

How Should Public Infrastructure Be Financed?

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Projections of large, even astounding, infrastructure “needs” are commonplace. According to these projections of what is known as the third deficit, the nation has undersaved in its public capital accounts as it has undersaved in its overall national income accounts, and major reinvestments are required to get back on track.

While the share of national output devoted to public capital investment has undoubtedly declined, it is another matter to argue that this investment share must be quickly recouped. Moreover, the notion of infrastructure “needs” is inherently uneconomic—who needs what, who is willing to pay what price? Hence this paper examines these needs from an economist’s perspective, not so much to assess them as to ask who might pay for any added infrastructure investment and under what payment scheme. The paper is, in a word, about public sector payment schemes, not about quantitative amounts of investment.

It makes sense to confine attention to capital needs that are truly public: anything other would fall in the domain of the private sector and be the responsibility of private investors. The subject can be further narrowed to the public capital needs of state and local governments, for the simple reason that the federal government does not really make many direct domestic public capital investments in the United States. Apart from pork barrel dam projects, which are on no one’s short list of national needs, the federal role is to give grants to state or local governments for capital purchases, and the main policy suggestions involve changes in the structure of these grants.

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The paper uncovers many instances where present laws provide incentives that seem deficient from a social point of view. For the most part, these deficiencies are simply identified and explained. No attempt is made to discuss why the incentives or disincentives were created in the first place. Such discussion would prove very valuable in making policy changes, but it is beyond the scope of this paper.

The paper goes through some normative considerations on how various types of public capital spending *ought* to be financed from the standpoint of orthodox canons of public finance. Each section then asks whether these normative considerations call for any major policy changes at either the federal or state and local level. The last section of the paper collects the main policy suggestions.

Types of Infrastructure Capital

The types of incentives that should be used for state and local public capital spending depend on why the public capital is desirable in the first place—whether this capital serves allocation or distribution purposes, whether spillovers occur, whether user fees can easily be assessed. Since different types of capital vary widely on these grounds, it makes sense to discuss the types separately. Broadly speaking, three types may be discussed:

- Local allocation: This type of public capital serves local needs where minimal interjurisdictional spillovers and minimal distributional implications are found.
- Local allocation with spillovers: Like local allocation except with benefit spillovers from one jurisdiction to another.
- Local allocation and distribution: Now public capital serves goals that importantly affect the distribution of income in the long run.

In distinguishing these types, two notions are particularly important. The first, interjurisdictional benefit spillovers, can be defined very simply. When community A builds a public facility, benefits spill over into community B, when some of its households are better off; examples include public roads or clean water and air treatment facilities.

The second, whether the public facility has long-term distributional implications, is trickier. By this, I do not mean that paying for the public facility has distributional implications: obviously any payment scheme will shift charges from one taxpayer to another and have short-term distributional implications. Rather it implies that the public facility promotes human investment and enables recipients to improve their long-run income prospects. The main examples of this occur in education, either local public schools or state university systems. Health

facilities would qualify as well; I will not discuss them because in the United States today the financing of health care facilities is by and large private, supported by massive federal insurance schemes that have their own special problems.

Local Allocation

When public capital satisfies only local needs with no particular distributional implications, orthodox microeconomic reasoning says it is efficient to provide the service with user fees. Were this not done, taxpayers would be taxed on a basis that is only coincidentally correlated with their own taste for the service. Economic inefficiency is minimized in switching to a regime where all consumers equate their marginal benefits with marginal costs, which then implies that the sum of marginal benefits equals the marginal physical costs of production. The classic example where such a scheme could prove workable is a public park system.

Even here, of course, the example might not be perfect. For one thing, while consumption of services from public parks cannot be said to be importantly related to future income prospects, some desire to make sure all consumers regardless of income get to consume some amount might warrant a general consumption subsidy. For another, the public service in question might be a so-called natural monopoly with falling average costs; again a fixed cost subsidy would be warranted. But these exceptions only moderate the degree to which user fees can pay for the cost of the facility; some user fees are still almost always an efficient financing device for this type of public service.

Another predominantly local service without distributional implications involves that new plague on most large cities—local landfills. Landfill costs are rising rapidly, and many localities are facing enormous capital expenditures simply to continue burying their trash. Many local politicians are toying with mandatory recycling schemes, and user fees would be a nice complement to recycling and a way of paying some or all of the landfill costs. Local governments could make households pay according to the volume of their own solid waste, by buying specially designated garbage bags if necessary. Confronted with this price, households will be more likely to voluntarily recycle newspapers, yard wastes, and the like. The city gains a source of revenue to pay for solid waste disposal, and the marginal benefits and marginal costs of landfill expansion can be brought into equality.

