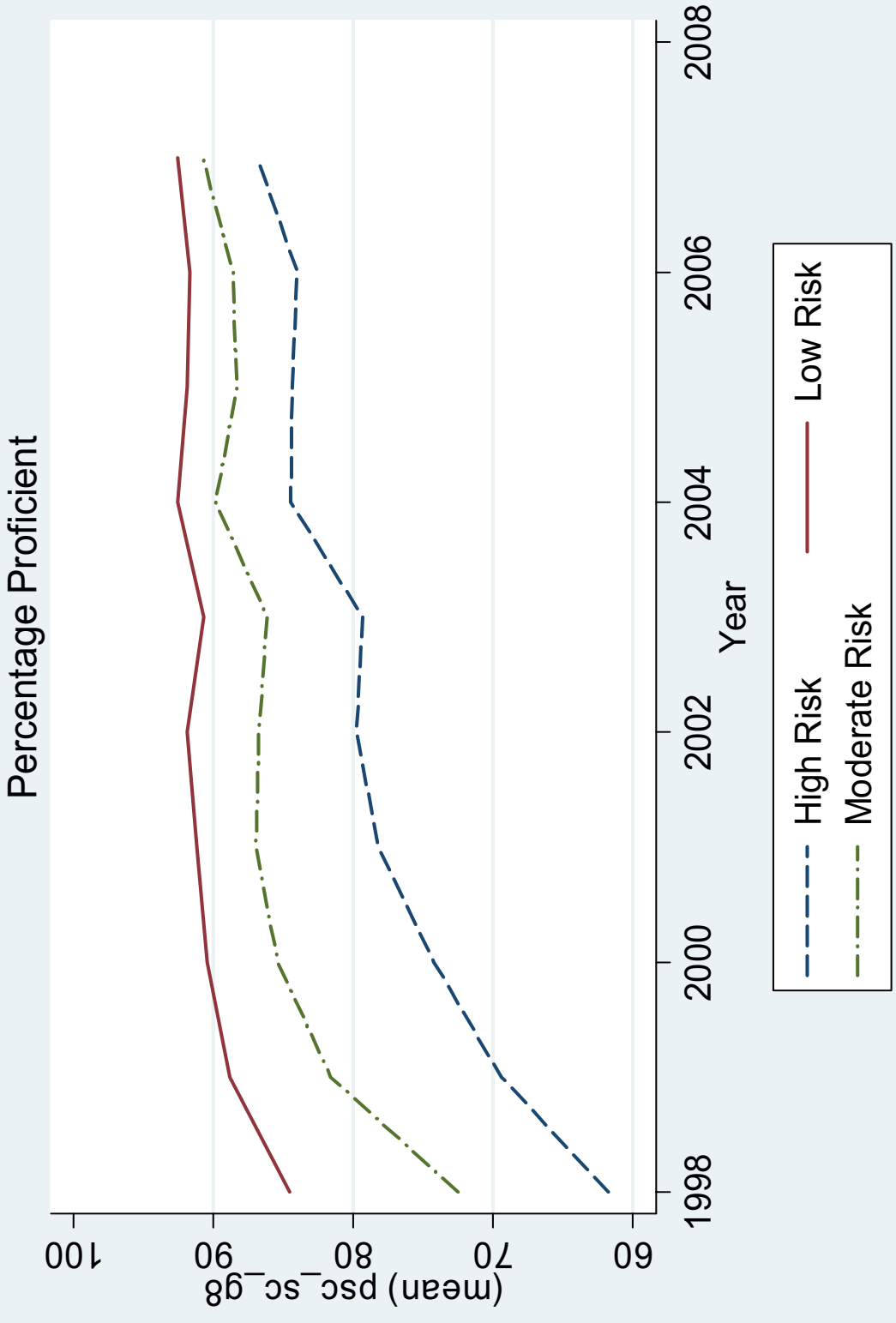


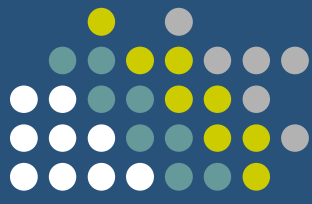
VA Achievement Trends for Social Studies, Grade 5





VA Achievement Trends for Science, Grade 8





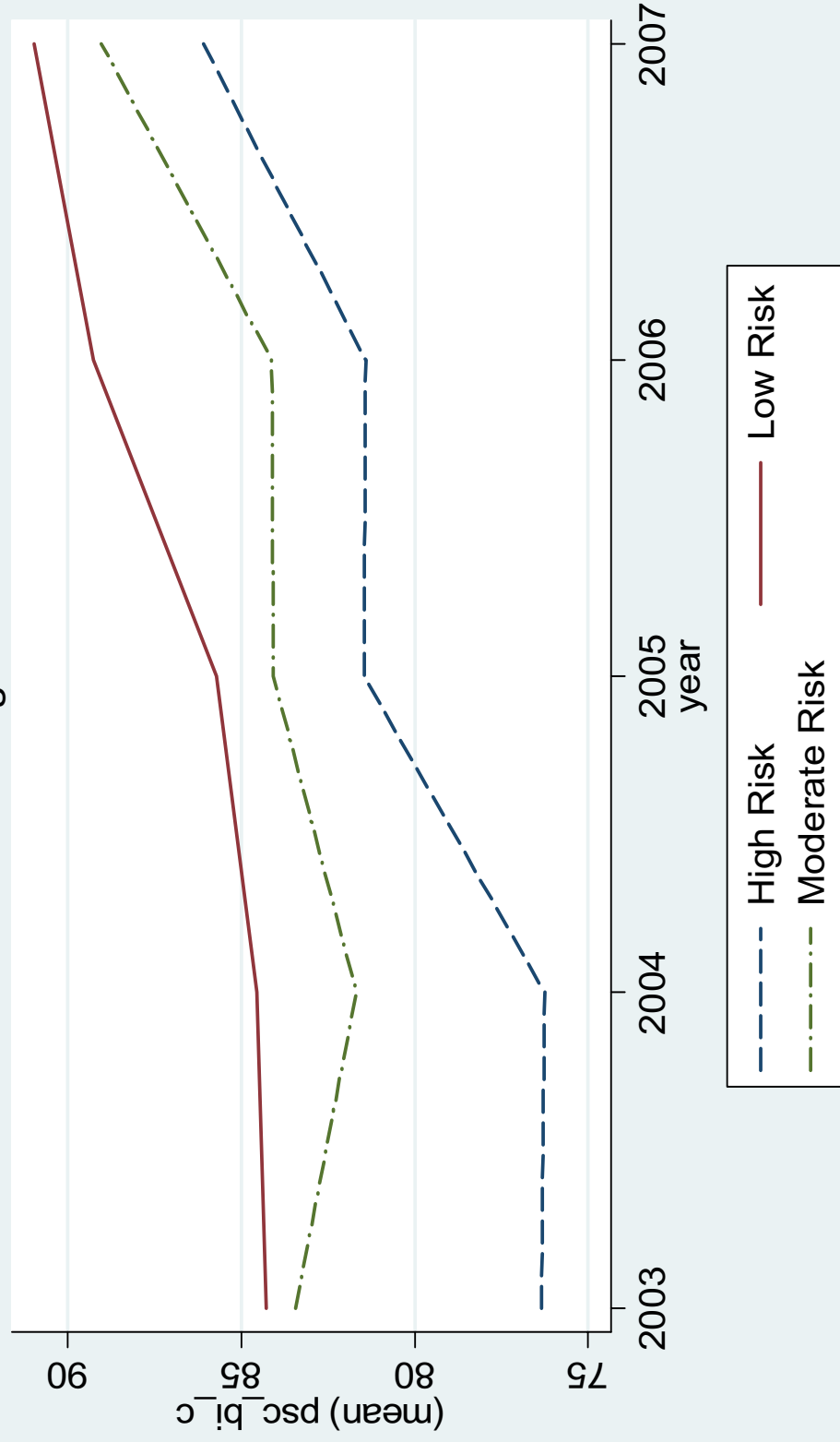
Results: Virginia (cont.)

