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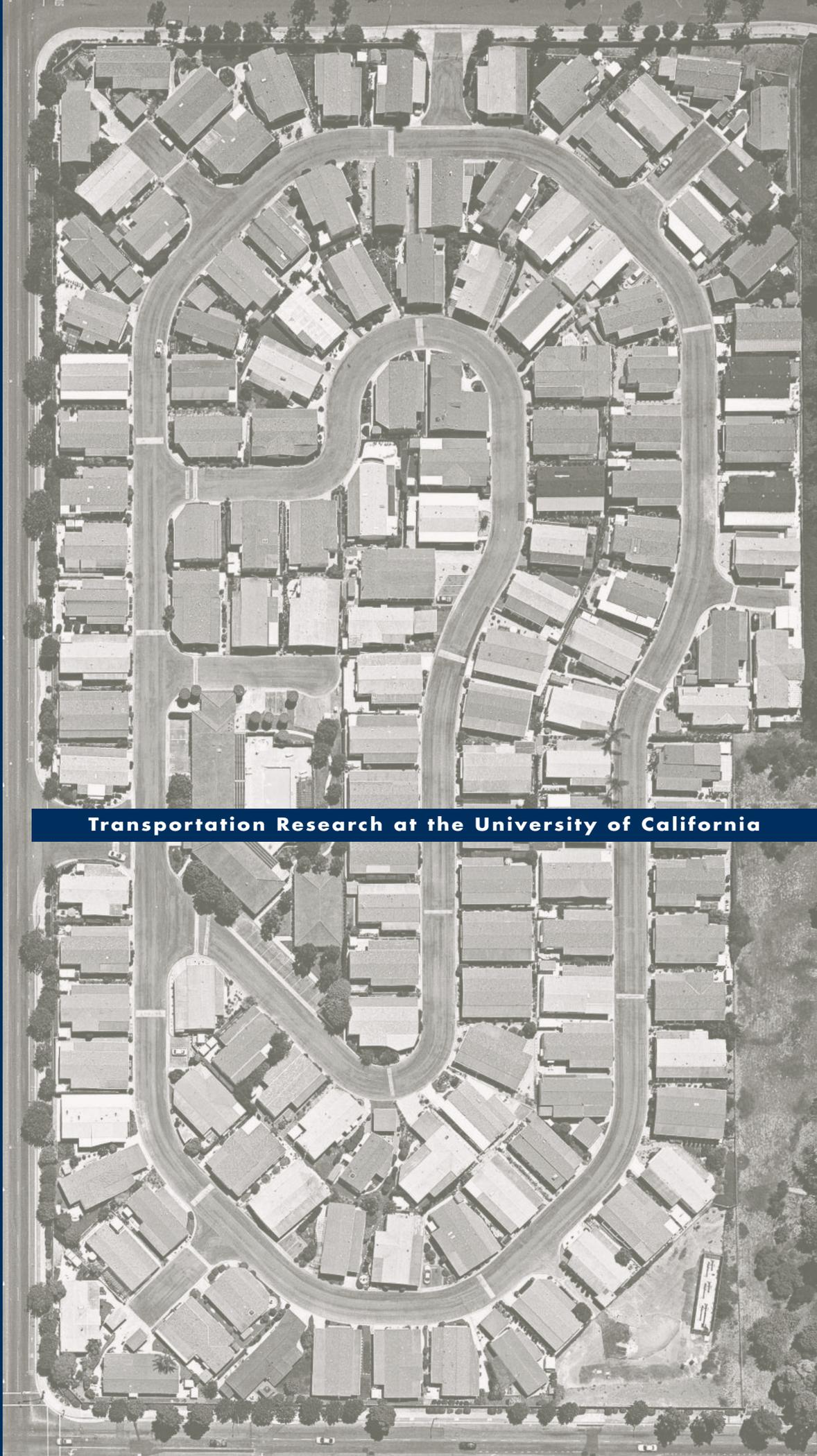
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Small Steps

“**M**ake no little plans. They have no magic to stir men’s blood and probably will not themselves be realized.” So said the great architect and planner Daniel Burnham—pioneer of the skyscraper, designer of some of the 19th century’s most stunning buildings, and creative and organizational force behind the “White City” of the Chicago World’s Fair. Burnham’s admonition resonates today. Planners, including transportation planners, have always liked to think big. Who doesn’t? People are drawn to outsized ambitions and outsized promises. And it’s easy to believe that we face big problems, which in turn require big solutions. How can we make transportation policy, after all, without also tackling land use, housing, and public health?

What is appealing, however, isn’t always effective. Thinking big might be necessary to get things approved, but thinking small is often what gets things done. Landmark policies tend to flow not from broad concepts but from ferocious dedication to specific goals.

Big ideas are popular because they tend to be ambiguous, and ambiguity enables consensus. But the consensus often breaks down when the ideas have to become actions. Consider the US Department of Transportation’s “Livability” initiative. “Livability,” as transportation consultant Alan Pisarski pointed out at UCLA’s 20th Conference on Transportation, Land Use, and the Environment last year, is pleasantly amorphous, and few people are against it. Nor, he went on, were many people opposed to previous DOT initiatives: “balanced” transportation, “smart” transportation, “performance” transportation. No one wakes up each day wishing we had an unlivable, unbalanced, dumb, and nonperforming transportation system, so agreement seems easy to come by. Unfortunately, we don’t enact “smart” transportation; we enact particular policies, which people may or may not consider smart. So everyone is only for livability until someone defines it as high-speed rail, or bike lanes, or double-decked freeways. Then the consensus disintegrates and we’re back where we started.

This problem of fragile consensus is exacerbated because transportation policy, especially at the federal level, has long been many things to many people. Ostensibly designed to promote

mobility and access, it also serves as a vehicle for public investment; an opportunity for legislators to cut ribbons; a lever for accomplishing environmental goals; and a form of social service for the poor. These goals don’t necessarily coincide, but all of them, depending on who is asked, could promote “livability.” Agreement on broad principles doesn’t matter without consensus about narrow policies.

Ironically, the reverse is true as well. Adherence to a broad principle can obstruct progress even if everyone agrees about the underlying action. Congestion pricing—using tolls to reduce traffic congestion—is embraced by environmentalists (who see it as a way to fight air pollution and global warming); libertarians (who see it as much-needed injection of market discipline into transportation policy); and a growing number of elected officials and practitioners (who see it as a much-needed source of revenue). These groups don’t necessarily, or even frequently, see eye-to-eye on matters of principle. Environmentalists have no particular allegiance to the market, and if congestion pricing were in place transportation agencies would probably spend its revenue on projects libertarians disapprove of. But big-picture disagreement shouldn’t overshadow consensus about a particular step.

Perhaps it’s time to resist the allure of big, comprehensive plans. Planners might do more good, and cause less harm, by thinking small. Thinking small never put anyone on the moon, but it also never sent anyone off to war. And the seemingly liberating realization that everything is related to everything else can actually be paralyzing, if it leads to the notion that nothing can be done unless everything can be done at once.

ACCESS has often given voice to small proposals that could lead to big improvements. This issue is no exception. We have articles that look carefully at congestion pricing, cash for clunkers, carsharing, and market-priced parking, as well as an essay that strikes a cautionary note about our ability to rescue the economy through large-scale transportation spending. Compared to the scale of the planet’s problems, these ideas might seem modest—perhaps too modest. But the better world often arrives in small steps.

Michael Manville

Political and Public Acceptability of Congestion Pricing: Ideology and Self-Interest in Sweden

BJÖRN HÅRSMAN AND JOHN M. QUIGLEY



THIRTY-FIVE YEARS AGO, ECONOMIST JOHN KAIN PROPOSED SEVERAL simple pricing mechanisms for roadways that would “improve urban transportation at practically no cost.” At about the same time, Nobel laureate William Vickrey championed a number of likeminded ideas, especially in New York City, that would reduce traffic congestion and improve the efficiency of the transport sector. Some of these proposals would also involve “practically no cost,” even using the technology of the 1960s. For example, Vickrey proposed varying the tolls on New York’s George Washington Bridge with the time of day, which would make rush-hour driving more expensive and reduce traffic congestion.

At first, only Singapore implemented this simple idea. In June 1975, in an attempt to reduce downtown congestion, Singapore introduced the world’s first comprehensive road pricing program. The Area Licensing Scheme, as it was called, imposed a toll on vehicles entering a restricted zone near Singapore’s central business district during business hours on workdays. Some fifteen years after the Singapore demonstration, the three largest cities in Norway—Bergen, Oslo, and Trondheim—introduced urban toll systems on circumferential roads. However, the rationale for these latter innovations was not to reduce congestion but rather to generate revenues for urban transport investments. In 2003, the City of London adopted a version of Singapore’s Area Licensing Scheme specifically to help control downtown congestion.

The examples set by London, Singapore, and the Norwegian cities have stimulated discussions of congestion pricing among traffic engineers, planners, politicians, and administrators in many US and European cities. But elected officials in many cities have rejected proposals for road pricing for fear that they are politically infeasible. These fears seem to be justified by survey results from both Europe and the US. Well-known studies of citizen preferences observe that public and political acceptability is an important precondition for the successful implementation of road pricing, and that the political acceptability of road pricing is rather low.

The only city where congestion pricing has been adopted freely by a vote of the electorate is Stockholm. Shortly after the 2002 national elections in Sweden, the new national government resolved to sponsor a full-scale experiment with a system of congestion charges for the city of Stockholm. A pricing scheme for roadways would be combined with a short-term increase in the capacity of the public transportation system. The Parliament also decided that a referendum on the permanent implementation of the system of charges should be held in Stockholm after the trial period was over, in conjunction with the general election of September 2006. After a trial of almost seven months, the charging system was approved by a majority (52 percent) of the city’s voters. The pricing scheme was re-introduced in August 2007, and has been in force continuously ever since. Stockholm thus represents the first time a congestion toll was imposed by a plebiscite.

Since it has been widely asserted that congestion tolls are politically unpopular, observing a popular vote on such tolls provides an opportunity to analyze the factors that influence public acceptance of priced roadways. The Stockholm case also provides an opportunity to observe how citizen voters make tradeoffs between the time and money costs of travel, and how these costs influence the willingness to impose a system of congestion tolls. >

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THE CONGESTION CHARGE

The system of congestion charges imposed in Stockholm during the first half of 2006 was quite simple. A cordon surrounding the inner city was established and 18 gantries monitored traffic flowing across the perimeter. Vehicles crossing the perimeter were assessed the congestion toll. Vehicles were identified either by transponders or by cameras that photographed license plates as they crossed the cordon. About 95 percent of charges were identified automatically, and bills were sent automatically to pre-registered users. Figure 1 shows the inner parts of Stockholm and the perimeter of the toll zone, as well as the locations of the monitoring devices.

The charging system was also simple: 10 Swedish Crowns (SEK) were charged for off-peak travel across the cordon boundary in both directions, and up to 20 SEK were charged for peak-hour travel, with a maximum charge of 60 SEK to any user in a day (10 SEK is about \$1.50). Charges were not imposed in the evenings, on weekends, or on public holidays, and some vehicles were exempt from charges altogether (for example, taxis and emergency vehicles). Simplicity and ease of understanding were the main reasons for this choice of design.

THE POLITICS

Activists and elected leaders had discussed congestion charging in Stockholm since the 1980s. Throughout, the discussion was characterized by strong differences among political parties as well as among politicians at both the national and local levels. The debate was also influenced by shifting political majorities and alliances, again both nationally and locally.

The 2002 congestion pricing initiative came about as a result of some of these shifting alliances, which resulted from the 2002 national elections. The Social Democrats had won a large plurality and formed a government, in part by attracting the support of the Environmentalist Party. In exchange for this support, the Social Democrats agreed to an experiment in congestion charging. Together, the Environmentalists and the national Social Democrats convinced the Stockholm Social Democrats (who had promised not to impose congestion pricing should they gain control of the city) to implement the experiment. On the other end of the political spectrum, after the 2002 election the opposition parties—the Christian Democrats, the Conservatives, the Liberals, and the Centre Party—formally decided to cooperate with one another. They proclaimed themselves the “Alliance,” and during the run-up to the 2006 election presented a common platform on all major political issues, including opposition to the congestion charges.

The congestion pricing program put the Stockholm Social Democrats in a vulnerable position. Opinion polls taken before the election showed that the share of the adult population in the Stockholm Region supporting the congestion charge experiment had fallen significantly between 2004 and 2005. Ultimately, the confidence of the Social Democrats increased when the results from the last opinion poll undertaken *during* the trial were released; the share supporting the experiment increased to 54 percent.

