

## Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity



WHEN YOU DINE AT AN ALL-YOU-CAN-EAT RESTAURANT, chances are that you eat more than you would if you paid à la carte. If gasoline were priced on an all-you-can-drive basis, you also would probably drive more. All-you-can-drive pricing may seem absurd, but automobile insurance is priced that way today. Drivers who are similar in other respects—age, gender, location, driving safety record—pay nearly the same premiums if they drive five thousand or fifty thousand miles a year. Just as an all-you-can-eat restaurant encourages more eating, current insurance pricing encourages more driving. The extra driving that results from this inefficient system leads to more accidents, more congestion, more carbon emissions, more local pollution, and more dependence on oil. This pricing system is also inequitable because low-mileage drivers subsidize insurance costs for high-mileage drivers, and low-income people drive fewer miles on average.

In a discussion paper for the Hamilton Project, Jason E. Bordoff and Pascal J. Noel propose a simple alternative: pay-as-you-drive (PAYD) auto insurance. If all motorists paid for accident insurance per mile rather than in a lump sum, they would have an extra incentive to drive less. Driving would decline by an estimated 8 percent nationwide, netting society the equivalent of \$50 billion to \$60 billion a year by reducing driving-related harms. To put it in perspective, it would take a \$1-a-gallon increase in the gasoline tax to achieve the same reduction in driving. Unlike an increase in the gasoline tax, PAYD would save most drivers money regardless of where they live. Roughly two-thirds of households would end up paying less for auto insurance, with each of those households saving an average of \$270 per car.

## THE CHALLENGE

Americans drive their cars and trucks nearly 3 trillion miles a year—the equivalent of 6 million round trips to the moon. With each mile driven, the probability that the driver will have an accident increases. A motorist who logs twenty thousand miles behind the wheel is twice as likely to be involved in a bodily-injury crash as a motorist who logs only five thousand miles.

Automobile insurance costs, however, do not adequately reflect this reality. The closest they usually come is to make small adjustments based on the unverified word of the insured about total miles driven or distance between home and work. There are two harmful consequences of the current all-you-can-drive method of pricing insurance.

First, without a per-mile pricing scheme, drivers are not aware of the full cost of driving each extra mile. When considering a trip, the driver might consider the incremental costs of gasoline and maintenance, but will not consider the cost of insurance since it is not dependent on whether the trip is made. Currently, drivers pay on average \$809 a year for accident-related insurance, equal to 6.6 cents a mile. Yet, unlike almost every other consumer good, drivers today cannot pay less for car insurance by consuming less. The current system thus induces an inefficiently high level of driving, which imposes significant social costs in the form of more accidents, congestion, carbon emissions, local pollution, and oil dependence. With a per-mile insurance charge, drivers would be able to save money on car insurance by driving less, and might decide that some of the miles driven are not worth the cost.

Second, the pricing structure of automobile insurance has the effect of forcing low-mileage drivers to subsidize the insurance costs of high-mileage drivers. This system is inequitable because low-income people drive fewer miles on average and thus are re-

sponsible for fewer accidents. Currently, therefore, their insurance costs are subsidizing high-income drivers. In 2001, according to data from Bordoff and Noel, drivers from households with incomes above \$100,000 drove each of their vehicles on average 25 percent more miles than did drivers from households with incomes below \$25,000.

## A NEW APPROACH

Bordoff and Noel propose a plan for PAYD insurance. Under PAYD, the price of auto insurance would be tied to the number of miles driven. The prices would still be risk-adjusted, so an urban twenty-five-year-old driver with a sports car and a DUI record would pay a higher per-mile insurance premium than a rural forty-five-year-old driver with a minivan and a spotless driving record. Pricing on a per-mile basis would make insurance pricing more equitable and create an incentive for people to drive less, thereby reducing a range of driving-related harms.

PAYD would be voluntary—no one would be forced to use it. Of course, as low-mileage drivers switch to PAYD pricing, the cost of traditional insurance for the higher mileage drivers will go up as the average accident rate of the drivers remaining in the current system rises. The higher cost will cause a few more drivers to decide that PAYD makes better financial sense and, over time, the traditional market will give way to widespread adoption of PAYD.