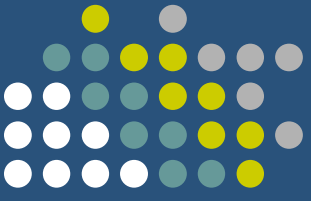
- On high school end-of-course exams, percent proficient has risen in science and social studies.
- The gap between high risk and low risk schools has narrowed.
- There is no achievement drop-off in high risk schools among later cohorts



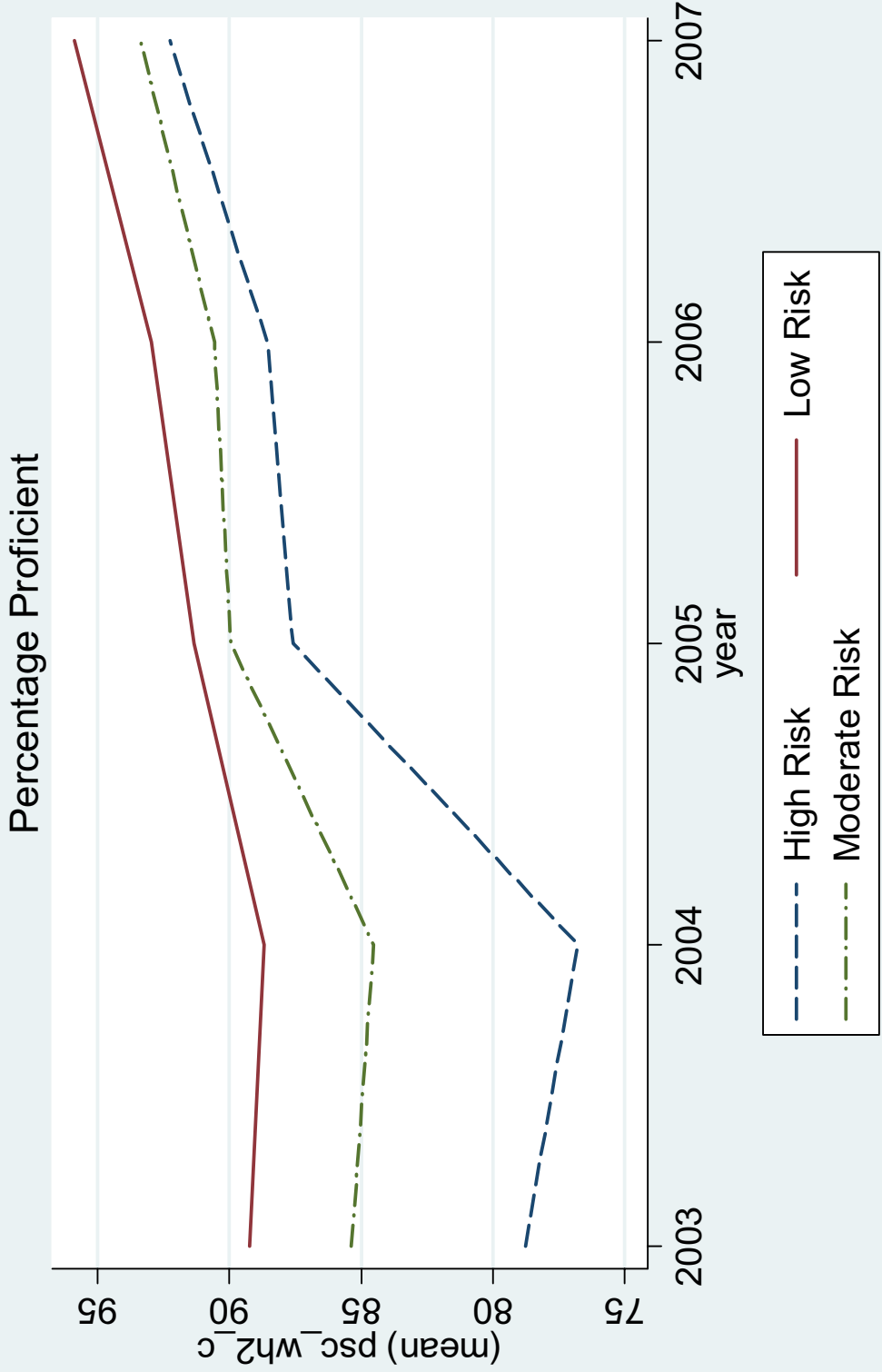
VA Achievement Trends for Biology

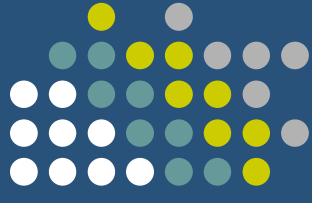
Percentage Proficient





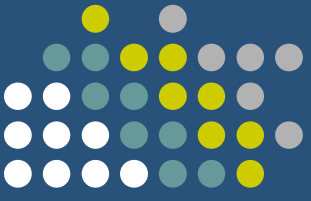
VA Achievement Trends for World History 2



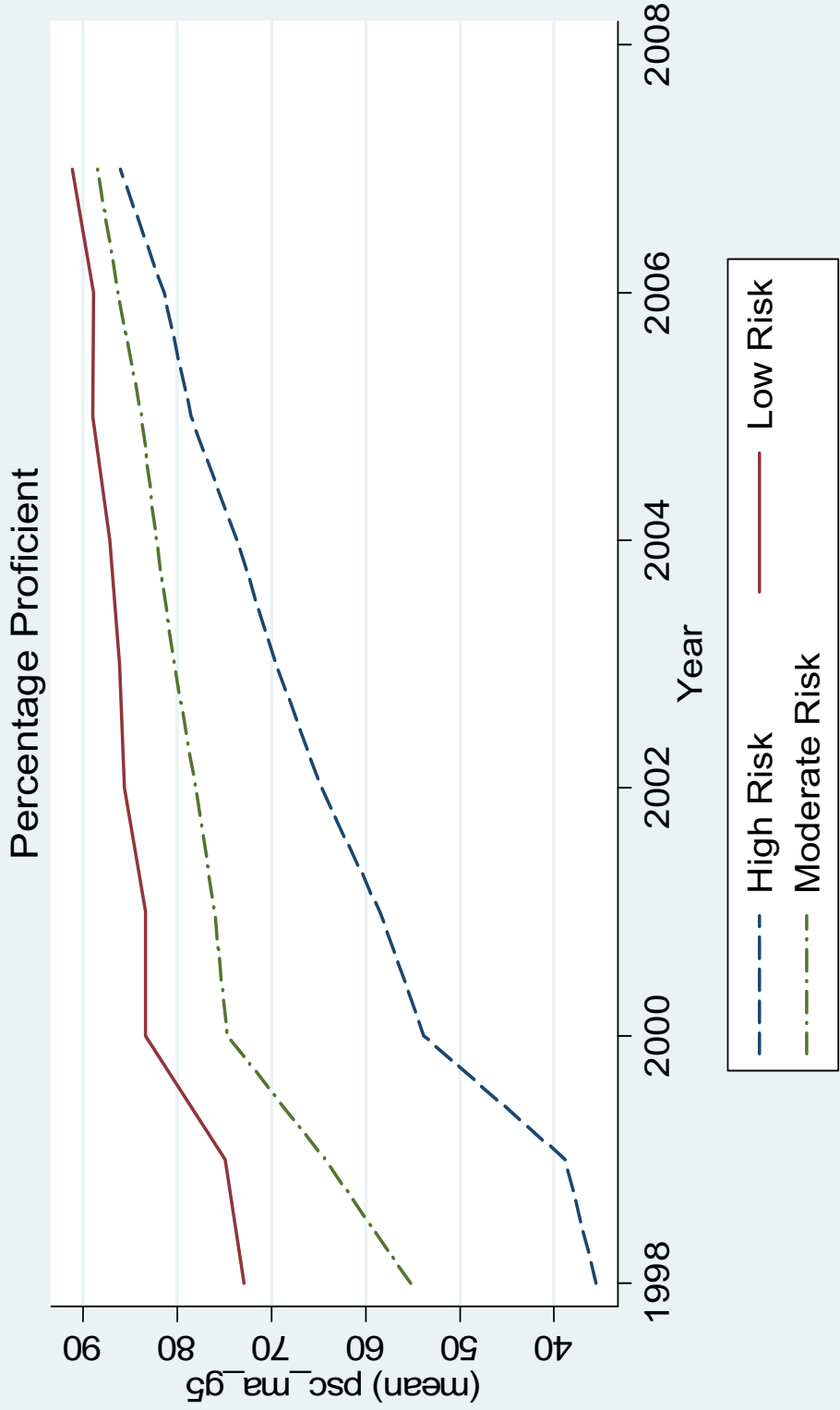


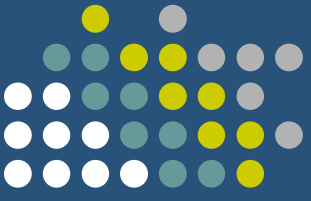
Results: Virginia (cont.)