The increased public support reported during the experiment turned out to be a good predictor of the referendum outcome: 52 percent of the electorate supported the charge. The victory for the congestion tolls did not, however, lead to more votes for the political parties advocating pricing. On the contrary, the general election in 2006 resulted in a clear victory for the parties opposing a system of tolls. The Alliance polled 54 percent of the vote, up from 48 percent in 2002.

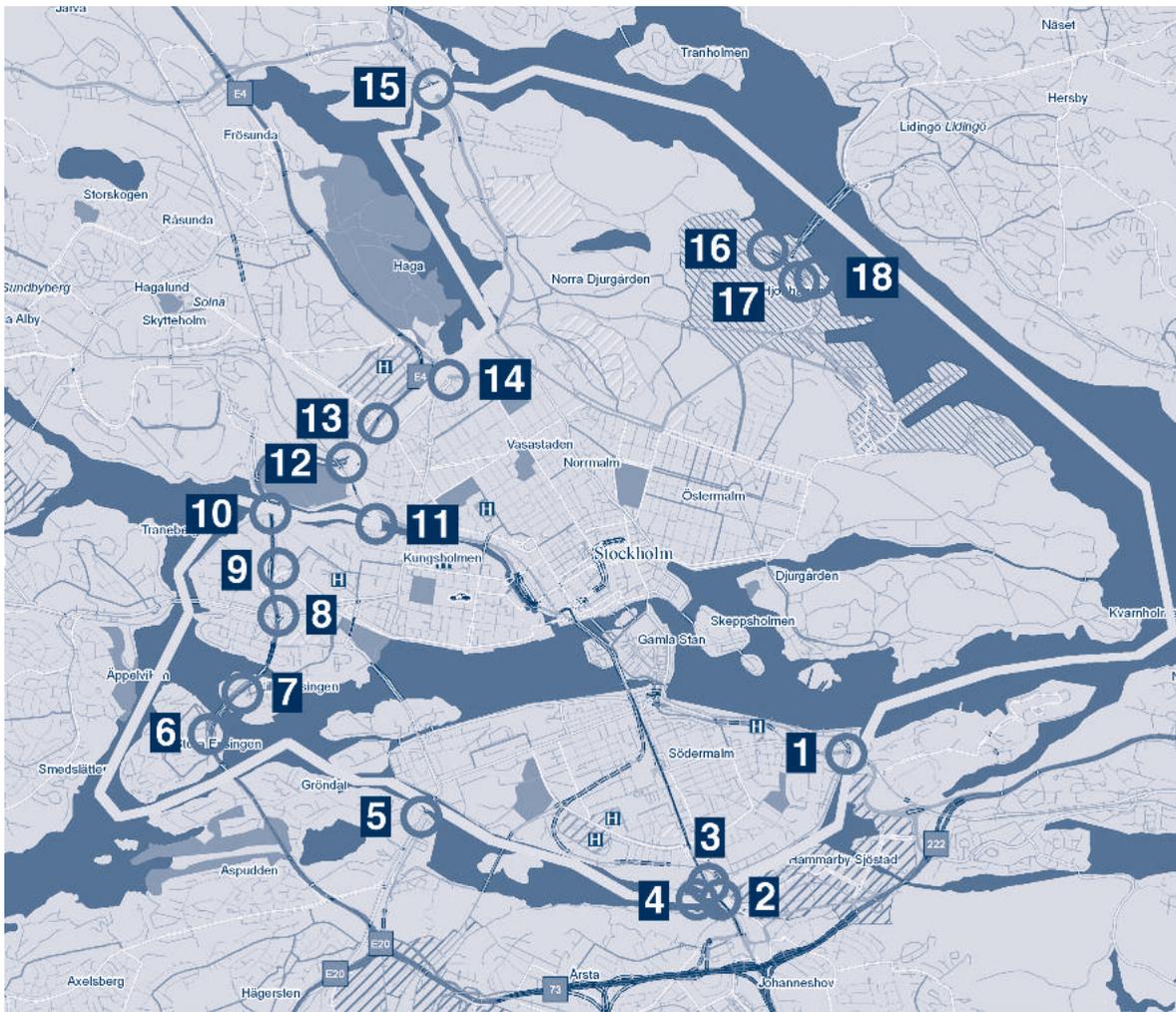


FIGURE 1
Perimeter of
Congestion Zone
and Location of
the 18 Gantries

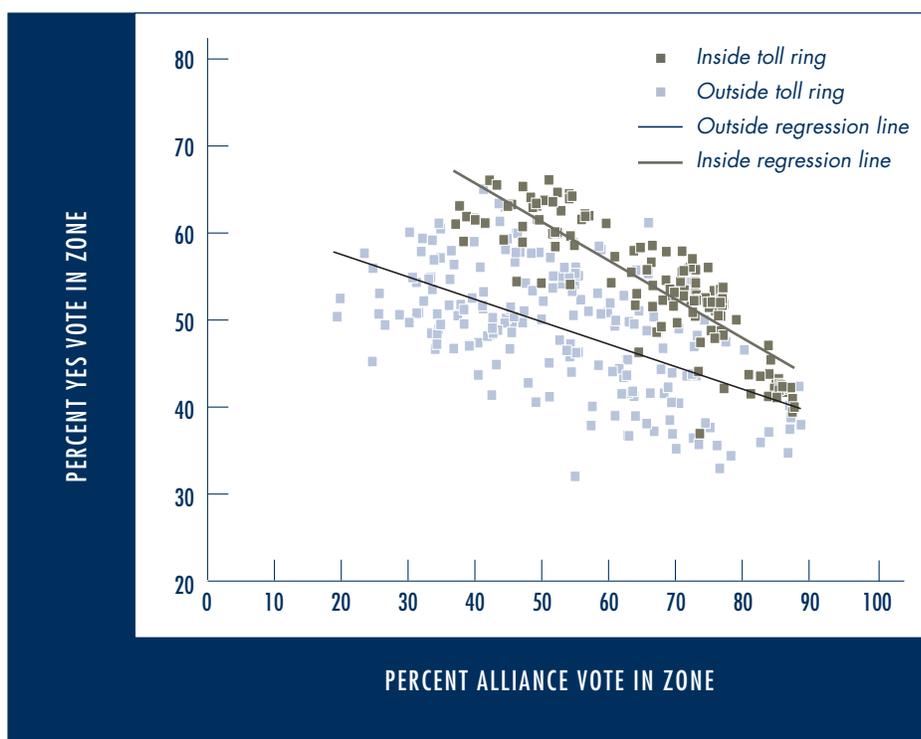
**EFFECTS OF THE CHARGING SYSTEM AND THEIR INFLUENCE
ON THE REFERENDUM**

Well before the referendum was held in the fall of 2006, the city of Stockholm published a detailed compendium of the results of the congestion pricing trial. A key finding was that the number of vehicles crossing the charge cordon declined by about 22 percent. Underlying the broad discussion in the compendium were the results of a sophisticated, but standard, traffic engineering model that simulated the effects of the tolling system on neighborhoods and traffic zones.

Although the congestion charge passed by a vote of 52 to 48 percent, in 26 voting districts fewer than 40 percent of voters supported the tolls, and in another 42 districts over 60 percent did. We can relate this variability in citizen preferences to the time savings and incremental transportation costs experienced by voters in the various districts. Using standard GIS methods, we allocated the voting and demographic data to the roughly 339 zones defined in the traffic engineering model. The data reveal substantial variability in demographic characteristics and political ideology by zone, and also in the distribution of time savings and incremental travel costs attributable to the system of congestion tolls. >

FIGURE 2

Percent Support for Alliance Candidates and Percent Support for Congestion Tolls, by Traffic Zone, 2006 Election



IDEOLOGY AND SELF INTEREST

Figure 2 shows the relationship between the percentage of voters in each district in favor of the system of tolls in the 2006 election and the percentage of voters in the district who supported one of the parties in the Alliance (which opposed the system of tolls) in the same election. An inverse relationship is clear. Voters who were more likely to favor Alliance candidates were also more likely to oppose the tolls. It is also clear that voters who resided inside the cordon were more likely to favor the toll system. Not only did these residents, on average, face lower costs (that is, no toll charges) if they commuted to the central core, but their homes and neighborhoods also benefited from the reduced traffic within the cordon.

Using statistical analysis, we dug deeper into the election results to see why people in some zones were more likely to support the congestion charge. We were particularly interested in testing two ideas. The first was that people would vote their narrow self-interest. That is, we assumed that those who gained the most (because their travel times fell) or perhaps lost the least (because they rode public transit and therefore wouldn't pay the toll) would support the congestion charge. Those who paid the most in tolls, by contrast, would oppose the tolls. The second idea was that people would demonstrate political loyalty. The Alliance came out strongly against the congestion charge, so we suspected that people living in areas with many Alliance voters would oppose the tolls.

We found strong statistical evidence to support both hypotheses. To be sure, a number of factors influenced support for or opposition to congestion tolls: better educated voters and working-age voters tended to favor the tolls, while male workers and immigrants tended to oppose them. But time and money savings were influential, even after controlling for these demographic attributes. Voters in traffic zones where the average

time savings were higher were more likely to support the congestion charge. In contrast, voters in zones where the average cost of a trip rose the most were less likely to support congestion charging. And voters who lived in zones *within* the tolling area were more likely to favor the congestion tolls. The most likely explanation for this latter finding is, again, that the congestion charge brought about other changes—reduced traffic, pollution and noise—that made these neighborhoods nicer places to live.

Somewhat to our surprise, holding time and money costs constant, we found no evidence that voters in zones with more public transportation users were more likely to vote for the congestion charge. In fact, the transit share of a zone's commuters appears to explain none of the variation in voting outcomes. Thus the voting outcome did *not* simply reflect a tendency of transit users to favor tolls while auto users opposed them. Rather, the vote reflected a more subtle relationship between the time savings and the cost increases associated with the tolling system. For some voters, the time savings from the tolls outweighed the monetary costs; these voters were more likely to support congestion charging. For others, the opposite was true; these voters were much more likely to oppose the tolls.

Alliance voters were much more likely than others to vote against the congestion charge, suggesting that political ideology did play a large role in the fate of the congestion charge at the ballot box. However, it is difficult to isolate the causal direction of this relationship. While it is likely that many Alliance voters cast their ballots against the congestion charge because of their partisan allegiance, it is also possible that some voters supported the Alliance because it was opposed to congestion charging. In other words, it's hard to say with certainty whether stronger support for the Alliance led to opposition to congestion charging, or whether opposition to congestion charging led to stronger support for the Alliance. Nevertheless, the association between political party and voting on congestion charging was powerful.

CONCLUSIONS

In sum, the analysis suggests that voters' more general political preferences influenced their vote on the congestion charge. The results also clearly document the importance of the private costs and benefits—the time savings in commuting and the tariffs paid by motorists arising from the tolls—in conditioning the acceptance of the system and in affecting voting behavior.

The empirical results suggest that a 10 percent decrease in commute time could increase the propensity to favor the tolling system by an average of 2 percentage points. A 10 percent increase in the incremental costs of commuting, by contrast, is associated with a decline of 4 percent in the approval rate of congestion tolls. The tradeoff between time savings and out-of-pocket costs in the voting calculus also says something about how much people value their commuting time. Our statistical results suggest that one hour of travel time saving is valued at between 53 and 69 SEK; this is roughly the same as the value of time for private trips used in benefit-cost calculations by the Swedish National Road Administration.

One implication of these findings is that consumers who experience the benefits of tolling firsthand may be more willing to support congestion charges. This suggests that there is considerable scope for well-designed experiments that tangibly demonstrate the effects of congestion tolls on the welfare of urban commuters. These well-thought-out experiments may lead to more efficient transportation policies. ♦

FURTHER READING

Richard Arnott and Kenneth Small. 1994. "The Economics of Traffic Congestion," *American Scientist*, 82: 446–455.

City of Stockholm, Congestion Charge Secretariat. 2006. "Stockholmsförsöket: Facts and Results from the Stockholm Trials," <http://www.stockholmsforsoket.se/templates/page.aspx?id=183>.

Bjorn Hårsman and John Quigley. 2010. "Political and Public Acceptability of Congestion Pricing," *Journal of Policy Analysis and Management*, 29 (4): 854–874.

John Kain. 1972. "How to Improve Transportation at Practically No Cost," *Public Policy*, 20: 335–352.

Jonathan Leape. 2006. "The London Congestion Charge," *Journal of Economic Perspectives*, 20 (4): 157–176.

Sock-Yong Phang and Rex Toh. 2004. "Road Congestion Pricing in Singapore: 1975 to 2003," *Transportation Journal*, 43 (2): 16–25.

