Economic Impact of COVID-19

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The Long-Term Effects of Educational Disruptions

By Santiago Pinto and John Bailey Jones

The COVID-19 pandemic and the measures taken to contain the virus have consequences that will likely extend beyond the short term. State and local governments will be forced to sharply reduce their expenditures, which will affect their ability to perform critical functions, such as the provision of education. Fewer resources devoted to formal education, combined with school closures, may have irreversible effects on some school-age students.

In this report, we review the economic literature on how disruptions to schooling affect educational and economic outcomes.[1] Our principal findings are:

1. Lower educational attainment is associated with lower earnings, higher crime rates, poorer health and mortality outcomes, and reduced participation in political and social institutions.
2. Childhood and adolescent development are characterized by what is known as "dynamic complementarity." Investments in children made at younger ages increase the efficiency of investments made at older ages. One consequence of dynamic complementarity is that investment shortfalls at younger ages are difficult to reverse.
3. The evidence suggests that classroom instruction time is positively associated with cognitive development. The ability to substitute parental inputs or online learning for face-to-face classroom instruction is often limited, especially among the most disadvantaged households.
4. The COVID-19 pandemic will likely interrupt the administration of several assessment measures. The evidence suggests that replacing formal metrics with subjective assessments increases the scope for misallocation and bias.
5. Consistent with the preceding evidence, a recent study shows that the cohorts exposed to educational spending cuts during the Great Recession had worse educational outcomes. The effects were largest for children in poorer neighborhoods. We likewise expect that in the current crisis, the reduction in public resources devoted to education, along with the strict lockdown of educational institutions, will widen the educational attainment gap. How jurisdictions manage their budget in response to the shock will matter.

The Importance of (Early) Education

The positive relationship between educational attainment and earnings is widely recognized. While the literature on the mechanisms that link education to earnings is too broad to review here, one likely channel is that education and cognitive skills are positively associated, and cognitive skills, typically measured using standard intelligence tests, have large returns in the labor market. Recent work finds that an increase in cognitive test scores of one standard deviation is associated on average with a 10 percent to 20 percent increase in wages.[2]

Conversely, lower educational attainment is associated not only with lower earnings, but also with higher crime rates, worse health, higher mortality rates, and lower participation in political and social institutions.

Work by Cunha, Heckman, and co-authors emphasizes the role of "dynamic complementarities" in skill formation: Early investment in skill formation increases the returns from skill investments later in life.[3] Conversely, a developmental shortfall at early ages inhibits human capital accumulation at later ages.

A large body of research also has shown that early childhood education is critical to future economic outcomes. This is especially true for children in disadvantageous environments.[4] However, the earliest educational investments are determined mostly by parental resources, which suggests that the children who could benefit the most from early childhood investments are less likely to receive them.

The research on childhood education is not very optimistic about the ability of policy interventions implemented later in life to offset deficits accumulated at earlier stages. Larger early childhood deficits increase the challenges for and reduce the effectiveness of formal education for years to come.

Learning in the Classroom and at Home

A number of studies find that instruction time affects performance in cognitive tests. Carlsson, Dahl, Öckert, and Rooth examined this relationship using data collected from a random experiment in Sweden.[5] They found that 10 days of extra schooling raises test scores by 1 percent of a standard deviation, concluding that education can also have an important positive impact on cognitive skills in late adolescence. To the extent that these results can be used to draw conclusions for the current COVID-19 episode in the United States, a 12-week (or 60-day) loss of schooling due to the lockdown implies a test score decline of 6 percent of a standard deviation.

Several studies have focused on the relationship between schooling and test scores. Pischke exploited variations in schooling time in Germany during 1966-1967 and found a positive association between instructional time and test scores.[6] Moreover, a shorter school year led to more grade repetition in primary school and fewer students going into secondary school. Using data from New York charter schools, Dobbie and Fryer found that instructional time is an important determinant of school effectiveness and student achievement.[7] Specifically, an increase of 25 percent or more in instructional time led to a 0.08 standard deviation increase in math scores and a 0.048 standard deviation increase in English Language Arts scores.