The main problem of moving to a regime where households actually pay for trash disposal is enforcement—what is to prevent households from just dumping their garbage? One thing that might prevent households from such dumping is a low disposal price, and if cities could start

assessing user fees now before the problem is serious and land becomes even scarcer, the enforcement problem would be less (it would have been less still, had user fees been in effect for the past thirty years). Beyond that, if communities have a serious enforcement problem, the best solution may be to pick up garbage without charge and pay for recycling. Such a scheme is costly, but it at least encourages conservation and recycling by maintaining the proper relative price structure.

Some types of local allocation goods have no feasible way to impose user fees—police cars, local streets, and perhaps the fixed-cost portion of natural monopoly public services. The American way is to pay for these costs by the local property tax. Without spillover benefits, calls for grants from higher levels of government are unwarranted. The services are local, the benefits are local, and the payments should be local.

Hence the major problem with present arrangements seems to be the public service areas such as landfills, where marginal costs are high and localities are facing large capital outlays. The obvious solution is to charge user fees. These fees might be fairly high, because of high marginal cost. While the high user fees may be unpopular, the culprit is not the idea of a user fee itself but the fact that many cities have allowed the problem to fester so long, charging households far too little to use landfills and encouraging “waste” and overuse, and now find themselves in a bind. The circumstances are regrettable, but for the solution, better late than never.

Local Allocation with Spillovers

The next step is to extend the analysis by assuming that benefits from the public service are partly internal and partly external, realized in other communities. Prime examples are national roads, wastewater treatment, or clean air facilities.

Again if feasible, the user fee solution is optimal, and this time it even solves the spillover problem. Suppose a road is being built from city A to city B. Assume either that fixed costs are minimal or that they can be amortized into the toll. This toll can be set to equal the marginal cost of use of the road, presumably more for heavy trucks, again with the property that every user equates marginal benefits to marginal costs. (Small, Winston and Evans 1989 discuss a set of such schemes.) Spillovers are dealt with automatically because if some driver desiring to use the road happens to be from out of state, that driver automatically pays. Out-of-state consumers of goods shipped by truck also pay.

But things are not so easy if user fees are costly to assess. Urban beltways might fall into this category because while toll gates can physically be constructed, the stop-and-go time loss can mount up (as any motorist skirting Chicago can attest). New technologies to deal with

this problem may be available, but until such technologies become widely feasible, various other schemes can achieve rough justice.

One scheme, following the classic prescription for the spillover problem, is for jurisdictions simply to join together to deal with spillovers, using regional special districts to conduct the same functions. Many large cities have such regional authorities for subways, ports, power, water, and public schools. The authority can plan and operate the service and assess fees that correspond to user benefits, and no higher government intervention is necessary.

Should these regional authorities not prove feasible, the higher government—hereafter the federal government—can step in and provide matching grants for the service. Ideally the federal matching rate should correspond to the percentage share of out-of-jurisdiction benefits, or approximately the share of out-of-jurisdiction use. Superficially many existing federal capital grant programs appear to be patterned after this rationale, but most of these existing federal matching grants have matching ratios that are 80 or 90 percent federal, 10 or 20 percent state. For the interstate highway system, for example, the federal matching rate is 90 percent and Department of Transportation (DOT) estimates of interstate travellers indicate that on the average interstate highway only 30 percent of the traffic is out of state. The typical state receiving a 90 percent subsidy when the external use ratio is only on the order of 30 percent will obviously expand use of the matching grants, with the consequence that the federal capital grant must be, as all now are, capped to limit use. But capping means no federal spending incentive at the margin, which in turn means that non-user-fee-financed federal roads are under-provided despite the generous initial federal matching.

The efficient solution is to return funds to states in the form of uncapped or open-ended 30 percent federal matching grants rather than capped 90 percent federal matching grants. The recent DOT report (1990) calls for part of this remedy—lower federal matching shares—but does not advocate removing the caps. I have previously estimated that were both changes made, total highway spending would be increased, economic efficiency would be improved, *and* the federal government would save money, all by noticeable amounts (Gramlich 1990). The key point is to alter federal grant incentives such that states have a price incentive to provide the right amount of highway spending, rather than to put a quantity limit on the grant.

Similar comments can be made about virtually all federal categorical capital grants. Inframarginal federal matching shares are higher than the likely out-of-state benefit spillover rate, the grants are capped, and capital is under-provided. The same is true of categorical grants in both Canada and Australia—the problem seems endemic in a federal struc-

ture. Exactly why the problem is endemic is unclear, perhaps because politicians realize greater gains in dispersing (and being lobbied for) a few large grants than many small ones. But whatever the cause, remedying this structure of matching rates would go a long way to providing proper subnational government spending incentives and cutting back on federal grant spending. To the extent that states would now have to pay more on average for facilities, they would have even more monetary incentive to find and levy efficient tolls, or user fees that are related to the true use of facilities.

