

Insurance Telematics: Thinking Outside the Box

Shift to a sample of one.

Telematics data enables carriers to accurately determine an individual driver's level of risk—within weeks of program inception.

October 2014

Introduction

For too long now, insurance carriers have been trapped inside the hamster wheel of market underwriting cycles, hoping that today's customers are more profitable than yesterday's, yet knowing that they can't be certain until tomorrow. Can telematics help carriers break out of this cycle? And what might US carriers learn from developments in the UK, which has a more mature telematics market?

Telematics: A long-term antidote?

Carriers around the world are looking to telematics as they seek to control claims costs, enhance pricing, increase profitability, and differentiate and personalize their products and services. The UK now leads the world market in insurance telematics adoption by both consumer uptake per capita, and adoption rates by carriers. Market penetration has been bolstered by support from both sides of the UK government.

Price comparison sites were launched in the UK market a decade ago, and have become increasingly popular. UK customers have grown accustomed to seeing multimillion-dollar advertising campaigns that highlight the benefits of online price-hunting—all this, layered upon what was already the most competitive auto insurance market in the world.

The effect of intense online competition, together with rising fraud levels and a legal environment that encourages claims farming, has resulted in a cutthroat and largely unprofitable market. It is a market where fluctuating prices and uncertain returns prevail. Consequently, UK carriers have been frantically searching for the antidote, which has led to a period of innovation in auto insurance pricing techniques. UK carriers have tested portfolio pricing, optimization tools and data enrichment, including leveraging credit scores. These techniques have provided lift, and the market has continued to innovate.

Similarly, in the US, price competition has led carriers to continuously adopt new rating techniques—and there is a growing need for telematics, or usage-based insurance (UBI), to be one of them. Indeed, in the past three years, more and more carriers are looking to UBI as a solution.

For carriers, UBI builds on the traditional technique of pricing based on an approximation of individual risk—to include pricing based on individual risk, or a sample of one.

Benefits of UBI include pricing innovation, self-selection and deeper customer engagement, which can support customer retention strategies. In addition, it can help carriers understand which channels attract preferred risks, resulting in more effective channel management. And it has the potential to change claims handling processes to reduce fraud exposure. In short, UBI has the potential to be a long-term antidote in the US auto market, rather than a short-term pricing win.

What is insurance telematics?

Telematics is the technology of recording, sending, receiving and storing information about driving behavior. Insurance telematics has many other names within the industry such as “pay as you drive,” “pay how you drive,” and more recently, usage-based insurance.

The potential for UBI to spread into the mass market is significant: increased customer awareness and significantly lower costs for acquiring data (thanks to smartphone applications) are poised to help early adopters achieve a competitive advantage.

Scoring driving behavior with UBI

Carriers have competed to identify and measure risk characteristics that are predictive of loss propensity. Most pricing methods involve applying multivariate statistical techniques to large, and ideally clean, sets of historical data. Historical data sets need to contain fields representing all risk characteristics included in the pricing plan—and in order to yield statistically significant results, the data set must be sizeable.

There are two shortfalls to this method. First, there is no feedback unless a claim is filed, which represents only a small percentage of the policyholder population. This introduces challenges leading to uncertainty in sample sizes, particularly for smaller carriers. Second, the timeline between incident, notification, estimation and settlement introduces further challenges and uncertainty, pushing back the intervention point for pricing or account management decisions.

In contrast, UBI offers the opportunity to radically reengineer this process, and significantly improve upon or enrich the existing pricing approach. UBI data is collected for all enrolled users, not just those that file a claim, which increases the sample size. And because carriers have access to a more frequent, up-to-date data set, they have more opportunities to intervene in pricing or account management adjustments.

Figure 1, based on a sample of 23,000 UBI policies, shows that compared to traditional pricing, UBI enables carriers to be more precise in aligning their pricing (\$x) with variance (\$z) to the claims exposure (\$y), with incremental improvements as the policy matures.