A study by Lavy examined how the amount of instructional time affects students' test performances. The analysis exploited differences in instructional time across countries, including both developed and developing economies. Lavy found that one more hour per week of instruction in mathematics, science, or language over the school year increases test scores (on average) by around 6 percent of a standard deviation (of the distribution of test scores). Furthermore, the paper found that the impact of instructional time is larger for immigrants and students from disadvantaged family backgrounds.[8]

What does this imply for the United States in light of the current school lockdown? The school year in the United States is approximately 30 weeks. Assuming that math instruction takes about four hours per week, a 12-week school closure would be equivalent to 1.6 fewer hours of instruction per week for 30 weeks. Lavy's results would then suggest a loss of around 9 percent of a standard deviation. The impact could potentially be worse for students from low-income families.

With schools closed, many families are teaching their children at home. Families are central to their children's education, but their role is generally understood more as a complement to, rather than a substitute for, the instruc-

tion obtained at school. Research suggests that homeschooling is often an imperfect substitute for classroom instruction, particularly for inexperienced parents. It is not easy to be the main driver of the learning process, and not all parents are capable of performing this activity successfully.[9] In addition, there are substantial differences in the resources parents can offer in support of their children's education. Such differences almost surely create additional disparities in outcomes.[10]

Factors driving these discrepancies include the amount of time parents can dedicate to teaching, parents' skills, and the financial resources households can allocate to support the learning process. In general, higher levels of family income are associated with higher educational attainment. However, family income may proxy for several other relevant inputs in the education production function, such as parental ability, education, and altruism.[11] Dahl and Lochner exploited plausibly exogenous variation in household income generated by the Earned Income Tax Credit.[12] They showed that an additional $1,000 of income increases test scores (combined math and reading) by 6 percent of a standard deviation. The impact is even larger for students from disadvantaged families.

Another discrepancy is broadband access: Many schools are offering online instruction and resources, but these require reliable internet access. Nationwide, 14.3 percent of children between 3 and 18 years old lacked internet access in 2017, according to the National Center for Education Statistics (NCES). Access varies with family income, parents' educational attainment, race, and where the children reside, that is, in a metro area versus a nonmetro area. (See Figures 1 through 4 for a summary of the data.) Data collected by the NCES also show that students with internet access at home tend to perform better on reading, math, and science tests. Differential access to digital learning will likely increase the achievement gaps among children from different family backgrounds even further.

The Importance of Formal Assessments

Along with school closures, the pandemic also has led to the postponement or cancellation of many exams and other critical educational assessments. Formal assessments are useful in several ways. First, they can provide timely information to teachers and families about the students' comprehension of the subject material. When such information is not readily available, learning difficulties will be identified only with delays, which may have harmful long-term consequences for the child. Assessments also certify students as they move through different levels of the education system and into the workforce. This may be particularly important to students from disadvantaged backgrounds, who might otherwise not be able to establish their credentials.

Because of the school lockdown and lack of formal assessments, teachers will use the information they currently have on students' performance to predict their final grades. Research has found that decisions based on teacher assessments, as opposed to blind examinations, introduce additional distortions to an already imperfect system.

Murphy and Wyness evaluated the effect on students' university choices in the U.K. when the choices are made using "predicted grades." (In the U.K., students decide which institution to attend based on the final examination grades predicted by their high school teachers rather than the actual grades.)[13] The paper finds that not only are "predicted grades" often inaccurate, they are also biased. Among high-achieving students, the predicted grades for those from disadvantaged backgrounds are lower than those from more advantaged backgrounds.

A study by Burgess and Greaves examined the differences between objective ("blind") and subjective ("non-blind") measures of student assessments.[14] The authors found that when these

two methods are used to compare the performance of students from different ethnic backgrounds, they provide systematically different measures of students' ability levels. The resulting pattern is consistent with a "stereotype model," according to which a student who belongs to a group that previously performed well in a specific subject will tend to be overassessed in the present, and vice versa.

Another concern about the lack of formal assessment is that interruptions in testing may hinder students' educational development. When designed and administered correctly, testing can serve as a useful diagnostic tool, which provides immediate feedback and helps improve student learning. Using data collected from a testing program implemented in California that allowed teachers to obtain timely information about students' performance, Betts found that providing feedback to students increased their math test scores by about 0.1 of a standard deviation.[15] Dizon-Ross shows that parents may also react to the information conveyed by tests. When teachers share students' test results with their parents, parents adjust their beliefs about their children's academic ability and invest more in their education.[16]

The lack of formal assessments may particularly affect recent graduates. When prospective employers do not have access to the information conveyed by formal assessments, they are forced to use other mechanisms and signals to screen and assess the skills of prospective employees. These alternative instruments may create worse matching between employees and firms, resulting in higher job separation rates and lower overall productivity.

