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for INSURANCE
POLICY
and RESEARCH

CIPR Study

**Usage-Based Insurance and Vehicle Telematics:
Insurance Market and Regulatory Implications**

by

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Contents

Glossary.....	iv
Forward.....	1
Telematics Technology in the Automobile Insurance Industry	7
Introduction	8
Current Telematics Technological Solutions.....	9
Insurers' PAYD UBI Telematics Programs	11
Data Challenges.....	12
Telematics UBI Modeling and Analytics.....	14
Introduction	15
Predictive Models	15
Tower Watson's DriveAbility.....	16
The Insurance Market for Telematics UBI	18
Introduction	19
Current State of Personal Auto Insurance Market.....	19
The Telematics Market within Auto Insurance.....	20
Consumer Acceptance	23
Ongoing Value	24
How Telematics Can Change the Auto Insurance Industry.....	24
Obstacles to Growth	26
Applying Behavioral Economic Concepts in Designing PAYDAYS UBI Programs	28
Introduction	29
General Consumer Decision-Making	29
Consumer Responses to Financial Gains and Losses	31
Payment Frequency and Payment Method Affecting Propensity to Conserve	32
Perspectives on Price Bundling	32
Optimal Customer Profile and PAYDAYS UBI Product	34
Designing PAYDAYS Insurance Pilot Projects to Learn More	39
Conclusion.....	41
Insurer, Consumer and Societal Benefits of Telematics-Based UBI.....	42
Introduction	43
Insurer Benefits.....	43
Consumer Benefits.....	44
Societal Benefits.....	46
Consumer Concerns and the Promise of UBI.....	50

Introduction	51
Policy Goals	51
Bright Future for Consumers?.....	51
Pushing Ahead.....	52
A Failed Promise?.....	53
Regulatory Implications of Telematics UBI	54
Introduction	55
Data Collection.....	55
Technology Concerns	55
The Need for Transparency.....	56
Rating Considerations	57
Availability and Affordability.....	59
Claims Management	59
Next Steps	60
FHWA UBI Funding Initiatives Promote Congestion Relief and Safety.....	61
Introduction	62
Current Efforts	62
Before-After Driver Behavior Study	63
Actuarial Study to Encourage PAYDAYS Insurance Premiums	64
Insurance Competitive Price Quotes	65
Conclusion.....	66
Study Conclusion.....	68
APPENDIX: CIPR Telematics State DOI Survey	71
Introduction	72
Survey Results	72

Glossary

DBD: Driving Behavior Data

DOI: Department of Insurance

ECU: Electronic Control Unit

FHWA: Federal Highway Administration

GPS: Global Positioning System

OBD: On-Board Diagnostics

PAYD: Pay-as-You-Drive

PAYDAYS: Pay-as-You-Drive-and-You-Save

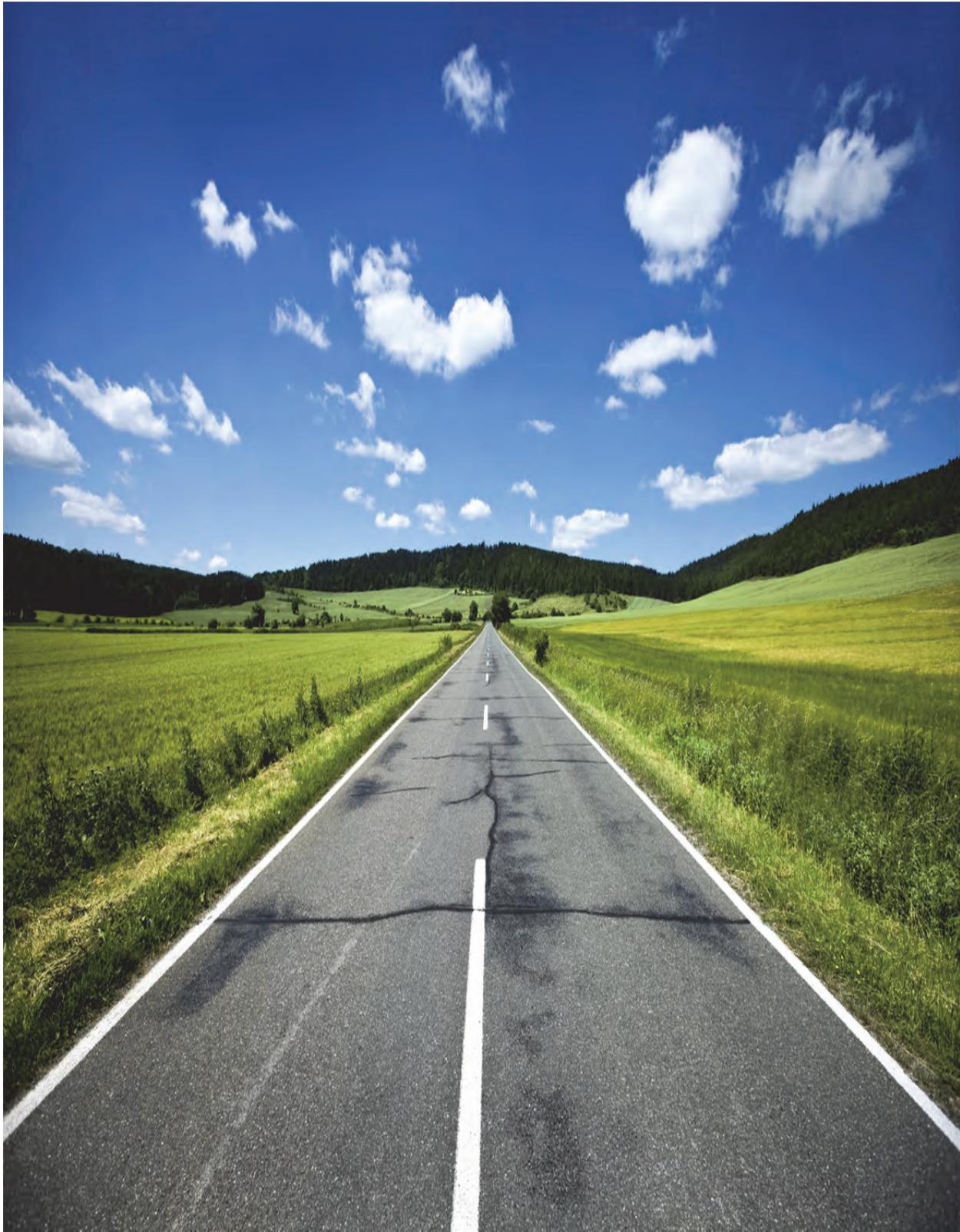
PHYD: Pay-How-You-Drive

PPP: Public-Private Partnership

UBI: Usage-Based Insurance

VMT: Vehicle Miles Traveled

Forward



Forward

By NAIC Staff

The development of telematics-supported usage-based insurance (UBI) has ushered a new era in the world of automobile insurance. This study will take a closer look at these technological advances, explore the changes in the insurance market and analyze in-depth the implications of telematics for insurers, consumers and state regulators.

Vehicle telematics, integrated navigation, and computer and mobile communication technology used to directly monitor driving behavior allow insurers to use true causal risk factors to accurately assess risks and develop precise UBI rating plans. Furthermore, with premiums accurately reflecting true risks, policyholders are incentivized to adopt risk-minimizing behaviors with benefits accruing not only to consumers and insurance companies, but also to society as a whole. These benefits are propelling the insurance market to quickly expand the availability of telematics-based UBI programs. This was illustrated by the CIPR survey of state departments of insurance (DOI), which found telematics programs are now available in at least 42 states. A detailed description of the results of the survey can be found in the appendix of this study. (See page 71.)

Until recently and since the first automobile liability insurance was sold in the U.S. 116 years ago, premiums were generally determined, in the absence of true causal data, by using a variety of group behavior-based demographic proxy factors affecting loss costs, such as driver record, age, gender, marital status and residence geographic location known as territory. More recently, other variables such as education, occupation and credit scores have been found to correlate with loss ratio, although their usage is controversial and restricted in a number of jurisdictions.

At the individual driver level, the concepts of UBI, pay-as-you-drive (PAYD), pay-as-you-drive-as-you-save (PAYDAYS) and pay-how-you drive (PHYD) are not new at all, with mileage being among the rating variables insurers have historically used. However, the predictive value of variables such as mileage and other driving details (i.e., commuting distance and location) always hinged on the veracity of the information furnished by consumers.

The value of real driving behavior data for calculating a more precise premium reflecting true risk exposure was recognized in the early days of automobile insurance history in a 1929 paper¹ by Paul Dorweiler, president of the Casualty Actuarial Society (CAS) in the early 1930s. Dorweiler identified driver habits, speed, weather conditions, seasonal and daily car use, and

¹ Dorweiler, Paul. 1929. "Notes on Exposure and Premium Bases," Proceedings of the Casualty Actuarial Society XVI, p. 319; reprinted PCAS LVIII, 1972, p. 59.

Introduction

mileage as critical factors directly contributing to accident frequency and severity.² While he recognized the simplicity, directness and definiteness in the measurement of these variables, Dorweiler lamented the fact they were not yet practically applicable due to the absence of the type of devices needed to record and convey such information.³ Fast forward about seven decades, and Dorweiler's solution moved from science fiction realm to scientific fact and practical use for the everyday consumer.

The incorporation of new digital technologies in cars during the 1980s allowed for the development of increasingly electronic management and operation control sophisticated systems (engine management, suspension systems, braking, safety, etc.). All types of on-board diagnostics and other data could be collected and analyzed, but technologies similar to the telemetry systems, first used exclusively in high-tech race cars, with wireless communication capabilities, were only introduced for commercial use in the mid-1990s. Long-distance truck fleet operators started first successfully using telematics to track and coordinate vehicle movements for operational, maintenance and other purposes.

In addition to the proliferation of mobile telephony, it was the emergence of satellite-based navigation technology and the opening of the global positioning system (GPS), originally developed by the U.S. Department of Defense for the military, for civilian use that paved the way for the rapid development and successful use of telematics. Through the integration of these new systems, vehicle telematics could provide very detailed driving behavior data, including exact time and location, and communicate it to a remote central location. By the late 1990s, telematics were introduced to the insurance business, first to assist with underwriting decisions and then to help determine premiums more accurately reflecting real risks. However, despite the apparent popularity of the initial programs, the high costs of integrating the new technology temporarily interrupted its use and deterred other would-be early adopters.⁴

With technology advancing in leaps and bounds and related costs coming down in the 2000s, the doors were wide open for viable and successful telematics-based UBI programs. The integration of GPS-enabled two-way communication systems by automobile manufacturers in their cars helped familiarize drivers with telematics technology and the services it can offer. Existing car telematics systems, such as General Motor's OnStar, Lexus' Link and BMW's Assist, offer a wide range of services such as remote diagnostics, roadside assistance, emergency response and stolen vehicle location services. According to IHS iSuppli, approximately 38

² Ibid.

³ Ibid.

⁴ Weiss, Jim and Smollik, Jared. 2012. "Beginner's Roadmap to Working with Driving Behavior Data." Casualty Actuarial Society E-Forum, Winter 2012-Volume 2.

Introduction

percent of the 2013 model-year cars in the U.S. were equipped with a telematics device.⁵ By the end of 2018, the percentage of new cars available for sale in the U.S. market with embedded telematics will soar to 80 percent.⁶ The section of the study on the technology of telematics (page 7) details further the technological options currently available to insurance consumers.

Consumers' growing enthusiasm for in-car connectivity in the last 10 years has added to the appeal of insurers' telematics-based programs. As applied in insurance, telematics is defined by SAS as "the use of wireless devices to transmit data in real time back to an organization. The data recorded in telematics devices can be used to develop more accurate pricing, improve the granularity of risk management techniques and reduce losses by enabling better claims assessments."⁷ The more granular driving behavior and vehicle data can be collected the better the predictive models used to identify and analyze risks would be. A discussion of the data and modeling challenges facing insurers as they try to develop telematics UBI programs is found in the predictive models and analytics section of the study. (See page 14.)

Many U.S. insurers have telematics-based UBI policies available offering significant discounts to consumers who, according to recent market surveys, seem overwhelmingly favorable to the technology and the value it can offer.⁸ With the technology advancing, insurers' telematics programs are expanding beyond premium discounts to include other value-added services aimed at increasing competitiveness and consumer loyalty.⁹ ABI Research predicts global insurance telematics subscriptions to grow at a compound annual rate of 81 percent from 5.5 million at the end of 2013 to 107 million in 2018.¹⁰ A more detailed account of the current state of the insurance telematics UBI market and its transformative effect on the car insurance industry as a whole can be found on the relevant section of the study. (See page 18.) Also, for the availability of telematics UBI programs across the country and the state legislative efforts regarding the use of telematics in auto insurance see the CIPR state survey in the appendix of the study.

Most existing telematics-based insurance programs use descriptive acronyms such as UBI, PAYD, PAYS or PHYD partly for marketing purposes. As consumers' decisions are driven by more than just price, these programs' added benefits and services should be instantly recognizable in the name and/or the description of the product. While these acronyms may be confusing and

⁵ IHS iSuppli. 2013. "Telematics to Find its Way into More Autos in 2013." Market Insight, IHS Technology, March 21, 2013.

⁶ IHS iSuppli. 2011. "Embedded Telematics in the Automotive Industry." White Paper, Nov. 22, 2011.

⁷ SAS. 2013. "Telematics: How Big Data Is Transforming the Auto Insurance Industry." SAS White Paper, March 25, 2013.

⁸ Towers Watson. 2014. "Usage-Based Insurance." U.S. Consumer Survey, July 2014.

⁹ Telematics Update. 2014. "Insurance Telematics Report." March 2014.

¹⁰ ABI Research. 2013. "Global Insurance Telematics Subscriptions to Exceed 100 million by 2018, but Auto Insurance Faces Dramatic Changes." June 6, 2013.

[Introduction](#)

imprecise, the main idea they all try to convey is that the factors affecting premiums are generally where (location) the automobile is driven, how often (number of trips), how far (mileage) and how well (driver behavior.) A very important aspect of the development and wider adoption of telematics UBI is the design and marketing of these programs. An exploration of consumer decision-making can be found in the section on behavioral economics concepts used in designing telematics UBI programs. (See page 28.)

The key drivers for the rapid growth of telematics-based UBI are the numerous benefits accrued to both insurers and consumers alike. For consumers, among the benefits are possible lower premiums, enhanced safety and improved claims experience, while for insurers, the main benefits are reducing claim costs, better risk pricing, mitigating adverse selection and moral hazard, modifying risky behavior, and improving brand recognition and loyalty.

Additionally, telematics PAYD insurance programs provide wider social benefits by effectively reducing negative externalities resulting from private automobile use. With premiums tied to mileage, PAYD incentivizes drivers to drive fewer overall miles, thereby reducing accidents, congestion and fuel consumption, which will cut down carbon emissions, as well as lessen dependence on fossil fuels. The section of the study on consumer and societal benefits derived from the generalized use of telematics PAYD UBI explores these issues in greater detail. (See page 42.)

However, a major barrier remains for the public acceptance and the complete mainstreaming of telematics. Many consumers have concerns regarding the privacy of the data they share with insurance companies, and they question insurers' ability to safeguard their data given the recent cases of major corporate security breaches. However, consumers are gradually feeling less uneasy with the use or potential misuse of their private data (e.g., when and where they are driving) by insurance companies,¹¹ particularly following insurers' assurances regarding the limited use and storing of private data (e.g., GPS-detailed data) and not sharing such data with other third parties (e.g., police enforcement, marketing companies). Consumer concerns vis-à-vis the promise of telematics are discussed in the relevant section of the study. (See page 50.)

Consumer privacy issues are also addressed in existing state legal frameworks (e.g., California prohibiting the use of private data for most insurance purposes) as it is detailed in the CIPR survey of state DOIs in the appendix of this study. The transmission, storage and reporting of private data constitute a key concern for state regulators along with the rating factors used to determine UBI premiums.

Generally, regulators in states with and without active telematics UBI programs, as shown in the CIPR state DOI survey, emphasize: 1) requirements for rates not to be excessive, inadequate

¹¹ Towers Watson. 2014. "Usage-Based Insurance." U.S. Consumer Survey, July 2014.

[Introduction](#)

or unfairly discriminatory; and 2) the need for public disclosure and transparency. The survey showed that a number of states have introduced and passed legislation regarding the use of telematics devices and the choice of rating factors used. If the rating factors specified in statute do not include the standard UBI PAYD behaviors, as is in the case of California, the availability of telematics UBI programs is in question. In states encouraging the development of telematics, UBI-specific legislation has been enacted affording confidentiality protection for insurers' proprietary UBI solutions. Given the novelty of telematics and the regulatory challenges of dealing with technological innovation, state regulators will continue to focus on safeguarding consumers' rights while allowing for the development of new and potentially more effective insurance plans. The section on regulatory implications explores in-depth these issues facing state regulators. (See page 54.)

To assist in the development of a competitive marketplace for telematics-based PAYD UBI programs ultimately delivering on the promise to be beneficial not only to insurers but also to consumers and society as a whole, the Federal Highway Administration (FHWA) is funding multiple promotion efforts. The last section of the study provides details on federal initiatives and other PAYD telematics UBI-related activities. (See page 61.)

Telematics Technology in the Automobile Insurance Industry



Telematics Technology in the Automobile Insurance Industry

By NAIC Staff

Introduction

Data has traditionally been one of insurance industry's greatest and more valuable assets. The ubiquity of wireless connectivity, the increasing sophistication of in-vehicle electronics and machine-to-machine (M2M) communication is presenting the auto insurance industry with a historic transformational challenge. Insurers are investing on their ability to collect, store, manage and analyze vast amounts of variable data to solve complex problems in order to remain competitive and profitable. Auto insurance is fast becoming a big data industry, with telematics-based UBI poised to potentially change the business of insurance as we know it.

Depending on the frequency and length of trips taken, data sets can represent about 5MB to 15MB of data annually, per policyholder. An insurer with 100,000 insured vehicles can collect more than one terabyte of data per year.¹² The cost of the technology and the hardware—as well as the indirect cost for installation, maintenance and logistics—is one of the main limiting factors to the quicker and wider adoption of telematics.¹³ As the technology becomes cheaper, the scalability and availability of telematics-based insurance programs is expected to grow at a faster rate.

The huge data demands in terms of storage and analytics, along with the lack of standardization in telematics devices, present significant challenges to insurers in their effort to successfully integrate telematics in their information technology (IT) infrastructure. The main players in the telematics ecosystem—auto manufacturers, insurance companies and telematics service providers—are competing for a larger slice of the market by developing their own telematics solutions and products. Choosing the technology that best fits their needs in order to start a UBI program is only the first challenge for insurers. The lack of publicly available driving behavior data that can be leveraged and the patented existing UBI technology are driving the high costs associated with launching and maintaining a telematics-based UBI program. The measure of success for insurers is centered on their ability to build an effective and profitable program without passing the costs of the device, installation and operation to consumers.¹⁴

¹² SAS

¹³ Handel, Peter, Skog, Isaac, Wahlstrom, Johan, Bonawiede, Farid, Welch, Richard, Ohlsson, Jens, and Ohlsson, Martin. 2014. "Insurance Telematics: Opportunities and Challenges with the Smartphone Solution." IEEE, July 24, 2014.

¹⁴ Cognizant. 2012. "The New Auto Insurance Ecosystem: Telematics, Mobility and the Connected Car." Cognizant Report, August 2012.

Current Telematics Technological Solutions

The telematics devices generally used by insurance companies are plugged into the on-board diagnostics (OBD-II)¹⁵ port of an automobile or are already integrated in original equipment installed by car manufacturers. The type of data recorded and transmitted from the car varies according to the telematics technology chosen and by policyholders' willingness to share personal data. Sensors in telematics devices can capture data as simple as date, time, location and distance driven to more complex as speed, lane changing, cornering, acceleration and deceleration.