Jens Schade and Bernhard Schlag (Eds.). 2003. *Acceptability of Transport Pricing Strategies*, Oxford: Elsevier Science.

William Vickrey. 1963. "Pricing in Urban and Suburban Transport," *American Economic Review*, 52 (2): 452–465.

TRANSPORTATION, JOBS, AND ECONOMIC GROWTH

MARTIN WACHS

A MERICAN POLITICIANS ARE BITTERLY DIVIDED ON MANY matters of public policy, yet they seem to agree that spending on transportation programs creates jobs and thus constitutes a path out of the nation's long and deep recession. Infrastructure investments are prescribed to stimulate the economy in the short term by creating construction employment, and to foster longer-term economic growth by making the transportation system more efficient and reliable. Democrats and Republicans, liberals and conservatives, rural and urban elected officials—all seek funding for roads and transit projects in their districts, asserting repeatedly that these expenditures will create jobs. President Obama vigorously sought to create jobs through transportation spending in the recent economic stimulus package. This seemed familiar: in 1991, when signing the historic Intermodal Surface Transportation Efficiency Act (ISTEA), President George H.W. Bush stated that the value of the bill “is summed up by three words: jobs, jobs, jobs.”

Are the politicians right? At this moment of challenge and opportunity, can wise national investments in infrastructure advance both short-term economic recovery and long-term economic well being? Rapid and sustained economic growth is a broadly shared goal, and efficient use of transportation dollars is critical when the nation is confronting growing deficits and persistent unemployment. Yet transportation projects are not all equally effective at creating jobs or stimulating economic growth. This article examines the relationships between transportation investments, short-term job creation, and longer-term economic growth. ➤

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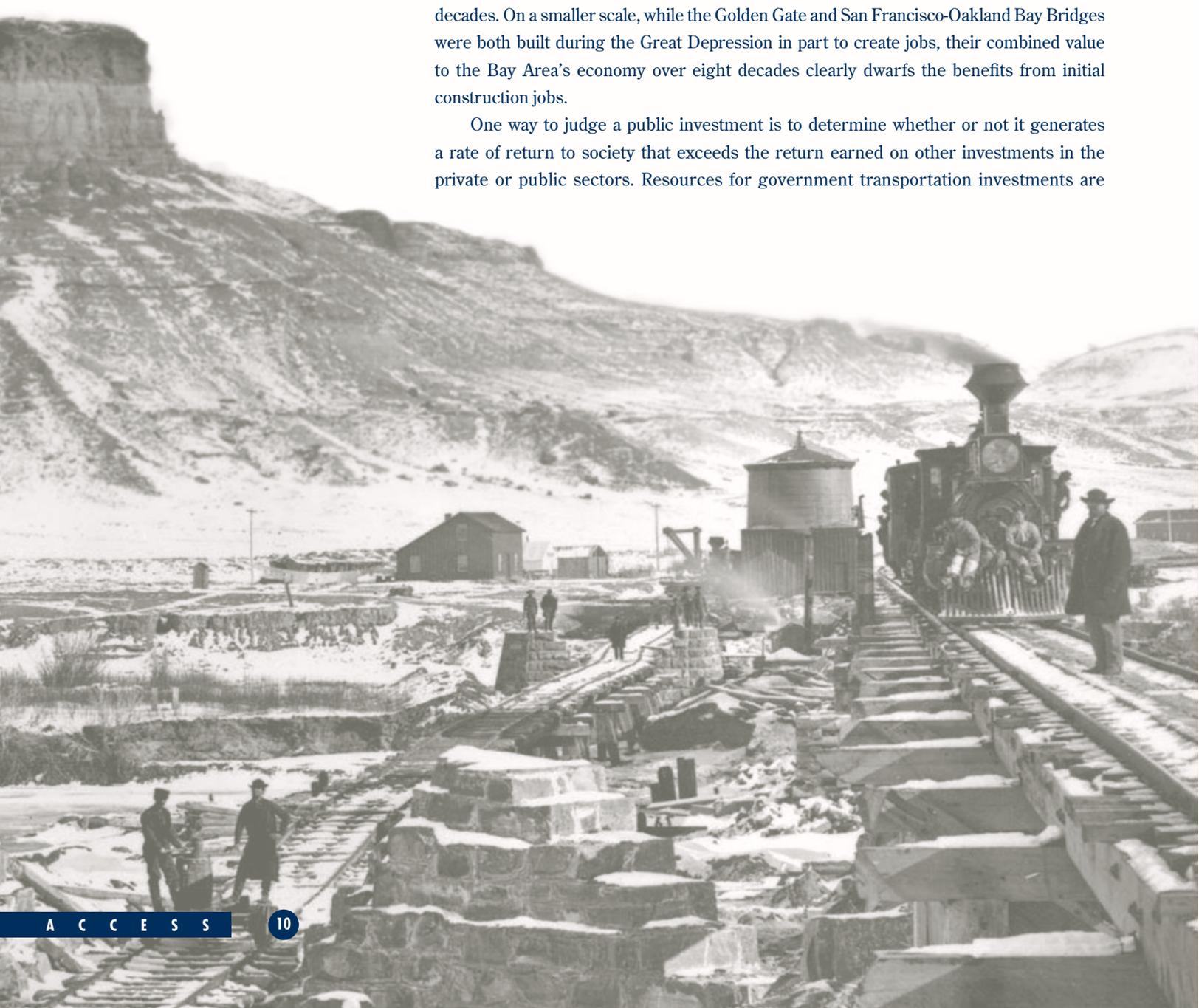


While transportation investment can “create jobs,” it can also destroy them.

Sound transportation investments lower the costs of moving people and goods. This increases economic productivity, which roughly can be measured as the output of goods and services per dollar of private and public investment. And improved productivity leads to a higher standard of living. Because productivity is a central component of economic growth, it should be of major concern when assessing the value of transportation expenditures. It is important to focus on improving productivity even when policymakers strive to serve other important long-term transportation objectives, such as improving safety, energy independence, and environmental sustainability. High-productivity transportation investments increase connectivity and reduce congestion; by doing so they improve economic well-being. Short-term job creation, while vitally important to economic recovery, should not cause us to ignore the longer-term view.

Building the Interstate Highway System created many construction jobs, but it would be a huge mistake to interpret that employment as the system’s contribution to the economy. Workers who drew salaries from the construction program benefitted, but far less than the travelers and shippers of goods who have used those facilities every day for six decades. On a smaller scale, while the Golden Gate and San Francisco-Oakland Bay Bridges were both built during the Great Depression in part to create jobs, their combined value to the Bay Area’s economy over eight decades clearly dwarfs the benefits from initial construction jobs.

One way to judge a public investment is to determine whether or not it generates a rate of return to society that exceeds the return earned on other investments in the private or public sectors. Resources for government transportation investments are



ultimately drawn from citizens and businesses through taxes or fees (like tolls), or borrowing. Had these dollars not been collected for transportation investments, they would have been put to other uses. Thus, the dollars used for these public investments constitute foregone opportunities to earn returns through private investments in businesses, or public investments in other programs ranging from schools to national parks. To be worthwhile undertakings, transportation investments should demonstrate that they raise the standard of living in the future as much, or more than, alternative private or public sector uses of the funds. To ensure the best use of taxpayer dollars, responsible officials should choose those projects yielding the highest returns. Most often that means transportation dollars should be spent on programs that most enhance long-term economic productivity.

TRANSPORTATION INVESTMENTS OFTEN REDISTRIBUTE RATHER THAN CREATE GROWTH

By building an effective transportation network, government transportation spending draws jobs to those industries that benefit from the investment. At the same time, this shift of resources moves jobs away from activities that would have been financed in the absence of the transportation investment. So while transportation investment can “create jobs,” it can also destroy them. The overall effect is positive only when it creates more and better jobs, or more and better economic activity, than it eliminates.

Determining whether a project’s effects are going to be positive or negative can be difficult. A transportation investment might shift jobs, not just across industries and sectors, but also across counties and states. Even a transportation investment that destroys more jobs than it creates can look good, especially in the short term, from the perspective of the winning state or city. Gains and losses might be unevenly distributed, temporally as well as spatially. For example, building an ill-advised rail line might give a local economy a short-term boost in employment, only to saddle taxpayers with large operating deficits in the future.

From a national perspective, and over time, gains that are immediate and obvious can be—and often are—outweighed by diffuse losses elsewhere. Suppose federal money was used to build a new highway link between a port and freight rail hub. The new link might cut delivery time within the region. The prospect of improved inventory management, increased sales, and other sources of profit would draw cargo to that port, increase port jobs, expand employment related to regional highway goods movement, and increase business at the rail hub. At the same time, it would likely reduce traffic to competing ports in other regions and create exactly the same chain reaction—in reverse—in those other areas. Employment would be lost as business is attracted to the competing port. The economy as a whole would be better off only if the increased productivity in the target area exceeded the cost of the highway investment and the loss of business in competing regions.

Not all transportation investments meet these criteria. In the example above, suppose the highway link was built not at the high-productivity port, but instead, because of political considerations, in a region that has a less-busy port with little congestion. While more people in the less-productive region are employed in the construction of the facility, people in the more-productive region are likely to lose jobs, and the overall effect is likely to be negative. That is precisely why a “bridge to nowhere” in one particular state is a >





Simply equating any transportation investment with jobs and gains for the economy cannot remain a sound basis for public policy.

poor national investment even though it may benefit construction workers and others where it is built. In Los Angeles, the Alameda Corridor freight rail project greatly improved connectivity between the ports and the ground freight shipment system, but some of its benefits must be offset by calculating the growth that it redirected away from other ports such as Seattle or Oakland, given that shipping is a highly competitive economic sector.

The Interstate Highway System, the nation's greatest transportation investment project, created jobs near interchanges when new businesses took advantage of the improved accessibility. At the same time, other towns that were bypassed "died on the vine." Most analysts and lay citizens believe that, overall, the gains exceeded the losses by an enormous margin, and thus that the Interstate System was justified as a national investment. But not every city, road, or interchange benefited equally.

TRANSPORTATION SPENDING AND THE MULTIPLIER EFFECT

When advocating federal spending on transportation projects that will benefit their jurisdictions, public officials often mention that each billion dollars of transportation infrastructure investment will create over 30,000 new jobs. This estimate relies on what is called the "multiplier effect." When money is spent on any public works project, the people who are paid to construct that project use the money they receive to buy services and goods from others. The money spent in any jurisdiction thus recirculates there and elsewhere, with the initial expenditure priming the pump of economic activity. Construction workers spend their income to buy hamburgers, television sets, and automobile insurance, so a given dollar of construction expenditure ends up having more than a dollar's worth of impact, thus "multiplying" the effect of the expenditure.

Unfortunately, asserting that any expenditure will create a specific number of jobs is not well supported by evidence. There are two problems with coarse estimates of the number of jobs that transportation spending will create. The first is that the number used is a gross estimate based on generalized mathematical models, and such estimates could be far off for any particular expenditure. Actual employment impacts vary dramatically from one project to another, even when focusing on short-term construction-related jobs. The second and more important problem is that, while short-term job creation is desperately sought during a deep recession, such crude estimates of job creation do not address the longer term economic impacts discussed earlier.

Transportation policy can have significant and lasting impacts on overall economic growth by promoting improved productivity, which in turn creates higher-paying jobs across the entire economy. But, in the short term, construction jobs and expenditures on steel and concrete are actually economic costs rather than benefits *unless* they contribute to long-term economic productivity. Proposals to invest money in surface transportation for the primary purpose of job creation present the nation with the serious risk that we will quickly build projects that will not necessarily grow the economy. There is no reason to believe that spending money on transportation projects creates more jobs in the short run than would spending money in other important economic sectors, like education and health care. We must also judge the social value of those projects in terms of their longer-term impacts on economic efficiency. If we rush to spend money in the hope that we can literally dig our way out of recession, well-intended spending on transportation for the purposes of job creation could fund investments that, in many cases, cost the economy far more in the longer term than they help it in the short term.

BALANCING LONG-TERM ECONOMIC GROWTH AND SHORT-TERM JOB CREATION

Ideally, well-chosen transportation investments can advance both long-term productivity growth and short-term job creation. If possible, governments should choose projects that are beneficial from a productivity perspective and also happen quickly enough to move the economy back toward full employment. A high-productivity investment that can be started quickly can produce a clear “win-win” outcome for the economy: The economy recovers more quickly and long-run productivity is enhanced. So, for example, building a high-speed freight highway to connect a congested port to a rail hub during a recession could be an excellent investment. It already offers a net benefit overall, and the construction jobs provide added benefits to society even though they are actually a cost to the project.

