INSURANCE COUNCIL OF TEXAS

service, information, and representation for the property and casualty insurance industry

March 7, 2003

The much anticipated University of Texas study on the relationship of credit history and insurance losses has just been released.

As expected, the study analyzed a large random sample of automobile insurance policies (175,647) and concluded that "...The lower a named insured's credit score, the higher the probability that the insured will incur losses on an automobile insurance policy, and the higher the expected loss on the policy."

The study was conducted by the Bureau of Business Research, McCombs School of Business, The University of Texas at Austin.

Rick Gentry
Executive Director
Insurance Council of Texas

A Statistical Analysis of the Relationship Between Credit History and Insurance Losses

Prepared by: Bureau of Business Research
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About the Bureau of Business Research

Research and services at the Bureau of Business Research (BBR) focus on the competitiveness of Texas industries. By providing essential research and information about Texas industries, the BBR has linked the academic community and the public since 1927. Located within the McCombs School of Business at The University of Texas at Austin, the BBR conducts applied economic research on the organizational and resource strategies of Texas industries, with an emphasis on the high-technology sector. The BBR also houses significant information resources through its affiliation with the State Data Center Program and the U.S. Bureau of the Census. For more information, please visit the BBR website at www.utexas.edu/depts/bbr/.

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A Statistical Analysis of the Relationship Between Credit History and Insurance Losses

Executive Summary

At the request of Lt. Governor Bill Ratliff in 2002, the Bureau of Business Research (BBR) examined the relationship between credit history and insurance losses in automobile insurance. With the assistance of the leading automobile insurers in Texas, the BBR research team constructed a database of automobile insurance policies from the first quarter of 1998 that included the following 12 months' premium and loss history. Choicepoint, a commercial firm that provides underwriting information products for the U. S. property and casualty personal lines insurance market, then matched the named insured on the policy with his or her credit history and supplied a "credit score" using an insurance credit scoring methodology it markets to automobile insurers. This credit score and its relationship with prospective losses for the policy were then examined.

Using logistic and multiple regression analyses, the research team tested whether the credit score for the named insured on a policy was significantly related to incurred losses for that policy. It was determined that there was a significant relationship. In general, lower credit scores were associated with larger incurred losses. Next, logistic and multiple regression analyses examined whether the revealed relationship between credit score and incurred losses was explainable by existing underwriting variables, or whether the credit score added new information about losses not contained in the existing underwriting variables. It was determined that credit score did yield new information not contained in the existing underwriting variables.

What the study does not attempt to explain is <u>why</u> credit scoring adds significantly to the insurer's ability to predict insurance losses. In other words, causality was not investigated. In addition, the research team did not examine such variables such as race, ethnicity, and income in the study, and therefore this report does not speculate about the possible effects that credit scoring may have in raising or lowering premiums for specific groups of people. Such an assessment would require a different study and different data.

A Statistical Analysis of the Relationship Between Credit History and Insurance Losses

Introduction

Over the past decade, the insurance industry has begun using credit histories to create "credit scores" for individuals who apply for, or renew, automobile insurance policies. These scores ("high" if a person's credit history is good, "low" if it is not good) are then used in rate-making decisions, presumably raising premiums for individuals with poor credit history and lowering premiums for those with good credit history. Additionally, such scores may be used by some insurers in underwriting procedures, including placement of policyholders within insurance company groups, or even in denying or canceling insurance.[1]

There is a public policy debate over whether a statistically significant relationship exists between credit history and insurance loss, and the debate concerns not only the existence of such a relationship, but also the effect that the use of credit scoring might have on various subgroups of the population. The insurance industry has conducted or sponsored a number of studies that claim to demonstrate that, statistically, the poorer an individual's credit history, the higher the expected losses that the individual will generate for the insurance company, thereby justifying a higher premium for people with poorer credit histories and a lower premium for people with better credit histories. Consumer groups have questioned the basis of this alleged relationship and assert that there is no relationship between an individual's credit history and the propensity to file insurance claims. Additionally, others maintain that if there is a relationship, it is due to other variables and that no underlying causal or direct link exists.

In the summer of 2002, then-Lt. Governor Ratliff asked the Bureau of Business Research (BBR), as a nonpartisan and independent research unit, to investigate whether a statistically significant relationship exists between credit score and insurance loss and to report the result of the investigation to the Legislature. To effect this assessment, a random sample of automobile insurance policies, including loss histories, premiums, and other variables, were obtained from several of the largest companies writing automobile insurance coverage in Texas. These policies were then matched with the credit history of the named insured on the policy to create a database including both policy information and credit information (including a summary "credit score"). Information about race, ethnicity, or income was not included in the data collected by the BBR for the study, and consequently no conclusions will be drawn about the effect of credit scoring on various racial, ethnic, or income sub-groups in the population.

Methodology

In order to establish whether a statistically significant relationship exists between a person's credit history and his or her potential to produce insurance losses, it was necessary to match a large database of insurance policies with the corresponding credit histories of the named insured

[1] A company group is a collection of insurance companies sharing the same managerial control. For example, some company groups have both a standard market subsidiary company and a county mutual (non-standard market) subsidiary company. These two companies would be considered part of the same company group.

in each policy. Then, controlling for other underwriting characteristics such as age, gender, prior driving record, and vehicle type, multivariate regression analyses were used to test whether adding credit information to a variety of other underwriting characteristics improved the accuracy of loss prediction.

