

# INFRASTRUCTURE AND THE ECONOMY

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## Introduction

Often, we hear claims that we face an infrastructure “crisis” in the United States. Such warnings usually arise when a dramatic failing of our infrastructure occurs, such as a bridge collapsing, a dam bursting, or medical waste washing up on our coastline. Lately, the buzzword has been “congestion” on our streets and highways, due to an apparently inadequate transportation network. In light of such concern about our infrastructure needs, in my recent research I have focused on the importance of our infrastructure for our ability to produce, for our growth prospects, and for our international competitiveness. This article summarizes some of the results of this research. Specifically, I address the following three questions:

- + Is there a strong and robust link between investment in our nation’s infrastructure and growth in productive efficiency?
- + Does public nonmilitary capital accumulation lift corporate profits?
- + Does public capital investment raise the national (private plus public) investment rate?

## Infrastructure and Productive Efficiency

Since 1982, the United States has staged a truly remarkable economic performance. An expansion of output well into its seventh year, the longest in any peacetime period in American history; an addition of 21 million jobs, an average of 3.1 million a year; a fall in the unemployment rate from 10.8% of the labor force to 5.1%; an inflation rate seemingly under control and minute in com-

parison with the double-digit rates of price increase that exploded during the 1970s—all are signs of a vital, growing economy.

Still, troubling clouds have been gathering on the economic horizon. For instance, the rate of growth of total factor productivity has fallen from 1.8% per year during the 1960s to .8% in the 1970s and .7% in the early 1980s (1.2% in 1986). The reasons for the productivity slump are many and varied. One reason, of course, was the series of oil shocks beginning in late 1973; an increase in the price of oil renders the capital stock partially obsolete and less productive. Another reason was the cessation of the shift in the labor force from relatively inefficient farm occupations to relatively efficient urban occupations. Finally, after peaking in the 1960s, research and development spending began to fall in the 1970s, thereby diminishing the pace of improvement of the associated technological change. It should be noted, however, that even after taking account of all the usual sources of the productivity decline, a large portion—roughly 1% per year—is left unexplained; hence the “productivity puzzle” much lamented by economists.

Further, labor productivity growth has been very low in the United States relative to other countries in the Group of Seven; while productivity growth has been a dismal .6% per year in the United States, it has been an impressive 2.9% in West Germany and 3.1% in Japan. This inferior productivity performance is at the heart of our “competitiveness” problem and associated chronic deficits in international trade. A country in which the growth in production per capita slips below growth in consumption per person must finance the excess consumption either by reducing physi-

cal investment (and thereby future consumption) or by importing the goods from overseas. To a large extent, the United States has followed the latter course, evidenced by 1987 trade deficits with Western Europe of \$26 billion and with Japan of \$56 billion. In the words of Harvard economist Robert Reich, “~o]ur nation’s growing economic problem.. .is due neither to the federal budget deficit per se, nor to foreigner’s unwillingness to treat us fairly. It is due to our overwhelming failure to invest in our collective productivity, and the consequent decline in our capacity to add value to the world economy.”

Economists and policymakers who are concerned with declining private sector productivity typically focus on the role of private investment in plant and equipment. The standard argument is that increases in the quantity and quality of private capital goods generate more output per worker. The potential importance of nonmilitary public capital—a general public infrastructure—is ignored. This neglect is troublesome for two reasons. First, the nonmilitary public capital stock (combined federal, state and local) is sizeable, varying from between 44% and 59% of the private nonresidential fixed capital stock. Hence, to ignore the influence of public capital on private production appears unjustifiable. Second, the ratio of public to private “productive” capital stocks peaked at end of year 1964. While private investment spending as a share of gross output has declined during the last two decades, nonmilitary public investment spending has declined even more, from 3.4% of GNP during the 1960s to 2.0% during the early 1980s. Thus, the slide in public capital accumulation may be partly responsible for the slump in private sector productivity.

In a series of published papers (see References), I have found strong and robust empirical evidence to substantiate the claim that a shift in government spending priorities away from public investment and into public consumption has resulted in a deterioration in the flow of public services and consequently in an erosion of productivity growth. Indeed, the growth rate of the

nonmilitary public capital stock is highly correlated with the growth rate of (total factor) productivity in the United States over the post-World War II period. My detailed statistical work indicates that a “core” infrastructure (streets and highways, mass transit, airports, water and sewer systems, and electrical and gas facilities) bears the strongest correlation with productivity. Quantitatively, as much as 60 percent of the productivity slump in the United States can be attributed to neglect of our core infrastructure.