Massive and generalized interruptions may also have beneficial effects on some students (or specific cohorts of students). For example, due to COVID-19, Norway has decided that all 10th grade students will receive a high school degree. Maurin and McNally looked at the long-run outcomes of students involved in the 1968 student riots in France.[17] After the riots, France stopped using normal examination procedures. In particular, standards were lowered, allowing some students to receive more years of education than what they might have received otherwise. The authors found that this decision had positive long-term labor market consequences (higher wages and occupational levels) for the affected cohort. They also found that the positive effects are transmitted across generations.

The Impact of Recessions

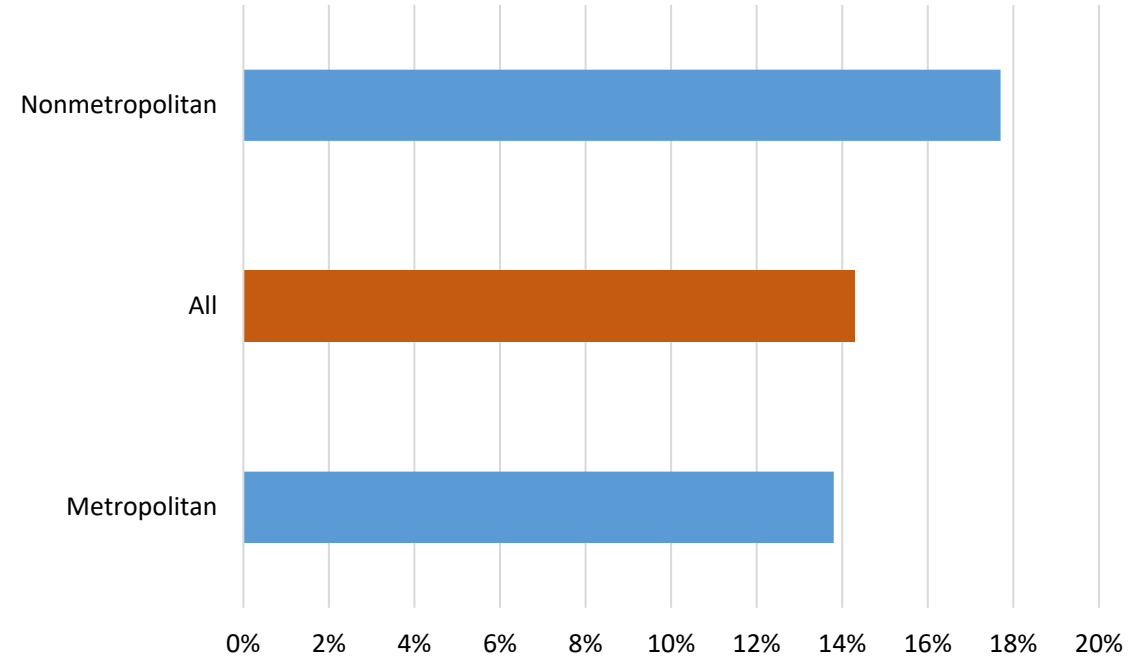
During the Great Recession, national public school per-pupil spending fell about 7 percent. It took several years to recover to pre-recession levels. Jackson, Wigger, and Xiong showed that cohorts exposed to these spending cuts had lower test scores and attended college at lower rates.[18] Moreover, the results indicated that children in poor neighborhoods experienced a larger reduction in test scores and the test score gap between black and white students within individual states increased.

Events outside of the school environment that take place during recessions also have an adverse effect on educational outcomes. These include reduced access to health services, canceled after-school and summer educational activities, and dislocated housing, such as home foreclosures or evictions. Childhood nutrition tends to suffer during recessions as well, negatively affecting cognitive development.

