Overview

This study addresses a key challenge confronting the United States—how to promote both widely shared and faster economic growth. It does so by analyzing and describing the effects of raising educational achievement, especially for those not at the top of the economic ladder. The results of this analysis, which are consistent with a large body of research across a variety of academic disciplines, demonstrate that improving the education of future workers accelerates economic growth and can promote more equal opportunity over the long run. The result: stronger, more broadly shared economic growth, which in turn raises national income and increases government revenue, providing the means by which to invest in improving our economic future.

Since the early 1970s, economic growth in the United States has been relatively slow and income inequality has risen rapidly. Over this same period, income growth has been so sluggish and unevenly distributed that families on the bottom and middle rungs of the income ladder experienced stagnating or declining incomes even as earnings among those at the top increased sharply. In contrast, the years immediately following World War II and continuing into the early 1970s were characterized by relatively rapid and broadly shared growth. Those at the top earned substantially more than those across the middle and bottom of the income spectrum, but high, middle, and low-income earners all saw their incomes grow at about the same rate.

A restoration, then, of the economic growth pattern that characterized the first three post-war decades would result in both greater and more widely shared economic growth—equitable growth. In order to address this key challenge confronting the United States, this study empirically quantifies the economic and tax benefits of raising the educational achievement of children from less advantaged socioeconomic backgrounds. In general, there are large gaps in the educational outcomes among children from families with lower and higher socioeconomic status. These gaps contribute to subsequent economic inequality, with the relatively poor performance of children from lower socioeconomic backgrounds

reducing U.S. economic growth. Thus, closing income or class-based educational gaps would promote faster and more widely shared economic growth.

The study shows the consequences of raising the educational achievement of children from the bottom three quarters of families who are most socioeconomically disadvantaged to more closely match those of children born into the top quarter of families. Observing the impact of three different scenarios that all have 2015 as their starting date, the analysis quantifies various outcomes over the next 35 years—to 2050, when the pressure of supporting the retired baby boomers will have largely abated—and over the next 60 years—to 2075, when the benefits of narrowing achievement gaps under the three scenarios will have been fully phased in.

Specifically, the study quantifies how much greater U.S. economic growth (measured by gross domestic product, or GDP, the total value of goods and services produced in our economy) and tax revenues would be. The analysis also assesses the reductions in economic inequality that result from the narrowing of education gaps.

In all three scenarios we use the 2012 scores on the Programme for International Student Assessment, or PISA, math and science achievement tests as our indicator of academic achievement.[1] For each scenario, a simulation model is used to estimate the economic effects of potential policy reforms that raise U.S. PISA scores—effects that improve the educational achievement of U.S. children and reduce disparities in educational outcomes among them. The results of this modeling suggest the extent to which appropriate policies could enhance economic growth, raise tax revenue, and reduce economic inequality. (See the Methodology section on page 45 for details on the simulation model and data used in this report.)

The three scenarios and the consequences for U.S. economic growth and fiscal stability

In the first and most modest scenario, we examine the consequences of simply raising the educational achievement of U.S. children so that it matches, instead of lags behind, the average of the 34 economically advanced nations who are members of the Organisation for Economic Co-operation and Development. Specifically, we raise the achievement scores of U.S. children from the bottom three quartiles of disadvantaged families just enough so that the national average educational achievement of all U.S. children on the PISA tests matches the average educational achievement of children from the OECD nations. This raises the com-

bined U.S. math and science PISA score from 978 to 995 (the OECD average) and improves the nation's relative ranking from 24th to 19th best out of the 34 OECD nations, or roughly to the middle of the pack on par with France. (See Table 1, and for a complete breakdown by OECD member country see table 6 on page 29.)

In the second, middle-range scenario, we explore the effects of raising the achievement of U.S. children to match that of the children of our neighbors to the immediate north in Canada. This adjustment lifts the combined U.S. math and science PISA score from 978 to 1044 (the Canadian average) and improves the nation's relative ranking from 24th to 7th, tied with Canada.

In the third and most ambitious scenario, the economic consequences of completely closing educational achievement gaps between U.S. children from lower and higher socioeconomic backgrounds are estimated. In particular, the PISA test scores of the bottom three quartiles of socioeconomically disadvantaged U.S. children are raised so that they match the PISA test scores of the most advantaged quartile of U.S. children. This increases the combined U.S. math and science score to 1,080 and raises the U.S. academic standing to third best among the OECD countries, behind only South Korea and Japan.

TABLE 1

Setting Targets to Improve U.S. Educational Outcomes

Educational improvements, measured by PISA scores, under three different scenarios, among the 34 member nations of the Organisation for Economic Co-operation and Development.