Under the simplest model of PAYD, drivers would pay for their insurance at the start of the year based on an estimate of miles to be driven, much as homeowners pay the local power company based on estimated use for months when no one reads the meter. At the end of the year, or more frequently, drivers would pay more or receive a refund according to actual miles driven. The initial estimate of mileage could be based on the previous year's mileage.

Other models are possible, but no matter how it was designed, PAYD would depend on verified mileage data—the equivalent of electrical meter readings. How would the data be collected? The same establishments that now periodically check cars’ safety and emissions systems could be licensed by the states to take odometer readings (and to confirm the odometer was tamper free). More likely, electronic devices in cars could record and transmit mileage information. Most new cars already record mileage in the engine computer, and devices such as GPS transponders could transmit the information to insurance firms.

### Implementing PAYD

Currently, insurance regulations in many states prohibit or pose significant barriers to pricing insurance by the mile. Bordoff and Noel would first ask states to pass legislation permitting mileage-based insurance premiums. Texas has already passed such legislation, and California is considering a related bill. If states failed to act on their own, Bordoff and Noel propose that the federal government require states to allow PAYD as a condition of receiving certain federal grant money.

A far more significant barrier to adoption, Bordoff and Noel argue, is that insurance companies have to pay to monitor miles traveled, for example by putting a GPS-like device in each car, and would also need to develop a new billing infrastructure and actuarial models. Private firms are unlikely to see much financial benefit from adopting PAYD, particularly once other firms adopt PAYD. The rewards of PAYD to society, however, are quite large. Bordoff and Noel calculate that it can cost more than \$100 to install a device that records miles traveled and that insurance companies are likely to gain at most \$34 per customer they switch to PAYD. The social benefits from driving reductions, however, would average \$257 per vehicle. Although installation is a one-time cost and the benefits annual, the typical driver switches insurance companies every few

Just as an all-you-can-eat restaurant encourages more eating, all-you-can-drive insurance pricing leads people to drive more because they do not pay the cost of insurance for each extra mile they drive.

years. Moreover, several companies that make the odometer-tracking devices charge monthly fees to transmit the data. The positive externalities arising from PAYD are a classic market failure that justifies targeted government involvement, and Bordoff and Noel propose two such policy reforms.

First, the authors would expand today’s small PAYD pilot programs, both to provide data on what works and does not work and to act as a “booster shot” to encourage insurance companies to base their premiums on miles driven. The current federal highway law authorizes \$12 million a year for all efforts in the Value Pricing Pilot Program (including PAYD) to relieve traffic congestion. Bordoff and Noel would add \$3 million strictly for PAYD pilot programs.

Second, to confront more directly the market failure surrounding monitoring costs, the authors recommend a \$100 tax credit for each new mileage-based policy that an insurance company writes. Under the authors’ plan, the tax credit would end after its total cost to the government reached \$500 million, which would mean about 2 percent of the nation’s vehicles were operating under mileage-based premiums. At that point, they believe, PAYD would prove its value and catch on both with the driving public and with the insurance industry,

## Key Highlights

### The Problem

Americans drive their cars and trucks nearly 3 trillion miles a year. With each mile driven, the probability that a driver will have an accident increases. Yet automobile insurance costs do not directly reflect this reality. Insurers charge on an all-you-can-drive basis. The failure to charge on a per-mile basis poses two key problems:

- Drivers have an incentive to drive more because they pay a lump sum for insurance no matter how much they drive. This extra driving increases accidents, congestion, carbon emissions, local pollution, and oil dependence.
- Low-mileage drivers are currently subsidizing high-mileage drivers, and low-income people tend to be low-mileage drivers.

### The Solution

Jason Bordoff and Pascal Noel of The Hamilton Project propose a staged process that would motivate insurance companies and customers to move to per-mile pricing.