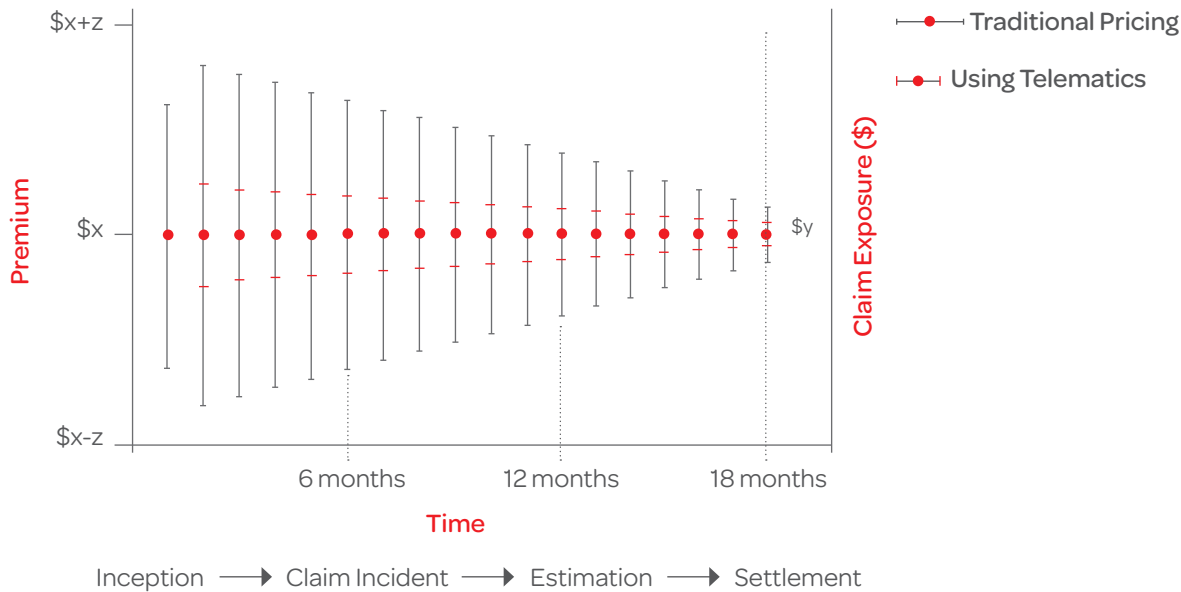


Figure 1. Uncertainty Pricing for Traditional and UBI Methods*

*Sourced from LexisNexis proprietary data in the UK

Pricing factors

Without the benefit of actual driving behavior data, carriers have relied upon proxies such as driver age, driving experience, location and more. We have found that directly measuring driving behaviors, combined with traditional rating factors, can dramatically improve pricing accuracy.

The most predictive driving parameters include:

- Confidence: firm acceleration when approaching on-ramps
- Congestion: actual speed relative to posted speed limit
- Day of week: weekdays versus weekends
- Familiarity: driving on known roads
- Journey length: excessively high frequency of short journeys
- Pace: speed relative to other drivers at that point on the road
- Smoothness: rate of hard braking and cornering
- Speeding: number of incidents of exceeding posted speed limits
- Time of day: daytime versus nighttime driving
- Type of road: paved versus unfinished
- Verified information: mileage and garaging address matches application

Figure 2 demonstrates the predictive power of these driving parameters. It shows the relative fault claim rates on different roads. Relative fault claim rate is simply the number of at-fault claims experienced on a given stretch of road. The higher the relative fault claim rate, the more at-fault claims filed for that stretch of the road—and therefore, the riskier the road segment. As shown in Figure 2, faster roads have fewer at-fault claims per mile: there are 11.6 times more at-fault claims per mile travelled on slower roads (40 mph and slower) than on 70 mph roads. A likely explanation is that roads with higher speed limits are designed for faster travel, and as a result, are safer than roads with slower speed limits.