Country	Current score		Scenario 1:		Scenario 2:		Scenario 3:	
	No change		Matching OECD average PISA score		Matching Canadian PISA score		Matching top quatrile U.S. PISA score	
	PISA score	Rank	PISA score	Rank	PISA score	Rank	PISA score	Rank
OECD average	995		995		955		955	
U.S.	**978**	**24th**	**995**	**19th**	**1044**	**7th**	**1080**	**3rd**

Source: OECD (2014), PISA 2012 Results: What Students Know and Can Do—Student Performance in Mathematics, Reading and Science (Volume I, Revised edition, February 2014), PISA, OECD Publishing. http://dx.doi.org/10.1787/9789264201118-en, and calculations by the Washington Center for Equitable Growth based on the PISA scores.

The paper then summarizes the reductions in disparities in educational outcomes under each of the three scenarios. It reports the gap in outcomes on the PISA tests scores between children in the top and bottom quartile of family socioeconomic status as a percentage of the average PISA score. (See Table 2.)

TABLE 2

The Results of Reaching New Targets for U.S. Educational Outcomes

Changes in disparities in educational outcomes, measured by the PISA score gap, under three different scenarios.

Country	Current score		Scenario 1:		Scenario 2:		Scenario 3:	
	No change		Matching OECD average PISA scores		Matching Canadian PISA scores		Matching top quatrile U.S. PISA score	
	75-25 gap (% of average)	Rank	75-25 gap (% of average)	Rank	75-25 gap (% of average)	Rank	75-25 gap (% of average)	Rank
OECD average	17.9%		17.9%		17.9%		17.9%	
U.S.	18.6%	21st	16.0%	11th	13.2%	6th	0.0%	1st

Source: Table M8. Average scores of 15-year-old students on PISA mathematics literacy scale, by national quarters of the PISA index of economic, social and cultural status (ESCS) and education system: 2012 available at http://nces.ed.gov/surveys/pisa/pisa2012/pisa2012highlights_3d.asp and Table S8. Average scores of 15-year-old students on PISA science literacy scale, by national quarters of the PISA index of economic, social and cultural status (ESCS) and education system: 2012 available at http://nces.ed.gov/surveys/pisa/pisa2012/pisa2012highlights_4f.asp, and calculations by the Washington Center for Equitable Growth based on the PISA scores.

Under scenario one, the education gap is reduced from 18.6 percent to 16 percent, and the U.S. ranking on equity improves from 21st to 11th out of the 34 OECD nations. Under the second scenario, the gap falls to 13.2 percent and the U.S. ranking rises to 6th. The third scenario completely closes the educational achievement gap between students from different socioeconomic background, and the United States ranks first among the OECD countries in the equality of educational outcomes.

The paper then demonstrates how the reduction in educational achievement gaps in the United States translates into stronger economic growth over the next 35 years and 60 years. Tables 3 and 4 summarize the economic consequences of raising academic achievement and narrowing educational achievement gaps.

TABLE 3

The Economic Consequences of Improving U.S. Educational Outcomes Over the Next 35 and 60 Years

Changes in economic growth due to rising educational achievement under three scenarios, 2015 to 2050 and 2015 to 2075.

Outcomes	Scenario 1:	Scenario 2:	Scenario 3:
2050	Matching OECD average PISA score	Matching Canadian PISA score	Matching top quatrile U.S. PISA score
Increase in GDP in 2050 in %	1.7%	6.7%	10.0%
Increase in GDP in 2050	$678 billion	$2.7 trillion	$4.0 trillion
Cumulative increase of present value GDP growth* 2015-2050	$2.5 trillion	$10.0 trillion	$14.7 trillion

2075

Increase in GDP in 2075 in %	5.8%	24.5%	37.7%
Increase in GDP in 2075	$4.1 trillion	$17.3 trillion	$26.7 trillion
Cumulative increase of present value GDP growth* 2015-2075	$14.0 trillion	$57.4 trillion	$86.5 trillion

* present value GDP growth is the current dollar value of future increases in GDP and allows for comparisons with GDP today.

Source: OECD (2014), "PISA 2012 Results: What Students Know and Can Do – Student Performance in Mathematics, Reading and Science" (2014 Volume I, Revised edition,). http://dx.doi.org/10.1787/9789264201118-en Calculations by the Washington Center for Equitable Growth based on 0.09, 0.37, and 0.54 standard deviation improvements in PISA scores (see methodology for details).

