

### **The Problem**

There is not enough investment in public roads in the city of Columbus, Ohio. While a 2009 report concluded that the city needed to spend \$60 million a year to maintain road quality in the city and \$78 million a year to improve it, the city has only invested \$30 million a year since then on roads. Columbus roads fare well compared to other large metropolitan areas in Ohio, but a quarter of Columbus roads are in poor condition and money is wasted every year on major repair projects that could be more cheaply invested in preventative maintenance.<sup>12</sup>

City roads present a classic public goods problem. In Columbus, urban roads are a nonexcludable good, which means that consumers cannot be prevented from using the good. This is because public roads do not have a pricing mechanism or any other way to keep people off of them who do not pay for them. In addition, they are essentially nonrival. This is because traffic problems in Columbus, Ohio are typical, with congestion levels measuring up to about the same level as comparably-sized cities in the region and far from excluding consumers from using roads.<sup>3</sup> Thus, urban roads function as a nonexcludable, nonrival public good, paid for through government funds.

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<sup>1</sup> “Bumpy Roads Ahead: America’s Roughest Rides and Strategies to Make Our Roads Smoother”, TRIP, November 2016.

<sup>2</sup> “Road Resurfacing,” Video, City of Columbus, August 1, 2016.

<sup>3</sup> “TomTom Traffic Index: Measuring Congestion Worldwide,” TomTom.Com, Accessed November 30, 2016.

Willingness to pay for roads, however, can be hard to estimate for governments, and political economy considerations can hamper the ability of governments to produce adequate quantities of public goods. This results in an underprovision of the public good, as we see by the underinvestment in road maintenance in the city. The objective of this policy analysis is to evaluate alternative financing schemes for Columbus's public road maintenance that help overcome this public goods problem.

### **Alternatives**

This policy analysis will compare the relative merits of four different policies for raising revenue for road maintenance: raising the municipal income tax, raising the municipal property tax, instituting a road pricing scheme, or using a parking pricing scheme.

The first alternative that will be considered is the most common way that the city of Columbus, Ohio pays for city services: its **municipal income tax**. Columbus, Ohio draws most of its revenue from a flat municipal income tax. About 75% of municipal revenues are drawn from this income tax, which is projected to bring in about \$620 million this year.<sup>4</sup> An increase in income tax rates from the current 2.5% level to 2.62% (about a 5% increase in the total income tax rate) could cover road expenditures up to maintenance levels and an increase in income tax rates to 2.69% (about a 7.5% increase in the total income tax rate) could improve road conditions.

The second alternative that will be considered is that of raising the **municipal property tax**. Since property taxes are generally the main revenue tool for school districts, municipal property taxes are much lower than municipal income taxes.

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<sup>4</sup> "City of Columbus Budget: 2016," City of Columbus, Ohio Official Publication, November 12, 2015.

Columbus's property tax rate is 3.14 mills per assessed value of the property and brings in about \$42 million per year, or 5% of total city revenues. A 70% increase in property tax rates could cover road expenditures up to maintenance levels and a 115% increase in property tax rates could improve road conditions. This might make more sense as a bond that could be spread over a number of years.

The third alternative that will be considered is that of **urban road pricing**. Road pricing is a much more innovative way to finance urban road maintenance and is not currently in place in any major U.S. city. The concept behind road pricing is to move away from the traditional methods of financing roads through taxation and public spending towards a system that uses excludability and price signals to bring roads closer to a perfectly competitive market model and further from a public goods model.

Road pricing is most common in the United States on highways, taking the form of toll roads. While highways have fairly simple entrance and exit points, urban road pricing provides excludability challenges, with cities relying on regulating tight urban commercial districts using car stickers, using sensors that report a car as it enters a district, or having choke points for tolls similar to those used for toll highways.

While other countries such as Singapore and the United Kingdom have instituted urban road pricing, the United States has been unsuccessful so far in instituting such schemes. In the 1970s, the United States Department of Transportation undertook a project to pilot urban road pricing schemes in a few cities across the country.<sup>5</sup> After being turned down by a number of cities, Berkeley, California, Madison, Wisconsin, and

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<sup>5</sup> Higgins, Thomas J. "Road-pricing attempts in the United States." *Transportation Research Part A: General* 20, no. 2 (1986): 145-150.

Honolulu, Hawaii agreed to begin studies on road pricing. None of the three projects advanced past the initial study phase.