On the other hand, identifying a project as shovel-ready in no way assures that it will produce long-term net economic benefits. Likewise, a high-productivity investment may not be shovel-ready, and, despite great social value, it may not add short-term jobs. In practice, the long lags associated with environmental reviews, permitting, engineering design, site acquisition, and so forth have traditionally hampered the use of public works projects as an anti-recession policy.

To create or preserve jobs in the short term, it might be more effective to use federal dollars to subsidize the operations and maintenance of transportation systems. Dollars spent on operating bus lines, for example, are spent largely on labor and thus quickly recirculate in the local economy. By contrast, dollars spent on capital or construction projects may include costly expenditures on concrete and steel imported from outside the US. However, statutes and regulations limit the use of federal funds to cover operating and maintenance costs. These limitations stem from the belief that operating subsidies discourage efficiency by inviting those who operate the systems to rely on the subsidies instead of cutting their costs or increasing their revenues from tolls or fares. >



FURTHER READING

James Heintz, Robert Pollin and Heidi Garrett-Peltier. 2009. "How Infrastructure Investments Support the U.S. Economy: Employment, Productivity and Growth," Political Economy Research Institute and Alliance for American Manufacturing.

Douglas Holtz-Eakin and Martin Wachs. 2011. "Strengthening Connections between Transportation Investments and Economic Growth," Bipartisan Policy Center.

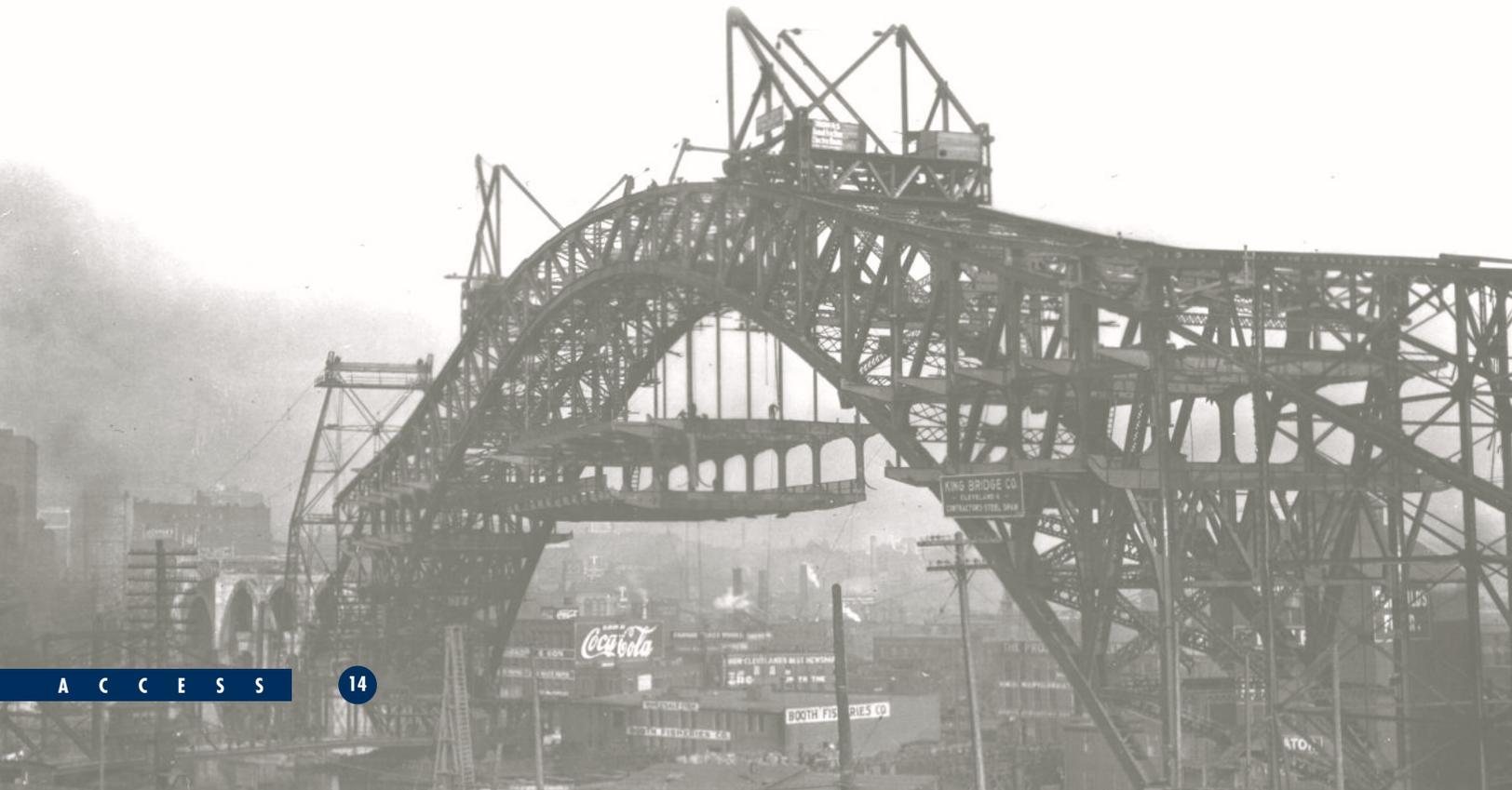
M. Ishaq Nadir and Theofanis P. Mamuneas. 1998. "Contribution of Highway Capital to Output and Productivity Growth in the US Economy and Industries," Federal Highway Administration.
<http://www.fhwa.dot.gov/policy/gro98cvt.htm>.

Brian Taylor and Kelly Samples. 2002. "Jobs, Jobs, Jobs: Political Perceptions, Economic Reality, and Capital Bias in US Transit Subsidy Policy," *Public Works Management and Policy*, 6 (4): 250-263.

US Department of Transportation, Federal Highway Administration. 2011. "Employment Impacts of Highway Infrastructure Investment,"
<http://www.fhwa.dot.gov/policy/otps/pubs/impacts/index.htm>.

These are legitimate concerns, yet it is inconsistent to recognize the goal of promoting efficiency when it comes to operations but to ignore it when spending money on "shovel ready" projects. And operating expenditures might be better than capital investments in both the short and long terms. Construction jobs do not inherently have higher multipliers than jobs driving buses, especially when bus routes are being curtailed to cope with deficits during a recession. Also, spending on operations might produce greater economic productivity benefits than capital projects. In the end, the economic productivity of alternative expenditures depends more on what is being built and which services are being offered, rather than on the number of jobs immediately saved or created. Yet this question is rarely asked and job creation remains the focus of political attention. During a recession, it might, in some cases, be appropriate to set aside limitations on operating subsidies rather than to fund capital investments that produce neither short-term jobs nor long-term economic growth. Doing so would more honestly amount to a "jobs" program than an economic growth program, and might have greater long-term benefits as well.

The perceived need to create jobs has spurred the Obama Administration and Congress to authorize \$35 billion in general fund transfers to the Highway Trust Fund and an additional \$27 billion through the American Recovery and Reinvestment Act (ARRA) to increase transportation spending. This means that the nation has increased its growing deficits to finance transportation projects in the hope of producing jobs in the short run, even though much of that spending could fail to contribute to longer-term economic growth. Moreover, in the past, spending on other worthy transportation projects to increase long-term economic productivity has proven to be too slow in getting started to alleviate unemployment in the short term. Thus, it is likely that some new spending will not be successful either at stimulating short-term employment or at creating long-term economic growth. Simply equating any transportation investment with jobs and gains for the economy cannot remain a sound basis for public policy. America needs to do a better job of systematically evaluating alternative investments so that we increase the returns from what are increasingly scarce funds available for transportation. ♦



Cash for Clunkers?

The Environmental Impact of Mexico's Demand for Used Vehicles

LUCAS W. DAVIS AND MATTHEW E. KAHN

OVER THE LAST TWO DECADES private vehicle ownership in the developing world has increased at an unprecedented pace. Between 1990 and 2005 the total number of registered vehicles in developing countries rose from 110 million to 210 million, and by some estimates it is forecast to reach 1.2 billion by 2030. Rising incomes explain a large share of this growth; as people get richer, they can afford the personal mobility that an automobile confers. Some of this demand for automobiles is satisfied when people in poor countries buy new vehicles. But another important, yet rarely discussed, factor is international trade in used vehicles. High-income countries export large numbers of used vehicles to low-income countries, and this trade will probably grow. ➤



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DOES EXPORTING VEHICLES EXPORT POLLUTION?

International trade in used vehicles between rich and poor countries functions as an informal “cash for clunkers” program: rich countries send used cars to poor countries, and poor countries send cash to rich countries. This trade has enormous implications for the mobility of people in developing countries, but it also has environmental consequences. Vehicles emit many local and global pollutants, and they are also a major source of carbon dioxide, the principal greenhouse gas associated with climate change. Older vehicles tend to be substantially dirtier than new ones, and people in poor countries tend to hold onto vehicles for longer than their counterparts in rich countries. As a result of the international trade in used vehicles, a car that is “retired” in the US or Japan can actually be driven for many years afterward in Mexico, Senegal, or another poor country.

What are the environmental results of the international trade in used vehicles? One possibility is represented by the “pollution havens” hypothesis, which says that trade liberalization will cause pollution to move to countries with lower environmental standards. If this hypothesis has merit, we should see heavily polluting vehicles being sent from rich countries to poor countries. However, even if poorer countries become

pollution havens, it does not automatically follow that trade makes pollution in the poor countries worse. What matters is not whether rich countries export heavily polluting cars to poor countries, but whether those cars pollute *more* than the cars *already in* poor countries. A vehicle too dirty to pass environmental muster in a developed nation might nevertheless be cleaner than the average vehicle in a less developed nation, meaning that a poor country might become a pollution haven yet simultaneously see the cleanliness of its vehicle fleet rise. Further, if the used cars exported from rich countries are replaced by newer, cleaner cars—as they most likely are—then trade could result in cleaner vehicle fleets in both the exporting and the importing nations.

But this happy conclusion depends on two factors: the length of time the exported vehicle stays on the road once it is in a poor country, and whether it replaces, rather than adds to, the vehicles in the existing poor-country fleet. A vehicle that is cleaner than average when it is imported will over time get dirtier, and if that vehicle is an addition to rather than a replacement for vehicles already in the poor country fleet, then overall emissions in that country could rise.

So what does happen as a result of this international trade? Because many factors influence the composition of a nation's vehicle fleet, it can be difficult to isolate the impact of the trade in used vehicles. The task is further complicated by the relative absence of detailed data on vehicles that flow across international borders. For example, the World Trade Organization tracks "automobile products," but doesn't distinguish between new and used vehicles. Media accounts suggest that the total volume of international trade in used vehicles is large, but there appear to be no comprehensive measures of this trade.

EVIDENCE ON TRADE FLOWS

Our attempt to measure the environmental impact of the trade in used vehicles circumvents these problems by examining the deregulation of US-Mexico trade in used cars and trucks following implementation of the North American Free Trade Agreement (NAFTA). Prior to 2005, Mexico prohibited the entry of virtually all used vehicles; exceptions were made for some agricultural vehicles. In August 2005, however, in accordance with the conditions of NAFTA, Mexico began allowing the import of vehicles that were between 10 and 15 years old from the United States and Canada. Virtually overnight a vigorous trade flow emerged, and between 2005 and 2008 over 2.5 million used vehicles were exported from the United States to Mexico. This represents a small fraction of the vehicle stock in the United States (about 232 million in 2005), but a substantial fraction of the vehicle stock in Mexico (about 22 million in 2005). This raw scale of imports suggests that international trade in used vehicles may have a significant effect on increasing pollution levels for the importing nation. But the actual environmental impact will depend on how much these vehicles are driven, their emissions per mile, and the transportation modes their new owners would have used in the absence of international trade.

To evaluate the environmental consequences of this trade pattern, we assembled the most comprehensive dataset ever compiled on the North American trade in used vehicles and vehicle emissions. We started with a dataset collected by the Mexican Customs Agency, which describes all vehicles imported into Mexico from the US between November 2005 and July 2008. The data show only those vehicles that were legally imported and thus received Mexican license plates; vehicles that entered Mexico temporarily (i.e., with a tourist permit) do not appear in these data. Our dataset allowed us to identify, at the >

What matters is not whether rich countries export heavily polluting cars to poor countries, but whether those cars pollute more than the cars already in poor countries.

