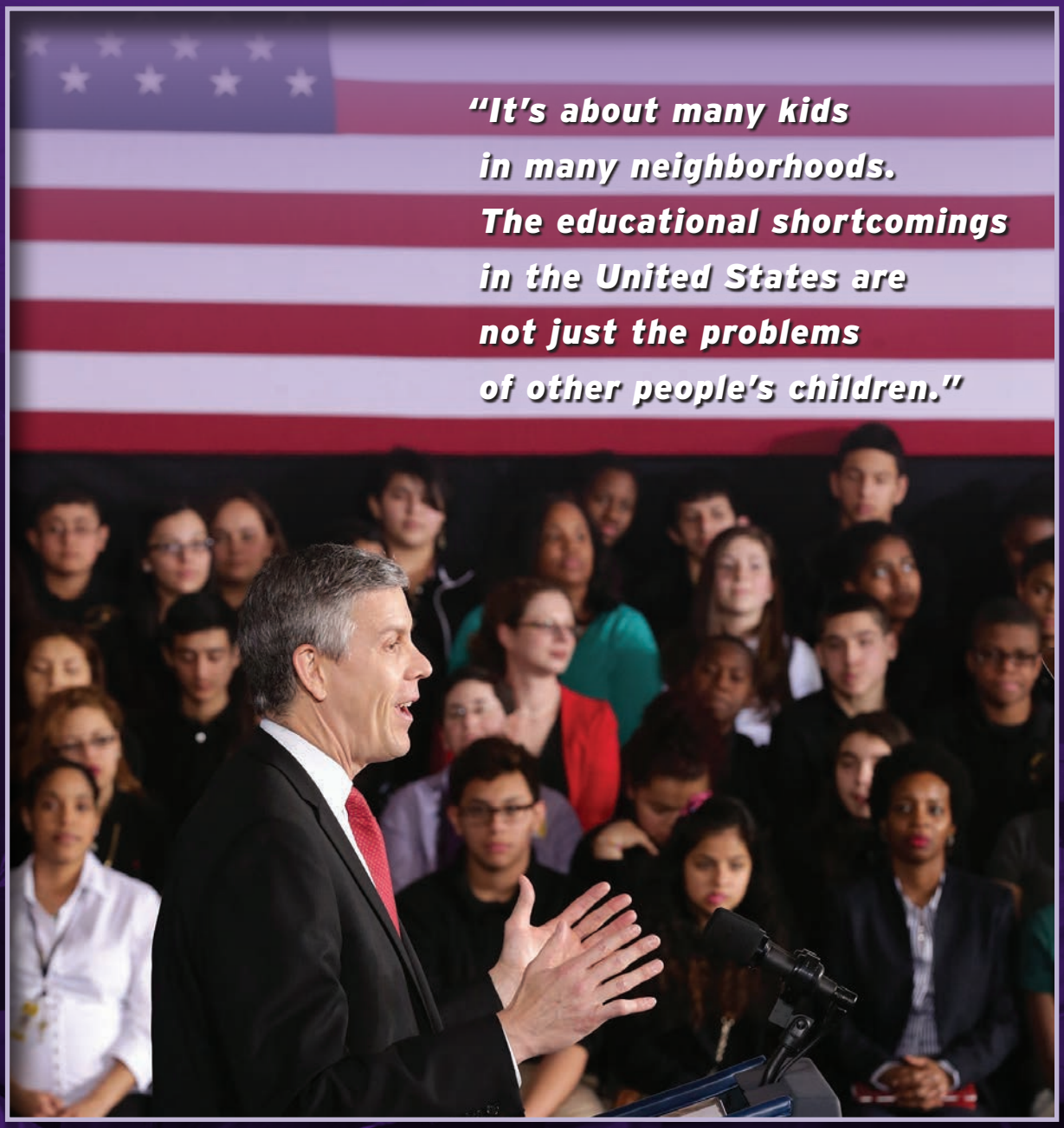
Not Just the Problems of Other People's Children:

U.S. Student Performance in Global Perspective

Eric A. Hanushek • Paul E. Peterson • Ludger Woessmann



Harvard's Program on Education Policy and Governance & *Education Next*
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Table of Contents

Figures

Photography:

Cover: Chip Somodeville/Getty Images
P. a, b, 54: Purestock/Getty Images
P. vii: Department of Education www.ed.gov/edblogs/international/news/
P. viii: AFP/Getty Images
P. ix: Photothek via Getty Images
P. x: AFP/Getty Images
P. xi: LightRocket via Getty Images
P. 1: UIG via Getty Images
P. 2: Anadolu Agency/Getty Images
P. 3: For The Washington Post/Getty Images
P. 4: Anadolu Agency/Getty Images
P. 6: The Washington Post/Getty Images
P. 7: Photothek via Getty Images
P. 8: Randy Risling/ Getty Images
P. 13: AFP/Getty Images
P. 14: AFP/Getty Images
P. 15: AFP/Getty Images
P. 18: MCT via Getty Images
P. 25: UK Press via Getty Images
P. 27: AFP/Getty Images
P. 31: Matt Cardy/Getty Images
P. 51: Photos Provided By Authors

Table

Maps

VE
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Executive Summary

"The big picture of U.S. performance on the 2012 Program for International Student Assessment (PISA) is straightforward and stark: It is a picture of educational stagnation.… Fifteen-year-olds in the U.S. today are average in science and reading literacy, and below average in mathematics, compared to their counterparts in [other industrialized] countries."[i] U.S. Secretary of Education Arne Duncan spoke these grim words on the bleak December day in late 2013 when the international tests in math, sciences, and literacy were released. No less disconcerting was the secretary's warning that the nation's educational problems are not limited to certain groups or specific places. The "educational challenge in America is not just about poor kids in poor neighborhoods," he said. "It's about many kids in many neighborhoods. The [test] results underscore that educational shortcomings in the United States are not just the problems of other people's children."[ii]

The "educational challenge in America is not just about poor kids in poor neighborhoods."

i. Duncan (2013).
ii. Duncan (2013).

We identify for each state and country the proficiency rate of students from families with parents of high, moderate, and low levels of education.

In this, the fourth in a series of reports on the condition of American education sponsored by Harvard's Program on Education Policy and Governance, we deepen our analysis of the U.S. education challenge. Our state-by-state data come from the 2011 tests administered to representative samples of U.S. students in 8th grade by the National Assessment of Educational Progress (NAEP) under the direction of the U.S. Department of Education. This authoritative test is generally known as "the nation's report card." Our country-by-country data come from the PISA tests, which are administered by the Organization for Economic Co-operation and Development (OECD), an international governmental organization that includes most of the nations of the industrialized world. In 2012, OECD administered the PISA tests to representative samples of students in public and private schools at the age of 15 in many national and regional jurisdictions, including all 34 OECD countries. Our analysis compares U.S. performance to those of students in the 33 other OECD countries.

Not everyone agrees that the nation's schools are in trouble. In their apology for the American school, David Berliner and Gene Glass seek to reassure Americans by trying to isolate the problem to minority groups or those of low income. "In the United States, if we looked only at the students who attend schools where child poverty rates are under 10 percent, we would rank as the number one country in the world," they write.[iii] But, this claim is highly misleading. The important question to ask is: Do students of the same family background do better in the United States than in other countries?

To answer the question of overall performance, we identify the percentage of public and private school students in the high school Class of 2015 who are performing at proficient and advanced levels of achievement in math and at proficient levels in science and literacy. We report results for each state within the United States and indicate its ranking relative to all other states and to all 34 OECD countries.

To ascertain whether the challenges facing the United States are concentrated among the educationally disadvantaged, we identify for each state and country the proficiency rate of students from families with parents of high, moderate,

iii. Berliner and Glass (2014), p. 15.

and low levels of education. If the problems are concentrated in ways that are conventionally believed, then U.S. students from families with high parental education should compare favorably with similarly situated students abroad. Such a finding would support the oft-repeated claim that the achievement challenges reflect mainly family factors and are limited to those who come from disadvantaged families (measured here by low levels of parental education).

The proficiency and advanced standards used in this study follow those developed by NAEP. The NAEP assessment identifies 34.7 percent of U.S. 8th graders as proficient in math in 2011. To equate proficiency and advanced performance rates across states and countries, we execute a crosswalk between the NAEP and PISA tests by identifying levels of performance on PISA that yield equivalent proportions of U.S. students as meet the NAEP proficiency and advanced standards. To execute this crosswalk between the two tests, we assume that all those who pass the NAEP proficiency bar in 8th grade will pass a similar threshold on the PISA test the next year.

Our results reveal that the nation's "educational shortcomings" are not just the problems of the other person's child. When viewed from a global perspective, U.S. schools seem to do as badly at teaching those from better-educated families as they do at teaching those from less-well-educated families. Overall, the U.S. proficiency rate in math (35%) places the country at the 27th rank among the 34 OECD countries. That ranking is somewhat lower for students from advantaged backgrounds (28th) than for those from disadvantaged ones (20th). Countries with higher proficiency rates among students from better-educated families than the United States (43%) include Korea (73%), Poland (71%), Japan (68%), Switzerland (65%), and Germany (64%). Other major countries that score much higher than the United States include Canada (57%), France (55%), and Australia (55%).

Striking differences in proficiency rates across states are evident when one divides students according to their parental education. Over 62 percent of students from Massachusetts families with high levels of parental education are proficient in math, placing that state just behind Germany and Switzerland, two of the top-five OECD countries. Only a bit further back are Vermont, Minnesota, Colorado,

U.S. schools seem to do as badly at teaching those from better-educated families as they do at teaching those from less-well-educated families.

Wisconsin, if ranked as a country, would come in 21st place, just below Ireland.

New Jersey, and Montana, all of which have a proficiency rate of 58% or 59% among students from better-educated families. Internationally, that places these states in the same league as the Czech Republic (58%), Canada (57%), and Finland (56%), which are among the OECD top 13. While those numbers do not post anything like an Olympic-level performance, they are at least not embarrassing.

But those six states are the highest-performing states in the Union, and are educating just 8 percent of U.S. students. Other states rank much lower down the international list. In many places, students from highly educated families are performing well below the OECD average for similarly advantaged students. For example, Wisconsin, if ranked as a country, would come in 21st place, just below Ireland. California is large enough to be an OECD country in its own right, and educates 12 percent of U.S. students. If it were an OECD country, its 43 percent proficiency rating would place it 30th, just below Italy, and New York's 40 percent rating entitles it to assume position number 31, just below Turkey. Florida's 38 percent rating gives it the 32nd position, just below Sweden, which has registered an abysmal performance given its level of economic development. Ranked near the bottom, Alabama, West Virginia, and Louisiana do worse at educating students from better-educated families than all OECD countries with the exception of Chile and Mexico. Mississippi ranks just below Chile.

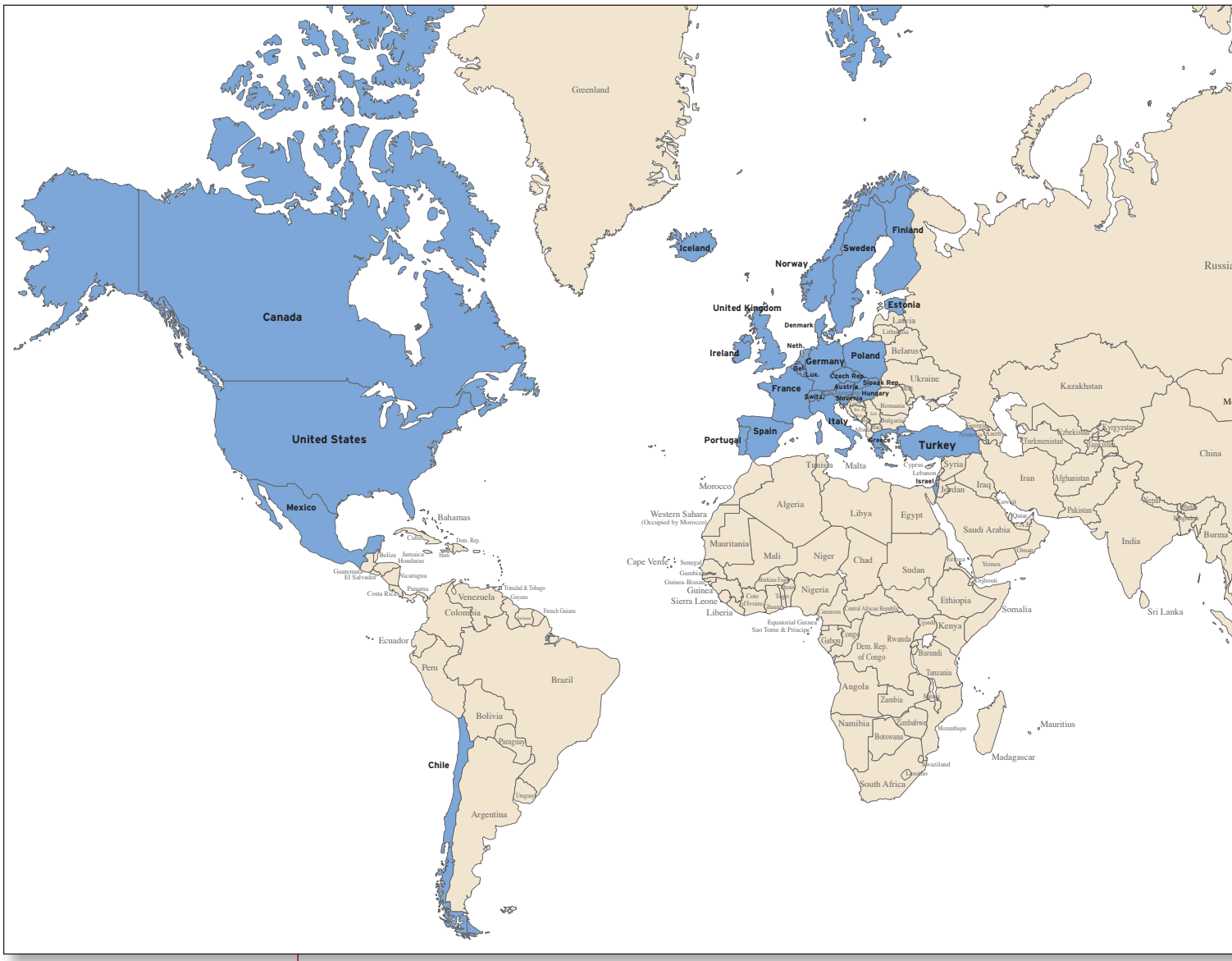
Students from families with low parental education levels have the highest proficiency rates in Texas (28%) and New Jersey (25%), putting them, respectively, in 7th and 12th place internationally. Those rankings are well ahead of Massachusetts and Minnesota (both at 18%), which puts them in 19th place internationally. Virginia and Florida are at about the U.S. national average, while New York, in 27th place, falls slightly below. California (9%), West Virginia (6%), and Utah (5%) rank at embarrassingly low levels.

The United States has attained its position of economic preeminence in large part because of its record of invention and innovation. But this record is itself dependent upon the nation's historic strength in science, technical, engineering, and math (STEM). The pool of people prepared to go into these fields in the future is dependent on students who have developed advanced skill in math and science in school.

To see if there is evidence of excellence at the very top of the American school system, we identify the share of the student population in the United States that scores at or above the advanced level of performance in mathematics (again using the existing NAEP definitions). Eight percent of all U.S. students perform at the advanced level in mathematics, leaving the United States in 28th place among the OECD countries. Only 2 percent of students from families with low parental education perform at that level, and only 4 percent of students from families with moderate parental education attain that level of accomplishment. By comparison, 12 percent of students from better-educated families reach the advanced level in math. But the feat leaves the United States in the 28th position out of the 34 OECD countries. Only Sweden, Spain, Norway, Greece, Chile, and Mexico do worse.

Although the focus of this report is on math performance, we show similar results for proficiency in science and literacy. There can be little doubt that educational shortcomings in the United States spread well beyond the corridors of the inner city or the confines of low-income neighborhoods where many parents lack a high school diploma. While bright spots can be identified—particularly in some states along the country's northern tier—the overall picture is distressing to those concerned about the well-being of the United States in the 21st century.

Students from families with low parental education levels have the highest proficiency rates in Texas (28%) and New Jersey (25%).



Map 1. Members of the Organization for Economic Cooperation and Development (OECD).

Not Just the Problems of Other People's Children: U.S. Student Performance in Global Perspective

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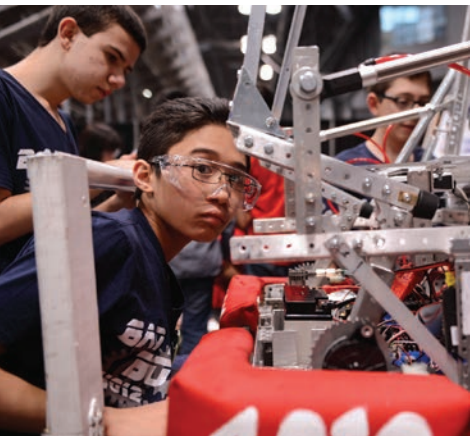
"The big picture of U.S. performance for the 2012 Program on International Student Assessment (PISA) is straightforward and stark: It is a picture of educational stagnation.… Fifteen-year-olds in the U.S. today are average in science and reading literacy, and below average in mathematics, compared to their counterparts in [other industrialized] countries."[1] U.S. Secretary of Education Arne Duncan spoke these grim words on the bleak December day in late 2013 when the latest international tests in math, sciences, and literacy were released. No less disconcerting was the secretary's warning that the nation's educational problems are not limited to certain groups or specific places. The "educational challenge in America is not just about poor kids in poor neighborhoods," he said. "It's about many kids in many neighborhoods. The [test] results underscore that educational shortcomings in the United States are not just the problems of other people's children."[2]

He went on to say, "That brutal truth, that urgent reality, must serve as a wake-up call against educational complacency and low expectations.… The problem is not that our 15-year-olds are performing worse today than before. The problem instead is that they are not making progress. Yet students in

Our 15-year-olds are not making progress.

1. Duncan (2013).
2. Duncan (2013).



Our analysis compares U.S. student performance to that of students in the 33 other OECD countries.

many nations...are advancing, instead of standing still.… In a knowledge-based, global economy, where education is more important than ever before, both to individual success and collective prosperity, our students are basically losing ground. We're running in place, as other high-performing countries start to lap us."[3]

The Study

In this, the fourth in a series of reports on the condition of American education sponsored by Harvard's Program on Education Policy and Governance, we deepen our analysis of the U.S. education challenge. In earlier reports, we documented the need for a "wake-up call" by showing the threat to our "collective prosperity" of low performance in American education and the extent to which it has been "running in place" for the past quarter of a century.[4] In a short monograph published in 2013, *Endangering Prosperity: A Global View of the American School*, we summarized and interpreted these findings.[5] In this report, we add to the discussion by drawing upon the latest achievement tests to discern whether "educational shortcomings" are to be found among public and private school students in all parts of the country and among students from both advantaged and disadvantaged backgrounds.

Our state-by-state data come from the 2011 tests administered to representative samples of U.S. students in 8th grade by the National Assessment of Educational Progress (NAEP) under the direction of the U.S. Department of Education. This authoritative test is generally known as "the nation's report card." Our country-by-country data come from the PISA tests, which are administered by the Organization for Economic Co-operation and Development (OECD), an international governmental organization that includes most of the nations of the industrialized world. In 2012, OECD administered the PISA tests to representative samples of students at the age of 15 in many national and regional jurisdictions, including all 34 OECD countries. Our analysis compares U.S. student performance to that of students in the 33 other OECD countries.