Road Speed Limit	Miles Travelled	Percentage Total Miles	Relative Fault Claim Rate Per Mile
= < 40mph	75645841	42%	11.6
50–60mph	53317470	29%	4.8
70mph	52624061	29%	1.0
Total	181587372		

Figure 2. Relative Fault Claim Rate Per Mile*

To facilitate UBI pricing, we suggest that carriers use a UBI driving score: a weighted combination of some of the predictive driving parameters listed above that assigns a score between 1 (worst drivers) and 100 (best drivers). The raw behavioral data would consist of time-stamped longitudes and latitudes and may come from a wired device, OBDII device or smartphone. To draw meaningful insights from this raw data, carriers must be able to validate and enrich it with mapping data, and subsequently determine driving parameters.

*Sourced from LexisNexis proprietary data in the UK

Regarding the use of GPS data, the law and insurance codes of conduct vary between countries and territories. However, it is critical for carriers to have accurate mapping data in order to deliver on the customer proposition for using telematics in the first place. For example, inaccurate speed limit data or poor validation will lead to inaccuracy in UBI driving scores—and with it, customer complaints and a lack of customer confidence in reporting and feedback.

Figure 3 illustrates how the overall success of any telematics product depends on carriers having access to accurate GPS data.



Figure 3. The Importance of Road Speed Limits Accuracy and Validation

Personalized pricing

UBI is often credited with enabling carriers to offer more personalized pricing. To confirm this, we investigated the correlation between UBI driving score and loss ratios derived from traditionally priced policies.

Based on our experience to date on the same 23,000 UBI policies studied above, Figure 4 shows a distribution of actual UBI driving scores across a population of drivers, with an overlay of forecasted loss ratios from traditional pricing methods. Forecasted loss ratios are depicted as a range due to different claims handling processes, and to account for claims that were still open.

As expected, the higher the UBI driving score, the lower the forecasted loss ratio. The drivers with lowest UBI driving score have a loss ratio of approximately 135 percent, compared to a loss ratio of approximately 38 percent for the top scorers. Preliminary research shows these insights to be valid and applicable in the US consumer market—and with modifications, in China, South Africa and Australia.

