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Consumers and Guaranteed Asset Protection ("GAP Protection") on Vehicle Loans and Sales-Financing Contracts: A First Look*

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Abstract

Guaranteed Asset Protection (GAP) shields purchasers from financial risks of losses exceeding insured collateral values if vehicles become total losses. Yet surprisingly little is known about the sales of this product or consumers' attitudes toward it. In this study, we report the results of a representative national survey conducted by the Survey Research Center (SRC) of the University of Michigan. The SRC interviewed 1,206 individuals in the fall of 2020. This survey shows that consumers purchased GAP in about 39 percent of financed vehicle transactions. Consumers purchase GAP more often when there is a heightened financial risk: larger credit amounts, longer loan maturities, and lower income levels. More than 90 percent of GAP purchasers report that buying GAP is a good idea and that they would buy it again. Only about 1 percent of surveyed purchasers indicate dissatisfaction with their choice. A multivariate model of GAP purchase suggests that consumers' financial situation and terms of the transaction are more important than risk aversion by itself.

Keywords: GAP, GAP waiver, GAP insurance, vehicle financing, ancillary products, consumer credit, debt cancellation agreements

JEL classification: G22, G23, G52

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1. Introduction

Anecdotal evidence suggests growth in sales of an insurance-type protection developed in the 1980s and typically called today "Guaranteed Asset Protection," "GAP Protection," or just "GAP." GAP shields purchasers from financial risks of losses exceeding insured collateral values if vehicles become total losses due to accidents, theft, or natural disaster. GAP is found in three forms in the U.S.

1. GAP Waiver. The most common form is structured as a non-insurance two-party contract between the purchaser and the seller of a vehicle and is sold in connection with the extension of credit (known as "GAP waiver" because it "waives" all or a substantial portion of the owed credit amount greater than collateral value). In slightly more precise and technical language, Gap Waiver is part of a finance agreement between a motor-vehicle creditor and a motor-vehicle purchaser, in which the creditor agrees to waive its right to collect amounts the purchaser has agreed to pay the creditor in the event of a total physical damage loss or unrecovered theft (total loss) of the financed vehicle.

2. GAP Rider. A less-common form is offered under personal lines of auto insurance and structured as a rider to the physical damage coverage (known as "GAP rider"). It can be purchased at any time from a personal lines auto insurer, not just as part of a vehicle sale.

3. GAP Written as Group Insurance. The least pervasive form is GAP written as a group insurance product through an insurance company ("GAP insurance"), also sold in connection with the extension of credit. Whether insurance or not, most purchasers likely think of GAP as an insurance-type product.

Because vehicles often depreciate faster than financing for the vehicle is paid off, consumers can find themselves with "negative equity," "under water," or "upside down" on their loan contract if the remaining loan balance at any time exceeds the book value of the vehicle.[1] This situation might come about when there is a high loan-to-value ratio at the outset of a loan, a long term to maturity, or, more generally, whenever vehicle depreciation exceeds for a time the amortization of the loan balance (payoff rate). In these situations, an insured total loss of the vehicle can leave such borrowers with remaining loan balances even after paying the full book value by the casualty insurer. If a total loss of the vehicle arises from a catastrophe like an accident, theft, or natural disaster under such circumstances, the borrower no longer has the vehicle but is still liable for the remaining loan balance. This situation is hardly an enticing prospect for any borrower, and it produces situations where additional coverage of some kind might be attractive for at least some of

[1] The authors are aware that credit from or through a dealer may not legally be considered a loan under various state laws, particularly historically. Because the term "auto loan" is used so pervasively today, however, particularly by consumers who are the subject of this study, the distinction between vehicle "credit" and vehicle "loans" is unimportant here and, consequently, is ignored in the terminology used.

them.

Financial inventors and entrepreneurs have stepped into this coverage gap with a product they have designated as "GAP." Although they sometimes have maintained that GAP is short for "Guaranteed Asset Protection," or "Guaranteed Auto Protection," probably most sellers and users think of it simply as coverage for the gap between loan amount still owing when a total loss of the vehicle occurs and the amount the casualty insurer pays (the book value).

There is surprisingly little systematic information available even about the extent of sales of this product or consumers' attitudes toward it. Individual sellers undoubtedly understand their own sales experience, and insurance underwriters and their actuaries know about their loss rates, revenues, and loss reserves, but they typically know little about the activities of other market participants. There are virtually no academic studies of this subject and even relatively little journalistic description. There are some public-information sources that describe the product and outline when it can be useful, but there is little available in the way of statistical evidence of its uses and users.

To fill some of this information void, in 2020 an industry coalition sponsored a nationally representative survey of consumers (exclusive of Alaska and Hawaii).[2] The survey, intended by the coalition for independent academic analysis of GAP, was undertaken by the well-known and highly respected Survey Research Center of the University of Michigan (SRC). SRC has been surveying consumers' financial attitudes and behavior, including vehicle buying, since 1946. The SRC added questions about vehicle financing and GAP to its monthly SRC survey, which also produced the well-known University of Michigan Index of Consumer Sentiment. This index is widely cited by the financial press and has been an important monthly national economic indicator for decades. During September and October 2020, the SRC completed 1,206 interviews about vehicle financing and GAP as part of this program. In December 2020, the coalition granted access to the survey results to the authors, directly through the SRC. The coalition did not place any conditions of any sort on the academic analysis.