- Similar patterns are found when we compare reading and math achievement of treatment and control schools.

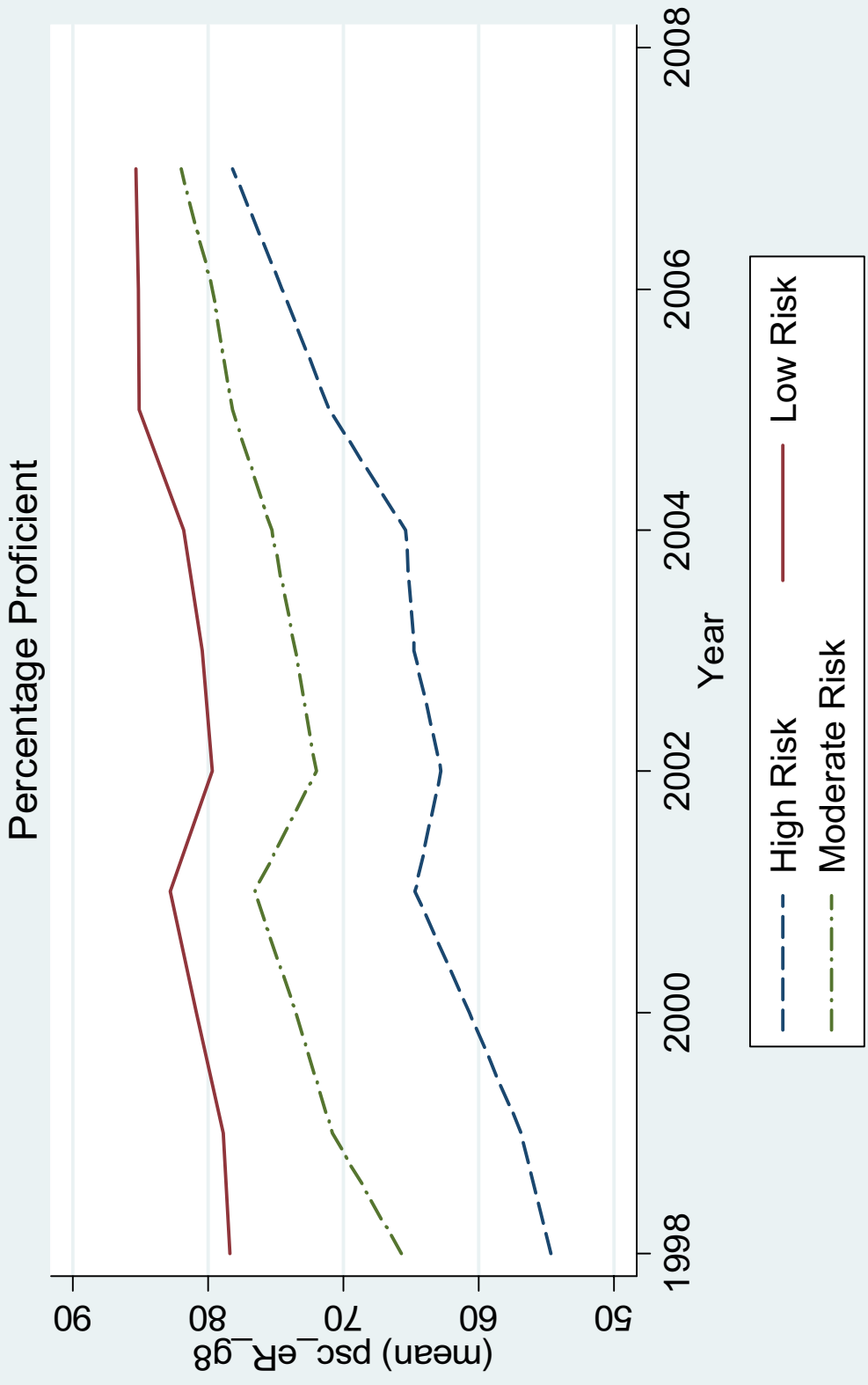


VA Achievement Trends for Mathematics, Grade 5





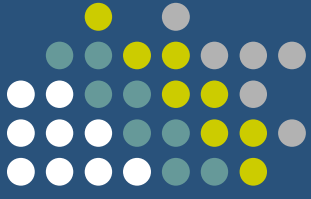
VA Achievement Trends for Reading, Grade 8



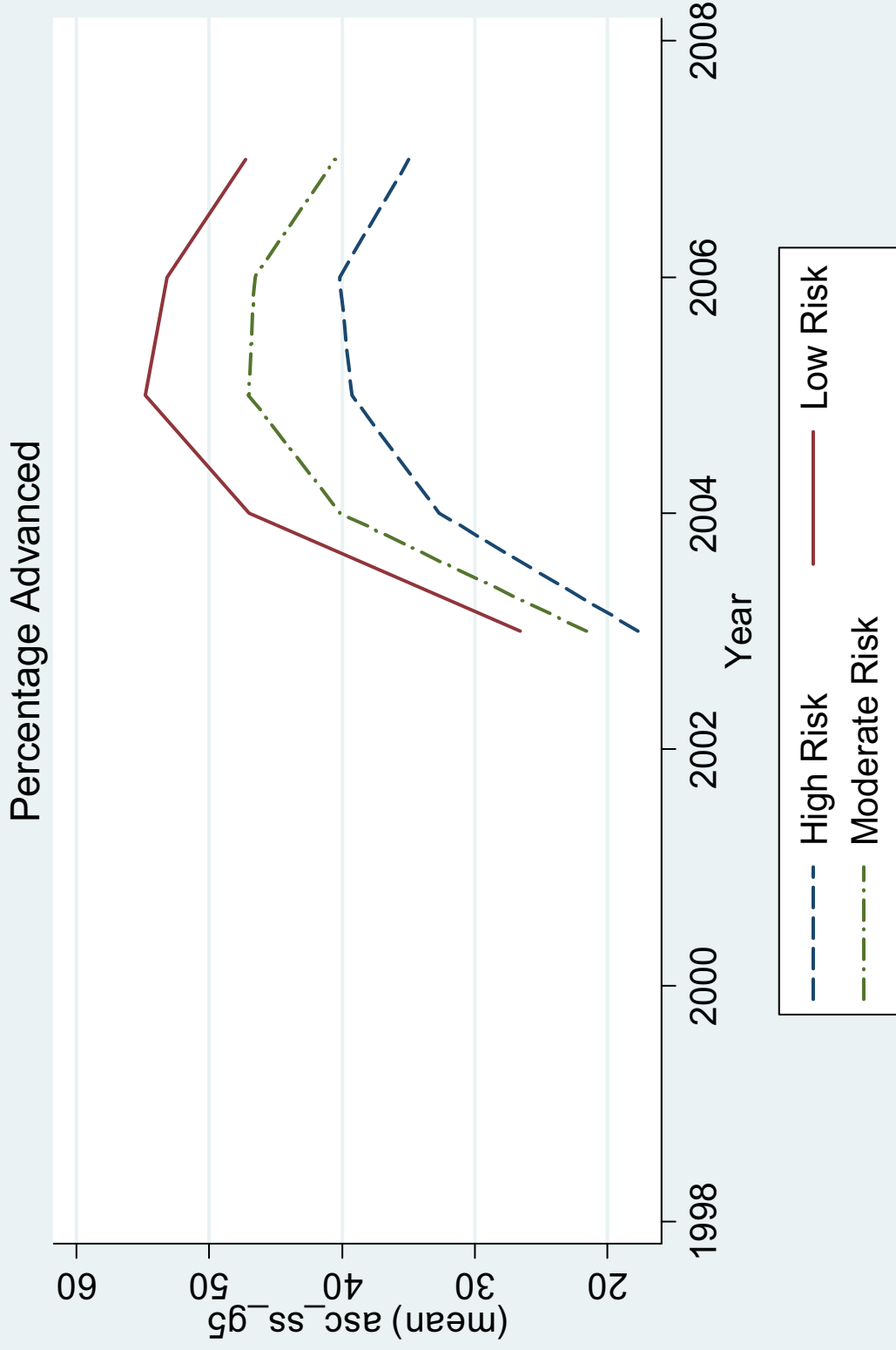


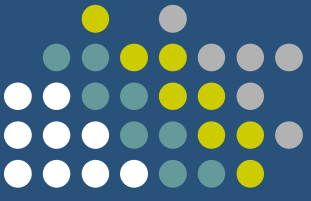
Results: Virginia (cont.)