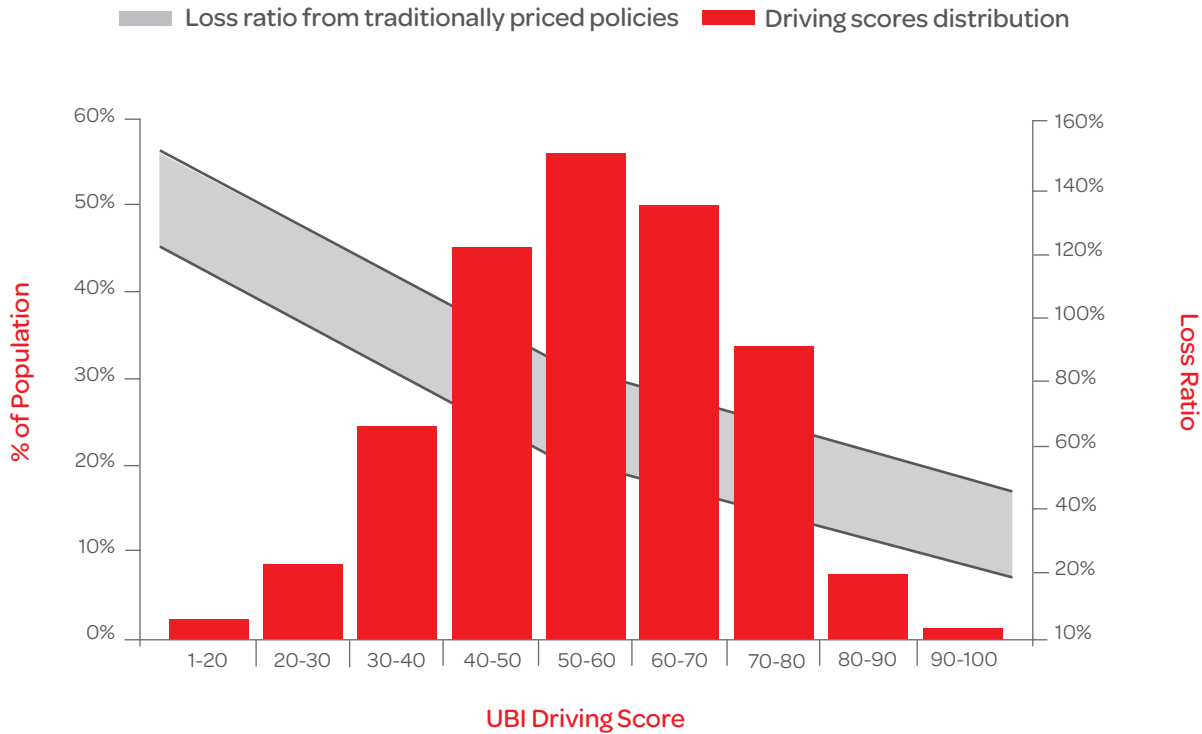


Figure 4. Distribution of Forecasted Loss Ratios from Traditional Pricing Compared to UBI Driving Score

This correlation is exciting, if not unexpected. After all, better drivers would be expected to have higher UBI driving scores—and accordingly, fewer claims, less severe claims and lower loss ratios. However, the more interesting question is whether driving behavior is a new addition to existing pricing methods, or whether driving behavior is already implicitly included in traditional rating factors.

To answer these questions, actuaries would point to results from a generalized linear model showing that the variability in UBI driving score is (or isn't) already taken into consideration by changes in one or more of the variables (that is, traditional rating questions).

Figure 5 shows that UBI driving behavior adds new insight to traditional rating factors. Using the same dataset of 23,000 policies, we calculated UBI driving scores retrospectively and compared them to premiums derived from traditional rating factors. Despite the strong correlation between UBI driving score and loss ratio, Figure 5 shows almost no correlation between UBI driving score and claims outcomes or premium.

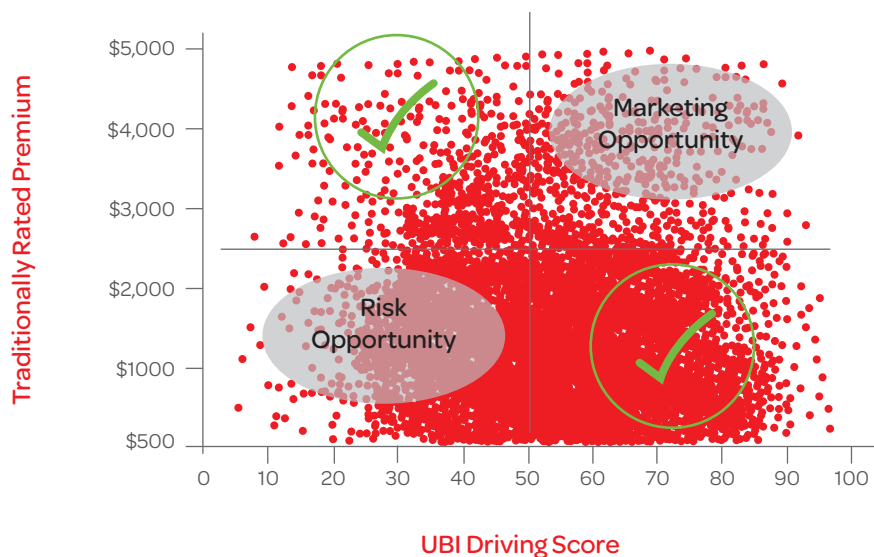


Figure 5. No Correlation Between Traditionally Rated Premium and UBI Driving Score

The lack of correlation is evidence that driving behavior adds something substantially new and incremental to traditional pricing models. Even when the comparison was completed across the full dataset for individual traditional factors such as age or lack of claims bonus, we observed little correlation between UBI driving score and traditional premiums.

So UBI driving scores are correlated to fault claims and they offer a new incremental insight in terms of managing an insurance portfolio. But how are these scores distributed and what can this tell us about how carriers can manage their businesses?