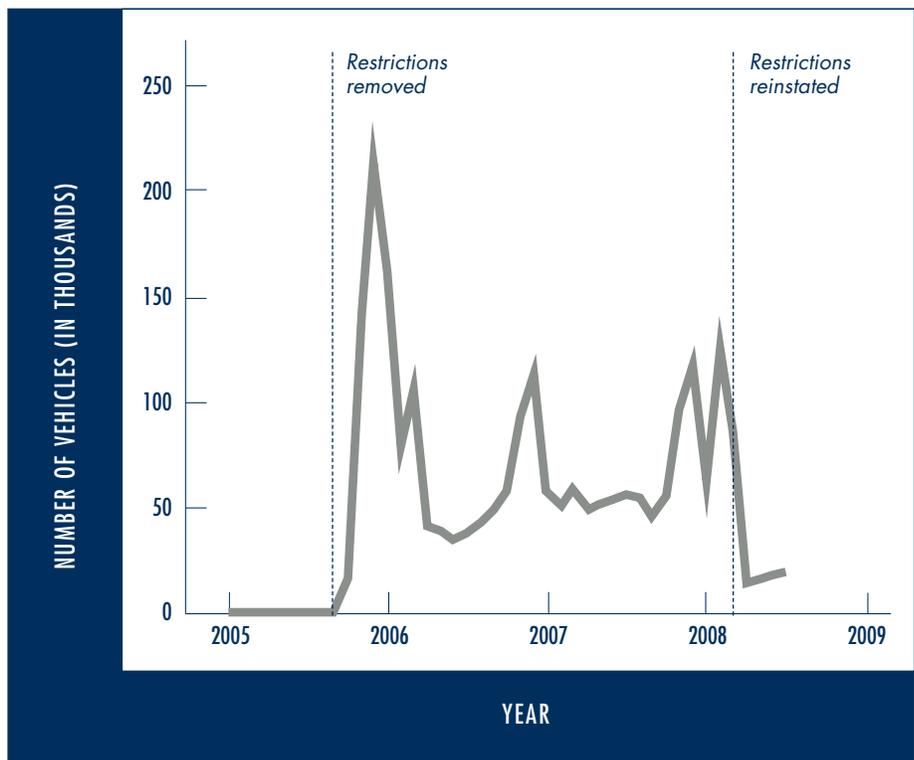
vehicle level (using vehicle identification numbers—VINs), which vehicles were traded. We combined these data with data on the overall vehicle fleets, by manufacturer and vintage, in the United States (from RL Polk) and in Mexico (from the Mexican Ministry of Public Safety). Finally, we merged these sources with data describing 7.2 million vehicles that were tested in 2005 under California’s Smog Check program.

Figure 1 shows the monthly trade flows of used vehicles into Mexico. The first vertical line indicates the policy change in August 2005 that removed restrictions for 10- to 15-year-old vehicles. The second vertical line in March 2008 indicates the second policy change when trade restrictions were reinstated. Trade spiked at the end of 2005, reaching 225,000 vehicles in December 2005. Similar smaller spikes occurred at the end of 2006 and 2007. After March 2008 trade continued but at a considerably slower pace.

DID TRADE MAKE MEXICO A VEHICLE POLLUTION HAVEN?

Our data allow us to examine every vehicle that was pollution-tested in California in 2005, and then, through the VIN, to identify which of these vehicles were subsequently exported to Mexico. The data therefore let us determine if vehicles that failed emissions tests were more likely to be exported. Vehicles that emit extremely high levels of pollutants are particularly detrimental to the environment; this small proportion of vehicles often contributes a large proportion of total emissions. We used a series of regression analyses to examine the probability that an exported vehicle failed emissions tests one or more times, as well as the probability that it was classified a gross polluter one or more times. (According to California law, a gross polluter is a vehicle that exceeds twice the allowable emissions for at least one pollutant.) The results show that exported vehicles

FIGURE 1
Monthly Trade Flows of Used Vehicles into Mexico



are significantly more likely to be gross polluters. Even after accounting for the model and vintage, exported vehicles are 27 percent more likely to have failed emissions testing three times. Trade does seem to have made Mexico a pollution haven.

ARE TRADED VEHICLES CLEANER OR DIRTIER THAN UNTRADED VEHICLES?

Table 1 shows some characteristics of the vehicles exported from the US to Mexico and compares them to the overall vehicle fleets in the US in 2005 and in Mexico in 2008. The average age of the traded vehicles is 11.4 years. The vehicle stock in the United States is newer and the stock in Mexico is older. Interestingly, whereas 10- to 15-year-old vehicles were eligible for trade, vehicles that were 10, 11, and 12 years old were traded much more often than older vehicles. Only vehicles produced in the United States and Canada were eligible for trade. This is apparent in Table 1, with Ford, Chevrolet, and Dodge representing 60 percent of all traded vehicles, but only 42 percent of the stock in the United States.

Do the vehicles sent from the United States to Mexico pollute more than the average vehicle in the United States? We can answer this question using our data from smog-tested vehicles in California. We used the records from the tests of these 7.2 million vehicles to estimate average emissions levels for vehicles of different manufacturers and vintages, and from there we estimate the average emissions of the vehicle fleets in the US and Mexico, and of the vehicles traded between them. >

TABLE 1

Characteristics of American, Mexican, and Traded Vehicles

	STOCK OF VEHICLES IN THE UNITED STATES IN 2005	VEHICLES THAT ENTERED MEXICO 2005–2008	STOCK OF VEHICLES IN MEXICO IN 2008
TOTAL NUMBER OF VEHICLES (millions)	232	2.45	24.8
MEAN VEHICLE AGE (in years)	8.8	11.4	13.7
VEHICLE MANUFACTURER (proportion)			
Ford	18%	33%	22%
Chevrolet	17%	17%	6%
Dodge	7%	10%	3%
Nissan	4%	7%	16%
Jeep	2%	6%	0%
Plymouth	1%	5%	0%
Mercury	2%	4%	1%
GMC	3%	3%	9%
Chrysler	2%	3%	6%
Pontiac	4%	2%	1%
Other	40%	10%	36%

TABLE 2

Characteristics of American, Mexican, and Traded Vehicles

	STOCK OF VEHICLES IN THE UNITED STATES IN 2005	VEHICLES THAT ENTERED MEXICO 2005–2008	STOCK OF VEHICLES IN MEXICO IN 2008
LOCAL POLLUTANTS:			
Hydrocarbons (parts per million)	39.9	44.4	50.7
Carbon Monoxide (percent)	0.147	0.153	0.215
Nitrogen Oxide (parts per million)	248	309	321
OTHER CHARACTERISTICS:			
Miles Per Gallon	23.8	23.5	22.3
Vehicle Weight (pounds)	3,516	3,708	3,460
Engine Size (liters)	3.47	3.70	3.45

Table 2 shows the results, and presents average emission levels for hydrocarbons, carbon monoxide and nitrogen oxide. Compared to the stock of vehicles in the United States, traded vehicles emit higher levels of all three local pollutants. The differences are substantial, ranging from 4 percent for carbon monoxide to 22 percent for nitrogen oxide. Compared to the stock of vehicles in Mexico, however, traded vehicles emit *lower* levels of all three local pollutants. Again, the differences are substantial, ranging from 4 percent for nitrogen oxide to 34 percent for carbon monoxide. The traded vehicles emit more than the average US vehicle, but less than the average Mexican vehicle.

The table also reports results for miles per gallon, vehicle weight, and engine size, all of which directly or indirectly measure vehicle fuel efficiency and, therefore, carbon dioxide emissions. Carbon emissions rise with total gasoline consumption. On average, traded vehicles are heavier and have larger engines than the stock of vehicles in both countries, but the differences are relatively small. Whereas local emissions vary across columns by as much as 20–30 percent, differences in miles per gallon vary by less than 5 percent.

CONCLUSION

Vehicle ownership and use continue to rise in the developing world. Some of the vehicles driven in the developing world are, and will be, manufactured there as well. The Tata Nano, for instance, is made in India and marketed specifically for poorer Indian drivers. But the developing world also imports used vehicles from the developed world. The United States sends tens of thousands of used vehicles to Mexico each year; Japan exports vehicles to over 100 different countries in Asia, Africa and the Middle East; and South Korea exports vehicles to Vietnam and Russia. Over 80 percent of the vehicle stock in Peru was originally imported as used vehicles from either the United States or Japan. Although these trade patterns have important environmental consequences, they have received little attention from economic researchers.

The trade in used vehicles can be thought of as an implicit cash-for-clunkers program. If other nations enact their own formal cash-for-clunkers programs, then they may well displace the international trade in used vehicles. While US households and new vehicle manufacturers would benefit from the domestic cash-for-clunkers programs, households in the developing world—who demand low-quality, cheap vehicles—would be made worse off. The social and environmental consequences of such incentive programs hinge on several behavioral parameters that our research has begun to examine. Our examination of NAFTA shows that the United States exports relatively high-polluting vehicles to Mexico but that these vehicles are cleaner than the average vehicle currently registered in Mexico. This suggests that trade lowers the average vehicle emissions in both countries. Since Mexico's total base of registered vehicles is much smaller than the United States, the composition shift is much more quantitatively important for Mexico than it is for the United States. However, whether this trade reduces *total* emissions, as opposed to average emissions, remains an unresolved question. The answer will depend on how long the imported vehicles are driven, and whether the existing vehicles in poor countries are scrapped as the cleaner imports arrive. As concern about both the local and global effects of vehicle travel grows, measuring the full impacts of the international trade in used vehicles will be increasingly important. ♦

FURTHER READING

Joyce Dargay, Dermot Gately, and Martin Sommer. 2007. "Vehicle Ownership and Income Growth, Worldwide: 1960-2030," *The Energy Journal*, 28 (4): 143-171.

Lucas W. Davis and Matthew E. Kahn. 2010. "International Trade in Used Vehicles: The Environmental Consequences of NAFTA," *American Economic Journal: Economic Policy*, 2 (4): 58-82.

World Bank Mexico Air Quality Management Team. 2002. "Improving Air Quality in Metropolitan Mexico City: An Economic Valuation," Policy Research Working Paper 2785.

World Trade Organization. 2007. *International Trade Statistics 2007*, Geneva: World Trade Publications.



The Impact of Carsharing on Household Vehicle Ownership

ELLIOT MARTIN AND SUSAN SHAHEEN

CARSHARING IN NORTH AMERICA IS CHANGING the transportation landscape of metropolitan regions across the continent. Carsharing systems give members access to an automobile for short-term use. The shared cars are distributed across a network of locations within a metropolitan area. Members can access the vehicles at any time with a reservation and are charged by time or by mile. Carsharing thus provides some of the benefits of personal automobility without the costs of owning a private vehicle.



Carsharing has grown to more than 20 major metropolitan regions throughout the US and Canada. As of January 2011, North American carsharing companies served almost 604,000 members with about 10,000 vehicles.

Carsharing can reduce household vehicle ownership because the service can eliminate the need for a private vehicle to complete non-work trips. In this way, carsharing provides members with an automobile only when needed. Typically, several members throughout the day access a shared vehicle. Vehicles are most frequently parked in dense urban areas with good public transportation services. The shared vehicles eliminate upfront ownership costs, but members still maintain auto access while leading a less car-dependent lifestyle.

Advocates for carsharing have frequently argued that the service not only reduces vehicle ownership, but also improves fuel efficiency, because carshare vehicles tend to be more fuel efficient than the average vehicle. While sensible, to date these claims have been hard to evaluate because data have been difficult to acquire. We conducted a survey to evaluate these claims and found strong evidence to support them.

MEASURING THE SCOPE AND IMPACT OF CARSHARING

In late 2008, we conducted an online survey of North American carsharing members. The survey reached members of the carsharing industry's leading organizations: AutoShare, City CarShare, CityWheels, Community Car Share of Bellingham, CommunAuto, Community Car, Co-operative Auto Network, IGo, PhillyCarShare, VrtuCar, and Zipcar.

We asked respondents about their household's travel behavior during the year before they joined carsharing, and about their travel behavior "at present." We also asked how many vehicles the household owned before joining carsharing and at the time of the survey. We asked about households, rather than individuals, because carsharing can affect the travel patterns of multiple people in the same household, even if only one person in the household is a carshare member. For example, a married couple may commute to jobs in separate locations, both by automobile. The husband then joins carsharing and starts to commute by public transit, but the couple keeps "his" car because it is newer. They shed the wife's vehicle and she uses the remaining car for her commute once they become a one-car household. In this case, surveying at the individual level might wrongly suggest that carsharing had not resulted in a vehicle reduction. Surveying at the household level helps avoid this problem.