Conventional Wisdom

In making his comments, Secretary Duncan challenged those who cling to an old belief that American schools are exceptional. Just as the United States has often prided itself on having a more durable democracy, a larger economy, greater national resources, and mightier armed forces, so many want to believe that it has the best and broadest education system. And, indeed, the United States was among the first to establish universal elementary education, among the first

3. Duncan (2013).
4. Hanushek, Peterson, and Woessmann (2010); Peterson et al. (2011); Hanushek, Peterson, and Woessmann (2012).
5. Hanushek, Peterson, and Woessmann (2013).

to create universal access to secondary schooling, and among the first to build a system of higher education with elite institutions that attract the very best students from throughout the world. But as Secretary Duncan explained, the United States has in recent decades been "running in place" while other countries have been catching up. That fact was given official acknowledgement in 1983 by the National Commission on Excellence in Education, appointed by the secretary of education to Ronald Reagan, which issued its own wake-up call, entitled "A Nation at Risk."[6] The report highlighted falling student achievement and lower levels of U.S. math and science performance as compared to those in other industrialized countries.

As subsequent studies confirmed the report's findings, the American public began to understand that the quality of its schools no longer reached the heights they once thought it had attained. In 2011, *Education Next*, a journal of opinion and research, asked a representative cross-section of Americans to estimate where U.S. students stood in math relative to those in other industrialized countries. The median estimate of the public was low—just 19th out of 34 countries, a guess only modestly more optimistic than the actual rank of 27th reported below.[7]

Yet some of the older, self-indulgent conventional wisdom persists. Americans remain optimistic about the schools in their local community. When the same survey asked what grade local schools deserved on the traditional A-to-F scale used to evaluate students, 50 percent of those surveyed said they should be given either an A or a B. They gave the local schools these marks despite the fact that only about 26 percent of these same respondents were willing to give the nation's schools one of those evaluations.[8] Inasmuch as the nation's schools are the sum total of all local schools, the two questions should have generated similar percentages from a representative cross section of the population. The discrepancy is very likely due to the exemption the public gives local schools from its generally critical assessment of U.S. schools more generally.

Not everyone agrees that the nation's schools are in trouble. In their apology for the American school, David Berliner and Gene Glass seek to reassure Americans by trying to isolate the problem to minority groups or those of low income. "In the United States, if we looked only at the students who attend schools where child poverty rates are under 10 percent, we would rank as the number one country in the world," they write.[9] That claim is highly misleading. Very likely, almost every other member of the OECD could also claim, "If we looked only at the students who attend schools where child poverty rates are

Americans remain optimistic about the schools in their local community.

6. National Commission on Excellence in Education (1983).
7. Peterson, Henderson, and West (2014), p. 75.
8. Peterson, Henderson, and West (2014), p. 46. These were the average responses to the annual poll for the six-year period between 2007 and 2012.
9. Berliner and Glass (2014), p. 15.

Presidents have repeatedly called for bold measures that will bring U.S. performance up to the international level.

under 10 percent, we would rank as the number one country in the world." Diane Ravitch, uttering pretty much the same claim, introduces a further confusion: "In U.S. schools where less than a quarter of the students [come from low-income families] the reading scores were similar to those of students in high-performing nations."[10] Very likely, any country that tosses out the results from students from low-income families can boost their apparent performance dramatically upward.

The important question to ask is: Do students of similar family backgrounds do better in the United States than in other countries? It is that apples-to-apples comparison that we undertake in the pages that follow.

Apologists for the American school also like to compare the highest-performing states within the United States to all students in other countries. "Massachusetts...scored so high that only a few Asian countries beat it," Berliner and Glass declare.[11] "The states of Massachusetts, Minnesota, and Colorado... ranked among the top-performing nations in the world. Massachusetts, had it been an independent nation would have been ranked second in the world, behind Singapore," reports Ravitch.[12] It is true that Massachusetts schools stand up to world competition, but it is important to keep in mind that the K–12 students living in Massachusetts are just 2 percent of the nation's total. One cannot generalize to the country as a whole from this small state.

Efforts to Raise U.S. Performance to International Levels

These defensive attempts to protect the public from coming to grips with the current state of American education have failed to persuade the nation's political leadership. On the contrary, presidents have repeatedly called for bold measures that will bring U.S. performance up to the international level. The most celebrated instance occurred in 1989 when President George H. W. Bush, with the bipartisan support of virtually all the governors of the 50 states, committed the country to a full-scale effort to bring U.S. education up to international standards by the first year of the 21st century.[13] Bush's proclamation received the hearty endorsement of President Bill Clinton, who in his own "Goals 2000" initiative declared: "What this Goals 2000 bill does…is to set world-class education standards for what every child in every American school should know in order to win when he or she becomes an adult. We have never done this before. We are going to do it now."[14]

President George W. Bush changed the conversation by focusing on the disadvantaged student when he persuaded Congress to enact No Child Left Behind (NCLB), a law expected to bring every student up to full proficiency

10. Ravitch (2013), pp. 64-65.
11. Berliner and Glass (2014), p. 17.
12. Ravitch (2013), p. 67.
13. Finn (2008), pp. 151-54.
14. Clinton (1993).

by the year 2014.[15] Yet when he announced his competitiveness initiative, he invoked the principle that "the bedrock of America's competitiveness is a well-educated and skilled workforce."[16] In the same vein, President Barack Obama has supported internationally competitive Common Core State Standards, declaring in his 2011 State of the Union Address that "we need to out-innovate, out-educate, and out-build the rest of the world."[17]

Is It Really Everyone's Problem?

As the deadline years of 2000 and 2014 have come and (almost) gone, international surveys continue to show U.S. students lagging behind their peers abroad and large segments of the student population unable to demonstrate proficiency in math and reading. This embarrassing reality has given credence to those apologists who insist the education problems are concentrated in the central cities, poor rural areas, and among families with less-well-educated parents. The children of the prosperous, well-educated segment of society are every bit as competent as similarly placed peers abroad, many well-to-do Americans believe. In 2011, *Education Next* asked a representative sample of affluent Americans (those with college degrees who also had an annual income that placed them in the top 10 percent of those within their state) to evaluate both the nation's schools and those in their own community. The affluent were especially dubious about the nation's schools—only 15 percent conceded them an A or a B. Yet 54 percent gave their local schools one of the two top ratings.[18] Pursuing this topic in another way, *Education Next*, in 2013, asked the public whether their local schools did a good job of teaching talented students. Seventy-three percent of the public said the local schools did "somewhat" or "extremely" well at the task, as compared to only 45 percent who thought that was true of their schools' capacity to teach the less talented.[19]

Many political and policy discussions reinforce the general perception that all education problems are concentrated among those from disadvantaged families. Many studies of student achievement highlight the disparity between the performance of urban and suburban schools, or white students and minority students, or those who come from low-income families and those who do not. States are regularly accused of violating equity in education by funding differentially school districts that serve higher- and lower-income communities.[20] NCLB asked states to bring all those below proficiency up to that level; it said nothing about enhancing the performance of more talented students. The Obama administration has asked states if they wish to receive a waiver

15. Peterson (2010), pp. 174-180.
16. Bush (2006).
17. Obama (2011).
18. Howell, West, and Peterson (2013).
19. Complete Polling Results, 2013. http://educationnext.org/files/2013ednextpoll.pdf
20. Peterson and West (2007).

It is critical that the country lift the lowest-performing schools to higher levels of achievement and to secure broader educational equity.

from NCLB requirements to concentrate resources on efforts to turn around the bottom 15 percent of all schools, implying that other schools are performing at a satisfactory level.[21]

Certainly, family background has a powerful impact on student achievement. It has been known for five decades—since the famous Coleman Report of 1966—that children from educationally disadvantaged families face extra challenges in school.[22] No study since then has shown otherwise. But that fact should not be twisted to suggest that there are no other education problems in our schools, or worse, that schools can do nothing about student achievement until society solves the problem of poverty. The differentials between the performance of the socially advantaged and those suffering serious challenges raise important issues that the United States must surely come to grips with. But as we shall see, that is hardly the only problem facing our schools today.

It is critical that the country lift the lowest-performing schools to higher levels of achievement and to secure broader educational equity. But one unanticipated consequence of this focus is the smugness and self-satisfaction it engenders among those who are not disadvantaged. In large parts of the country, the perception persists that the high incidence of poverty within the United States is the primary cause of our low international standing. Richard Rothstein argues that social class differences, not schools themselves, are the primary source of America's educational problems.[23] He and Martin Carnoy attribute low U.S. achievement levels to the much larger size of the lowest social class in the United States than in other countries.[24] They claim that "if the social class distribution of the United States were similar to that of top-scoring countries [Korea, Finland, and Canada], the average test score gap between the United States and these top-scoring countries would be cut in half in reading and by one-third in math." The authors go on to say, "Because social class inequality is greater in the United States than in any of the countries with which we can reasonably be compared, the relative performance of U.S. adolescents is better than it appears." The press release promoting their study says it even more sharply: "U.S. students' scores are low in part because a disproportionately greater share of U.S. students comes from disadvantaged social class groups."[25]

Rothstein's emphasis on social class as the major educational issue facing the country has been iterated by many others. "Poverty in the United States, rather than overall school achievement, appears to be the more important national problem for us to solve," Berliner and Glass tell us. When the 2012 PISA results were announced, Randi Weingarten, president of the American Federation of

21. http://beta.congress.gov/bill/113th-congress/senate-bill/1094
22. Coleman et al. (1966).
23. Rothstein (2004). See also the website of the Broader Bolder Approach to Education, www.boldapproach.org
24. Carnoy and Rothstein (2013).
25. Carnoy and Rothstein's findings assume that the number of books in a student's home is a good indicator of a family's social class. That assumption generates the peculiar finding that more students in Korea come from higher social class families than in the United States, as 31 percent of Korean students report having many books in the home, as compared to only 18 percent of U.S. students. But it is more likely that Korean families are not richer but more attentive than Americans to the reading habits of their children, as U.S. GDP per capita in 2012 was twice that of Korea [http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/index.aspx, accessed March 18, 2014].

Teachers (AFT), pointed to poverty in America as the key explanation: "If we don't get honest about dealing with the shameful equity gap, our students will continue to lag behind."[26]

Secretary Duncan's emphasis on the broad extent of "educational shortcomings" discomfited such self-protective thinking.[27]

Overall Findings

It is that debate that motivates our report. We seek to determine whether the problems in American education are as wide-ranging as the comments by the Secretary of Education imply or whether they are concentrated among the most disadvantaged segments of U.S. society. The study examines the percentage of students in the Class of 2015, that is, the cohort of public and private school students expected to graduate from high school in that year, who are proficient in math, science, and reading in the 34 OECD countries.[28] We identify the proficiency rate for each state within the United States and indicate its ranking relative to all other states and to all 34 OECD countries.

To ascertain whether the challenges facing the United States are concentrated among the educationally disadvantaged, we identify for each state and country the proficiency rate of students from families with parents of high, moderate, and low levels of education.[29] If the problems are concentrated in ways that are conventionally believed, then U.S. students from families with high parental education should compare favorably with similarly situated students abroad. Such a finding would support the oft-repeated claim that the challenges are limited to those who come from families with low levels of parental education and do not accurately reflect any differences in school quality across countries.

Our results point in quite the opposite direction. We find that the international rankings of the United States and the individual states are not much different for students from advantaged backgrounds than for those from disadvantaged ones. Although a higher proportion of U.S. students from better-educated families are proficient, that is equally true for similarly situated students in other countries. Higher levels of parental education lift student performance everywhere. Compared to their counterparts abroad, however, U.S. students from advantaged homes lag severely behind. In short, our findings document Secretary Duncan's observation that educational shortcomings are not just the problems of the other person's child.

Looking at the same question from another vantage point, we report the percentage of students performing at the advanced level of proficiency in

The international rankings of the United States and the individual states are not much different for students from advantaged backgrounds than for those from disadvantaged ones.

26. United Teachers of Dade, (2013).
27. Duncan, (2013).
28. A significant share of the students can be expected to have graduated in 2014, however.
29. Note that the overall country scores come from combining scores by each parental group weighted by the relative proportion of the population in each group. Thus, the overall rankings can be quite different from the rankings within each subgroup. Within each subgroup, the ranking reflects more the quality of schools attended by each group, while overall they will reflect the combination of parental background and quality of schools.

We assume that all those who pass the NAEP proficiency bar in 8th grade will pass a similar threshold on the PISA test the next year.

mathematics. If the highest-performing students in the United States were being educated as well as the highest-performing students abroad, then the country—and individual states—should have similar percentages of students performing at the advanced level. That should be particularly true for those students who come from families with high levels of parental education. Once again, our findings will not bring comfort to those who think the problem is isolated to those from disadvantaged families.

Making International Comparisons

To see how students in individual states stand internationally, it is necessary to link the data obtained from NAEP and PISA. Fortunately, both tests have been developed carefully over an extended period of time by specialists familiar with sampling and testing principles that ensure the reliability and validity of the tests.

Test reliability and validity. Informally known as "the nation's report card," NAEP has been administered to representative samples of the U.S. student population periodically for over four decades. Unlike "high-stakes" state assessments, which are given to all students and are designed to provide information about specific schools and, at times, specific classrooms, NAEP is administered to representative samples of students in such a way that no student or teacher or school or school district can be identified.[30] Instead, the data are aggregated to the state and national levels and only reported for broad categories of students, such as those of particular ethnicities, genders, and levels of parental education. For this reason, NAEP is best understood as a "low-stakes" test that provides few, if any, incentives for cheating or otherwise manipulating student performance by teachers or school administrators. PISA test procedures are similar to those used by NAEP.

The NAEP tests were administered to representative samples of students in 8th grade in 2011. The PISA tests were administered one year later to public and private school students at the age of 15, when most of the tested students were in 10th grade.[31] We refer to these cohorts of students as the Classes of 2015, as these students are expected to graduate from high school in that year. Our analysis focuses on the 34 members of the OECD, in part because test administration is the most reliable for these countries. For the OECD countries, there is no concern that countries ahead of us in the rankings are so identified because a large portion of the 15-year-old cohort were not in school.

Another reason for excluding non-OECD countries is the strong correlation between educational performance and levels of economic development. There is no doubt that U.S. schools perform at levels well beyond those in most parts

30. Indeed, no student takes the entire test. To minimize intrusion on the school day, NAEP test assessments are divided into five parts, with only one part given to any one student. Estimations of performance use sophisticated statistical procedures to combine information from various parts of the test when aggregating results to state and national levels. Twenty large urban school districts have volunteered to take the NAEP, so for those districts results are available.

31. Twelve percent of the 15-yr.-old students are in 9th grade, 71 percent are in 10th grade, and 17 percent are in grade 11. A better match would be between NAEP 2010 and PISA 2012 but NAEP is not available for that year. However, change in performance by cohorts from one year to the next can be expected to be very small.

of Latin America, Africa, the Middle East, and South Asia. But those are not the places that are usually identified as useful points of institutional comparison. Rather, the United States looks to the leading industrialized nations of Europe, Asia, and North America to see whether lessons can be learned for its own policies and practices.

By contrast, apologists for the U.S. education system have relied upon results from surveys that collect most of their information from the developing world. For example, Berliner and Glass note that U.S. 8th graders ranked as high as 9th in math and 10th in science on the 2011 Trends in International Mathematics and Science Study (TIMSS). The results from that survey, they say, undermine the general belief that "the United States will slip into oblivion by trailing international peers in...knowledge and skills."[32] That survey is also cited by Ravitch in her defense of American education. "In eighth-grade science, American students were outperformed by only six [of 57] nations...and tied with four others," she tells her readers.[33] All three writers ignore the fact that most of the countries that participated in the 2011 TIMSS assessment were from the developing world, and only a few participants were members of the OECD.[34] Their analysis shows only that the United States performs better than Armenia, Romania, Malaysia, Thailand, Indonesia, Morocco, Oman, Ghana, and other developing countries.

Our criticism of these analysts should not be interpreted as a critique of TIMSS itself. That survey of student achievement, like PISA, is a well-established and well-conducted undertaking, but its results do not allow for comprehensive comparisons among industrialized nations for the simple reason that many of them do not participate in TIMSS but depend upon PISA for information about their international standing.[35]

Measuring student proficiency. The proficient and advanced standards used in this study follow those developed by NAEP. (See sidebars for definitions and examples of proficiency levels set by NAEP and PISA).[36] The 2011 NAEP assessment identifies 34.7 percent of U.S. 8th graders as proficient and 8.2 percent as advanced in math. To equate proficiency and advanced performance rates across states and countries, we execute a crosswalk between the two tests by identifying levels of performance on PISA that yield equivalent proportions of U.S. students as meet the NAEP proficiency and advanced standards. To execute this crosswalk, we assume that all those who pass the NAEP proficiency bar in 8th grade will pass a similar threshold on the PISA test the next year. Thus, in math, that threshold is calculated by identifying the lowest PISA score of students who rank in the top 34.7 percent of U.S. PISA test-takers. Similar procedures are used to conduct crosswalks at the advanced level in math and at the proficiency

32. Berliner and Glass (2014), p. 13.
33. Ravitch (2013), p. 67.
34. We discuss differences between TIMSS and PISA in Hanushek, Peterson, and Woessmann (2013), pp. 55-56, and in Hanushek, Peterson, and Woessmann (2010), Appendix.
35. Vietnam, participating in PISA for the first time in 2012, astounded nearly everyone with its high math performance, achieving a 48 percent proficiency rate (as compared to 34 percent for the United States). Whether or not this is a valid and reliable assessment of Vietnamese students, however, has not been completely resolved.
36. "Proficiency" is actually a somewhat ambiguous and confusing term. For example, NAEP's judgment of what constitutes proficient is considerably higher than that of officials in most U.S. states according to the proficiency standards they set under the No Child Left Behind accountability system. In 2011, only three states—Massachusetts, Tennessee, and Missouri—set their proficiency standards at the same high level as NAEP (Peterson and Kaplan [2013]).

NAEP Definition of Math Proficiency at the 8th-Grade Level and PISA's Definition of Proficiency Level Three

Eighth-graders performing at the proficient level should be able to conjecture, defend their ideas, and give supporting examples. They should understand the connections between fractions, percents, decimals, and other mathematical topics such as algebra and functions.... Quantity and spatial relationships in problem solving and reasoning should be familiar to them, and they should be able to convey underlying reasoning skills beyond the level of arithmetic.... These students should make inferences from data and graphs, apply properties of informal geometry, and accurately use the tools of technology. Students at this level should...be able to calculate, evaluate, and communicate results within the domain of statistics and probability.[i]

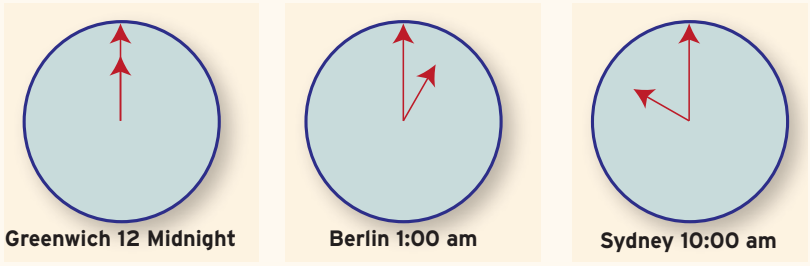
Roughly comparable is PISA's Level 3 standard, defined as follows:
At Level 3 students can execute clearly described procedures, including those that require sequential decisions. They can select and apply simple problem solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them. They can develop short communications reporting their interpretations, results and reasoning.[ii]

Sample NAEP Question at 8th-Grade Proficiency Level

Three tennis balls are to be stacked one on top of another in a cylindrical can. The radius of each tennis ball is 3 centimeters. To the nearest whole centimeter, what should be the minimum height of the can? Explain why you chose the height that you did. Your explanation should include a diagram.
If you chose 18 cm from the list of five choices, you are in the company of the 28 percent of U.S. 8th graders from the Class of 2011 who answered correctly.[iii]

Sample PISA Question at Proficiency Level Three

Mark (from Sydney, Australia) and Hans (from Berlin, Germany) often communicate with each other using 'chat' on the Internet. They have to log on to the Internet at the same time to be able to "chat." To find a suitable time to chat, Mark looked up a chart of world times and found the following:



At 7:00 pm in Sydney, what time is it in Berlin? *The answer is 10 am.*[iv]

i. NAEP's definitions of the different levels of math achievement http://nces.ed.gov/nationsreportcard/mathematics/achieveall.asp. 'accessed in June 13, 2013' with a more recent visit.
ii. OECD (2009a).
iii. Question come from NAEP's online past questions database, http://nces.ed.gov/nationsreportcard/itmrlsx/search.aspx?subject=mathematics. 'accessed in June 13, 2013' with a more recent visit.
iv. Shiel, Perkins, Close, and Oldham (2007).

level in science and reading. (See Appendix for further methodological details.) This crosswalk is of course not necessary for comparisons among the U.S. states, as that information is available directly from the NAEP assessments. The crosswalk is necessary to identify the ranking of individual states, as well as the U.S. as a whole, among all OECD countries in terms of the share of proficient or advanced students.