- First, states should pass legislation permitting mileage-based insurance premiums.
- Next, the federal government should expand today's small Pay-As-You-Drive (PAYD) pilot programs. Bordoff and Noel recommend adding \$3 million a year for five years strictly for PAYD pilot programs.
- Third, the authors recognize that PAYD has little to offer insurance companies because most gains accrue to society as a whole rather than to the private companies; those companies would face monitoring and other costs to offer PAYD. The authors recommend a \$100 tax credit for each new mileage-based policy that an insurance company writes. This credit would be phased out once 5 million vehicles nationwide are covered by PAYD policies.

### Benefits

Bordoff and Noel estimate the aggregate and distributional impacts of switching from lump-sum premiums to PAYD:

- Driving and fuel consumption would fall by 8 percent, reducing congestion, accidents, carbon emissions, local pollution, and oil dependence for a net benefit of \$50 billion to \$60 billion per year.
- Because a minority of drivers is responsible for the majority of driving, about two-thirds of households would save money under PAYD with an average savings of \$270 per vehicle for that group.
- PAYD would be a strongly progressive reform, with most benefits accruing to low-income, low-mileage households.

without further government support. The first 2 percent to sign up for PAYD would presumably be low-mileage drivers—those who stand to benefit the most. As noted above, removing these drivers from risk pools of drivers with traditionally priced insurance would drive up the cost of that insurance, thus inducing more drivers to switch to PAYD. In the virtuous circle that would develop, nearly all drivers would ultimately choose mileage-based insurance, according to Bordoff and Noel.

### National Benefits of PAYD

Drawing on household and vehicle level driving data and previous work measuring drivers' responsiveness to higher gasoline prices, Bordoff and Noel estimate that if PAYD were fully adopted it would reduce driving nationwide by 8 percent over time. This estimate is consistent with both other empirical studies and the limited available real-world experience. They estimate the average per-mile premium is 6.6 cents, although it varies significantly from state to state. States with relatively high auto insurance premiums would have the higher per-mile premiums and therefore potentially the steepest driving reductions: 13.5 percent in New Jersey and 11.5 percent in New York. Toward the other end of the spectrum, miles driven would be reduced by 5.9 percent in Iowa and Kansas.

The benefits of reducing mileage and fuel consumption by 8 percent would be substantial. As seen in Table 1, Bordoff and Noel estimate the gross benefits to society to be \$58.9 billion per year. They do not attempt to directly estimate monitoring costs due to the large uncertainties over technologies and prices, but note that even under very conservative assumptions the net benefits come to \$50 billion per year. These benefits would be mostly from reduced accident costs and congestion but also from reduced carbon emissions, local pollution, and oil dependence.

### Distributional Benefits of PAYD

Bordoff and Noel are the first analysts to estimate the impacts of PAYD on a driver or household level.

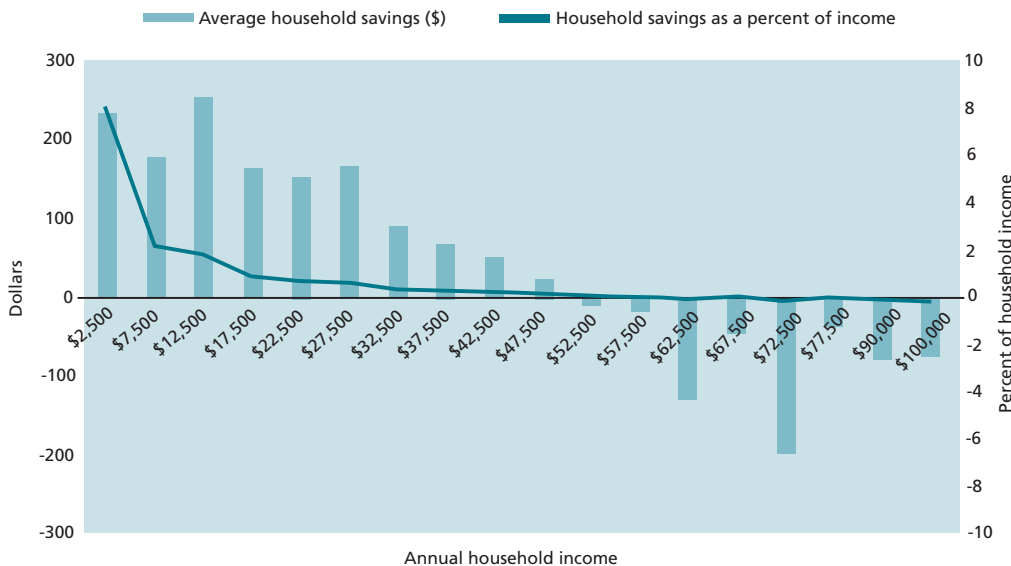
TABLE 1.