We also collected data on the make, model, and year of each vehicle within the household both before joining carsharing and at the time of the survey. This information was used to determine the vehicle's fuel economy by linking each vehicle to an appropriate entry in the Environmental Protection Agency (EPA) fuel economy database, which contains information on cars built since 1978. In addition, we asked questions about >



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the make and model of the carsharing vehicle that members drove most often and whether they would have purchased a car in the absence of carsharing.

In the end, we had responses from 6,281 households in carsharing organizations that use the “neighborhood” business model. The neighborhood business model consists of carsharing vehicles positioned in residential and mixed-use neighborhoods for use by local residents, and represents about 90 percent of the industry’s membership base. Two business models we did not consider in this analysis were the college and corporate business models, which represent smaller and distinct markets within the industry.

VEHICLES SHED AS A RESULT OF CARSHARING

We found that carsharing lowers the total number of vehicles owned by members. Across the sample, households owned 2,968 vehicles before carsharing, which translates to 0.47 vehicles per household. After carsharing, the sample owned 1,507 vehicles, or 0.24 vehicles per household. The difference between these means (–0.23) is statistically significant at the 99 percent confidence level. Notably, much of this shift involved house-

holds becoming carless: 80 percent of the sample owned no vehicle after joining carsharing. Most of this shift was the result of one-car households becoming no-car households. A smaller change occurred with two-car households becoming one-car households.

Carsharing not only reduces the number of personal vehicles owned across the sample; it can also deter carless households from acquiring a vehicle. Most of the households that join carsharing are carless: 62 percent of households joining carsharing owned no vehicle when they joined, while 31 percent of households owned one vehicle. That is, some carsharing members who consider buying a car ultimately decide against it and use carsharing instead. This effect is hard to measure because a decision *not* to purchase something is hard to observe. However, in the survey we asked respondents whether in the absence of carsharing they would buy a car. The available responses included “definitely not,”



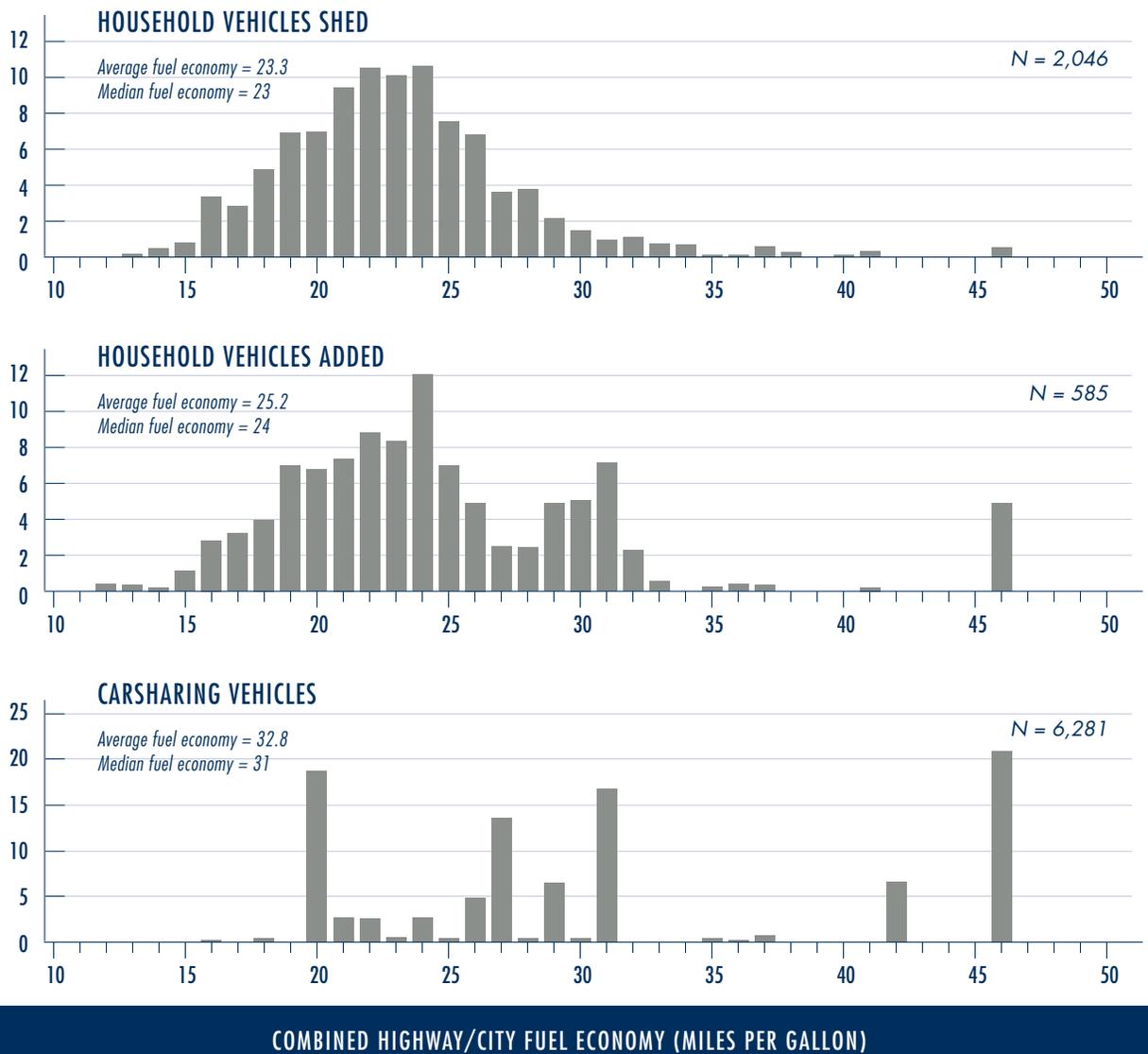


FIGURE 1
 Fuel Economy of Household and Carsharing Vehicles

“probably not,” “maybe,” “probably,” and “definitely.” This question gives insight into the degree to which carsharing substituted for a personal vehicle that would have been purchased. About 25 percent of the total sample indicated that they “maybe,” “probably,” or “definitely” would buy a car in the absence of carsharing.

FUEL ECONOMY AND AGE OF VEHICLES ADDED AND SHED

Figure 1 shows the distribution of the fuel economy of vehicles shed, added, and used by carsharing households. The average fuel economy of vehicles shed is 23 mpg and the fuel economy of vehicles added has a slightly higher average of 25 mpg. The average fuel economy of carsharing vehicles is much higher, at 33 mpg. Hence, the average carsharing vehicle is about 10 mpg more efficient than the average vehicle shed by >

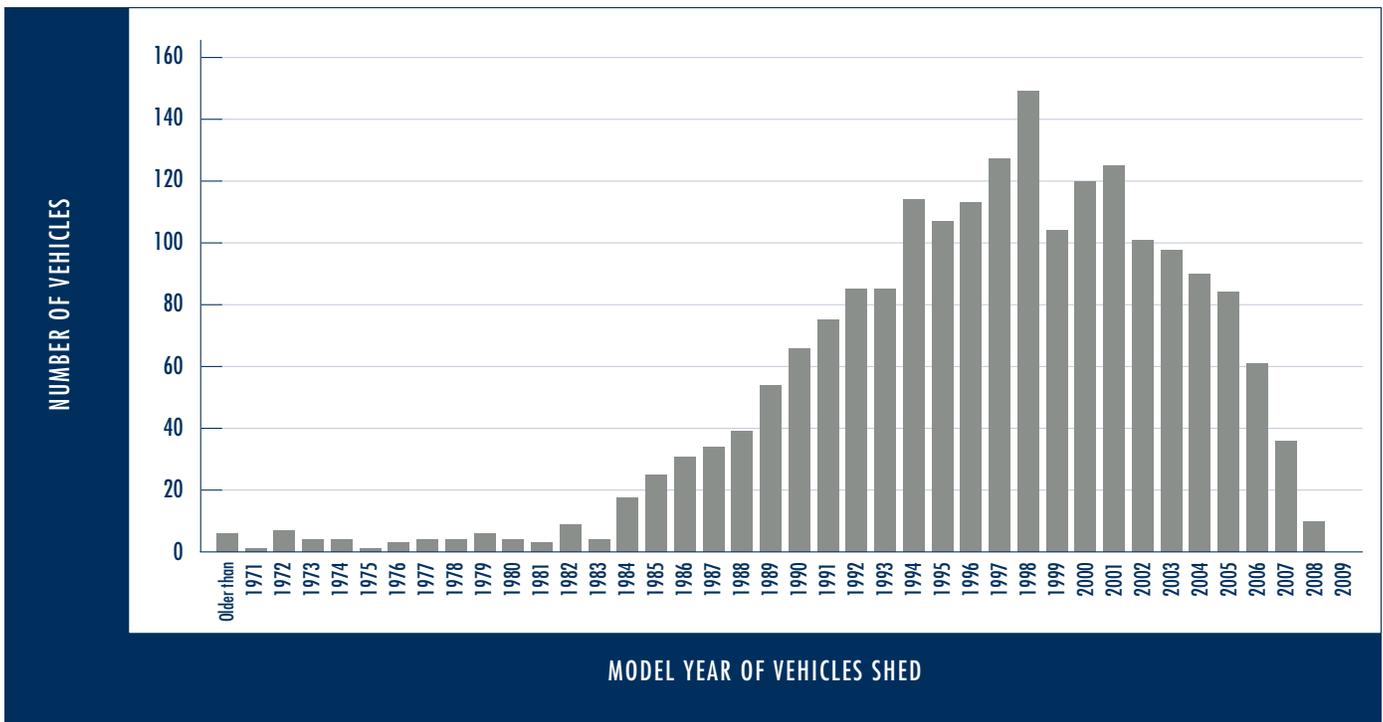


FIGURE 2

Distribution of Vehicles Shed by Model Year

members. While carsharing organizations offer a variety of vehicle types to members, the majority are highly efficient hybrids, sedans, and compact cars.

The age of the vehicles that people shed after joining carsharing varies considerably. About 60 percent of the vehicles shed by the sample are between 5 and 15 years old, which falls within a typical vehicle life. Nearly 15 percent are newer than 5 years, while the remaining 25 percent are older than 15 years. The diversity of vehicles shed is evident in Figure 2, which shows the distribution of all shed vehicles by model year.

These results show that carsharing members reduce their ownership of older vehicles and shift their driving towards newer, more efficient vehicles. However, these results do not quantify the trade-off between personal vehicles shed and the new vehicles added to the road by carsharing organizations. What is the net effect of this trade-off?

To evaluate this question, we need to understand the population represented by this sample. As mentioned earlier, the sample covers the neighborhood business model of the carsharing industry, which is by far the largest. In addition, some households have two carsharing members, and since the impact is expressed in household units and not members, the population of households is smaller than the population of members. Finally, some carsharing members are inactive in their membership (i.e., they do not use carsharing very frequently). Such members can exist within plans that permit member-

ship at little or no cost, and they represent about 10 percent of our sample. In our study, we considered the impact of inactive members to be zero; we do not ascribe their observed changes in vehicle ownership to carsharing because they rarely use the service. When considering these factors, we estimate that the population represented by this sample consisted of between 189,000 and 267,000 households actively using carsharing. Given the roughly 9,800 vehicles deployed by the organizations at the time of the survey, we estimate that approximately four to six vehicles were *shed* for every carsharing vehicle. The shed vehicles do not include vehicles that were *not purchased* due to carsharing. When we consider the vehicles potentially not purchased (as defined earlier) in addition to those shed, we estimate that every carsharing vehicle removes between 9 and 13 other vehicles from the road.

CONCLUSION

Carsharing can substantially reduce the number of vehicles owned by member households, despite the fact that 60 percent of all households joining carsharing are carless. Households joining carsharing owned an average of 0.47 vehicles per household before joining carsharing, but that average dropped to 0.24 after membership. Carshare households exhibited a dramatic shift towards a carless lifestyle. The vehicles shed are often older, and the carsharing fleet is an average of 10 mpg more efficient than the vehicles shed.

Given North America's shifting demographics, urban environments, and industry dynamics, additional research on the impacts of carsharing is warranted. As carsharing continues to grow, its impact may expand. Carsharing represents an attractive alternative for carless households, but such households are a minority in North America at present. In the future, as carsharing networks grow and become more established, their attractiveness to vehicle-owning households may increase. Further, carsharing may expand into lower-density communities, such as the suburbs, through peer-to-peer carsharing (carsharing in which the vehicle fleet is member-owned through the use of personal vehicles as part-time carsharing vehicles). Thus, while this study shows that carsharing has already had a significant and measurable impact in many metropolitan regions, industry growth into new markets may produce much greater environmental benefits in the future. ♦

Acknowledgments

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FURTHER READING

Robert Cervero, Aaron Golub, and Brendan Nee. 2007. "City Carshare: Longer-Term Travel Demand and Car Ownership Impacts," *Transportation Research Record: Journal of the Transportation Research Board*, 1992: 70–80.