If scores show a very narrow standard deviation then we might conclude that claims experience is driven by a small tail of poorer risks. However, Figure 4 shows a significant spread in UBI driving scores, and therefore, abilities. Extrapolating from Figure 5, we can see the two regions of note: (1) drivers with a low UBI score and low premiums that are underpriced, and (2) drivers with a high UBI score and high premiums that are overpriced. The former represents a risk opportunity, the latter a marketing opportunity—that is, further opportunities to achieve incremental lift on top of traditional pricing models.

UBI driving scores

To facilitate UBI pricing, we suggest that carriers use a UBI driving score: a weighted combination of predictive driving parameters listed that assigns a score between 1 (worst drivers) and 100 (best drivers).

- UBI driving behavior adds new insight to traditional rating factors
- UBI driving scores are correlated to fault claims
- UBI driving scores enable carriers to shift to a sample of one—determining accurately, within weeks of inception, the ultimate fault loss ratio of an individual risk

In short, UBI driving scores offer carriers the opportunity to view the entire new business and retention value chain through a different lens.

Consideration of time

Our evidence suggests that UBI driving scores stabilize after weeks—not months—of collecting driving behavior data. Figure 6 outlines the variation in average year-to-date scores against days of coverage, based on a sample of more than 30,000 hard-wired devices.

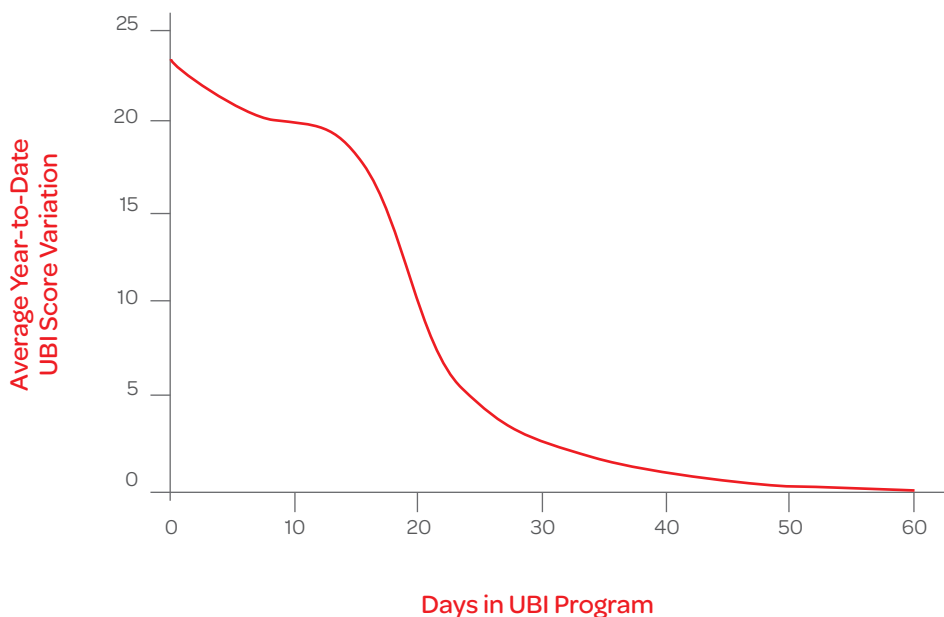


Figure 6. Average Year-to-Date UBI Driving Score Variation Against Days in UBI Program

Early feedback suggests standalone smartphone apps can offer a meaningful score within a similar time period. In addition, given the right feedback and targeted communications, drivers can improve their UBI driving score over time. It follows that UBI products can provide the incentive for customers to improve their driving and share in the rewards.

However, it is the speed with which a reliable UBI driving score can be established that may lead to the greatest revolution in insurance pricing and account management. The ability to predict—after just weeks—the ultimate loss ratio of a single risk is truly personalized pricing. This is pricing on a sample of one, which in turn should lead to the emergence of what could be called dynamic account management.

