Improving Lender Offers Using Consumer Preferences[1]

by

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Abstract Designing new loan products and introducing product features is critical to establishing and maintaining a competitive advantage in retail credit lending. In thinking about these processes, there is a tendency to think that creating and selling a product to a consumer has the economic characteristics of a fixed positive sum gain . The better the deal for the company, the worse it is for the consumer, and vice versa. This need not be the case. With the many choices of company offers to a consumer (e.g. price, quality, features, and design), the company can create win-win alternatives better for both the consumer and the company than those that are suggested by fixed positive sum (i.e. divide the pie) analyses. A key to creating win-win alternatives is to explicitly utilize the consumer's preferences for price and quality and integrate those with the company's preferences for profit and market share. Using these concepts, we develop a model and illustrate how to determine the set of win-win alternatives. Our development focuses on the creation of financial products (e.g. loans, credit cards) to consumers.

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1. Introduction

Acquiring and managing financial loan portfolios are major components of the retail credit business in the United States. Such portfolios include household mortgages, automobile loans, equity lines of all types, and credit cards. The total amount loaned is estimated to be between 8 and 13 trillions of dollars in the United States alone (Federal Reserve (2002)). It is obviously important to manage those portfolios in a way that is consistent with portfolio objectives.

Different lenders may naturally have different objectives that they hope to achieve in managing their portfolios. Many are means objectives, such as minimize required loan loss reserves, minimize the cost per new customer acquired, maximize the response rate on acquisitions mailings to acquire new customers, minimize time from billing to collection, and minimize the default rate on loans. Means objectives matter because they eventually have an impact on the economic performance of the portfolio. Two fundamental objectives for the economic performance of many loan portfolios are maximize profits and maximize market share.

Everyone seems to accept profit as a fundamental objective, but some are not sure that market share is. There are several reasons why it should be. First, in evaluating decisions that will affect profits over several years, one cannot with any accuracy predict what the profits will be more than two or three years into the future. One can predict profits due to different alternatives over the next two years, for example, and then use market share at the end of the period to indicate the ability of the organization to make decisions to address whatever the situation is at that time. With larger

market share, a sagging product can be revised or a new product introduced and sold to existing customers to improve future profits. Second, there are opportunities to cross-sell other products to existing customers and increase profits of the institution without changing the profits directly attributed to the original loan portfolio. For example, customers who currently have an auto loan with a given lender may get offers to use a credit card. If successful, this cross-sell may increase both overall lender profits and the market-share of the credit card portfolio. Third, existing customers become more profitable because the average cost to manage an existing loan will drop as market share (i.e. number of customers) increases and management efficiencies are introduced. Note that the reasons to include market share as an objective along with profits are the same reasons an organization might offer potential customers a product with negative expected profit. Finally, in the model developed here, the lender organization should eventually weight profits versus market share to evaluate prospective product offers. If zero weight is placed on market share, the offers that are predicted to lead to maximum expected profits are selected; analogously, a zero weight on profit focuses attention entirely on market share.

In this paper, we develop and illustrate an effective procedure to enhance loan portfolio performance in terms of profit and market share. The general concepts can be extended to include other objectives that a loan manager may consider important. To place our work in context, consider the broad picture of a lender's financial performance in Figure 1. One can imagine an existing loan portfolio with an efficient frontier and a current operating point as indicated in the figure. It would be useful to improve the current operating point by increasing both profits and market share. In

general, there are three ways to improve performance in such a situation. One needs to make decisions to achieve the following:

1) Move the current operating point towards the current efficient frontier by improving profits and/or market share,
2) Move the new operating point along the efficient frontier to find the best balance of profits and market share, and
3) Move the efficient frontier up and to the right and then follow steps one and two.

By developing a model of offers for potential new customers (i.e. consumers) that are tailored to individual preferences, we identify offers that both move the current operating point towards the efficient frontier and push the efficient frontier up and to the right. We then indicate how to select the specific offers for individual consumers that will guide the operating point to one desired by the lender on the new efficient frontier.

The focus in developing offers to consumers is to account for the preferences of each individual consumer. We examine the contributions of each of the potential offers to the profit and market share objectives of the organization. Our analysis indicates how to improve offers to individuals that simultaneously improve the potential contribution of that individual to organizational lending objectives. Collectively, all of the individuals to whom the methodology is applied will enhance the organizational profits and market share performance.

Information about consumer preferences has been used for a long time in numerous situations to guide the design of new products (Green and

Wind, 1973; Urban and Hauser, 1980). A combination of structured qualitative information about design attributes and quantitative information about priorities can stimulate the creation of innovative and better products (Griffin and Hauser, 1993; Keeney, 1994; Kim and Mauborgne, 1997; and Ulwick, 2002). There are also cases where detailed multiattribute objective functions have been assessed (Keeney and Lilien, 1987) for the design of expensive business products. All of this experience has been for situations where the same product would be purchased or used by a large class of consumers. In situations such as this, a reasonable amount of time can be taken to assess each individual's preferences, since only a representative set of consumer preferences is needed.

There are three aspects of this paper that are innovative. First, each individual consumer's preferences are explicitly used in developing appropriate product offers for that consumer only. Second, the individual's preferences and the corporate preferences for the achievement of its objectives are combined in evaluating the desirability of the prospective product offers. Third, a small class of "win-win" offers is identified that represents the dominant set of offers for the organization and also the dominant set of offers for the individual consumer.