Currently, there are four distinct categories of telematics solutions available in the market:

- **Dongle:** The dongle is a self-installed device provided by the insurer to be used for a certain time, typically for six months. This is the most preferred solution in the U.S. market due to its relatively low cost and high reliability. Its "plug and play" low cost makes it the most suitable choice for new and emerging telematics UBI markets. The dongle is typically installed by the driver, is re-usable, can be transferred to another vehicle, automatically turns on with the car's ignition, generates high-quality and secure data on location and driving style, and can be bundled with other value-added services. However, along with its many strengths, the dongle has a number of weaknesses, such as the fact that it can only be used in modern vehicles, is vulnerable to fraud as it could be tampered since it cannot be hard-wired into the car's electronics, and will soon (12 to 18 months) be technologically obsolete.¹⁶
- **Black box:** The professionally-installed black box, popular across Europe, is considered to be one of the most secure and reliable solutions. The black box can be used with both PAYD and PHYD, but it is most suitable for the latter since it can provide some of the most in-depth and detailed data on driving behavior. Because PHYD plans tend to be the most sophisticated of the telematics, UBI products require devices like the black box with integrated accelerometers to track a variety of performance data like speed, g-forces in hard cornering and braking. The black box, in addition to its own sensors, can use the vehicle's internal sensors by linking with its electronic control unit (ECU). The black box is also ideally suited for first notice of loss (FNOL) services as it is fixed in the car chassis, providing early notice in the event of theft and valuable information for forensic crash reconstruction in the case of an accident. The black box is also preferred for tracking driving behavior data (DBD) of young and inexperienced drivers. However, it

¹⁵ OBD is a computer-based system built into all 1996 and later light-duty vehicles and trucks, as required by the Clean Air Act Amendments of 1990. OBD systems are designed to monitor the performance of some of an engine's major components, including those responsible for controlling emissions. The OBD-II port is the U.S. Environmental Protection Agency (EPA) standard allowing single devices to query the on-board computer(s) in any vehicle.

¹⁶ Telematics Update.2014. "Insurance Telematics Report 2014." Insurance Report, Telematics Update.

is not portable, and it tends to be the most expensive solution in the market with high installation and administrative costs.

- **Embedded:** As of the end of 2013, there were 11 car manufacturers with embedded telematics equipment in vehicles. While early on, embedded telematics provided services such as remote diagnostics, navigation and infotainment services, now they can deliver UBI services. The embedded module connected to the vehicle's ECU is able to record and transmit a wealth of data about the vehicle's performance. The strengths of embedded telematics range from product differentiation to improved customer relationship management and potentially lower costs in the case of product recalls.¹⁷ Some importance challenges with embedded telematics are the comparatively high cost for the consumer (most are subscription-based), lack of standardization, compatibility with insurance solutions and obsolescence. The lengthy product cycles of automobile manufacturers practically ensures that whatever cutting-edge telematics technology gets designed for a particular car, it will be nearing obsolescence by the time the car hits the market.¹⁸
- **Smartphones:** Mobile telecommunication technology is the latest tool in telematics, with smartphones working as stand-alone devices or linked to vehicles' systems to transmit a variety of information to and from the car. Smartphones are an ideal telematics solution as they are typically equipped with a host of relevant sensors, such as GPS, accelerometers and gyroscopes. They also have large data storage capacity, or infinite with the cloud, and superior communication capabilities. There are no device, installation or data connectivity costs to the insurers (and no additional cost to the consumers) with smartphones-based UBI programs. Smartphones' computing power allows a big part of the data processing to be done on the device, helping to lower data handling and storage costs.¹⁹ The large manufacturing volumes for smartphones exploiting economies of scale make the price–performance metric of the technical capabilities of the smartphone superior to many rivals, and it is still continuously improving over time.²⁰ However, despite the advantages the smartphone can offer, smartphone-based telematics programs have not taken over the market. A weakness possibly slowing down their deployment is the quality of data and the reliability of measurement data smartphones can provide.²¹ Smartphones' accelerometer data is not

¹⁷ Berg Insight. 2014. "The Global Automotive OEM Telematics Market." M2M Research Series, Sept. 4, 2014.

¹⁸ Telematics Update. 2014. "Embedded telematics and the art of future-proofing." June 12, 2014.

¹⁹ Telematics Update. 2014. "Insurance Telematics Report 2014." Insurance Report, Telematics Update.

²⁰ Handel, Peter, Skog, Isaac, Wahlstrom, Johan, Bonawiede, Farid, Welch, Richard, Ohlsson, Jens, and Ohlsson, Martin. 2014. "Insurance Telematics: Opportunities and Challenges with the Smartphone Solution." IEEE, July 24, 2014.

²¹ Ibid.

calibrated, while the cellular gyroscopes need to be constantly adjusted based on the phone's changing positions.²²

Insurers' PAYD UBI Telematics Programs

Progressive's Snapshot is a wireless device plugged into an OBD II port and records and transmits time, speed and harsh braking. Progressive has partnered with AT&T for network support. The Snapshot device collects the time of the day the vehicle is in operation, vehicle speed, mileage and frequency of hard stops. Progressive notes the device does not record and transmit the location of the vehicle because unlike other onboard devices, Snapshot does not currently have GPS functionality. According to the company, drivers' personal data received is not shared with any third parties, and Snapshot information is only used to resolve a claim if the policyholder permits it and will not be shared unless it is required to prevent fraud.

Progressive's telematics UBI technology is covered by 598 patents relating to systems for monitoring and communicating operational characteristics and driving behavior. While the technology is available to other insurers via licensing agreements, a number of these patents, generally related to commercial applications, have been challenged by competing insurers.²³

In March 2014, Progressive announced it had already reached more than 10 billion miles of collected driving data with its telematics Snapshot program.²⁴ Additionally, the insurer stated it is exploring new tracking methods, such as mobile applications and GPS, to capture new driving factors. These new factors could then be added to its existing database of driving data to further refine predictive models. Similarly to the Progressive Snapshot program, Allstate's Drivewise employs a telematics device installed in the vehicle's diagnostic port. Allstate has also partnered with AT&T to support and provide connectivity for its telematics devices. The device records the time and location of the vehicle during trips, the number of trips per day, the speed at which the vehicle is traveling, hard breaking and mileage.

According to Allstate, average driving performance on the factors above would not earn policyholders any discounts. A high number of speeding miles, braking events, high annual miles driven or high-risk-hours driving (e.g., during the night) may actually reduce, and in some cases even eliminate, any potential savings a driver had earned. Drivewise participants can monitor their behaviors and view potential discounts by using a smartphone app.²⁵

²² Verisk Telematics. 2014. "Telematics Rivals the Traditional." Sept. 3, 2014.

²³ Insurance Networking News. 2014. "Progressive UBI Patents Cancelled." Insurance Networking News Online.

²⁴ Progressive. 2014. Progressive Snapshot reaches 10 billion mile mark [Press release]. Retrieved from www.progressive.com/newsroom/article/2014/march/snapshot-ten-billion-mile/.

²⁵ Allstate. 2015. Drivewise. Retrieved from www.allstate.com/drive-wise.

State Farm's telematics solution, unlike Progressive and Allstate, uses a third-party technology. The Drive Safe & Save program offered to drivers by State Farm works with existing telematics technology embedded into vehicles such as OnStar and SYNC and with an In-Drive device provided by Verizon. Drivers who enroll in the program have to pay an annual subscription after the first year, which they receive for free. The recorded data includes, miles driven, acceleration, hard braking, sharp turning, speeding and time of the day the vehicle is driven. State Farm's solution provides some additional services like roadside assistance, maintenance alert and stolen vehicle locator.²⁶

Although all State Farm's third-party solutions use a GPS tracker, the company states it only records the general location (within 40 miles) of where the vehicle is driven and does not share that private information with any third parties, except in certain cases as required by law.²⁷

The Hartford's TrueLane solution relies on a telematics device that plugs into vehicles' OBD-II port. The device collects and transmits drivers' data to the company using cellular phone signal.²⁸ National General's telematics UBI program is based on General Motor's OnStar connectivity to confirm miles driven, making it available only to those vehicles equipped with OnStar.²⁹ Nationwide's SmartRide also employs a plug-in device that collects only driving behavior data and GPS information to detect drivers' location. Drivers can go online to track their discount and get personalized feedback about their driving trends.³⁰

Data Challenges

Aside from the choice of the most appropriate device, the other technological challenge is achieving a critical mass of data necessary for an effective telematics. Abstracting from cost considerations, given the right technology tools and information infrastructure, collecting and analyzing massive amounts of driving behavior data is within reach. However, the insurance industry, for the most part, has not yet moved to richer and more granular data that includes not only driving behavior, but also environment (i.e., road type and conditions, traffic patterns, etc.) and still depends on exposure-related driving variables such as mileage, duration of driving, and number of braking or speeding events, which are just secondary contributors to risk.³¹

²⁶ State Farm. 2015. "Drive Safe & Save with In-Drive." Retrieved from www.statefarm.com/insurance/auto/discounts/drive-safe-save/indrive.

²⁷ Ibid.

²⁸ The Hartford. 2015. TrueLane. Retrieved from www.thehartford.com/auto-insurance/truelane-savings.

²⁹ National General Insurance. 2015. "Low Mileage Pay-as-You-Go." Retrieved from www.nationalgeneral.com/auto-insurance/smart-discounts/low-mileage-discount.

³⁰ Nationwide. 2015. SmartRide. Retrieved from www.nationwide.com/smartride.

³¹ Tamir, Asaf. 2014. "Driving for Change." Visualize, Q2 2014 Issue, Verisk Analytics.

Collecting the right data is necessary if the aim is to understand and adequately model risky driving behavior. For insurers to be and remain competitive over time in the new telematics UBI market, they must be able to collect and analyze the right data. Collecting the wrong type of data would quickly render insurers' telematics UBI program mostly ineffective, with only limited benefits. The one sustainable solution to this problem is rich data that can ensure, particularly as analytics continuously improve, a competitive telematics UBI program for many years to come.³²

Moreover, the right data has to be appropriately communicated to the end-user in order to be really effective. The standardization of telematics data collected and reported to insurers for the purpose of making risk decisions is a necessary and important step for effective analytics and widespread telematics adoption. The Association for Cooperative Operations Research and Development (ACORD), a global standards development organization, is actively working on standardizing data elements involved in delivery of telematics data to insurers in order to improve analytic consistency and reduce the need to support multiple data interfaces. As there are multiple representations of the data, from any of the many devices available—to a cell tower/satellite to the device manufacturer, to the data aggregator, to the insurer—ACORD is engaged at the final step by striving to ensure data is delivered in a standard format to all insurers.³³

Once the right telematics data is delivered to insurers, it is critically important to be able to make sense of the data collected in order to understand specific driving events and their context. In reality, no one braking event is the same as another. A real dynamic environment is far more complex, and it cannot be modeled by simply counting how many times a driver applies the brakes. Braking while traveling at low speeds on a rural road is much less risky than aggressive high-speed braking on a highway. While it can be very challenging to make sense of the various driving events and the permutations of their environmental characteristics, an effective analytics platform should be able to differentiate, for example, between types of braking events and how and where they took place in order to assess their true overall contribution to risk.³⁴

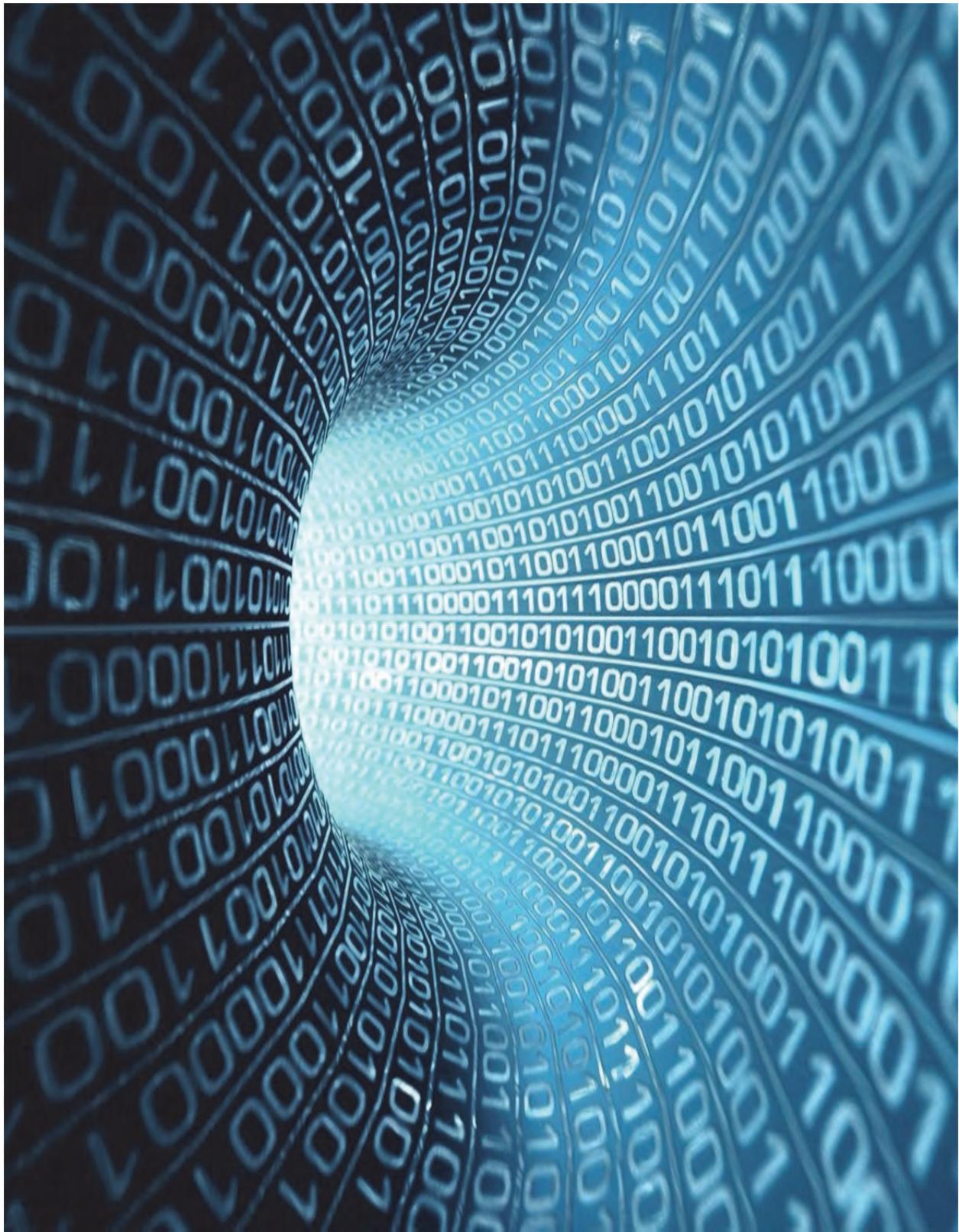
Rich PAYD variables are the best way to understand how drivers behave under real conditions and to help sustain telematics UBI risk models over many years. For most insurers, telematics data provides the foundation for understanding how a person drives and under what type of conditions a person drives, as well as the basis for more sophisticated data modeling.

³² Tamir, Asaf. 2014. "Driving for Change." Visualize, Q2 2014 Issue, Verisk Analytics.

³³ ACORD. 2014. "Property & Casualty Program, Activity and Implementation Report." ACORD Standards Program Activity Report, September 2014.

³⁴ Tamir, Asaf. 2014. "Driving for Change." Visualize, Q2 2014 Issue, Verisk Analytics.

Telematics UBI Modeling and Analytics



Telematics UBI Modeling and Analytics

By Robin Harbage, Director, Towers Watson

Introduction

Usage-based insurance has been in development since the 1990s. The original research relied on data collected from telematics devices professionally installed in automobiles either in the manufacturer factory or by a technician equipping an aftermarket device. After a defined period of monitoring the vehicle operation, the insured is provided with a new rate that uses the driving experience as a part of the rating algorithm. Almost no insurers base the entire premium on just the driving behavior, and most still largely rely on the common proxy variables approved for use in their jurisdiction.

At the top of the list of the key issues facing insurers trying to adopt or expand a telematics-based UBI programs is the ability to build predictive loss cost models that identify behaviors indicative of unsafe vehicle operation.

Predictive Models

Current loss cost models for telematics-based UBI products are largely of two types. One type relies on total mileage, time of day and a set of predefined events. The “event counter” scores are limited in their capability because they are based on the assumption that a few harsh braking, acceleration or cornering events constitute the universe of variables to predict loss costs based on patterns of vehicle operation.

A second approach is based on collecting much more granular data about vehicle use on a second-by-second basis, or even slightly more granular as needed for accelerometers, and then using the more granular detail to research the predictive power of a host of vehicle operation characteristics in a very contextual basis. An example might be to observe the distribution of g-force when changing heading by more than 45 degrees at greater than 45 mph. If the researcher chooses a series of thresholds based on what percentage of the turns actually indicate that behavior and then validates which of the threshold events is most correlated with actual insured losses, the researcher may identify an event that adds to the predictive power of an existing loss cost model. This type of continual research and refinement can lead to increasingly more predictive models over time as it was discussed in the previous section. However, it requires the insurer to collect highly granular data and is improved by recording GPS coordinates and other information which allows the insurer to place the events in the context of road type, sunlight or darkness, weather, road speed limit, etc.

Telematics UBI Modeling and Analytics

There are several distinct differences between these two approaches of using a predefined set of events or refinement through collecting granular data. First, the granular data allows the researcher to identify new predictive variables much more quickly as they do not need to guess at new events which might be predictive, and then reconfigure the collected data and wait for sufficient new data to be collected before testing the value of the new characteristic. With granular data, the new variable can be created from current historical data and tested based on previously collected trips and losses.

Another advantage to granular data is that the researcher can identify driving behaviors that can be described in a manner that the operator may be coached to correct hazardous behavior to improve their driving and the road safety.

Vehicle operation characteristics may also be correlated with fuel consumption, so the vehicle operator may be coached on behaviors to improve fuel consumption and save fuel. The key to this accelerated learning is the type of data collected and the ability to place the collected data in the context of road type, speed limits, weather and other contextual information which allows for increasingly more accurate loss cost models and better contextual information for the consumer. The challenge for regulatory bodies is to balance the desire for privacy protection against the value of allowing consumers to voluntarily join programs where their data can inform and improve models which will lead to the ability to coach for behavior change that will lower loss costs, improve fuel consumption and save lives.

Tower Watson's DriveAbility®

Towers Watson has taken a leadership role globally in assisting with development of UBI programs. Beginning in 2008, Towers Watson has worked with more than 45 clients on six continents in the development and operation of the clients' UBI programs. These engagements have taken a number of different approaches, from day-long workshops to introduce company management to the concepts of UBI, to long-term engagements in which Towers Watson manages all telematics data for the insurer and provides DriveAbility vehicle operation scores for each enrolled vehicle.

The data management and scoring service includes analytics to create UBI models and file those models for approval with the regulatory authorities for the clients' geographic jurisdictions of operation. These filings include all actuarial support. The DriveAbility score is based on an expected pure premium relativity, but it is up to each individual subscribing insurer to file their own proprietary rates using the DriveAbility score.

One of the biggest challenges for Towers Watson's clients is the collection of sufficient vehicle operation data to develop a predictive model of vehicle operation correlated with expected loss

costs. The DriveAbility database, which supports Towers Watson's UBI services, includes all of the telematics data from a group of global insurers. Each insurer contributes all of its telematics data and all of the associated policy and loss data for the enrolled vehicles. Each insurer has access to its own data, but only Towers Watson has access to the combined data, which is not shared with any of the contributing companies.

This telematics data includes very granular information collected on a second-by-second basis for each trip, and is linked with the insured policy and loss data for the UBI-enrolled vehicles. The database also includes associated external data such as maps, road type and weather matched with each vehicle and trip. The loss data is linked to the precise point in each trip where the loss occurred. This matching allows Towers Watson to perform unique analytics in which all vehicle operation behaviors can be assessed during trips leading up to an accident, and commonly observed behaviors can be noted for testing in each update of the scoring model. Through this method, Towers Watson has identified a number of vehicle operation characteristics which are not only highly correlated with losses, but are actually believed to be causative of losses.