- Progress at the advanced level has been more erratic.
- The gap between low and high risk schools has remained stable or widened slightly.



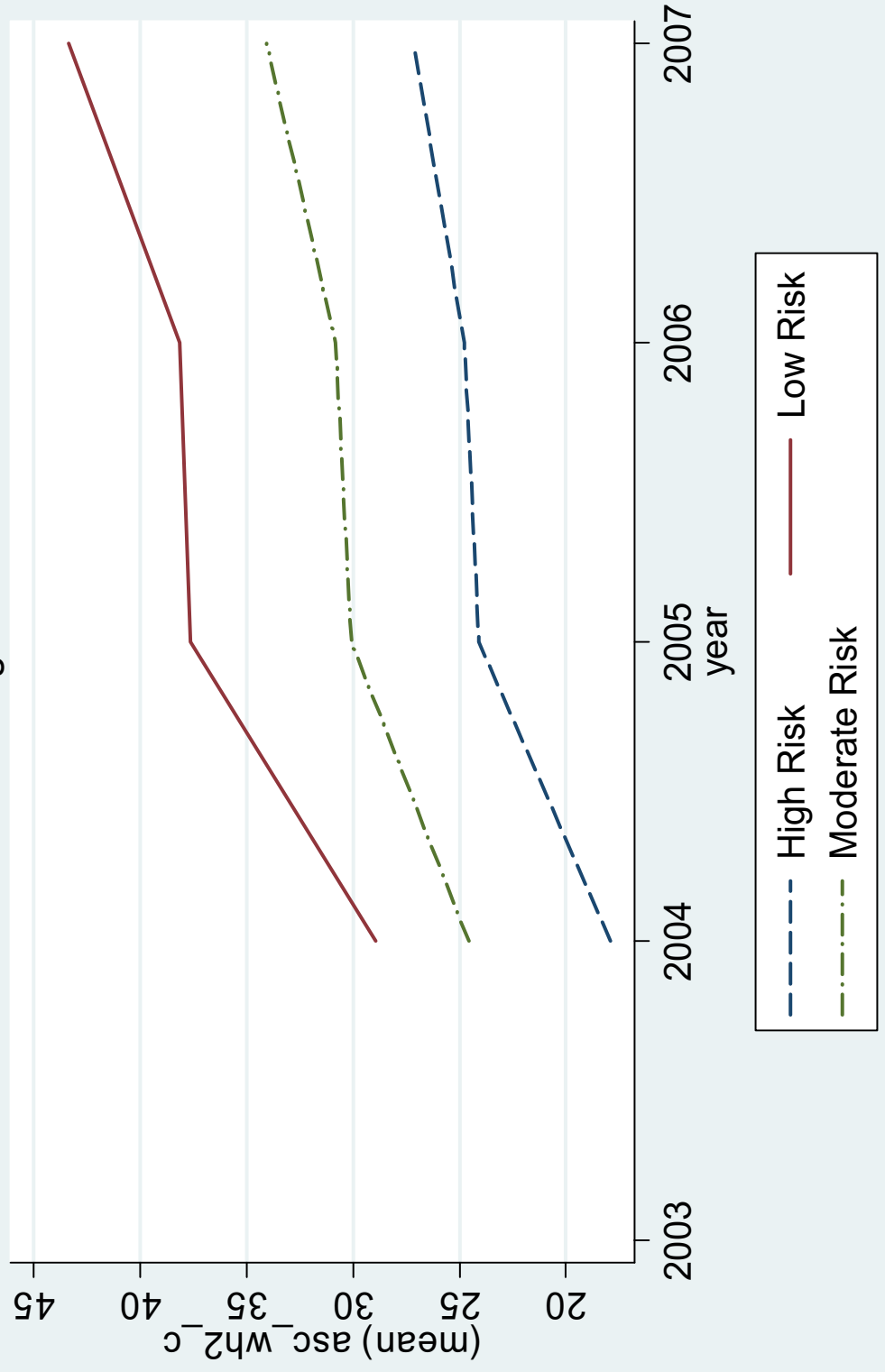
VA Achievement Trends for Social Studies, Grade 5





VA Achievement Trends for World History 2

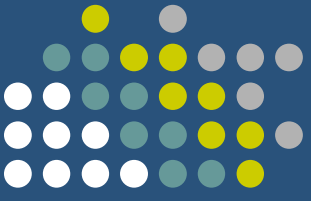
Percentage Advanced





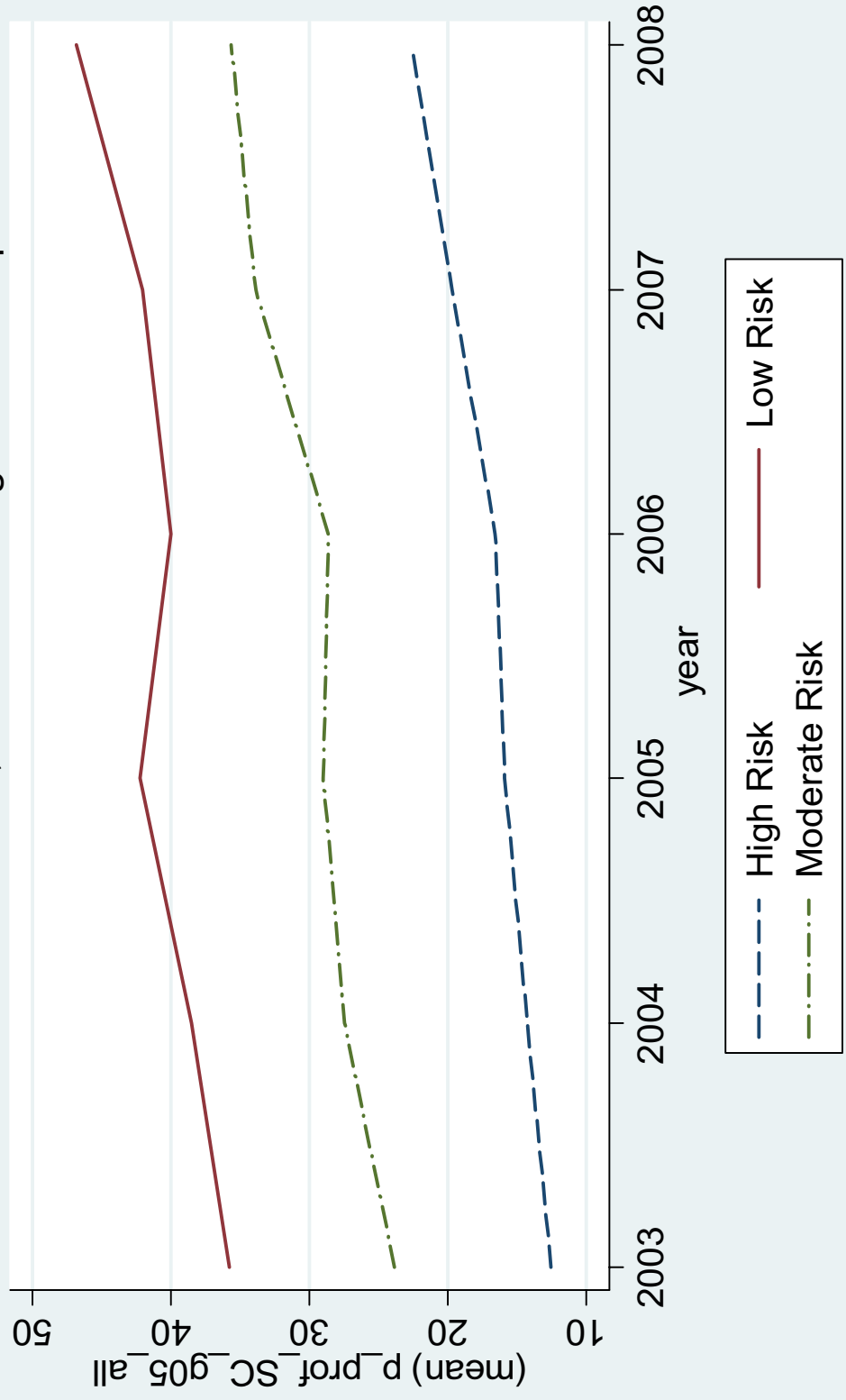
Likewise, in South Carolina the visual evidence does not indicate substantial curriculum narrowing.