The remainder of this article consists of three parts and a conclusion. The next section briefly describes GAP and discusses conditions under which it might sometimes be attractive to vehicle buyers. The following section provides information from the consumer survey on such things as the frequency of GAP purchases on vehicle loans, characteristics of buyers, experiences with the purchase transaction, and consumers' attitudes toward the product. This section also contains an outline of elements of a model of the purchase decision. The final section examines hypotheses arising from the purchase model with further multivariate statistical analyses.

[2] The funding organizations were a subset of the Voluntary Protection Products Coalition. See https://voluntaryproducts.org.

2. GAP

As pointed out in an industry publication, even terminology in the GAP area has been somewhat imprecise. For this reason, at the outset it seems worthwhile to examine briefly some terms and product background. For its own purposes, the Consumer Credit Industry Association ("CCIA") considers it useful to define terms in its Fact Book of Credit-Related Insurance (2020 edition, p. 43):

> *GAP [insurance] insures the excess of the outstanding indebtedness over the primary property insurance benefits that may occur in the event of a total loss to a collateral asset. Primary property insurance refers to the underlying insurance policy insuring the property, such as vehicle physical damage insurance. GAP can be written on a variety of assets that are used as collateral to secure credit; however, it is most commonly written for motorized vehicles. GAP may or may not be insurance depending on the state regulations and the contractual relationships. Since its introduction in the mid-1980s, the products and the applicable regulations have been evolving.*

As noted here and in the introduction above, for legal and regulatory purposes, GAP takes either of three forms, depending on state regulation and market channels, although the survey questioning does not focus closely on the distinctions among them. First, GAP rider is sold by primary auto insurers as an add-on ("rider") to physical damage coverage. Apparently, most GAP coverage, however, is of the second type designated as "GAP waiver." As indicated above, GAP waiver is a two-party agreement between the financing source and the consumer to cancel ("waive") any remaining GAP owed to the lender if a total loss of the vehicle occurs under circumstances when a gap exists. (The financial lender may enter into a master insurance policy with an insurer to cover all its GAP-waiver agreements, but this commercial arrangement behind the scenes is transparent to individual consumers.) Third, in contrast to GAP waiver, "GAP insurance" is a three-party insurance agreement among financer, consumer, and an insurance company that provides the GAP coverage directly to the customer as a legal matter rather than technically through the financer. Although the distinctions among GAP rider, GAP waiver, and GAP insurance are likely not of much interest to consumers (and so, as indicated, the consumer survey does not make much of the distinctions), apparently there can be some feature and coverage differences between GAP rider and the other two products. Although the distinctions among GAP rider, GAP waiver, and GAP insurance are likely not of much interest to consumers (and so, as indicated, the consumer survey does not make much of the distinctions), apparently there can be some feature and coverage differences between GAP rider and the other two products.

In recent years, the sale of either GAP waiver or GAP insurance apparently has become

common enough that it now appears in various widespread sources of consumer information, although using terminology meaning the same thing as industry definitions but employing different wording. For instance, in the section titled "Gap Coverage," the Federal Reserve Board's online called Keys source to Vehicle Leasing: Comprehensive Consumer Guide notes that "Gap coverage is often included in lease agreements. If it is not, it can be purchased." Concerning buying a vehicle rather than leasing, the Guide then continues:

> *Gap coverage is usually not included in finance agreements, but it can be purchased.* ***Gap coverage.*** *Gap coverage is an agreement by a lender or a third party to cover the gap amount if your vehicle is stolen or totaled.* ***Gap amount.*** *The gap amount is typically the amount by which the early payoff, not including any past-due amounts, exceeds the insured value of your vehicle. Gap coverage is usually not included in finance agreements, but you may be able to buy it separately. If you do, gap coverage usually has a one-time charge, or premium.* ***Reason for gap amount.*** *The gap amount exists because your vehicle usually depreciates faster at the beginning of the loan than as you pay down your loan balance. Gap coverage is designed to cover the gap amount of your prepayment liability if your vehicle is stolen or totaled. See the section Early Termination. However, gap coverage does not reimburse you for any down payments you have made. It does not cover past-due amounts you owe under the financing agreement or other amounts you are responsible for such as personal property taxes or unpaid parking tickets. In most cases, gap coverage does not cover your insurance deductible, any insurance policy deductions for past-due premiums, and so forth.*[3]

Many other public information sources provide similar descriptions, for example, the federal Consumer Financial Protection Bureau (CFPB), Wikipedia, Investopedia, Nerdwallet, and others. There also are many online advertisements for GAP products that provide information on GAP, of course sometimes also touting their own products.

3. GAP Uses and Users

Insurance companies, administrators, and sellers of GAP can assemble their own statistical information about their sales, and they may even survey customers about their experiences.

[3] Industry sources suggest that part of this last sentence is correct for GAP rider but incorrect for GAP waiver in that almost all GAP waivers cover the primary deductible up to a set amount of $500 or $1000. There also apparently are other differences between GAP waiver and GAP rider contractual arrangements. Without access to individuals' contracts, it is not possible with consumer population survey design like this one that is aimed at obtaining basic indications of purchase, buyers, and attitudes, to study the impact of specific differences in aspects of individual product offerings. The survey did determine, however, that only about a third of GAP purchasers indicated that their insurance agents had offered them a GAP rider product. The rest replied negatively or did not know. It is possible to conclude from this that the majority of GAP in the marketplace is GAP waiver. Only about a quarter of non-purchasers said their agent had offered a GAP product.