For the three states—Massachusetts, Florida, and Connecticut—that agree to participate in PISA testing in 2012, we can check the crosswalk by directly comparing our estimates of state performance on PISA with actual PISA performance. All of our estimates for proficiency across the three subject areas and for advanced math performance in Florida and Massachusetts are virtually identical to the actual scores (see Table A.1). For Connecticut, the reading estimates are also similar, but the math and science estimates are further away.[37] There are a variety of possible explanations for these two discrepancies, and it is difficult with available evidence to identify their precise cause.[38] Nonetheless, we take the overall results from the 12 comparisons as evidence that our crosswalk approach to comparing states and countries yields generally reliable estimates of jurisdictional performances.

Classifying by Parental Education

To see whether educational shortcomings in the United States are limited to those students from less-advantaged family backgrounds, we divide students into three groups according to their reports of the level of their parents' educational attainment. Low levels of education are defined here as having no parent who received a high school diploma; families with moderate education levels are those in which at least one parent is reported to have received a high school diploma but neither parent has earned a college degree; families with high education levels are those reported to have at least one parent with a college degree. (See Appendix for further methodological details.)

We chose parental education as the critical background characteristic for distinguishing between more- and less-advantaged students because it is an exogenous background variable that has been identified as a powerful, independent determinant of student test performance.[39] According to many studies, educational attainments of the mother and father are probably more important for test performance and life outcomes than any other single variable, including race or ethnicity, household income, family structure (one- or two-parent family), number of siblings, or any other stable characteristic.[40] The number of books in the home is also a strong correlate of student achievement,

37. The difference between our estimates of the percentage proficient in math (science) in Connecticut is 7.8 percent (7.0 percent), while the difference in reading is just 0.1 percent. For Massachusetts and Florida, the discrepancies between our estimates and the direct measures range from 0.3 to 3.0 percent. The standard error of the differences in percentage proficient is approximately 3 percent. Thus, among the discrepancies for proficiency, only those for Connecticut in math and science are statistically significant.

38. The PISA score is based on a sample of 50 out of more than 1,100 schools in Connecticut, leading to large standard errors (over 6 PISA points) in the overall score. Also, Connecticut has a much larger discrepancy between NAEP math and science and NAEP reading scores than does any other state.

39. See, for example, Duncan and Brooks-Gunn (1997); Duncan, Featherman, and Duncan (1972); Haveman and Wolfe (1995); Dubow, Boxer, and Huesmann (2009). PISA explains the selection of education as a variable of interest by noting, "Theoretically, it has been argued that parental education is a more relevant influence on [a] student's outcomes than is parental occupation (Organization for Economic Co-operation and Development (2012), p. 281).

40. In the United States, a commonly available measure of poverty is eligibility for the National School Lunch Program. According to the NAEP data, 81% of children in the low-education category fall into this poverty group, 56% of the moderate-education category, and 25% of the high-education category. Clearly, the education indicator of family background used here is correlated with another commonly used indicator of a family's socioeconomic status.

NAEP Definition of Reading Proficiency at the 8th Grade Level

Eighth-grade students performing at the proficient level should be able to provide relevant information and summarize main ideas and themes. They should be able to make and support inferences about a text, connect parts of a text, and analyze text features. Students performing at this level should also be able to fully substantiate judgments about content and presentation of content.

Sample NAEP Question

What is an acceptable way to place a $1 Bargain Basement ad in this newspaper?

1. Phone in the ad, pay by credit card
2. Phone in the ad, pay by money order
3. Mail the ad, pay by cash
4. Mail the ad, pay by check

If you chose answer four, you, along with 31 percent of 8th graders, got the question correct.

Question from PISA corresponding to the NAEP proficiency level in reading:

Comparable PISA Question

Question: Underline the sentence that explains what the Australians did to help decide how to deal with the frozen embryos belonging to a couple killed in the plane crash.[i]

(Answer underlined in red in text to the right.)

R236: New Rules

EDITORIAL

Technology Creates the Need for New Rules

Science has a way of getting ahead of law and ethics. That happened dramatically in 1945 on the destructive side of life with the atomic bomb, and is now happening on life's creative side with techniques to overcome human infertility.

Most of us rejoiced with the Brown family in England when Louise, the first test-tube baby, was born. And we have marvelled at other firsts—most recently the births of healthy babies that had once been embryos frozen to await the proper moment of implantation in the mother-to-be.

It is about two such frozen embryos in Australia that a storm of legal and ethical questions has arisen. The embryos were destined to be implanted in Elsa Rios, wife of Mario Rios. A previous embryo implant had been unsuccessful, and the Rioses wanted to have another chance at becoming parents. But before they had a second chance to try, the Rioses perished in an airplane crash.

What was the Australian hospital to do with the frozen embryos? Could they be implanted in someone else? There were numerous volunteers. Were the embryos somehow entitled to the Rioses' substantial estate? Or should the embryos be destroyed? The Rioses, understandably, had made no provision for the embryos' future.

The Australians set up a commission to study the matter. Last week, the commission made its report. The embryos should be thawed, the panel said, because donation of embryos to someone else would require the consent of the

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to respond to the commission recommendation. Should there be an overwhelming outcry against destroying the embryos, the commission would reconsider.

Couples now enrolling in Sydney's Queen Victoria hospital for in vitro fertilization programmes must specify what should be done with the embryos if something happens to them.

This assures that a situation similar to the Rioses won't recur. But what of other complex questions? In France, a woman recently had to go to court to be allowed to bear a child from her deceased husband's frozen sperm. How should such a request be handled? What should be done if a surrogate mother breaks her child-bearing contract and refuses to give up the infant she had promised to bear for someone else?

Our society has failed so far to come up with enforceable rules for curbing the destructive potential of atomic power. We are reaping the nightmarish harvest for that failure. The possibilities of misuse of scientists' ability to advance or retard procreation are manifold.

Ethical and legal boundaries need to be set before we stray too far.

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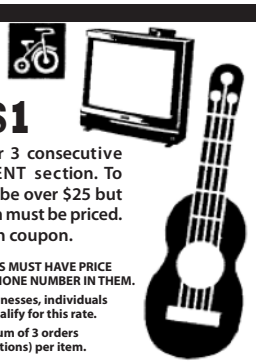

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i. Cosgrove, Sofroniou, Kelly, and Shiel (2003).

but that variable is potentially endogenous, as it could be influenced by the quality of the school the child attends.[41]

Selecting parental education as the critical background variable is attractive also because students at age 14–15 are likely to be able to identify parental education with greater accuracy than other background factors, such as household income. The data suffer from some limitations, however. Information is missing for 2 percent of U.S. math test-takers in PISA and for 11 percent in NAEP,[42] and some of the remaining students appear to exaggerate the amount of education the parent has received.[43] Nine percent of U.S. students who took the PISA math test said that neither parent had completed high school, 32 percent indicated that at least one parent had a high school diploma but neither parent had finished college, while 59 percent reported that at least one parent had finished college. The distribution for U.S. students taking the NAEP math test in 8th grade one year previously is quite similar, 9 percent, 36 percent, and 56 percent, respectively. But according to the data from the 2011 American Community Survey (ACS) of the U.S. Census Bureau, reports by students overestimate actual levels of parental education, as it shows that the distribution among the three categories of education among all parents with children aged 12 to 16 (counting the parent with the higher education level) is as follows: 10 percent did not finish 12th grade, 44 percent finished 12th grade but did not graduate from college, and 46 percent graduated from college.

From these results, we may conclude that the low-education group is fairly well identified, but that roughly 10 percent of the students mistakenly state that one of their parents has completed college when in fact that parent appears to have left college prior to completing a college degree. In fact, more than half of the 44 percent in the middle category of the ACS calculations did attend some college: 17 percentage points attained one or more years of college credit without completing a degree, and another 6 percentage points attended college for less than one year. Some of the children of these parents may have classified them as college graduates, knowing that they have attended college for quite some time but not taking into account that they did not in fact graduate. In other words, perhaps one-sixth of those included here in the high education group come from families where a parent did not receive a college degree and would have been more accurately classified as having a moderate amount of education.

The exaggeration by students of their parental education does not come as a surprise. Socially desirable activities are generally over-reported in surveys. For example, more people say they voted in the last election than election rolls reveal to be the case,[44] more people report giving to charities than financial records

Students at age 14–15 are likely to be able to identify parental education with greater accuracy than other background factors, such as household income.

41. The PISA study also provides a number of indices of socioeconomic status that combine information from several measures, but these indices are not available for the U.S. states in the publicly available NAEP data.
42. Across the different countries, the share of missing data on parental education is below 3% in PISA. Germany stands out with 21.5% missing information on parental education, so we recommend caution in interpreting the German results that are broken down by parental education. In New Zealand, 8.9% of the observations are missing, in the United Kingdom, 7.6% are, and in Luxembourg 6.8% are. All other countries have less than 6% missing information on parental education. Reassuringly, however, neither across countries nor across U.S. states is the share of missing parental-education information significantly correlated with math proficiency levels of any of the three subgroups.
43. Children's misreporting of their parents' education level has been documented regularly, but most studies come to the conclusion that overall, students' reports provide a valid description of the social status of their parents. See Kreuter et al. (2010) and the references cited therein.
44. Clausen (1968);Traugott and Katosh (1979); Hammer, Banks, and White (2014).

Math appears to be the subject in which accomplishment in secondary school is particularly significant for both an individual's and a country's economic well-being.

reveal,[45] and more students report getting good grades than administrative records indicate.[46] But such over-reporting of good events does not bias comparisons among jurisdictions as long as over-reporting is consistent from one place to another. That seems to be the case with student reports of parental education. Despite having a large, long-established, easily accessed system of higher education, the United States ranks only 12th among the 34 OECD countries in the percentage of families said to include a parent with a college degree. Seventy-nine percent of Finnish students say one of their parents has a college degree, and similarly exaggerated claims are made by students in Canada (72%), Sweden (69%), Norway (68%), Denmark (67%), Iceland (66%), the Netherlands (63%), Belgium (63%), Japan (62%), Israel (62%), and the United Kingdom (59%). More than 50 percent of the students in 10 other countries also say one of their parents has a college degree. Exaggerating parental accomplishments is hardly endemic to the United States.

Furthermore, the share of high-educated parents is not significantly correlated with proficiency rates of students in the high-educated category across countries in any of the three subjects.[47] Nor is the share of low-educated parents correlated with proficiency rates of students in the low-educated category. Across states, there is actually a positive correlation between the size of the high-educated category and its proficiency level, indicating that states with a "less selective" group in the category of high-educated parents are in fact doing better, not worse, than "more selective" states. In sum, there is no indication that lower levels of proficiency of students from better-educated family backgrounds is simply a function of higher reported rates of college graduation in the United States than in some other countries.

Still, all rankings of countries must be interpreted with care. Even when controls for family background are introduced, the remaining variation cannot be attributed solely to differences in school quality. Separate and apart from school quality, cultural influences, parental expectations, student self-discipline, and many other factors contribute to student performance. International comparisons are nonetheless instructive indicators of the relative institutional and social capacity of a society to sustain its human capital across generations.

U.S. and State Math Performances in Global Perspective

Figures 1 through 4 and Figure 6, as well as Figures A.1 through A.11 in the appendix, provide the overall rank order for the 50 states and 34 OECD countries in math, science, and reading proficiency and also for advanced performance in mathematics as well as for students grouped according to levels of parental education. Each U.S. state is ranked both in comparison to all other states and

45. Parry and Crossley, 1950: Burt and Popple (1998).
46. Kuncel, Crede, and Thomas (2005).
47. Across states, there is actually a positive correlation between the size of the high-educated category and its proficiency level, indicating that states with a "less selective" group in the category of high-educated parents are in fact doing better, not worse, than "more selective" states.

given the OECD rank it would have received had it been identified as an OECD country.[48] Although we do not burden the text with numerous references to those figures, the percentages reported are taken from them.

We give special attention to math performance because math appears to be the subject in which accomplishment in secondary school is particularly significant for both an individual's and a country's economic well-being. Existing research, though not conclusive, indicates that math skills better predict future earnings and other economic outcomes than other skills learned in high school.[49] If individuals can profit by investments in math education, the same is true for countries as a whole. Growth in the economic productivity of a nation is driven more clearly by the math proficiency of its high school students than by their proficiency in other subjects.[50]

There is also a technical reason for focusing on math. This subject is particularly well suited to rigorous comparisons across countries and cultures. There is a fairly clear international consensus on the math concepts and techniques that need to be mastered and on the order in which those concepts should be introduced into the curriculum. The knowledge to be learned remains the same regardless of the dominant language spoken in a culture. Comparing reading performance is more challenging because of structural differences in languages, and science comparisons can be faulted for a lack of consensus on the science concepts that need to be mastered at specific grades.

Overall country rankings. According to NAEP, 35 percent of the U.S. Class of 2015 reach or exceed the proficiency level in math. Based on our calculations, this places the United States at the 27th rank among the 34 OECD countries (Figure 1). The percentage of students who are math proficient is not far from twice as large in Korea (65%), Japan (59%), and Switzerland (57%). Other countries with performance that clearly outranks the United States include Finland (52%), Canada (51%), Germany (50%), Australia (45%), France (42%), and the United Kingdom (41%).

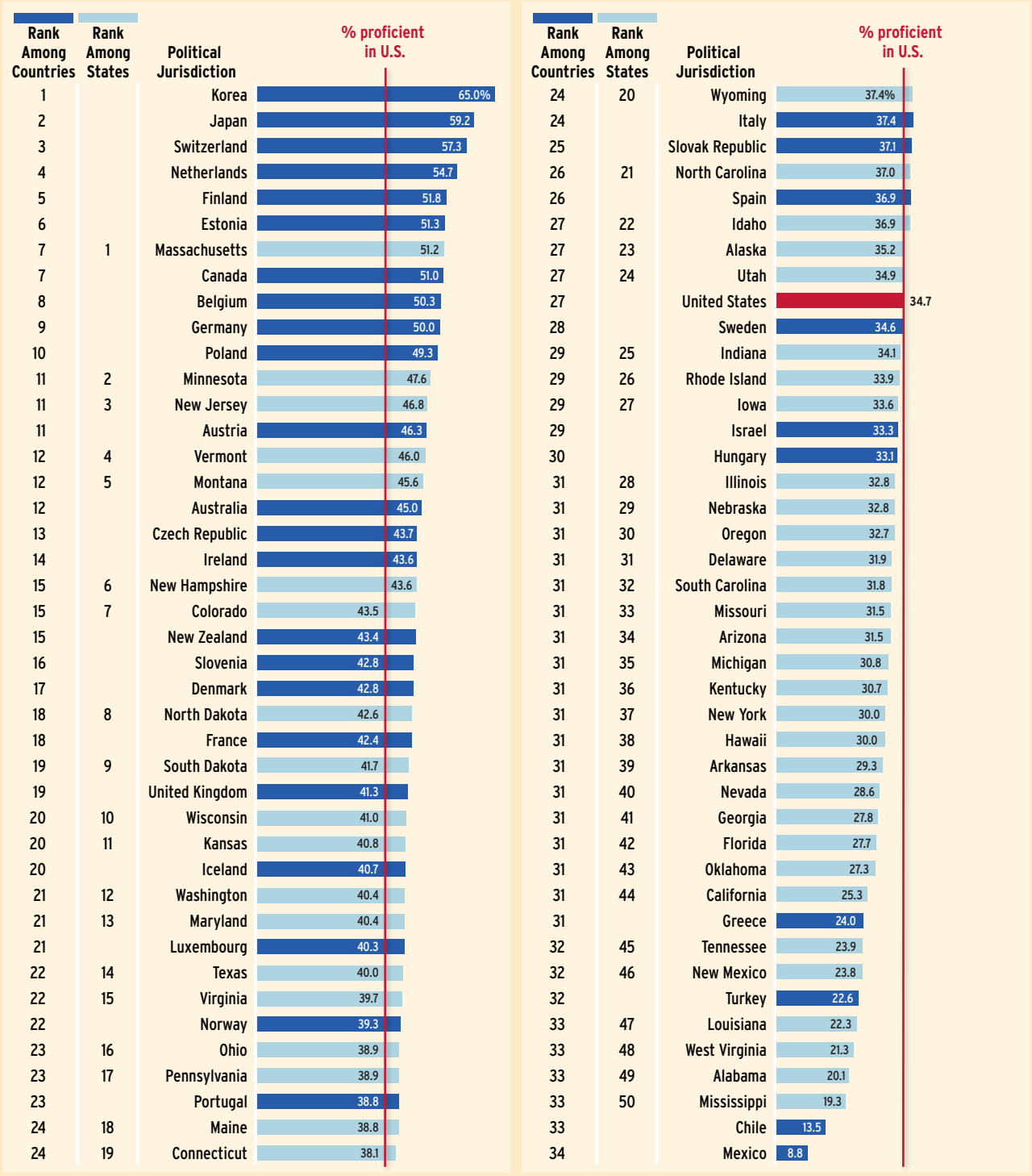
To see whether the low U.S. ranking in math is due mainly to social class factors separate and apart from the schools, we next identify proficiency ratings for students from families with differing amounts of parental education.

Low parental education. When one looks only at those students from families with low education levels, the situation appears dire (Figure 2). Only 17 percent of these U.S. students are proficient in math. This is less than or barely half the percentage of similarly situated students, those whose parents also have low levels of education, in Korea (46%), the Netherlands (37%), Germany (35%), Japan (34%), and Switzerland (33%). Among OECD countries as a whole, the United States

35 percent of the U.S. Class of 2015 reach or exceed the proficiency level in math. Based on our calculations, this places the United States at the 27th rank among the 34 OECD countries.

