

Keynes Rules: Human and Public Capital Spending to the Rescue

BY STEVEN P. LANZA

*Long out of fashion,
J.M. Keynes stressed the
demand half of the
economy's supply-
demand balance.*

As the recession spirals downward, it is spinning off some new buzz words. Suddenly, education is all the rage, and infrastructure is in vogue again. Connecticut has long invested in grade-school education at above-average levels, though its commitment has wavered in recent years. Moreover, the state has redoubled both current spending and capital investments at the post-secondary level, moving from the back to past the middle of the pack. Tight budgets threaten those gains, but the governor and legislature are determined to preserve them. And the federal stimulus promises more funding for human and public capital, raising hopes that increased spending can jumpstart the economy soon and boost its efficiency later.

BACK TO BASICS

The economic crisis is spawning a back-to-basics movement, as everyone makes do with less. Families are switching from \$5 lattes to home-brewed Joe, repairing their old rattletaps rather than buying sleek new sedans, and settling for fresh coats of kitchen paint instead of costly home makeovers. Firms that aren't announcing layoffs are returning to leaner workforces through attrition and, forswearing the latest in new technology, squeezing extra life out of older computers and other equipment.

Government is getting back to basics, too. In a revival of old-time pragmatism, policymakers are dusting off vintage tomes on Keynesian economics, with its emphasis on counter-cyclical fiscal policy, in their quests for effective responses to increasingly dire economic conditions.

ECON 101

Education and infrastructure investments are a cornerstone of the Obama administration's economic stimulus package. The plan includes more than \$500 billion in new spending, most of it targeted at improving infrastructure and education. The rest will go to fiscal relief for states, health care, and income support like unemployment and food stamps.

Long out of fashion with the increased stability of the macroeconomy in recent years, Keynesian economics stressed the demand half of the economy's supply-and-demand balance. (Keynes was a Depression-era British economist who advocated increased government spending to extricate economies from recessions.) On the demand side, goods and services are either consumed by households (C), used for investment by businesses (I), procured by government for public uses (G), or sold to foreigners, after netting out our purchases of goods and services produced abroad (eXports - iMports). In equilibrium, aggregate demand ($C + I + G + X - M$) will equal aggregate supply or output, more commonly known as Gross Domestic Product or GDP. Currently, with both consumers (-C) and businesses (-I) cutting back, and our foreign trading partners in economic slumps of their own (-X), total demand is sagging, output has been reduced, and the economy is sinking deep into recession.

The classic Keynesian prescription for the current economic malaise is increased government spending (+G) to offset the declines in C, I and X-M. Moreover, the economic kick is typically not limited to the size of the initial increase in government spending.

Through a multiplier process, the new spending raises the incomes of some who, by boosting their own spending, raise the incomes of others—a process repeated over and over again. According to Moody’s Economy.com, the multiplier for infrastructure spending is a relatively high 1.59, meaning an extra dollar of spending raises total GDP by \$1.59. Aid to states carries a multiplier of 1.38. Tax cuts, in contrast, can have multipliers of 1.0 or less, as much of the added income is channeled toward savings or paying down debt.

In choosing among stimulus measures, however, we should not ignore the supply side of the equation, which emphasizes that how government spends the money can have an impact on the economy’s future productivity, once the economic storm has subsided.

THE IMPACT OF EDUCATION AND INFRASTRUCTURE ON GROWTH

Economists commonly study the economy’s supply side using production function models. Just as a recipe tells how to mix various ingredients to create a finished dish, a production

function describes how factors of production, chiefly capital and labor, are combined to produce economic output. The amount of output will vary with the quantities and characteristics of the inputs used in the production process.

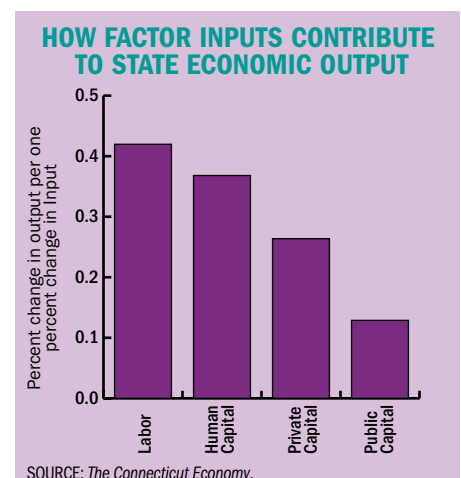
Output indeed varies considerably across states. In 2006, for example, per-capita GDP ranged from a high of \$64,000 in Delaware, to a low of \$24,000 in Mississippi; Connecticut, at \$53,000 per-capita ranked second. And much of the variation in output traces to differences in the quantity and quality of the inputs used in the production process.

To see why current policy proposals are putting so much emphasis on education and infrastructure, it helps to partition both the labor and the capital terms into two components. Labor can have a quantitative dimension—the share of the population in the workforce, for example—and a qualitative one, such as the educational attainment of the population. Similarly, we can divide capital into a private component—the plant and equipment used by businesses—and a public one—roads, bridges, and

But in choosing stimulus measures, we should not ignore the supply side of the equation.