Such information remains proprietary, however, and is not made available publicly. A search of indexing source Google Scholar using keyword terms like GAP waiver, GAP insurance, Guaranteed Asset Protection, and variations finds little analytical information beyond a few legal and legislative citations, some advertisements, some non-English citations to legal situations in other countries, a handful of citations to professionals like actuaries, and even some patent applications for product variations for the vehicle leasing market. There does not appear to be available public analyses of the extent of GAP purchases, features of transactions where GAP purchase may be likely, consumer knowledge of and attitudes toward the product, or even consumers' purchase experience.

Among the limited available articles and sources on GAP protection, probably the most interesting is an online article by principals of the actuarial services firm Kerper and Bowron discussing some of the actuarial challenges in implementing a successful GAP program.[4] Underlying any such program are the basic elements of consumer demand for the protection. Actuarial concerns involve measuring the risks associated with product demand and then pricing the risks so that they do not endanger the solvency of the risk-coverage program. This necessarily involves explorations of the situations where demand for the risk coverage program is likely. Presence of many of these demand elements can be measured with a consumer survey.

For instance, it is reasonable first to expect that demand for GAP would exist in situations where a large gap exists between the amount of a vehicle loan and the book value of the collateral. By definition, this occurs if vehicle depreciation is greater during some period than loan payoff, such as a high loan-to value credit arrangement on a depreciating new vehicle. High loan to value could persist for some time if the payments are relatively small for the loan size due to extended maturity.

Second, demand for protection would be greater among individuals who are vulnerable to adverse events or are inherently more risk averse. Some people simply are more concerned about the possibility of facing unexpected large expenditures and will take more protective measures to smooth the expected value of losses than others. The degree of risk aversion among consumers can be measured by direct questioning about it, but also by exploring individual consumers' underlying financial situation, including income and liquidity.

Third, models of the marketing process find that knowledge, purchase experience, and attitudes toward a product can influence product demand. These also are measurable in a consumer survey, as marketers are well aware.

Taking these demand elements together produces a basic demand model of the following form:

[4] See A. Lee Bowron and John Kerper, "GAP Insurance – Techniques and Challenges," Casualty Actuarial Society E Forum, Winter 2011.

$$D_{GAP} = \text{f(Loan to value, Vulnerability to adverse events,}$$
$$\text{Risk aversion/demographics, Attitude/purchase experience)}$$

Unfortunately, directly comparing the size of the gap between loan amount outstanding and collateral value over time on automobile purchases (loan-to-value ratio) is inherently difficult without extensive details of the initial financial terms necessary to calculate the repayment pattern and loan amount still outstanding over time. These components include the purchase amount, down payment, interest rate, maturity, ancillary purchases, etc. Further information is also necessary for a reasonable estimate of collateral value over time as well (make, model, features, the intensity of use of the vehicle, vehicle demand and supply, etc.).

Nonetheless, to develop an estimating model of the probability of GAP purchase, many of the underlying elements of these calculations are ascertainable through consumer surveys. For example, other things equal, loan value will be higher over time for larger initial loans (say, for new vehicles), loans with longer initial maturities, and for loans where a remaining balance from an earlier loan is carried over into the new transaction. Likewise, depreciation will be greater if the intensity of use (mileage) is higher.

Concerning risk aversion, risk aversion itself can be measured through direct questioning. But risk aversion also can be associated with demographics such as income and presence of family, and with liquidity constraints and credit scores. These factors influence individuals' ability to withstand adversity. Attitude toward the product and information about the sales experience can also be the subject of questions.

Expanding the basic model above to include such elements provides an extended demand model of the following form:

$$D_{GAP} = \text{f(Initial loan size, Loan maturity, New/used vehicle,}$$
$$\text{Previous balance included, Mileage, Product recommendation,}$$
$$\text{Availability of savings, Ability to borrow, Job security,}$$
$$\text{Basic risk aversion, Demographic variables)}$$

Table 1 provides some statistics on those who purchased (one or more) vehicles during this period and financed the purchase. The survey found that 63.2 percent of households (including single-person households) had purchased a car or truck in the prior four years and 60.0 percent of them financed the purchase. The sample consists of 1,206 individuals.[5]

[5] All survey statistics are subject to a small sampling range that exists because it is never possible to interview everyone. At a ninety-five percent confidence, all the statistics reported here are within a few, but varying,

Notably, among those who purchased a vehicle and financed it, 38.7 percent also purchased GAP. Whether this is a large or small proportion of households who purchased a vehicle and financed it probably depends upon the expectation of the individuals noting it, but it does seem large enough for further investigation to be interesting. How this proportion compares with past years or the trend over the past few years or decades likely will remain unknown, but what appears to be a fairly high proportion of GAP buyers among recent purchasers who financed vehicles may reflect in some way aspects of the high nominal cost of cars and trucks in recent years, especially new ones.