Using actual vehicle operation has been proven to be significantly more predictive of expected loss costs than proxy variables commonly employed for auto insurance ratemaking. Towers Watson's DriveAbility score has been demonstrated to be at least three times more predictive than any rating variable previously employed when comparing the difference in loss costs between the riskiest decile of insured vehicles and the safest decile.

Towers Watson's goal is to not only produce scores which are highly predictive of future losses, but also to develop driver feedback programs which can improve driving behavior and lead to significantly safer roadways. Evidence exists in Canada, the UK and the U.S. that driving behavior is improved through the operation of UBI programs. This will only become more successful as better feedback and coaching is developed that identifies the most risky behaviors and those behaviors that are most controllable by the insured.

The Insurance Market for Telematics UBI



The Insurance Market for Telematics UBI

By NAIC Staff

Introduction

Auto insurance markets are changing rapidly. In the past, auto insurance policies were rated on a small number of rating factors, with each having a multiplier effect on the overall rate. A policyholder might receive a quote based on the fact the person was a 30-year-old married woman who drives less than 15,000 miles per year with the car garaged in a particular ZIP Code.

As technology has evolved and as the price of data has fallen, rates can now be produced through millions of variables in a multivariate analysis. Factors can include gender, age, driving experience, marital status, education, occupation, credit score, multi-policy discounts, location, annual mileage, vehicle use, lapse in coverage and type of vehicle, just to name a few.

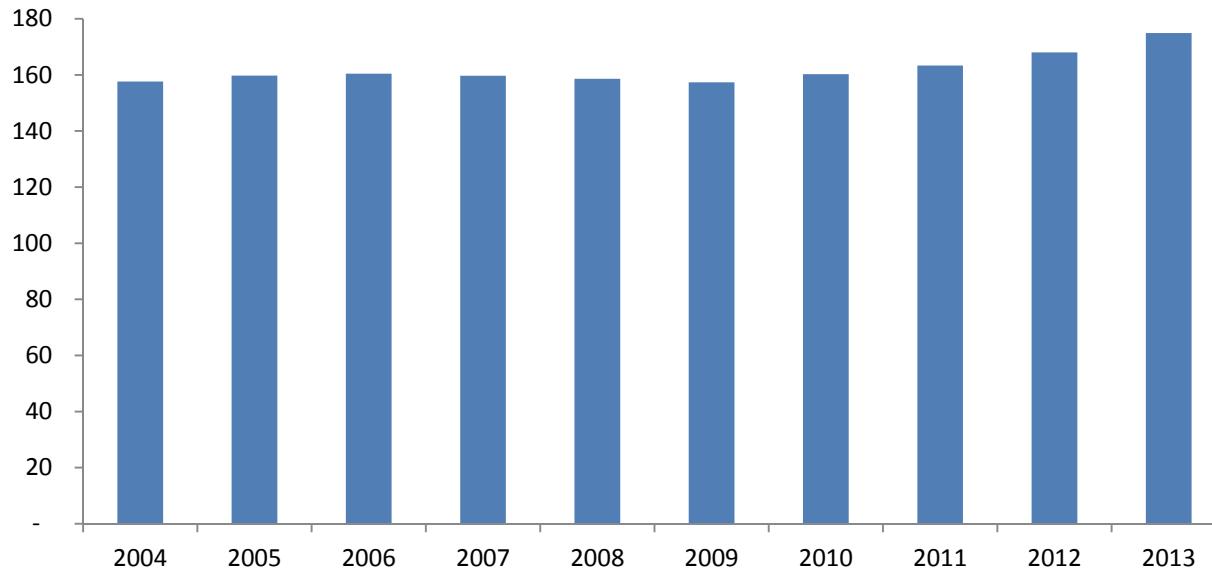
As illustrated in the previous sections of this study, the next step in the evolution of auto insurance rating is here via telematics. Through telematics, risks can be rated on an individual basis. An insurer can now technically identify, measure and rate a particular person's driving ability. An insurer can now know when, where, at what speed and how a person drives—i.e., the number of hard brakes, sharp turns and other potentially dangerous maneuvers.

Current State of Personal Auto Insurance Market

The auto insurance market is the largest insurance market segment in the U.S., and it is fiercely competitive, as insurers strive to attract the more profitable low-risk drivers. Hundreds of auto insurance writers are essentially competing for the same premium base, which is not growing. As vehicles and roads are becoming safer, premiums are falling. In such an environment, the opportunity for growth appears to be limited. Total premiums in the private passenger auto insurance market (liability and physical damage) have only grown from \$158 billion to \$175 billion in the last 10 years (Figure 1.) Over this period, the market has not even kept up with inflation. For some large insurers showing strong growth, most of the growth is primarily a result of increasing their market share. The stagnant growth in a competitive market makes the attraction, retention and accurate rating of policyholders all the more important, and any tools that can help achieve these goals are immensely valuable.

**Figure 1: Total Private Passenger Auto Direct Written Premiums
(2004-2013 in \$Billions)**

Source: NAIC



The Telematics Market within Auto Insurance

The telematics UBI market is still a fast-growing developing market, with insurers trying to compete for a bigger slice of the \$170 billion auto insurance market. Although the use of telematics has accelerated in recent years, it is difficult to estimate with any accuracy the overall size of the market. A July 2014 Towers Watson survey found that 8.5 percent of consumers had a UBI policy in force in the prior 17 months, up from 4.5 percent in February 2013. Most large auto insurers, with the exception of GEICO, have publicly discussed their venture into the world of UBI for underwriting and rating purposes. According to SMA Research, approximately 36 percent of all auto insurance carriers are expected to use telematics UBI by 2020.³⁵ Based on the CIPR survey of state insurance departments (see appendix), in all but five jurisdictions—California, New Mexico, Puerto Rico, Virgin Islands and Guam—insurers currently offer telematics UBI policies. In 23 states, there are more than five insurance companies active in the telematics UBI market.

Progressive appears to be the most active and largest auto writer using telematics-based UBI, with its well-known and heavily advertised Snapshot program, currently available in 45 states and Washington, DC. Progressive was among the very early adopters of the telematics technology introducing its UBI program in March 2011. Progressive has an estimated \$2 billion

³⁵ SMA Research. 2013. “How Do Insurers and Agents Think Telematics Will Impact the Industry.” SMA, Insurance Telematics ExecuSummit, Nov. 6, 2013.

in premiums and 2 million customers in its Snapshot auto insurance program. If the Snapshot program were a stand-alone insurer, it would be a top 15 writer of private passenger auto insurance by itself.

The discount offered to drivers who enroll in the Snapshot program is based in the first 30 days and applied for the remainder of the policy's term, typically six months. The discount set in the first six months continues to apply as long as nothing else changes. Policyholders who tend to drive less can get discounts on their premiums up to 30 percent, according to Progressive. Premiums can only be discounted and cannot be negatively affected by participants' driving behavior data.³⁶

Although telematics was pioneered by Progressive, currently more than half of the major insurers in the U.S. have an active telematics UBI program, and several others are conducting market trials for their own UBI offerings.³⁷ Towers Watson notes U.S. insurers, representing close to 75 percent of the auto insurance market, have telematics programs or are currently active in preparing to deploy them.³⁸ Frost & Sullivan projects telematics UBI activations in the U.S. market will increase from 137,000 in 2010 to 1.1 million by 2017, a compound annual growth rate of 34.7 percent.³⁹ The major providers of telematics solutions wrote approximately \$79 billion in total auto insurance in 2013 (includes traditional as well as telematics UBI policies) or about 45 percent of the aggregate industry premiums written (Figure 2.)

Figure 2: Premiums Written by Main Telematics UBI Providers (2013 Year-End)

Source: NAIC

NAIC Code	Company/Group Name	Written Premium
176	STATE FARM GRP	32,353,629,762
8	ALLSTATE INS GRP	18,067,452,324
155	PROGRESSIVE GRP	15,358,291,116
140	NATIONWIDE CORP GRP	7,279,834,888
3548	TRAVELERS GRP	3,178,691,672
91	HARTFORD FIRE & CAS GRP	2,349,919,064

³⁶ Progressive. 2014. "Progressive Snapshot reaches 10 billion mile mark" [Press release]. Retrieved from www.progressive.com/newsroom/article/2014/march/snapshot-ten-billion-mile.

³⁷ Cognizant, 2012. "The New Auto Insurance Ecosystem: Telematics, Mobility and the Connected Car." Cognizant Reports, August 2012.

³⁸ Towers Watson. 2013. "Usage-Based Insurance." Presentation at the Spring Meeting of the Casualty Actuarial Society. May 2013.

³⁹ Frost & Sullivan. 2011. "Strategic Analysis of North American Market for Telematics-enabled Usage-based Insurance." March 9, 2011.

Allstate launched its own telematics solution, Drivewise, in January 2011, and it is currently available in 28 states. The discount applied is based on the driver's performance rating, which is calculated on a rolling basis using 12 months of driving information. Policyholders enrolling in the program receive an automatic discount of 10 percent with additional savings calculated and applied every six months, with total discount of up 30 percent.⁴⁰

In 2012, State Farm expanded its Drive Safe & Save initiative adding a telematics solution called In-Drive. Travelers' IntelliDrive telematics UBI solution was launched in October 2011 and it is currently available in eight states. According to State Farm, drivers initially receive an automatic five percent discount for signing up and subsequently they may earn discounts of up to 50 percent. The discounts are calculated based on 30-day monitoring periods with premiums adjusted at renewal every six months. State Farm states that while not everyone is guaranteed a discount, which is contingent on drivers' monitored behavior, no policyholder should see an increase in premiums after participating in the program, except if they already receive a low-mileage discount (less than 7,500 miles annually) and record an excess of that.⁴¹

The Hartford also offers its own telematics device called TrueLane, which was launched as a pilot in 2012 and is currently available in 34 states. Instead, TrueLane uses telematics to get a clear picture of policyholders' driving habits and adjusts their rates accordingly. TrueLane can potentially save policyholders up to 25 percent on their auto insurance premium.⁴²

National General offers a Pay-As-You-Go insurance program to OnStar subscribers, with discounts exclusively based on mileage driven and confirmed by the OnStar vehicle diagnostics reports. The National General OnStar program is currently available in 35 states. Policyholders can get discounts ranging from 7 percent to 54 percent depending on how many miles they drive per year, with 15,000 being the maximum allowed.⁴³

Nationwide SmartRide uses a plug-in telematics device to monitor and collect data and offers discounts based on driving behavior data like some of its competitors. Participants receive an immediate 5 percent for signing up, and then based on their data, they can qualify for discounts up to 30 percent. Similar to the competition, participation in the SmartRide will not negatively affect premiums.⁴⁴

⁴⁰ Allstate. 2015. Drivewise. Retrieved from www.allstate.com/drive-wise.

⁴¹ State Farm. 2015. "Drive Safe & Save with In-Drive." Retrieved from www.statefarm.com/insurance/auto/discounts/drive-safe-save/indrive.

⁴² The Hartford. 2015. TrueLane. Retrieved from www.thehartford.com/auto-insurance/truelane-savings.

⁴³ National General Insurance. 2015. Low Mileage Pay-as-You-Go. Retrieved from www.nationalgeneral.com/auto-insurance/smart-discounts/low-mileage-discount.

⁴⁴ Nationwide. 2015. SmartRide. Retrieved from www.nationwide.com/smartride.

Insurers who adopted telematics early on gained a great competitive advantage as they were able to not only increase their market share by offering better pricing and services, but also win consumers' loyalty. In a new segment of the market, particularly one based on a game-changing technological innovation, such as telematics, retaining consumers is a less costly proposition than acquiring them. Having telematics UBI in their business mix can be a powerful tool in attracting new consumers as well as retaining them. Insurers are keenly aware that the first telematics device consumers install will most likely be their last, and they will almost certainly remain with their existing carrier as technology evolves.

By deploying telematics programs, insurers can provide discounted coverage underwritten on the risk consumers personally pose, thanks to the accumulated data on their driving behavior. According to consumer research by LexisNexis, 36 percent of insurance consumers would consider switching insurance companies in order to participate in a telematics PAYD UBI program if they are offered discounts of 10 percent as rewards for safe and better driving behavior.⁴⁵ Leading auto insurers assert using telematics UBI can save consumers 10 percent to 15 percent on their premiums and could soon increase to 30 percent based on accumulated data on their driving behavior and car usage.⁴⁶ Discounts are particularly important to lower-income drivers, whose insurance premiums are often higher than their car loan payments despite their clean driving record.⁴⁷ Additionally, to further differentiate themselves from other insurers, telematics UBI carriers can enhance their consumers' experience with a number of value-added features tied to their telematics program.

Competing insurers entering the market later are placed at a serious disadvantage because they lack the valuable large and statistically credible UBI data sets to lure existing customers away from their insurers with better pricing. Also, late adopters may end up competing with each other for a shallower pool of riskier drivers.

Consumer Acceptance

One of the biggest and most obvious challenges to telematics adoption in the auto insurance world is the degree to which consumers are ready to accept the product. Recent surveys have shown a majority of auto insurance policyholders are at least open to the idea of telematics. A January 2014 survey by Deloitte found more than 25 percent of respondents would allow monitoring of their driving without any minimum discount in return. About the same percentage of people were comfortable with the use of telematics if the premium discount was

⁴⁵ LexisNexis. 2013. "Consumers & Usage Based Insurance." Lynx Research.

⁴⁶ Cognizant, 2012. "The New Auto Insurance Ecosystem: Telematics, Mobility and the Connected Car." Cognizant Reports, August 2012.

⁴⁷ Cognizant, 2012. "The New Auto Insurance Ecosystem: Telematics, Mobility and the Connected Car." Cognizant Reports, August 2012.

high enough. Less than half actually said they would not want their driving monitored regardless of any savings. The younger consumers seem to be more receptive to the idea. Nearly two-thirds of those in their 20s were receptive to telematics, compared to 44 percent of those over 60.

Ongoing Value

Auto insurers can attract new customers by enticing them with not just lower premiums, but also add-on services. These include immediate feedback on driving, alerts related to road or weather conditions, tracking or locating stolen vehicles, roadside assistance, or monitoring or geo-fencing youth drivers. Several consumer preference studies indicate consumers have a strong desire for ancillary services, such as vehicle maintenance reports, fuel management and concierge services. Insurers offering these value-added services have the potential to increase customer satisfaction, add new revenue streams and differentiate themselves from other insurers. Once policyholders become used to an insurer's ancillary benefits, they are less likely to move to another carrier.

There has been a great deal of focus recently on the gamification or the application of gaming concepts to a broader commercial experience. Policyholders become active participants in safe driving as they earn rewards and compete against friends or others in driving more safely or driving less and being more green. (See the Benefits section of this study for more details.) Policyholders will drive less and drive more safely in order to get instant feedback and feel not just a sense of pride, victory or accomplishment, but win actual tangible prizes or reductions in premium. To many policyholders, the customer experience goes from being one of paying a premium and getting nothing in return to one of competition, interaction and fun. Like the add-on services, these policyholders find value in the whole experience and are more loyal customers.

How Telematics Can Change the Auto Insurance Industry

The use of telematics has already changed the industry, and it has the possibility of revolutionizing the industry. As the population becomes more accepting of technology and as the generation that has grown up surrounded by technology in their everyday life grows, it is likely that the percentage of policyholders ready to adopt telematics will increase dramatically.

Traditional rating factors tend to be proxies for risk. The idea of telematics is to actually measure risk on an individual level. Recently, actual mileage driven has been added to the more traditional factors such as age, gender and experience. Now telematics promises to add even more accurate factors to the equation by measuring actual driving behavior through events such as hard breaking or swerving. Ultimately, an insurer will measure how a car is driving as well as the situation, such as time of day and weather and traffic conditions. Technology, due to

advancements and reductions in price, allows insurers to directly measure factors that determine risk. By using UBI rating factors instead of traditional rating proxies, insurers could offer an 80 percent discount on the best drivers and still be profitable.⁴⁸ The competitive advantage gained by insurers with a telematics UBI program over non-UBI insurers is enormous, especially considering that even late adopters may not be able to catch up due to adverse selection.

In telematics' infancy and in the near future, it is likely that insurers actively pushing their telematics programs will attract good risks, partly by promising discounts. It makes sense that someone who drives a lot, at unusual times and unsafely probably will not sign up for these programs. The early adopters will bring in good drivers and can rate them at fairly cheap prices. As the use of telematics grows, companies will have to include both increases and decreases to rates in order to avoid adverse selection. More precise pricing will reduce or eliminate cross subsidies. Currently risk characteristics grouped together in the process of risk classification are priced on an average, so some individual risks are above the average and some are below.

As detailed in the Technology section of the study, many large insurers currently have their own telematics programs, usually using their own data, as it has been detailed in the technology section of the study. Medium and small insurers may use consultants or third-party vendors because they do not have the expertise or the vast amount of data needed to have a telematics program. Those companies not rating correctly may be left behind. If a company is overcharging a good risk, it will lose that policyholder to a company with a cheaper, more accurate, rate. If a company is undercharging a bad risk, the company will lose money and not be profitable. Eventually, companies charging inaccurate rates will not be able to survive in the market. There is an incentive for insurers to use the technology because there will be adverse selection where riskier drivers may be more likely to use insurers not using a telematics system.

The use of telematics has the potential to reduce insurers' reliance on controversial rating factors. There are factors—such as credit scoring, occupation and education—that are used by many insurers but are not intuitive to policyholders why they are risk factors for auto insurance. Consumer advocates believe the use of these factors disproportionately harms certain disadvantaged classes. The use of telematics may eventually reduce the need for these factors. If a person's true driving behavior can be observed, measured and compared to others, insurers will be able to rate more accurately and may not need to rely upon credit scores, occupation, education or other traditional risk classification factors. Ultimately, what matters to an auto insurer is how a policyholder drives and how to accurately price for that risk.

⁴⁸ Verisk Telematics. 2014. "Telematics Rivals the Traditional." Sept. 3, 2014.

The use of telematics could have another dramatic effect on the industry by causing drivers to drive more safely. The degree to which an insurer can influence its policyholders' driving behavior is heavily dependent on the sophistication of its telematics program and its communication with drivers. Drivers receiving feedback on their driving behavior will be more likely to try to improve their behavior. They will wish to improve the behavior in order to be safer, and they will be incentivized to do so through lower premiums offered by their insurer. This is expected to reduce losses as well as rates. According to a study by the Brookings Institute, reducing miles driven correlates to fewer accidents and lower claims costs.⁴⁹ Thus, tying premium to miles driven encourages drivers to limit their vehicle use, lowering insurers' associated loss costs.

Policyholders will know that they actually have control over their rates. Previously, a policyholder had little control because rates were based on factors such as location, gender, age or credit score. These factors are difficult, or in some cases impossible, to change. Now a person can actually drive less or drive more safely in order to receive a better score and, therefore, reduced rates.

Obstacles to Growth

Insurers are currently exploring technologies that would allow mobile devices like cell phones to transmit the telematics data as discussed in the technology section. Challenges include battery usage and knowing whether the mobile phone is with a driver or passenger. If solutions can be found, it is promising as insurers would save the cost of purchasing monitoring devices for each user. With current monitoring devices usually placed on the car for only a limited time, the increasing use of a mobile device would improve data collection because it stays with the policyholder indefinitely through the term of the policy or life cycle of the customer. The potential for increased amounts of data is also critical to an insurer in order to create more accurate rating outcomes.

A potential obstacle to the expansion of the telematics UBI program could be Progressive's decision to patent telematics as strictly a proprietary technology, obliging other insurers to license the technology if they wish to market similar and competing UBI products. Recently, several of the patents were cancelled by the U.S. Patent Trial and Appeal Board, and while the decision may be a controversial opinion not shared by patent-holders, it could lead to a faster and more widespread adoption of the technology.⁵⁰

⁴⁹ Jason E. Bordoff and Pascal J. Noel (2008), "Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity," *The Brookings Institution*.

⁵⁰ Insurance Networking News (Online.) 2014. "Progressive UBI Patents Cancelled." March 27, 2014.

