

Early Childhood Development and Economic Growth
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Early childhood development may seem like an odd topic for a Federal Reserve Bank president.¹ The public policy responsibility for which the Fed is best known is the nation's monetary policy – a macroeconomic subject that would seem to stand in sharp contrast to the more microeconomic focus of Governor Kaine's summit today. But as a regional Reserve Bank in a federated central banking system like the Fed, we spend a good deal of time trying to understand the economies that make up our District, which, as you may know, includes Maryland, D.C., Virginia, West Virginia and the Carolinas. We supplement formal data on the national economy with information we gather from numerous sources – both formal and informal – about economic conditions in our region. This process gives us an opportunity to observe and learn about the economic trends and challenges facing the people of our District. It also allows us to observe the range of public policies and private initiatives undertaken across the District aimed at promoting local and regional economic growth.

Our interest in growth derives directly from our mandate, which includes both maximizing employment and ensuring price stability. Although it is now widely known that the best contribution monetary policy can make to growth is to keep inflation low and stable,² understanding the wellsprings of growth is essential to our work. More broadly, to an economist, comparative economic growth makes an irresistible topic. The magnitude of the differences in economic well-being across cities, states and nations – differences that stem directly from decades of historical differences in growth rates – can be staggering. Indeed, one prominent economist has written that once one starts to think about these differences, “it is hard to think about anything else.”³

Policymakers at the national, state and local levels generally look for ways to enhance economic growth in their jurisdictions. In keeping with our status as a nonpartisan institution, Federal Reserve officials tend to avoid commenting on controversial policy proposals, especially when such policies benefit some but disadvantage others. On such issues, I prefer to restrict myself to pointing out what economists know about a policy's costs and benefits that may have been overlooked in the public debate. On many issues, the economics of the question are not decisive, though economics does tend to spotlight the often-overlooked costs associated with many otherwise seemingly attractive ideas.

On some questions, however, economic research sends a fairly clear message. I believe that early childhood development *is* such an issue. I will elaborate in my remarks here this morning on why I believe this to be the case, but simply stated, my position is that if government is going to invest in education at all, it should invest in enhancing early

childhood development. For me, this is an economic growth issue. The continual enhancement of skills over time is essential to sustained growth in economic well-being, and research indicates that early childhood development is critical to the life-long development of skills. I need to mention at the outset, however, that although my views on early childhood development owe much to what I have learned from my colleagues in the Federal Reserve System, my remarks represent my own personal views.

I come to this conclusion from an understanding of the economics of growth. A moment ago, I mentioned the disparities in economic well-being across regions. At any point in time, some nations, states and cities are wealthier, per capita, than others, and over time, some grow faster than others. Efforts by economists to account for these differences in growth point pretty convincingly in one direction – human capital, that is, the skills, abilities and knowledge people possess.

Now it probably sounds like simple common sense to say that a person’s economic well-being is related to the economic value of their skills. And while skills are difficult to measure precisely, the measures we do have – on levels of education and work experience, for instance – show that people with these characteristics tend to have significantly higher incomes. I’ll have more to say later on about the relationship between skills and income at the level of the individual worker or household. But first, I want to talk about the role of human capital in the broader phenomenon of economic growth, particularly at the level of regions within the United States.

Data on the growth of income per person across the United States and across cities and metropolitan areas reveals that at least one important measure of skills is consistently correlated with future growth. That measure is education, and a typical finding is that the share of the population of a U.S. city or state that had a college degree in 1990 is positively associated with growth in family income between 1990 and 2000.⁴ In other words, the more highly educated the population, the greater the subsequent growth in economic well-being. Furthermore, *population* growth in U.S. cities and metropolitan areas is correlated with education levels, suggesting that places with highly skilled populations create opportunities that attract newcomers. Similar results have been found in research that covers different time periods and different geographical designations (for example, cross-country analyses).