The final alternative that indirectly puts a price on using roads is the **pricing of parking**. Columbus has an extensive parking pricing scheme already in place with parking meters covering the downtown commercial district, the university district, and dense urban districts such as the Short North, Grandview, and German Village. The city also has a residential parking permit scheme for the Short North, requiring residents to purchase a parking permit to park on the street.

Currently, the city of Columbus collects about \$10 million in revenues through its current parking scheme, about 2/3 of which comes through the city Parking Violations Bureau. This means that the parking system would have to quadruple in size in order to make up the shortfall in road maintenance financing and would have to increase by a factor of 5.6 in order to grow to the size where funds could improve road quality.

### **Criteria**

Alternatives will be evaluated on the three following criteria.

1. Efficiency – Strong alternatives will minimize inefficiencies and will maximize the general welfare of the members of the city of Columbus. This will be evaluated by comparing the different alternatives as different approximations of a market model of welfare maximization. For taxes, the approach will focus on calculating relative dead weight loss incurred by society with different tax schemes, meaning the relative welfare loss to society caused by taxation. For pricing schemes, the approach will focus on which schemes are able to best tie payments for road maintenance to usage of roads.

2. Political Feasibility – Strong alternatives will have a high likelihood of being adopted by the city government and approved of by its citizens. Municipal politics can be influenced greatly by inattentive publics, and road pricing schemes in the past have fallen prey to both public pressure and lack of support from key policymakers.<sup>6</sup> Political feasibility is likely the culprit in past underinvestment in public roads, and alternatives must be politically feasible if they are likely to be put in place. Alternatives will be evaluated for political feasibility by comparing local conditions and comparable policies in other environments, making qualitative assessment of the possibility of a policy being taken up by policymakers and not creating substantial public backlash in the process.
3. Equity – Strong alternatives will have desirable distributional impacts, not falling too heavily on the poor. Alternatives will be evaluated for equity by estimating the differences in impact on low-income constituents versus the impact on high-income constituents. While one interpretation of equity would say that users of a public good should be the consumers who pay for it, the analysis in this paper will focus on different impacts on different members of the income distribution and consideration of payment coming from those who enjoy the good will be relegated to discussion in the “efficiency” sections.

## **Analysis**

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<sup>6</sup> Higgins, Thomas J. "Road-pricing attempts in the United States." *Transportation Research Part A: General* 20, no. 2 (1986): 145-150.

## **Alternative 1: Raise Income Taxes**

From an economic efficiency standpoint, income taxes are more efficient than property taxes but less efficient than pricing mechanisms. The main inefficiency caused by raising income taxes is labor market distortions that result in deadweight loss. Since income taxes result in lower wages for workers, the value of their time spent at work is reduced and they work less, causing an overall reduction in value to society. Economists estimate that the cost to society for an additional dollar raised through income taxes is somewhere between 16 cents and 31 cents.<sup>7</sup> Thus, the welfare losses for raising an additional \$30 million in income taxes to keep road quality stable would be \$4.8 million to \$9.3 million and the welfare losses for raising an additional \$48 million in income taxes per year to improve road quality would be \$7.7 million to \$14.9 million.

Another way to consider the efficiency impacts of a tax is to see how much the tax falls on the users of the good it is paying for. For a public good to best approximate a perfectly competitive market, those who benefit most from the good should pay the most for it. This means that the benefits of the good will be efficiently distributed among the users of it. Thus, an income tax will be more efficient if it is used to resurface roads for people who are commuting on those roads. Since 78% of arterial streets are rated as “poor” or “very poor” pavement condition by the city and only 43% of residential streets achieve the “poor” or “very poor” rating, we can see that arterial streets, which are more likely to be used by commuters, are more likely to benefit from more road resurfacing funds. Thus, we have more reason to believe that income taxes would be relatively efficient compared to property taxes.

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<sup>7</sup> Ballard, Charles L., John B. Shoven, and John Whalley. "General equilibrium computations of the marginal welfare costs of taxes in the United States." *The American Economic Review* 75.1 (1985): 128-138.

From a political feasibility standpoint, income taxes have never been popular, but are especially unpopular now. An April Gallup poll showed that 57% of Americans think they are spending too much on income taxes, the highest percentage in over fifteen years.<sup>8</sup> It is hard to predict what the political landscape will look like under a Trump presidency, but signs show that the general public is more cool to taxes than they've been so far in this century and turning to taxes for revenue may cause consternation among the public.