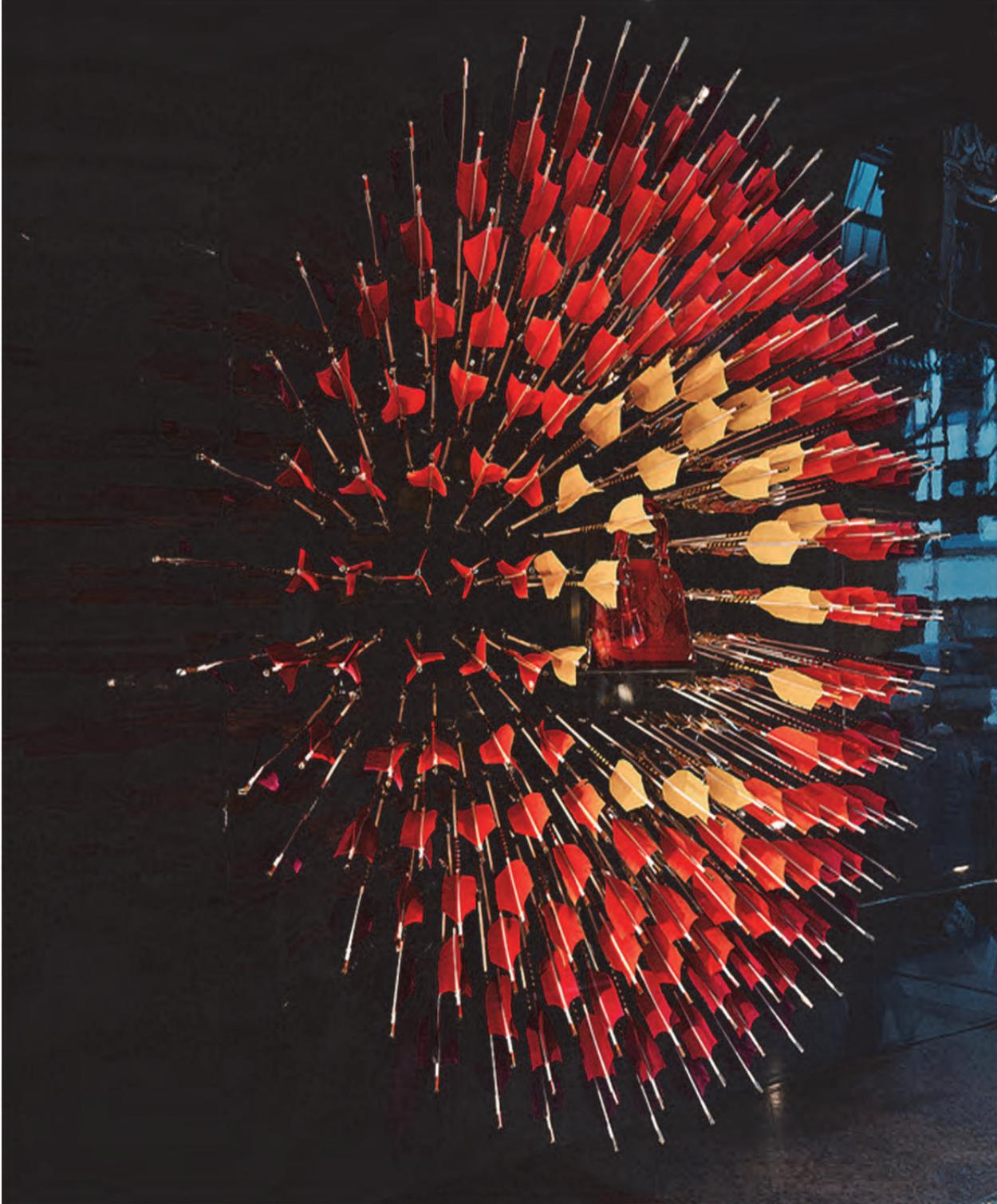
The Insurance Market for Telematics UBI

A further hindrance to the growth of the market is if a driver leaves an insurer with which he or she had a telematics device installed, the driving behavior data is property of the insurer and cannot be transferred to a new carrier to help price a new policy. One idea floating through the industry is the creation of a statistical agent to collect centralized telematics data, similar to what exists with credit scores for insurance. This would allow customers to shop around. A centralized agent would allow insurers to have additional amounts of information about a driver's driving behavior prior to becoming insured. The logistics behind this idea are not developed, but portability could dramatically change telematics.

The use of telematics may also introduce concerns about affordability if territorial rating is used, which is likely to harm those in economically disadvantaged neighborhoods. Similarly, older cars may drive differently and lead to higher rates. Telematics introduces the possibility of using the device for claim adjusting. Consumers wonder if the decision to use a telematics device will be forced upon them by the insurer. Other concerns include whether telematics will be transparent so that drivers know what is being measured and have an opportunity to improve these characteristics and then see the resulting lower rate. If drivers have a full understanding of what metrics make up their telematics score and how to improve that score, they will have the tools to take action. This will allow drivers to improve their insurance rates by improving their score by either driving less or driving more carefully or in less dangerous locations or times. This reduces risk for all.

If telematics can be shown to reduce risks and encourage people to drive less or drive more safely, it is likely to have fairly widespread support from all parties. As an example, individuals receive insurance discounts for smoke alarms or seat belts, which encourages them to use those devices.

Applying Behavioral Economics Concepts in Designing PAYDAYS UBI Products



Applying Behavioral Economics Concepts in Designing PAYDAYS UBI Products

By Allen Greenberg, Federal Highway Administration

Introduction

Behavioral economics, a discipline combining economics and psychology to explain consumer decision making, offers insights on marketing and designing telematics PAYDAYS UBI products to maximize profitability, consumer acceptance and public benefits. Through behavioral economics, one can determine how different product designs and marketing could strongly influence both consumer acceptance of the product and how effectively the product encourages consumers to curb their driving.

By converting fixed insurance costs to per-mile or per-minute-of-driving charges, PAYDAYS insurance encourages voluntary reductions in driving that reduce congestion, air pollution and crashes, as it was discussed in the Benefits section of the study. 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 vehicle miles traveled (VMT) and in the magnitude of related benefits. This section analyzes how PAYDAYS insurance plans are designed to attract and retain customers, and discourage driving. A pilot experiment is proposed to help illuminate consumer response to this kind of insurance program, and improve the application of behavioral economics principles to the design of PAYDAYS insurance products.

General Consumer Decision-Making

As a group, consumers avoid making decisions they see as complex, and if they cannot avoid such decisions, they often apply only minimal mental effort to the task. They rarely reconsider past decisions that continue to influence their current circumstances. In consideration of complex products, such as of telematics PAYDAYS insurance, this bodes ill for consumer adoption.

While consumers consider economic factors beyond just product price in their decision-making, such factors generally tend to have relatively little influence. Consumers typically formulate very rough budgets in their heads that cover short periods of time, with little economic concern for the long term. They consider savings opportunities only where potential savings appear to be significant relative to price, and they look for deals that make sense to them and appear fair. Consumers also tend to be biased toward accepting a default option even if better non-default

options are readily available. All this is especially true in markets where the products are complex.

Consumers are most likely to shop for new insurance when premiums rise or when changes occur in their household (the addition of a driver), circumstances (financial, employment, etc.) or vehicle (purchasing or leasing a vehicle). Financial pressure is a major motivator for changing insurance policies. For example, from October 2008 to March 2009, a period of sharp decline in the economy, 25 percent of surveyed car insurance shoppers reduced their insurance coverage, while 31 percent increased their deductibles. During this period, quotes for coverage on the website www.Insurance.com dropped by an average \$100.⁵¹

Consumers readily categorize spending decisions into different budgets, such as food and transportation, and they tend to calculate trade-offs within each category without regard to changes in other budget categories.⁵² Put another way, consumers may view spending related to driving within the broader context of their predetermined car insurance and travel budgets. This suggests advocates of PAYDAYS UBI seeking reduced VMT should persuade consumers they can actually reduce their car insurance budget relative to its size under traditional insurance.

Consumers generally appear to be more sensitive to their immediate cash flow needs than to longer term budgets (although this is less true for affluent consumers.) For example, when making car-buying or leasing decisions, the average consumer is much more sensitive to the size of the monthly payment than to the total number of monthly payments.⁵³ Because of consumers' cash-flow concerns, PAYDAYS UBI will be more effective in encouraging reduced driving if billing is frequent—thus reminding PAYDAYS UBI customers that they incur insurance costs every time they drive.

As noted above, consumers concern themselves with opportunities to save only when the potential savings seem significant relative to the price. Thus, if PAYDAYS insurance is sold in use-or-lose packets of 2,500 miles—about two months-worth for the average American driver—this may do little to discourage short and frequent trips. However, such packets would be likely to influence longer-term decisions, such as whether to join a carpool, purchase a commuter rail pass, or try to telecommute a couple of days per week. Conversely, two-week packets of PAYDAYS insurance might also encourage buyers to avoid or consolidate individual trips, while longer-term packets probably would not.

⁵¹ Kuykendall, Lavonne. 2009. "Drivers Looking to Cut Costs on Insurance," *The Wall Street Journal*, Marketplace, New York, April, 22, 2009, p. B4B.

⁵² Thaler, Richard H. 1999. "Mental Accounting Matters," *Journal of Behavioral Decision Making*, Vol. 12, John Wiley & Sons, Hoboken.

⁵³ Gourville, John. 2002. "Use the Psychology of Pricing to Keep Customers Returning," *Working Knowledge*, Harvard Business School. Cambridge, September 2002.

Marketing PAYDAYS UBI as a better and fairer deal could help it gain acceptance. Consumers generally are very sensitive to the perceived fairness of the deal (transaction utility), and they are much more willing to spend on what seems like a good deal, regardless of the purely economic value they may derive from using a particular product or service.

Consumers are much more likely to choose a default option than an alternative, even if choosing the alternative involves no more effort than checking a box on a form. Thus, for PAYDAYS UBI to become highly successful, insurers should start offering it as the default. This propensity to pick the default has been shown in a variety of markets, including automobile insurance. In Pennsylvania, for example, where full-tort insurance coverage is the default option, more than half of drivers sign up while in New Jersey; where it is not, fewer than one in 12 consumers sign up.⁵⁴

Consumer Responses to Financial Gains and Losses

One of the major lessons from behavioral economics, derived from microeconomics, is that consumers discount the future generally preferring present value far more than a higher value they could gain in the future. This is central in the design of PAYDAYS UBI pricing schemes in order to get the greatest reduction in mileage. Consumers will drive fewer miles if they have to pay for them now than if they are offered a rebate for miles not driven in the future.

Unfortunately, virtually all U.S. pilot projects testing consumer response to mileage pricing have not been designed to take advantage of loss aversion. These pilots give participants bank accounts which are incrementally depleted for each mile driven, with the money remaining at the pilot's end given to the participant. People perceive money that is given to them as a windfall, rather than as their own hard-earned cash that they saved through driving less, and they would, therefore, value it commensurately less. Thus, these pilot studies were far less effective at reducing miles driven than they would have been had there been direct mileage pricing.

Similarly, various PAYDAYS UBI policies in the marketplace are framed as offering low-mileage discounts instead of basing their premiums directly on mileage. This may result in comparatively higher mileage than if the products were to be framed the other way.

⁵⁴ Leonhardt, David. 2005. "Why Do So Many Consumers Choose Frills When Plain-Old Will Do? Pure Laziness," *The New York Times*, Business, New York, July 11, 2005.

Payment Frequency and Payment Method Affecting Propensity to Conserve

The timing and frequency of payments have a profound effect on the propensity to conserve. Part of this stems from peoples' general aversion to decision-making, especially regarding complex financial decisions whose consequences are not immediate and/or transparent. Thus, if PAYDAYS insurance could be purchased only in use-it-or-lose-it buckets of 2,500 miles, consumers would not worry about the financial consequences of short trips until they approach the bucket's mileage limit. On the other hand, with frequent payments, people would be acutely aware that their driving was costing them money, and they would make a conscious effort to conserve miles.

The form of payment also influences decision making. People tend to spend more freely when paying by credit card than by cash or check, because credit cards reduce the frequency of the pain of paying to once monthly and the impact of individual charges are somewhat masked by the size of the overall bill.⁵⁵

Perspectives on Price Bundling

Consumers may prefer all-inclusive pricing over pay-per-use pricing schemes for a variety of reasons. People love to feel that they are getting something for nothing, even if the freebie requires paying far more for what the freebie is bundled with than what that something is really worth.⁵⁶ Nevertheless, unbundling, or pay-per-use pricing, has been shown to be an effective strategy in the marketplace if deployed with particular attention to consumer concerns, needs and desires.

Consumers often prefer buying in bundles partly because this way, they do not need to worry about usage. A number of the reasons consumers hesitate to accept pay-per-use schemes, which also apply to UBI, include: 1) difficulty to estimate usage costs; 2) laziness regarding tracking expenses; and 3) excessive concern they will pay a lot for those few times when they need to take longer trips, combined with undervaluing the savings that will accrue from driving less overall. Telecom industry research shows most consumers are ignorant of the price of individual phone calls, and may over-estimate the cost by a factor of three. Since bundled products seem to come with more price certainty than unbundled products, consumers demonstrate a general preference for bundled products. This is especially the case since "most

⁵⁵ Thaler, Richard H. 1999. "Mental Accounting Matters," *Journal of Behavioral Decision Making*, Vol. 12, John Wiley & Sons, Hoboken.

⁵⁶ Anderson, Chris. 2009. "Free: The Future of a Radical Price." Hyperion Books, New York.

people are risk averse and, other things being equal, will choose an option with a known price over one with an uncertain price.”⁵⁷

Not all purchasing in bundles is done by consumers to avoid the risk of paying more with pay-per-use pricing. Purchasing in bundles (e.g., all-you-can-use monthly gym memberships instead of single-use one-day passes) has been shown to be especially prevalent with health club memberships, because consumers typically overestimate how much they will use their memberships and also want to motivate themselves to use them more.⁵⁸ In the context of PAYDAYS UBI plans, this overestimation of personal discipline suggests that consumers see UBI pricing as offering even greater savings than they would typically ultimately realize. Thus, if consumers understand the benefits of driving less, and are optimistic about their ability to do so, UBI seems like a very attractive deal.

And while many consumers may still be reluctant to sign up for PAYDAYS—probably due to fear of the unknown—attracting them with a trial run can make the unfamiliar familiar, with positive results. Participants in a Minnesota PAYDAYS leasing simulation pilot—entailing a reduced fixed monthly vehicle charge in combination with a variable per-mile charge—who were randomly assigned the pricing treatment were substantially more likely than control group participants to be interested in securing a similar leasing arrangement and PAYDAYS UBI plans after pilot completion.⁵⁹

The preference for purchasing some products in bundles is not boundless, and a maximum monthly charge might be useful in encouraging acceptance of UBI plans. Among six separate PAYDAYS focus groups observed in Minnesota, participants showed substantial preference for scenarios where the maximum monthly lease payment was capped, even though mileage charges in excess of caps were rolled into subsequent bills. The latter presumably would keep consumers from driving excessively after breaching the mileage corresponding to the maximum monthly payment.

Surveys associated with the Minnesota leasing pilot showed that interest in leasing tripled (from 6% to 18%) as the top choice of respondents for acquiring their next vehicle when new leasing plans were presented that combined a reduced fixed monthly charge and a variable mileage charge. When two variants of this new type of lease were presented, two-thirds

⁵⁷ Bonsall, Peter, et al. 2004. “Road User Charging—Pricing Structures.” Final Report for the Department for Transport on PPAD 99/159/002. University of Leeds, England, September 2004.

⁵⁸ DellaVigna, Stefano and Malmendier, Ulrike. 2004. “Contract Design and Self-Control: Theory and Evidence,” *The Quarterly Journal of Economics*, Vol. 119, Issue 2, MIT Press, Cambridge.

⁵⁹ Minnesota Department of Transportation. 2005. “Pay-As-You-Drive Experiment Findings: Mileage-Based User Fee Demonstration Project Technical Memorandum,” Draft prepared by Cambridge Systematics, Inc., Aug. 29, 2005.

preferred the option with the higher per-mile price and lower fixed-monthly price over the reverse.⁶⁰

But introducing too many pricing schemes at once could be risky by creating confusion and discouraging consumers from trying something new. As the market for cell phone services suggest, however, PAYDAYS UBI could ultimately be offered by different companies in many different forms, but behavioral economics suggest that individual companies would be wise not to confuse customers with too many different offerings.

A number of surveys and real-world marketing experiences of insurance companies show how consumers tend to react to bundled PAYDAYS insurance versus traditional insurance. The survey in Minnesota found that 32% of respondents would prefer PAYDAYS UBI pricing over having to pay traditional insurance premiums.⁶¹

A 2010 comScore survey showed similar results about consumers' growing desire for unbundled PAYDAYS UBI products, with 20% of respondents claiming to have heard of the term "pay-as-you-drive insurance" versus 17% in 2009. More significantly, of those who had heard of it, 31% said that they would definitely purchase it in 2010 versus only 17% in 2009. Also, while 18% of 2009 respondents who had heard of it said that they definitely would not purchase it, only 11% said that in 2010.⁶²

Optimal Customer Profile and PAYDAYS UBI Product

Once PAYDAYS UBI programs become widely available, the human biases and foibles described above—especially the aversion to decision-making—suggest adoption may be somewhat slow, at least absent superb product design and marketing efforts. Nonetheless, behavioral economics can help guide selection of product design features to enhance UBI's attractiveness to the most promising segments of the insurers' customer base.

Tables at the end of this document profile the most receptive potential customers (Table 1), identify marketing features to appeal to such customers (Table 2), and specify product characteristics that would achieve the highest possible mileage reductions among these customers (Table 3).

⁶⁰ Minnesota Department of Transportation. 2004. "Market Assessment Survey Results: Mileage Based User Fee Demonstration Project." Prepared by Cambridge Systematics, Inc., with MarketLineResearch, St. Paul, June 2004.

⁶¹ Ibid.

⁶² comScore. 2010. "Online Auto Insurance Report." Reston, April 2010.

Table 1: Targeting the Most Receptive Potential PAYDAYS UBI Insurance Customers

Customer Attribute	Effect of Attribute on Mileage Reductions	Boosting Mileage Reductions Where Feasible
Low mileage	This would yield smaller mileage reductions than with higher-mileage drivers.	“Skimming” of profitable low-mileage drivers would in time force traditional time-based policy rates to rise and thereby expand the PAYDAYS insurance market beyond low-mileage drivers.
High premiums	Large reductions would result because of high per-mile savings.	
Low income	Because low-income drivers are the most price-sensitive, large driving reductions would result.	
Urban	The relatively higher number of transportation and home-delivery options would suggest large driving reductions.	Consider subsidizing customer transit passes to encourage transit use.
Environmentalists	Large driving reductions would be expected.	Reinforce environmental benefits of reduced driving in communications.
Current transit, vanpool, carpool and non-motorized commuters	Potential peak-period mileage reductions would be much lower than for current drive-alone commuters.	Work with Transportation Management Associations and service providers to co-market PAYDAYS insurance to both existing and potential alternative transportation customers.
Vehicle lessees	A positive effect on reductions was found in Minnesota, most likely because vehicle lessees are more accustomed than others to managing their mileage (Gourville, 2004).	Work with vehicle leasing entities to allow customer rebates, reflective of increased residual value, for vehicles returned from lease with lower than allowable mileage.
Owners of multiple vehicles driven infrequently, including car collectors and do-it-yourself mechanics	Pricing of low-mileage vehicles would result in less per-vehicle mileage reductions than pricing of higher mileage vehicles. Nevertheless, households with many vehicles tend to drive more than other households, even if mileage on individual vehicles may be low.	