A few topics require special comment. Airport capital spending is now financed by a federal ticket tax returned to localities in the form of capped 80 percent federal grants. Airport use studies are not as commonly cited, but surely 80 percent is again too high. If airports were given control of their own user fees, or if grants were made open-ended at a lower federal matching rate, airport spending could be encouraged and federal net spending could again be cut. To the extent airports need more funds to pay for their facilities, they could make stronger use of landing fees, especially at peak-load times. Landing fees would have the added advantage of cutting peak-load airport use *and* the need for airport expansions. Price signals can be a powerful force if used properly, and they really have not been for either highway or airport grants.

Efficient solutions are available for both highways and airports because it is possible to finance most capital needs with user fees. In other cases where the user fee approach is costly or difficult, financing questions become more difficult, but the same comments apply to federal capital grants. One such grant is for wastewater treatment, where it is costly to monitor the volume of household use. These facilities will presumably have to be financed by state or local general taxes, though federal matching rates should again be lowered and the grants uncapped. Clean air legislation is moving in the welcome direction of greater use of price incentives through resalable emission permits (Tietenberg 1988), but it would again make sense to finance some of the large capital costs by open-ended federal grants at low matching rates.

The bottom line is that while capital needs may be large, the real problem is that the country simply has not designed proper price incentive schemes. The preferred solution is to restructure, but not necessarily increase, federal grants in combination with much more vigorous use of user incentives at the state or local level.

Local Allocation and Distribution

Complicating matters again, now assume that whether or not benefit spillovers exist, the local capital stock in question also serves

long-run distributional needs. The standard examples are local public schools and state university systems.

The question of local public schools has always proved key in such discussions, partly because schooling does promote long-run economic opportunity for the recipients, partly because schooling is simply so large. In recent years, purchases for public schools have accounted for one-third of all state and local purchases in the United States.

Two basic democratic assumptions dictate the financing problems of public schools:

- Public schools are maintained and operated by local school boards, keeping the power of determining curriculum and so forth close to the people.
- As a matter of democratic right, public schools are free of charge. Since no form of user fee is possible, and since the main local tax in the United States is the property tax, public schools are essentially financed by local property taxes.

But they are not necessarily entirely financed by local property taxes. As is by now well-known, since communities vary widely by property wealth, a common-rate property tax applied across all communities will lead to widely varying levels of expenditure per pupil. Putting it differently, the tax price of a unit of educational services varies widely by community—higher in poor communities and lower in rich communities. Many state courts have argued that this varying tax price violates the “equal access to education” provision and have mandated states to come up with what are known as “district power equalization plans” to reduce the intercommunity variation in the tax price of public schooling.

It might first be noted that while the district power equalization problem has arisen for local public schools, in principle it could also arise for any of the non-user-fee local services discussed earlier. One difference is that public schooling is perceived to be the pathway to eliminating income differences in the long run, more so than, say, local streets or police cars.

A second matter arising is *how* states might correct unequal tax prices. The answer is once again by open-ended matching grants, where the state matching rate varies inversely with community taxable wealth. Feldstein (1975) worked out a simple model to show how this could be done: the state matching share is made inversely dependent on community wealth so that the full effect of wealth on education spending averages out to be zero across communities. Like the federal categorical matching grants discussed earlier, these state grants must be open-ended to influence tax prices at the margin. But now the matching rate is not related to benefit spillovers, as before, but to community wealth.

While public schooling is largely viewed as a matter between states and localities, the federal government enters in as well:

- The federal government has a limited amount of Chapter One grants for underprivileged school districts; as usual, they are capped, with high federal matching shares.
- The federal income tax permits deductibility of local property taxes, which works *against* power equalization since many more taxpayers itemize deductions in wealthy than in poor communities.

The appropriate policy toward education expenditures depends on one's goals. If the goal is simply to raise spending on public schooling, federal policies might be left unchanged and state schooling grants, matching and uncapped, should be provided to all schools. If, on the other hand, the goal is to improve poor schooling in underprivileged areas, a more complex set of remedies is called for:

- Federal tax deductibility should be abolished, as a fundamentally disequalizing measure. A large federal revenue gain would result from this change, and some of the funds might even be devoted to other education measures (Gramlich 1985).
- Federal Chapter One grants to poor schools should be reformed as suggested above, by removing the cap and lowering the federal matching rate.
- State power equalization plans must be substantially strengthened until they eliminate much of the variation in local tax prices.

The other important type of public spending with long-run distributional implications is higher education, operated mainly by state governments. Here the states can impose user fees, in the form of tuition charges, and no reason exists in principle why these user fees cannot cover the full cost of higher education. No state charges user fees nearly high enough to cover full costs, but some do assess full cost user fees on out-of-state students.

Whether user fees are full cost or not, higher education has become very expensive, and this just pushes the financing question down a rung. That question now becomes either how state legislatures can afford higher education (if user fees do not cover the full cost), or how families can afford it (if user fees cover a major share of the cost).