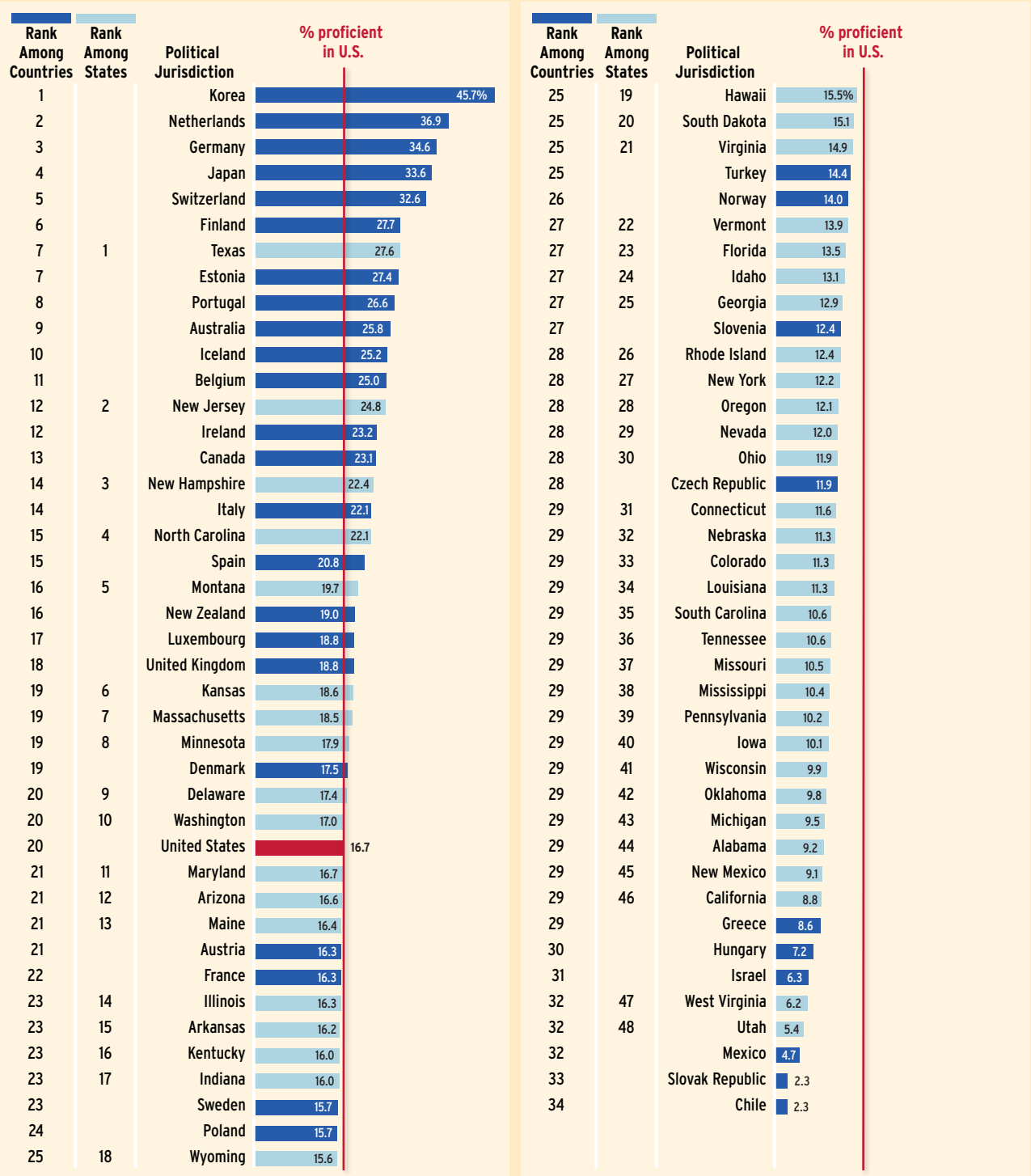
48. States are ranked against the OECD countries without displacing any countries in the rank order and without regard to the position of other states.
49. Bishop (1992); Murnane, Willett, and Levy (1995); Hanushek et al. (2013).
50. Hanushek and Woessmann (2012), Table 2.

Figure 1. Percentage of proficient students in math among all students in the Class of 2015 in U.S. states and OECD countries.



Note: States ranked against the OECD countries without displacing any countries in the rank order and without regard to the position of other states.

Figure 2. Percentage at or above proficiency level in math among students whose parents have a low level of education in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1. No data are available for Alaska and North Dakota.

For its performance in educating students with high parental education, the United States stands at the 28th rank within the OECD.

ranks 20th, placing it slightly ahead of Austria and France and just behind Denmark and the United Kingdom. In other words, the argument advanced by Rothstein and Carnoy is correct in one respect: the education of the least advantaged is unacceptably low. In simplest terms, many other countries do a much better job of educating young people whose parents lack a high school diploma.[51]

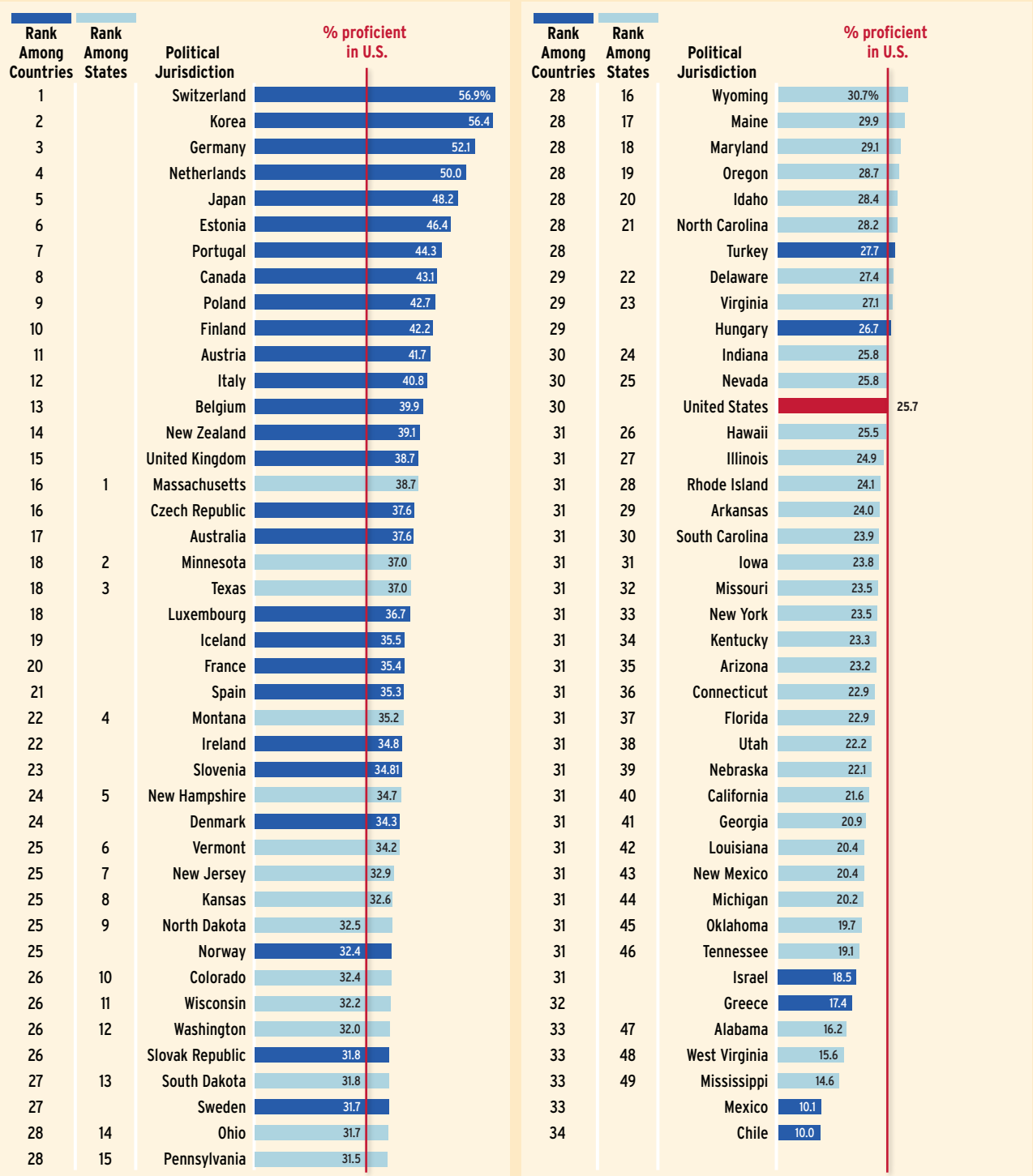
Moderate parental education. But for the Rothstein-Carnoy argument to hold, it is necessary to find that other U.S. students are doing much better when compared to their peers abroad. Unfortunately, that is not the case. The relative standing of the United States is just as low among students from moderately well-educated families (Figure 3). It is true that the percentage who are math proficient (26%) is higher for this group of U.S. students than for those U.S. students with less parental education, but the proficiency rate only about half the rate enjoyed by Switzerland (57%), Korea (56%), Germany (52%), and the Netherlands (50%). Other major countries that outperform the United States include Japan (48%), Canada (43%), Poland (43%), the United Kingdom (39%), and France (35%). When it comes to instructing the children of the moderately well educated, the United States comes in at the 30th rank among the 34 OECD countries, lower than was the case for students from families with low parental education. Contrary to the claims of apologists for American education, its troubles are not just among the most disadvantaged.

High parental education. Despite these discouraging numbers, many adults in the United States remain convinced that the schools do at least a relatively good job of educating students from families with substantial educational resources. And it is true that the percentage proficient for 15-year-olds from families with high parental education (43%) is higher than the proficiency rates for those from families with low (17%) or moderate (26%) levels of education. But the relative standing of the United States vis-à-vis other OECD countries remains near the very bottom (Figure 4). For its performance in educating students with high parental education, the United States stands at the 28th rank within the OECD. When viewed from a global perspective, U.S. schools seem to do as badly at teaching those from better-educated families as it does teaching those from the less well educated.

Countries with high proficiency rates among students from better-educated families include Korea (73%), Poland (71%), Japan (68%), Switzerland (65%), and Germany (64%). Other major countries that score much higher than the United States include Canada (57%), France (55%), and Australia (55%). The only comfort the United States can take is that it is only 5 percentage points behind its mother country, the United Kingdom (48%).

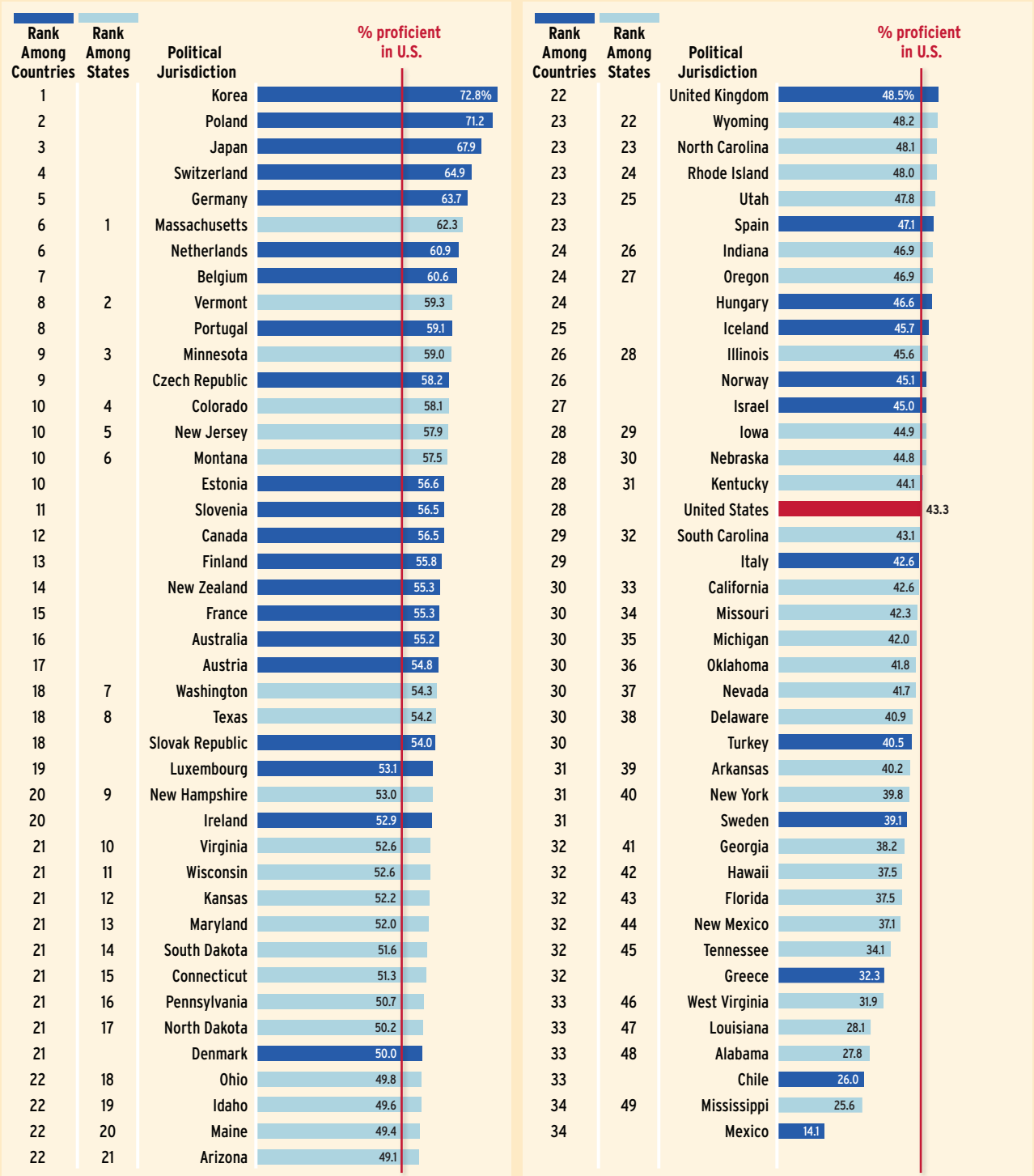
51. The crosswalk between NAEP and PISA was done for all students in the United States. Separate crosswalks for each level of education were not performed. As a result, there are minor discrepancies in the determination of proficiency and advanced levels for U. S. students in each level of parental education, depending on whether the percentage proficient or percentage advanced is calculated with NAEP or PISA data. For example, using NAEP data, the proficiency rate is 14.9% for U. S. students from families with low parental education, placing the United States at the 25th rank, internationally; for this same group, the percentage proficient is 16.7% when calculated from the PISA data, which places the United States at the 20th rank, internationally. This difference of 1.8% is the largest discrepancy across the various tests and comparisons.

Figure 3. Percentage at or above proficiency level in math among students whose parents have a moderate level of education in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1. No data are available for Alaska.

Figure 4. Percentage at or above proficiency level in math among students whose parents have a high level of education in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1. No data are available for Alaska.

In other words, when an apples-to-apples comparison is made between the math performance of U.S. students from families with high levels of education to similarly situated students abroad, the United States looks just as bad as it does when one compares the performance of the students from disadvantaged backgrounds. If Rothstein and Carnoy get one-half of the story correct, they are utterly offtrack when the other half of the story is considered.

OECD pattern. For OECD countries as a whole, there is a strong relationship (r=0.69) between the math performance of students from families with high and with low educational backgrounds. Mexico and Chile are particularly weak at educating those from better-educated families, however. Conversely, Poland and Slovakia are particularly weak at educating students from families with less education, given the performance of those from families with high education. The relative performance of the U.S. education system is pretty much the same across social groups compared to the other 33 OECD countries. It is weak at the bottom, no less weak at the middle, and just as weak with respect to educating the most advantaged. As Secretary Duncan said, it is not a problem for some other person's child.

State rankings. The math proficiency rate of 15-year-olds varies widely among the states—from a high of 51 percent in Massachusetts to a low of 19 percent in Mississippi. Variation is also substantial among many of the largest states in the Union. Forty-seven percent of New Jersey students are proficient, and 40 percent of Texans and Virginians are as well, closely followed by students in Ohio and Pennsylvania (both at 39%). But only 31 percent of the students in Michigan, 30 percent in New York, and 28 percent in Florida are proficient, placing them at the 35th, 37th, and 42nd rank among states, respectively. At the 44th rank stands California, educating one-eighth of the nation's students with a proficiency rate of just 25 percent. Seemingly embarrassed by such appalling numbers, California decided in 2013 to ignore nationally mandated testing requirements and call a moratorium on publishing any test results, apparently on the dubious theory that what you don't know can't hurt you.

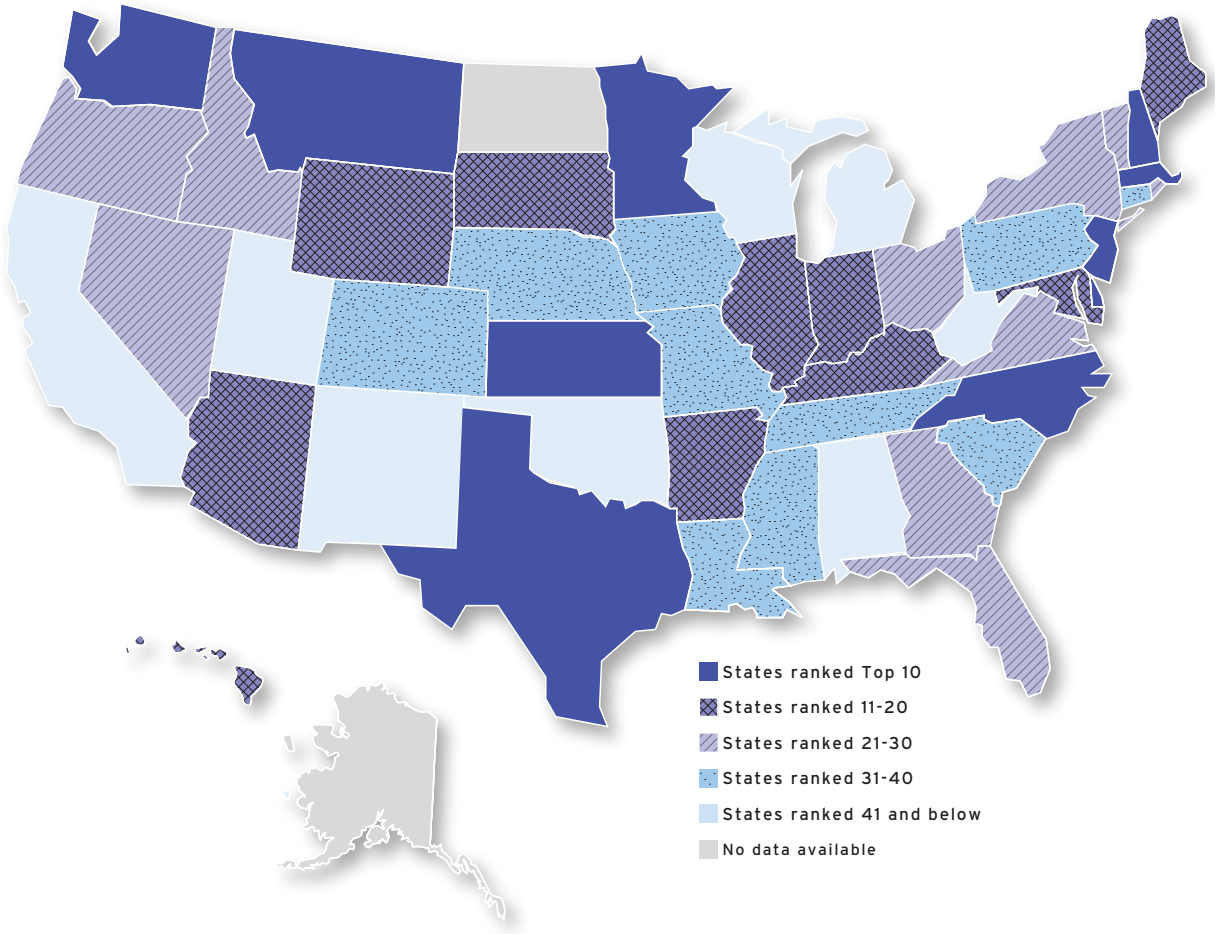
Striking state differences remain when one divides students according to their parental education. For students from families with low parental education levels, Texas (28%) and New Jersey (25%) have the highest proficiency rates, well ahead of Massach usetts and Minnesota (both at 18%), putting them in 7th and 8th place among U.S. states for this category of students. Virginia and Florida are at about the national average, while New York, in 27th place, falls slightly below. California (9%), West Virginia (6%), and Utah (5%) rank at embarrassingly low

levels. When apologists argue that it is society, not schools, that is at fault, those claims ignore even what Texas can do, let alone countries abroad. (See Map 1 for a picture of the overall pattern throughout the 50 states.)