Table 2: Marketing PAYDAYS UBI Products

Product or Marketing Attribute	Effect of Attribute on Mileage Reductions	Boosting Mileage Reductions Where Feasible
Default option (but with traditional time-based policy readily available)	Has the potential to boost participation substantially if company already has a large customer-base.	
Limited, free miles of PAYD UBI provided upfront with the purchase of a transit pass, car sharing membership, or commuter bicycle	Should be negligible as almost all drivers would need to purchase additional miles because the initial provision would be small.	
Simple pricing (but algorithm to determine a policyholder's price need not be)	Unknown.	
Savings	Customers who continue to focus on overall premium savings after switching to PAYD insurance would be less motivated to reduce mileage than those focusing on per-mile or per-minute costs.	After customers switch to PAYDAYS insurance, immediately refocus communications to emphasize cost per mile or minute. When marketing policy renewal, focus back onto total savings.
Control over total premiums	There should be some positive effect.	
Low premium payments with some timing discretion	Unknown.	
Cap maximum premium billed	While this may be critical to some to accept PAYD insurance, it reduces disincentives for high mileage.	Charges in excess of cap need not generally be forgiven but rather rolled over into subsequent bills until paid off.
Promise to compare after-the-fact costs with traditional premium	Unknown, but consumers are willing to take greater financial risks (e.g., accepting a new insurance product) if they know they will see a later cost comparison with the alternative not chosen (Gourville, 2002).	
Societal benefits (model after hybrid car marketing)	Some additional reductions among environmentalists and other socially conscious customers may occur.	

Table 3: Maximizing Mileage Reductions across Customers

Strategy	Effect on Customer Acceptance	Improving Customer Acceptance Where Feasible
Direct and transparent per-mile charges (no rebates or requirements to purchase miles in large use-or-lose bundles)	Customers would sometimes like to forget about their per-mile costs and might be reluctant to accept a PAYDAYS UBI product with these price-related attributes.	Avoid focusing on per-mile or per-minute charges until after customer has chosen PAYDAYS insurance. Refocus to total savings and away from per-mile pricing when seeking policy renewal.
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.	Would be very popular, especially in urban and other areas with good transit options.	Engage in joint marketing campaigns with transit providers (e.g., “Wouldn’t it be great if your insurance company helped pay for your transit trips? Now it might!”)
Provide individualized assistance to customers to reduce driving by identifying alternative transportation, trip consolidation and trip elimination (e.g., through Internet shopping) options.	Would be positively construed generally and potentially very useful to some.	
Establish reasonable driving-reduction goals for participants and provide frequent-flyer-program-like status-related designations and rewards, and “regret lottery” rewards, contingent upon achieving such goals.	Would be positively construed because the only consequence of not achieving a program-established goal would be not receiving an extra reward. Customers who achieve a high status would be expected to be especially loyal.	

Proposed target customers who would benefit most from PAYDAYS UBI pricing include those with the following characteristics: low mileage (can save money right from the start); high premiums (can get substantial discounts with even modest driving reductions); low income (need to save money); urban (have many options to reduce driving); environmentalists (committed to reducing pollution); current transit, vanpool, carpool and non-motorized commuters; vehicle lessees; and owners of multiple vehicles driven infrequently, including car collectors and do-it-yourself mechanics.

A great marketing idea, aimed at likely receptive customers, would be to bundle 100 (irresistibly) free miles of insurance per month (or, for non-car owners, \$10 worth of car-sharing or bicycle supplies/repairs per month) with a transit pass. Free miles of insurance could also be offered to those purchasing commuter bicycles and car-sharing memberships (replacing their second vehicle). Such short-lived bundling might encourage recipients of the small amount of already-paid-for PAYDAYS insurance to switch from traditional insurance to PAYDAYS UBI.

Regarding the product itself, PAYDAYS UBI pricing should, as reflected in Table 2, be the default option unless the consumer explicitly chooses standard pricing. Pricing should be clearly explained and simple, with a cap placed on the maximum billable premium, because many consumers will not choose such a product without a cap.⁶³ Marketing materials should highlight potential personal savings, control over premium size and payment terms, and environmental and other societal benefits.

To maximize mileage reductions, as outlined in Table 3, per-mile or per-minute-of-driving charges should be direct and transparent, and billing should be frequent, with interim pricing reminders sent through e-mail or conveyed via taxi-like meters in the consumer's car, such as have been deployed in the Washington state mileage-pricing pilot that tested pricing alternatives to a fuel tax.⁶⁴ Transportation alternatives should be made more appealing through negotiated price discounts for unlimited ride transit passes and by providing individualized assistance in identifying appropriate options.

A major product design issue is whether premium charges and related vehicle monitoring should be based only on miles or driving time, or whether other usage-based factors should be part of the reckoning: time of day of driving, driving style (aggressive vs. calm) and the relative safety of the types of roads driven. Research shows that tracking more factors and incorporating them into premiums improves actuarial accuracy. Rewarding calmer, presumably safer driving would further enhance safety and reduce fuel consumption.

⁶³ Bonsall, Peter, et al. 2004. "Road User Charging—Pricing Structures." Final Report for the Department for Transport on PPAD 99/159/002, University of Leeds, England, September 2004.

⁶⁴ Department of Commerce, State of Washington. 2013. "Washington State Energy Strategy." May 2013.

Applying Behavioral Economics Concepts in Designing PAYDAYS UBI Products

The main PAYDAYS UBI products' pricing is based, to a degree, on drivers' behavior observed via a telematics device. It has been noted that 90% of drivers view themselves as better than average, suggesting they would be amenable to products which base their rates partially on "how" they drive—e.g., avoiding hard braking and swerving—when compared to others, even if they are really no better than the average driver.⁶⁵ In fact, in surveys conducted as part of a pilot that involved the North Central Texas Council of Governments and Progressive Insurance where participants were paid for reducing their driving time and mileage, some said they would like having the quality of their driving monitored as part of determining their discounts because they believed they were better drivers than others even if they were not sure they could cut down their mileage⁶⁶

Designing PAYDAYS Insurance Pilot Projects to Learn More

While it is possible to make theoretical projections of the success of different PAYDAYS UBI programs, in terms of accuracy, these cannot replace pilot studies. Unfortunately, federally funded pilot studies of transportation pricing have sometimes faced practical constraints that have not always enabled them to be ideally designed.

First, it is important to start with what not to do. The studies mentioned above all gave participants a "bank account," a specific sum from which deductions were made for each mile driven. Participants got to keep whatever cash was left in these accounts at the pilot's end. As noted earlier, people perceive such cash as a windfall that they value far less than their own hard-earned dollars, and they, therefore, put far less effort into preserving the windfall by curbing their driving than they would if required to pay outright for each mile driven.

A better design of a pilot program, assuming the commercial product cannot initially be offered in a test environment where before and after data can be collected, would entail providing a stipend up front, instead of the "bank account." Participants would be allowed to spend the stipend whenever and however they choose—conditioned upon signing a contract to complete the pilot which would entail direct per-mile pricing. Behavioral economics has shown once people take mental ownership of such a stipend, which they generally do after a bit of time elapses, but which they never got to do with the "bank accounts," they quickly come to see it as their own, rather than as a windfall. Thus, most participants would discount the importance of their initial stipend and consider money spent related to the pilot to be their own. Of course,

⁶⁵ Thaler, Richard H. and Sunstein, Cass R. 2008. "Nudge: Improving Decisions about Health, Wealth, and Happiness." Yale University Press, New Haven.

⁶⁶ North Central Texas Council of Governments. 2008. "Pay As You Drive (PAYD) Insurance Pilot Program: Phase 2 Final Report." Prepared by Progressive County Mutual Insurance Company and the North Central Texas Council of Governments.

this might lead some to try to abscond with the stipend without paying all of their incurred per-mile charges, but such risk is often part of high-reward research.

The pilot program should include sufficiently large numbers of urban, suburban and rural households to draw conclusions about responsiveness from each. Households with a range of incomes and insurance premiums should also be included, as should others with limited-mileage leased vehicles. Comprehensive surveys should be administered to participants in order to learn how their views about the need for environmental protection—especially related to driving—and openness to alternative transportation options affects their propensity to reduce their driving distance.

Surveys should also ask participants whether they prefer PAYDAYS UBI or traditional insurance pricing in order to determine how their insurance preferences influence their propensity to curb their driving under PAYDAYS UBI pricing. A good pilot program should include participants with both preferences; a generous stipend can motivate subjects to allow themselves to be assigned randomly to a PAYDAYS UBI group or a control group with a traditional insurance plan. Multiple billing protocols should be tested—perhaps including weekly, monthly, quarterly and semi-annual billing—as should pricing reminder protocols, including regular e-mails and in-vehicle taxi-like meters. Testing the effects of co-marketing transit pass subsidies with PAYDAYS insurance should also be considered. For projects designed to assess PAYDAYS UBI product demand, test groups should include permutations of PAYDAYS UBI that bundle transit passes as well as some free miles of car insurance as sweeteners. The opportunity to buy more miles of insurance should also be provided to test how effective a combined offer of some free miles of insurance with a simple system to purchase additional miles is in persuading drivers to accept PAYDAYS UBI premiums. Finally, some participants should be offered extensive hand holding in mapping out and determining their travel options to see how such information, in concert with the pricing signals, influences their mileage.

An inherent challenge in marketing any new product, no matter how thoughtfully designed, is that customers overvalue the features that they anticipate losing, and undervalue those that they anticipate gaining.⁶⁷ This was expressed in the Minnesota PAYDAYS lease focus groups.⁶⁸

Inevitably, some consumers may refuse a PAYDAYS UBI product where payments vary with mileage. Nonetheless, given the interest in PAYDAYS UBI from insurance companies, governments, advocacy groups and consumers, along with the marketplace successes of other

⁶⁷ Schwartz, Barry. 2004. "The Paradox of Choice: Why More is Less." HarperCollins Publishers, Inc., New York.

⁶⁸ Minnesota Department of Transportation. 2004. "Market Assessment Survey Results: Mileage Based User Fee Demonstration Project." Prepared by Cambridge Systematics, Inc., with MarketLineResearch, St. Paul, June 2004.

Applying Behavioral Economics Concepts in Designing PAYDAYS UBI Products

PAYDAYS pricing products such as car-sharing, PAYDAYS UBI is very likely to succeed in the market.

Conclusion

The PAYDAYS UBI pricing strategy promises to benefit individuals, insurance companies and the country as a whole (as discussed in the section of the study dealing with benefits). Many individuals will be able to reduce their insurance premiums by driving less. The overall reduction in driving will cut CO₂ emissions, lessen traffic, improve public health through a reduction in car crashes, improve the nation's balance of payments and reduce the funds that go to hostile, oil-producing countries. All this is widely acknowledged. Moreover, the basic concept can be offered in many forms, each designed to appeal to a different segment of the market, raising the potential market penetration of this revolutionary concept. Insights from behavioral economics will continue to improve the design, marketing and pricing of PAYDAYS UBI products.

Insurer, Consumer and Societal Benefits of Telematics-Based UBI



Insurer, Consumer and Societal Benefits of Telematics-Based UBI

By NAIC Staff

Introduction

Telematics, particularly when paired with UBI, offers many potential benefits for insurers, consumers and society as a whole. Insurers benefit by being able to differentiate their product offerings, enhance pricing, lower claim costs, enhance brand awareness and create new revenue streams. For consumers, telematics-based UBI offers certain advantages over traditional insurance, including the ability to control premiums and receive ancillary benefits. Society as a whole accrues benefits from improved road safety, less road congestion and lower emissions resulting from drivers' focus on vehicle-usage and driving performance.

Insurer Benefits

As previously noted, telematics-based UBI programs benefit insurers most by enabling them to develop more accurate risk assessment and pricing practices. Insurers use collected driving behavior data to achieve a more granular predictor of risk, allowing underwriters to better segment drivers by their risk indicators. Underwriters can then offer premium rates, deductibles and coverage features appropriate for each segment.

Studies show applying variable pricing within existing classifications (such as age, annual mileage and territory) can be a much better pricing model than relying on indirect aggregated classification variables alone. This is because traditional classifications are based on indirect aggregated variables of past trends and events. However, insurers already using this data caution it is important to identify variables which enhance rather than duplicate existing model predictability. Doing so can provide insurers integrating telematics driving behavior data for risk-segmentation with a distinct competitive advantage over other insurers.

Telematics-supported UBI's focus on tying driver behavior to pricing also allows insurers to better control their risk exposure, potentially raising their risk tolerances and allowing them to reach new customer bases. The ability for insurers to charge drivers less for safer driving habits provides a powerful incentive to consumers to improve their driving behaviors in order to lower their premiums. This affords insurers using these programs several competitive advantages. First, insurers can identify their lowest-risk drivers, raising retention levels for preferred risks. Secondly, they are also likely to gain new customers by offering all drivers the opportunity to pay less for their car insurance. This could particularly help reach younger drivers who are generally riskier but more amenable to modifying their behavior in order to earn a discount.

Insurer, Consumer and Societal Benefits

The connected nature of telematics provides insurers with new policyholder communication channels. As illustrated in the insurance market section, insurers can leverage these new channels to increase their interaction with policyholders and build stronger relationships. Insurers also benefit from the potential reduction in loss costs derived from the incentive telematics-based UBI programs provide to modify driving behaviors. According to a study by the Brookings Institute, reducing miles driven correlates to fewer accidents and lower claims costs.⁶⁹ Thus, tying premium to miles driven encourages drivers to limit their vehicle use, lowering insurers' associated loss costs.

Additionally, insurers' claims management practices can be enhanced through telematics. More sophisticated telematics programs seamlessly transmit driving data between the insured's vehicle system and the insurer's application platform, increasing the speed and efficiency of claims processing. By analyzing real-time driving data (such as hard breaking, speed and time) during an accident, insurers can more accurately estimate accident damages and reduce fraud and claims disputes. As detailed in the market section of this study, ancillary safety benefits, offered in conjunction with many telematics-based UBI programs, also help insurers to lower accident and vehicle theft related costs by improving accident response time, allowing for stolen vehicles to be tracked and recovered, and monitoring driver safety.

Some studies predict insurers will receive more than 25 percent of their premium revenue, representing \$30 billion, from telematics-based insurance programs by 2020.⁷⁰ Early adopters would most likely have a competitive advantage due to the rich driving behavior data they have collected for pricing analysis. The proprietary nature of the collected data available to the insurer would make it exceedingly difficult for its competitors who do not have historical driving data to appropriately price their products.

Consumer Benefits

Telematics-based UBI programs offer several potential consumer advantages. As exemplified throughout the study, consumers benefit most by having the ability to reduce their auto insurance costs. Premium reductions can come from insurer participation discounts, improved driving performance or voluntary reductions in mileage driven. Consumers are commonly told they can expect 20-50 percent reductions on their insurance premiums under a telematics-based UBI program.⁷¹ Some insurers offer smaller program participation discounts to encourage drivers to switch to a UBI plan.

⁶⁹ Jason E. Bordoff and Pascal J. Noel. 2008. "Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity," The Brookings Institution.

⁷⁰ SAS Institute Inc., (n.d.). "Telematics: How big data is transforming the auto insurance industry."

⁷¹ Williams, G. (2014, January 13). "Should you try pay-as-you-drive insurance?" *US News and World Report*.

Telematics-based insurance programs are still evolving in the market. However, consumer surveys indicate premium discounts and the ability to control premiums are the primary drivers for consumer adoption of telematics-based UBI programs. According to the 2014 Annual LexisNexis Insurance Telematics study, 78 percent of respondents cited discounts as an incentive to adopt telematics insurance programs.⁷² Seventy-four percent cited the ability to control their auto insurance costs as an incentive. This study, which focused on consumers and small fleet managers, found consumer awareness of UBI has plateaued, but demand among those who are aware continues to increase.

Consumers' attraction to these programs also lies in part from the empowerment to control premium costs with variables, which have a common sense link to pricing. Telematics UBI programs are designed to convert the fixed costs, or part of the fixed costs, associated with mileage driven into variable costs, which can then be integrated into existing class and risk categories for premium calculation. This provides consumers with a more transparent and direct link between driving behavior and usage and policy pricing. It also provides for more flexible pricing by allowing consumers to achieve more affordable premiums when needed by reducing the miles they drive or improving driving performance. This can be particularly beneficial to lower-income, urban and multi-car households.

This pricing scheme also eliminates the cross-subsidy between higher risk and lower risk drivers, benefiting the majority of consumers. According to a study done by the Brookings Institute, 63.5 percent of households with insured vehicles would save an average of \$496 a year (a 28 percent average reduction in premium) under a fully variable mileage-based UBI program.⁷³ This savings is primarily from eliminating the subsidy for high mileage drivers, who account for the majority of miles driven within each risk class, but pay a disproportionately lower premium. Eliminating this cross subsidy increases affordability for lower-mileage drivers, many of whom are also lower-income drivers. Those who do not initially save still benefit by having the ability to shrink premiums by changing their driving habits.

Telematics-based UBI programs also benefit consumers by incentivizing them to increase their safety through better driving habits. Safer drivers become even safer and riskier drivers, whose premiums are typically highest, are educated to modify their high risk behavior. This focus on educating and promoting safety can be particularly appealing to households with young drivers. According to the 2014 LexisNexis study, young driver programs were cited as one of the most popular value-added features among consumers, with 56 percent of respondents with children

⁷² Lukens, D. 2014. "Usage-Based Insurance (UBI) Research Results for Consumer and Small Fleet Markets." LexisNexis.

⁷³ Jason E. Bordoff and Pascal J. Noel. 2008. "Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity," The Brookings Institution.

on their policy indicating interest in telematics programs which track and provide feedback on their teens.⁷⁴ Parents enjoy the benefit of remaining informed on their young driver's performance behind the wheel of a car. Young drivers have the benefit of receiving educational coaching on riskier driving behaviors, such as rapid acceleration, speeding and sharp turns, tracked through telematics devices.

Like insurers, consumers accrue the benefits of safer driving and reduced usage in lower costs associated with accident frequency and severity. The use of telematics data, such as breaking, vehicle impact and speeding, to assess fault in accidents provides consumers with more efficient claims settlement. Telematics devices also facilitate more continuous communication between drivers and insurers, providing consumers with greater personalized communication. This continuous connection allows consumers to receive value-added benefits, such as faster emergency response time, road-side assistance, stolen vehicle recovery, and fuel efficiency and vehicle maintenance support. These types of value-added services are gaining in popularity and becoming important benefit features for consumers. Interestingly, the 2014 Annual LexisNexis study found bundling value-added services to discounts beyond ten percent was as effective as higher discounts alone.⁷⁵

Societal Benefits

Many of same benefits consumers reap under telematics-based UBI programs provide significant societal benefits as well. Insurance programs linking premium to mileage provide a powerful incentive for consumers to reduce the miles they drive. Fewer miles driven mean fewer cars on the road, less road congestion, lower infrastructure costs, and lower overall fuel consumption and vehicle emissions. Additionally, insurers' use of telematics data to assess driving behaviors and encourage safer driving habits result in fewer accidents, creating safer roads for all citizens.

According to a study done by the Brookings Institute, tying insurance costs directly to miles driven would result in an approximate 8 percent reduction in vehicle miles traveled. The study, which focused on examining data from states with UBI programs, found policyholders were willing to seek out alternative transportation options or forego less valued travel altogether to lower their premiums. Researchers then extrapolated the findings to a national level and found this 8 percent reduction in vehicle miles traveled would result in annual net social benefits of \$50 billion to \$60 billion, related mainly to reduced accidents and road congestion. (See the section on FHWA UBI funding initiatives for more.) The study also found fewer VMT would

⁷⁴ Lukens, D. 2014. "Usage-Based Insurance (UBI) Research Results for Consumer and Small Fleet Markets." *LexisNexis*.

⁷⁵ Ibid.

proportionally reduce fuel consumption, but have a greater reduction on carbon emissions when the total refining process is considered. Accordingly, reducing VMT would result in a proportional 8 percent reduction in gasoline consumption, lowering carbon emissions by 126 tons, or 2 percent of the U.S. carbon emissions in 2006. This reduction in fuel consumption would reduce U.S. oil consumption by about 4 percent and potentially help to support U.S. national security policies.