Families have basically two options—prepayment or postpayment. The tried and true prepayment scheme is for families to save up and pay for tuition. Since even many high-income families cannot manage to do that, some states are now experimenting with forced saving schemes, whereby a family would buy a contract when the prospective student is young and the money would accumulate. The price of the contract then

varies inversely with the interest rate and positively with the anticipated rate of growth of tuition. Any number of technical problems may emerge with such plans (Lehman 1990), and it remains to be seen whether they can resolve the financing problem satisfactorily.

The tried and true postpayment scheme is for student loans, though these have at least two problems:

- High default rates.
- The possibility that high payment obligations constrain the career choices of graduates.

Schemes that would make payback amounts income-related have also been discussed, but these too are still untested (Reischauer 1988). As earlier, present payment schemes operate on top of a small Pell grant federal program that provides grant assistance to very poor students, but Pell grants have not been, and are not likely to be, much help for students with incomes above the very lowest levels.

Of all the financing problems, then, those involving education seem clearly to be the most serious. At the elementary and secondary level, exactly how serious depends on whether the problem is felt to involve education spending in general, or just the education received by low-income children. Even if just the latter, state power equalization plans have to be significantly expanded, and the federal revenues that could be saved by eliminating local tax deductibility provide one possible revenue source. At the higher education level, the needs will be large too, and here new schemes might be required to help families pay their user fees.

Timing Issues

The discussion thus far has been timeless—concerned with which groups should pay how much for what facility. At this point timing questions need to be considered.

Whether the project involves local allocation goods, local allocation with spillovers, or distributional implications as well, the basic normative longitudinal principle is the same as the normative cross-sectional principle—those who benefit should pay. Under this principle, capital expenditures should be financed by long-term bonds with maturities close to the natural life of the structure. User fees or taxes should then pay annual depreciation expenses plus the interest and principal on the bonds. When the bonds are retired, new ones can be floated and the structures rebuilt.

Many states and localities have provisions in their constitutions that permit these kinds of arrangements for bond financing of capital

spending. By this standard, states and localities seem to follow fairly conservative spending practices; durable goods purchases and construction expenditures typically run about 15 percent of total state and local spending, while the overall general government surplus or deficit is typically close to zero (apart from the large, but independent, cash surpluses of employee trust funds).

One might carry the argument over to the federal level: if state and local capital spending should be bond-financed, why not federal capital grants? In principle, they should be. In practice, to do so would raise the ugly specter of federal capital budgeting, something that horrifies most Washington budgeteers. So many capital budgeting questions can be found at the federal level—what to do about depreciation on defense hardware or grants, on human investment programs, funded or unfunded social security liabilities, funded or unfunded saving and loan deposit liabilities, and so forth—that it would be impossible to raise the capital grant issue without getting into all the rest of the capital budgeting problems, many of which do not have clear solutions. Since federal capital grants to state and local governments are now only about 4 percent of federal spending, this would be a case of having the capital grant tail wag the federal budget dog. Moreover, federal policy-makers have assured that the federal budget deficit is *much* greater than federal capital grants—if it makes anybody feel better, these grants can easily be considered to be bond-financed right now.

To summarize these timing issues, no need or reason exists to change anything. One can make a strong normative argument for bond financing of capital spending at the state and local level, and generally present institutions are set up to accommodate the argument. One could make a theoretical argument for the same treatment at the national level, and while institutions are not set up to accommodate the argument, actual practice has more than provided the requisite bond financing.

Trust Funds

Both at the federal and at the state and local levels, much infrastructure investment is financed by dedicated trust funds. Governments often devote, say, gas tax revenues to a trust fund to finance highway construction. At the federal level, five such trust funds are in operation—for airports, highways, aquatic resources, harbors, and inland waterways.

These federal trust funds have been the focus of much discussion because all five are now running surpluses, amounting to about \$2 billion a year. Lobbyists for the affected type of investment have made the predictable calls for taking the trust funds off budget, so that overall

Gramm-Rudman-Hollings-type spending limitations would not constrain spending. A set of deeper considerations also exists about why dedicated federal trust funds should have been established in the first place.

From a normative point of view, trust funds do seem to be a useful way to tie marginal benefits to marginal costs when dedicated taxes or user fees can be assessed and when no externalities are present. In this pure case, one budgeting sub-constraint is that the user fee revenue must cover spending over time, a sub-constraint that can be ensured by the trust fund arrangement. Even in this case, however, no good reason is evident for taking the trust fund off budget, at least if the federal budget is supposed to measure total federal spending.

But suppose externalities are present. On one side, it might be that the type of spending under consideration contains enough external benefits that a subsidy should be provided. The more relevant case for federal trust funds is on the other side. Say a tax, the federal gas tax for example, is assessed to pay for highways and devoted to the highway trust fund (as now). But in part this tax might also be assessed for general energy conservation purposes, or because it is viewed as an efficient way to finance overall federal non-highway spending. Then either the gas tax must be split between the highway trust fund and general revenues, or the highway trust fund should run at a substantial surplus. The debate inspired by Senator Daniel P. Moynihan suggests that it is so hard for the political world to understand why a trust fund should ever have a surplus (even when, as in the case of Social Security, a perfectly good reason exists), that the trust fund mode may become an impediment to sound fiscal policy.