In this study, insurance companies selling in the Texas automobile market were ranked according to the amount of their premiums written in the state. The insurers comprising the top 70 percent of the market (in descending order, starting with the largest companies) were then asked to provide a random sample of new or renewing automobile policies from the first quarter of 1998 (January 1, 1998 through March 31, 1998). This examination period was chosen chiefly for two reasons. First, most of the insurers from whom data were requested were not using credit scoring at that time in rate-making or underwriting decisions, which meant that premium data collected were not affected by credit history. Second, loss information, including paid losses and reserves for losses, could be obtained for a one-year period with ease. Even slow-paying claims would then have some chance of being recorded in the database. Five insurers, including those with both standard and non-standard subsidiaries (county mutuals), supplied data for the study, with the number of policies produced by each insurer corresponding to its market share. (For example, if Insurer A had a 10 percent market share of the dollar value of premiums written in Texas, it was asked for a number of policies that would total 10 percent of the resulting sample.) Data on the following variables were requested from the insurers:[2]

- Age of insured
- Gender of insured
- Marital status of insured
- Location where automobile(s) driven
- Use of automobile(s) (i.e., business use, pleasure, to and from work)
- Prior driving record of insured drivers
- Annual mileage driven
- Make and model of automobile(s) covered
- Age of automobile(s)
- Premium[3]
- Incurred losses[4]

A total of 175,647 separate policies were submitted by the participating insurance companies and transferred to a commercial firm (Choicepoint) that provides underwriting information products for the U. S. property and casualty personal lines insurance market. Choicepoint obtained the credit history for the policies' named insured by matching on name, address, or Social Security number. (Such individual identifying characteristics were removed from the data by Choicepoint prior to transmittal to the BBR.) Of the policies transferred to Choicepoint, 22,321 (12.7 percent) did not have sufficient or matchable information or credit history to create a credit score.[5] Thus, the final database contained 153,326 policies with credit scores matched and 22,321 without credit scores. For non-standard market insurance company (county mutual) data, the "no-hit" rate was slightly higher (at 14.4 percent) than for standard insurance market company data (12.3

[2] Not all companies provided all requested information.
[3] Premium data were for exactly one year of coverage from policy inception or renewal date.
[4] Incurred losses included actual losses and reserves for losses for a 12-month period after the inception or renewal date in the first quarter of 1998.
[5] Choicepoint did not go to secondary or tertiary credit vendors to try to increase the "hit" rate. This was partially due to time and financial constraints, but also because a consistent data record for each named insured was needed to perform tests on the data.

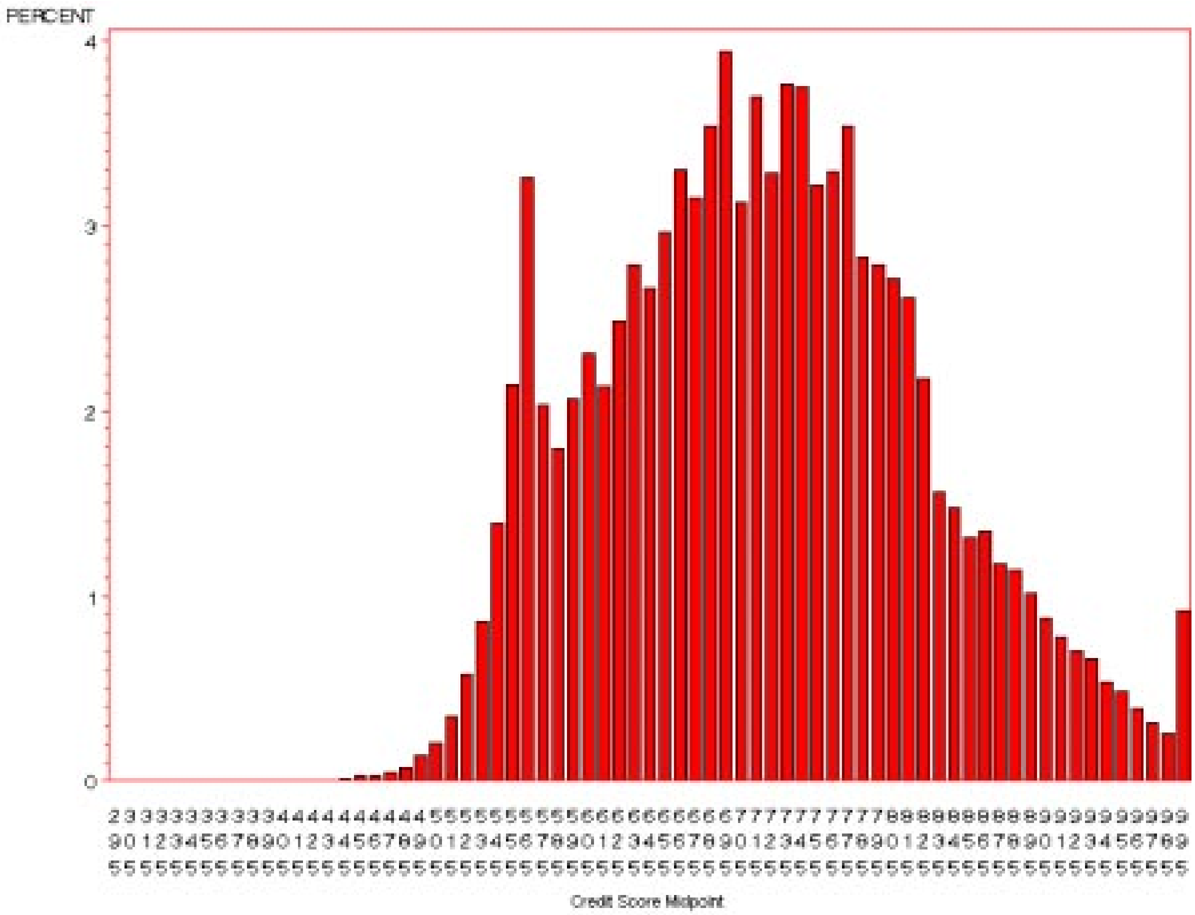
percent), which may be because of the “safety valve role” that the non-standard market insurers play in the proper functioning of the automobile insurance market in Texas.[6]