Under scenario one, the inflation-adjusted size of the U.S. economy in 2050 would be 1.7 percent, or $678 billion, larger. The cumulative increase in real GDP (after factoring in inflation) between 2015 and 2050 would amount to $2.5 trillion in present value, or PV, the current dollar value that is equivalent to the future GDP increases calculated by the model, which allows for a comparison of future values of GDP to current values of GDP. [2] This amounts to an average of over $72 billion per year. The economic effects of raising and narrowing achievement gaps build upon themselves so that over time the growth consequences are increasingly magnified. By 2075, when the effects of policy reforms required to reach this first scenario are fully phased in, the U.S. economy would be 5.8 percent, or $4.1 trillion, larger than it would otherwise be, and the cumulative increase in GDP over the 60-year period from 2015 to 2075 would amount to $14 trillion in present value, an average of $234 billion per year.

If American children matched the academic achievement of Canadian kids, then economic growth would be significantly larger. In 2050 the U.S. economy would be 6.7 percent, or $2.7 trillion, larger. The cumulative increase in GDP between 2015 and 2050 would amount to nearly $10 trillion in present value, $285 billion on average per year. In 2075, the real U.S. GDP would be 24.5 percent, or $17.3 trillion, larger, and the cumulative increase between 2015 and 2075 would sum to over $57 trillion in present value GPD, an average of $956 billion per year.

Finally, if achievement gaps between children from different socioeconomic backgrounds were completely closed, then the U.S. economy would be 10 percent, or $4 trillion, larger in 2050. The cumulative increase in GDP by 2050 would amount to $14.7 trillion in present value, or $420 billion per annum. In 2075, once policy reforms have fully taken effect, the real U.S. GDP would be 37.7 percent, or $26.7 trillion, larger, and the cumulative increase in present value GDP over 60 years would sum to $86.5 trillion, an average of over $1.4 trillion per year.

These results demonstrate that investments targeted at raising academic achievement and narrowing achievement gaps generate large returns in the form of economic growth. The increases in present value economic growth described above suggest the size of potential policy investments that would pay for themselves in the form of growth over the next 60 years and beyond.

Narrowing or closing achievement gaps would also have significant positive consequences for future federal, state, and local revenues. Over the first 35 years, these

TABLE 4

The Economic Consequences of Improving U.S. Educational Outcomes Over the Next 35 and 60 Years

Changes in government revenues, due to rising educational achievement, under three scenarios, 2015 to 2050 and 2015 to 2075.

Outcomes	Scenario 1:	Scenario 2:	Scenario 3:
2050	Matching OECD average PISA score	Matching Canadian PISA score	Matching top quatrile U.S. PISA score
Cumulative increase in all present value* federal and state and local revenues 2015-2050	$902 billion	$3.6 trillion	$5.3 trillion
Cumulative increase in Social Security revenues 2015-2050	$256 billion	$1.0 trillion	$1.5 trillion
Cumulative increase in Medicare revenues 2015-2050	$77 billion	$306 billion	$452 billion
2075			
Cumulative increase in all present value* federal and state and local revenues 2015-2075	$5.2 trillion	$21.5 trillion	$32.4 trillion
Cumulative increase in Social Security revenues 2015-2075	$2.5 trillion	$10.4 trillion	$15.8 trillion
Cumulative increase in Medicare revenues 2015-2075	$767 billion	$3.2 trillion	$4.8 trillion

* present value federal and state and local revenues is the current dollar value of future increases in revenues and allows for comparisons with revenues today

Source: OECD (2014), PISA 2012 Results: What Students Know and Can Do – Student Performance in Mathematics, Reading and Science (Volume I, Revised edition, February 2014), PISA, OECD Publishing. http://dx.doi.org/10.1787/9789264201118-en and calculations by the Washington Center for Equitable Growth based on 0.09, 0.37, and 0.54 standard deviation improvements in PISA scores (see methodology for details).

would sum to $902 billion in PV federal, state, and local revenues under scenario one, $3.6 trillion under scenario two, and $5.3 trillion under scenario three. Over 60 years, the consequences would be significantly larger. Federal, state, and local revenues would sum to $5.2 trillion (scenario one), $21.5 trillion (scenario two), and $32.4 trillion (scenario three), all expressed in present value. (See Table 4.)

Thus, public policy investments that raised academic achievement as described under the three scenarios and that cost less than an average of $87 billion, $358 billion, and $540 billion over each of the next 60 years would more than pay for themselves in budgetary terms. To put these revenue figures in perspective, consider that the entire budget for the federal Department of Education in 2013 was $72 billion. Keep in mind, as well, that these revenue increases are not a function of tax rate increases. Instead they are the additional revenues that would accrue to governments because U.S. GDP would be larger and Americans would be earning more income and paying taxes on their additional income.