The rankings change again when one looks at the math performance of students from families with a moderate level of parental education. Massachusetts (39%), Minnesota (37%), and Texas (37%) are the three medal winners for math proficiency. Wisconsin, Ohio, and Pennsylvania, each with proficiency ratings of 32 percent, are clustered at ranks 11, 14, and 15. With a 22 percent proficiency rate, California ranks 40th. Resting at the bottom are three southern states: Alabama, West Virginia, and Mississippi.

State leaders often brag about the high performance of the children who come from more advantaged families, as they outperform students whose parents are less well educated. And in some states, those bragging rights are warranted, even when performance is viewed from a global perspective. Over 62 percent of students from

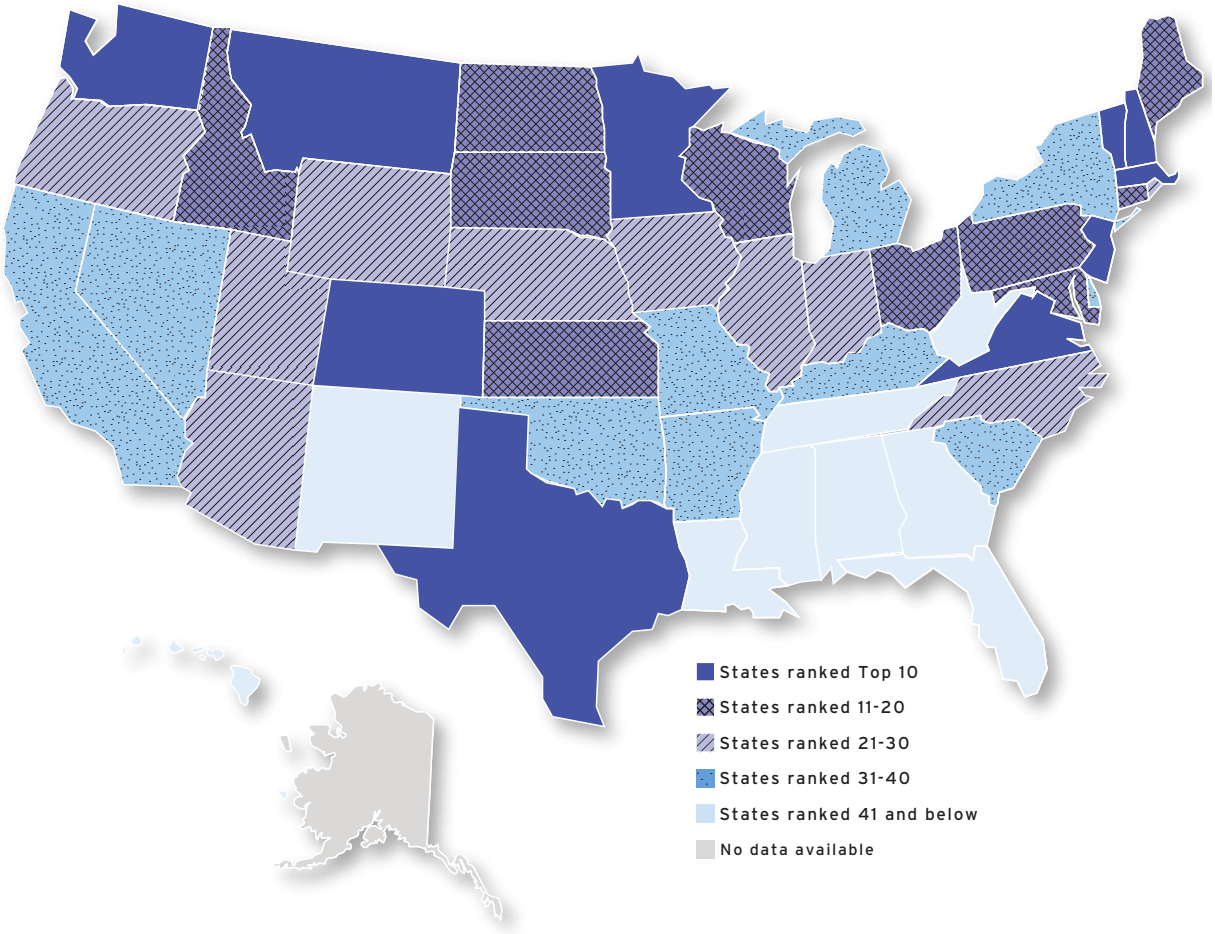
Map 2. Percentage at or above proficiency level in math among students whose parents have a low level of education in the Class of 2015 in U.S. states.



Massachusetts families with high levels of parental education are proficient in math, placing that state just behind Germany (64%) and Switzerland (65%), two of the top-five OECD countries. Only a bit further back are Vermont, Minnesota, Colorado, New Jersey, and Montana, all of which have a proficiency rate of 58 percent or 59 percent for students from better-educated families. Internationally, that places these states in the same league as the Czech Republic (58%), Canada (57%), and Finland (56%), which are among the OECD top 13. While those numbers do not post anything like an Olympic-level performance, they are at least not embarrassing.

But those six states are the highest-performing states in the Union. Other states rank much lower down the international list. In many places, students from highly educated families are performing well below the OECD average for similarly advantaged students. For example, Wisconsin, if ranked as a country on this measure, would come in 21st, just below Ireland. California is large enough to be an OECD country in its own right. If it were, its 43 percent proficiency

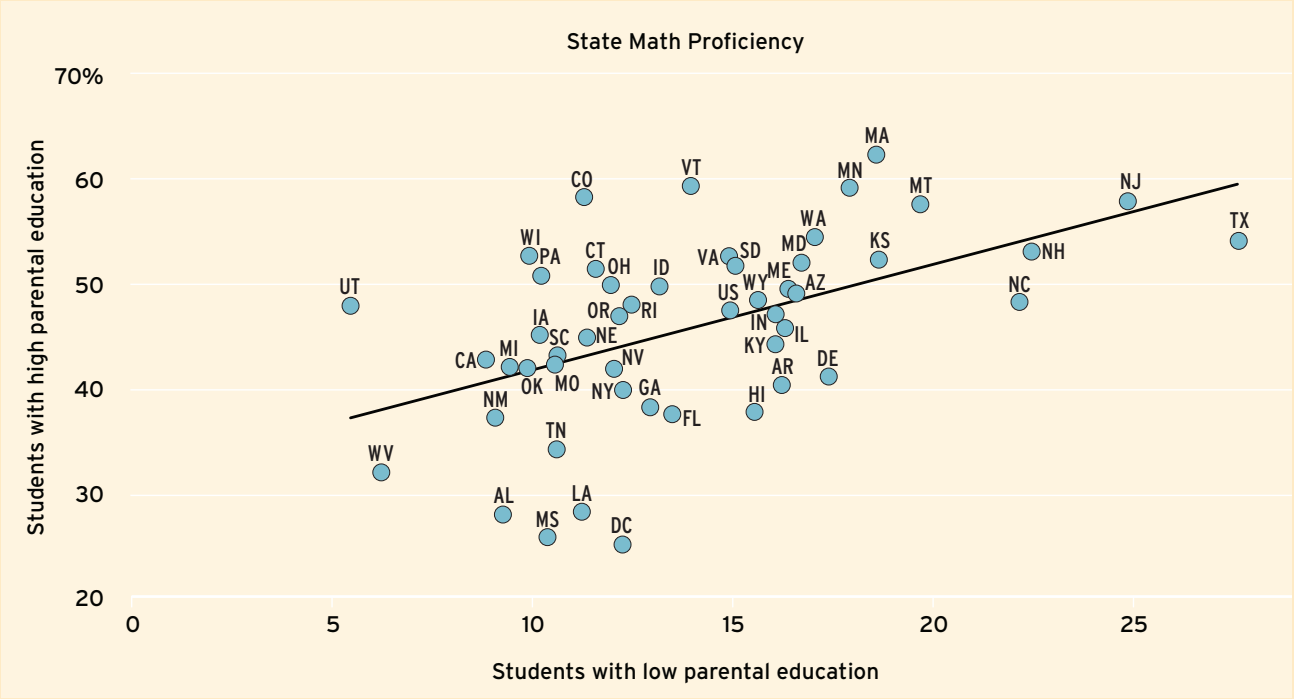
Map 3. Percentage at or above proficiency level in math among students whose parents have a high level of education in the Class of 2015 in U.S. states.



rating would place it 30th, just below Italy, and New York's 40 percent rating entitles it to assume position number 31, just below Turkey. Florida's 38 percent rating gives it the 32nd position, just below Sweden, which has registered an abysmal performance given its level of economic development. Ranked near the bottom, Alabama, West Virginia, and Louisiana do worse than all OECD countries with the exception of Chile and Mexico. Mississippi ranks just below Chile. (See Map 2 for an overall portrait of the pattern among the states.)

Generally speaking, states that rank well for math education among students with high parental education also rank highly for students from less-advantaged backgrounds ($r = 0.52$). But some high-performing states, such as Massachusetts, Vermont, and Colorado, do relatively better with students from families with higher educational backgrounds than they do with their less-advantaged peers (Figure 5.). Meanwhile, Texas, New Jersey, New Hampshire, and North Carolina do equally well with students from low or from high educational backgrounds.

Figure 5. Relationship between proficiency of students with low and high levels of parental education, U.S. states, Class of 2015.



U.S. and State Science Performance

If the U.S. educational shortcomings are disturbingly large in math, they are only slightly less so in science. Thirty-two percent of students are proficient in science, placing the United States at the 22nd rank among the 34 OECD countries. While that is a small improvement on their 27th rank in math, U.S. students trail those in many other countries by wide margins. Around half of all students are proficient in science in the world-leading countries of Japan, Finland, Korea, and Estonia. Over 40 percent are proficient in nine other countries, including Germany, Canada, Australia, and the United Kingdom. U.S. student performance is slightly better than that of students in Italy, Spain, and Hungary, but again these are not the countries with which the United States ordinarily compares itself. See Figure A.1.

Nor does the picture improve when one looks only at those students with high parental education. Once again, the United States comes in 22nd, just behind Hungary and barely ahead of the Slovak Republic and Spain. The problems clearly are not peculiar to students whose parents did not go to college. The educational shortcomings in the United States are not concentrated, as much of the popular rhetoric suggests—they exist across the board. (See Figures A.2, A.3, A.4)

State rankings. Five states—North Dakota, Montana, Massachusetts, Vermont, and Utah—have a science proficiency rating of 43 percent or higher, with the Peace Garden State, at 45 percent, capturing pride of place. That places North Dakota sixth on the international list, just behind Germany and just ahead of the Netherlands. But only a small fraction of U.S. students are educated in North Dakota; in larger states, the track record is not nearly as strong. Texas (32%) ranks 22nd internationally, just above Italy, while New York (29%) and Florida (28%) rank 27th, and California (22%) ranks 31 (out of 34), internationally (Figure A.1).

Nor does the picture improve for students from families with high levels of parental education (Figure A.4). Other than Colorado (55%) edging Utah (53%) out of the top-five U.S. positions, the same states remain at the top of the charts, although Massachusetts (56%) takes over first place, earning it an international rank of 6th, just behind Korea. But only 2 percent of the country's school children are educated in Massachusetts. States with larger segments of the population do not perform nearly as well. Texas (46%) and New Jersey (46%) stand in 19th place, just ahead of Austria; New York (40%), California (39%), and Florida (38%) hold international ranks of 23, 26, and 27.

In general, there is a positive relationship ($r = 0.58$) between the science proficiency of students from high and low family education backgrounds

Five states—North Dakota, Montana, Massachusetts, Vermont, and Utah—have a science proficiency rating of 43 percent or higher.

in a particular state. For example, California, Maine, and Virginia do not appear to be any better at teaching science to one group of students than the other. However, Wisconsin, Minnesota, and Colorado seem relatively more effective at teaching students from better-educated backgrounds than teaching those from less-educated backgrounds. (Figures A.2, A.3, and A.4).

U.S. and State Reading (Literacy) Performance

Whatever the problems in math and science, conventional wisdom has it that U.S. literacy rates are world-class. Students may not know how to calculate the numbers, but there is no question as to their reading ability.[52] But that wisdom, if it is to be called such, hardly applies to the Class of 2015. Compared to other OECD countries, U.S. performance in reading is at best ordinary, as it ranks only 18th among the 34 countries. See Figure A.5. The U.S. reading proficiency rate of 33 percent lags far behind a proficiency rate above 50 percent in Korea and Japan and a rate above 44 percent in Finland, Canada, and Ireland. The much higher proficiency rates in Canada and Ireland are especially worth noting, because in both countries the language in which the test is administered, English, is the same as in the United States. The other three English-speaking countries within the OECD, New Zealand (42%), Australia (41%), and the United Kingdom (36%), also have higher rates of literacy proficiency than does the United States.

The United States ranks even lower internationally for the reading performance of students who have high levels of parental education. See Figure A.8. Its proficiency rate of 42 percent among this group translates into the 22nd position among OECD countries, far below proficiency rates in excess of 60 percent in Poland, Japan, and Korea. Over half of the students in Germany, New Zealand, Ireland, France, Belgium, Australia, and Canada are reading proficient. That list includes all the English-speaking countries other than the United States and the United Kingdom (43%), which also has a (slightly) higher literacy proficiency rate than the United States. The literacy proficiency rate in the United States exceeds that of Turkey, Austria, and Slovenia, however.

Among students from families with low parental education, U.S. literacy proficiency is a disastrous 18 percent, far below the 42 percent mark reached by students with high parent education (Figures A.6, A.8). But similar or even greater disparities are to be found in other OECD countries. Thus, the U.S. literacy ranking among this group of students is as high as 16th, just above Poland and France. The highest-performing countries, Korea, Japan, Finland, and Germany, have literacy proficiency rates of 25 percent or better, and most of

52. PISA identifies its test as a "literacy" test, while NAEP calls a similar assessment a test of "reading" skills. We use the words interchangeably.

the other English-speaking countries, including Ireland, Canada, Australia, and New Zealand, have literacy rates in excess of 20 percent for this student group. But the United States does outrank the United Kingdom, which has a (slightly) lower literacy proficiency rate of 16 percent among these disadvantaged students.

State rankings. Six states—Massachusetts (46%), New Jersey (45%), Connecticut (45%), Vermont (44 %), Montana (42%), and Colorado (40%)—have literacy proficiency rates for all their students that come within reasonable distance of the performance of OECD's leading countries. See Figure A.5. But most states, including many large ones, rank well down the international list. New York (35%), Wisconsin (35%), and Illinois (34%) score slightly above the U.S. average but New York comes in 17th internationally, just below Israel, and the other two states rank 18th internationally. At 30 percent, Florida holds the 28th rank internationally, just below Spain. Only 24 percent of California students are literacy proficient, placing that state 32nd internationally, just below the Slovak Republic.

Among those students coming from families with high levels of parental education, over half are reading proficient in the states of Massachusetts, Connecticut, New Jersey, Vermont, and Colorado, with Massachusetts (59%) once again claiming the top spot (Figure A.8). That places the Bay State almost in the same league as Poland, Japan, and Korea, all of which have a better than 60 percent proficiency rate. Even Colorado (52%) has a rating equivalent to Belgium, the 8th-ranked country. But before relaxing confident in the reading prowess of the children of highly educated parents, one must contemplate the more sobering fact that Illinois (47%) and Wisconsin (46%) stand at the 15th and 17th ranks just ahead of the Czech Republic and Estonia, respectively, while Florida (37%) and California (36%) stand at the 30th rank out of 34 OECD countries.

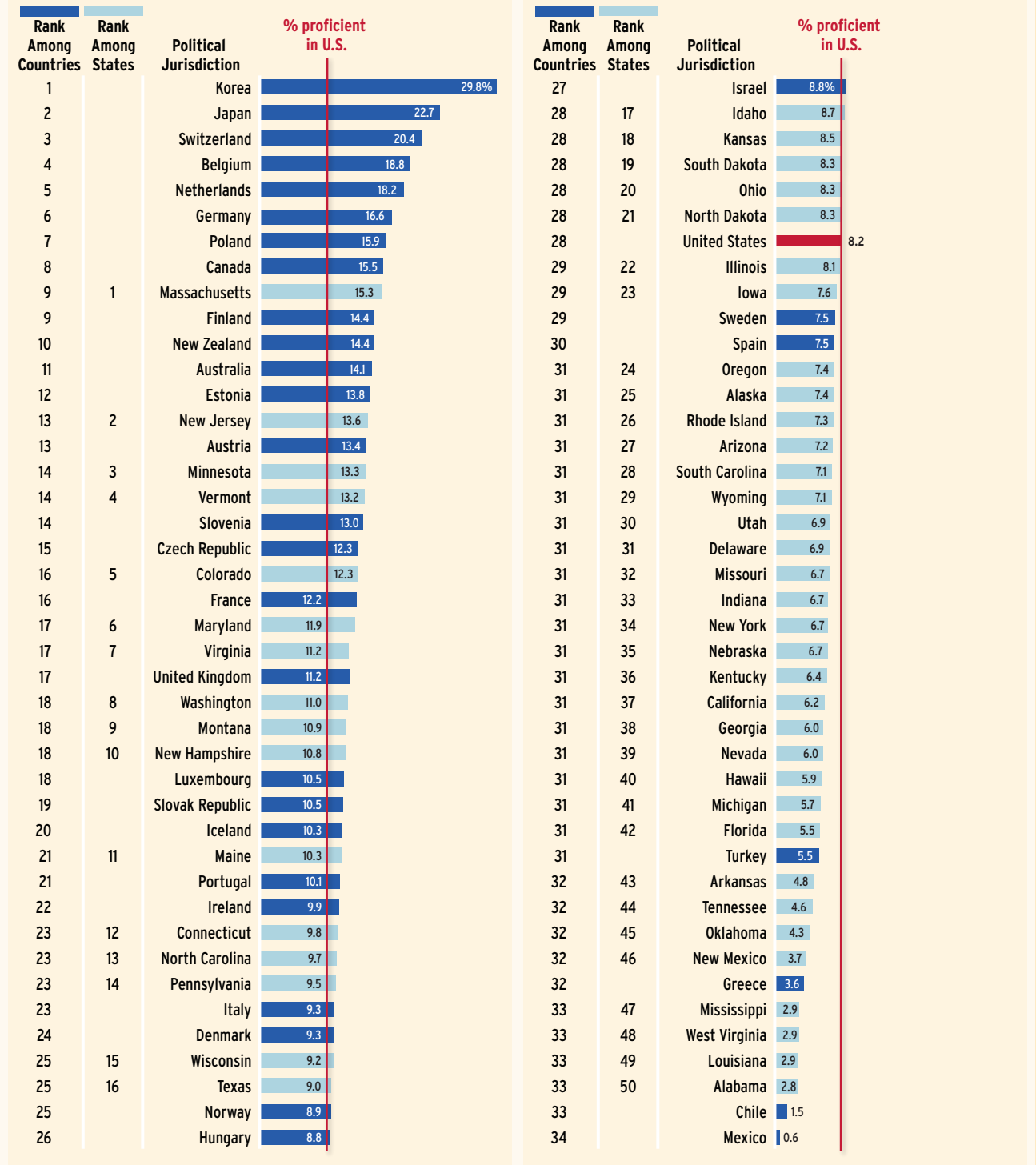
Overall, there is a positive relationship ($r = 0.43$) between the reading proficiency rates of students from high and from low education backgrounds. Nonetheless, the students from the less-privileged backgrounds do particularly poorly in Massachusetts, Vermont, and New Jersey, given the relative performance of students from more-privileged backgrounds. See Figures A.6, A.7, and A.8.