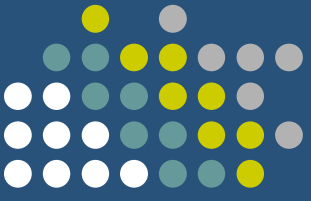
- Percent proficient has trended upward in science and social studies in SC.
- Gains are not as great as in Virginia.
- The gap between high risk and low risk schools has remained stable rather than shrinking (but not widening, as the hypothesis predicts).



SC Grade 5 Achievement Trends in Science

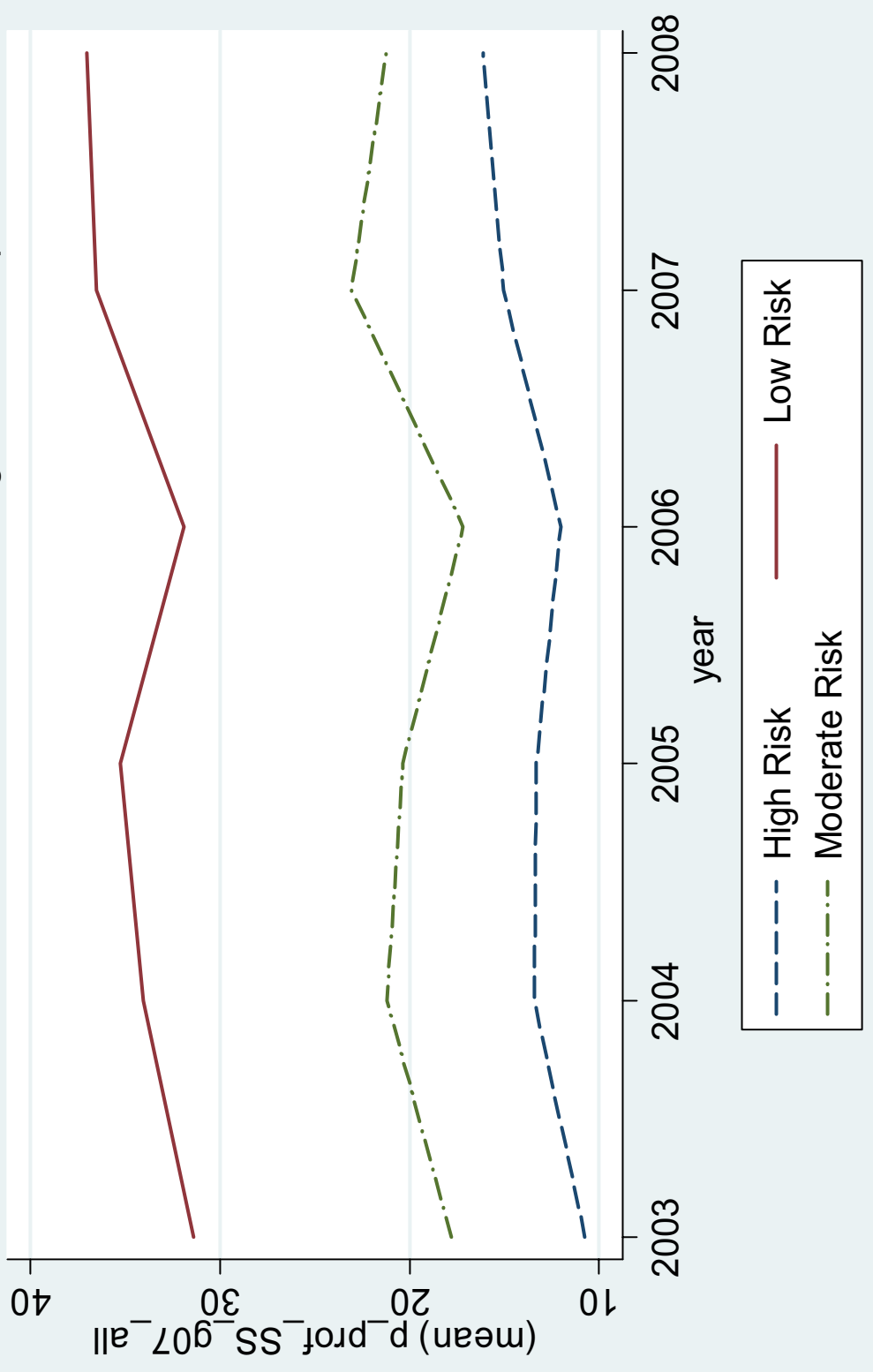
% Proficient - Low, Moderate & High Risk Groups

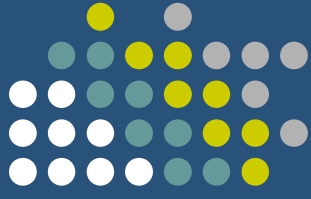




SC Grade 7 Achievement Trends in Social Science

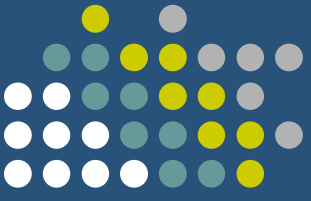
% Proficient - Low, Moderate & High Risk Groups





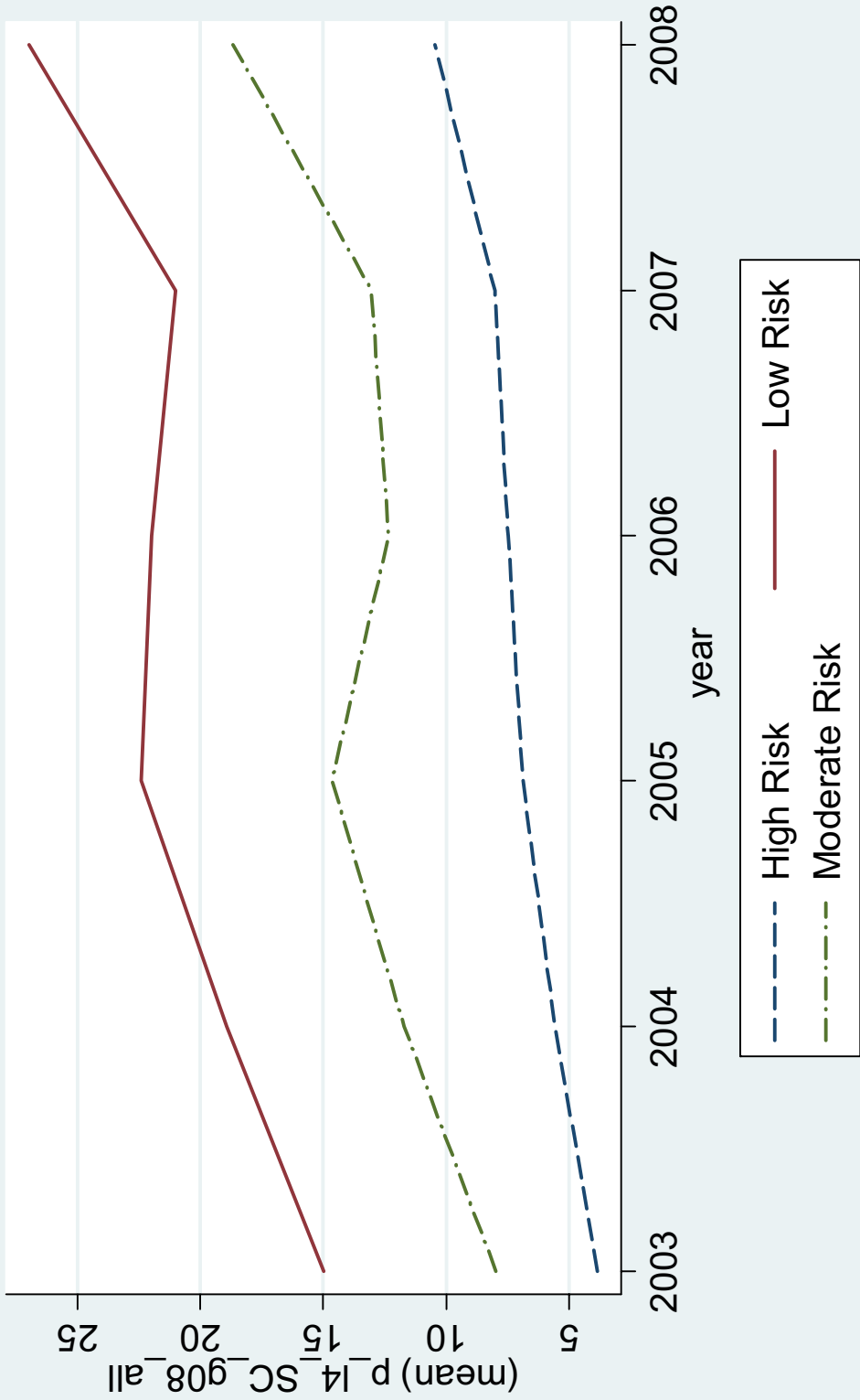
Results: SC (cont.)