Clayton Lane. 2005. "PhillyCarShare: First-Year Social and Mobility Impacts of Carsharing in Philadelphia, Pennsylvania," *Transportation Research Record: Journal of the Transportation Research Board*, 1927: 158–166.

Elliot Martin and Susan Shaheen. 2010. "Greenhouse Gas Emission Impacts of Carsharing in North America," Mineta Transportation Institute, San Jose State University.

Elliot Martin, Susan Shaheen, and Jeffrey Lidicker. 2010. "Impact of Carsharing on Household Vehicle Holdings: Results from a North American Shared-Use Vehicle Survey," *Transportation Research Record: Journal of the Transportation Research Board*, 2143: 150–158.

Susan Shaheen, Adam Cohen, and Melissa Chung. 2009. "Carsharing in North America: A Ten-Year Retrospective," *Transportation Research Record: Journal of the Transportation Research Board*, 2110: 35–44.

Free Parking or Free Markets

DONALD SHOUP

It is no doubt ironic that the motorcar, superstar of the capitalist system, expects to live rent-free.

WOLFGANG ZUCKERMAN



CITIES SHOULD CHARGE THE RIGHT PRICES FOR CURB PARKING because the wrong prices produce such bad results. Where curb parking is underpriced and overcrowded, a surprising share of cars on congested streets can be searching for a place to park. Sixteen studies conducted between 1927 and 2001 found that, on average, 30 percent of the cars in congested downtown traffic were cruising for parking. More recently, when researchers interviewed drivers stopped at traffic signals in New York City in 2006 and 2007, they found that 28 percent of the drivers on a street in Manhattan and 45 percent on a street in Brooklyn were cruising for curb parking.

In another study in 2008, the average time it took to find a curb space in a 15 block area of the Upper West Side of Manhattan was 3.1 minutes and the average cruising distance was 0.37 miles. For each individual driver, 3.1 minutes is not a long time, and 0.37 miles is not a long distance, but because there are so many drivers, the cumulative consequences are staggering. In a year, cruising for underpriced parking on these 15 blocks alone creates about 366,000 excess vehicle miles of travel (equal to 14 trips around the earth) and 325 tons of CO₂.

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PERFORMANCE PARKING PRICES

Free curb parking in a congested city gives a small, temporary benefit to a few drivers who happen to be lucky on a particular day, but it imposes large social costs on everyone else every day. To manage curb parking and avoid the problems caused by cruising, some cities have begun to adjust their curb parking prices by location and time of day. These cities do not have a complicated pricing model, and they do not aim to raise a certain amount of revenue. Instead, they have established a target *occupancy*: they aim to produce about an 85 percent occupancy rate for curb parking, which on a typical block with eight curb spaces corresponds to one open spot. The price is too high if many spaces are vacant and too low if no spaces are vacant. But if one or two spaces are vacant on a block and drivers can reliably find open curb spaces at their destinations, the price is just right. We can call this the Goldilocks principle of parking prices.

Some cities refer to the policy of setting prices to produce one or two open curb spaces on every block as *performance pricing*. It can improve performance in three ways. First, curb parking will perform more efficiently. If all but one or two curb spaces are occupied on every block, parking will be well used but also readily available. Second, the transportation system will perform more efficiently because cruising for curb parking will not congest traffic, waste fuel, pollute the air, and waste drivers' time. Third, the local economy will perform more efficiently. In business districts, drivers will park, buy something, and leave promptly, allowing other customers to use the spaces. ➤

If most curb spaces are filled, parking meters can't be chasing all the customers away.

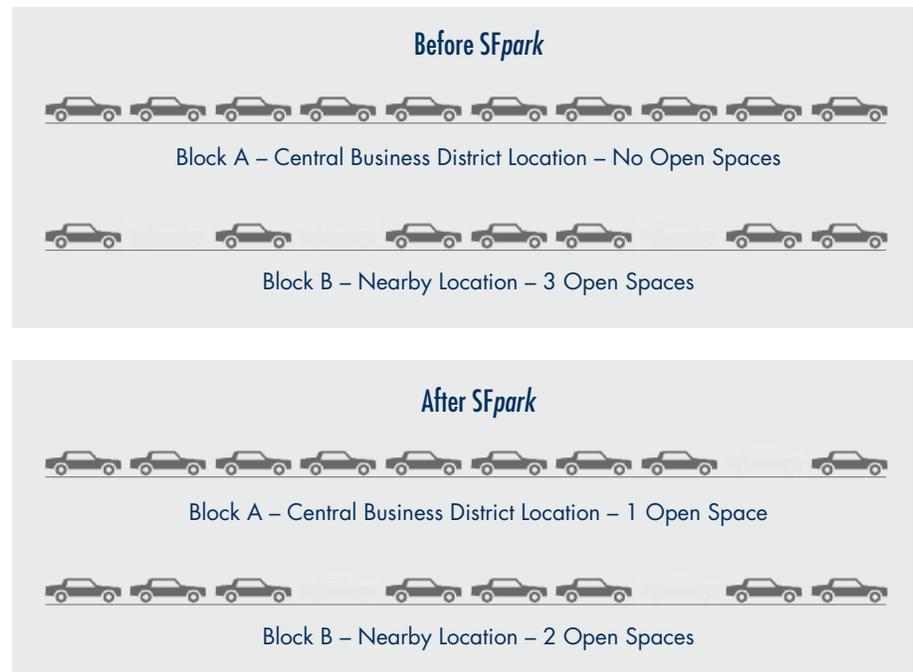
SFPARK

San Francisco has embarked on an ambitious program, called *SFpark*, to get the prices of curb parking right. The city has installed meters that charge variable prices and sensors that report the occupancy of each space in real time. The city will thus have information on curb occupancy rates and the ability to adjust prices in response to the occupancy rates. The city intends to adjust prices once a month, never by more than 50¢ an hour. By nudging prices up or down in a trial-and-error process, the city will seek a structure of prices that vary by time and location throughout the city, yielding one or two open spaces on every block.

SFpark embodies two important ideas. The first is that you cannot set the right price for curb parking without observing the occupancy. The goal is to set the price that will yield one or two open spaces on every block; this is the lowest price the city can charge without creating a parking shortage. The second is that small changes in parking prices and location choices can lead to big improvements in transportation efficiency. Figure 1 shows that nudging up the price on crowded Block A by enough to shift only one car to less crowded Block B can significantly improve the performance of the transportation system. This shift will eliminate cruising on Block A and take advantage of the empty spaces on Block B. Even if all the curb spaces are occupied on all the nearby blocks, shifting only one car per block from a curb space to nearby off-street parking can also eliminate cruising.

Beyond managing the curb parking supply, *SFpark* can help depoliticize parking by stating a clear principle for setting the prices for curb spaces: the demand for parking will set the prices. After shifting from a revenue goal to an outcome goal for the parking system and choosing the occupancy rate for the desired outcome, the city council will no longer have to vote on parking prices. If too many curb spaces are vacant, the price will go down, and if no curb spaces are vacant, the price will go up. Wanting more revenue will no longer justify raising prices. Relying on the power of an impersonal market test to set prices makes an end run around the politics of parking.

FIGURE 1
Performance Prices Create Open Spaces on Every Block



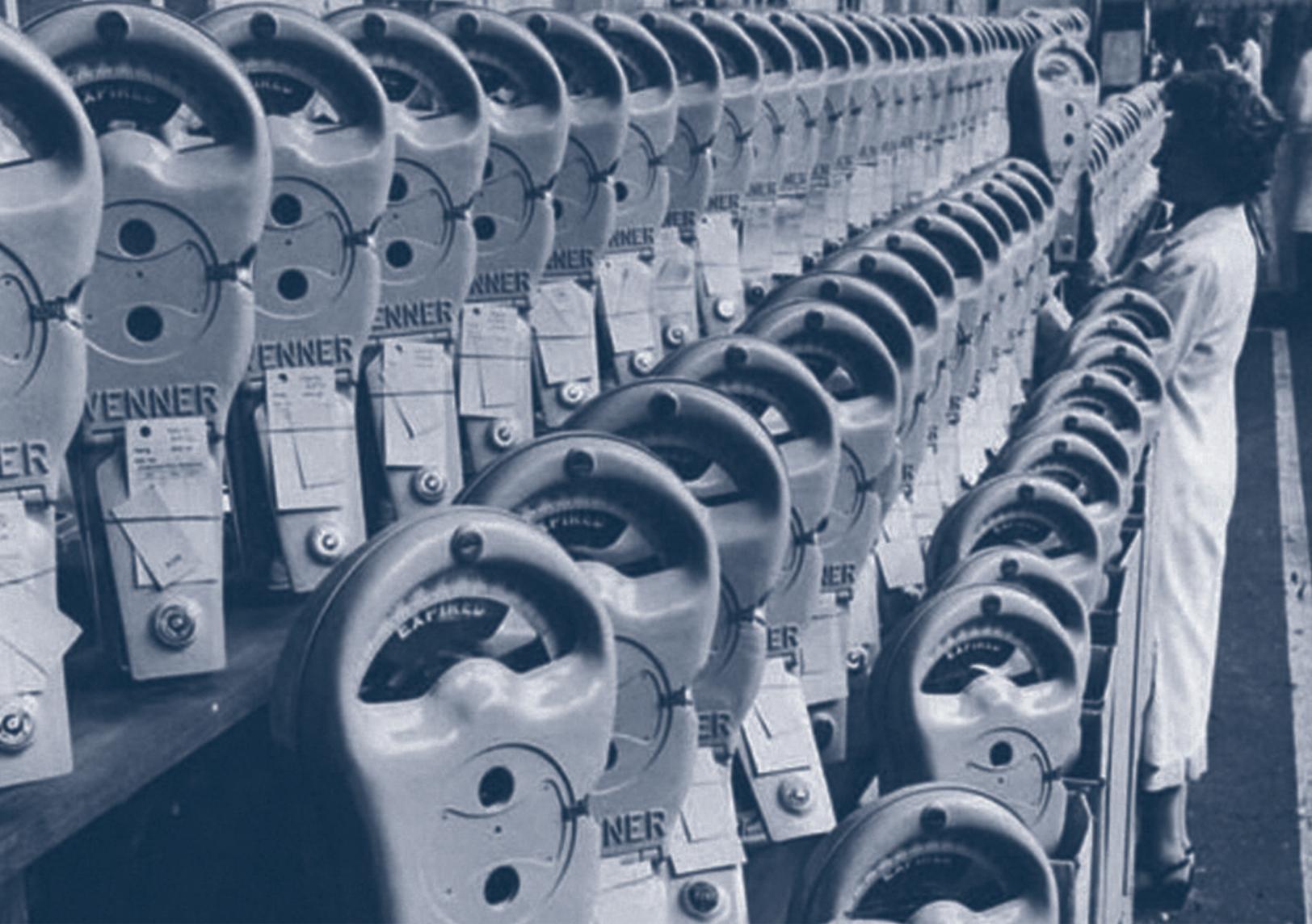


IF THE PRICE IS RIGHT, CUSTOMERS WILL COME

Proposals to increase parking prices or run the meters later in the evening usually provoke vehement complaints like, “If this city operates the parking meters in the evening, I will never drive downtown to eat in a restaurant again.” This threat to boycott downtown restaurants would be a convincing argument if many curb spaces remained empty after the meters began operating in the evening. But this threat ignores the key argument for performance prices: If the meters are priced right, cars will fill most of the curb spaces, leaving only one or two vacant spaces on each block. If most curb spaces are filled, parking meters can’t be chasing all the customers away.

Meters *will* chase away some drivers, but the curb spaces these drivers would have occupied will become available to customers who are willing to pay for parking if they can easily find a convenient curb space. Because the curb spaces will remain almost fully occupied, merchants shouldn’t worry that performance prices will harm their businesses. And who is likely to leave a bigger tip for the waiters in a restaurant? Drivers who are willing to pay for convenient curb parking if they can always find an open curb space? Or drivers who will come only if they can park free after circling the block a few times to find free parking?

Both common sense and empirical research suggest that performance-priced curb parking will motivate more people to carpool, because carpoolers can share the cost of parking while a solo driver pays the full cost. Drivers who pay to park may arrive with two, three, or four customers in a car. Further, performance prices will promote faster turnover because drivers will pay for as long as they park. If a curb space turns over twice during the evening, each space can deliver two groups of diners to a restaurant. For both reasons—higher-occupancy vehicles and faster turnover—performance prices for curb parking will attract more customers to a business district. With more customers, >



restaurants can expand and hire more waiters and pay more in sales taxes. Charging performance prices to manage curb parking can thus benefit many people.