That is not the only problem with the trust fund mode. For reasons that are not entirely clear, four of these trust funds—for airports, highways, inland waterways, and harbors—contain provisions whereby some of the spending is financed by general revenues (Congressional Budget Office 1989). In the case of highways, 15 percent of the spending is so financed, for airports one-half, for harbors two-thirds, and for inland waterways almost all spending. This arrangement seems to achieve the worst of both worlds: the subsidy encourages overspending, and the phony surplus energizes lobbyists who argue for still more spending. The proper remedy would be either to eliminate the trust fund (in cases where externalities are important), or to make sure that dedicated taxes or user fees finance all spending (in cases where externalities are not important).

Of the five federal trust funds, the fund for aquatic resources is now in balance; dedicated taxes or fees cover all spending, leaving a minimal overall surplus or deficit. The funds for airports, inland waterways, and harbors should be corrected by eliminating the general fund financing

and increasing user fees or dedicated taxes to cover all spending. Making these changes, and the further changes in matching provisions suggested above, would lower the overall federal deficit by about \$5 billion a year. The Department of Transportation (1990) also suggested an expanded use of trust funds and dedicated user fees for the Coast Guard and railroads. Putting these operations in trust funds, with their own designated source of finance, could whittle the federal deficit by another \$2 billion a year.

The case for the highway trust fund is the most interesting. The matching provisions should be changed as in the other trust funds. As for revenues, it would take an increase in the federal gas tax of about \$.08 a gallon, for \$8 billion, to cover all federal highway and transit spending. Were the trust fund mode preserved, this would be the minimum added revenue requirement. But, as mentioned above, one could easily argue for a higher federal gas tax increase on the basis of overall budget or conservation needs. In this case the easiest thing is probably just to get rid of the highway trust fund, or at a minimum redraw the treaty on how much of the gas tax is devoted to the trust fund.

Constraints

In addition to the matching provisions discussed above, federal grants often come with a number of other strings attached. For example, it has long been argued that federal capital grants suffer by being just that—grants for capital construction instead of grants for services provided (Schultze 1974). Various constraints also are placed on the types of user fees the recipient authority can assess. Although some of these constraints have been relaxed lately, it would seem to make sense to remove most of the constraints that force lower levels of government to use grants only for capital purchases or new construction, or to raise money in certain ways. Why not let states and localities decide for themselves how money is best raised and spent?

The highway trust fund contains an additional constraint—apart from bridges, highway grants cannot be used to finance construction of toll roads. In recent years, provisions added to the basic highway legislation have lifted this restriction in selected cases (ironically, with 35 percent federal matching in these cases), but why not just lift the provision universally? States have to finance their own share of highway expenses; why not simply let them decide whether to finance through a toll, a gas tax, or some other scheme?

Constraints could make sense when they achieve valid public purposes. As a general rule, that condition does not appear satisfied for most constraints on present-day federal grants.

Policy Changes

The previous discussion has compared the normative arrangements one might set up to deal with infrastructure financing with existing arrangements. Several important policy changes emerge from that comparison. Many of these suggestions are quite radical, compared with those usually made in Washington budget discussions. The justification for making radical suggestions is that even if they are not adopted, it is still helpful to know the directions in which changes should be made. Of course it should be understood that any steps in the right direction are just that—intermediate or piecemeal improvements are certainly to be welcomed.

Federal Level

Perhaps the most important suggestion at the federal level is that the trust funds that now finance many of the capital grants for infrastructure investment should be reorganized.

- All spending for the relevant function should be financed by user fees or designated taxes; the general revenue subsidies should be ended.
- Grants should be altered, with much lower federal matching rates (reflecting actual use shares) and with the caps eliminated, so that spending is subsidized appropriately at the margin and lower levels of government have more pressure to levy efficient user charges.
- Restrictions on how funds are raised or whether they are used for capital or maintenance expenses should generally be eliminated.
- In some cases, such as the highway trust fund, either the gas tax should be increased enough to generate a surplus in the fund, the gas tax should be shared between the fund and general revenues, or the trust fund arrangement should be abolished.

The next set of issues involves federal provisions that affect education:

- Again, those matching grants devoted to education and training should carry lower federal matching rates and be made open-ended.
- Depending on objectives, the federal tax deduction for state and

local taxes might be altered. This deduction might be left alone if one's goal is simply to raise spending on education, but if one's goal is to let poor districts consume public education on more equal terms with rich districts, the tax deduction should be curbed or eliminated.

State Level

The most important policy improvement at the state level is to enhance power equalization formulas so that rich and poor districts can in fact consume public education on more equal terms. Improvements in state power equalization schemes would satisfy both the goals of increasing and of equalizing spending on public education: mainly they should increase spending by poor school districts.