That being said, an income tax increase has some politically attractive qualities, too. For one, the income tax is already used so much by the city of Columbus and thus is not a new policy tool. The increase of only 0.12-0.19 percentage points is very small and would only amount to a \$54-\$85 increase in income taxes for the median household.<sup>9</sup> Since 85% of municipal income taxes are collected through employer withholdings, these taxes are likely to come out to less than \$5 per paycheck, and the sting will be very small.<sup>10</sup> Also, taxes for a specific purpose tend to be more popular than taxes that go to a "general fund" and infrastructure spending is among the most popular of public spending programs according to general public polling.<sup>11</sup>

According to a recent analysis by the Brookings Institution, the 95<sup>th</sup> household income percentile in Columbus, Ohio is \$149,516 and the 20<sup>th</sup> household income

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<sup>8</sup> "Taxes," Gallup Poll, April 6-10, 2016.

<sup>9</sup> "Columbus city, Ohio," United States Census Bureau, 2014 data.

<sup>10</sup> "City of Columbus Budget: 2016," City of Columbus, Ohio Official Publication, November 12, 2015.

<sup>11</sup> "Americans Say 'Yes' to Spending More on VA, Infrastructure," Gallup poll, March 9-13, 2016.

percentile is \$18,451.<sup>12</sup> This gives us a good reference point for equity analysis. This means that the average low-income family would pay between \$22.25 and \$35.23 per year under this scheme and the average high-income family would pay between \$179.42 and \$284.08 per year. The flat income tax means that low-income taxpayers are burdened more than high-income taxpayers due to the marginal utility of money: \$22.25 means a lot more to a poverty-level household than \$179.42 does to a wealthy household. This makes the flat income tax more inequitable than a wealth tax such as the property tax.

### **Alternative 2: Raise Property Taxes**

Property taxes, in contrast to income taxes, are a tax on wealth, and a specific one at that. According to the work of economists Christophe Chamley and Kenneth Judd, capital taxation is even more distortionary than consumption or labor taxation because it not only causes capitalists to substitute away from saving in the first place, causing a short-term distortion, but it also reduces the overall capital stock, thus reducing the productivity of workers and reducing overall wealth in the economy.<sup>13</sup><sup>14</sup> Thus, the optimal tax rate for wealth should be zero and increasing the tax on property only further distorts the economy and reduces wealth.

Available estimates of the marginal excess burden of taxation associated with property taxes say that each dollar raised in property taxes results in an 18 to 46 cent loss

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<sup>12</sup> Holmes, Natalie and Alan Berube, “City and Metropolitan Inequality on the Rise, Driven by Declining Incomes,” Brookings Institution, Metropolitan Policy Program, January 14, 2016.

<sup>13</sup> Chamley, C. (1986). Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives. *Econometrica*, 54(3), pp. 607-622.

<sup>14</sup> Judd, K.L. (1985). Redistributive taxation in a simple perfect foresight model. *Journal of Public Economics*, 28(1), pp. 59-83.



to society.<sup>15</sup> This means that the welfare losses for raising an additional \$30 million in property taxes to keep road quality stable would be \$5.4 million to \$13.9 million and the welfare losses for raising an additional \$48 million in income taxes per year to improve road quality would be \$8.7 million to \$22.2 million.

An argument against application of this theorem in this circumstance is that the dollars gained through the tax are being invested straight into capital in the form of well-maintained roads. Thus, the property tax may not be as distortionary because it is being invested in a needed capital input. While this may make the tax less distortionary than a tax that pays for services, it is unlikely to overcome the inefficiencies of removing the capital from a functioning market. Capital spending on roads is likely to provide efficiency improvements, but not at the same level that market-based investments would.

Another argument for efficiency of property taxes in funding road resurfacing is that taxpayers on property could be likely to receive the benefit of the spending. However, since most of the roads that need work are arterial, property taxes are no more effective than income taxes at tying taxpayers to services. Thus, property taxes are not only less efficient than pricing strategies, they are also less efficient than income taxes.

Property taxes are also a political liability. Much of the arguments advanced above around the unpopularity of income taxes apply well to property taxes as well. Taxes are not popular, and since the Tea Party revolt and in this new age of conservative populism, taxes are touchy.

Past these basic problems, property taxes pose particular problems as well. One is that political interests might be able to organize more effectively against a property tax

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<sup>15</sup> Ballard, Charles L., John B. Shoven, and John Whalley. "General equilibrium computations of the marginal welfare costs of taxes in the United States." *The American Economic Review* 75.1 (1985): 128-138.

increase than an income tax increase. This is because property taxes are more pointedly targeted towards those with wealth, who are more politically engaged than the general public.<sup>16</sup> Also, business groups and property owners' associations are more likely to mobilize against a property tax than an income tax increase.