Choicepoint’s credit data on each named insured included a total of 445 credit variables along with a summary “credit score” created by Choicepoint.[7] Charts 1, 2, and 3 contain distributions of credit scores in the database. The distribution of credit scores within an insurer’s clientele (also known as an insurer’s “book of business”) will vary according to the strategic plan of the insurer. Chart 1 shows the distribution of scores for the entire sample of policies from both standard and non-standard insurers. Chart 2 shows the distribution of scores for policies from the non-standard insurers participating in the study. Chart 3 shows the distribution of scores for policies from the standard market insurers participating in the study. Credit scores for the standard market (mean=733.0) are significantly higher than the credit scores for the non-standard market (mean=657.7). This most likely represents the safety valve role that the non-standard market insurers play in Texas, providing insurance for those unable to obtain insurance in the standard market.

[6]For more information on the role played by non-standard market companies in Texas, see “An Economic Overview of the County Mutual Insurance Market in Texas,” Patrick L. Brockett and Chris Sapstead, Working Paper, Center for Risk Management and Insurance, University of Texas at Austin, 1999.

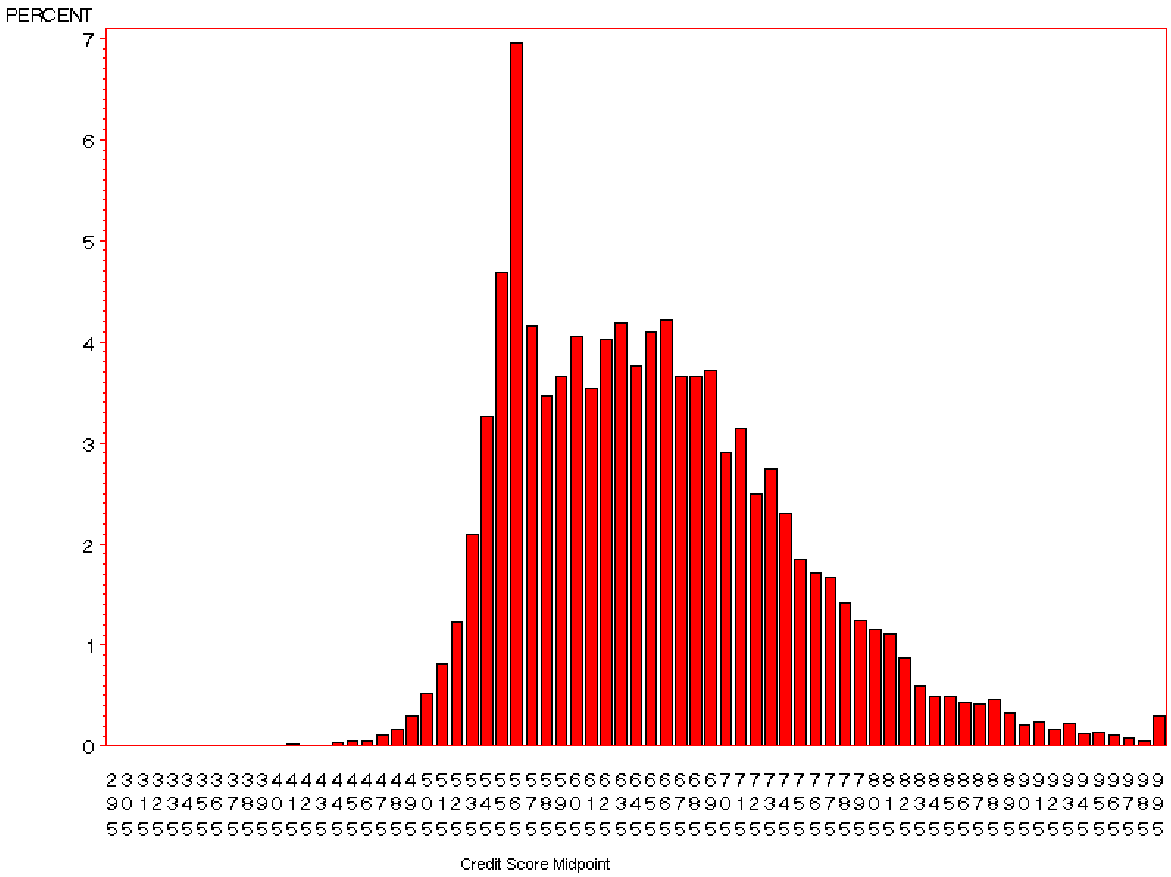
[7]A credit score typically is a number between 200 and 1000 that reflects the strength of a person’s credit history. It is created either by the credit vendor or the insurance company. Many insurance companies use their own algorithms to customize credit scores based on their particular market segments. The score used in this study should not be considered definitive, only representative of scores created by a major vendor in the market.