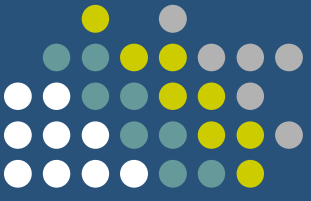
- There has also been an upward trend in percent advanced in science and social studies.
- The gap between low risk and high risk has widened slightly.
- There is typically no drop off among later cohorts.



SC Grade 8 Achievement Trends in Science

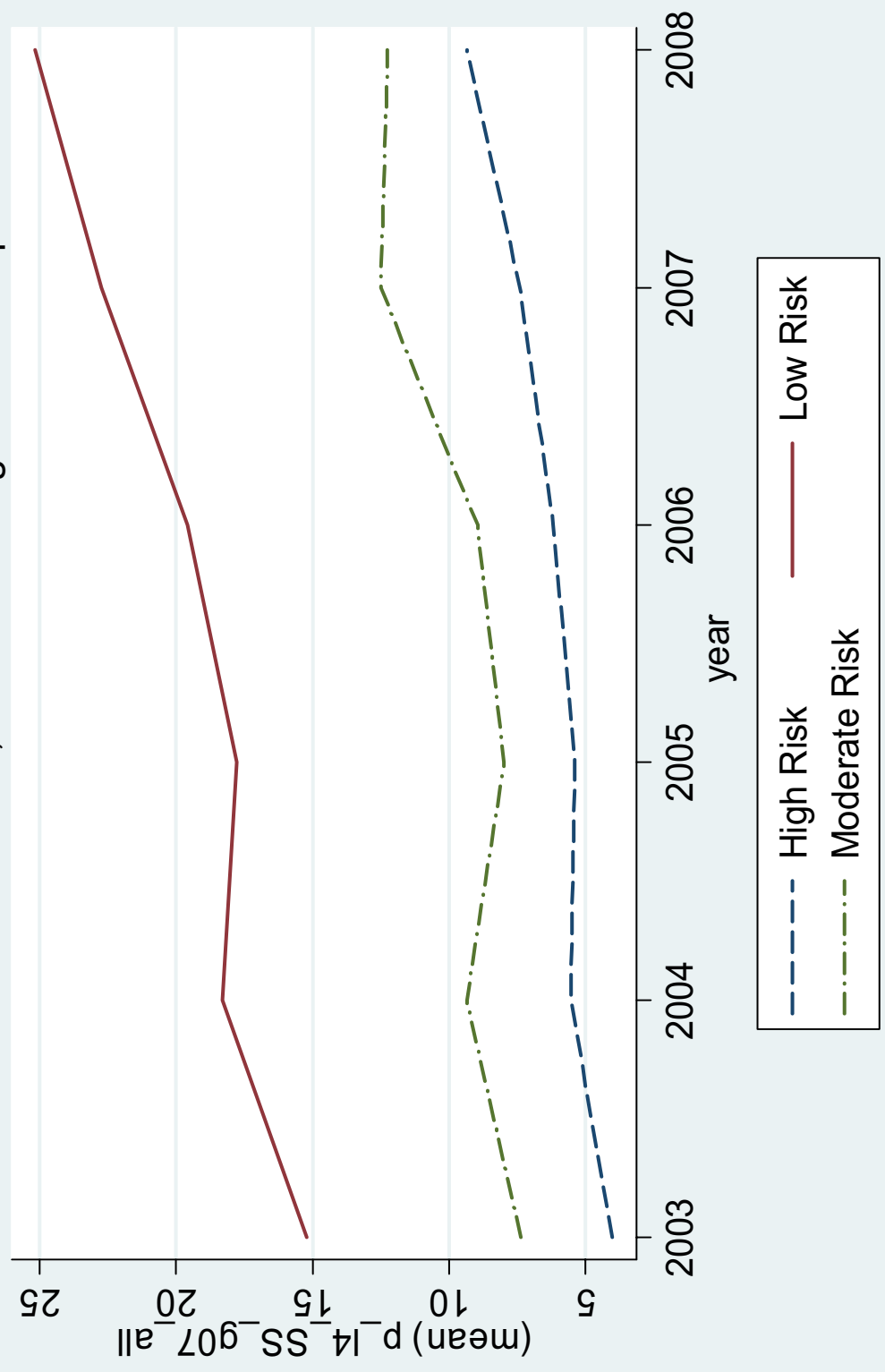
% Advanced - Low, Moderate & High Risk Groups

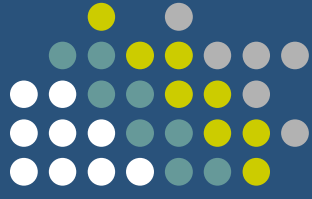




SC Grade 7 Achievement Trends in Social Science

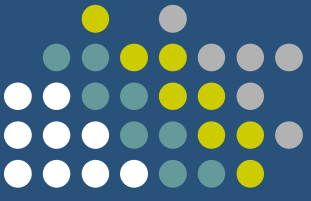
% Advanced - Low, Moderate & High Risk Groups





