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In a November 5 referendum, voters in northern Virginia will decide whether to increase the sales tax in the region by a half-cent per dollar to pay for transportation projects. Advocates of the tax, such as Gov. Mark R. Warner (D-Virginia), emphasize that northern Virginia's traffic congestion problems are among the worst in the nation; the average commuter is said to spend the equivalent of a two-week vacation stuck in traffic each year (Texas Transport Institute 2001).

Most of the popular debate has focused on two main issues. The first concerns the types of projects that will be funded by the revenues from the tax. Some argue that road improvement and expansion is the most effective way to alleviate traffic bottlenecks and increase travel flows, though congestion benefits could be limited if better roads encourage people to drive more. Environmental groups concerned about urban sprawl and motor vehicle pollution often oppose new roads and instead argue for more transit projects (transit projects account for 40% of the proposed spending). Second, is a tax hike, in fact, necessary to pay for transportation projects? Anti-tax conservatives have argued that the state's budget has been among the fastest growing in the nation in recent years and that local transportation money could be made available by cutting other social spending, or by increasing northern Virginia's share of state spending on transportation.

But there are other important issues that have received virtually no popular attention. Are there better revenue-raising measures than the sales tax? And before arguing about how many new highways and transit routes to build, shouldn't we make sure we're making the best use of existing infrastructure? It turns out that these two questions are intimately connected. Roads get clogged because motorists do not take account of the crowding and inconvenience imposed on other drivers when they use scarce road capacity. The ideal way to address this problem, and to get traffic on existing roads moving, is to charge people for driving on busy roads at peak periods, and thereby encourage some to reschedule trips, car-pool, use other routes, switch to

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public transit, and so on. The fees collected, in turn, provide revenue, reducing the need for higher sales taxes.

Such peak-period fees have been slow to catch on in the United States, and one of the major obstacles is that motorists oppose paying new taxes if they do not expect to benefit from the tax payments they fork over. Including congestion fees as part of a package along with a smaller hike in the sales tax would have offered a unique opportunity to get around this problem. It would have been clear to northern Virginia residents that, for a given amount of spending on transportation projects, revenues raised from congestion fees would be refunded to households in lower sales taxes.

Here we discuss the economic efficiency, revenue potential, practical feasibility, and distributional effects of congestion fees and sales taxes, and compare them with other potential revenue sources including property taxes, gasoline taxes, and higher transit fares. A sales tax hike may well be the worst of all these measures on economic grounds, though it is probably the most practical option on political grounds. Nonetheless, in any future referendum on transportation taxes we believe there is a strong case for including congestion charges, at least in a limited form to start with, as part of a package of revenue-raising measures. We set the scene with some background on the transportation situation and the tax referendum in northern Virginia.

Some Background

The Metropolitan Washington, DC, area is consistently ranked as having some of the worst traffic congestion in the nation, behind only Los Angeles and San Francisco. Daily backups have now spread to vast stretches of the Washington area highway system such as I-95 in northern Virginia and the Capital Beltway, where 10 years ago traffic was relatively free flowing. Congestion in the Washington region now causes over 200 million person hours of delay each year.

Congestion has increased because roadway capacity has not kept pace with the growth in driving. From 1990 to 2000, vehicle miles traveled in the Washington, DC, region increased by around 30%, while lane miles of roadway capacity expanded by just 11%. These trends are likely to continue. Under current budgets, road capacity for the Washington region is projected to grow by 13%, while vehicle miles traveled are projected to increase by over 40%. For northern Virginia alone, it is estimated that an additional $15 billion needs to be spent on infrastructure investments over 20 years, just to keep congestion from worsening. The proposed increase in the

sales tax from 4½ cents to 5 cents per dollar would only meet about a third of these funding needs.

But even if the sales tax increase were larger, we should not fool ourselves into believing that we can simply build our way out of congestion. New roads tend to fill up with traffic, in part because some people who were previously using other travel means now find it convenient or worthwhile to drive. Furthermore, road construction is becoming increasingly difficult because of opposition from environmental and community groups, and the financial cost of adding capacity in densely populated urban areas where property values are high. In our view, this underscores the need for supplementing infrastructure policies with road-pricing policies to improve traffic flows on existing roads, and to help prevent the frequent traffic snarl ups experienced today.

The sales tax vote in northern Virginia can be seen as part of a nationwide trend toward relying more on local sales and property taxes to finance transportation projects. This reflects a greater need for transportation funds as an expanding road and transit network requires more resources for operation and maintenance. Moreover traditional revenue sources, particularly fuel tax revenues, have been eroding as governments have been unwilling to increase nominal rates to keep pace with inflation¾Virginia's state gasoline tax is the same as it was 15 years ago. The popularity of local transportation sales taxes has been attributed to several factors including county (rather than state) control over how the revenues are spent, specific lists of what local projects the money will pay for, and the opportunity of residents to vote on whether they favor the sales tax or not. But before proceeding further down this path, it is worth assessing carefully the pros and cons of sales taxes versus other revenue options on both economic and practical grounds.