Chart 1
Credit Score Distribution for the Total Market Data Set



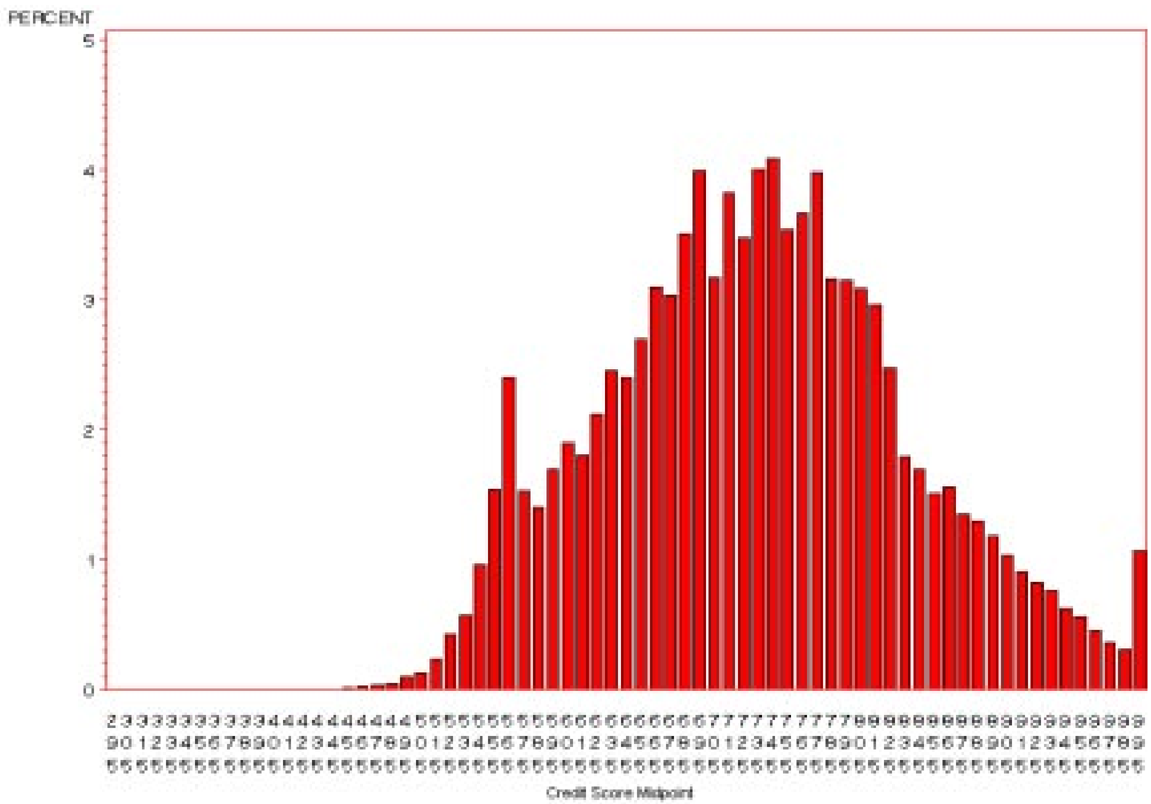
Mean: 719.5
Standard Deviation: 106.9
Range: 295-997
Sample size: 153,326

Chart 2
Credit Score Distribution for the Non-Standard Market Data Set



Mean: 657.7
Standard Deviation: 93.5
Range: 383-997
Sample Size: 29,086

Chart 3
Credit Score Distribution for the Standard Market Data Set



Mean: 733.0
Standard Deviation: 104.6
Range: 295-997
Sample Size: 124,240

Loss Ratio

For every dollar in premiums that automobile insurance companies receive, they plan on spending a certain amount of money to pay claims and loss adjustment expenses. The remaining amount is available for administration costs, taxes, profit, and commissions. The ratio of incurred losses plus loss adjustment expenses to earned premiums is called the **loss ratio** and is a frequently used measure of performance for a group of automobile insurance policies.[8] For the companies writing policies in Texas that were examined in this study, the average individual insurance company loss ratio varied from 58 percent to 74 percent, with an average of 61 percent across all companies in the database. Because different insurers have different underwriting guidelines and different risk profiles for their businesses, the "target" loss ratio will differ from insurer to insurer depending on the strategic positioning and the returns needed to accomplish strategic objectives (i.e., insurers writing higher risk business may strategically require higher rates of return or profit,

[8]Formally, the loss ratio for a policy is defined as the sum of actual paid losses, loss expenses, and loss reserves divided by the earned premium. This ratio takes into account the "best expectation" of the ultimate claim cost for a claim that has not yet fully settled and been paid and the actual premium that has been "earned" in the sense that the coverage was actually provided for the time interval.

resulting in a lower target loss ratio). In a simplified fashion, the insurer sets premiums (using underwriting criteria such as age, type of automobile, coverage, deductible, territory where driven, age and gender of driver, etc.) in such a manner as to accommodate the underwriting characteristics while targeting the insurer's anticipated loss ratio. If the underwriting characteristics for a group of policies indicate that an expected loss will exceed that supported by the premium, then the premium is raised for this group of policies. If the underwriting characteristics indicate that an expected loss will be less than that supported by the premium, then the premium can be lowered until the expected loss ratio is, on the average for the group being priced, equal to the target loss ratio.

Within a given insurer, policies are grouped together according to the underwriting characteristics of the policy with the intent of making policies within a group as homogeneous as possible. For any such group of policies, a loss ratio exactly equal to the insurer's target loss ratio means that the insurance company has correctly priced its premiums for this group to account for the expected losses in that group and the strategic goals of the insurer. A loss ratio for an underwriting group that is greater than the insurer's target loss ratio means that the losses for the group exceed the amount that the premiums can support within the strategic positioning of the insurer. Similarly, a ratio for an underwriting group that is less than the insurer's target loss ratio indicates that premiums were set too high relative to the losses and expenses (including profit) and the insurer's strategic goals (as demonstrated by the loss ratio).