**Social Benefits from Reducing Driving and Fuel Consumption by 8 percent**

	U.S. total (\$ billions)	Per vehicle (\$)
<b>Reduced accidents</b>		
Individual auto insurance savings	7.7	34
External insured accident cost savings	21.3	93
Government accident cost savings	2.0	9
Other accident cost savings	3.2	14
<b>Reduced congestion</b>	<b>13.3</b>	<b>58</b>
<b>Reduced local pollution</b>	<b>3.3</b>	<b>15</b>
<b>Reduced carbon emissions</b>	<b>2.5</b>	<b>11</b>
<b>Reduced oil dependence</b>	<b>5.6</b>	<b>25</b>
<b>Total Gross Benefits</b>	<b>58.9</b>	<b>257</b>

Note: Numbers may not add up due to rounding

FIGURE 1.  
**Savings from Pay-As-You-Drive Insurance**



Note: Savings in 2007 dollars but household income groups in 2001 dollars. Savings are deflated to 2001 dollars to calculate percentage of 2001 income levels.

Low-income individuals drive less and are therefore responsible for fewer accidents, but currently their insurance premiums are subsidizing high-mileage drivers.

Their results suggest that not only would PAYD have large social benefits, but it would also be a very progressive reform.

As demonstrated in Figure 1, savings accrue most predominantly to low-income households because they tend to drive less than high-income households. The savings come from two sources. First, PAYD eliminates the current subsidy that low-mileage drivers effectively pay to high-mileage drivers. Second, PAYD allows drivers to save money on insurance by choosing to drive less.

Almost two-thirds of all households with vehicles save money as a result of lower premiums under PAYD, with an average saving for those households of \$270 per car. The one-third of households who pay more would pay an



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average of \$370 extra per car, but Bordoff and Noel argue that is reasonable given that the higher premium reflects the increased accident risk they pose. Importantly, the high proportion of drivers who save money is the same in both urban and rural areas. Rural drivers will not pay more money in insurance under PAYD merely because they drive more miles than the average urban driver does. Under PAYD, mileage will be a risk factor but other risk factors will remain. Since geographic location is a key risk factor, premiums will be determined relative to how many miles the average driver in a certain area drives. Rural drivers who drive less than the average rural driver in their risk category will thus save money.

## Questions and Concerns

### **Is per-mile pricing fair, given that a motorist who drives four times as much as another is only twice as likely to have an accident?**

It is true that the relationship between vehicle miles traveled and accidents is not proportional. High-mileage drivers may be better drivers, drive safer vehicles, or drive more on highways. But per-mile pricing does not assume that every twenty-thousand-mile driver is four times more likely to be involved in an accident than every five-thousand-mile driver, nor does it charge four times more in premiums. Per-mile premiums are risk-adjusted so that a better driver would pay a lower per-mile premium (all else being equal). For any individual driver with a given risk profile, however, the likelihood of being involved in an accident declines roughly proportionately with miles traveled, so any given driver is roughly 10 percent less likely to be involved in an

accident if she drives 10 percent less.

### **Is PAYD used anywhere today?**

Yes. In the United States, Progressive Casualty Insurance has offered mileage-based discounts (though not true per-mile pricing) on a pilot basis in several states. Based on its success, Progressive announced in June that it would offer an insurance program that offered discounts (or imposed surcharges) based on how many miles people drive, their driving behavior, and when those miles are driven—going beyond per-mile pricing to adjust for other risky driving behaviors. General Motors Acceptance Corporation has offered mileage-based discounts to OnStar subscribers in certain states, and several smaller insurance firms are experimenting with various versions of per-mile pricing. Internationally, per-mile pricing is offered, albeit on a small scale, to drivers in Canada, Great Britain, Israel, Japan, the Netherlands, and South Africa.

