PAY-AS-YOU-DRIVE-AND-YOU-SAVE
INSURANCE: POTENTIAL BENEFITS AND ISSUES

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By converting all or some portion of fixed insurance costs to per-mile or per-minute-of-driving charges, pay-as-you-drive-and-you-save (PAYDAYS) insurance—also commonly known as usage-based insurance—has the potential to encourage voluntary reductions in driving and related decreases in congestion.

Traditional rating factors (e.g., residential location, gender, age, and driving record) are directly incorporated into usage-based rates, with such rates also reflecting the specific coverage a driver chooses. PAYDAYS insurance is likely to result in charges that more accurately reflect crash risk, based, as they are, on usage. By contrast, traditional insurance rates vary little, if at all, based on mileage, even though few claims are made for damages, such as theft, that may happen when a vehicle is not being driven.

With conventional insurance, consumers have little opportunity to save by driving fewer miles despite the fact that insurance claims are directly related to miles driven. In exchange for reducing fixed insurance costs, many drivers—especially lower income ones—would readily accept mileage premiums that they can reduce by driving less. They could do so through voluntary trip consolidation, carpooling, alternative transportation use, and forfeiting of low-value trips.

The potential benefits of PAYDAYS insurance, discussed below, would principally be a result of reduced mileage by consumers in response to facing higher variable costs of driving. Reduced driving levels are projected using observed results from previous before-after studies where consumers experienced a change in their per-mile cost of driving and adjusted their driving habits in response. These studies derive what is called a price elasticity, which expresses the change in mileage as a function of the change in price. Major studies on PAYDAYS insurance have converged on a consensus elasticity figure of -0.15, based on finding a “conservative average” of results from previous price elasticity studies (Edlin, 1996, Bordoff and Noel, 2008, Ferreira and Minikel, 2010). That is, if the per-mile cost of driving (including fuel costs and insurance premiums that are tied directly to mileage, but generally excluding vehicle wear and tear because drivers may not consider it) doubles, drivers are expected to cut their vehicle-miles traveled (VMT) by 15%.

Finding the Appropriate Balance Between Fixed and Variable Premiums

There is a debate as to whether it is appropriate to convert all fixed insurance costs to mileage charges. Since, as noted above, benefits are principally a result of consumers reducing their mileage due to higher variable costs of driving, benefits will be reduced if not all insurance costs are made variable. Researchers at the Massachusetts Institute of Technology (MIT) matched claims data that insurance companies are required to report to the State of Massachusetts with mileage data from annual vehicle inspections. The data included $502 million in reported claims corresponding to almost 3 million cars driven about 3.4 billion miles. The period recorded for insurance claims and mileage tended to match fairly closely (within months), but not precisely. The study concluded that—when also accounting for territory and class (reflective of years of driving experience)—the “best fit” premium pricing model included a fixed fee that covered the first 2,000 miles of driving, plus a fee for additional miles (with both the fixed and per-mile prices varying by individual risk factors). The projected result for Massachusetts, a high-cost insurance state, was that applying the “best fit” model to premium pricing would yield a 5.0% reduction in driving, versus a 9.5% reduction with a fully variable pricing model (Ferreira and Minikel, 2010).

Because for a variety of reasons higher mileage drivers tend to present a lower per-mile risk than lower mileage drivers, and vice versa, a PAYDAYS pricing model that fails to differentiate customers based on a multitude of demographic factors will invariably overestimate the “fixed risk” of an individual driver and underestimate his or her per-mile driving risk. As researcher Todd Litman from the Victoria Transport Policy Institute has pointed out on many occasions, if a pricing model were sophisticated enough to differentiate the risk of every driver, it could then reflect the likelihood that if an individual curtails his or her driving by a certain percentage, that driver’s probability of getting into a crash should be cut by the same percentage, assuming that the nature of driving (mixture of time and place, plus the condition of the driver) that he or she does remains similar despite reduced mileage. A more sophisticated “best fit” model would almost certainly yield a lower fixed premium and higher variable premium than what was developed through the MIT research.

Possible Benefits

Studies estimate VMT would drop between 8 and 20% if all fixed automotive insurance costs were converted to usage-based, with the more recent estimates trending to be on the (Continued on page 19)
lower side of this range (Litman, 2004; Barrett, 1999; Parry, 2005; Bordoff and Noel, 2008; Ferreira and Minikel, 2010).

The Brookings Institution has calculated that between $50 and $60 billion in net benefits would accrue in the U.S. from reduced driving related externalities if fully-variable PAYDAYS premiums became the standard insurance product offering (Bordoff and Noel, 2008).

Congestion reduction had been shown in many instances to be disproportionately greater than the reduction in traffic. For example, the Oct. 22, 2008 INRIX report, *The Impact of Fuel Prices on Consumer Behavior and Traffic Congestion*, concluded that the price spikes led to a 26% reduction of peak-hour congestion, resulting from a much smaller reduction (i.e., around 3%) in VMT.