Because of the random nature of individual accidents, it makes sense to only measure the average loss ratio for large groups of policies and not for individual policyholders. (About 80 percent of policies show no claim during a given year and hence have a loss ratio of zero, but the average for a group of policies will be non-zero.) However, some groups of drivers may exhibit higher accident frequencies than other groups and submit claims at a higher rate. For instance, younger drivers tend to have more accidents as a group than older drivers. If premiums were not adjusted upward for younger drivers, the loss ratio for the group would be higher than the target ratio. Theoretically, however, when premiums are raised for younger drivers, the loss ratio for younger drivers as a group adjusts downward. This adjustment process continues until the target loss ratio for an insurance company is achieved. When this occurs, the loss ratio for younger drivers should approximate the loss ratio for older drivers, since increased losses are already compensated for by increased premiums. If done correctly, this adjustment process makes the loss ratio for the insurer constant across all groups of drivers, with no group of drivers being charged premiums disproportionate to its anticipated losses.

In a world with perfect information, the premiums charged by the insurer would be adjusted upward or downward by actuaries to account for increased or decreased loss expectancy for the group of drivers being priced, so that each group has a loss ratio equal to the insurer's target loss ratio. Thus, the expected loss ratio for policies within a class of policies defined by their underwriting characteristics has already, to the best ability of the insurer's actuaries in a cost-effective manner, accounted for underwriting variables such as age, gender, territory driven, deductible, make, model and year of car, number of cars and drivers, and so forth, such that the expected loss ratio of this class will approximate the insurer's target loss ratio. Indeed, if there were systematic deviations from the target loss ratio for a given underwriting class, the premiums for this class would be adjusted to remove this systematic bias. Any variation in loss ratio within the class should be due strictly to random or non-systematic error. Conversely, if an analysis of a particular potential underwriting variable shows that it is significantly related to the loss ratio for the insurer, then this variable's influence on losses has not been accounted for by previous adjustments in premiums, and the inclusion of this variable as another underwriting variable adds value when determining the appropriate premium.

Thus, for a particular insurer, the usefulness of adding an additional underwriting variable beyond those that have already been priced and included can be assessed by ascertaining whether the variable is significantly related to the loss ratio. For example, consider proposed underwriting variable A. The current loss ratio has already incorporated the existing underwriting variables such as age, gender, make, model and year of car, and usage of the automobile, and insurance selections such as coverage amounts and deductibles through adjustments of the premiums. The statistical relationship between proposed underwriting variable A and the loss ratio will reveal whether including variable A into a new underwriting classification scheme is actuarially justified or whether the information underwriting variable A contains is already incorporated into the premium. If the information about losses due to underwriting variable A is already incorporated into the premium, there will be no statistical relationship between the loss ratio and variable A.

Relative Loss Ratio

As mentioned earlier, different insurers have different target markets and different risk profiles, and consequently different target loss ratios. The above discussion implies that for any one particular insurer, the loss ratio incorporates the multitude of underwriting variables and is an appropriate variable for assessing the statistical usefulness of a new potential underwriting variable such as credit score. However, one must be careful when aggregating across insurers. If one insurer or group of insurers had both a lower average credit score for its clientele and a higher average loss ratio than the automobile insurance industry as a whole, then an examination of credit scores versus loss ratios might indicate a relationship due to an insurer effect rather than due to an intrinsic relationship between credit score and loss ratio. The way to avoid this problem is to use a **relative loss ratio** for each policy, where relative loss ratio is defined as the loss ratio for the policy divided by the average loss ratio for the insurer issuing the policy. In this manner, each policy is adjusted to reflect the individual issuing insurer’s characteristics. Doing so avoids potentially spurious findings due solely to insurer differences. If there were no insurer differences in target loss ratios, this adjustment would not have any effect on the outcome of the statistical analysis. But if there were differences, using relative loss ratios rather than (absolute) loss ratios for assessing the statistical impact of using credit scoring eliminates this source of bias.

In the analysis that follows, the assessment of the relationship between credit scoring and insurance losses, after accounting for other underwriting variables, will be accomplished by relating the relative loss ratio to the credit score. This will be done for groups of policies. If a group of policies has been priced to reflect the expected losses for the group, then the average relative loss ratio will be 1.0 (i.e., the average loss ratio for members of the group will be the same as the target loss ratio for the issuing insurer).