HUMAN AND PUBLIC CAPITAL BOOST STATE GDP PER CAPITA			SPENDING ON SCHOOLING RAISES STATE EDUCATIONAL ATTAINMENT		
Variable	Coefficient	P-value	Variable	Coefficient	P-value
Intercept	5.86	0.00	Intercept	2.98	0.55
Labor	0.42	0.06	College Spending (\$000)	1.26	0.00
Percent B.A.	0.37	0.00	Grade School Spending (\$000)	1.68	0.04
Private Capital	0.26	0.00	Percent Foreign Born	0.42	0.00
Public Capital	0.13	0.06	Percent White	0.08	0.09

Coefficient values measure the change in the dependent variable (in italics) associated with a change in the independent variables listed (in percent terms for per-capita GDP and unit terms for educational attainment). The p-values are estimates of the likelihood that these coefficient values occurred by chance. The smaller the p-value, the more statistically significant the result.



schools, for instance. Assuming these resources are indeed productive, we'd expect that raising either the quantity or quality of labor or increasing the amount of either type of capital would boost an economy's output.

Let's test that idea using a cross-sectional regression model of per-capita output across the fifty states for 2006, the latest year for comparable data. The table (p. 5, left) shows the results of the regression. Each of the four factors in this simple production model contributes to the output of goods and services, just as theory predicts. Together, the four variables explain almost two-thirds of the nearly three-fold variation in state GDP per capita found in the 2006 data.

In this simple model, the estimated coefficients are elasticities that show the sensitivity of output to variations in inputs. The larger its elasticity, the greater the contribution a factor of production makes to output. The elasticity for physical labor is the winner, at 0.42. Holding other factors constant, a ten-percent increase in the share of the population in the workforce increases per-capita output by 4.2 percent.

The qualitative dimension of labor is nearly as important. A ten-percent increase in the share of the population with a bachelor's degree raises output by 3.7 percent, presumably because better-educated workers are better-skilled and more productive.

Less important is the contribution made by physical capital: increasing it by ten percent expands output 2.6 percent. A similar boost to public capital, or infrastructure, adds only half as much, 1.3 percent, to output.

Connecticut's high rank in GDP per capita traces to the high quality and quantity of its factor inputs. The share of the population employed and the quantity of public capital available to workers are both above-average, by about 3% and 5%, respectively. But it is in its stock of human and private capital where the state really shines. At nearly 34%, we're fourth from the top in the percent of the population holding a bachelor's degree or higher, compared with a 50-state average of 26%. And private capital per worker, estimated by allocating the nation's capital stock across states by industry, stands some 29% above average.

Given these resources, the model predicts that Connecticut would rank seventh among states with a per-capita GDP of \$43,000. That we actually come in \$10,000 higher than predicted, at \$53,000, may be due to the higher efficiency of Connecticut inputs, or to other factors not captured in this simple model.

BUYING BETTER HUMAN CAPITAL

Human capital appears to offer a larger return on investment than does physical infrastructure. But can we be sure that increased government

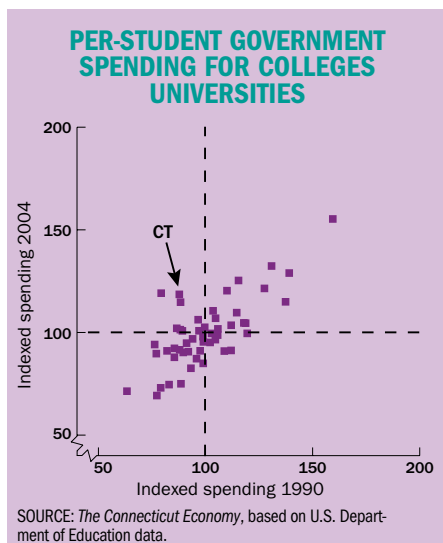
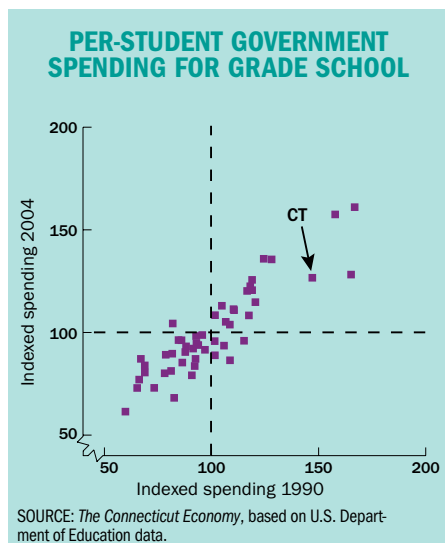
spending will actually translate into improvements in educational attainment? After all, academic success can potentially depend on a host of other demographic factors.