The increased growth and subsequent revenue increases will enable us to more easily sustain public retirement benefit programs such as Medicare and Social Security. Improving educational outcomes, for example, would lift Social Security tax contributions by $256 billion, $1 trillion, and nearly $1.5 trillion under the three scenarios by 2050.[3] Similarly, Medicare tax revenues for the Hospital Insurance Fund would increase by $77 billion, $306 billion, and $452 billion under the three scenarios from 2015 to 2050, providing a substantial boost to Medicare solvency.[4] Revenues for Social Security and Medicare would be substantially larger by 2075.

TABLE 5

The Reduction in Income Inequality from Narrowing Educational Achievement Gaps

Increases in lifetime earnings, due to rising educational achievement, under three scenarios.*

Quartiles	Scenario 1: Matching OECD average PISA score	Scenario 2: Matching Canadian PISA score	Scenario 3: Matching top quatrile U.S. PISA score
Bottom quartile	4.3%	10.9%	22.0%
Third quartile	4.3%	11.5%	17.0%
Second quartile	4.3%	8.5%	9.3%
Top quartile	0.0%	6.4%	0.0%

* These effects are calculated under the three scenarios for children who complete their schooling 20 years from the start of the necessary policy reforms (in 2035) because it is assumed that it takes 20 years for the academic reforms to be fully phased in. Children who complete their schooling prior to 2035 would experience only a part of the increase in lifetime earning.

Source: OECD (2013), PISA 2012 Results: Excellence Through Equity: Giving Every Student the Chance to Succeed (Volume II), PISA, OECD Publishing. http://dx.doi.org/10.1787/9789264201132-en, and calculations by the Washington Center for Equitable Growth based on the PISA scores.

The benefits of closing educational achievement gaps also would reduce income inequality. These effects are calculated under the three scenarios for children who complete their schooling 20 years from the start of the necessary policy reforms (in 2035) because it is assumed that it takes 20 years for the academic reforms to be fully phased in. Children who complete their schooling prior to 2035 would experience only a part of the increase in lifetime earnings. (See Table 5.)

Under scenario one, the lifetime earnings of children from the bottom three quartiles of socioeconomic status would increase by an additional 4.3 percent. Under scenario two, all children would earn more, although the increases are smallest for children with the highest socioeconomic status and thus income inequality would be reduced. Finally, under the third scenario, the increase in lifetime earnings for children in the bottom three quartiles of socioeconomic status would be very large: 22 percent, 17 percent, and 9.3 percent respectively.

As explained in greater detail later in the report, these economic and tax benefit projections understate the impact of raising achievement gaps for at least four reasons. First, under scenarios one and three, they assume that educational achievement improvements are limited to children in the lower three quartiles of socioeconomic status, but in the real world policies that increase these children's educational achievement are likely to improve all children's achievement and further enhance growth.

Second, the model does not take into account any of the social benefits—such as better health outcomes—that are likely to occur as a result of educational improvement. Third, the model may be understating growth effects because it assumes that improvements in the educational achievement of children in the bottom three quartiles of socioeconomic status have the same impact on growth as do equal sized improvements in the educational achievement of the average child. Yet there is evidence that raising skills at the bottom improves growth more than raising skills at the top.[5] Finally, the model does not calculate the potential positive effects on children born to future parents who, because of improved academic achievement, will have higher incomes and thus be able to provide them better educational opportunities.

If the model properly accounted for all of these factors, the benefits of improving educational achievement would be larger than those estimated in this study. Yet by a similar logic, the projections overstate the reductions in economic inequality. Helping the most disadvantaged students improve their educational outcomes will likely

The benefits of closing educational achievement gaps would also reduce income inequality.

improve the educational outcomes of all children and thus raise the incomes of the most advantaged children as well as temper reductions in income inequality.

Closing the socioeconomic gaps in education

The potential economic gains described above illustrate in stark terms the waste of human talent and opportunity that we risk if achievement is not raised and gaps are not narrowed. They also suggest the magnitude of the public investments we should be willing to make now and in the decades to come to achieve these goals. Even from a narrow budgetary perspective, the tax revenue gains this study forecasts suggest that many investments to raise achievement and close educational achievement gaps could amply pay for themselves in the long run.

The report provides numerous examples of effective public policy strategies that promote equitable growth to illustrate that there are many ways of doing so, though their details are left to future research. Broadly, these public policy strategies fall into three categories:

- Early childhood care and education

- Criminal justice reform

- Family friendly workplaces

Completely closing socioeconomic-based educational achievement gaps will not happen instantly, but we can begin to narrow them immediately. As the report details, we already know many of the reasons these gaps exist and policies that can help close them. Thus, we can begin to experience some of the economic gains described in this report as policies that successfully narrow achievement gaps are implemented. Raising achievement and closing socioeconomic-based educational gaps is about not only reducing the degree of inequality in our society and promoting more widely shared economic growth but also inducing faster economic growth. In short, it is about promoting equitable growth.