University of California Professor of Law and Professor of Economics, Aaron Edlin, has also researched the insurance-costs-to-others externality of driving in traffic-dense states. His research in California concluded that an additional insured driver causes between a $1,725 and $3,239 increase in total statewide insurance costs to other drivers compared to only $10 in North Dakota (Edlin, 1996).

The report, *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*, a joint effort of multiple Federal agencies, environmental organizations, and Shell Oil, shows the importance of implementing various packages of policy measures in reducing VMT and related greenhouse gas emissions in meeting reduction targets. Significantly, when fully-variable PAYDAYS insurance was added to a bundle of land use/transit/non-motorized transportation measures (one of a number of policy bundles evaluated), it led to a 44% increase in the reduction of transportation-related greenhouse gas emissions through 2050 than without the inclusion of such insurance (Cambridge Systematics, Inc., 2009).

By providing affordable insurance to low-income motorists who are willing to limit their mileage, PAYDAYS could reduce the number of uninsured motorists (Litman, 2004). It has been projected that 63.5% of households with insured vehicles (63.7% of urban households, 62.9% of rural households, and approaching 80% for the poorest of households) would save an average of 28% on their total premiums, or about $496 annually for households that do save for fully variable PAYDAYS premiums (Bordoff and Noel, 2008).

Another issue to consider when projecting the benefits of PAYDAYS insurance is the degree to which behavioral economics strategies are deployed in concert with the new pricing to encourage reductions in driving beyond what would be realized without the use of such strategies. Behavioral economics, a discipline combining economics and psychology to explain consumer decision making, offers insights on marketing and designing PAYDAYS insurance products to maximize consumer acceptance and benefits. General behavioral economics research findings strongly suggest that different product offerings among the myriad of PAYDAYS insurance product possibilities would result in substantial differences in VMT and in the magnitude of related benefits. For PAYDAYS insurance, the following product features and related communications protocols have been identified as most likely to increase consumer response (i.e., lead to greater reductions in driving) at all levels of premium:

- Direct and transparent per-mile charges (no rebates or requirements to purchase miles in large use-or-lose bundles);
- Frequent billing emphasizing tangible (check or even cash) as opposed to less tangible (credit card) payment forms;
- Reinforce pricing through e-mail reminders and taxi-like in-vehicle meters;
- Negotiate transit pass discounts and matching funds to buy down prices of alternative transportation modes;
- Provide individualized assistance to customers to reduce driving by identifying alternative transportation, trip consolidation, and trip elimination (e.g., through Internet shopping) options; and
- Establish reasonable driving-reduction goals for participants and provide, contingent upon achieving such goals, frequent-flyer-program-like status-related designations and rewards and “regret lottery” rewards, where participants would regret it if they had to forfeit a lottery award for failing to meet a goal (Greenberg 2010).

The benefits discussed earlier in this section presumed that PAYDAYS insurance would be offered as a pure per-mile premium without the “bells-and-whistles” product features suggested immediately above that would likely enhance driver responsiveness to PAYDAYS pricing. The additional benefits from the above strategies is something insurance commissioners may want to consider if faced with a rate filing request that includes product features like these.

**SHORT- AND LONG-TERM PROSPECTS**

The combination of consumer acceptance and the ability of insurance companies to use telematics in an affordable way to offer PAYDAYS insurance products suggest that the pattern of market development in the short term may be

relatively straightforward. Insurance companies have a very compelling reason to use telematics for market segmentation and to offer consumers some incentives, perhaps through “PAYDAYS insurance lite” policies (where some minor discounts are offered in exchange for drivers sharing telematics data), to gain their cooperation. Companies that fail to use telematics for segmentation face fairly extreme adverse selection risk. (For example, one firm that facilitates insurance companies in offering usage-based insurance asserted the following benefits of its driver evaluation scoring at a recent industry conference: when insurance companies with sophisticated, but not telematics-informed, premium-setting models use its usage-based score to recalculate premiums, 10% of drivers had an expected loss ratio of 30% or less of the average-driver loss ratio and another 10% of drivers, at the other extreme, had an expected loss ratio that was 250% greater than the average (Harbage, 2013). Clearly, adverse selection will occur if some companies have this data, and price accordingly, while others do not, and the latter will likely be unable to price in a way that will both retain market share and enable continued profitability.)

The National Association of Insurance Commissioners, CIPR Key Issues webpage cites industry experts projecting that 20% of insurance plans will incorporate PAYDAYS features within five years (Detroit News, 2013). A recent Towers Watson survey provides an upper-range estimate of consumer interest. Fully 79% of respondents would at least consider purchasing a usage-based product, rising to 89% if they were guaranteed that their premiums would not rise (Towers Watson, 2013).