### **Would mileage-monitoring systems raise privacy concerns?**

Odometer readings are already frequently taken during servicing, used-car sales, and crash investigations. Electronic monitoring techniques, however, have the potential to reveal where a car has been and when it has been there. Some people already use technologies such as OnStar that track a car's location like this. Individuals seem increasingly willing to share information with private companies in return for a service. Furthermore, Progressive's internal polling suggests that a majority of all drivers, and a vast majority of low-mileage drivers, would be willing to turn over their driving data to insurance companies in return for the opportunity to save significant amounts on their car insurance. It is also possible to install electronic odometer reading devices that have no other capacities.

### **Is PAYD the most efficient way to reduce driving-related externalities such as pollution and congestion?**

The primary purpose of PAYD is not to reduce driving-related externalities, but rather to correct a failure with the way that auto insurance is priced today and the

inefficient and inequitable consequences of that pricing structure. By addressing these problems, PAYD would also reduce a range of other driving-related externalities by creating an incentive for people to drive less. It is not, however, a substitute for directly addressing driving-related externalities by imposing user fees related to the social costs of driving.

## CONCLUSION

Suppose that the technology had long existed to monitor automobile odometers, and car insurance had been charged on the basis of miles driven. Those who chose to drive more paid more; those who chose to drive less paid less. But then some state legislators proposed to throw out the mileage-based system in favor of one that carried a yearly one-size-fits-all premium adjusted for age, location, and driving record—but not for actual miles driven. You can practically hear the howls of protest about the new system, which would be viewed as massively unfair to those who drive less than average.

Bordoff and Noel concede that the public is quicker to see the drawbacks of new ways of doing business than the drawbacks of the old ways that people have learned to live with. But in the case of automobile insurance, turning today's situation on its head makes it clear that the status quo of all-you-can-drive auto insurance pricing has hardly any defense. PAYD reduces accidents, decreases traffic congestion, improves the environment through lower carbon emissions and less local pollution, and promotes energy security by decreasing the nation's consumption of oil. And PAYD achieves these social benefits while reducing insurance costs for two-thirds of households, resulting in a more equitable system. It is no contest, say Bordoff and Noel. It is time to upend the status quo and usher in a new system.

## Learn More About This Proposal

This policy brief is based on The Hamilton Project discussion paper, *Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity*, which was authored by:

### JASON E. BORDOFF

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Bordoff's research focuses on the economics of climate and energy policy, income inequality and insecurity, and tax policy. He previously served in the U.S. Treasury Department and worked as a consultant with McKinsey & Co.

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Noel's research focuses on the economics of climate change policy, energy security, alternative energy, and a range of transportation issues.

## Additional Hamilton Project Proposals

### An Economic Strategy for Investing in America's Infrastructure

This overview paper presents a comprehensive strategy for physical and telecommunications infrastructure policy in the United States. It emphasizes the need to use existing infrastructure more efficiently, improve the way in which infrastructure-related decisions are made, and promote infrastructure as a component of broadly shared growth.

### Physical Infrastructure

Several new papers from The Hamilton Project discuss ways to make better use of physical infrastructure. These policies would encourage users to consider the full costs of their infrastructure use through better pricing mechanisms, while compensating low- and middle-income households with the revenue generated by these mechanisms. These papers include:

- *America's Traffic Congestion Problem: A Proposal for Nationwide Reform* by David Lewis
- *Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity* by Jason E. Bordoff and Pascal J. Noel
- *Creating a Safer and More Reliable Air Traffic Control System* by Dorothy Robyn

### Telecommunications Infrastructure

Two new Hamilton Project papers on telecommunications infrastructure aim to facilitate technological innovation and share the benefits of technology more broadly. Maximizing the value of telecommunications will require using wireless spectrum—the airwaves that allow devices to communicate—more efficiently and facilitating deployment of high-speed Internet access to rural areas. These papers include:

- *The Untapped Promise of Wireless Spectrum* by Philip J. Weiser
- *Bringing Broadband to Unserved Communities* by Jon M. Peha

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