Conclusion

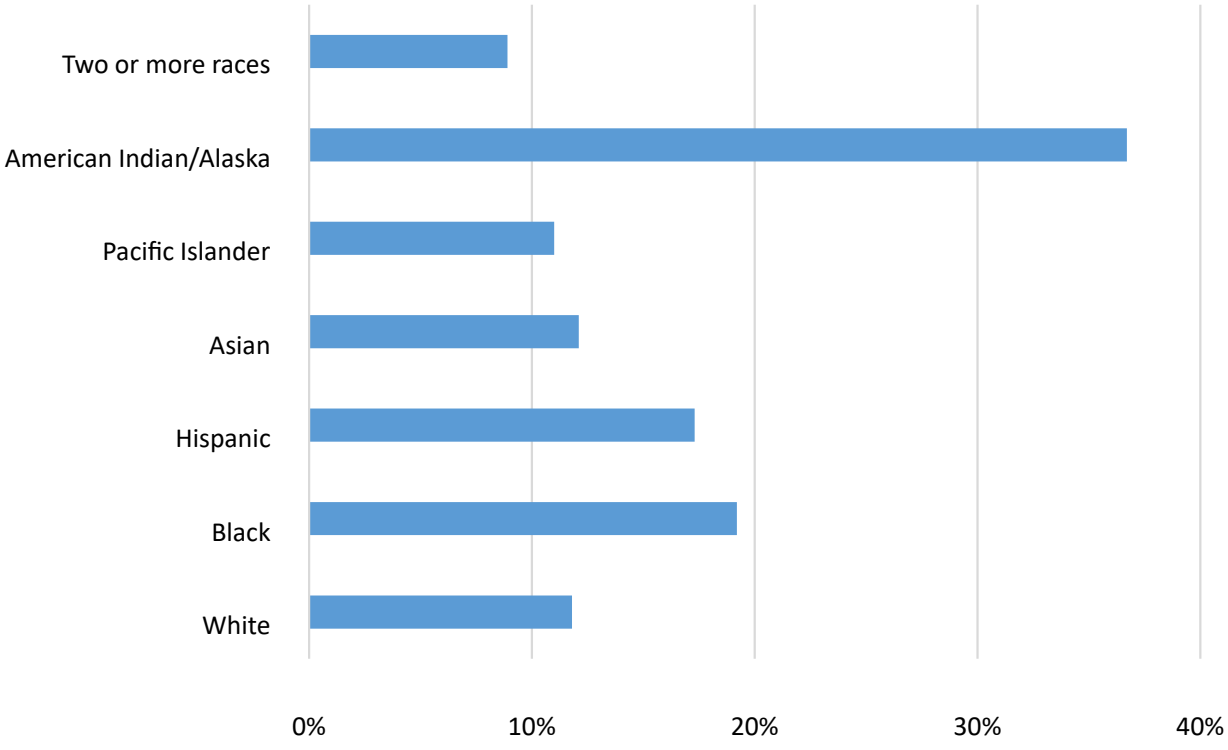
Lower educational attainment due to economic disruptions — particularly those affecting younger children — will likely have long-lasting effects for years, and maybe generations, down the road. ■