Advanced Performances in Mathematics

The U.S. economic strength has been built in large part through its record of invention and innovation, things that themselves depend upon the U.S. historic strength in science, technical, engineering, and math fields (STEM). The pool of people prepared to go into these fields in the future is dependent on students who have developed advanced skill in math and science in school.

In reading, Florida (37%) and California (36%) stand at the 30th rank out of 34 OECD countries.

Figure 6. Percentage of advanced students in math among all students in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1.

To see if there is evidence of excellence at the very top of the American school system, we identify the share of the population in the United States that scores at or above the advanced level of proficiency in mathematics. NAEP sets a high bar before giving students an advanced rating, making this a highly informative indicator of the extent to which true excellence can be found in U.S. math education.[53]

Eight percent of the U.S. Class of 2015 proved its merit by scoring at the advanced level in math. That could be regarded as a triumph, were it not for the fact that it leaves the United States 28th on the OECD list. See Figure 9. Other countries do a much better job at bringing students up to the advanced level of performance. The eight world leaders are Korea (30%), Japan (23%), Switzerland (20%), Belgium (19%), the Netherlands (18%), Germany (17%), Poland (16%), and Canada (16%). Disturbingly, our neighbor to the north turns out twice as high a percentage of students at the advanced level in math as the United States.

The percentage scoring at the advanced level is only 2 percent for U.S. students from families with low levels of educational attainment and only 4 percent for students from moderately educated families. Those disgraceful numbers could be offset by unusually high performances among the better educated, however. Does the United States achieve a breakthrough at least among this group? Some may wish to take pride in the fact that 12 percent of the students from better-educated families reach the advanced level in math. But such pride is misplaced, as the feat still leaves the United States in the 28th position out of the 34 OECD countries. Only Norway, Sweden, Spain, Greece, Chile, and Mexico do worse. Among all OECD countries, there is a strong tendency ($r = 0.71$) for those countries to do well educating students from low-education families to this level if they do the same for students from high-education families. See Figures A.9, A.10, and A.11.

State rankings. The four states with 13 percent or more students performing at the advanced level in math are Massachusetts, New Jersey, Minnesota, and Vermont, with the Bay State taking honors with 15 percent of its students scoring at that level. All of these states rank alongside the top 13 OECD countries, and Massachusetts ranks 9th, just below Canada, though still well below Korea and Japan. But if some states compare favorably with OECD countries, they are more than offset by the many others that rank far down the list. With just 8 percent of its students performing at the advanced level, Illinois ranks 29th out of the 34 OECD countries, just ahead of Sweden and Spain. With less than 7 percent of their students performing at the advanced level, New York and California rank 31st, just ahead of Turkey and Greece. However, the two lowest-performing

53. We do not report the percentages of students performing at the advanced level in reading and science. According to NAEP, only 2 percent of all U.S. students are said to have reached an advanced level of performance in science and only 4 percent in reading. That should not be interpreted as showing that U.S. students are even more poorly taught in science and reading than in math. Rather, the governing board for NAEP set the advanced standard in these two subjects at such high levels that very few students could attain them. Any standard set that high isolates such a small percentage of the population that it introduces the possibility of considerable error in measuring cross-country and cross-state differences.

states, Alabama and Louisiana, do outrank the two lowest-performing OECD countries—Chile and Mexico.

The same states—Massachusetts, New Jersey, Minnesota, and Vermont—are top performers on this measure for students from families with high education backgrounds; in all four plus Colorado, 18 percent or more of such students perform at the advanced level. That places them in the same league as Canada and France but well behind Korea, Poland, Japan, Switzerland, Belgium, and Germany. But other states have much lower percentages of students from high-education backgrounds performing at the advanced level. Only 15 percent perform at this level in Pennsylvania and 14 percent in Wisconsin, and less than 10 percent do so in New York, Michigan, and Florida. If states do comparatively well with students from better-educated family backgrounds, they tend to do well with those from less-educated ones (r = 0.40). But as can be seen in Figure 6, there are clear exceptions to this pattern. West Virginia, Louisiana, and Mississippi score particularly badly on their capacity to teach students from more-educated backgrounds. The specifics are provided in Figures A.9, A.10, and A.11.

Conclusions

There can be little doubt that educational shortcomings in the United States spread well beyond the corridors of the inner city or the confines of low-income neighborhoods where many parents lack a high school diploma. While bright spots can be identified—particularly in some states along the country's northern tier—the overall picture is distressing to those concerned about the well-being of the United States in the 21st century.

The current achievement levels are not simply a matter of national pride. As we have shown in *Endangering Prosperity*, growth in U.S. productivity is dependent on the nation's capacity to generate the necessary human capital.[54] Without a high-quality workforce, the country will not make the best use of new technologies, and without a large pool of exceptionally talented and well-prepared young people, the ingenuity needed to drive the economy will falter. Apologists are quick to find excuses. The United States can import talent, or a talented population need not be well educated by age 15, or tests do not measure what is important, or economic growth can occur without improvements in human capital, or the future of the economy will be so unlike the past that nothing can be learned from historical trends. We have responded to those dubious assertions in the just-mentioned study. The weight of the evidence points decidedly in another direction.

54. Hanushek, Peterson, and Woessmann (2013).

Secretary Duncan accurately identified the pervasiveness of the achievement challenge. What remains to be done is to convince politically influential members of the well-educated segment of society that the problems are not isolated to other groups but can be found close to home. Without good information, it has been too easy for even sophisticated Americans to be seduced by apologists who would have the public believe the problems are simply those of poor kids in central-city schools. As long as the focus remains on distinctions within the United States, then the comfortable can remain comforted by the distance between suburbia and the inner city. But once the focus shifts to countries abroad and fair apples-to-apples comparisons are made, it becomes manifest that nearly *all of our young people*—from privileged and not-so-privileged backgrounds—are not faring well.

The United States has two achievement gaps to be bridged—the one between the advantaged and the disadvantaged and the one between itself and its peers abroad. Neither goal need be sacrificed to attain the other.

Without a large pool of exceptionally talented and well-prepared young people, the ingenuity needed to drive the economy will falter.

Appendix

Methodology for Comparing U.S. States and OECD Country Performances

The goal of our analyses is to compare how students in the United States and in several individual states are doing with respect to their peers abroad in terms of reaching proficient and advanced levels, respectively. We want to do so with as much detail (by state and social group) as the data permit. To obtain this information, we build a crosswalk between the 2011 National Assessment of Educational Progress (NAEP) and the 2012 Program for International Student Assessment (PISA), which was administered to representative samples of 15-year-old students in 34 OECD countries and in many other of the world's political jurisdictions.

The crosswalk is developed by looking at the percentage of U.S. students who reach the proficient and advanced levels on the NAEP assessment and at the equivalent cutoff scores in PISA for those percentages of U.S. students. This gives us the equivalent of the PISA thresholds, allowing us to estimate comparable rates of students performing at the proficient and advanced levels for all countries and to compare student performance in each of the states in the United States with that of their OECD peers.

Our analysis relies on test-score information for young adults collected by NAEP in 2011 and PISA in 2012.[55] NAEP is a large, nationally representative assessment of student performance that has been administered periodically since the late 1960s to U.S. students in 4th and 8th grades and at the age of 17. Since 2003, it has provided achievement data for students in each of the 50 states in mathematics and reading, and since 1996 it has provided similar data in science. PISA is an internationally standardized assessment of student performance in mathematics, science, and reading established by OECD. It has been administered every three years since 2000 to representative samples of 15-year-olds in all OECD countries as well as in many other jurisdictions.[56]

NAEP is governed by the National Assessment Governing Board (NAGB), which consists of 26 educators and other public figures appointed by the U.S. secretary of education who rely on experts to help determine basic, proficient, and advanced levels of performance in each subject. We rely on the 2011 samples of NAEP for 8th-grade public and private school students in each of the 50 states. For each of these jurisdictions, NAEP 2011 calculates the percentage of students who perform at the basic, proficient, and advanced levels; our analyses use the latter two performance levels.

55. Data for NAEP come from the official website, http://nces.ed.gov/nationsreportcard/.

56. The OECD, which administers PISA, is an international economic organization encompassing most of the high-income, developed countries of the world. In 2012 it had 34 members. Sixty-four countries/economies participated in PISA in 2012. Data for PISA 2012 come from the PISA microdata (www.pisa.oecd.org/).

Our crosswalk from NAEP to PISA aims to identify the relative performance of students in the Class of 2015. NAEP examinations are given to 8th graders, in January through March, when most students are 13 or 14 years of age. PISA examinations are given to a random sample of public and private school students at the age of 15. To construct the achievement comparisons for the Class of 2015, we rely upon the 2011 NAEP test and the 2012 PISA test. In comparing the performance of the Class of 2015 on the NAEP and PISA tests at these two different points in time, we assume that no event happened between 8th and 9th or 10th grade that significantly altered the performance of American students relative to that of students in other countries.

Because U.S. students took both the NAEP and the PISA, it is possible to find the score on the PISA that is tantamount to scoring at a specific performance level on the NAEP, that is, the score that will yield the same percentage of U.S. students as scored at this level on the NAEP. We describe this crosswalk exercise for the example of performance at the proficient level in math. Given that NAEP identified 34.736 percent of U.S. 8th-grade students as proficient in math, the PISA equivalent is estimated by calculating the minimum score reached by the top-performing 34.736 percent of U.S. students participating in the 2012 PISA test. Using the NAEP and PISA data for the United States as a whole, the crosswalk exercise on the PISA microdata then identifies an estimated PISA score of 515.9 for math proficiency, as defined by NAEP.[57]

With the PISA data, we can obtain an estimate of the percentage of students in all other countries participating in the PISA test above this cutoff, that is, those who reach the level equivalent to the proficient level in 8th-grade math on NAEP 2011. The shares of students who reach the proficient level in 8th-grade math in each U.S. state are taken directly from NAEP 2011. It is assumed that both NAEP and PISA tests randomly select questions from a common universe of mathematics knowledge. Given that assumption, it may be further assumed that students who scored similarly on the two exams will have similar math knowledge, that is, students who scored 515.9 points or better on the PISA test would have been identified as proficient had they taken the NAEP math test. The scaling of PISA straightforwardly reveals that a score of 515.9 points is 16 percent of a standard deviation above the average OECD student score on the PISA, indicating that a similarly accomplished group has been found.

Performing similar crosswalk exercises for reading and science and for advanced performance in math, we derive comparable numbers for the other categories as follows. For reading proficiency, 33.504 percent of U.S. students are proficient on the NAEP, which corresponds to a score of 538.8 on PISA.

57. To cover a broad content area while ensuring that testing time does not become excessive, the tests employ matrix sampling. No student takes the entire test, and scores are aggregated across students. For individual student observations, results are thus estimates of performance obtained by averaging five plausible values, as PISA and NAEP administrators recommend. All PISA calculations use the PISA sampling weights to yield nationally representative estimates.

For science proficiency, 31.838 percent of U.S. students are proficient on the NAEP, which corresponds to a score of 542.9 on PISA. For advanced math, 8.256 percent of U.S. students scored at the advanced level on the NAEP, which corresponds to 609.9 on PISA.

Classification of Parental Education Groups

We first calculate the shares of students reaching proficiency and advanced levels for all students in a state or country. In a second step, we perform the same calculations for three subgroups of students in each state and country, depending on the educational attainment of the students' parents. The three subgroups are defined as follows: Families with low education levels are those in which no parent received a high school diploma; families with moderate education levels are those in which at least one parent received a high school diploma but neither parent earned a college degree; and families with high education levels are those in which at least one parent obtained a college degree.

In NAEP, these categories are directly available, based on student responses on their parents' education levels. The moderate-education category combines those families in which the highest level achieved by either parent is to have graduated high school or to have some education after high school (without graduating from college).

In PISA, the same student-reported information on parental education levels is available, based on the International Standard Classification of Education (ISCED) developed by UNESCO to compare education indicators across countries on the basis of uniform and internationally agreed definitions. Here, the low-education category includes having no education, ISCED 1 (primary education), and ISCED 2 (lower secondary); the moderate-education category includes ISCED 3B and 3C (vocational/prevocational upper secondary), ISCED 3A (upper secondary), and ISCED 4 (non-tertiary postsecondary); and the high-education category includes ISCED 5B (vocational tertiary) and ISCED 5A, 6 (theoretically oriented tertiary and postgraduate).

The share of students who fall into the three categories in each state and country are available from the Harvard Program on Education Policy and Governance, upon request. Comparing the U.S. responses in the NAEP and PISA data, 8.9% or 9.0% of U.S. parents are classified as low education in NAEP and PISA, respectively; 35.6% or 32.4% as moderate education, and 55.6% or 58.6% as high education.[58] These shares refer to those students without missing information on parental education. The amount of missing information differs somewhat between NAEP and PISA, at 11% and 2.2%, respectively. Given these

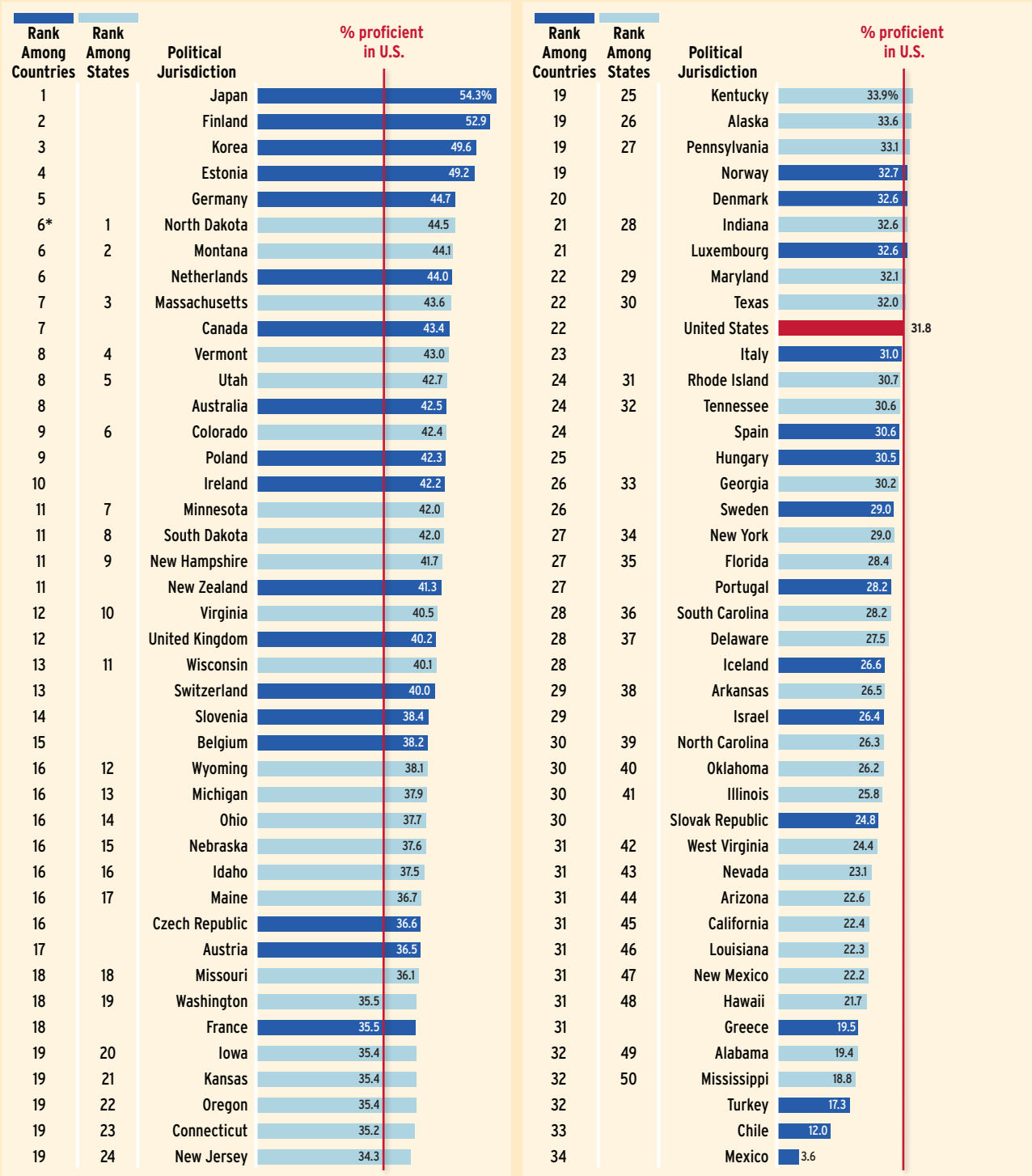
58. Because of these slight differences, results for the parental-education subgroups for the U.S. as a whole will differ slightly between the PISA-based classification reported in this report and the alternative NAEP-based classification used for state estimations.

differences in missing information and differences between the NAEP and PISA target population, it is reassuring to note how similarly the education shares are estimated in the two data sets.

Another way to cross-check whether the parental-education classification affects the proficiency estimates between NAEP and PISA is to compare the states that participated with representative samples not only in NAEP but also in PISA. It turns out that these are all reasonably close together. For example, the NAEP-based estimate of 13.5% of Florida students from low-education backgrounds who are proficient in math compares to a PISA-based estimate of 13.6%, and similarly for Massachusetts (18.5% vs. 18.6%). In no case do these alternative estimates of subgroups in these states surpass the bounds of statistical significance.

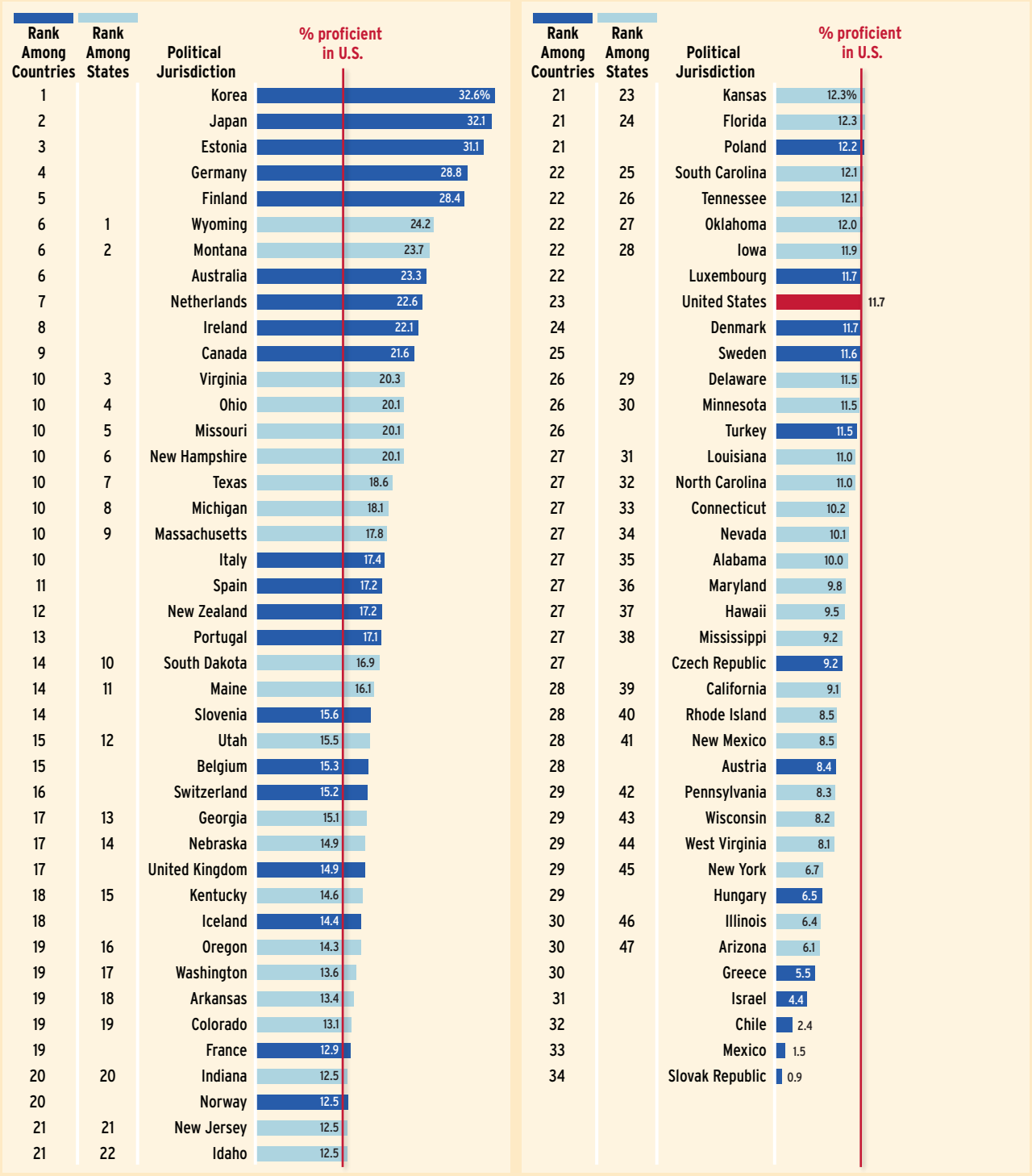
As with any international comparison of national features, there are limitations to the extent to which educational attainment levels are comparable across countries. Use of the ISCED classification provides the highest comparability possible. The OECD (2012), p. 281, describes remaining concerns as follows: "The core difficulties with parental education relate to international comparability (education systems differ widely between countries and within countries over time), response validity (students are often unable to accurately report their parents' level of education) and, especially with increasing immigration, difficulties in the national mapping of parental qualifications gained abroad."