The link between an area’s level of educational attainment at a point in time and its subsequent growth suggests that the relationship could be causal – that having a greater skills base enables an area to grow faster. Causality is sometimes hard to establish, and a great deal of research has been aimed at this question. While such research often is not as conclusive as one would hope, I think it is fair for us to take as a lesson from the scientific literature that human capital is an important determinant of a region’s economic growth.

Note that it is not obvious that the average level of human capital in a region should be related to *future* economic growth. One would expect higher average skill levels to be associated with higher *current* income, but one might expect regions to grow thereafter at

the same rate, independent of their starting point.⁵ What is striking about the empirical evidence is that higher *current* skill levels predict faster *future* growth, all else equal. One possible interpretation of this fact is that skills, in addition to boosting current income, enhance an area's ability to further build its skill base – “human capital begets more human capital,” you might say. Economists have identified two distinct ways this might come about. One is the straightforward notion that certain general skills make people better at learning new skills. Another involves what economists call “externalities” or “increasing returns,” meaning that a skilled worker is more productive in a marketplace or work environment with other skilled workers. The basic idea is simple, though: there is a bonus when you invest in human capital – you get greater productivity in producing goods *and* in producing more human capital.

The idea that human capital promotes growth is, perhaps, not too surprising. After all, and as I mentioned earlier, it's quite natural to think of differences in skills as explaining a substantial part of the differences in income between individual people – why shouldn't this logic extend to communities, cities, states, and so on? At the level of individual workers, in fact, there is abundant evidence that the importance of skill to one's economic well-being has grown over the last several decades. This is seen in a growing gap between the average wages earned by high school graduates and those with college or advanced degrees.

The growth in this pay differential, or “skill premium,” is a major factor behind the increase in income inequality that has received so much attention of late. The apparent reasons for this widening dispersion are germane here. Wages paid to workers at any particular skill level generally reflect how productive those workers are – how much economic value their work creates. If the wages of higher-skilled workers have grown more rapidly than the wages of the less-skilled, then it must be the case that the work environment has changed in a way that has made the productivity of higher-skilled workers rise more rapidly.

One change that has had a tremendous effect on the way people work in recent decades is the application of information technology. And this change appears to have had differing effects on the productivities and wages of workers at different skill levels. It's become commonplace to talk about jobs that have been replaced by automation. These tend to be relatively low-skilled jobs – involving tasks that you can program a machine to perform, for example. On the other hand, jobs that require judgment and adaptability to changing conditions do not lend themselves as easily to automation. In fact, the application of information technology is likely to enhance the effectiveness of people in such jobs by relieving them of routine aspects of their jobs.

So technological change has enhanced the productivity of high-skilled workers *relative to* low-skilled workers – economists call this “skill-biased technological change.” It can be thought of as a shift in demand from low- to high-skilled workers. The resulting increase in the wage premium associated with higher levels of workplace skills provides an incentive for workers to acquire more education and skills. And college enrollments *have* been trending up, which would tend to increase the relative supply of skilled workers and

dampen the increase in the skill premium. The fact that the skill premium has continued to rise essentially means that the (relative) supply of higher skilled workers has not kept pace with demand.

It is worth noting that the skills that have become most valuable over time seem to be the general types of skills that come with higher levels of education – as opposed to the very specific skills that one can gain through experience in a particular job or occupation. This is an important distinction. It means that more so than ever before, the path to economic success lies in education rather than in on-the-job work experience. And if these sorts of general skills are the key to success, it follows that a lack of skills presents a formidable barrier to success – for an individual, a community, a state or a nation.

Building a skilled workforce requires investments at several levels, and one important public policy question involves getting the right mix of public and private responsibilities for those investments. After all, the evidence that education pays off in the form of higher lifetime wages means that people should have a strong private incentive to invest in their own skills.

But there are good reasons why relying on individuals to finance their own investments in human capital might not be sufficient. One is that, as I alluded to earlier, an individual's education benefits society at large, beyond the individual's increased earning power. Economists call this type of broader benefit an "externality," and the traditional case for public funding of education at various levels rests in part on such effects.