The policy choices for higher education are not so clear. One option is for states gradually to withdraw from public funding for higher education, letting state universities raise in-state tuition. Were this to be done, states would probably have to improve the capital market for higher education by enhanced prepayment or postpayment schemes. The other option is for states simply to continue present arrangements, recognizing that the growing relative cost of higher education will make such arrangements increasingly expensive.

Finally, states too have trust funds to finance capital spending, and the general comments would be the same as at the federal level. To the extent that user fee financing of the relevant type of spending falls short of efficient levels, it should be enhanced.

Even after such enhancements, it should be noted that the whole package of measures suggested here is likely to cause an increase in state government deficits. Certainly altering the federal grant matching rates in the way suggested and enhanced district power equalization schemes will work in this direction. This ultimately reflects the fact that compared to an efficient set of payment schemes, state governments now benefit. In part, states might restore their budget positions by pressing harder for user fees that reflect true wear and tear. Beyond that, were there a desire to hold states harmless, other fiscal adjustments would have to be made, such as changing the terms of finance for public assistance or Medicaid, or restoring some general revenue sharing.

Local Level

The main suggestion for local spending involves their new plague—landfill dumps. The large marginal costs have to be paid. Conservation and recycling at the household level should be encouraged, not by a set of mandates, but by a set of user fees that make households pay the true

cost of their own solid wastes. Such a scheme will both finance a major part of, and cut down on, the net landfill expenses faced by local governments.

Conclusion

All of these measures address the basic infrastructure investment problem now faced in the nation, the shortfall in public capital investment. But none of them do that by simply "throwing money" at the problem. The common theme is simply to get the incentives right. When that happens, aggregate government spending and/or budget deficits are as likely to go down as they are to go up. Ultimately, the shortfall is more a deficit in sensible payment schemes than in aggregate money spending.

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Discussion

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Having very much enjoyed Edward Gramlich's paper and finding little with which to disagree, my comments will elaborate on a problem that he mentioned only briefly—the problem of capped grants. They clearly illustrate how difficult it is to design an efficient grant system when decision-making is severely constrained by political considerations.

Why are federal grants and subsidies, whether for infrastructure or other purposes, often structured so differently than the ideal grants described in public finance textbooks? To an economist, the whole purpose of a grant or subsidy is to affect marginal decisions, but many federal programs do not do that and are very likely to provide large lump sum windfalls to someone who would have engaged in exactly the same activity in the absence of the grant or the subsidy.

The typical patterns alluded to by Gramlich can be described as follows. A law is passed that creates a large set of people or projects eligible for assistance. The assistance is described by a formula that provides a very generous per person or per project grant. The budget then created for the program is sufficient only to fund a small portion of the eligible population or projects, and the scarce funds are meted out by a rationing mechanism that is often controlled by the bureaucracy.

In theory, the project selection process might target scarce funds precisely on the marginal decision, such that the windfall component, which we economists know must exist in almost every subsidy system, is minimized. Frequently, quite the reverse occurs. In credit programs,

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which I know best, the rationing bureaucrat is often judged by the default rate within his or her programs and, therefore, the scarce funds are likely to be concentrated on the most creditworthy, eligible borrowers—the ones most likely to be able to borrow in private markets without government assistance. With regard to physical projects, the grants often go to the jurisdictions hiring the most able grantsmen or those mostly likely to perform well on the project—not those who, by some standard, need it most. During the height of the Great Society grant system, it was New Haven, Connecticut, that became famous for its ability to extract money from the federal government, while I never heard of particularly skillful grantsmen coming from, say, Biloxi, Mississippi, unless they happened to have moved to New Haven.

So the design of many grants makes little economic sense, the results are often perverse, and yet, as Gramlich points out, these perverse characteristics are pervasive. They exist in a wide range of U.S. programs from housing to highways, and they exist in the federal systems of most Western democracies.

If something so irrational by economic textbook standards is also so pervasive, something important must be going on. If the force that is at work could be identified, a paper might be written called “Why Gramlich’s Sensible Suggestions Will Never Be Enacted.” If a natural tendency exists for the design of grant systems to be fundamentally flawed, such a fact is of vital importance to the topic of this conference, because it severely limits the ability of higher level governments to induce lower level governments to exploit beneficial spillovers.

In discussing these issues with legislators, it becomes clear quickly that many results that seem wildly perverse to an economist often seem quite acceptable, indeed desirable, to legislators. Examples of this phenomenon will be described later, but first it should be noted that what Gramlich calls capped grants—I prefer to call them rationed grants—have an evil effect not noted by Gramlich. Many are very susceptible to corruption. Indeed, some beg to have money stolen from them. The recurring cycle of scandals in the Department of Housing and Urban Development (HUD) is, in my judgment, due in no small part to the rationed nature of grants under most HUD programs. The design of the subsidy has a two-pronged effect. First, the rationing mechanism often gives enormous discretionary power to bureaucrats and low-level political appointees who are susceptible both to bribery and to political influence from above. Second, the extreme generosity of the per project grant makes it worthwhile to try to steal from the program.