A separate regression (p. 5, right table) tests the strength of the connection between current spending on education and educational attainment. Assuming that the workforce mirrors the general population, with a median age of 40 nationwide, the "typical" worker with a B.A. started grade school in 1971 and finished college in 1988. Regressing educational attainment in 2006 against real per-student educational expenditure during those earlier years, after controlling for important demographic influences, shows a significant link between spending and achievement.

Spending an additional \$1,000 per student in 1982-84 dollars annually during grade school (worth \$2,100 at today's prices) raised the population's share of bachelor's degrees by 1.7 points. A similar increase in post-secondary spending boosted educational attainment by 1.3 points. Considering that increased *college* spending needs to be sustained for just four years, as opposed to 13 years for grade school, higher-education spending appears to be the better bargain.

Spending on education at all levels in Connecticut during the '70s and '80s exceeded the 50-state average by more than 15%. For higher education, however, that lofty perch reflected healthy outlays by private colleges. Ranked by *government's* spending on public colleges and universities, Connecticut landed just one spot above the bottom quintile in the early 1980s.

As the accompanying scatterplots show, Connecticut has maintained a lead in funding elementary and secondary education in recent years, and has made significant improvements since 1990 in its commitment to public higher education. Both charts compare the relative position of each state in 1990 (horizontal), to 2004 (vertical), with per-student spending in both



years indexed to 100. Connecticut spent more at the grade school level than the 50-state average in both years: by 47% in 1990, and by a less generous 26% in 2004. A similar comparison for college spending shows a more marked change: Connecticut went from spending 12% less than average in 1990, to 19% more than average in 2004. Only one other state, Pennsylvania, managed a more dramatic shift in priorities.

By other measures, the state's support for public higher education appears less steadfast. Like many states in the northeast, Connecticut has a long tradition of sending many of its college students to private institutions of higher learning, a practice in evidence across a range of educational statistics. Our state spending on higher education per high school graduate—an index of institutional commitment to publicly-funded higher education—is still only 40th in the nation. We're in the middle of the pack when it comes to education's share (K-college) of total government spending, and spending as a percent of GDP places Connecticut fourth from the bottom.

DON'T FORGET THE SMALL STUFF

The returns to investments in public capital, though smaller than for education spending directly, are also positive. Part of the public education budget is, in fact, earmarked for capital outlays on buildings, classrooms and equipment. And the spending patterns seen for current expenditures on education, as discussed above, are largely repeated in the case of capital spending.

Thanks to UConn 2000 and related capital investment projects, Connecticut has jumped from spending barely one-quarter of the average state allotment for capital improvements in 1990 to a sum that exceeded the 50-state average by 11% in 2004. Only New Hampshire did more to boost investment in higher education public capital over this period.

The Nutmeg State has, however, failed to maintain a consistently high

level of support for capital investments at the elementary and secondary level. In 1990, per-pupil capital spending in Connecticut exceeded the average by 17%, ranking us 13th among states. By 2004, we had slipped to 28th, spending some 7% less than average.

In fact, the state's track record of investment in all forms of public infrastructure—roads, bridges, buildings, and the like—has been mixed. Granted, we do rank an estimated 10th among states in the stock of public infrastructure per worker in fiscal year (FY) 2006. But Connecticut was one of a handful of states that allowed its public infrastructure stock to shrink during the 1990s (see graph). This estimate is based on capital spending data from the U.S. Census Bureau that stretch back to 1991, and assumes that investment that year was sufficient to offset wear and tear on the then-existing stock. Summing the stream of spending in subsequent years, after adjusting for rising prices and depreciation, produces a working estimate of the real capital stock in 2006 and the intervening period.

UConn 2000 notwithstanding, Connecticut has made relatively little overall improvement to its infrastructure in recent years. Between FY 1992 and 2006, Connecticut added less than two percent to its total real stock of public capital, compared with a 50-state average of 12%. Only Rhode Island posted a more meager gain. And like our tiny neighbor to the east, Connecticut brings home middling grades at best on state infrastructure report cards. (See Arthur Wright's discussion of the rankings by the Pew Center on the States on page 8, and also CFED's latest Development Report Card for the States at www.cfed.org.)

LEMONS FROM LEMONADE

With the economy currently in recession, businesses are paring their workforces and reducing their investments in plants and equipment. As the production function model of the economy makes clear, the consequence

of these cuts will be a shrinking economy. But such challenges can also double as opportunities.

The model also shows the method in what some regard as the madness of President Obama's ambitious recovery plan: government spending on human and public capital can both offset some of the short-run reductions in private consumption and investment, and pave the way for a more productive economy, once business conditions improve. Investments in education, roads, bridges, and public buildings have long been the province of government, and the federal government in particular is in the best position of any major economic actor at the moment to ramp up its spending.

Connecticut can become a prime beneficiary of the stimulus plan's focus on education and infrastructure. Though we currently enjoy ample stocks of human and public physical capital, the state's efforts at augmenting these resources have been spotty. State and local budget cuts will make that job no easier. An infusion of federal aid may help to build the state's future productive capacity, or at least mitigate the worst effects of the belt tightening that will accompany leaner State and municipal budgets.