A further advantage of performance prices is that they will decline when demand declines during a recession. The price of curb parking will automatically fall to keep the customers coming. The cheaper curb parking will help businesses survive and prevent job losses. But if curb parking prices remain high during a recession, curb spaces will be under-occupied, stores will lose customers, and more people will lose jobs.

If cities eliminate cruising by charging performance prices for curb parking, where will the cruising cars go? Because drivers will no longer have to arrive at their destinations 5 to 10 minutes early to search for a curb space, their vehicle trips will be 5 to 10 minutes shorter. The reduction in traffic will come not from fewer vehicle trips but from shorter vehicle trips.

Everybody wants something for nothing, but we shouldn't promote free parking as a principle for transportation pricing and public finance. Using performance prices to manage curb parking can produce a host of benefits for businesses, neighborhoods, cities, transportation, and the environment. Parking wants to be paid for.

REMOVING MINIMUM PARKING REQUIREMENTS

Reforms involve not only adopting good policies but also repealing bad policies. Requiring all buildings to provide ample parking is one such bad policy that cities should repeal. Some cities have begun to remove minimum parking requirements, at least in their downtowns, for two reasons. First, parking requirements prevent infill redevelopment on small lots where fitting both a new building and the required parking is difficult and expensive. Second, parking requirements prevent new uses for many older buildings that lack the parking spaces required for the new uses.

A search of newspaper articles found 129 reports of cities that have removed off-street parking requirements in their downtowns since 2005. Although newspaper articles don't represent what all cities are doing, they do include many comments on *why* cities are changing their policies. At least in downtown business districts, some elected officials think that parking requirements put the brakes on what they want to happen and accelerate what they want to prevent. Some of the reasons given for removing parking requirements are “to promote the creation of downtown apartments” (Greenfield, Massachusetts), “to see more affordable housing” (Miami), “to meet the needs of smaller businesses” (Muskegon, Michigan), “to give business owners more flexibility while creating a vibrant downtown” (Sandpoint, Idaho), and “to prevent ugly, auto-oriented townhouses” (Seattle).

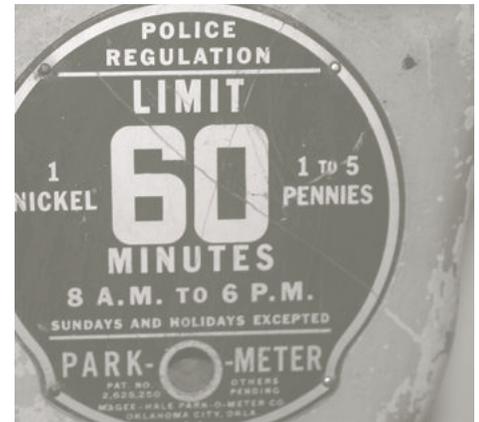
Removing a parking requirement is not the same, however, as restricting parking or putting the city on a parking diet. Rather, parking requirements force-feed the city with parking spaces, and removing a parking requirement simply stops this force-feeding. Ceasing to require off-street parking gives businesses the freedom to provide as much or as little parking as they like. Cities can remove minimum requirements without imposing maximum limits, and opposition to maximum parking limits should not be confused with support for minimum parking requirements.

AN EXAMPLE FROM DOWNTOWN LOS ANGELES

Many older downtowns have some wonderful buildings in terrible condition. Minimum parking requirements make restoring these historic buildings difficult or impossible, because they rarely have all the parking spaces cities require for new uses. Spring Street in Los Angeles, once known as the Wall Street of the West, is a prime example. It has the nation's largest collection of intact office buildings built between 1900 and 1930. Starting in the 1960s, the city's urban renewal program moved most office uses a few blocks west to Bunker Hill and left many splendid Art Deco and Beaux Arts buildings on Spring Street vacant except for retail uses on the ground floor.

In 1999, Los Angeles adopted its Adaptive Reuse Ordinance (ARO) that allows the conversion of economically distressed or historically significant office buildings into new residential units—with no new parking spaces. Before 1999, the city required at least two parking spaces per condominium unit in downtown Los Angeles. Michael Manville studied the results of the ARO and found that many good things can happen when a city removes its parking requirements.

Developers used the ARO to convert historic office buildings into at least 7,300 new housing units between 1999 and 2008. All the office buildings had been vacant for at least five years, and many had been vacant much longer. By contrast, only 4,300 housing units were added in downtown between 1970 and 2000. ➤



*Parking wants
to be paid for.*

FIGURE 2

Office Building in Los Angeles
Converted to Residential Use
Without Adding On-Site Parking



Skeptics doubted that banks would finance developers who wanted to convert office buildings into residential condominiums without two parking spaces each, but the skeptics were proved wrong. Developers provided, on average, only 1.3 spaces per unit, with 0.9 spaces on-site and 0.4 off-site in nearby lots or garages. Had the ARO not been adopted, the city would have required at least two *on-site* spaces for every condo unit, or more than twice as many as developers did provide. Manville noted, “The ability to supply parking off-site helped developers simultaneously satisfy lenders, minimize development costs, and maximize the potential of an old building.” Deregulating both the *quantity* and the *location* of parking for the new housing was a key factor in restoring and converting the 56 office buildings Manville studied. Manville concluded that removing the parking requirements “led to both *more* housing and a greater *variety* of housing. Not only were more units built, but these units were constructed in buildings and neighborhoods that had long been stagnant and underused. Further, developers unbundled parking prices from housing prices in almost half of these buildings, allowing them to target an underserved demographic—people without cars.”

The ARO also produced other benefits. It allowed the preservation of many historic buildings that had been vacant for years and might have been demolished if minimum parking requirements had remained in place. Historic buildings are a scarce resource in any city, and the evidence shows that parking requirements stood in the way of preserving these buildings. The ARO applied only to downtown when it was adopted in 1999, but the benefits were so quickly apparent that it was extended citywide in 2003. We usually can’t see things that don’t happen or count things that don’t occur, but the beautifully restored buildings on Spring Street give us some idea of what parking requirements often prevent.

A QUIET REVOLUTION IN PARKING POLICIES

Requiring Peter to pay for Paul’s parking, and Paul to pay for Peter’s parking, is a bad idea. People should pay for their own parking, just as they pay for their own cars and gasoline and tires. Parking requirements hide the cost of parking, but they cannot make it go away, and free parking often means fully subsidized parking. At the very least, parking requirements should carry strong warning labels about all the dangerous side effects.

Despite institutional inertia in the practice of planning for parking, reforms are sprouting. Paradigm shifts in urban planning are often barely noticeable while they are happening, and afterward it is often hard to tell anything has changed. But shifts happen. Planners simply begin to understand cities in a new way and can scarcely remember a time when they understood cities differently. The incremental reforms now under way suggest that off-street parking requirements will not quickly disappear but will gradually erode. Cities may slowly shift from minimum parking requirements to performance parking prices without explicitly acknowledging that planning for parking had ever gone wrong. Eventually, however, planners may realize that minimum parking requirements were a poisoned chalice, providing ample free parking while hiding the many costs. They may then marvel at how their predecessors could have been so wrong for so long. ♦



FURTHER READING

Michael Manville. 2010. “Parking Requirements as a Barrier to Housing Development: Regulation and Reform in Los Angeles,” UCLA Lewis Center Working Paper, University of California, Los Angeles. http://www.its.ucla.edu/research/rpubs/Manville_ARO_DEC_2010.pdf.

Bruce Schaller. 2006. “Curbing Cars: Shopping, Parking and Pedestrian Space in SoHo,” New York: Transportation Alternatives. http://www.transalt.org/files/newsroom/reports/soho_curbing_cars.pdf.

Donald Shoup. 2011. *The High Cost of Free Parking*, revised edition, Chicago: Planners Press.

Transportation Alternatives. 2007. “No Vacancy: Park Slope’s Parking Problem and How to Fix It,” New York: Transportation Alternatives. <http://www.transalt.org/files/newsroom/reports/novacancy.pdf>.

Transportation Alternatives. 2008. “Driven to Excess: What Under-Priced Curbside Parking Costs the Upper West Side,” New York: Transportation Alternatives. http://www.transalt.org/files/newsroom/reports/driven_to_excess.pdf.

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B O O K S

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Boarnet, Marlon and Randall Crane
Travel by Design: The Influence of Urban Form on Travel
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The Transportation Experience: Policy, Planning, and Deployment
(Oxford University Press, 2005)

Hall, Peter Geoffrey
Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century
(Blackwell Publishers, 2002)

Jacobs, Allan B., Elizabeth S. Macdonald, and Yodan Y. Rofé
The Boulevard Book: History, Evolution, Design of Multi-Way Boulevards
(MIT Press, 2002)

Loukaitou-Sideris, Anastasia and Renia Ehrenfeucht
Sidewalks: Conflict and Negotiation over Public Space.
(MIT Press, 2009)

Shoup, Donald C.
The High Cost of Free Parking
(Planner's Press, 2005)

Shoup, Donald C.
Parking Cash Out
(Planning Advisory Service, 2005)

Sperling, Daniel and James Cannon, eds.
Driving Climate Change: Cutting Carbon from Transportation
(Elsevier Academic Press, 2006)

Sperling, Daniel and James Cannon, eds.
The Hydrogen Energy Transition: Moving Toward the Post Petroleum Age in Transportation
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Sperling, Daniel and Deborah Gordon
Two Billion Cars: Driving Toward Sustainability
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Life in the Fast Lane

BY ERIC A. MORRIS

According to Lee Friedman, Donald Hedeker, and Elihu Richter, repealing the federal 55 mph speed limit in 1995 resulted in 12,545 deaths between 1995 and 2005. That's about 45 percent more American fatalities than we have suffered in 9/11, Iraq, and Afghanistan combined. And all those human tragedies are due not to weighty national security imperatives but to the fact that we all want to drive a little bit faster.

Why is driving faster so dangerous? At higher speeds you have to react more quickly and you have less margin for error, increasing accident risk. Kara Kockelman and fellow researchers at the University of Texas at Austin have reported that being on a road with a 65-mph limit instead of 55 mph means a 3 percent higher probability of crashing.

A much more significant factor is that the extra speed makes crashes that do occur far deadlier. The Texas researchers estimated that, compared to a crash on a 55-mph-limit road, a crash on a 65-mph road is 24 percent more likely to be fatal. When the greater severity and higher incidence of crashes are added together, the difference between 55 mph and 65 mph adds up to a 28 percent increase in the overall fatality count.

In addition to lives, increased speed limits are costing us treasure. While the difference between 55 mph and 65 mph may not seem large, the relationship between speed and fuel economy is highly non-linear due to engine characteristics and the physics of wind resistance. A car that gets 30 mpg at 55 mph gets about 27.5 mpg at 65 mph and 23.1 mpg at 75 mph. Higher speeds thus mean greater fuel costs and more dependence on foreign oil, a relationship that inspired the national speed limit in the first place. Reduced fuel economy also means more greenhouse gas emissions.

That said, even after reading this, are you about to write to Congress to demand a return to 55 mph? Probably not, because there are other dynamics at play: the thrill of speed and the value of time savings.

It's difficult to calculate the economic benefits we derive from going faster, in large part because they vary so widely. (Benefit of high speed limit to driver on lonely rural highway: potentially large. Benefit to driver on congested urban freeway: zero). Nevertheless, the benefits are there. Some of that saved time will go to reading to children, building homes, creating works of art, or finding a cure for cancer.

Plus, let's admit it. Going faster is more fun.

Is the trade-off of safety for speed worth it? This question can best be answered through a spirited public debate. But, disappointingly, that debate is not happening. Study of the speed limit has been relegated to a handful of obscure academic journals, a few government reports that few people actually read, and the occasional newspaper article on page B12. We should slow down and give this issue the attention it deserves.

FURTHER READING

Lee Friedman, Donald Hedeker, and Elihu Richter. 2009. "Long-Term Effects of Repealing the National Maximum Speed Limit in the United States," *American Journal of Public Health*, 99 (9): 1626–1631.

Kara Kockelman and CRA International, Inc. 2006. "Safety Impacts and Other Implications of Raised Speed Limits on High-Speed Roads," Transportation Research Board of the National Academies, Project 17–23. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w90.pdf

Eric A. Morris is a doctoral candidate in the Department of Urban Planning at UCLA, and the incoming Associate Editor of ACCESS. He also blogs regularly at Freakonomics; this Almanac essay is an abridged version of a Freakonomics post (ericmorris3@gmail.com).



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