Further, the particular nature of the use of the property tax by the city of Columbus would make this a broad expansion of its use. A sufficient increase in the property tax to cover shortfalls in road financing would require approximately doubling the current city rate. This would raise questions with the general public, which generally sees the property tax as a tax for supporting schools rather than city government services.

An advantage the property tax has over the income tax is its progressive nature. While some poor property owners will be hit by the tax, renters will be able to largely avoid it since the relatively competitive housing market in Columbus will allow renters to substitute away from spending on housing if landlords try to pass on the costs of rent. Thus, a property tax will be more likely to fall on wealthier residents than an increase in the flat city income tax would.

### **Alternative 3: Institute a Road Pricing Scheme**

Economists love markets. This is because they do amazing things: they create signals that arbitrate between production and consumption. When functioning properly, they allow people to decide, based on their own subjective preferences, how much to consume a given product. Thus, they create an efficient distribution of goods prioritizing

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<sup>16</sup> Cook, Fay Lomax et al, "Political Participation by Wealthy Americans," Northwestern University, Institute for Policy Research, Working Paper Series, April 2013.

those who subjectively desire the goods the most compared to other goods they can consume.

That is the theory behind road pricing: by creating a market, roads can be funded by the people who use them most and who desire to use them. By making roads excludable, the public goods problem is overcome and those who value the use of roads become the people who pay for them.

There are a few different technologies that can be used to institute a road pricing scheme. One is to designate a district and issue a driving permit. This is the system behind the London congestion charge: licenses are purchased and people are ticketed for noncompliance by on-duty police or through the use of public cameras.<sup>17</sup>

Another option is “choke points” marked with either sensors, cameras, or kiosks like toll roads. By charging people when they enter a central business district (or the city itself), a price is then levied on the use of roads in that area.

Ultimately, a study would be in order to determine the best implementation strategy for a road pricing system. While Columbus’s open, non-limited geography provides challenges to managing traffic flows for pricing purposes, current technology can likely provide a scheme if the city decided to choose this alternative.

Assuming the goal would be to charge commuters within the city, and considering that about 800,000 people commute to work by car in the Columbus area and the average American works 212.5 days a year, a daily commute charge to raise the \$30 million needed keep roads at current quality would come out to about 18 cents a day, or \$37.49 a

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<sup>17</sup> Leape, Jonathan. "The London congestion charge." *The Journal of Economic Perspectives* 20.4 (2006): 157-176.

year and a daily commute charge to raise the \$48 million needed to improve roads would come out to 28 cents a day, or \$60 a year.<sup>1819</sup>

Whether this alternative would have any success in the political sphere, however, is another question altogether. Efforts to institute urban road pricing in the United States in the past have been unsuccessful. The most recent large effort undertaken by the federal government was a United States Department of Transportation effort to encourage pilot projects in a handful of medium-sized U.S. cities in the 1970s.<sup>20</sup> In the case of Berkeley, California, the effort to institute road pricing resulted in a local politician's worst nightmare: a public uprising against the policy and a demonization of the policymakers who were supporting it. In other cities, efforts were either headed off before they could get off the ground or died with interest when policymakers never really got on board.

The massive shift in attitude that road pricing would require from the public makes this the least politically feasible of the four options.

The road pricing alternative also has an equity problem. As the public road system in Columbus is currently treated as a public good, people can "free ride" on the use of roads no matter what their ability to pay currently is. While this causes problems from an efficiency standpoint, it amounts to an indirect subsidy to the poor from an equity standpoint. More wealthy residents would be able to take on a new \$37-60 yearly expense, while this would pinch less wealthy residents by adding a whole new expense to the list of expenses they already have to deal with.

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<sup>18</sup> "Public Transportation Commuting U.S. Map," *Governing: States and Localities*. Online.

<sup>19</sup> "4,542 International penn World Table Series Added to FRED," Federal Reserve Bank of St. Louis, August 14, 2013.

<sup>20</sup> Higgins, Thomas J. "Road-pricing attempts in the United States." *Transportation Research Part A: General* 20, no. 2 (1986): 145-150.

#### **Alternative 4: Expand the Parking Pricing System**

A strategy that cities use to indirectly price the use of roads is the pricing of parking. While parking is not the same as driving (some drive through roads and park in other areas or utilize private parking areas), parking provides an indirect pricing mechanism that captures at least some of the driving that is done on local roads.