The Economic Costs of Financing Options

For households and businesses the cost of taxes is the dollar amount they pay to the government, but for society as a whole the cost also includes the effect on the efficiency of resource use. Taxes produce economic costs or distortions to the extent they reduce employment and investment, or alter how households would prefer to spend their money in the absence of taxes. Economists usually find that it is less costly to raise revenue from taxes with broad bases, such as those on all income or consumption, rather than a narrow tax on an individual commodity or activity. A broader tax limits the scope for firms and households to lower their tax liabilities by altering their spending behavior.

In this regard the sales tax is not so bad; it applies to more than half of household spending in northern Virginia (exempt items include food, electricity, and housing expenses). The tax does cause some economic distortion by dampening demand for products, leading to slightly lower levels of economic activity and employment, and by forgoing revenues from tax-exempt goods. Overall, economic models suggest that the distortionary cost of broad consumption or sales taxes amounts to around 20 or 30 cents per dollar of revenue raised.

Externality considerations. But an important exception to the general economic principle that broad based taxes are superior to narrow taxes has to do with "externalities." An externality occurs when people impose costs on others. Traffic congestion is a classic example: motorists do not take into account their impact on adding to congestion and slowing speeds for other drivers; consequently there is too much congestion from society's perspective. Charging motorists for driving on busy roads is a way to make them factor societal costs into their travel decisions. According to our estimates, the appropriate charges vary from 10 to over 30 cents per mile on major freeways in northern Virginia that are currently gridlocked during rush hour. A further benefit of congestion fees is that they raise the value of road investments as, by improving traffic flows, they help society get the most out of additional road capacity.

Higher gasoline taxes would also raise the cost of driving, though, per dollar of revenue raised, congestion benefits are much lower than under route-specific and time-specific congestion charges. Gasoline taxes do encourage people to use mass transit and to car pool. But they penalize all driving regardless of whether it occurs at peak or off-peak period, and regardless of whether it is on clogged or free-flowing roads. Unlike peak-period fees, they do not encourage people to modify their work hours to avoid the rush hour or to look for less congested routes.

A full assessment of transportation taxes should also take account of other externality benefits, besides congestion. These include reduced local air pollution from tailpipe emissions, which is harmful to human health and, more broadly, reduced greenhouse gases and oil dependency. On the other hand, motorists already pay for some of the external costs of driving through existing fuel taxes; the combined state and federal gasoline tax is 38 cents per gallon in northern Virginia. Nonetheless, our own calculations suggest that externality component of the optimal fuel tax for northern Virginia could amount to three or four times the current fuel tax.

Caveats about transportation taxes. So far, it seems that there is a strong case on economic grounds for raising revenues from driving taxes as they have a beneficial impact on reducing motor vehicle externalities, while the primary economic impact of sales and income

taxes is to (moderately) reduce economic activity. But we should be careful not to overstate the case.

One caveat is that higher transportation taxes can also have adverse employment effects as they raise the cost of commuting to work and the cost to firms of doing business. Employment effects might be a bit weaker than those of sales taxes; nonetheless, taking account of them narrows the cost difference between transport taxes and sales taxes.

Another is that the demand for driving, particularly peak-period travel (which is dominated by commuting) is only moderately sensitive to price; in other words, most people will still continue to drive during rush hour even if they have to pay more for it. This makes the externality benefits more modest when expressed per dollar of revenue raised (though they may still be large in absolute terms).

A third caveat is that transportation taxes cause economic costs by inducing people to drive less than they would prefer to in the absence of taxes; gasoline taxes can also induce people to drive smaller, lighter vehicles than they might prefer. However, so long as taxes are not set at excessive levels, these sorts of costs will be well below the benefits from reducing externalities.

Taking most of these considerations into account, a study by Parry (2002) of the metropolitan Washington area estimates that raising a dollar of revenue through congestion taxes would lead to a net gain in economic efficiency of roughly 12 cents (leaving aside any efficiency benefits from spending the money on transportation projects). The gasoline tax also had a net benefit in this analysis, though it was very small. Still, these estimates suggest that for each $100 million in revenue raised through transportation taxes rather than sales taxes, the benefits to society exceed the costs by around $25 to $40 million.

Other revenue sources. Another option for raising revenue is to increase local property taxes. Like sales taxes, this could have moderately harmful effects on economic activity by discouraging business investment and the demand for housing. The economic effects of property taxes are complicated, however, because tax provisions—particularly the deductibility of mortgage interest for homeowners—create a bias in favor of the real-estate sector. By serving to counteract this bias, higher property taxes may well improve overall economic efficiency.