Why, then, are programs with such bad and inefficient results so popular with legislators? First, the programs can be very seductive because they often convey a great deal of discretionary power to the bureaucracy and to the legislators on the appropriate subcommittees.

People do like having power. But I am one who usually defends politicians and bureaucrats against the charge that they are power-hungry people. They are not completely crass. Most truly believe in public service.

Rationed grants are also politically appealing because they reduce the uncertainty facing politicians. If Gramlich's truly open-ended, low cost-sharing grants were used, the government would be uncertain as to total costs and the geographical distribution of the funds. Bureaucratic discretion in determining the latter is often constrained by formula, and when a generous subsidy is combined with a limited budget, the government knows with virtual certainty that no more or less than all of the spending authority will be spent.

The combination of rigid control that reduces uncertainty and discretionary power that varies from grant to grant is very seductive. When the advantages of rigid control are put up against the advantages of economic efficiency, the former generally wins. But perhaps this is largely because the noneconomist designers of grants are often unaware that they are inefficient. Since ignorance can be overcome, the situation most likely can be improved.

It is strongly believed by most that corruption is created by evil people and not by evil incentives. The media encourage this belief by focusing investigative reporting on the colorful individuals who become dishonest, and they seldom look at or understand the program characteristics that really caused the problem.

Noneconomists also have a strong propensity to believe that any project receiving a federal subsidy would not have been built if the subsidy program had not existed. The notion of a windfall is very hard to explain. It is not an intuitively obvious concept. The notion that a subsidy should be designed to affect decisions at the margin and minimize windfalls is even harder to explain. In fact, few people understand what an economist means by "a decision at the margin." The concept of "the margin" may be ingrained in the soul of economists but it is understood by few other species.

So, a lot of education is necessary before Gramlich's ideas have any hope of implementation and economists must find simpler language with which to explain these concepts. But this can be done.

One notion beloved by economists seems to have little appeal to politicians, even when clearly explained. That is the notion of horizontal equity. In discussions of rationed subsidies, I have often suggested that it would be fairer to give small per capita subsidies to 100 percent of the eligible population rather than subsidies ten times as high to 10 percent of the eligibles. This does not strike a responsive chord at all. The politician is likely to respond, "Why should I give a small, barely noticeable subsidy to a whole bunch of people when I can do a really big

favor for a few—one that might really change their lives?" One could concoct an economic model that rationalizes this intuition, but it would be pretty complicated.

Economists' discussions of user fees and earmarked taxes also pay too little attention to the difficulty of designing the right level of fee or tax in a political environment. Twenty years ago it used to be necessary to pledge to always oppose earmarked taxes in order to get a job at the Office of Management and Budget (OMB). The OMB model went like this: The special interest groups backing projects—the construction industry, unions, and users—would lobby for too high a tax or fee. They would claim property rights to the proceeds and OMB would be helpless to control the tied spending. This model developed because twenty years ago gas tax proceeds were flooding in; they mostly had to be used for new construction, and it appeared as though we would pave over America. Ultimately, the OMB model proved wrong. OPEC indirectly curbed the growth of gas tax revenues and the law was eventually changed to divert some portion of the proceeds to maintenance and mass transit. You can, again, talk about earmarking at OMB, but do not let the old-timers overhear you. They still do not believe that anyone can get it right.

If my remarks have a theme, it is to be careful out there. It is one thing to document the existence of public investment opportunities that promise a high social rate of return. It is quite another to design grant and political decision-making systems that effectively target resources on those opportunities. Most of us budgeteers thought that it was something of a triumph to reduce public civilian investment in the late seventies and early eighties. In one of his few successes, President Carter was able to control water projects, but at great political cost. God willing, we shall never build a Tombigbee Waterway again. Perhaps the budgeteers were too successful, but I remain skeptical. It does not take much encouragement for politicians to fund physical projects. They provide identifiable jobs; you can start them with a ceremonial shovel; and you can cut ribbons to open them—all on the nightly news. Again I say, be careful out there.

Discussion

*James M. Poterba**

This paper suggests several substantial reforms in the financing arrangements for public infrastructure spending. The general theme of Edward Gramlich's excellent and provocative paper is that greater reliance should be placed on the price mechanism in funding and allocating public goods, a position that is largely immune to attack from other economists. Nevertheless, some of the author's specific recommendations are at least subject to debate. My remarks first develop the general point that the financing mechanism used in providing public goods can significantly affect the level of such outlays. The question then is why closed-end matching grants are so popular despite their limited marginal incentive effects. The final section includes several brief comments on some of the particular reforms suggested here, notably those for pricing sanitation services, higher education, and highway utilization.