The city of Columbus currently manages 4,215 parking meters in the downtown, German Village, Short North, University, and Grandview commercial districts.<sup>21</sup> In addition, residents in the Victorian Village, University District, and German Village areas can purchase parking permits for street parking in their neighborhoods.<sup>22</sup>

In order to raise the sufficient amount of revenue to keep roads at current quality, current rates would need to double and the number of meters would need to double—and that assumes that new meters would be used at the same levels as old meters. More likely, even more meters would have to be installed and rates would have to be increased even more. Since current rates are only, at their worst, \$1.00 for half an hour of parking, there is still room to increase rates.<sup>23</sup>

A strategy that could be used in conjunction or in place of rate increases or new parking meters would be to implement demand-responsive parking rates on meters. This technology will increase or reduce parking rates depending on usage with the goal of hitting a demand-optimal price for given times of the day. Technology such as this is already in use in San Francisco and has been successful so far.

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<sup>21</sup> “Parking Meter Advisory Team: Recommendations for Changing the Parking Meter System,” Department of Public Service, Division of Mobility Options, Final Report, May 12, 2010.

<sup>22</sup> “Residential Parking Permit Information,” Columbus.gov, Accessed November 30, 2016.

<sup>23</sup> “Current Meter Rates,” Columbus.gov, Accessed November 30, 2016.

While parking pricing is not as efficient as direct road pricing, it comes much closer than a tax because it ties indirect road usage to payment. Thus, it is able to avoid many of the inefficiencies of taxation while coming close to approximating the efficient outcome of road pricing.

From a political feasibility standpoint, parking pricing allows the most flexibility of any of the options. A system of parking pricing is already in place, so some expanding of it can already be done administratively, though a larger overhaul may require city council approval. The public is more likely to accept parking pricing changes rather than tax increases or controversial road pricing measures.

A large overhaul, if done poorly, could create public backlash. Thus, expansion and meter rate increases must be deliberate and well-planned. Much more than a tax increase, parking pricing measures can be modified to increase political feasibility. Demand-responsive parking rates can also add a level of fairness that can make changes easier to swallow for the public and can reduce the need for extreme parking meter expansions and rate increases. Parking pricing reforms can also be piloted, phased in and tied to certain popular road maintenance projects to increase political feasibility. Residential permit rate increases should also be on the table, though they are unlikely to generate as much revenue as meter increases.

The weak spot for parking pricing is its impact on the poor. While road pricing would take an effective subsidy away from poor residents, parking pricing actually falls on the poor more than richer residents. This is because parking violation fees, which make up two thirds of parking revenues for the City of Columbus, fall disproportionately

on poor families rather than wealthy families.<sup>2425</sup> This happens through limited resources on the part of poor families to evade tickets, bias in traffic courts, and flat rates that fall more heavily on poor families than on rich families.

### **Recommendation**

In order to confront tradeoffs between the four alternatives, I have ranked the four alternatives on the four criteria above. The best option in regards to each separate criteria was awarded four points, the second best option was awarded three points, the third best option was awarded two points, and the worst option was awarded one point. I then weighted the three criteria, giving equal weight to efficiency and political feasibility and half weight to equity, thus prioritizing efficient delivery of city services and the potential for adoption while still factoring in equity concerns.

The results can be seen in the table below.

<b>Alternative</b>	<b>Efficiency (.4)</b>	<b>Political Feasibility (.4)</b>	<b>Equity (.2)</b>	<b>Total</b>
<b>Income Tax</b>	Third Best (2)	Second Best (3)	Second Best (3)	Second Best (2.6)
<b>Property Tax</b>	Worst (1)	Third Best (2)	Best (4)	Worst (2)
<b>Road Pricing</b>	Best (4)	Worst (1)	Third Best (2)	Third Best (2.4)
<b>Parking Pricing</b>	Second Best (3)	Best (4)	Worst (1)	Best (3.0)

Of the four options, parking pricing reform comes out as the most desirable, mixing strong efficiency with very strong political feasibility. Its weak equity ranking is

<sup>24</sup> “City of Columbus Budget: 2016,” City of Columbus, Ohio Official Publication, November 12, 2015.

<sup>25</sup> “Stopped, Fined, Arrested: Racial Bias in Policing and Traffic Courts in California,” Report, April 2016.

not enough to pull it down on its own, though it is an issue to pay attention to when designing a policy. Subsidies to low-income families, court reform, and considering neighborhood resources when setting prices can help mitigate this unfortunate side effect of parking pricing.

Thus, **I recommend that the city of Columbus expand its parking pricing system** to raise revenue for road resurfacing, with special attention paid to equity considerations.