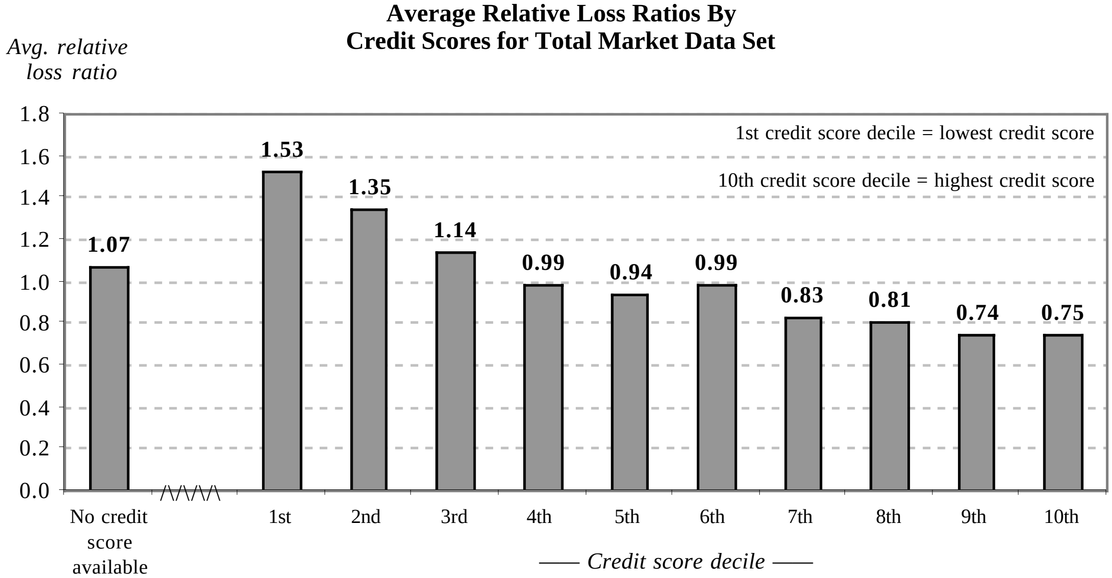
Deleted Files

The database contained a small number of policies that were clearly anomalous and consequently were deleted before undertaking any data analysis. A total of 157 policies and credit histories with the following characteristics were deleted from the database: earned premium equal to or less than zero; incurred loss less than and not equal to zero; or no automobiles or a negative number of automobiles covered during the policy period. In addition, 57 other policies with loss ratios equal to or greater than 100 were deleted. For example, some policies that were deleted in this category were reported to have loss ratios in the hundreds of trillions of dollars. These deletions represent a statistically insignificant percentage (.0012 percent) of all policy records in the database, but an analysis without deleting these anomalous policies affected averages in an unwarranted fashion. The net sample on which tests were conducted was 175,433 policies, of which 22,284 were policies for which there was too little credit information available to generate a credit score (the “no hit group”) and 153,149 policies with credit scores matched.

Research Findings

Chart 4 graphically illustrates the main finding of the study. The database of policies was sorted by credit score into ten groups of equal size. (Hereafter, the ten groups are referred to as "deciles.") All but one of the deciles contained 15,315 policies (one decile contained 15,314 policies).[9] The average relative loss ratio is given in Chart 4 for each of ten credit score deciles and the group of policies with no associated credit score.[10] The chart reveals that the three deciles containing policies with the lowest credit scores have average relative loss ratios greater than 1.0. The seven deciles containing policies with the highest credit scores have average relative loss ratios less than 1.0. For the named insureds in the lowest 10 percent of the credit scores, the relative loss ratio for their policies averaged 53 percent higher than expected, whereas for the named insureds within the highest 10 percent of the credit scores, the relative loss ratio averaged 25 percent lower than expected. (Recall that a relative loss ratio of 1.0 is the average or expected relative loss ratio obtained when ignoring credit scoring altogether.) The group of policies with no credit history available has an average loss ratio of 1.07, or 7 percent higher than the average relative loss ratio for the dataset.

Chart 4
Average Relative Loss Ratios By Credit Scores for Total Market Data Set



Statistical analyses confirmed the visual relationship apparent in Chart 4. A regression analysis of the relative loss ratio on credit score was highly significant ($p<.0001$). This indicates that there is less than a 1 in 10,000 chance that the relationship observed between credit score and relative loss ratio could be due to chance alone. Breaking the loss into frequency of loss and severity of loss, two additional analyses were performed. A logistic regression analysis was conducted to determine whether the existence of a positive claim (incurred loss greater than zero) was significantly related to credit score. Each policy was classified as to whether a positive loss or no

[9]The 22,284 policies with no credit score available were placed in their own group and analyzed along with the other ten groups.

[10]The standard deviations of the relative loss ratios for each of the deciles, including the "no credit score available" category, from left to right, are: 6.1, 6.9, 6.3, 5.7, 5.1, 5.3, 5.8, 5.0, 4.9, 4.4, 4.9. Not only does the average relative loss ratio tend to decrease with increasing credit score, but the uncertainty in predicting the relative loss ratio (standard deviation) also tends to decrease with increasing credit score.

loss was experienced. This classification variable was then related to credit score using logistic regression. It was found that there was a statistically significant relationship between credit score and the likelihood of a positive claim being filed (p<.0001). Another analysis was performed to ascertain if the size of the claim was related to credit score. For this analysis, a regression of the relative loss ratio on credit score was performed using only those policies having a positive relative loss ratio. Again for this regression the credit score was significant (p<.0001), indicating that the size of the loss is also significantly related to credit score. Finally, using the data grouped by credit score deciles exhibited in Chart 4, the correlation between credit score and relative loss ratio was calculated. The correlation (r) was .95, which is statistically and substantively significant. Thus, the analyses show that both the likelihood of a positive claim, and the size of the claim should it occur, are significantly related to credit score, even accounting for other underwriting variables and differences in individual insurance company target loss ratios.

Chart 5 shows the average relative loss ratio distribution for each credit score decile among policies in the sample taken from standard market insurers. The distribution is similar to that shown in Chart 4, with policies in the three lowest credit score deciles showing an average relative loss ratio significantly higher than the seven highest deciles. Again, for the grouped data in Chart 5, the correlation between credit score and relative loss ratio, .95, was highly significant.