A central point to recognize in discussing reforms in infrastructure finance is that financing mechanisms are not simply accounting conventions. Rather, they directly affect the level of infrastructure spending. Two examples illustrate this proposition. First, transitions from general revenue financing to earmarked taxes affect the level of outlays. In a detailed study of urban mass transit systems, Cromwell (1989) found that transit workers in systems that adopted earmarked taxes received real wage increases totaling 20 percent over the next five years. This finding accords with claims that earmarking, by insulating the targeted activity from annual budgetary pressures, permits greater outlays.

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Whether such increases in outlays are consistent with an optimal fiscal program is unclear, but the results do suggest the power of earmarked taxes to raise expenditures.

A second example concerns the role of state capital budgeting techniques. Previous research by Bunch (1988) suggests that state debt limits constrain capital outlays; those states with such debt limits have lower levels of infrastructure spending. My own related research (Poterba 1990) on capital budgets suggests that states that distinguish capital from current outlays in their budget process ultimately spend approximately 15 percent more on capital than do states that combine capital and non-capital outlays in a single budget. These results underscore the role of fiscal institutions in affecting the outcome of public good provision, and suggest the potential importance of funding reforms in changing the level of such spending.

One of the major themes of Gramlich's paper is that closed-end matching grants, which provide matching rates well above plausible estimates of the marginal externalities from state and local infrastructure spending, should be replaced with open-end grants with lower matching rates. The pervasive nature of closed-end grants, however, suggests either that strong political factors incline politicians against such a change, or that some factors omitted from the standard efficiency analysis may be operating. Probably the most important political factor is the perceived need for equitable treatment of different jurisdictions. Open-end grants admit the possibility that rich states or localities will contribute several times as much as their poorer neighbors to the matching programs. The absolute transfer between the federal government and these jurisdictions will be larger than that to poorer jurisdictions, exacerbating pre-existing inequities. It may also be politically difficult for representatives of poorer jurisdictions to explain why much larger federal transfers were received by communities other than their own. These political considerations may be the principal reason for the prevalence of closed-end grants.

Closed-end grants may also be justified by efficiency considerations, a point widely recognized in various contexts in regulatory economics. With no uncertainty regarding the response of localities to subsidy programs, price and quantity schemes can be used interchangeably to encourage expenditures on particular activities. With uncertainty, however, good reasons may be found for choosing one program or the other. As Weitzman (1974) has argued, substantial uncertainty regarding the price sensitivity of the regulated agents may leave the regulator uncertain about the likely consequences of price-based schemes. For example, if federal grant-givers envision a minimally acceptable level of interstate highway in each jurisdiction, with relatively small marginal benefits to additional highways beyond this level,

then closed-end grants may be an optimal way to elicit desired local behavior. High subsidy rates on expenditures up to some level ensure that most jurisdictions will take advantage of programs to this point. The possibility that closed-end grants are an efficient way to achieve certain legislative objectives does not, of course, imply that these grants are well designed or that the "kink" in the matching rate is at the appropriate point. Nevertheless, the case for dismissing matching grants is weaker than the conventional analysis might suggest.

One of the most appealing features of Gramlich's paper is its blend of general theory with particular applications, many of which provide fertile opportunities for creative policy design. Each of these raises intriguing issues in policy design. First, consider the potential of user charges in ameliorating the growing solid-waste crisis in the United States. User fees undoubtedly can play an important role in encouraging recycling, particularly if they are levied on products at the time of purchase. User charges are more successful when levied on consumers buying a good than when they apply to consumer disposal of a bad. This is because fewer ways exist to avoid compliance with user charges for goods (How many people rent four-wheel drive vehicles so they can enter national parks without paying fees?) than with charges for disposing of bads. User charges for waste disposal are particularly problematic, since significant charges per can of trash may encourage illegal dumping. The net effect—trash in public parks and dumping in places where the environmental damages may significantly exceed those in traditional landfills—may be quite contrary to that of standard user charge models, which assume perfect compliance.

Another example of how user charges might be used concerns higher education. The rapid increase in the rate of return to higher education in the last decade suggests little need for direct state subsidies to those who wish to attend college. Arguments may be made for government assistance in relaxing liquidity constraints, coupled with strengthened enforcement to avoid significant revenue costs.

The final area is the user fee for highway use. One issue this paper does not address is the efficacy of imperfect user charges in targeting the ultimate activity that must be taxed. Gasoline taxes, the standard user charge for highways, illustrate these difficulties. Numerous studies have documented that different vehicles cause different amounts of damage on the interstate highway system, and that these marginal costs are not particularly tied to gasoline consumption. The policy options for raising user fees in this context therefore involve imperfections, a point that must be recognized in policy design. This is not an argument against user fees per se, but a call for further research on this intriguing aspect of the problem.

Gramlich's paper is a refreshing examination of how capital outlays should be financed. It raises a number of points that deserve central attention in the policy arena, and suggests several avenues for future research in public finance. In the austere budget environment of Washington and the state capitals in the early 1990s, this paper's proposals for more efficient infrastructure finance, often with a positive revenue yield, are sure to attract serious attention.

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