Figure 1: No Broadband Access, by Metropolitan Status



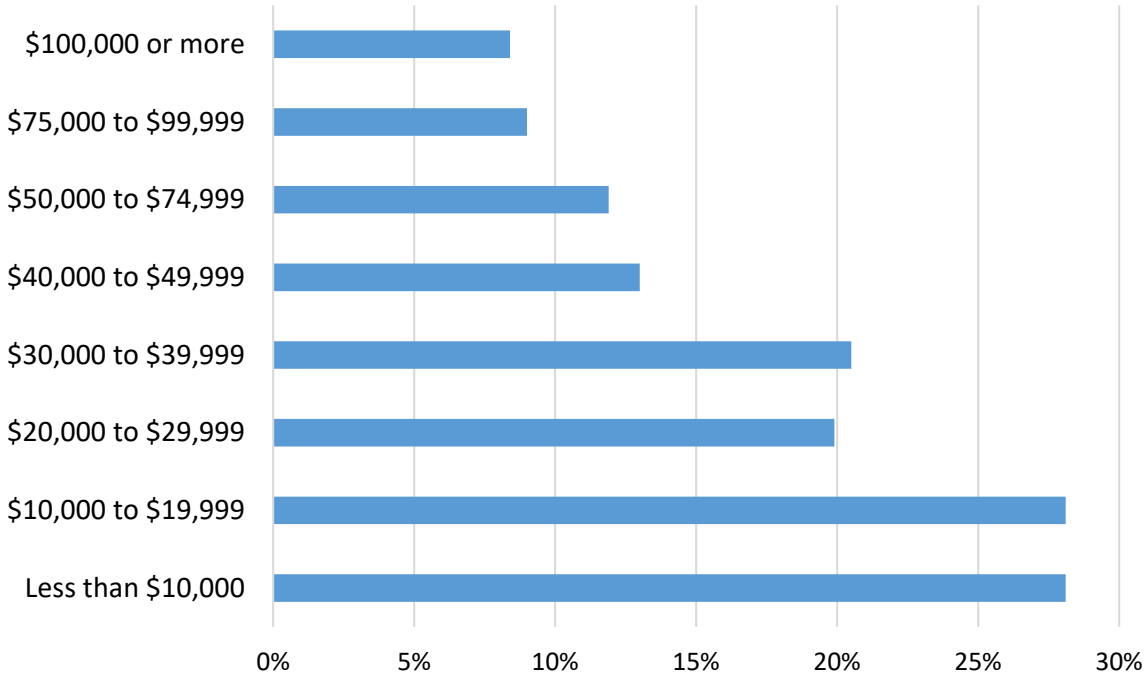
Source: National Center for Education Statistics

Figure 2: No Broadband Access, by Race/Ethnicity



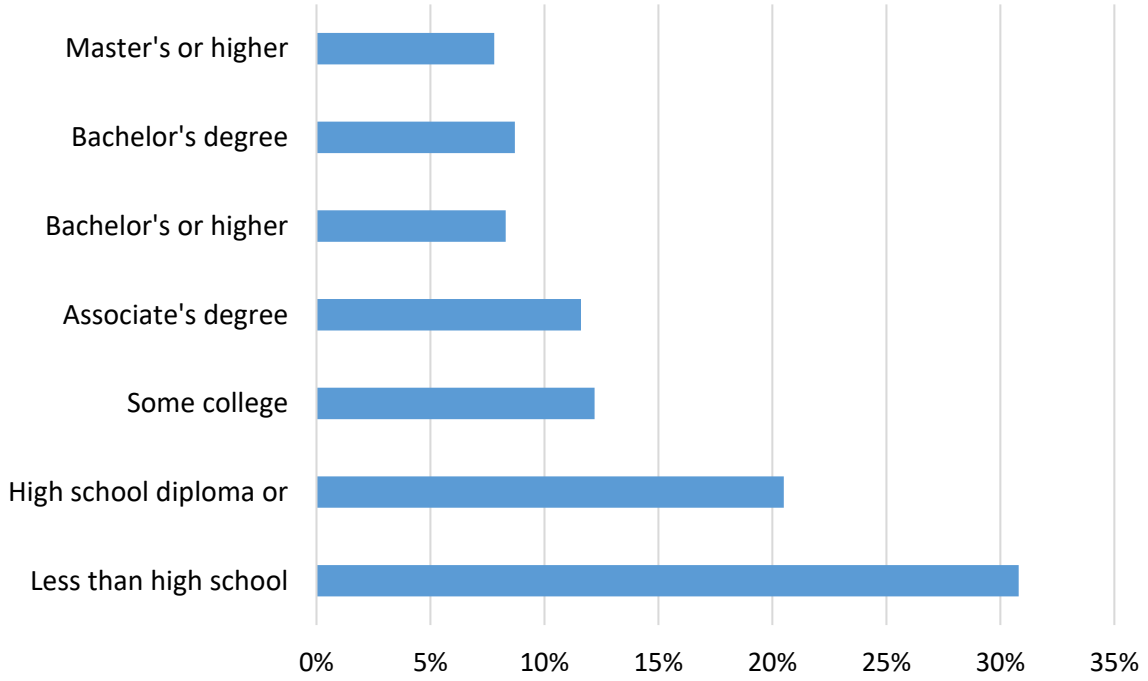
Source: National Center for Education Statistics

Figure 3: No Broadband Access, by Family Income (current $)



Source: National Center for Education Statistics

Figure 4: No Broadband Access, by Parents' Education



Note: Education level is the highest level attained by either parent.