Table 2 provides comparisons on various dimensions of GAP purchasers and their loans compared to non-purchasers based upon the extended model above. Each comparison in the table is along only one characteristic dimension at a time, but together the comparisons reveal clear differences between GAP buyers and non-buyers in the circumstances of their loan arrangements. The table is divided into groupings based upon the GAP purchase model introduced above: Loan circumstances, risk aversion, vulnerability to adverse events, personal circumstances, and attitudes and purchase experience. GAP purchasers and non-purchasers differ notably in all of these areas.

Specifically, those borrowing larger amounts, for longer periods of time, or who rolled in a remaining balance upon trade-in of a previous vehicle all exhibit more frequent purchase of GAP products (the first column, lines 1-3 of the table). These results are hardly surprising. Larger loans for longer time periods, especially with roll-in of a previous balance, are precisely the circumstances when a "gap" between the value of a vehicle and the remaining loan amount might arise and persist.

Some other features and expectations associated with the loan also showed association with greater prevalence of GAP purchase, although to a somewhat lesser degree: expected mileage (intensity of use) of the vehicle, financing through a dealer rather than directly from a financial institution (indirect versus direct credit), and purchase of a used vehicle compared to new one (the first column, lines 4-6 of the table). None of these findings is especially surprising either, and they likely are sometimes associated in various ways with the specific personal circumstances of the purchasers. For instance, those using the vehicle more intensively likely realize that value depreciation could take place more rapidly than otherwise. Likewise, some of those arranging financing through the dealer might exhibit more fragile creditworthiness characteristics suggesting the usefulness of the dealer's participation in arranging for credit. If so, they might be more concerned about risks in the

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percentage points of the population value, depending on the individual measure in question.

For most questions, very few individuals answered "do not know" or refused to respond. In the statistical information and tables that follow, these cases are mostly excluded unless "do not know" is a meaningful response. Essentially, this exclusion is equivalent to the statistical assumption that the individuals answering "do not know" or refusing would have been distributed the same way as those who did respond. If the excluded cases were numerous, this would not be a good assumption. Such cases were rare, however, unless noted, and for this reason even if there were some sort of bias among them, statistical results would not have differed more than slightly where they are excluded and would be less than the sampling-error range that exists in all surveys.

transaction and be interested in various sorts of protection, including GAP. Further, used-vehicle purchasers also often differ from new-vehicle buyers in ways that are associated with transaction risks. The survey does show differences in various measures of personal circumstances that differ between GAP purchasers and non-purchasers. The second part of the table shows that GAP purchase was more frequent among those with lower income, with children at home, with more concern over credit history, and with more likely difficulty managing a financial emergency (first column, lines 7-10 of Table 2). Such individuals may feel they are not well suited to take on financial risks and, consequently, may become likely candidates for this sort of financial protection.

Responses to questions about attitudes and experience with the transaction and a further question about buyers' circumstances show that GAP purchase also was higher among those to whom the vehicle dealer recommended the product. Specifically, among those to whom the dealer recommended GAP coverage, more than 71 percent purchased it (first column, line 11 of Table 2). Among those surveyed who said the dealer "offered" it but who did not perceive a recommendation to buy it, only 45.3 percent purchased. Dealer salesmanship may certainly be involved in this finding, but it also seems possible that dealers would more likely recommend GAP to those with loan or personal characteristics that might make it more easily saleable (larger loans, longer maturities, previous balances rolled in, more concern over credit history, etc.). Dealers apparently never mentioned GAP to many customers, and, again hardly surprisingly, few of these individuals purchased GAP. Some did, however, in part because the customer brought up the purchase of the product.

The table shows that GAP purchasers are generally much more favorably inclined to the product than non-purchasers, again hardly surprisingly (the first column, line 12 of Table 3). More than 93 percent of purchasers reported that the GAP purchase was a good idea, compared to only about 43 percent of non-purchasers, still a considerable proportion considering that they had not purchased the protection. While it is hardly surprising that those favorable to a product are more likely to purchase it, the high percentage of favorable feeling among buyers suggests that apparently at most only a few had downgraded their view after the purchase took place. The 4.2 percent of purchasers who indicated the view that purchase was a bad idea, may include some cases of buyers' remorse for an expenditure that, after the fact, could have been avoided since the protected loss had not occurred. Also, purchasers who experienced losses because GAP coverage did not provide the expected amount of relief might express dissatisfaction with the product. Of course, no one has that sort of foresight at the moment of initiating a transaction with risks.

To learn more about reasons for favorable or unfavorable attitudes toward GAP, both groups of respondents (favorable and unfavorable) were asked the open-ended question, "Why do you say that." Coding the responses suggests that both buyers and non-buyers understood the GAP product.

For instance, as indicated, among buyers by far the most frequent answer was that purchase is a good idea. The follow-up question found a variety of reasons for this response, with by far the most frequent that GAP protects against losses (Table 3). Given that these individuals more often than non-purchasers include those with lower incomes, smaller reserves for emergencies, and longer and larger loans (that could indicate smaller down payments and higher loan-to-value ratios, although the survey could not measure this), this result is certainly not surprising either. Such conditions entail higher risks for the individuals involved.