Chart 5

Average Relative Loss Ratios By Credit Scores for Standard Market Data Set

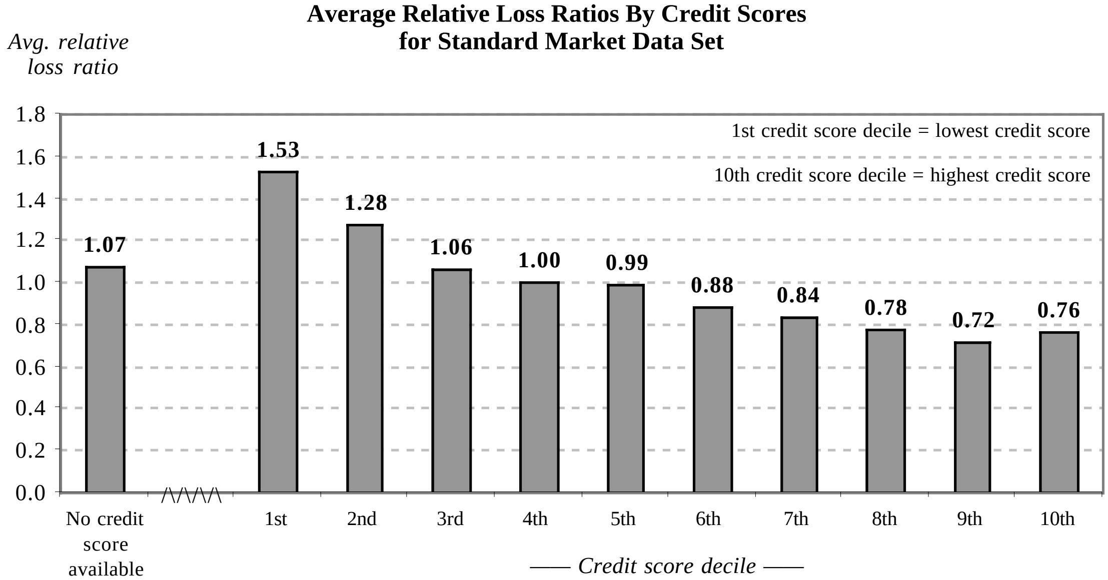
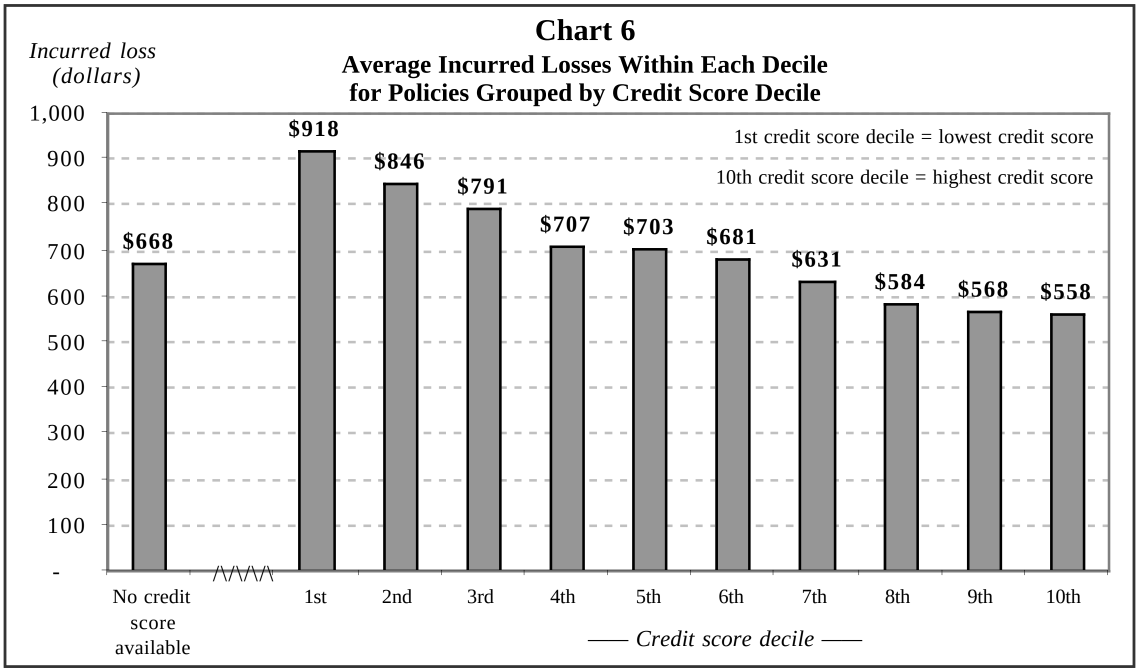
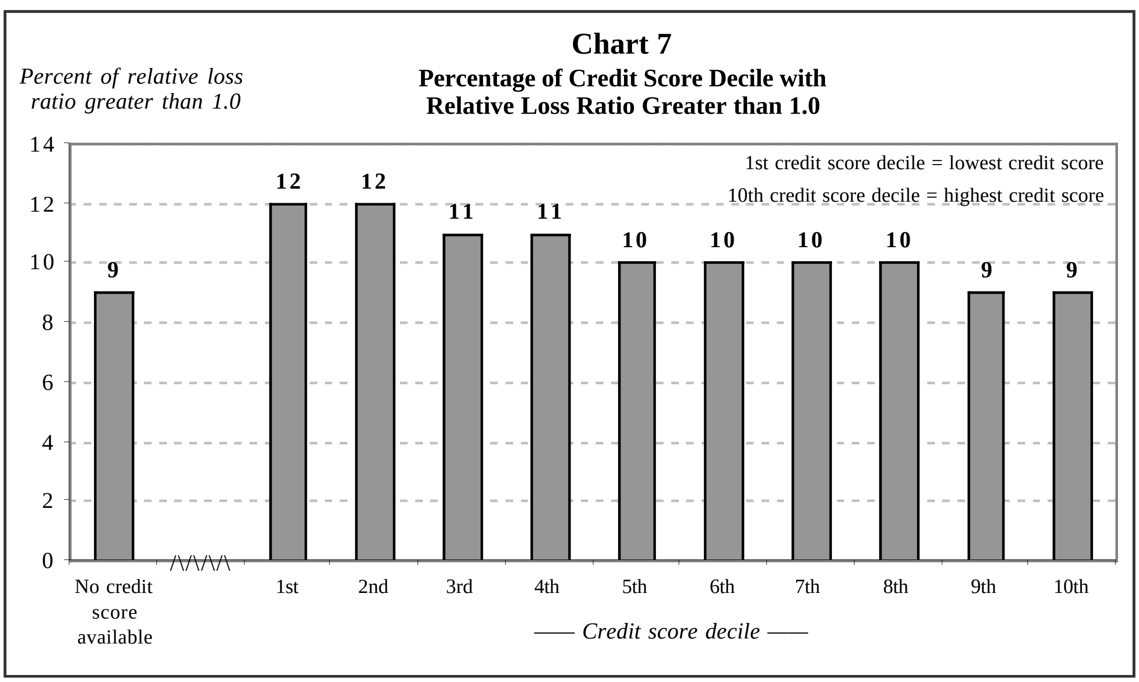