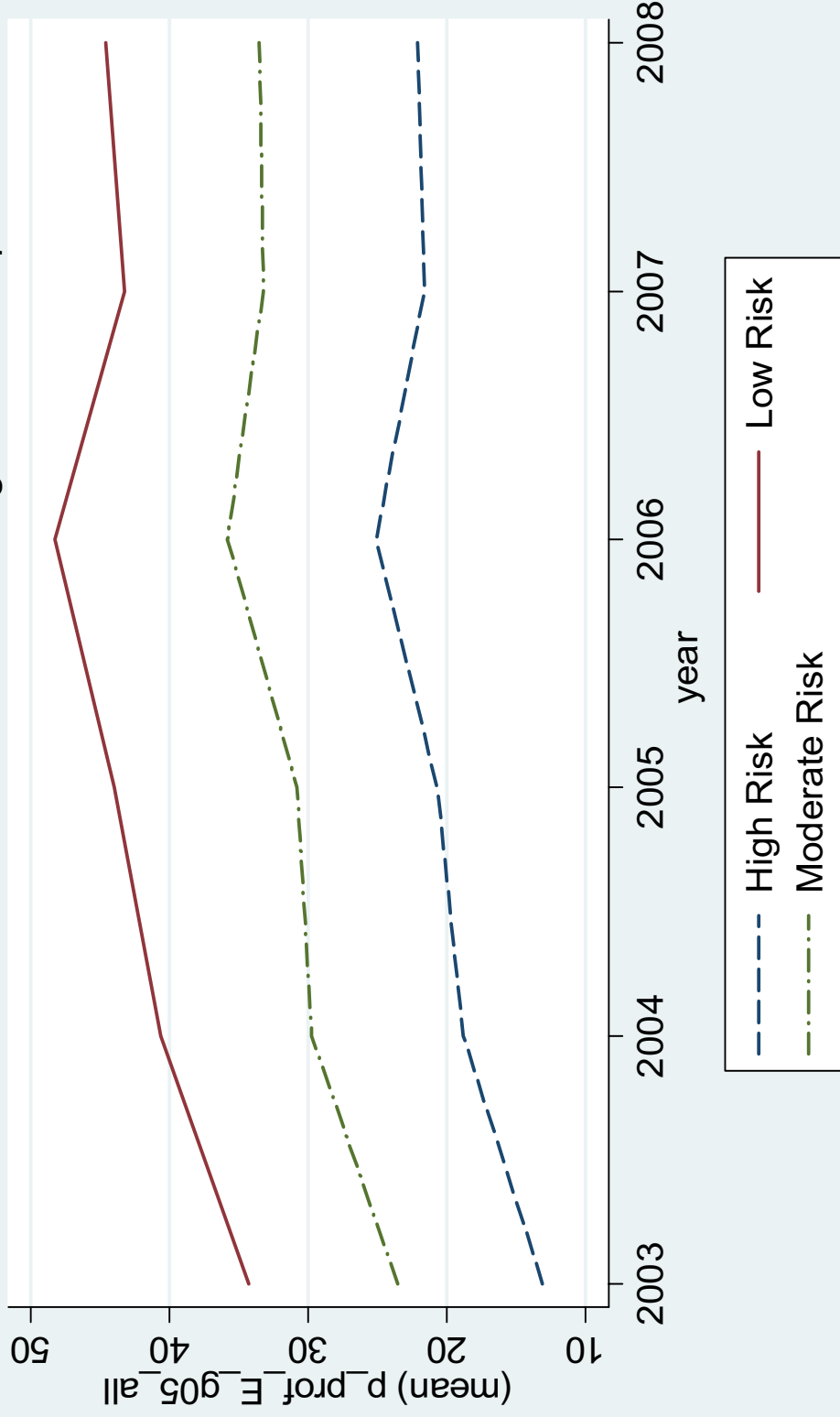
Results: SC (cont.)

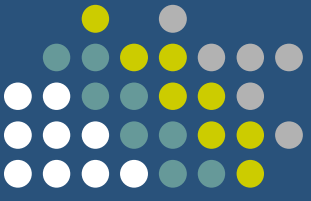
- Reading and math gains are smaller or non-existent.
- The gap between high and low-risk schools has been stable.
- There is no evidence that high-risk schools are holding students back in science and social studies in order to promote reading and math.



SC Grade 5 Achievement Trends in ELA

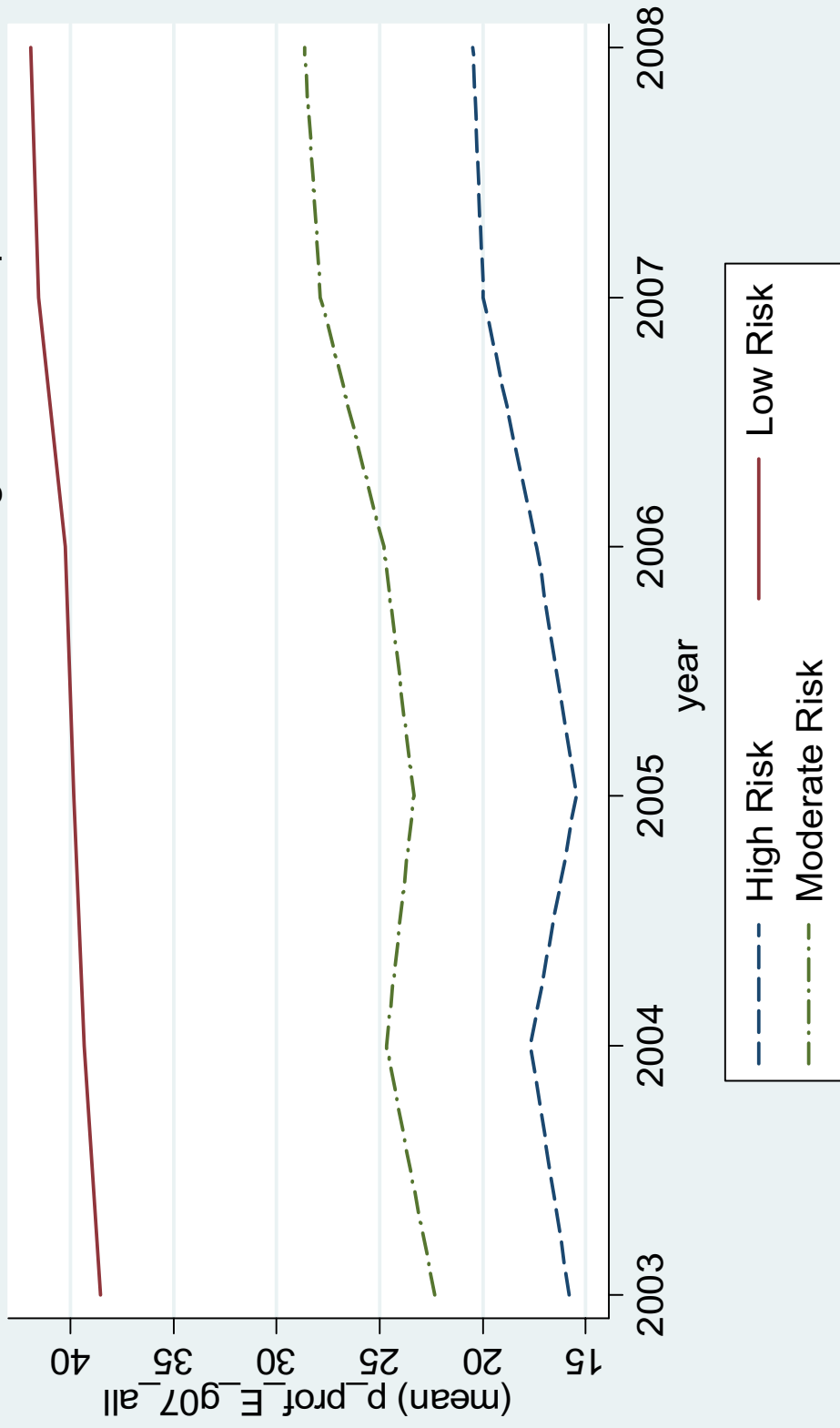
% Proficient - Low, Moderate & High Risk Groups