The benefits of having consumers appreciate how their driving affects their rates and then being provided an opportunity to change behavior to save on premiums may be lost if “black box” pricing becomes the norm. (“Black box” pricing refers to where an insurance company gathers and applies usage-based data in premium setting primarily for improved market segmentation—to offer the most attractive rates to the lowest-risk drivers within any rate class—but without the consumer having any detailed knowledge as to how their usage characteristics affect their rates.) This concern is not just theoretical since the majority of the almost two million people who have signed up for telematics-enabled insurance products are not provided by their insurance carriers significant personalized guidance about reducing their crash exposure and earning premium savings as a result. For any benefits to be conveyed, consumers would need to have access to their own driving data that is linked to crash risk—including about driving amounts, conditions (e.g., related to congestion and time of day), and vehicle handling (e.g., prevalence of hard braking)—and be provided the opportunity to alter their driving to further reduce their premiums and crash risk. It is uncertain whether or when the marketplace, without market intervention (whether through regulations or incentives), will provide consumers such an opportunity.

Interestingly, separate from insurance product offerings, there are a number of sophisticated smartphone applications that score drivers on their safety and green-driving performance, coach drivers on improving their performance, and even in some cases facilitate social media interaction (comparing scores with friends) and the provision of rewards—such as with participating retailers—for good driving. While there is much discussion and some experimentation within the industry of using the smartphone to provide data for PAYDAYS pricing, this approach has not taken off in part because insurance companies cannot be sure that they are getting all of the relevant data. Various technology fixes are being tested to address this challenge.

Over the longer term, premiums under traditional insurance plans would have to rise to reflect that the drivers with the lowest risk exposure will have moved into telematics-informed insurance plans, leaving the traditional plans to cover drivers with somewhat higher average risk exposure. Among the drivers who remain in the traditional plans, those with the lowest risk exposure will—like those who left traditional insurance plans before them—then have an incentive to move into PAYDAYS insurance plans, too, and traditional plans will again need to raise their rates as this phenomenon repeats itself.

The key unknown, though, is whether the PAYDAYS insurance products that are to become prevalent in the marketplace will provide transparent and variable pricing that encourages motorists to reduce their risk exposure in order to secure a lower rate, or instead whether the products will improve driver segmentation without offering such incentives (and, thus, without yielding benefits). Of those interested in PAYDAYS insurance, 60% said they would change their driving habits to reduce their premiums, rising to 76% of drivers between the ages of 18 and 34 (Towers Watson, 2013). The question remains whether drivers will be afforded this opportunity.

The most significant voluntary reductions in driving resulting from PAYDAYS pricing would be expected for products that offer both a reasonable amount of pricing transparency and pricing that is presented and structured in a way that empowers consumers to secure a better rate by reducing their risk exposure over time.

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Many people, especially young adults, are beginning to rely on “shared economy” services in lieu of car ownership to meet their “automobility” needs. Two types of “shared economy” transportation services are becoming available—peer-to-peer (P2P) carsharing and dynamic ridesharing (both described below)—where new PAYDAYS insurance products could be especially helpful.

While the prevalent carsharing model (of a company like Zipcar owning or leasing vehicles that are made available to rent by the hour for its members) lends itself to coverage under existing insurance structures, where a commercial insurance product covers all members (who are required to be pre-qualified by the insurance company), insurance offerings may need to be reinvented to accommodate P2P carsharing. P2P carsharing entails individual vehicle owners making their cars available—through a company that handles scheduling, payment, insurance, and modifying owners’ vehicles to allow authorized third-party access—to rent by the hour. While a traditional carsharing firm will only acquire and supply vehicles for specific locations where rental income is expected to cover fixed lease/ownership costs, monthly parking charges, and insurance premiums, P2P carsharing instead takes advantage of an underutilized asset (the personally owned vehicle) that has already been acquired and for which the owner typically has reserved parking. Such carsharing requires a usage-based insurance product in order to be economically viable for vehicle owners just starting to share their cars, where insurance premiums that are not usage-based could easily exceed rental income. One possibility is an insurance product that meshes a personal and commercial policy into one, which would provide vehicle owners a further incentive to limit their own driving (beyond the opportunity cost of potentially forgone rental income), while also charging fairly for insurance coverage for other users.

In addition to sharing of vehicles, people are sharing rides in new ways, typically enabled by smartphone applications, and where money changes hands as part of such ridesharing, the nature of its effects on insurance coverage sometimes becomes murky. Like with P2P carsharing, usage-based premiums for shared rides when considered commercial (typically where the payment to drivers exceed mileage costs) could be especially helpful, when vehicle owners/drivers are only offering their services occasionally.

References

ABOUT THE AUTHOR

Allen Greenberg has over 20 years of experience in analyzing and advocating for sustainable U.S. transportation policy at the national and regional levels from both inside and outside of government. For the last thirteen years, Allen has been employed as a senior policy analyst at the Federal Highway Administration, where he plays a leadership role with the Value Pricing Pilot Program and the Urban Partnership Program, including soliciting and managing transportation pricing pilot initiatives related to usage-based auto insurance, variable and transparent demand-based parking pricing, and new forms of vehicle-use pricing and services (including car sharing and priced dynamic ridesharing, both of which entail insurance-related challenges). Allen has authored seven peer-reviewed research papers covering a very broad array of issues related to pay-as-you-drive insurance. Allen holds a Masters in Urban and Regional Planning from the University of Virginia and a Bachelor of Science in Public Policy and Management from Carnegie Mellon University.
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