Raising fares for mass transit could also provide more revenue. Travel by transit is heavily subsidized in the Washington region (as it is nationwide): fare revenues cover only around 50% of the combined operating costs of rail and bus transit. However the economic case for financing transportation spending through higher fares is tenuous. The revenue potential from higher transit fares is limited, as transit accounts for only a minor fraction of vehicle miles

traveled. And higher fares, at least during rush hour, can encourage people to drive more, leading to a worsening of congestion.

Some Practical Considerations

Implementing a small increase in an existing tax¾such as adding a ½ cent to the sales tax—is straightforward. Introducing an entirely new tax¾such as congestion pricing¾is a different matter. How would it work?

We do not envision motorists lining up at tollbooths to hand over cash to an attendant before they can get on a highway; instead charges can be deducted electronically from a pre-installed credit card on a vehicle's windshield as it passes under a transponder, without the need to stop. In principle, the charges should apply to all lanes on all congested freeways in northern Virginia, and should vary over the course of a day as the degree of congestion varies. In practice, going from no pricing to pricing every freeway would face too much opposition from motorists who previously had the right to use roads without paying. We would favor a gradual approach beginning with the conversion of existing HOV lanes on I-66 and I-95 into toll lanes, and the pricing of any newly constructed freeway lanes. As people became accustomed to road pricing and (hopefully!) it was seen to be successful in terms of improving traffic flows, charges should gradually be expanded across all major congested freeways.

Nonetheless, as illustrated in Table 1, a key advantage of the sales tax, and also the property tax, is that it has a broad base and therefore a substantial amount of revenue can be raised with only a small, and barely noticeable, change in the tax rate. Increasing the sales tax from 4½ to 5 cents, and the property tax from 1.15% of housing value to 1.22%, would each, initially, raise roughly $140 million a year for northern Virginia.

If freeways and arterials were comprehensively priced across northern Virginia, we estimate that up to $700 million per year could be raised in new revenue; however in a limited, and for the time being more plausible, pricing scenario, about a tenth of that sum is generated. Increasing the gasoline tax by 5 cents per gallon in northern Virginia would raise a similar amount.

These revenue estimates underscore the point that, realistically, transport taxes should be viewed as only a partial, rather than a full, substitute for the proposed sales tax increase.

Table 1. Revenue Potential of Alternative Measures

Revenue source	Tax increase	Initial revenue raised, $ million per year
Sales tax	4 ½ to 5 cents per dollar	140
Local property tax	1.15 to 1.22% of housing value	140
Gasoline tax	5 cents per gallon	60
Congestion pricing	Limited	70
	Comprehensive	700

Sources: Authors' calculations. The scenarios make some allowance for behavioral responses to tax increases that reduce the tax base, although these adjustments affect estimated revenues only moderately.

Equity Considerations

We can view the equity effects of transportation taxes in a couple of ways. First, are those paying the tax the ones who receive the benefits, and second does the tax impose an unfair burden on the poor? As regards the first issue, congestion taxes are better than sales taxes. People who drive a lot benefit the most from road projects, and they will be the ones to pay most under congestion pricing.

But a legitimate concern about congestion fees is that they are regressive¾everyone pays the same charge regardless of income¾and may push poor people off the roads. On the other hand, lower-income families may benefit disproportionately from lower sales taxes, as they tend to consume a larger portion of their income than better off households. And the people who will bear the biggest burden from congestion pricing will be those living in the outer suburbs¾a crude characterization is that these are middle- to high-income families, while the poor often live in inner-city areas.

While we believe that distributional concerns should not hold up action to address urban gridlock, the poor should still have access to the roads, as they should to basic health care, housing, and food. Increasing personal allowances for state income taxes to reflect higher transportation costs is not well suited to addressing this issue, as most of the state's residents are either not poor, or do not drive regularly in northern Virginia. Instead, we would propose that low-income households be granted a state income tax credit equal to a portion of their annual payments on congestion taxes.

Conclusion

In essence, two types of policy responses are required to best address northern Virginia's transportation woes. First, there needs to be a long-term plan to make worthwhile additions and improvements to the existing road and transit infrastructure. But second, it will also be important to make the best use of the existing road network and to do so requires that motorists bear the full social costs of driving. A sales tax does nothing to address this second issue, and the benefits of any new road improvements that it finances are lower than they would be if there were optimal traffic flows on that road. We believe that northern Virginia should move toward funding some of its transportation needs with limited congestion pricing as soon as possible, such as converting the HOV lanes on I-66 and I-95 to toll lanes and pricing a lane of the Capital Beltway, with a view towards more comprehensive peak-period pricing in the longer term. The revenues raised from these charges reduce the sales tax increase required to finance proposed transportation spending.

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