Source: National Center for Education Statistics

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Endnotes

[1] A few recent articles review additional effects that COVID-19 may have on education and economic outcomes. See, for example, Psacharopoulos et al., 2020, and Burgess and Sievertsen, 2020.

[2] Hanushek and Rivkin, 2012; Hanushek et al., 2013.

[3] Flavio Cunha and James Heckman, "The Technology of Skill Formation," *American Economic Review*, May 2007, vol. 97, no. 2, pp. 31-47.

[4] Sneha Elango, Jorge Luis García, James J. Heckman, and Andrés Hojman, "Early Childhood Education," in *Economics of Means-Tested Transfer Programs in the United States*, Robert A. Moffitt (ed.), Chicago: University of Chicago Press, 2015.

[5] Magnus Carlsson, Gordon B. Dahl, Björn Öckert, and Dan-Olof Rooth, "The Effect of Schooling on Cognitive Skills," *Review of Economics and Statistics*, July 2015, vol. 97, no. 3, pp. 533-547.

[6] Jörn-Steffen Pischke, "The Impact of Length of the School Year on Student Performance and Earnings: Evidence from the German Short School Years," *Economic Journal*, September 2007, vol. 117, no. 523, pp. 1216-1242.

[7] Will Dobbie and Roland G. Fryer, Jr., "Getting beneath the Veil of Effective Schools: Evidence from New York City," *American Economic Journal: Applied Economics*, October 2013, vol. 5, no. 4, pp. 28-60.

[8] Victor Lavy, "Do Differences in Schools' Instruction Time Explain International Achievement Gaps? Evidence from Developed and Developing Countries," *Economic Journal*, November 2015, vol. 125, no. 588, pp. F397-F424.

[9] Anders Bjorklund and Kjell G. Salvanes, "Education and Family Background: Mechanisms and Policies," in Eric Hanushek, Stephen Machin, and Ludger Woessmann (eds), *Handbook of the Economics of Education*, 2011, Vol. 3, pp. 201-247. Bjorklund, A. and K. Salvanes (2011), "Education and Family Background: Mechanisms and Policies," in E Hanushek, S Machin and L Woessmann (eds), *Handbook of the Economics of Education*, Vol. 3.

[10] Philip Oreopoulos, Marianne E. Page, and Ann Huff Stevens, "Does Human Capital Transfer from Parent to Child? The Intergenerational Effects of Compulsory Schooling," *Journal of Labor Economics*, October 2006, vol. 24, no. 4, pp. 729-760.

[11] James J. Heckman and Stefano Mosso, "The Economics of Human Development and Social Mobility," *Annual Review of Economics, Annual Reviews*, August 2014, vol. 6, no. 1, pp. 689-733.

[12] Gordon B. Dahl and Lance Lochner, "The Impact of Family Income on Child Achievement: Evidence from the Earned Income Tax Credit," *American Economic Review*, August 2012, vol. 102, no 5, pp. 1927-1956.

[13] Richard Murphy and Gill Wyness, "Minority Report: the impact of predicted grades on university admissions of disadvantaged groups," CEPEO Working Paper Series No. 20-07, Centre for Education Policy and Equalising Opportunities, UCL Institute of Education, March 2020.

[14] Simon Burgess and Ellen Greaves, "Test Scores, Subjective Assessment, and Stereotyping of Ethnic Minorities," *Journal of Labor Economics*, July 2013, vol. 31, no. 3, pp. 535-576.

[15] Julian R. Betts, Youjin Hahn, and Andrew C. Zau, "Can testing improve student learning? An evaluation of the mathematics diagnostic testing project," *Journal of Urban Economics*, 2017, vol. 100, pp. 54-64.

[16] Rebecca Dizon-Ross, "Parents' Beliefs about Their Children's Academic Ability: Implications for Educational Investments," *American Economic Review*, August 2019, vol. 109, no. 8, pp. 2728-2765.

[17] Eric Maurin and Sandra McNally, "Vive la Révolution! Long-Term Educational Returns of 1968 to the Angry Students," *Journal of Labor Economics*, January 2008, vol. 26, no. 1, pp. 1-33.

[18] C. Kirabo Jackson, Cora Wigger, and Heyu Xiong, "Do School Spending Cuts Matter? Evidence from the Great Recession," National Bureau of Economic Research Working Paper No. 24203, January 2018.