Dynamic account management

The value that telematics can offer is well documented in many countries and territories. Often at the top of the list is better risk selection, including self-selection and improved claims handling.

Importantly, the spread in UBI driving scores yields insight into all customers, not just those that file a claim. There is the added benefit of UBI data being available from day one, and continuously thereafter, which offers more data for understanding risk. This enables carriers to shift away from large data sets that are dependent on claims that emerge slowly over time. Instead, carriers can shift to a sample of one—determining accurately, within weeks of inception, the ultimate fault loss ratio of an individual risk. This offers the opportunity to view the entire new business and retention value chain through a different lens.

Dynamic account management can be used in six main areas to gain a significant competitive advantage.

- **Marketing management:** For the first time, carriers can establish which media, campaigns or messages are attracting good or bad business, and adjust their approach accordingly.
- **Underwriting and pricing reactions:** Carriers can promptly judge how changes have affected business quality.
- **Competitor management:** Carriers can quantify how competitor pricing within a peer group, or across the market, affects the risk distribution within their own portfolio.
- **Channel management:** Carriers can quickly establish which channels perform best, and even drill down to the individual aggregator, broker or branch that will achieve the best results.
- **Retention plans:** Good drivers will be invisible to most competitors, so using UBI insights can help carriers retain preferred customers that competitors may not have the confidence to lure away with a lower price.
- **Claims management:** Inconsistencies between UBI driving score and claims history can alert carriers to potential fraud—ultimately changing the claims handling process to better detect fraudulent activity.

Justifying entry into telematics

An incumbent insurer and a new challenger will have different business cases for entering the telematics market. A large incumbent may be concerned with brand interaction, customer retention and future pricing benefits, while a new challenger will see risk selection, new rating and improved claim handling as key. Both will need to be cognizant of local market conditions.

To be fair, telematics requires a technology investment, and these investments need to be viewed against the improvement in loss ratios, not against its impact on expense ratios. It is important to focus on the impact of telematics on the overall combined operating ratio, and not the cost of the technology relative to the expense allowance inside a single financial period.

In our experience, some carriers try to fit the cost of telematics into an established traditional budget only to ask: how can I afford telematics when, to be successful, I have to keep my expense ratio below, for example, 15 percent? The simple answer is that their expense ratio may have to increase to 20 percent—but telematics may enable them to achieve a loss ratio improvement of, for instance, 20 percent.

Carriers must also be certain that their customers will want to purchase telematics products. If they believe so, then customers who will benefit from telematics (through discounts) will purchase these products, particularly if they receive wider mobility benefits. Eventually, this will isolate the poorest drivers, and carriers that do not invest in telematics may find themselves at risk of adverse selection.

Consumers will purchase UBI products if they trust the technology, trust the brand, believe they are a better driver than average and will receive large enough savings to warrant the underlying intrusion. In our experience, there is strong evidence that the premium savings can be generated through a number of areas, including better risk selection and improved account management. These savings will drive UBI from niche markets through to the mass market, particularly based on the strengths of mass-market technologies like the smartphone and connected vehicle.

About the authors



Paul Stacy has an extensive auto pricing background and been working in telematics underwriting and pricing for the last 6 years with direct telematics experience in Australasia, China, US, South Africa, UK and Italy. He co-founded Wunelli in 2008, creating a proof of concept UBI product, Coverbox, for the UK motor market. LexisNexis acquired Wunelli in 2014. Prior to Wunelli, Paul worked for Accenture's insurance practice in Australasia and as a UK-based insurance broker. At university, Paul studied engineering and holds a Masters in Mathematics from The Australian National University



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Prior to joining LexisNexis, Lukens was product development manager with AIG's personal lines auto group, where he was responsible for building and delivering new multivariate rating models for the agency and direct distribution channels. He has also managed claims operations in AIG's personal lines auto group, serving as process leader for both the physical damage and casualty areas. Lukens holds a bachelor's degree from Cornell University and a master's degree from the University of Delaware.

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