Some of the few among buyers who indicated that GAP purchase was not a good idea mentioned that only some people needed it, that the risk was not very great, or that the coverage is expensive relative to the perceived risk. Responses of this sort might well be expected of those with better personal circumstances who, while recognizing the risk, believe they are able to self-insure. Verbatim responses to the follow-up question about reasons for purchase or not illustrate the sorts of views that GAP purchasers and non-purchasers expressed. These statements suggest that most respondents appeared to be aware of the features of the product (e.g., see some sample statements near the bottom of the table). By comparison, the second column of the top line of Table 3 shows (as did the second column, line 12 of Table 2) that a sizeable percentage of those not purchasing GAP still thought that GAP was a good idea. Again, the availability of risk prevention was the chief among reasons given by non-purchasers. Table 3 shows that many of them simply perceived that the risks to them were not worth the costs of the protection. Ultimately, this is the way that markets work. Some people do not think that protecting against the potential risk was worth the cost and they do not buy protection.

Finally, the survey also asked some further questions of buyers concerning product satisfaction. Specifically, the survey asked whether they would buy this protection again, whether they would recommend GAP to family or a friend, and, overall, how satisfied they were with the purchase. Responses were very similar and very one sided (Table 4).

About ninety percent of purchasers said they would purchase the product again and would recommend it to family and friends. In each case, a few were unsure. Only a bit over one percent of respondents indicated they were dissatisfied or very dissatisfied with the protection on the loan (third panel of the table). A follow up to the recommendation question asking, “Why do you say that?” produced answers largely similar to the question on whether GAP was a good idea or not (results not in table).

Immediately before asking the series of questions about measures of satisfaction with the GAP product among purchasers, the survey asked all respondents who had purchased a vehicle and financed it some questions about the GAP sales experience. Immediately after describing the GAP product and asking whether they had purchased it, respondents were asked about dealer/lender recommendation and explanation.

The first of this group of questions involved whether the dealer or lender (the latter in

the case of direct credit) recommended GAP protection. A preliminary look at this question in the discussion of line 11 of Table 2 described above suggested that recommendation and purchase were strongly correlated, with 71.7 percent of those receiving a recommendation also purchasing. The discussion above also briefly suggested the possibility that sellers can sometimes ascertain situations when GAP usefulness enters the picture and then recommend it. Dealers and lenders obtain substantial information about credit applicants that would enable them to identify applicants who would have large or long periods of negative equity and potentially face difficulty in repaying the remaining debt if an adverse event occurs. Such applicants might be receptive to a product that reduces the risk. Dealers and lenders could be expected to recommend GAP protection and focus their sales efforts on these applicants, The survey results show that when they merely offer it, as opposed to recommending it, sales are lower, and if they do not mention it at all, sales are lower still. This, of course, does not demonstrate that it is the sales recommendation that itself produces the purchase outcome. It appears from responses to the full sequence of questioning, and especially from responses to the open-end question about why GAP purchase is a good idea or not, that customers on balance seem to understand the product and respond accordingly. Nonetheless, there were some additional questions about the sales experience.

Notably, respondents indicating that GAP was recommended or offered as an option then were asked whether they thought it was required. About 20 percent of those who purchased GAP thought it was required and 80 percent did not (Table 5). It is worth noting that requiring GAP is not illegal, if the representations and paperwork are managed and prepared properly, which cannot be determined in a consumer survey. In some cases, dealers are required to offer GAP, for instance, in Louisiana. In addition, GAP is typically included as mandatory protection in leasing transactions which may account for a portion of those purchasing GAP who thought it was required, since it was not one of the purchase decisions they had to consider. Nonetheless, the large majority believed it was voluntary. A large majority also believed, even among non-purchasers, that the dealer or lender had explained the terms of the product (second panel of Table 5). For some non-purchasers, particularly if they announced early in the discussion that they were not going to purchase GAP, further review of costs and terms could well be perfunctory or even non-existent.

Finally, a hypothetical question about what they might do in a GAP situation was asked of those respondents who did not purchase GAP. Hypothetical questions of this kind do not necessarily indicate what actions would really be taken in actual situations. The motivation behind this question was more the exploration of knowledge of GAP situations than it was to determine likely actions. In this context, the hypothetical question did not elicit many vague or “do not know” responses (third panel of Table 5). Other possible answers such as taking money from savings, rolling the amount into a new loan or lease, or simply continuing to pay, were all reported frequently.

In sum, it appears that, based upon univariate responses to questions about GAP,

purchasers of vehicles who financed them and who, therefore, might be interested in the product not only purchase GAP with some frequency but also seem informed about the product and their choices. Also, a very high percentage of them would recommend the product to others. With all this as background, we now turn to a multivariate examination of GAP-purchase conditions.

4. A Multivariate Model of GAP Purchase

As indicated, exploration of potential demand for GAP protection purchase has proceeded so far only on a univariate basis, one variable at a time. So far, all the measurements of variables associated with the proposed demand model have been consistent with expectations. It is also worthwhile, however, to explore the joint impact in a multivariate equation and to discuss which model elements might be most important holding others constant.

In the multivariate analysis that follows, the dependent variable DGAP equals one if the respondent obtained GAP protection and zero otherwise. Independent variables used in the multivariate equation reflect the model of the decision also outlined above:

D_{GAP} = f[1. Transaction characteristics; 2. Vulnerability to adverse events; 3. Risk aversion and demographics (including income, family, liquidity, credit score); and 4. Personal characteristics.]