Figure A.1. Percentage of proficient students in science among all students in the Class of 2015 in U.S. states and OECD countries.



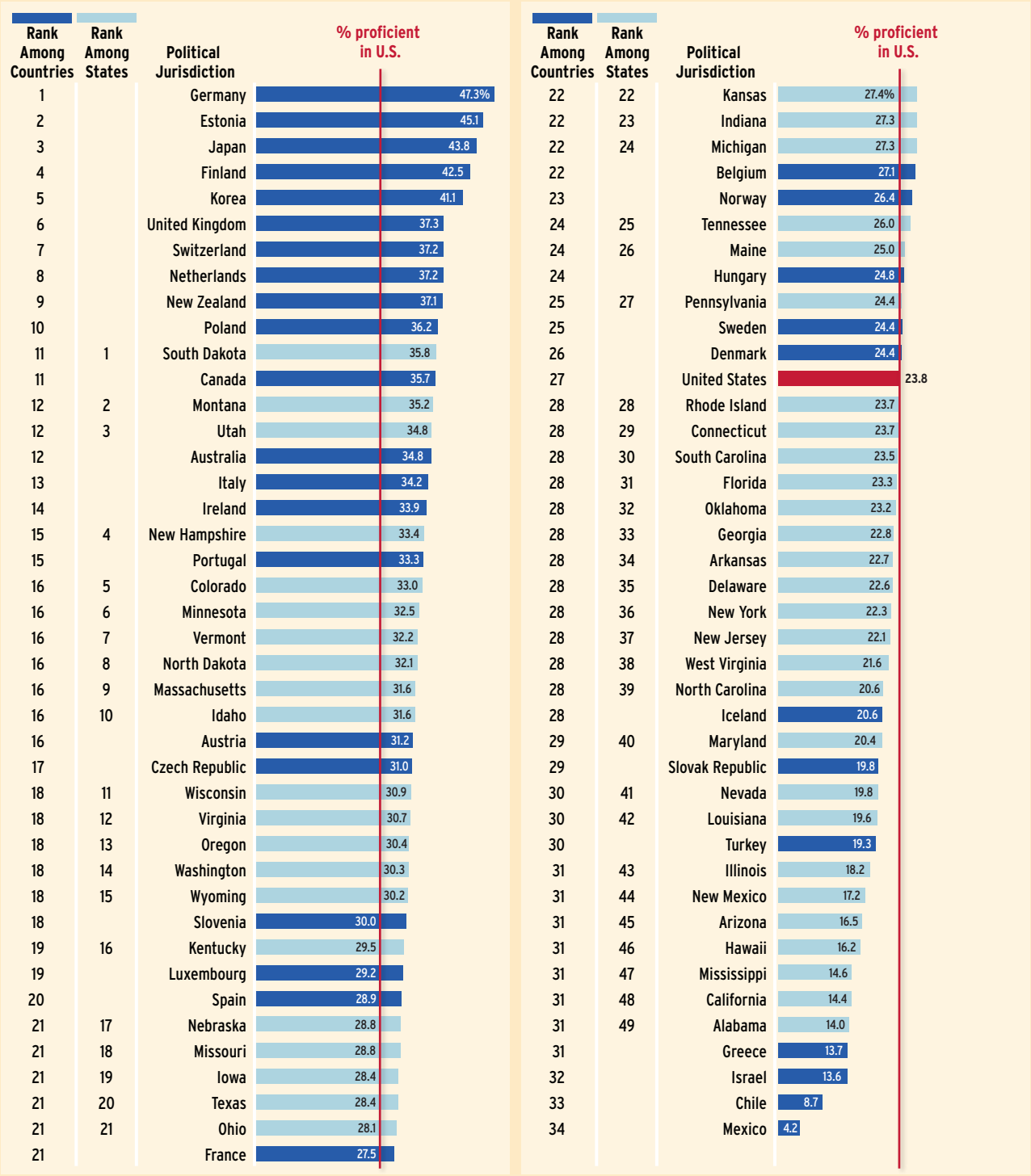
Note: See note in Figure 1.

Figure A.2. Percentage at or above proficiency level in science among students whose parents have a low level of education in the Class of 2015 in U.S. states and OECD countries.



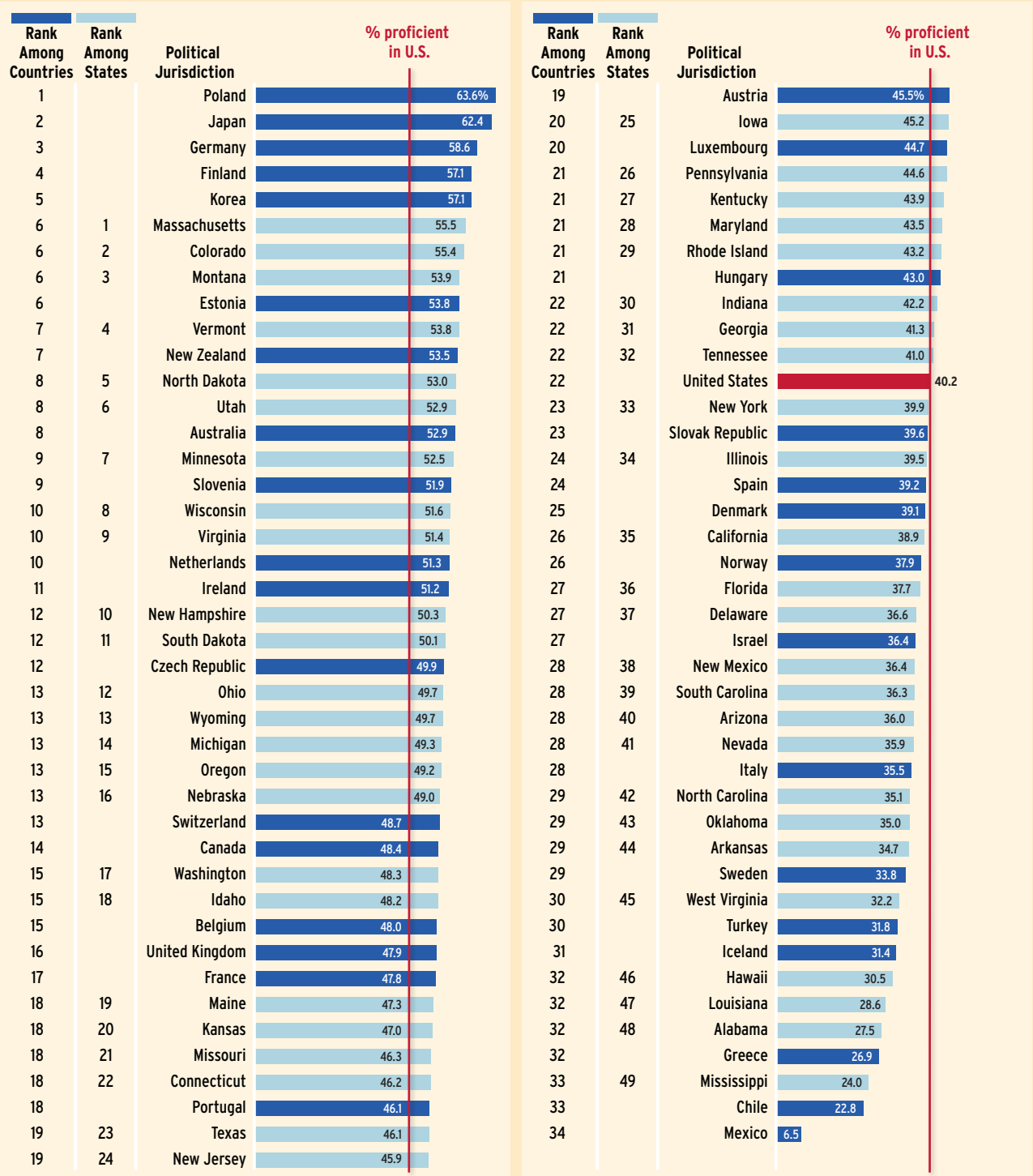
Note: See note in Figure 1. No data are available for Alaska, North Dakota, and Vermont.

Figure A.3. Percentage at or above proficiency level in science among students whose parents have a moderate level of education in the Class of 2015 in U.S. states and OECD countries.



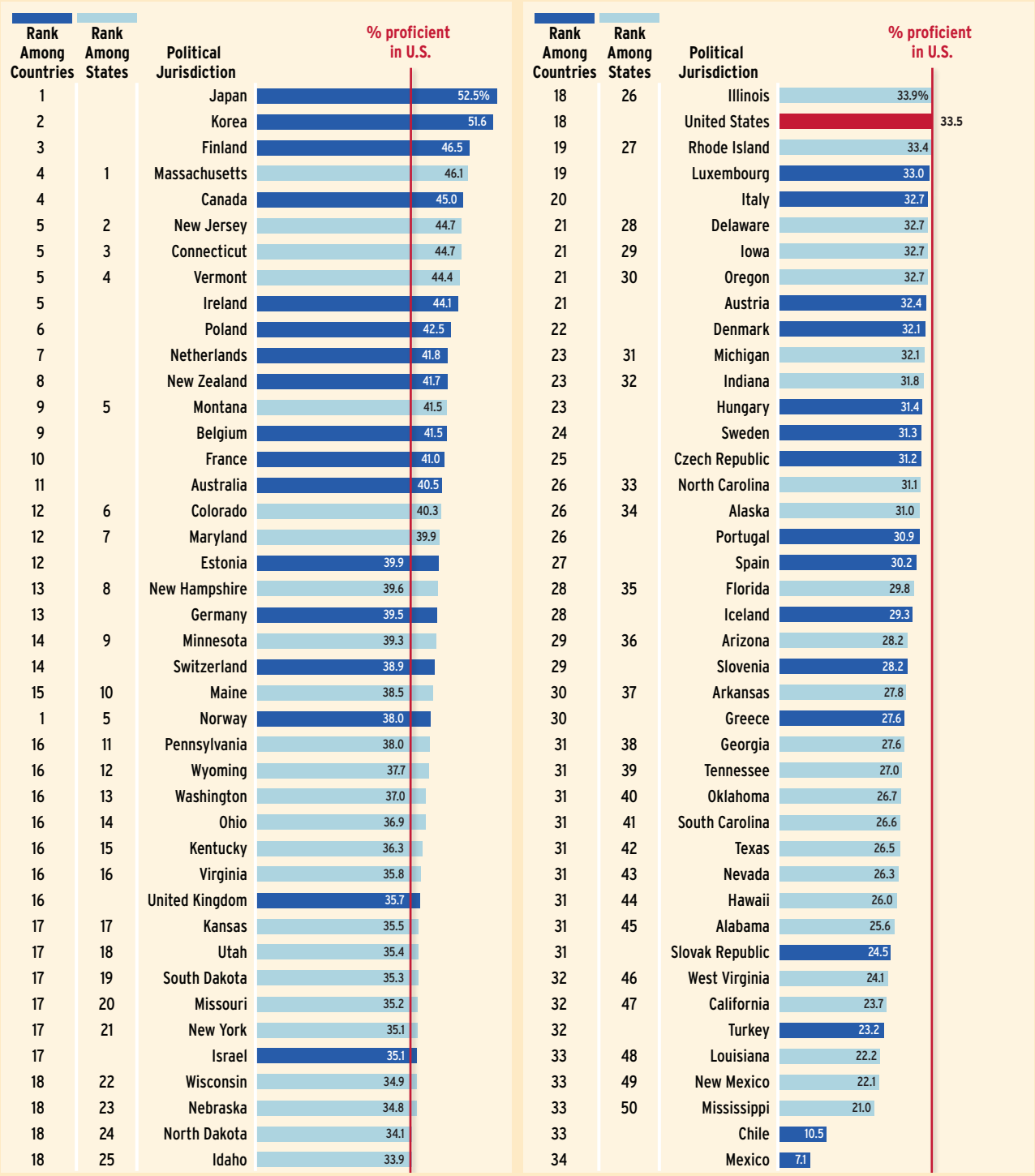
Note: See note in Figure 1. No data are available for Alaska.

Figure A.4. Percentage at or above proficiency level in science among students whose parents have a high level of education in the Class of 2015 in U.S. states and OECD countries.



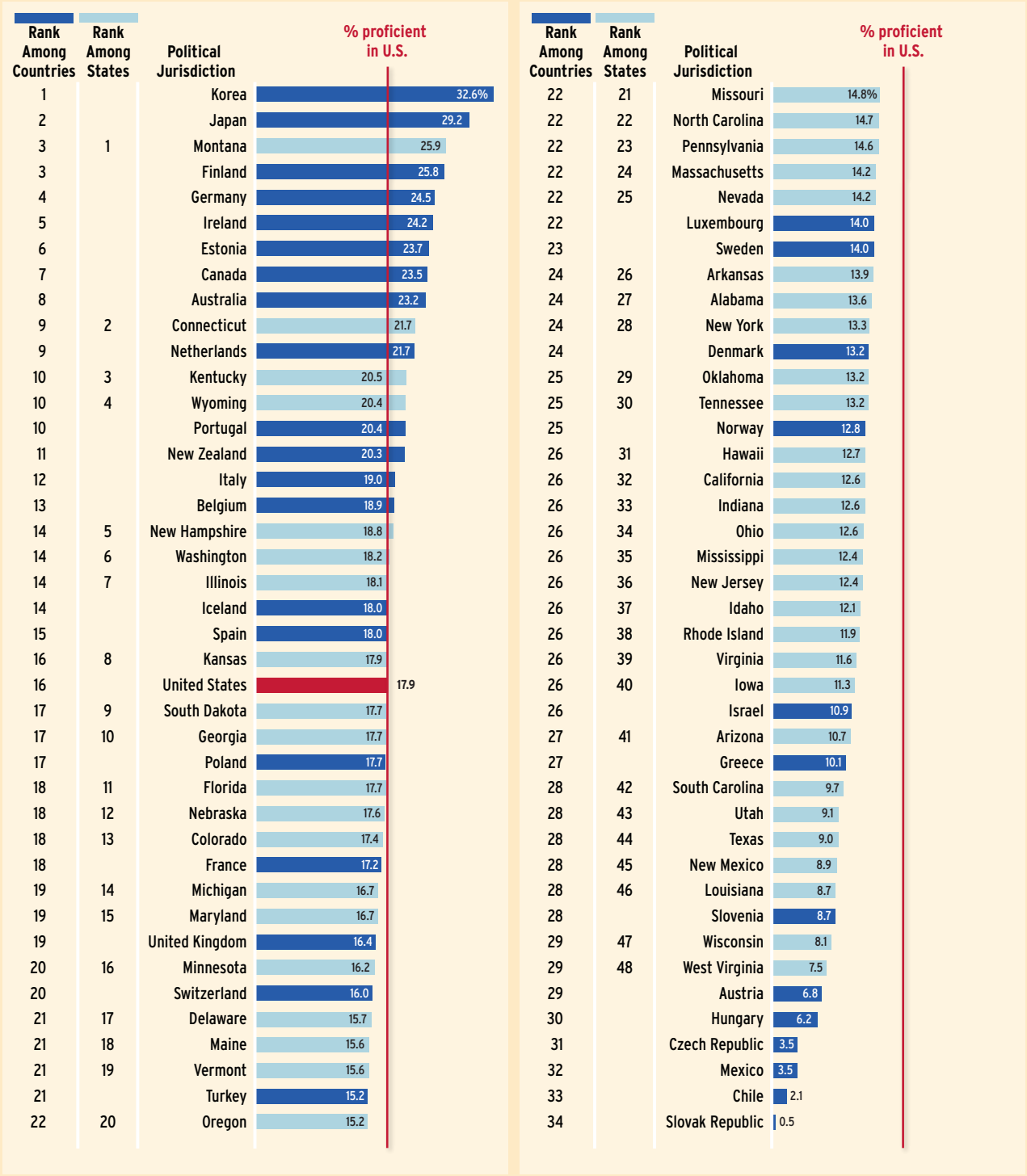
Note: See note in Figure 1. No data are available for Alaska.

Figure A.5. Percentage of proficient students in reading among all students in the Class of 2015 in U.S. states and OECD countries.