Up to now, I've been talking about the role of human capital and investment in skills in the process of economic growth. Let me summarize the general points. Skills are a key determinant of individual economic well-being and broader economic growth. Recent trends in technology have amplified the importance of skills, especially the general skills that come from education through the post-secondary level. And there are good reasons for people's own financing of human capital investments to be supplemented by public support.

What does this have to do with early childhood? I mentioned earlier that acquiring skills improves one's ability to subsequently acquire further skills. Could this logic extend back to the earliest investments in human capital – those that occur between birth and age 5? I believe the evidence indicates that the answer is "yes."

Specifically, there is substantial evidence that differences in early childhood treatment have long-lasting effects in school performance as well as in a variety of other indicators of social success.⁶ Some of these findings come from studies of experimental or pilot programs in which children receiving different early educational experiences were tracked over a long time. Two of the most famous of these studies are Michigan's Perry Preschool Project and North Carolina's Abecedarian Program. The Perry Preschool Project began with a sample of children from low-income families in the 1960s and has followed their experiences well into adulthood. The study featured random assignment – half of the sample population was placed in a high-quality preschool program and half

was not. Random assignment greatly enhances our confidence in the validity of the findings, because it minimizes the extent to which different outcomes may be due to extraneous differences in sample groups. The Abecedarian Program, begun in the 1970s, also featured random assignment and the assessment of outcomes over a long period – through age 21.

In both of these studies, program participants were found to show greater success along a number of dimensions. They generally completed more years of schooling, showed better scores on standardized tests, and were less likely to need special education services. In addition, participants had lower rates of involvement in crime and out-of-wedlock births, and higher rates of employment and home ownership – this last indicator being specific to the Perry Preschool Project, which followed participants to age 40. In very broad terms, then, the average participant had a demonstrably better life than the typical member of the control group. Such striking results appear to give convincing evidence that well-targeted, high-quality early childhood services can yield benefits well in excess of their costs.

In addition to these and other relatively small studies, a number of somewhat larger studies suggest that the benefits from quality early childhood education can be realized on a larger scale and that the results of studies like Abecedarian and Perry were not merely due to the specific communities in which they were conducted. For example, a study in Chicago examined the educational and social experiences of nearly a thousand Chicago youths from poor households across the city, some of whom had and some of whom had not participated in the Chicago Child Parent Centers Program when they were very young. As with the other studies, those having received the early childhood treatment showed better educational attainment and lower incidence of delinquency and other social problems.

The association in these studies between enhanced early childhood environments and improved life outcomes appears to be consistent with the emerging understanding of the dependence of a child's early brain development on their exposure to intellectual stimulation, but that topic is a good deal beyond my area of expertise.

It is worth noting that there are aspects of early childhood development programs that deserve further research. The most convincing results come from small programs targeted at particular at-risk populations. One would expect the benefits of such programs to be greatest for these populations. Returns might be less dramatic for more universal programs, since presumably they would include more children who are likely to succeed without a program. Details of program implementation deserve further scrutiny as well. In particular, the skills and training of the staff seem to be important to a program's success, which suggests paying close attention to the design of appropriate qualifications and standards for early childhood education professionals. All this implies that broader investments in early childhood education should allow for experimentation with alternative programmatic models, and should be accompanied by continuing research that tracks the experiences of participating children over time.

Economists like to think about investment in terms of rate of return, and there is reason to think that the rate of return on early childhood investment could be particularly high. In fact, Art Rolnick and Rob Grunewald of the Minneapolis Fed have used the results of the Perry Preschool Project to estimate that the average annual inflation-adjusted rate of return on investments in early childhood education, targeted to at-risk populations, is in the neighborhood of 16 percent.⁷ This compares very favorably with real rates of return implied by financial markets of around 3 percent, for instance, on long term Treasury securities. Like any investment in human capital, some of the return accrues directly to the individual in the form of increased life-time earning ability. But a substantial share of the return – perhaps as much as three-quarters of the total – is a broader, social benefit, coming from such sources as reduced costs of remediation and other special services in primary and secondary school, as well as from the reduced incidence of the array of social problems often associated with low educational achievement.