The estimated logistic regression model is statistically significant.[6] Statistically significant explanatory variables and their signs include the following, summarized in the table below, which is analogous to Table 6 that reflects the detailed results.

Previous balance included	Positive
Amount of credit ≤ $10,000	Negative
Amount of credit ≥ $40,000	Positive
Recommended	Positive
Loan term ≥ 6 years	Positive
First and second lowest income quartiles	Positive
Age less than 35	Positive
Education: High school diploma	Positive
Has children at home	Positive

[6] The model likelihood ratio test statistic is 145.51. It has a chi-square distribution with 31 degrees of freedom and is significant at <0.0001. For discussion of logistic regression, see Peng, Chao-Ying Joanne, Kuk Lida Lee, and Gary M. Ingersoll, "An Introduction to Logistic Regression Analysis and Reporting," Journal of Educational Research, 96 (September/October 2002): 3-14.

A positive sign indicates that, holding other factors constant, the variable is positively associated with the likelihood of GAP purchase, and a negative sign means a negative association. Positive signs for large loans, longer term to maturity, and the need to include previous balances are suggestive that GAP purchases are associated with greater debt and higher loan-to-value ratio. Dealer or lender recommendations appear to play an important role in GAP purchase decisions as discussed earlier. Dealers likely visualize the situations where GAP purchase may be useful. Relatively low incomes, being young, and having children in the family suggest that early life-cycle stage and liquidity constraints might also influence GAP purchases.

In a logistic regression, the estimated coefficient for an explanatory variable indicates the rate of change in the log odds as the explanatory variable changes, which is not very intuitive. Consequently, the size of an effect is commonly evaluated by its odds ratio. The odds ratio for an indicator variable X is the probability that the dependent variable D_{GAP} = 1 within that category of X, relative to the probability that D_{GAP} = 1 within the reference category. An odds ratio greater than one indicates a positive effect, and less than one indicates a negative effect. For instance, in Table 7 the 2.204 odds ratio for credit amounts greater than $40,000 indicates that individuals were 2.204 times more likely to purchase GAP protection than individuals borrowing between $20,001 and $30,000 (the reference group). The 0.187 odds ratio for individuals borrowing less than $10,001 indicates that these individuals were much less likely to purchase GAP protection than individuals in the reference group. Odds ratios for the statistically significant coefficients from Table 6 point to the importance of large credit amounts, previous balances rolled in, dealer or lender recommendations, and income and life-cycle considerations.[7]

These findings appear usefully indicative of buyers' reasoning concerning their GAP purchases. Financial situation and terms of the transaction are more important than risk aversion by itself, although future research in this area should explore this contention further. Since many vehicle transactions today exhibit the characteristics where GAP purchase might be expected (Table 1), it is not surprising to find that GAP purchase also is fairly common, even if not much about its prevalence in vehicle lending has heretofore been known.

5. Conclusions

[7] The logistic regression results do not mean that the vulnerability to adverse events or risk aversion considerations are not present. Individuals in early life-cycle stages may have limited savings and therefore less than $400 of reserve funds or be unable to cover 3 months' expenses, for example. Such considerations are simply weaker than those indicated by the statistically significant variables. Separate logistic regression models estimated using only variables in each of the four explanatory variables categories were all statistically significant.

GAP protection relieves a consumer's responsibility for any remaining loan balance above the collateral value of the vehicle (negative equity) in the case of a total loss due to accident, theft, or natural disaster. Specifics of past trends in GAP purchase are unknown, but a recent nationwide consumer survey has shown that purchase of GAP on auto loans has become fairly common since its introduction about three decades or so ago. In 2020, GAP purchase reached almost 39 percent of recent financed vehicle transactions. As term to maturity has lengthened over this period, the incidence of large or extended periods of negative equity in financed auto transactions, and with it demand for GAP protection, likely has grown.

This paper examines the economic considerations the influence the purchase of GAP protection and elements of consumers' decision process. Analysis of survey responses shows that GAP purchase is related to these transactions in expected ways: GAP purchase is more likely when credit amounts are greater, term to maturity is longer, and previously existing loan balances are rolled into the new loan balance. These transaction characteristics are associated with greater likelihood of negative equity. GAP purchase is also more likely among consumers being in early household life-cycle stages and having lower incomes, factors that are associated with relatively high levels of debt and more limited resources to pay. All these factors are associated with heightened risk among consumers entering such transactions of financial difficulty of covering a shortfall in the insured collateral value if certain adverse events occur. Dealers appear to be aware of such situations and recommend GAP them. Analysis of a nationwide survey in 2020 shows the importance of these factors in both univariate and multivariate contexts.

The survey also shows that auto buyers largely were aware of the terms and cost of GAP protection and that consumers who obtained GAP protection evaluated their purchase decisions positively. By far most consumers, whether they purchased GAP protection or not, said that the dealer or lender explained the product. When asked why GAP protection was a good or bad product, most GAP purchasers mentioned protection from losses or the risk of owning an expensive auto. Many non-purchasers also gave these reasons. Non-purchasers frequently mentioned that price of GAP protection was high relative to the benefit or that their risk was low. Non-purchasers generally also appeared to understand the consequences of being in a GAP situation. On balance, it seems that auto buyers understood the GAP protection product and that the circumstances of the transaction and their own financial situation influenced decisions.