UBI programs also have the potential to increase the number of insured drivers on the road by creating more affordable auto insurance options. Pricing insurance on usage allows consumers to adjust the mileage they drive to fit the amount of auto insurance premium they can afford. This has important implications for lower-income drivers, who may not be able to purchase auto insurance otherwise. The Insurance Research Council (IRC) estimates 29.7 million people, or 12.6 percent of drivers, nationwide were uninsured in 2012. In states with a higher proportion of lower-income drivers, the uninsured motorist rate shoots up to as much as 26 percent.⁷⁶ The Brookings Institute study found the average household making less than \$52,500 a year save when using an insurance program where premiums are based on miles driven.⁷⁷ This savings has a much bigger impact on lower-income households, who spend up to four times more of their income on insurance and other transportation costs than higher-income households.⁷⁸ According to the 2013 U.S. Bureau of Labor and Statistics (BLS) Consumer Expenditures Survey, households in the lowest twentieth percent income quintile spent 5.7 percent of their income on vehicle insurance. In contrast, the highest twentieth percent income quintile spent just 0.9 percent of their income on vehicle insurance.

Lower auto insurance premiums and fuel consumption also help lower total transportation costs. As illustrated below, total transportation costs represented 34.4 percent of income for the lowest 20 percent income quintile in 2013. This compares to just 10.4 percent of income for the highest percent income quintile. Similarly, vehicle insurance and gas and motor oil represented 53.4 percent of total transportation costs for the lowest income quintile in 2013. This compares to just 33 percent of total transportation costs for the highest income quintile.

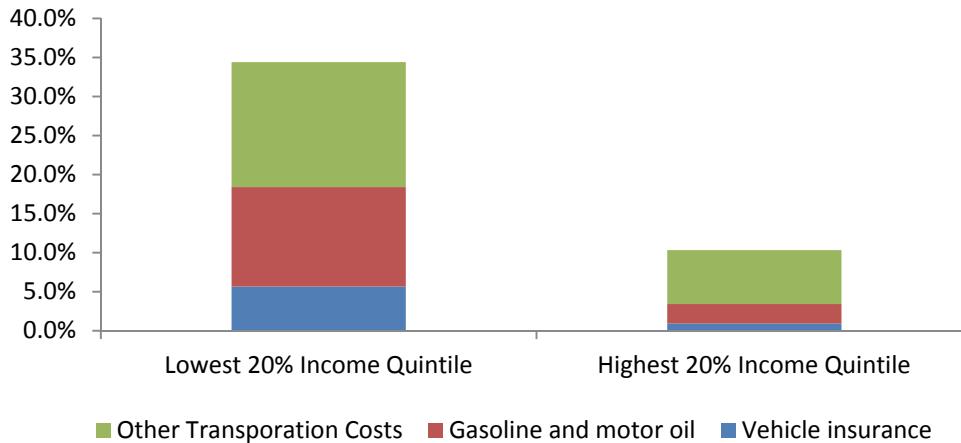
⁷⁶ Corum, D. (2014, August 5). "New Study Reveals a Declining Trend in the Percentage of Uninsured Motorists." *Insurance Research Council*.

⁷⁷ Jason E. Bordoff and Pascal J. Noel (2008), "Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity," The Brookings Institution.

⁷⁸ Moving Cooler Steering Committee., Cambridge Systematics., & Urban Land Institute. (2009). "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Washington, DC: Urban Land Institute.

Figure 1: Transportation Costs by Income

Source: U.S. Bureau of Labor Statistics Consumer Expenditures Survey



Because pricing insurance on usage and actual driving behaviors eliminates the cross-subsidy between lower-mileage and higher-mileage drivers, it is also more socially equitable. Depending on a state's regulations, insurers may use additional non-driving rating factors in their auto insurance pricing models. Common non-driving factors include marital status, occupation, educational attainment, credit score and homeownership.⁷⁹ Although these factors are statistically valid predictors of risk, they have the potential to penalize young drivers, the poor, senior citizens, urban residents and non-homeowners with higher rates. This issue was illustrated in a recent Consumer Federation of America (CFA) study. The study found a Baltimore driver would pay 46% less in premium for minimum liability coverage under one insurer's rating structure if he or she were a married homeowner in a higher-income ZIP Code.⁸⁰ This study also found auto premiums exceeded \$500 annually in 24 out of 50 of the nation's largest urban areas. Because urban drivers usually drive fewer miles, they would likely pay less in auto insurance premium under an insurance program which based premiums on miles driven.

The potential for telematics PAYD UBI programs to deliver societal benefits is predicated on each program's ability to change consumer behavior. To affect consumer behavior, the link between behavior and pricing must be clearly understandable by consumers. However, the mix of factors used in complex algorithms to derive a driving score can complicate consumers' ability to identify which behaviors affect pricing the most.⁸¹ Consider the drivers whose driving pattern includes too many hard breaks, but they do not know how many fewer breaks he they

⁷⁹ Rust, A. (2014, March 11). "Is Usage-Based Insurance a Better Deal for the Poor?" [Web log message]. Retrieved from <http://banktalk.org/content/auto-insurance-pricing-bias-against-poor>.

⁸⁰ Toups, D. (2012, September 24). "Drivers to Insurers: Watch Our Driving, Not Our Wallets." *CarInsurance.com*.

⁸¹ Sachdev, A. (2011, September 16). "Your Car Knows Everything." *Chicago Tribune*.

Insurer, Consumer and Societal Benefits

need to lower their premium. Additionally, the proprietary nature of these models and the driving data they rely on can make it more difficult for consumers to move their business to a new insurer and continue to reap the benefits of their improved driving. For these reasons, consumers and society will benefit most from more transparent programs.

Consumer Concerns and the Promise of UBI



Consumer Concerns and the Promise of UBI

By Birny Birnbaum,* Executive Director, Center for Economic Justice

Introduction

Telematics-based UBI has the power to transform both auto insurance and auto safety. UBI has long been promoted by consumer advocates as a way to improve auto insurance pricing and to better empower consumers to modify their behavior to reduce accidents and lower auto insurance premiums.

Policy Goals

Consumers see two overriding public policy goals for insurance. First is ensuring that all consumers have access to essential insurance products. Insurance products are essential financial security tools for individual and community economic development and asset preservation. Low-income consumers, who need these products even more than more affluent consumers, must have access to these key products.

Second, insurance is the core institution for loss reduction and risk mitigation. Through the risk classification system, insurance has shown it can promote the reduction of loss of life and property by giving economic feedback to consumers through incentives for less risky behavior and disincentives for more risky behavior.

The insurance system is uniquely positioned to accomplish these goals. Consumer advocates have long pushed for pay-by-the-mile auto insurance, an early form of UBI, as a fairer way of pricing insurance by focusing rating factors on things that a consumer has some control over and, consequently, have the potential to change consumer behavior.

Bright Future for Consumers?

We see a future for telematics UBI that provides real-time feedback to consumers regarding risky driving and, in exchange for sharing the data with insurers, a future of auto insurance premiums based predominantly on miles driven and driving behavior while reducing or eliminating the use of the plethora of currently-used socio-economic rating factors like education, occupation, prior insurance, prior insurance limits, credit scoring, and other proxies for race and income.

* NAIC funded consumer liaison representative.

Consumer Concerns and the Promise of UBI

Unfortunately, the development of UBI and telematics has taken a wrong turn. Instead of using telematics to create transparency in auto insurance pricing and create new opportunities for loss mitigation, insurers have turned telematics into just another black box rating factor, like credit scoring but without even the limited protections afforded consumers for insurers' use of consumer credit information. Our concerns about the current state of telematics include:

- Privacy issues and use and distribution of data by insurers for purposes other than loss mitigation and pricing, including, for example, insurers using information from telematics in claim settlements when helpful to insurers but not making the data available to consumers when helpful to consumers.
- Disproportionate impact of offer and sale of UBI against consumers in low- and moderate-income and minority communities.
- Failure to achieve meaningful loss mitigation because of a black box approach by insurers of collecting data for rating.
- Use of telematics data as merely another data mining exercise following on insurer use of credit information—including penalizing consumers not because of driving behavior but because of where and when they drive as a function of work and housing segregation.
- Limited regulatory oversight to date.

Pushing Ahead

Industry representatives caution regulators not to do anything to impede insurers' ability to innovate with telematics; that is code for do not regulate. Consumer advocates have seen the results of innovation in the past—massive abuses in credit scoring in the 1990s early 2000s; counting inquiries as a claim in Comprehensive Loss Underwriting Exchange (CLUE) databases in the 2000s; and price optimization or price gouging under the banner of management pricing discretion in the 2010s.

The problem with unfettered “innovation” is that interests of insurers do not align with those of consumers. If the insurer and consumer interests did align, we would see telematics UBI programs featuring transparency and explicit protection of consumer privacy and consumer-generated driving data. Instead, insurers compete on the basis of risk classifications, slicing and dicing the population, and keep these methods secret. By using telematics in this manner, the

insurers defeat the key function of risk classification: to provide incentives for less risky behavior and disincentives for more risky behavior.

A Failed Promise?

From a consumer and public policy perspective, the development of telematics has been a market failure. Insurance regulators can and should address this market failure by providing a regulatory structure for telematics programs which would not only ensure transparency and fairness to consumers, but which promote greater confidence by consumers that their data would not be used against them. Consequently, consumer use and acceptance of UBI would grow more quickly and result in more loss reduction and greater fairness in insurance pricing. The regulatory framework should include:

- Establish data ownership and privacy standards.
- Establish standards for permitted and prohibited uses of consumer data.
- Collect and analyze granular data on offers and sales of UBI based related to prohibited risk classification factors, including race and income.
- Require insurers to include variables for race and income in generalized linear models.
- Establish standards for disclosure of telematics results and rating programs to ensure consumer receive feedback necessary to alter behavior.
- Replicate analyses presented by insurers in summary form—require insurers to produce all analyses—not just loss ratio as outcome variable, but other analyses using other outcome variables.
- Stop this fiction of discounts only unless and until the rating factor can be associated with lower overall claims and not simply a redistribution of income.

Regulation and competition are not inconsistent. We believe one of the impediments to greater use of telematics is consumer concern over privacy and the lack of transparency on the uses of the data. Regulatory efforts to establish data ownership, privacy and permitted/prohibited data use standards would increase consumer confidence and grow the market.

Regulatory Implications of Telematics UBI



Regulatory Implications of Telematics UBI

By Sandra Castagna, Associate Commissioner, Maryland Insurance Administration (Retired)

Introduction

Insurance companies underwrite and price risks, and pay claims based on data. By making telematics-based UBI programs available, insurers will gather more data than ever regarding the driving behavior and habits of policyholders. The implementation of these programs and the collection, analysis and use of the data present regulatory concerns and provide an opportunity to propose action to address them.

Data Collection

When first introduced to regulators, telematics-based UBI seemed simple enough: As it has been detailed in the technology and market sections of the study, a device is provided to the policyholder to plug into a port in the vehicle, and after a set period of time established by the insurer, the device is removed. Then, based on mileage information transmitted, a premium discount is applied to the policy by the insurer. These PAYD discounts can range from as low as one percent (just for participating) to a maximum of 30% (very few miles driven). There was little concern as to the real accuracy of the data collected by the device or to the application of the discount. The number of miles driven was technically verifiable and the less time spent on the road, the less risk an insured presented. This arrangement appeared straightforward, was understood by consumers, and any discount to the policy premium was easily computed.

Fast forward to the myriad technological methods now available to collect data related to driving behavior as has been discussed in the technology section. Currently, as regulators have seen, the devices capture much more information, including not only the number of miles driven, but also when, where and how they are driven. Furthermore, once captured, data can be reported in different formats. As a result, telematics-based UBI programs are no longer as simple and straightforward as they used to be.

Technology Concerns

A threshold concern for regulators reviewing filings containing telematics UBI programs is the method used by insurers to record, transmit, receive and report driving data. It is less likely the insurance company is collecting data directly and more likely it has entered into an agreement with one or more third parties. If raw driving data is transmitted to a vendor, how is the information processed before being forwarded to the insurer? Does the vendor scrub the data for accuracy? How will it be formatted, stored and protected from misuse by internal and

Regulatory Implications of Telematics

external actors? To fully understand and review a filing that contains telematics rules and discounts, the method(s) employed to capture the driving behavior requires disclosure to and understanding by regulators.

Another concern arises when different equipment is provided to insureds based on the make and model of the vehicle being driven. In certain instances, the devices may not record the same data or record the data in the same manner. No matter what arrangement an insurance company enters into for the collection and measurement of driving data, regulators should confirm the same data is obtained for every program participant and all potential discounts are made available to all participants who meet the established criteria.

The frequency and duration of data transmission to the recipient must be taken into account. Telematics devices or apps may record and transmit data every 30 seconds or less when the vehicle is in motion; therefore, a great deal of information is captured per day, week, and month or policy term. Some insurers' telematics UBI programs are structured to collect data continuously throughout the policy term, while others may limit collection to a specific period of time, such as 30 or 60 days. One insurer's experience may support the adequacy of 30 days' driving data to determine the risk an insured presents; however, another may determine only continuous monitoring throughout the policy term produces credible results. If data is to be captured for shorter periods, complete and consistent measurement is imperative.

The Need for Transparency

When credit history, occupation and education were introduced as rating factors for automobile insurance, their use was questioned, studied and, in some states, limited or prohibited. A lack of transparency and the failure to explain how and why socio-economic factors were predictive of loss, as well as concerns that their use may be unfairly discriminatory, were reasons cited by regulators and legislators for the increased level of scrutiny. The use of telematics in automobile insurance rating seemingly does not garner similar attention because driving factors are being measured, and driving behavior is considered fundamentally to be an accurate predictor of risk.

While data privacy concerns for some may outweigh the economic benefits to be gained by participating in a UBI program, for many consumers, providing access to some personal driving information in exchange for the opportunity to reduce insurance premiums makes perfect sense. If simply told "good driving behavior" will result in a premium reduction, just what constitutes good driving behavior becomes the question. If an insured is not privy to detailed information regarding the factors being measured and their relationship to the receipt of a discount, it is less likely that changes in driving behavior will result in premium reductions will

Regulatory Implications of Telematics

be achieved. Telematics then becomes another inaccessible black box understood by few and trusted by even fewer.

By making information related to data collection, use, ownership, storage, protection and dissemination available to regulators and policyholders, insurers could demystify their telematics programs. This information may be disclosed to regulators in the filing and to insureds via a UBI participation agreement. Insurer best practices and participation agreements should include instructions that clearly identify each driving factor being measured, why it is being measured and why making more right turns than left is safer, or why driving at certain times of the day presents a greater risk than driving at others. By entering into the agreement, the insured accepts its terms and acknowledges that the insurer or its vendor will obtain and use specific driving-related information.

Access to mobile applications on smartphones or websites that track driving history and identify improvements insureds can make in order to reduce premiums also serves to make UBI programs more transparent. Any other terms related to the data's use—such as information sharing with third parties for marketing purposes, claims management or disclosure to government officials—should be stated clearly in the agreement.

Although it may seem unrelated to the review of rates and rules, information about data collection, use, ownership, storage, protection and dissemination should be made available to regulators when a filing incorporates telematics-based UBI. To determine if insurers have charged and collected premium in accordance with the applicable rate filings during market conduct examinations and consumer complaint investigations, regulators generally require support for discounts applied to the policy. One-page reports generated by third-party vendors at specific points in time throughout the policy term may or may not be sufficient to support the application or removal of a UBI discount. Questions pertaining to assumptions made by insurers regarding the storage, ownership and protection of the underlying data are appropriately asked during the filing review process to avoid compliance issues at a later date. Such questions include: Can data be retrieved easily when required? Is it being secured safely in a protected environment? Will it be retained in accordance with record retention regulations?

Rating Considerations

The challenge for regulators is to understand how recorded driving information is predictive of loss and reflected in the insurer's rates. Regulators must ensure that insurers do not consider any factors prohibited by statute or that result in rates that are inadequate, excessive or unfairly discriminatory.

Regulatory Implications of Telematics

One may feel driving within the speed limit, limiting the number of hard stops and rapid accelerations, and making fewer left turns than right turns are all positives. It would be expected any reduction in the frequency and severity of claims resulting from the use of telematics will result in lower premiums for policyholders. When rates for auto insurance are based on loss costs for broad risk classes and an individual insured's driving record (accidents and violations), they are verifiable and understandable. But, when modeled data suggest people who drive in certain areas (urban) at certain times of the day (1 a.m. – 5 a.m.) present more risk than others and the developed rates reflect that, are those rates actuarially sound? If the insurer's rating plan also contains factors for education, occupation and credit scoring, will low-skilled employees who work evening shifts at offices or hospitals located in urban areas present the greatest risk and pay the higher rates, or is this an example of unfair discrimination in rating?

Insurers and/or their third-party vendors developed generalized linear models (GLMs)⁸³ to quantify characteristics most predictive of safe operation of a vehicle and least likely to result in a loss. These rating models or algorithms may be defined as supplementary rate information, subject to filing requirements under the rating laws of the state. Insurers may object to filing the models, asserting they represent confidential commercial information, are trade secrets or proprietary in nature and should not be made available for public inspection. However, absent a review of the models, it is difficult to determine if any rates based upon them are compliant. What assumptions were made regarding the driving factors being measured? When considering the number of left versus right turns, the speed at which the turns are made, the number of hard braking events and rapid accelerations, the time of day, miles driven, location driven and the length of time the vehicle is driven at a speed in excess of a certain number of miles per hour, e.g. 70 mph, what combination of values presents the least likelihood of loss and will result in the greatest premium discount?

As we have seen, telematics-based UBI programs enable tremendous amounts of data to be collected and analyzed by insurers. By slicing and dicing data, insurers would be able to identify and develop more granular risk classes. This would result in more complex models, nuanced rating plans and individualized rates for personal automobile insurance. While it is incumbent upon regulators to review the data and the rating plans rigorously for compliance with the insurance laws, this is easier said than done in a file-and-use or use-and-file regulatory environment.

⁸³ A GLM is a generalization of the basic statistical linear model to allow for a non-normal and continuous (can take any value in a range) distribution of the dependent (or response) variable.

Availability and Affordability

The availability and affordability of automobile insurance have been studied and debated for many years and in many contexts. Numerous reports have been issued by various insurance industry groups, consumer groups, insurance departments and the NAIC. Currently, the NAIC Auto Insurance (C/D) Study Group, a joint working group of the Property and Casualty Insurance (C) Committee and the Market Regulation and Consumer Affairs (D) Committee, is studying the affordability of automobile insurance as it relates to low-income insureds. Recently, the Federal Insurance Office (FIO) requested comments on the same subject. A definition of affordable, the impact of high rates on the number of uninsured motorists, and whether the inclusion of rating factors for education, occupation and credit history produces rates that are unfairly discriminatory continue to be topics of ongoing discussion.

The insurance industry maintains that telematics-based UBI programs are another way of making automobile insurance more affordable. Discounts related to driving behavior are made available, insurance premiums are reduced by demonstrating safe driving behavior and, therefore, coverage becomes more affordable. Thus, insureds who stand to benefit most from the implementation of telematics programs include those who pay higher than average premiums or pay higher premiums relative to income, including residents of high-risk territories, inexperienced operators and low-income individuals. Insurers assert that by maintaining competitive markets and providing policyholders with increased options, premium savings will automatically ensue.

There is some merit to this proposition. If what was previously \$X is now \$0.7X, the policy is less expensive for that insured. However, concerns related to cross subsidization and the use of certain rating factors remain valid. If insurance rates are higher at the outset for certain classes due to the use of alleged unfairly discriminatory factors unrelated to driving history, the application of a discount for some based on driving behavior masks the underlying issue. While premium discounts are welcomed, they are not a substitute for the establishment of appropriate classifications of risk and actuarially sound rates for those risk classifications.

Claims Management

As it was noted in the section discussing benefits, a major benefit insurers cite for the increased use of telematics in automobile insurance is a reduction in the frequency and severity of claims. One theory suggests people modify their behavior when they are being observed. Therefore, when driving behavior is recorded, people will tend to drive more attentively and conservatively. More attentive and conservative driving will usually result in fewer accidents. A vehicle's whereabouts are known when the telematics technology is GPS-enabled, so a reduction in theft and fraud claims also has been noted by insurers. By combining driving

Regulatory Implications of Telematics

information with mapping technology, insurers have additional evidence to consider when investigating claims. If, when and where an incident occurred may be corroborated or disputed by data received through the use of telematics.