Chart 6 shows the average incurred dollar loss for each policy in each decile. Over the entire data set, the average loss per policy was $695, but for those policies in the lowest 10 percent of credit scores, this average loss was $918, whereas within the highest credit score decile, the average loss per policy was $558. Thus, the average loss per policy is higher for the lowest credit score deciles and lower for the higher credit score deciles.[11]

[11] The dollar losses shown for each decile are incurred losses for the policies and do not consider premiums. The extent to which each decile group is profitable or not for the insurance company depends upon the company being able to charge premiums that exceed these losses plus other expenses. Also, while Chart 6 shows the average incurred loss for named insureds whose credit scores fall into the decile listed, it does not address the issue of whether existing underwriting characteristics account for this variability. This was accounted for in Chart 5.



Another way of showing that policies belonging to named insureds with lower credit scores have a higher probability of incurring losses is to look at the distribution of relative loss ratios in each credit score decile in the sample. Chart 7 shows the percentage of policies within each credit score decile with a relative loss ratio greater than 1.0. As can be seen, named insureds in the lowest two credit deciles are about 33 percent more likely to have a relative loss ratio greater than 1.0 than are those with credit scores in the top two deciles (12/09=1.33). A relative loss ratio of 1.0, as described in the Methodology section (above), is the target toward which individual insurers aim for specific classes of insured drivers.



Limitations of the Study

While this study found that poor credit history strongly relates to insurance losses in the automobile insurance industry, it was not designed to, nor does it, answer a number of important public policy questions. Certain critics argue that credit information collected by the three main credit bureaus (TransUnion, Experian, and Equifax) can contain inaccurate information on consumers and their credit histories, which would then compromise any subsequent credit score created by third-party commercial firms like Choicepoint for use in the insurance industry, not to mention credit scores created by insurance companies themselves. In the present study, if the credit information provided to Choicepoint for the random sample of policies contains inaccuracies, then the credit scores generated for the named insureds will be inaccurate, as well. It was beyond the scope of this study to examine the accuracy of the credit report supplied, but this certainly is important if wide-scale adoption of credit history in underwriting is undertaken.

An important proviso regarding inferences that can be drawn from this study concerns the credit score itself. The analysis in the study used the credit score created by Choicepoint. Individual insurance companies can (and do) use individual credit histories and variables contained therein to create their own credit score models and credit score values for use in underwriting. To the extent that individual insurance companies create a "better" (more predictive) credit score, the relationship found in this study may be weaker than that observed by such insurance companies. Conversely, to the extent that insurance companies use credit histories and less predictive credit scoring models than that furnished by Choicepoint, the relationship found in this study may be stronger than that observed by such insurers. To the extent that individual insurers use different formulas, results presented here should be viewed as illustrative of the relationship that can be determined between credit scoring and losses. Without access to individual insurance companies' proprietary credit scoring models, the findings presented here can only suggest the potential for a correlation between credit score and losses. This analysis is based on the Choicepoint model and cannot predict the relationship that would be exhibited by individual insurers' credit scoring models.

Another factor that should be pointed out relates to the use of credit scoring in policies having multiple drivers. As is the general practice in the insurance industry, the credit score generated by Choicepoint, which was used in the analysis presented, was based on a credit match with the identifying characteristics of the named insured (e.g., the social security number of the named insured). For multiple driver policies, each driver might have a different credit score and different incurred losses, and yet their individual losses are aggregated and associated solely with the credit score of the named insured. Consequently, it is possible for a named insured (a father, for example) to have a very good credit history, while the young son driving on the policy has a bad driving record with many incurred losses. In such a case, a "good" credit score would be associated with a policy having high incurred losses. In this regard, the current study should be interpreted as showing a significant relationship between the credit score of the named insured and losses for everyone on the policy and not as showing a relationship between the credit score of an individual driver and the losses of that particular driver. The fact that there was a significant relationship found in this study even using "noisy data" indicates that perhaps an even stronger relationship would occur if every driver's credit and record were examined separately. This was not possible in this study, nor is it insurance industry practice.

A common criticism of credit scoring and its use in underwriting decisions is that it may discriminate against low-income and/or minority applicants, and that its use, in effect, amounts to "red lining." Some within the insurance industry have maintained that their underwriting and rate-making practices are blind with regard to ethnicity and income. The database used in this study did not contain information on named insured income, ethnicity, or physical address (other than rather gross delineation of rating territory for some but not all insurers), so the results of this study cannot and do not address this issue.

Conclusion

This study analyzed a large random and representative sample of automobile insurance policies from the Texas market to determine if: 1) credit history and losses were statistically related and 2) whether such a relationship, if it exists, is explained by standard underwriting variables. The analysis found that incurred losses on individual policies are statistically significantly related to the credit score of policy's named insured (see Chart 6). Additionally, incorporating underwriting variables used by the companies through the use of relative loss ratios, it was found that there was still a statistically significant relationship between credit score and the relative loss ratio for policies (Charts 4, 5), so standard underwriting variables do not explain the observed statistically significant relationship between credit scores and losses. (The correlation between credit score and relative loss ratio is .95, which is extremely high and statistically significant.) The lower a named insured's credit score, the higher the probability that the insured will incur losses on an automobile insurance policy, and the higher the expected loss on the policy.