We would also expect that countries which sustain a high level of public investment relative to output would experience higher productivity growth than countries that do not invest in infrastructure. Confirmation is not difficult to find; Japan has invested about 5.1% of output in public facilities and achieved productivity growth of 3.1% per annum, while the United States has had a low public investment ratio of .3% and inferior productivity growth of .6% per year.

Thus, a root cause of the decline in the competitive position of the United States in the international economy may be found in the low rate at which our country has chosen to add to its stock of highways, port facilities, airports, and other facilities which aid in the production and distribution of goods and services. In the words of Nancy Rutledge, past Executive Director of the National Council on Public Works Improvement, “~i]f we spend too little on public works...society loses more than the direct public cost. In the long run, our ability to compete in the international economy will be weakened, and our standard of living will suffer.”

### **Public Infrastructure and Private Profits**

I hope to have shown that an adequate and well-maintained infrastructure is of critical importance to the process of productivity improvement. The public capital stock makes private labor more efficient and should make private capital more profitable. The 1950s and 1960s were characterized by a rising share of output devoted to public

investment and a payoff in the form of climbing profits to the nonfinancial corporate sector, the 1970s and early 1980s, on the other hand, have shown falling public investment shares and profitability. Quantitatively, my statistical results suggest that a one percentage point increase in the nonmilitary public capital stock (16 billion dollars in 1985) is estimated to result in a rise in the corporate profit rate of 10 basis points (1/10 of one percentage point). Consistent with these results, in 1985 and 1986 we have seen a modest increase in public investment as well as in corporate profitability.

### **Public and National Investment**

Public capital has been shown to be essential to private sector productivity and profitability. I adhere to the recommendation of the National Council on Public Works Improvement that the United States should boost its spending on infrastructure facilities to some \$90 or \$100 billion a year.

However, in an economy already operating at or near its capacity limits, we would need to know where the resources for the higher level of public investment would come from. Would raising public investment merely result in a displacement of private investment, so that national investment would be left unaffected? There are a number of reasons to suspect that such a “crowding out” of private investment spending might arise. To the extent that publicly provided capital serves as a substitute for private capital in private sector production, firms require less private capital to produce the same level of output. In addition, higher public sector demand in the capital goods market raises capital goods prices, thereby lowering the demand for investment goods by the private sector. Finally, the increased government demand creates a general scarcity of resources, a rise in inflation-adjusted interest rates, and a further contraction of capital spending.

But we have seen that a higher public capital stock also raises the profitability of private

capital and, thereby, lifts stock market values. This improves the incentives and increases the ability of firms to accumulate capital, thereby “crowding in” private investment expenditure. New highways allow faster transportation of goods from factory to market; the availability of mass transit allows firm to hire good workers at reasonable wages.

What, then, would have been the net effect on the national investment rate if we had raised the public investment rate during the 1970s and 1980s to the level maintained during the 1950s and 1960s? Based on my statistical model, if we had maintained this higher level of nonmilitary public investment during the 1970s and 1980s, the rate of return to private capital would not have fallen as it actually did and, in 1986, would have been equal to 10.8% instead of its historical value of 7.7%. There would have been no “falling rate of profit” in the United States for economists—let alone stockholders—to worry about.

The immediate response of private investment would have been negative as a result of higher capital goods prices and interest rates, and national investment would be left mostly unaffected. However, by the end of 1974 the positive influence on the profitability of private capital would have come to dominate, and national investment would have been higher. By 1986, national net nonresidential investment would have equalled 5.3% of the private capital stock as opposed to its actual value of 2.2%. Clearly, the government can exert a positive influence on the course of national investment and, in so doing, on our rate of economic growth as well.

### **Conclusion**

Large public sector deficits of recent years have brought attention to the overall scale of government activity in the economy. Some argue that the government should spend less, and others that it should tax more. Both of these responses to the problems posed by the federal budget deficit contain merit.

However, the evidence presented here suggests that more attention should be paid to the composition of the government's expenditure, particularly to the effects various spending patterns may have on the macroeconomy's profitability and productivity. While total government spending mounts, investment in public works slides. Indeed, the share of total government outlays dedicated to public investment declined from nearly 9% in 1965 to a mere 6% in 1985. By reorienting our public spending priorities so as to upgrade and expand the public capital stock, we can be confident we will heighten the productivity of our work force and improve our position in the increasingly competitive international marketplace.

## References

- Aschauer, David Alan. 1988. Government spending and the "Falling rate of profit." *Economic Perspectives* 12:11-17.
1989. Is public expenditure productive? *Journal of Monetary Economics* 23: 177-200.
1989. Public investment and productivity growth in the Group of Seven. *Economic Perspectives* 13: 17-25.
1989. Does public capital **crowd out** private capital? *Journal of Monetary Economics* 24:171-188.
- In Press. Is government spending stimulative? *Contemporary Policy Issues*.