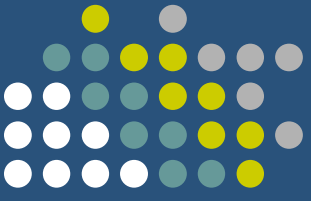




SC Grade 7 Achievement Trends in ELA

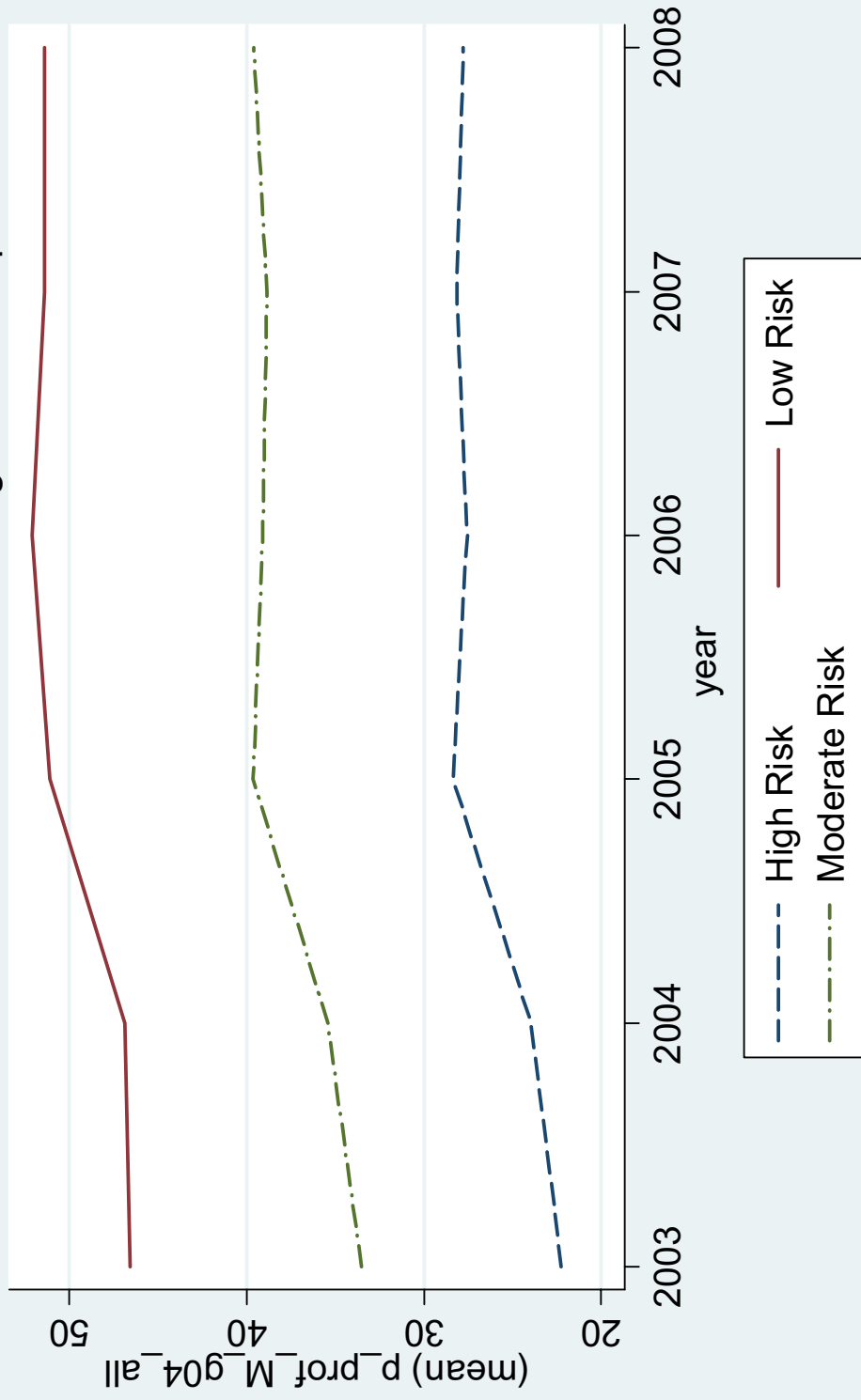
% Proficient - Low, Moderate & High Risk Groups





SC Grade 4 Achievement Trends in Math

% Proficient - Low, Moderate & High Risk Groups





Research Strategy: Phase Two

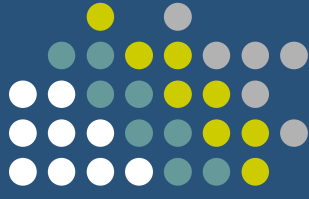
Motivation: Not all high-risk schools with an incentive to promote reading and math necessarily did so. Thus we examine the school-level association between performance in reading & math and performance in science, social studies, using regression analysis.

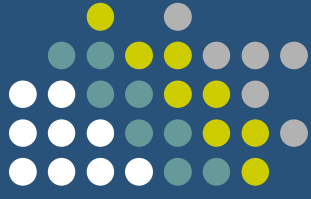
Dependent variable: percent proficient (or advanced) in science or social studies

Independent variables:

- percent proficient in reading
- percent proficient in math
- percent minority enrollment
- percent eligible for free or reduced-price lunch

Contemporaneous values and pre-NCLB values of the independent variables enter the equation (thereby controlling for influences on achievement that were present prior to NCLB).





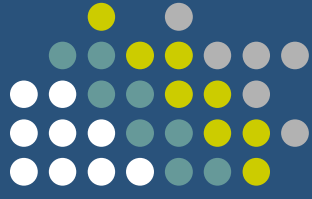
Coefficients on independent variables are estimated separately for high-stakes and low-stakes schools.

Because scores are positively associated across subjects, evidence of an NCLB-induced trade-off takes the form of a weaker (though still positive) association among high-risk schools relative to low-risk schools.



Results: VA

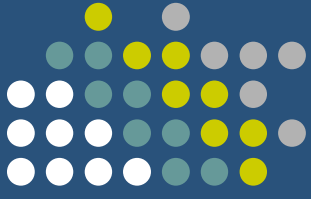
- When percent proficient in science or social studies is the dependent variable, we generally find no significant differences between high- and low-risk schools. *High-risk schools are not sacrificing the improvement we see in low-risk schools as math or reading scores increase.*



Results: VA (cont.)

- When percent advanced is the dependent variable, this is no longer the case. As math and reading scores increase, social studies and science scores do not increase as much as in low-risk schools.
 - Typical difference at elementary or middle school level: .1 to .2 percentage points for each percentage point increase in reading or math scores.
 - Typical difference for high school end-of-course exams: 1 for 1.

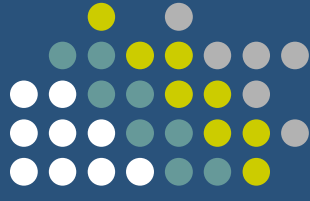
Results: SC

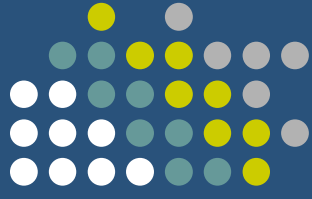


- When percent proficient in science or social studies is the dependent variable, we find a significant difference between high- and low-risk schools in about half the grades.
- Typical magnitude: .1 to .2 percentage points for each 1 percentage point increase in reading or math.
- Most of these effects show up in connection with elementary school reading, suggesting that in the lowest grades there is an emphasis on reading that displaces other instruction. Achievement in other subjects catches up by middle school.

Results: SC (cont.)

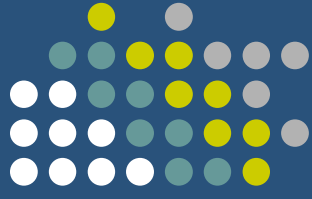
- When percent advanced is the dependent variable, differences between high- and low-risk schools arise in most grades for both science and social studies.
 - Typical difference: .1 to .2 percentage points for each percentage point increase in reading or math scores.





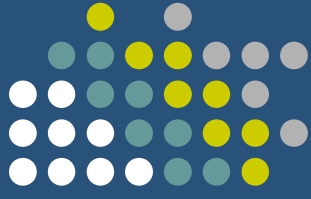
Conclusions from Phase Two

- There is little indication that improvements in math or reading are achieved by lowering the percentage of students proficient in social studies or science. The strongest evidence arises in connection with grade-school reading in SC, but is largely gone by middle school.
- There is evidence of a trade-off affecting the percentage of students at the advanced level.

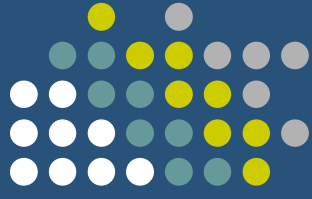


Summary

- In general, science and social studies achievement has been rising as fast in high-risk schools as low-risk schools, if not faster.
- Deviations from this pattern are modest and arise mostly at the advanced level, where the number of students is much smaller than the percentage proficient.



- Relative gains of high-risk schools in science and social studies equal or exceed their relative gains in reading or math. This is not consistent with the hypothesis that the former are being sacrificed to promote the latter.
- In high-risk schools where math and reading scores have increased, there has been a tendency for science and social studies not to improve as much as elsewhere. The effects are modest (.1 to .2 percentage points for each 1 percentage point gain in reading or math).



- These findings may not generalize to states where science and social studies are not part of the state accountability system. Thus, there may be states where NCLB is lowering science and social studies achievement significantly. But this need not happen, as the examples of SC and VA show.