There are many explanations for the apparent high economic returns to early childhood education, but let me briefly highlight one. A key difference between early childhood investments and investments at primary and secondary education levels is the potential for compounding that I mentioned earlier. That is, enhancing early childhood development appears to improve a child's ability to learn at later stages. This means that the return on early education comes not just from the direct effects, say on the development of cognitive ability, but also from the fact that these early investments increase the productivity of later educational investments. This is a point the Nobel prize-winning economist James Heckman has emphasized in his writing on early childhood education.⁸

This compounding effect means that disparities in early childhood development have the potential to exacerbate inequality within our society. People with limited means are more likely to have difficulty providing their children with a high-quality early childhood environment, leaving those children less able to benefit from later investments in human capital. This possibility creates, I believe, a legitimate public interest in helping people of modest means find and afford quality early childhood education. It holds the promise of expanding the development of human capital more broadly across our society and in so doing, widening our potential for skill-based economic growth.

So I tend to think of the benefits of early childhood education as providing children in less-advantaged families and less-developed communities with better preparation for acquiring the education and skills that expand economic opportunity. For decades, substantial efforts have been made to improve economic outcomes for disadvantaged populations by enhancing access to formal educational institutions. The widening of the skill premium in recent decades demonstrates that those efforts have had only limited success, and widespread evidence indicates that variations in per-pupil spending have only limited effects. Parental inputs into a child's education, on the other hand, explain a substantial portion of the variation in educational preparedness and outcomes.⁹ The promise of early childhood education is that it can begin to address disparities in educational outcomes, and thus economic outcomes, at a more fundamental level.

Having said all that, I should note that the problems facing disadvantaged communities – problems that limit the realization of human capital potential – are multifaceted, and no one policy initiative offers a panacea. This is not the place to survey the broader array of challenges in such communities. I do believe, however, that the new attention to early childhood development presents a unique opportunity in the area of public policy aimed at economic development. By broadening the development of human capital, early childhood education can add to our capacity for growth while also creating opportunities for the benefits of that growth to be shared more broadly.

¹ I have benefited from the help of John Weinberg in preparing this speech, though I remain solely responsible for the contents.

² Jeffrey M. Lacker and John A. Weinberg, "Inflation and Unemployment: a Layperson's Guide to the Phillips Curve," Federal Reserve Bank of Richmond 2006 Annual Report.

³ Robert E. Lucas, Jr., *Lectures on Economic Growth*, Cambridge, MA: Harvard University Press, p. 21.

⁴ Glaeser and Saiz (2004), "Rise of the Skilled City," Brookings – Wharton Papers on Urban Affairs. Bauer, Schweitzer and Shane (2006), "State Growth Empirics," Federal Reserve bank of Cleveland Working Paper Series. This work is also discussed in the Federal Reserve Bank of Cleveland's 2005 Annual Report.

⁵ Or indeed, one might expect *low* human capital areas to grow faster and "catch up" with areas that start with higher human capital.

⁶ Burr and Grunewald (2006) "Lessons Learned: A Review of Early Childhood Development Studies." Federal Reserve Bank of Minneapolis,

<http://www.minneapolisfed.org/research/studies/earlychild/lessonslearned.pdf>.

⁷ Grunewald and Rolnick (2003), "Early Childhood Development: Economic Development with a High Public Return." Federal Reserve Bank of Minneapolis, Fedgazette.

⁸ Cunha and Heckman (2006), "Investing in our Young People." University of Chicago manuscript, <http://jenni.uchicago.edu/human-inequality/>

⁹ Heckman and Masterov (2007), "The Productivity Argument for Investing in Young Children." University of Chicago manuscript, <http://jenni.uchicago.edu/human-inequality/>