As the economy has expanded, consumer demand for vehicles and vehicle credit is both a cause and result. As credit inclusion has expanded along with the economy, apparently GAP has become a significant component and survey evidence clearly indicates its importance to many purchasers. Although there always will be risk associated with any credit transactions, it appears that many potential vehicle purchasers have chosen to purchase GAP as a means of managing some of this risk, and purchasers report their satisfaction with the product. All this now seems well established and seems unlikely to

change in the environment of increasing vehicle prices.

References

Board of Governors of the Federal Reserve System. "Keys to Vehicle Leasing: Comprehensive Consumer Guide", https://www.federalreserve.gov/pubs/leasing/resource/different/gap.htm (accessed July 14, 2022).

Bowron, A. Lee and John Kerper. "GAP Insurance—Techniques and Challenges" Casualty Actuarial Society E Forum (Winter 2011), https://www.casact.org/sites/default/files/database/forum_11wforumpt2_bowron_kerper.pdf (accessed July 14, 2022).

Consumer Credit Industry Association. *Fact Book of Credit-Related Insurance*. Atlanta: Consumer Credit Industry Association, 2020.

Peng, Chao-Ying Joanne, Kuk Lida Lee, and Gary M. Ingersoll, "An Introduction to Logistic Regression Analysis and Reporting," *Journal of Educational Research*, 96 (September/October 2002): 3-14.

Table 1: **Some Information on Households who Purchased a Vehicle and Financed It in the Previous Four Years, in Percent**

Sample size: 1,206.	
1. Loan amount	
$5000 or less	4.0
$5001 to $10,000	11.1
$10,001 to $20,000	31.6
$20,001 to $30,000	27.1
$30,001 to $40,000	14.6
Greater than $40,000	11.5
2. Loan maturity	
Less than 3.5 year (i.e., 3 years)	17.1
3.5 years and less than 4.5 (4 years)	15.5
4.5 years and less than 5.5 (5 years)	52.7
5.5 years and less than 6.5 (6 years)	12.1
Greater than 6.5 years	2.6
Home equity loan	0.1
3. Dealer financed (indirect credit)	65.6
4. Expected annual mileage	
Less than 12,000	44.7
12,000 and less than 20,000	42.7
20,000 or more	12.5
5. Dealer recommended or offered GAP	
Recommended	20.9
Offered	38.6
Never mentioned	37.5
Respondent initiated	2.9
6. Purchased GAP	38.7
7. GAP purchase a good idea or bad idea	
Good	61.6
Good with Qualifications	0.7
Pro/Con (Depends)	2.1
Bad with Qualifications	0.9
Bad	31.5
Do not know/Not ascertained	3.1
8. Perceived credit history	
Excellent	48.7
Good	25.2
Average	15.1
Bad	3.6
Very bad	1.5
No credit history (if volunteered)	0.6
Do not know/Not ascertained	5.4

Table 2: **Some Comparisons of GAP Purchasers Versus Those Not Purchasing GAP**

(Percentages of those with various transaction characteristics)

	Purchased GAP Protection	Did not Purchase GAP Protection
Loan Circumstances		
1. Loan amount		
$10,000 or less	20	80
Greater than $10,000	42.1	57.9
2. Loan maturity		
Five years or less	36.6	63.4
Greater than five years	52.1	47.9
3. Rolled in a balance from a previous loan upon trade in		
No	32.8	67.2
Yes	81	19
4. Expected mileage		
Fewer than 12,000/year	37.6	62.4
12,000 to 20,000/year	39.2	60.8
More than 20,000/year	41.3	58.7
5. Indirect or direct loan		
Direct	36.1	63.1
Indirect	40	60
6. New car or used		
New	36.2	63.8
Used	41.2	58.8
Risk Aversion and Personal Circumstances		
7. Income		
Highest one third	29.3	70.7
Middle one third	40.4	59.6
Lowest one third	54.6	45.4
8. Has children at home under age 18		
No	35.3	64.7
Yes	44.3	55.7
9. Perceived credit history		
Excellent	25.3	74.7
Else (i.e. Good, Average, Bad, Very Bad)	52.5	47.5
10. Could cover expenses for three months if lost income		
Yes	35.9	64.1
No	55.7	44.3
Attitudes and Purchase Experience		
11. Dealer/Lender recommended or not		
Recommended	71.7	28.3
Offered	43.5	56.5
Never mentioned	14.3	85.7
Do not know/Not ascertained	24.2	75.8
12. GAP Purchase a good idea or bad idea[a]		
Good	93.2	42.9
Good with Qualifications	0.3	1
Pro/Con (Depends)	1	2.3
Bad with Qualifications	0	1.5
Bad	4.2	49.1
Do not know/Not ascertained	1.3	3.1
Total	**100**	**100**

[a]Note: Data presentation for this line does not sum across for purchasers and non-purchasers of GAP protection, but rather explores attitudes among GAP protection purchasers and non-purchasers, respectively (sums vertically).