Generally, denying a claim for an arbitrary or capricious reason based on all available information and misrepresenting a pertinent fact that relates to the claim at issue are violations of state unfair claims settlement practices acts. When information obtained through telematics exists, failure to consider it consistently may invite administrative action. Insurers should establish protocols to ensure consistency and uniformity with respect to telematics driving data usage in claims investigations. The information may support denials, but it also can aid in acceptance of claims, as appropriate.

Next Steps

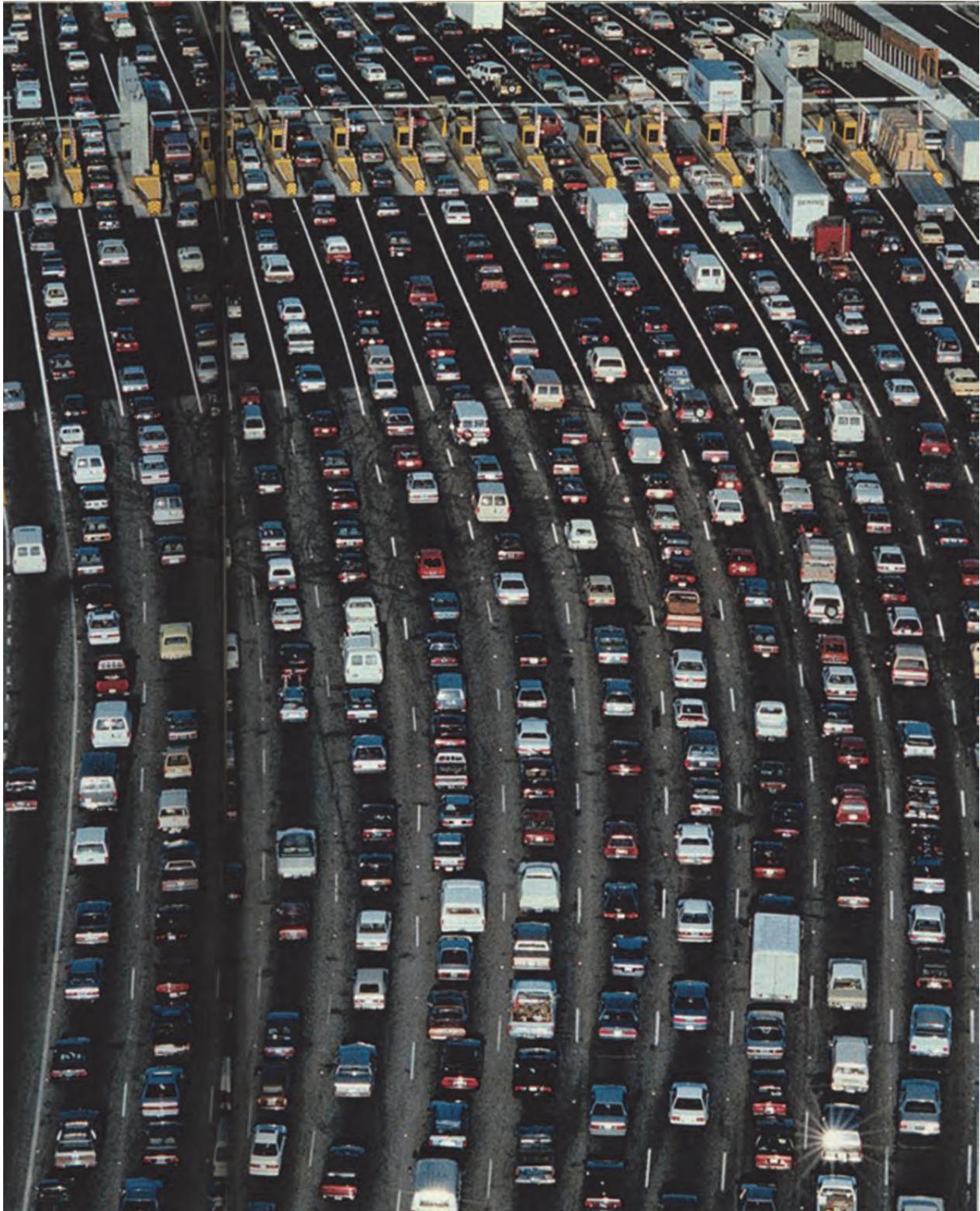
The challenges presented here are neither inconsequential, nor insurmountable; however, they do warrant attention. Vast amounts of information are collected, stored, analyzed and incorporated into rating plans by or on behalf of insurers. Currently, regulators must determine if the rating plans comply with rating laws, if premiums charged are in accordance with those filed plans and if appropriate disclosure and notice requirements have been met.

Regulators reluctantly acknowledge technological innovation will continue to affect rate development. Telematics began with PAYD and evolved into PHYD. Devices record data as the vehicle is being driven and presume the operator is the rated driver for the vehicle. However, with multiple operators and mobile technology, the driving behavior cannot always be linked to the actual operator. Insurers and rating organizations already overlay multiple models, including topography, GPS, crime, traffic and population density. When combined with driving behavior information, this could contain prohibited factors or produce rates that are unfairly discriminatory. If garaging location is replaced by factors related to the areas or zones where the vehicles are customarily driven and parked, could the new classifications discourage insureds from engaging in activities (e.g., working, shopping or visiting) in those zones if higher rates result?

If participation in the telematics UBI program requires policyholders to allow an insurer or its vendors to sell data to business partners, has the insurer engaged in unfair discrimination between insureds in “the other benefits payable on the insurance or in any of the other terms or conditions of insurance” if insureds in certain geographic areas receive discounts, coupons or other promotions, and others do not?

At a minimum, when the word “telematics” appears in a rate filing, regulators must ask questions.

FHWA UBI Funding Initiatives Promote Congestion Relief and Safety



FHWA UBI Funding Initiatives Promote Congestion Relief and Safety

By Allen Greenberg, Federal Highway Administration

Introduction

As documented elsewhere in this study, and also in the October 2013 CIPR Newsletter article, “Pay-as-you-drive-and-you-save (PAYDAYS) Insurance: Potential Benefits and Issues,” there are numerous public policy benefits to telematics-supported PAYDAYS UBI—related to reducing congestion, curtailing vehicle emissions and enhancing roadway safety—that have inspired some federal and state government public policy measures to promote it.⁸⁴ These benefits of pricing insurance based on claims’ risk associated with actual driving data come from voluntary actions taken by drivers in exchange for lower premiums. Obviously, insurance companies would only offer drivers such savings if they expect it would result in the company saving even more money due to reduced crash-caused claims. Motorists, of course, will only reduce their driving when the savings offered by UBI pricing exceeds the value of particular drive-alone trips to them.

While this section of the study is focused on federal PAYDAYS insurance related activities and investments, and especially those taken within the last 18 months, it is noteworthy that 13 states have included PAYDAYS insurance in at least some capacity within their climate action plans designed to reduce greenhouse gas emissions statewide. Oregon, in particular, has made tax credits available to insurance companies offering PAYDAYS UBI if at least 70% of the premium varies by miles or minutes of driving.

Current Efforts

The FHWA is currently funding multiple efforts to demonstrate and bring about the benefits of PAYDAYS insurance through the development of a competitive marketplace for PAYDAYS UBI programs. The efforts include: 1) supporting one or more before-after studies of driver behavioral changes resulting from PAYDAYS insurance; 2) helping small and mid-sized insurance companies through an initiative designed to figure out the precise relationship to crash-caused insurance claims of the amount of driving (distance and time in motion), driving conditions (congestion, roadway type, weather and night versus day) and driver behaviors (operating “smoothness” and speed limit compliance), bolstering companies’ actuarial know-how and enabling them to offer PAYDAYS insurance products; and 3) working with small businesses and insured drivers to collect, understand and repackage usage-based driving data to coach drivers

⁸⁴ Greenberg, Allen. 2013. “Pay-as-you-drive-and-you-save (PAYDAYS) Insurance: Potential Benefits and Issues.” CIPR Newsletter, October 2013.

to improve safety (and to save money) and provide them with multiple PAYDAYS insurance price quotes, thereby encouraging purchases of PAYDAYS UBI products that reward driving reductions and safer driving. Together, these initiatives, each described below, are intended to lead to better drivers and reduced exposure through a continuous incentive to reduce their risk of a crash by tying their UBI premiums to such risk.

Before-After Driver Behavior Study

Regarding the first topic area, and as discussed in the October 2013 CIPR Newsletter article cited above, reduced driving levels due to PAYDAYS UBI are projected using observed results from previous before-after studies where consumers experienced a change in their per-mile cost of driving (but not related to insurance costs) and adjusted their driving habits in response. Because consumers sometimes perceive identical costs are originating from varying sources differently (e.g., mileage-related costs associated with gasoline purchases versus tire replacement due to wear), they may in turn respond to actual price changes that look pretty similar to other proposed price changes in different ways. Thus, a before-after study of a specific price change—in this case, PAYDAYS UBI—is much preferable to having to extrapolate expected results of new price changes from studies following other price changes.

On Nov. 19, 2014, the FHWA issued a competitive solicitation seeking proposals (by Jan. 16, 2015) for the remaining balance of Value Pricing Pilot Program (VPPP) funds (authorized under Section 1012(b) of Pub. L. 102-240, as amended by Section 1216(a), Pub. L. 105-178 and Section 1604(a), Pub. L. 109-594). As noted in the solicitation, value pricing encompasses a variety of strategies to manage congestion on highways, including tolling of highway facilities through congestion pricing, as well as other strategies not involving tolls, such as PAYDAYS insurance and parking pricing. The FHWA is primarily seeking non-toll congestion pricing proposals in order to address the legislative requirement that a minimum amount of VPPP funds be “set-aside for projects not involving highway tolls.” Also according to the notice: “While the FHWA evaluation team will consider a range of non-toll pricing projects of any variety, the intent is to prioritize applications that test something that has not yet been tested in the United States, such as a before/after study of driver behavior impacted by [PAYDAYS insurance], where the insurance premium varies substantially and transparently by miles or minutes of driving; however this interest does not preclude submission of other applications that meet VPPP eligibility criteria.”

This is not the first time the FHWA solicited for before-after PAYDAYS UBI studies. Previous attempts did not result in any studies that moved into implementation. The Nov. 19, 2014, solicitation seeks to facilitate public-private partnerships (PPPs) by offering to provide eligible applicants (state departments of transportation) interested in testing PAYDAYS insurance with

contacts at insurance companies that, also having responded to the solicitation, have informed the FHWA that they would like to participate. By helping to forge strong PPPs, the FHWA is seeking to overcome the kinds of relationship weakness that were significantly responsible for past failures.

Actuarial Study to Encourage PAYDAYS Insurance Premiums

The second topic area, bolstering actuarial knowledge to facilitate companies in pricing PAYDAYS UBI products, stemmed from many sessions and discussions at insurance conferences and meetings, including an event sponsored by the NAIC's CIPR, where this need has been highlighted. According to the related federal solicitation: "FHWA is strongly promoting creativity and innovation ... and is interested in developing and identifying new, different and improved methods and techniques in the area of PAYDAYS car insurance actuarial analysis to inform and support the competitive insurance marketplace. ... Cutting edge actuarial research, especially if the results were made public, could lead to broader market penetration of PAYDAYS insurance and greater consumer, economic and societal benefits."

The solicitation continued: "A key barrier companies face in offering PAYDAYS insurance is in figuring out how to price it in a way that is actuarially accurate. This is harder to do than commonly thought, since insurance companies typically do not have accurate information about their customers' driving mileages. A number of companies have tried, with some success, to get such data on their own, but even when these companies acquire some such data and use it to begin to figure out the PAYDAYS insurance pricing puzzle, companies rarely succeed at getting most of the data they would like, thereby limiting their related pricing acumen. Additionally, the data they obtain and analysis they perform are not disseminated throughout the industry.

"An additional barrier companies face in offering PAYDAYS insurance is that, while the resulting initial costs and reduced premium revenues may be fairly transparent, the claims' reduction benefits from customers who take advantage of the new opportunity to save money by reducing their risk exposure are likely much less well understood."

The solicitation concluded regardless of whatever firm or company was to be chosen to complete the work, "Federally supported actuarial research that produces publicly-available, high-quality results, where such results are shared with insurance companies, state insurance commissions, and consumer group, would likely facilitate companies to begin offering PAYDAYS insurance. Additionally, helping companies quantify the reduced loss costs resulting from offering PAYDAYS insurance could encourage an expansion of PAYDAYS insurance offerings."

FHWA UBI Funding Initiatives Promote Congestion Relief and Safety

The FHWA awarded funding to a partnership including the SmarTrek app creator, Metropia, Inc., an expert in mobile data collection and analysis, and Illinois State University, Department of Finance Insurance, and Law, which has substantial actuarial expertise. While currently in its early stages, the intent of the study is to gather data without cost from the SmarTrek app, discern likely crash events from the data, and financially reward those believed to have crashed for answering follow-up injury and insurance claims survey questions.

For surveys that are not completed, claims will be estimated based on what the data from the app indicates about crash severity (analyzed using expertise garnered by having previously used similar data to find claims fraud). Driver exposure factors—e.g., trip distances, time of day, weather, traffic, and hard braking and other indicators of aggressive or inattentive driving—will be compared against the claims data to enable the appropriate weighing of each relevant factor within the PAYDAYS premium structure.

Insurance Competitive Price Quotes

The market today for insurance products using telematics technologies and services has technology and data providers selling services and products directly to insurance companies, and the data is not in turn offered back to consumers in a format that would enable them to solicit competitive PAYDAYS prices as they are able to solicit competitive prices for traditionally structured car insurance products. The result is that the dominant insurance company products including usage-based elements offer rates informed by driver data, but such data generally remains in a black box to consumers who might otherwise want to share it with competitors to secure lower premiums. The public policy benefits of having consumers appreciate how their driving affects their rates (including the number of miles driven in congested conditions) and then being provided an opportunity to change behavior to save on premiums is lost because of how the market is developing. Therefore, there is a need to create a marketplace that would enable consumers to collect and share their own portable driving data linked to crash risk—including mileage, conditions (e.g., related to congestion, time of day and weather), and vehicle performance and handling (e.g., prevalence of hard braking)—which would enable multiple insurance carriers to offer competitive and comparable PAYDAYS rates.

The products available today in the marketplace offer premiums that either do not vary at all after having been adjusted once reflective of baseline driving data or are less variable than actuarially justified. In either case, if instead of individual insurance companies owning the data collected for PAYDAYS UBI pricing, the consumer would, this would propel the market to respond to consumers shopping their own data for better prices by offering PAYDAYS UBI premiums that are more variable and competitive.

FHWA UBI Funding Initiatives Promote Congestion Relief and Safety

In order to stimulate a competitive marketplace for PAYDAYS insurance, funds have been awarded under the U.S. Department of Transportation (DOT) Small Business Innovative Research (SBIR) Program to enlist small and mid-size businesses—including vendors of in-vehicle telematics equipment—to work with personal lines insurance companies and environmental and consumer groups to gather data from willing insurance customers to enable competitive PAYDAYS UBI pricing. Two teams led by two small businesses—Vehicle Sciences Data Corp. and Agnik, Inc.—were awarded SBIR funding to in turn solicit volunteer drivers and multiple insurance companies to gather the necessary data for participating drivers to be offered at least three competitive PAYDAYS insurance rate quotes.

Outcomes expected from Phase I of the SBIR awards include detailed concepts demonstrating the viability of consumer telematics products and systems from which at least three insurance companies agree to accept the data to offer competitive premiums. Phase II of the projects is expected to include demonstrations of working prototypes of in-vehicle telematics devices, linked to data integration and warehousing systems, that would gather and inform consumers of their driving data and enable consumers to share such data with insurance companies in exchange for competitive price quotes and guidance on reducing future crash risks and the premiums that link to them.

Conclusion

Insurance companies today have compelling reasons to use telematics for market segmentation, as companies failing to do so face fairly extreme adverse selection risk. Thus, companies are offering consumers some incentives to gain their cooperation (e.g., “PAYDAYS insurance lite” policies where some minor discounts are offered in exchange for drivers sharing telematics data). These firms, however, experience little market pressure to use the data to offer genuine PAYDAYS UBI premiums.

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 an insurance company gathering and applying 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 more than 2 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.

FHWA UBI Funding Initiatives Promote Congestion Relief and Safety

The three FHWA-funded initiatives discussed above—demonstrating the public policy benefits of PAYDAYS UBI, learning about its actuarial underpinnings and facilitating consumers in getting competitive PAYDAYS UBI price quotes—together will help facilitate bringing competitively priced PAYDAYS UBI products with highly-variable premiums into the marketplace.

Study Conclusion



Conclusion

By NAIC Staff

The mature and highly competitive U.S. auto insurance industry is undoubtedly undergoing a fundamental change aided by technological innovations, promising a more efficient pricing of risks and widespread benefits accruing to insurers, consumers and society in general. The telematics-supported UBI programs, offered by an increasing number of insurers, are eagerly embraced by consumers seeking discounts in return of improved driving behavior.

The many societal benefits that can result from the adoption of telematics UBI PAYD programs—such as less congestion, lower vehicle emissions and enhanced roadway safety—has moved the FHWA to engage in the funding of multiple efforts to demonstrate and help realize the benefits of UBI through the development of a competitive marketplace.

Insurance companies, employing a variety of technological platforms and tools, are able to capture multiple data points on vehicle usage and operational characteristics, as well as driver behavior, to better understand and adequately model risky behavior. Using causal risk factors, rather than simply correlated variables, allows insurers to calculate premiums that accurately reflect true risks and thus offer significant discounts to those policyholders who consent to operate their vehicles within prescribed risk-minimizing parameters. Insurers also benefit from the superior fraud detection telematics can provide. This allows them to significantly reduce accident- and vehicle theft-related costs, passing a percentage of the savings along to their policyholders.

Increasing consumer acceptance of telematics technology and insurer UBI products, as evidenced by a number of surveys, is critical for mainstreaming these programs and, thus, harnessing the full benefits they can offer. Consumers primarily benefit by having lower premiums, while they also can materialize gains from their improved driving behavior mainly in the form of reduced fuel and maintenance costs. However, before reaping the benefits, a number of concerns by consumers and insurance state regulators regarding the use of telematics-based UBI programs need to be overcome. Consumers are concerned about the realization of the promise of transparency in auto insurance pricing held by telematics and instead are worried telematics would turn to a system such as credit scoring but absent any of the protections afforded to consumers. Regulators are equally concerned about consumer privacy and data misuse, as well as transparency regarding what type of data is collected, how it is stored, who has access to it and how it is used in pricing. Telematics should not become another opaque black box understood by few and trusted by even fewer.

Conclusion

It is critical all information about data collection, use, ownership, storage, protection and dissemination is made available to state insurance regulators when a filing incorporates telematics-based UBI. Regulators need to understand how recorded driving information is predictive of loss and reflected in the insurer's rates to make sure that insurance companies do not consider any factors prohibited by statute or that result in rates that are inadequate, excessive or unfairly discriminatory.

In addition, issues such as affordability and availability are important to both consumers and regulators, especially as it relates to underrepresented and low-income consumers, who tend to operate older vehicles.

As the CIPR survey of state DOIs suggests, state regulators are keenly aware of the potential benefits, as well as the implications, of the new telematics technology as applied in UBI policies. State regulators are very active in providing an appropriate legal and regulatory environment for telematics UBI based on the specific needs of their respective states, in the interest of a dynamic, fair and competitive marketplace but first and foremost in the service of their policyholders.