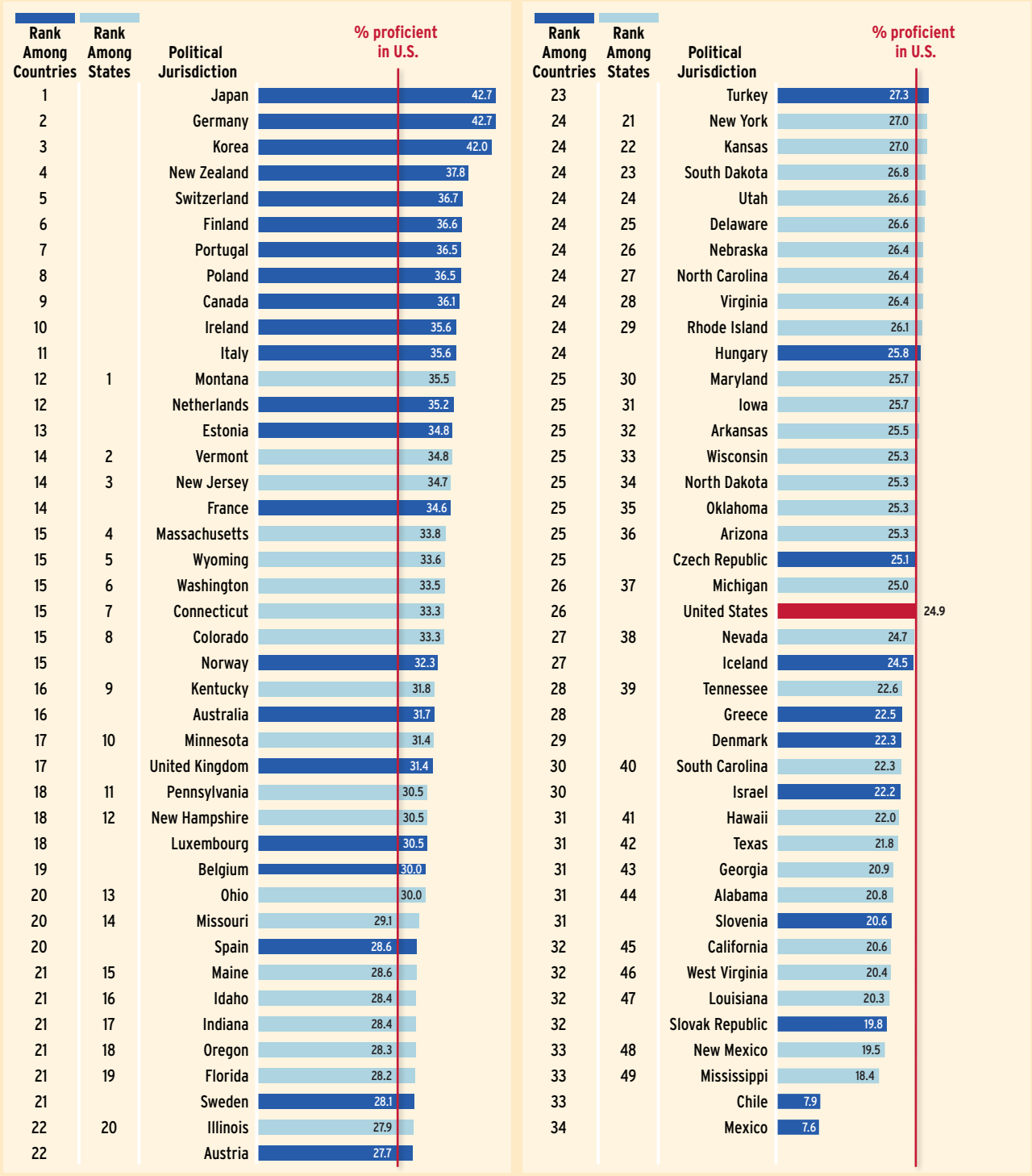
Note: See note from Figure 1.

Figure A.6. Percentage at or above proficiency level in reading among students whose parents have a low level of education in the Class of 2015 in U.S. states and OECD countries.



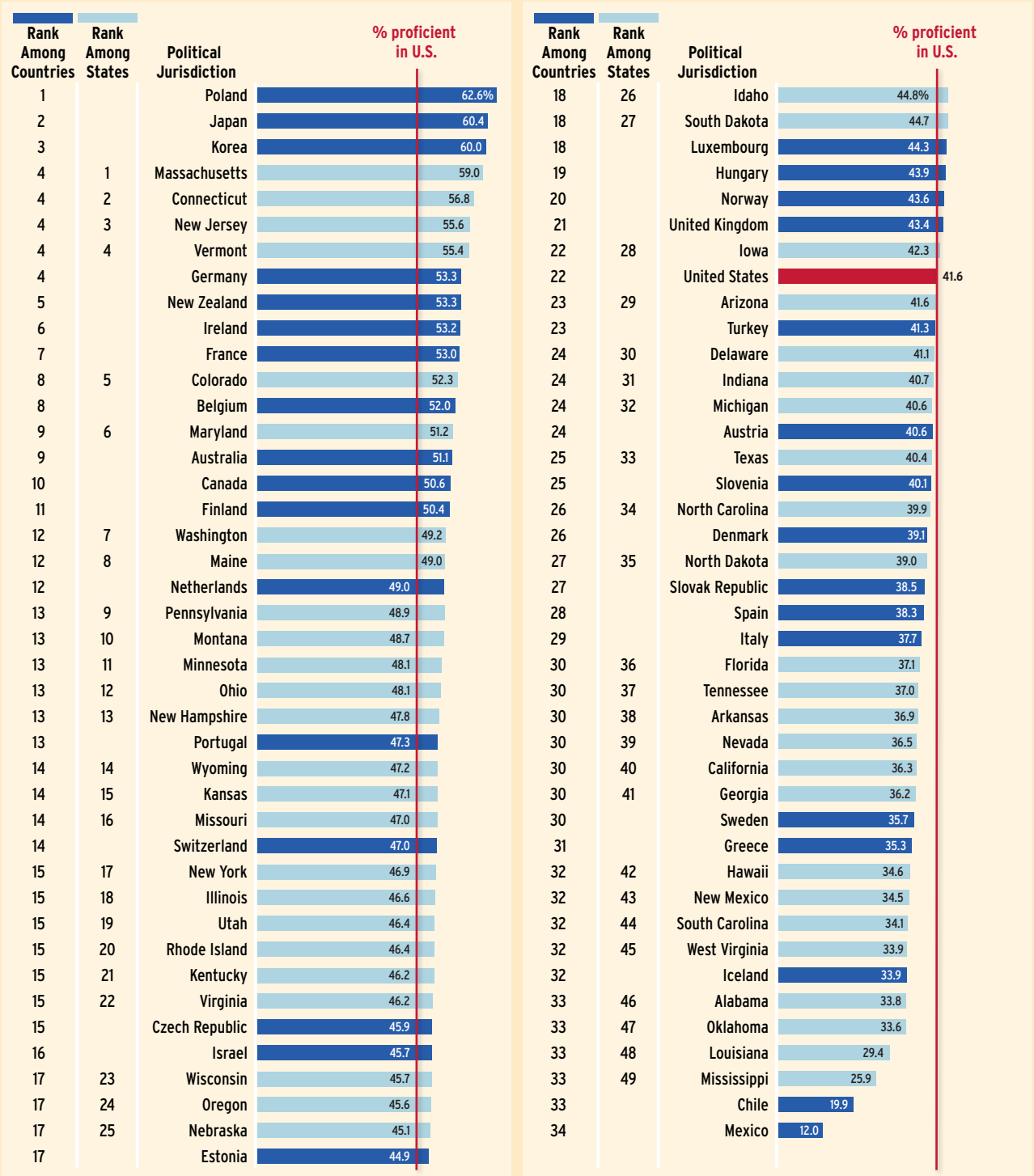
Note: See note in Figure 1. No data are available for Alaska and North Dakota.

Figure A.7. Percentage at or above proficiency level in reading among students whose parents have a moderate level of education in the Class of 2015 in U.S. states and OECD countries.



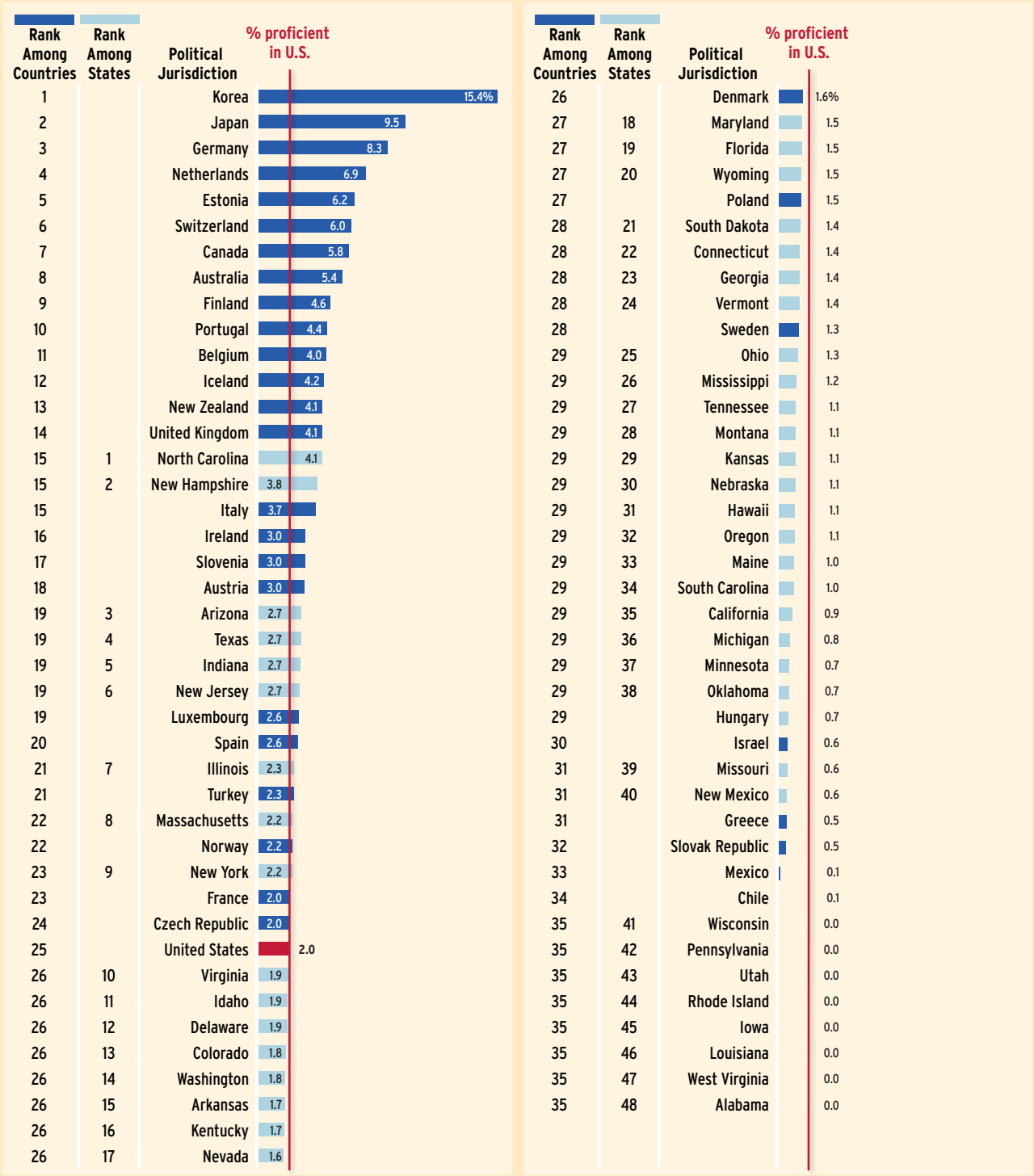
Note: See note in Figure 1. No data are available for Alaska.

Figure A.8. Percentage at or above proficiency level in reading among students whose parents have a high level of education in the Class of 2015 in U.S. states and OECD countries.



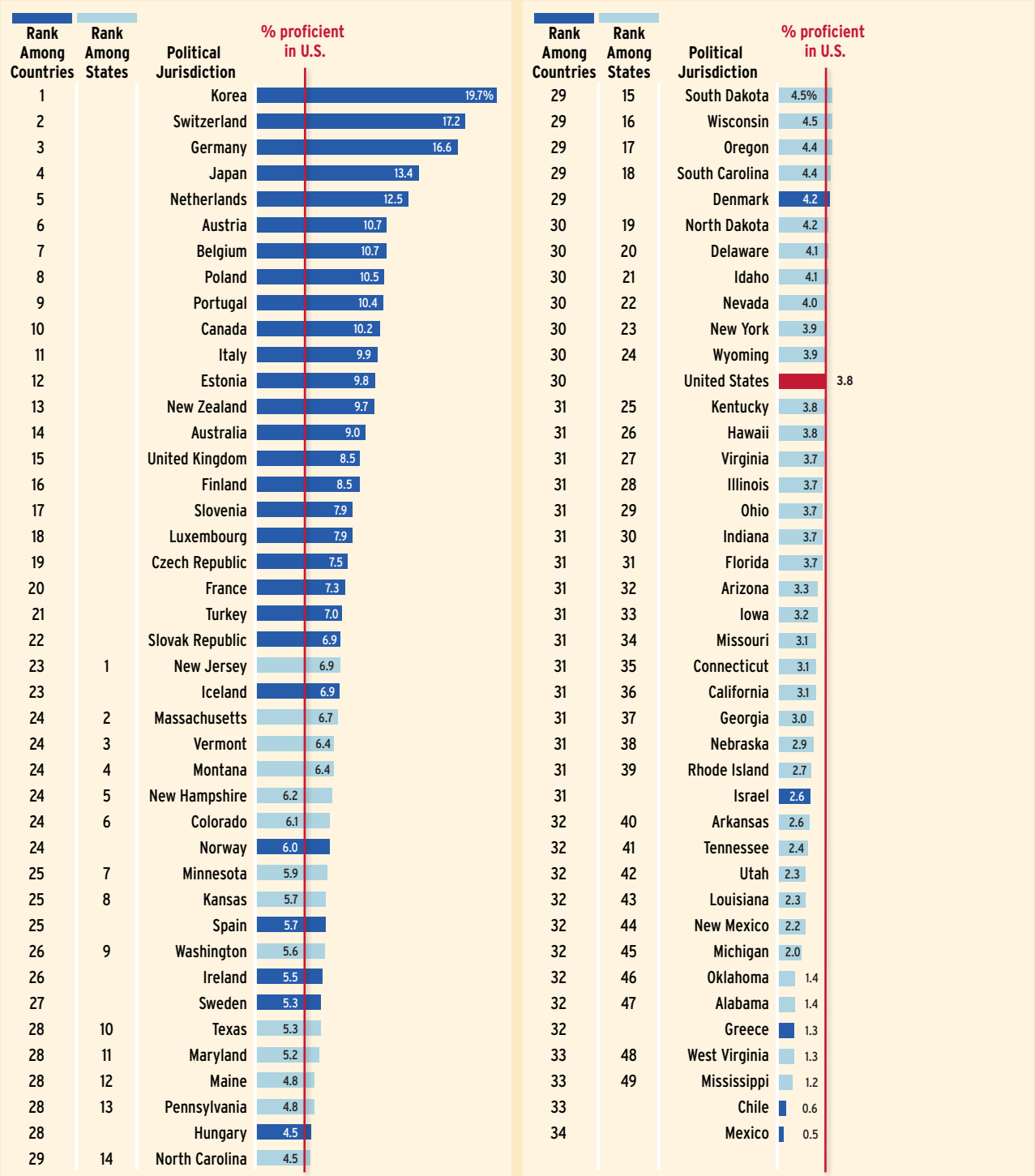
Note: See note in Figure 1. No data are available for Alaska.

Figure A.9. Percentage at or above advanced level in math among students whose parents have a low level of education in the Class of 2015 in U.S. states and OECD countries.



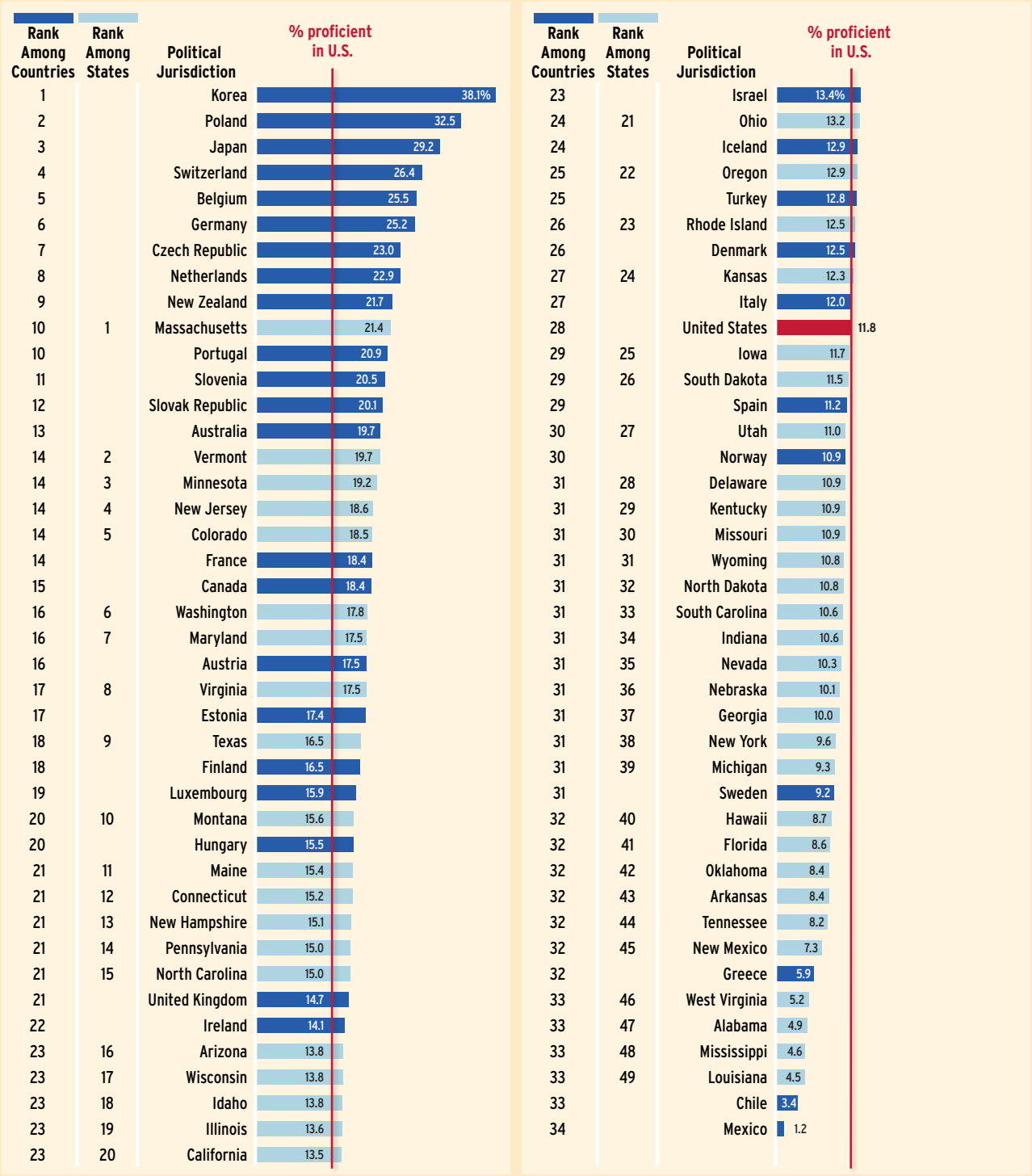
Note: See note in Figure 1. No data are available for Alaska and North Dakota.

Figure A.10. Percentage at or above advanced level in math among students whose parents have a moderate level of education in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1. No data are available for Alaska.

Figure A.11. Percentage at or above advanced level in math among students whose parents have a high level of education in the Class of 2015 in U.S. states and OECD countries.



Note: See note in Figure 1. No data are available for Alaska.

Table 1. Percentage proficient and percentage advanced in three states as identified by NAEP 2011.

	% Proficient			% Advanced
	Math	Science	Reading	Math
Massachusetts (PISA)	48.2%	44.4%	45.9%	17.7%
Massachusetts (NAEP)	51.2	43.6	46.1	15.3
Florida (PISA)	28.1	27.2	30.9	5.4
Florida (NAEP)	27.7	28.4	29.8	5.5
Connecticut (PISA)	46.0	42.2	44.6	15.8
Connecticut (NAEP)	38.1	35.2	44.7	9.8

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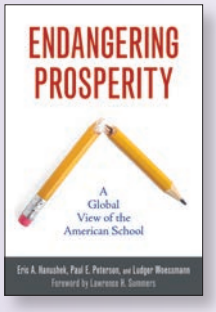

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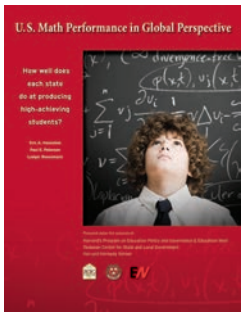

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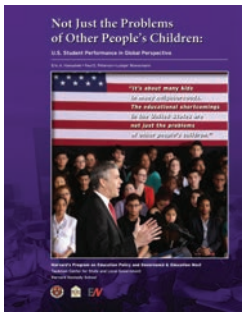

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