Table 3: **Reasons Why GAP Purchase is a Good Idea or a Bad Idea**
(Percentages of those purchasing GAP or not)

	Purchased GAP Protection	Did not Purchase GAP Protection
Reasons why purchase was a good idea or a bad idea:		
Protects from losses/from risks of losses/from risks of expensive cars	80.9	38.4
Protects in some situations	1.5	4
Gives sense of security/peace of mind	5.8	0.9
Inexpensive	0.9	
Protects borrower's credit rating	0.3	
Convenient to have full coverage	0.6	
Insurance is good/always good	1.9	0.5
Some people need it		0.4
Depends on whether you have money	1.6	2.1
Not needed		0.2
Expensive/expensive for risk/waste of money	2.2	14.4
Time of usefulness is limited		0.2
Protects company, not borrower		0.5
Redundant with other coverage	0.3	5
Just a profit item for company/dealer	0.4	2.7
Using debt/too much debt is the real problem		5.1
Risk is low/not needed in many or most cases	0.7	11.2
I don't buy extra coverages (not ascertained why)		1.3
Specific reasons given		8.5
(E.g., I am a good driver/my mileage is low/GAP is not big/only needed if not upside down/not needed if down payment is high/not needed on used cars/ not needed in rural areas/not needed because I can pay off loan)		
Do not know/Not ascertained	2.8	4.7
Total	**100**	**100**

Table 4: **Some Experiences and Attitudes of Purchasers**

(Percent of GAP purchasers)

Purchase this protection again	
Yes	88.4
No	7.7
Do not know/Not ascertained	3.9
Total	**100**
Recommend this protection to friend or family	
Yes	90.2
No	6.8
Do not know/Not ascertained	3
Total	**100**
Overall, how satisfied	
Very satisfied/Somewhat satisfied	88.2
Not particularly satisfied or dissatisfied	10.4
Somewhat dissatisfied/Very dissatisfied	1.4
Total	**100**

Table 5: **Some Aspects of the GAP Sales Experience**

(Percent of those purchasing GAP and not purchasing)

	Purchased GAP Protection	Did Not Purchase GAP Protection
GAP was required or voluntary		
Required	19.8	1.4
Voluntary	79	97.7
Do not know/Not ascertained	1.2	0
Total	**100**	**100**
Dealer explained costs and terms		
Yes	94.8	86.6
No	4	10.4
Do not know/Not ascertained	1.2	3
Total	**100**	**100**
Responses to a hypothetical question about what non-purchasers might do in a GAP situation:		
Take money from savings		37.8
Roll into new lease/loan		28.9
Continue to pay		27.1
Insurance/comprehensive insurance will cover		4
Do not know/Not ascertained		2.2
Total		**100**

Table 6: **Logistic Regression of Factors Associated with Purchase of GAP Protection on Vehicle Financing**

(Statistically Significant Variables)

Variable	Coefficient estimate	Standard error	Probability > Chi Sq.
Previous balance included	2.04	0.68	0.0027
Amount of credit ≤ $10,000	-1.68	0.51	0.0011
Amount of credit ≥ $40,000	0.79	0.45	0.0763
Recommended	1.64	0.33	0
Loan term ≥ 6 years	0.6	0.36	0.0989
Lowest income quartile	1.28	0.51	0.0119
Second lowest income quartile	1	0.4	0.0128
Age less than 35	0.64	0.36	0.0804
Education: High school diploma	0.6	0.35	0.0882

Table 7: **Odds Ratios for Factors Associated with Purchase of GAP Protection on Vehicle Financing**

Effect	Point Estimate	95% Wald Confidence Limits	
Transaction characteristics			
Bought new vehicle	0.651	0.355	1.196
Had trade in	1.001	0.568	1.762
Previous balance included	7.718	2.028	29.378
Indirect credit	1.299	0.727	2.32
Credit ≤ $10,000	0.187	0.069	0.51
Credit $10,001-20,000	0.762	0.387	1.5
Credit $30,001-40,000	0.86	0.38	1.946
Credit ≥ $40,001	2.204	0.92	5.283
Loan term ≤ 2 years	1.313	0.73	2.362
Loan term ≥ 6 year	1.819	0.894	3.7
Miles 20,000-29,999	1.001	0.583	1.72
Miles ≥ 30,000	0.53	0.23	1.221
Recommended	5.161	2.703	9.853
Vulnerability of adverse effects			
Credit history good	0.624	0.288	1.351
Credit history bad	1.253	0.318	4.934
Do not know whether credit history is good or bad	0.338	0.04	2.849
Has reserve funds ≥4,000	0.9	0.34	2.382
Able to cover 3 months' expenses	0.854	0.342	2.131
Worried about job loss	1.16	0.606	2.221
Risk aversion			
Unwilling to take financial risk	0.772	0.395	1.507
Personal characteristics			
Lowest income quartile	3.604	1.327	9.787
Second income quartile	2.721	1.237	5.986
Third income quartile	1.374	0.698	2.704
Age less than 35	1.891	0.926	3.863
Age 55 or older	1.355	0.69	2.66
Ed: Less than high school diploma	1.304	0.236	7.214
Ed: High school diploma	3.498	0.547	22.374
Ed: Some college	1.824	0.914	3.641
Homeowner	0.696	0.362	1.339
Married	0.753	0.416	1.36
Has children at home	2.164	1.189	3.94