APPENDIX

CIPR Telematics State DOI Survey



CIPR Telematics UBI State DOI Survey

By NAIC Staff

Introduction

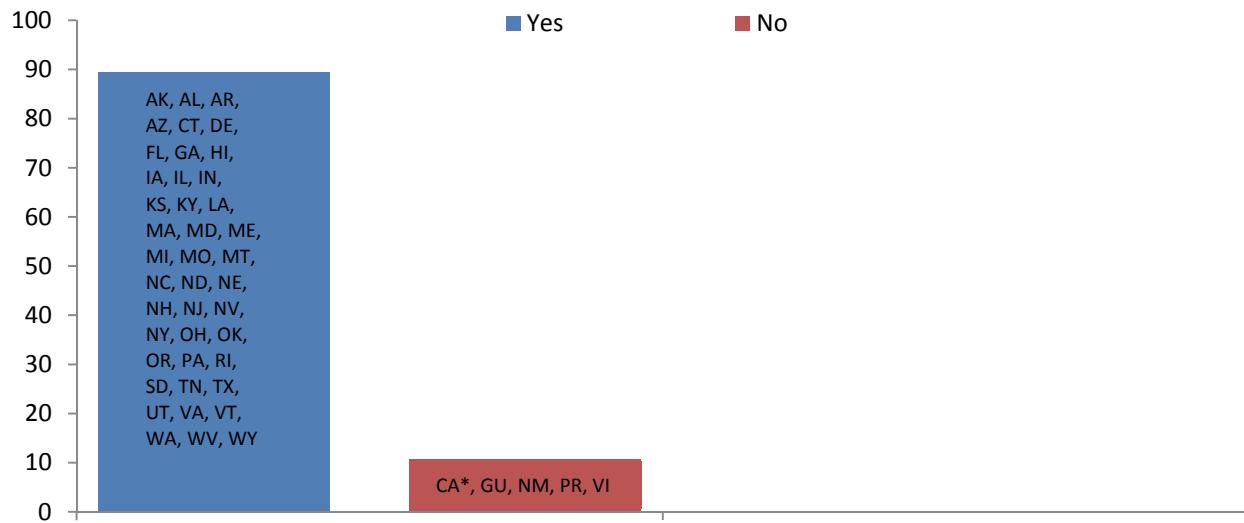
In order to find out more about what actions states may have taken or contemplated related to the use of telematics UBI in auto insurance, CIPR developed a 10-question Web-based survey inviting in May of 2014 all U.S. jurisdictions to participate. The high response rate in the survey, with 47 jurisdictions providing answers, allowed for a comprehensive assessment of the growth of telematics and the readiness of the state regulatory system to ensure a viable, fair and dynamic auto insurance market.

Survey Results

Approximately 89 percent of the responders answered telematics-based UBI auto insurance is available in their states, closely reflecting recent market studies (Figure 1.) Eight of the jurisdictions noted they have 12 or more companies offering telematics UBI programs to their consumers. Another 15 states responded they have at least five but less than 12 domiciled insurers with a telematics UBI program. Ten states noted the number of companies offering telematics UBI programs in their jurisdiction were less than five. The remaining nine jurisdictions could not provide a precise number of companies active in telematics because legislation permitting such programs was only recently passed in their state and/or they do not have systems in place to accurately track how many companies offer telematics.

Figure 1: Telematics UBI Program State Availability

Source: CIPR



Appendix: CIPR Telematics State Survey

The follow-up to the first question was an open-ended inquiry seeking to explore the reasons a telematics program may not be available in a specific jurisdiction. Smaller jurisdictions—such as Guam, Puerto Rico and the Virgin Islands—noted the lack of interest by their domiciled insurers to make telematics-based UBI policies available in their local markets.

However, the California DOI pointed to the state's legal mandate to preserve drivers' privacy and control of their vehicles' data⁸⁵ and to the need for transparency and stability in premium rating factors behind the DOI's restrictive approach to telematics programs. At this point in time, only rating factors specified in statute or regulation are allowed in California and currently, none of the common telematics UBI PAYD behaviors, other than mileage, are among these factors. The only data telematics UBI programs available to California can use is mileage driven.

The third question in the survey asked state regulators to provide information of any specific legislation introduced relating to the usage of telematics and/or dealing with privacy concerns and rating issues. Six states responded affirmatively, noting the passage or introduction of unique legislation intended to establish a regulatory framework for telematics-based UBI.

During the 2006 legislative session, the legislature of the commonwealth of Virginia passed a bill addressing the use of recording devices in vehicles for the purpose of pricing auto insurance.⁸⁶ Two new statutes, §46.2-1088.6 and §38.2-2213.1, were introduced defining what a telematics is and how it can be used and specifying the pricing of a policy with or without telematics. In the event an insurer chooses to not allow access to his data to an insurer, the legislation prohibits retaliatory action by the insurer, such as reducing coverage, raising premium, applying surcharges and placing in a less favorable tier.

The legislature of the state of Washington in its 2012 session passed House Bill 2361 dealing with automobile UBI and exempting certain UBI information from public inspection. The legislation covers the usage of the data captured by a telematics device as defined in statute RCW 46.35.010 and the usage-based determination of rates or premiums. In addition, it ensures that all information about the UBI methods and/or processes of the insurer remains confidential.

⁸⁵ Existing California regulation restricts insurer use of a technological device for the collection of driving data, such as mileage.

⁸⁶ HB 816: Recording devices in motor vehicles; access to recorded data. Amending § 38.2-2212; adding §§ 38.2-2213.1, 46.2-1088.6, and 46.2-1532.2.* (Patron-May, CH 851). Commonwealth of Virginia.

SB 90: Recording devices in motor vehicles; agent cannot refuse to renew insurance if owner denies access thereto. Amending § 38.2-2212; adding §§ 38.2-2213.1, 46.2-1088.6, and 46.2-1532.2.* (Patron-Watkins, CH 889). Commonwealth of Virginia.

Appendix: CIPR Telematics State Survey

The state of Illinois passed legislation in the 2011 session relating to trade secrets and commercial or financial information.⁸⁷ The 5 ILCS 140/7 statute provided protection to insurer proprietary trade secrets, allowing insurers to make their telematics solution available to consumers.

The General Assembly of the state of Delaware passed House Bill 56w/SA3 in the 2014 session enacted into law in May 2014.⁸⁸ The legislation prescribes certain regulations for telematics devices prohibiting the use by insurers of vehicle personal data for anything other than consideration for premium discounts. The law also requires disclosure to the insured of others who may gain access to their data, and otherwise prohibits insurance companies from releasing such data to others.⁸⁹

The state of Montana noted its legislature will consider legislation in the 2015 session. The senate in North Carolina has passed SB 180, allowing enhancements to auto insurance, but it has not been enacted to date. Also, California pointed again the existence of legislation specifically restricting insurer use of a telematics device.

Eight jurisdictions (Arizona, Arkansas, Iowa, Kansas, Maine, Missouri, Nebraska and Texas) responded that their existing legal and regulatory framework adequately covers telematics UBI programs providing guidance on ratings and confidentiality protection for insurers' UBI solutions.

The fourth question inquired if the existing laws affect the development, availability and use of telematics-based UBI. Ten jurisdictions that had given a negative answer in the previous question responded their legal requirements may potentially hinder insurers' efforts to offer telematics solutions.

The state of Maryland pointed to the Insurance Article §11-307(a)⁹⁰, which requires all auto insurers to file with the Commissioner all rates and supplementary rating information for use in the state. The Maryland Insurance Administration is responsible for reviewing the rating criteria to ensure no insurer has rating criteria that would otherwise amount to a violation of the Insurance Article. The rating criteria and supporting documentation is subject to public disclosure pursuant to §11-307(c) of the Article.⁹¹ According to the Maryland DOI, the public disclosure requirements for the telematics rating criteria have been a point of contention with some insurers. At the same time, there is no indication it has actually deterred any insurer from filing a telematics plan.

⁸⁷ 5 ILCS 140/7(1)(g), Illinois General Assembly.

⁸⁸ House Bill # 56 w/SA 3. State of Delaware 147th General Assembly.

⁸⁹ House Bill # 56 w/SA 3. State of Delaware 147th General Assembly.

⁹⁰ Maryland Insurance Article 11-307. General Assembly of Maryland.

⁹¹ Ibid.

Appendix: CIPR Telematics State Survey

Similarly, the state of Iowa's Insurance Division noted complete rating information is required under Iowa Code §515F.5 on rate filings.⁹² The state law requires all insurers to file their rates or rating plans, every manual, minimum premium, class rate, rating schedule and all relevant factors. Furthermore, all filings and supporting information should be open to public inspection.

The Office of Insurance Regulation of the state of Florida added that public disclosure requirements and review of all aspects of auto insurance rates are required in accordance with statute §627.0651.⁹³ The state of New York DOI referred to state Insurance Laws §2305⁹⁴ and §2307⁹⁵ on rates and ratings plans and policy forms, respectively. The laws require prior approval for all forms, rates and rating rules, and public disclosure of the filing and supporting information following approval. Also, New York's Freedom of Information Act means that no specific protection is guaranteed or afforded to any filed algorithms by insurers offering telematics UBI.

Hawaii revised statutes §431:10C-207 regarding discriminatory practices and §431:14-103(a)(1) dealing with the making of rates are the legal questions facing insurers offering telematics-based UBI, according to the Hawaii DOI.⁹⁶ Discriminatory practices are prohibited, so no insurer can base any standard or rating plan, directly or indirectly, on a person's driving experience, physical handicap and other factors like age, race, creed or ethnicity. Also, rates cannot be excessive, inadequate or unfairly discriminatory.

The state of Michigan's DOI pointed to a set of statutes in chapter 500 of the Insurance Code of 1956 that could affect the availability and use of telematics UBI in the state. Statute §500.2109 requires rates not be excessive, inadequate or unfairly discriminatory. Statute §500.2110a allows insurers to use factors for rating if universally applied, and statute §500.2111 lists factors such as miles driven, vehicle characteristics relating to automobile theft prevention devices and major driving hazards that can be applied by an insurer only on a uniform basis throughout the state. Statute §500.2403 deals with the use of the rate that has or will have the effect of destroying competition among insurers, creating a monopoly or causing a kind of insurance to be unavailable to a significant number of applicants who are in good faith entitled to procure the insurance through ordinary methods.⁹⁷

The Bureau of Insurance of the state of Maine noted the revised statute §2303 of Maine's Insurance Code that prescribes the establishment of classifications or modifications of classifications or risks based on such factors as individual experience is not prohibited provided

⁹² Casualty Insurance Chapter 515. Iowa General Assembly.

⁹³ Chapter 627, s. 627.0651. Florida Legislature.

⁹⁴ Insurance Law §2305. New York Department of Financial Services.

⁹⁵ Insurance Law §2307. New York Department of Financial Services.

⁹⁶ Chapter 431 Insurance Code. Hawaii Department of Commerce and Consumer Affairs, Insurance Division.

⁹⁷ The Insurance Code of 1956, Chapter 500. The Michigan Legislature.

such classifications and modifications apply to all risks under the same or substantially similar circumstances or conditions. Also, revised statute §2304-A was referred regarding public disclosure of any filing and any other supporting information after the filing becomes effective.⁹⁸

The Nevada DOI responded by noting the state is a prior approval state for all personal lines of insurance, meaning all UBI models have to be filed with the state and receive prior approval.

California DOI points to the state's Insurance Code 1861.02, where the mandatory rating factors are identified, and to the California Code of Regulations, Title 10, Chapter 5, Subchapter 4.7, Section 2632.5, where the allowable optional rating factors are listed. (None of the common PAYD factors are included.)⁹⁹ Section 2632.5 also specifies the use of a technological device is strictly limited for the purpose of collecting vehicle mileage information.¹⁰⁰

The next open-ended question to state regulators asked how state DOIs monitor and supervise the ratemaking process for auto insurance, particularly in the presence of telematics UBI plans.

Almost all the jurisdictions have a requirement for filing of rates and rating systems. Rates also must be actuarially supported and not excessive, inadequate or unfairly discriminatory. Prior approval is a requirement shared by most jurisdictions. A number of jurisdictions have an exemption to prior approval requirement except when a flex rate method is used. However, telematics-based UBI programs generally cannot use the flex rate filing and must seek prior approval.

Guam responded by noting the existence of a tariff system for auto insurance in the territory. Any admitted insurer in the jurisdiction of Guam must file for any rate adjustment that deviates from the tariff.

The survey's sixth question inquired how states evaluate the level of competition in the presence of UBI programs in their jurisdictions.

The DOI of the commonwealth of Massachusetts in its response recognized UBI has the potential to create an uneven playing field in competitive markets due to the holding of telematics patents by insurers. However, it was noted that because annual mileage is already easily tracked in Massachusetts, the use of telematics-based UBI becomes less compelling as a competitive tool. The DOI reiterated rate filings are carefully reviewed to understand the type and extent of discounts offered in the market for UBI policies.

⁹⁸ Title 24-A: Maine Insurance Code. The Maine Legislature.

⁹⁹ State of California, Department of Insurance. Title 10, California Code of Regulations, Chapter 5, Subchapter 4.7, Section 2632.5. Pay-Drive (Usage Based Auto Insurance.)

¹⁰⁰ Ibid.

Appendix: CIPR Telematics State Survey

The Bureau of Insurance of Virginia emphasized it is purely consumers' decision to participate in a telematics plan, and there is no indication the presence of telematics in the state has had any adverse effects in Virginia's competitive insurance market.

New York's Department of Financial Services said state regulators work with insurance companies in implementing their individual telematics UBI programs. Pursuant to New York Insurance Law, all such programs are required to meet certain standards which must be approved by the Department prior to their implementation. Montana's DOI in its response stressed the fact the telematics UBI market is still in its early development. Because UBI is relatively new in Montana and the interest for UBI by consumers is not known, it is difficult, noted the DOI, to accurately assess how competition has changed in the presence of telematics UBI. Ultimately, the personal auto insurance market in the state is greatly driven by rate levels, said the DOI, and concluded by underscoring that while privacy is valued by a great number of consumers in the state, the better drivers in the state will likely try a telematics plan at some point in the future.

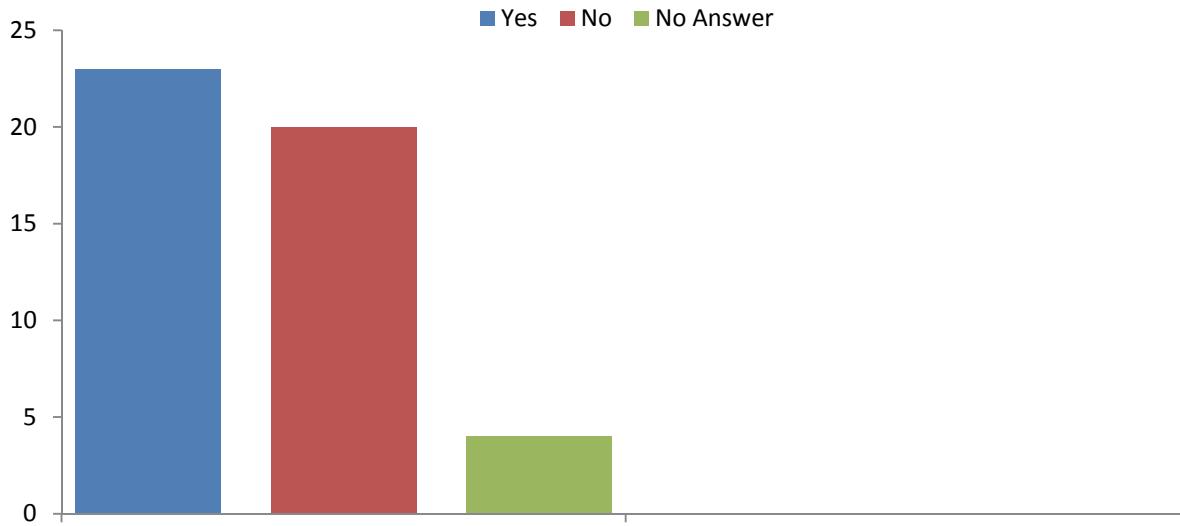
Michigan's DOI, in its response, highlighted the high degree of competition in the state's insurance market, with more than 100 insurers offering auto insurance plans. Therefore, consumers can choose the auto insurance plan with the best price and best service for their varying situations. The DOI noted Michigan law does not require insurers offering telematics UBI programs be competitive beyond this scenario. For example, regulators would not mandate any of the insurers to offer such programs nor consider telematics UBI are not acceptable rating plans because only one or a handful of insurers use them.

To our question if a state has any specific concerns regarding the marketing and use of telematics UBI products, 23 jurisdictions answered in the affirmative, listing their concerns, while 20 jurisdictions responded they presently have no particular concerns. Four jurisdictions provided no answer (Figure 2.)

The survey listed four reasons for concern, thought to be more common according to prior research, for regulators to choose and an option to add on that, expand or elaborate. The four concerns listed were: 1) claims management; 2) pricing fairness between UBI consumers and those who wish to not participate; 3) privacy issues; and 4) data ownership and portability. While the issue of privacy figured prominently in most of the responses, states' answers varied in their nuance and choice of concerns that often went beyond the four listed issues.

Figure 2: State Concerns with Telematics UBI Marketing and Use

Source: CIPR



The Delaware DOI stated its concerns regarding telematics span all four choices, but more time is needed following the implementation of HB 56¹⁰¹ in May 2014 to see if any particular issues emerge and/or consumers submit any complaints. The state of New Hampshire also noted all four issues are of concern, with a particular emphasis on privacy. Furthermore, the state DOI stressed that telematics programs are monitored to make sure they are strictly voluntary.

The Insurance Division of the Department of Business Regulation of the state of Rhode Island pointed to all four issues as equally concerning and added that currently, telematics programs are offered solely as an option to consumers. Insurers may offer discounts only and may not surcharge risks or use to non-renew. Similarly, the DOI of the state of Indiana responded all four are concerns shared by Indiana regulators, adding another concern is the issue of transparency to the policyholders. The Maryland DOI also said all four issues are regulatory concerns, adding that equally concerning are if appropriate disclosures regarding how the program works to consumers are made and the accuracy of the data transmitted to the insurer via the device. All four issues were also concerns noted by the DOI of the state of Arizona.

The Georgia DOI answered that when telematics UBI programs were first introduced, there were some privacy concerns, but because the use of UBI is strictly voluntary, these concerns are reduced as the consumers have to consent to participate in the program.

The Florida DOI added the accuracy of the algorithms used to create UBI scores as a serious regulatory concern in addition to the concerns about privacy, data ownership, and portability and claims management. The New York DOI shared its main concerns were with claims

¹⁰¹ House Bill # 56 w/SA 3. State of Delaware 147th General Assembly.

Appendix: CIPR Telematics State Survey

management and data ownership and portability, while the Connecticut DOI pointed to privacy and data concerns.

The State of Montana's DOI stressed concerns regarding disclosure of how the data collected may be used, privacy issues, underwriting and renewal. The Department of Insurance and Financial Services of Michigan noted it is concerned about classifications used are not unfairly discriminatory. The DOI of the state of Hawaii, the Bureau of Insurance of the state of Maine and the Washington DOI noted concerns with pricing fairness, privacy, and data ownership, and portability. Finally, the North Dakota expressed concerns with rebating issues with telematics UBI plans.

To the question if a jurisdiction has enacted or proposed any legislation regarding any of the concerns with telematics UBI, state DOIs responded either by noting the same telematics-related legislation discussed earlier or by saying that no additional legislation is required. Only the state of New Hampshire pointed to new state statutes whose main intent is to deal with privacy issues. The DOI added that although these statutes¹⁰² did not specifically address UBI devices, they did encompass them.

The last question of the survey inquired if any of the jurisdictions has received a consumer complaint connected with a telematics UBI program. Two state DOIs, Maryland and New Jersey, answered in the affirmative. The Maryland DOI has received two complaints with regard to UBI programs. The first complaint was directly related to advertisement of the UBI program. Here, the insured felt the insurer failed to disclose the program required a subscription to an outside service (i.e., OnStar, Ford SYNC, In-Drive). The second complaint alleged the insurer did not properly inform the insured how long the device was required to be installed in the vehicle in order to receive a discount. The DOI of New Jersey said it received two complaints, one related to the applicable rating discount and the other related to the mechanics of using the telematics device.

¹⁰² HB1567, HB1619, HB1324. 2014 Session of New Hampshire Legislature.



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