In Sections 2 and 3 we consider the consequences of potential product offers to an individual consumer and to a lender respectively. In Section 4, the set of win-win offers is identified. Implementation and application issues are considered in Section 5, and Section 6 is a summary. The ideas in this paper are described using logic and graphical illustrations rather than mathematical formulas. It is easier to understand the concepts using a

specific example. For this purpose, we have chosen a credit card. Again, however, it is important to stress that the ideas are applicable to many types of loan product and can be readily extended to include different or more objectives of both consumers and lenders.

2. Consequences of Product Offers to Consumers

Consumers are interested in the quality and price of almost anything they purchase. Regarding loans, a major feature and indicator of quality is the loan amount and of price is the interest rate. Hence, in our model, the two consumer objectives are to maximize the available credit line and minimize the interest rate. Measures to indicate the degree to which these objectives are achieved are thousands of dollars for the loan amount and annual percentage rate (APR) for the interest rates. The set of all possible products to an individual consumer is illustrated in Figure 2. Each specific point in the figure represents a specific product. For instance, point A represents a loan of $25,000 at a 15% interest rate. Point B is a $10,000 loan at a 20% interest rate.

Some aspects of consumer preferences for these potential products are obvious. Specifically, we would expect that any consumer would prefer a higher loan amount to borrow against and a lower interest rate. Figure 2 illustrates two iso-preference lines, which are lines composed of offers that are equally preferred by a consumer. Naturally the consumer would prefer either offer A or A' to either offer B or B'. Hence, the consumer's preferences increase as offers move up and to the left in the credit line -APR space.

Even though the iso-preference curves for each consumer represent more desirable offers as they move upward and to the left, they could vary greatly among consumers. The steepness of those curves would depend on the value tradeoff that the individual consumer makes between increasing the loan amount and decreasing the interest rate. A consumer who was more sensitive to the interest rate would have iso-preference curves that were much more vertical than a consumer who was more sensitive to the amount of the loan and whose iso-preference curves would be more horizontal.

3. Lender Consequences of Offers

Since the fundamental objectives of the lender are to maximize profits and market share, the contribution of any offer is the degree to which the lender's objectives are eventually affected. Let us measure profits by dollars and market share by the number of customers as indicated in Figure 1. The contribution that an individual consumer might make to achieving those objectives are the expected profits contributed by the individual and the likelihood that that individual will become a customer.

To understand the consequences to the lender, we view the consumer consequence space of offers and consider the implications of different offers on lender profits and the likelihood of taking them. We first assume that the consumer will accept any product that is offered and then account for the likelihood that the product is really accepted (i.e. taken).

Any offer that falls on a consumer's iso-preference curve in Figure 3 is, by definition, equally desirable to that particular consumer. Hence, it is reasonable to assume that any offer along that curve has an equal probability of being taken.

Now, consider contribution to profits. As one begins at the bottom of the iso-preference curve and moves up to the right, three changes occur. There is increasing revenue to the lender if there is no default on the loan. There are increasing losses to the lender if there is default, because a larger amount can be in default. Also, the default risk increases as the loan amount and interest rate both increase along the given iso-preference curve. At the lower part of the curve, there is little contribution to profit as the amount borrowed is small. As the amount increases, we would expect profit to increase before the default risk increases significantly. However, at some point, the default losses begin to contribute more than the increasing revenue without default; as a result contribution to profit would again decrease as you move up along the iso-preference curve. In summary, we find that a contribution to expected profits is initially small, increases to a single high point and then decreases monotonically along any individual iso-preference curve in Figure 3.

What happens as one moves across different iso-preference curves from left to right? At the far left, the offer would not be profitable to the lending organization as the interest rate would simply be too low. At the far right, the offers would also not be profitable as credit lines with a very high interest rate would rarely be used; besides, the chance of default would be much higher. Furthermore, we expect that the likelihood of accepting such

an offer would be very low. Hence, if accepted, the loan might contribute negatively to expected profits, and it certainly contributes nothing if it is not accepted. The same type of reasoning applies as you go from bottom to top and vary the credit line in Figure 3. If the credit line is very low, there is little opportunity to make any profit. On the other hand, if the credit line is very high, the possibilities of default and large losses lead to expected negative profits if the offer is accepted.

The reasoning above indicates that the expected profit contribution to a lender from a prospective customer can be represented by a hill over the consequence space of the consumer where the height at any point on the hill corresponds to expected profit. The top of that hill represents the offer that contributes the most to expected profit. Because some individuals are poor credit risks, the top of that hill may actually be a negative value. In general, there are sophisticated models that use indicators such as the credit worthiness and financial situation of the prospective customer to determine the consequences of different offers. The determination of accept/reject cutoff scores for acquisition appears to have been first described by Lewis (1992); more recently, Hoadley and Oliver (1998) explored cutoff policies that maximize expected profit. Oliver and Wells (2001) have explicitly analyzed the two objectives of expected profit and market share in retail credit portfolios and shown how the tradeoffs between these two measures affect the optimal cutoff policies. We will say more about how to determine this hill and the expected profit contours in Section 5 on implementation.

We now examine the implications of specific offers made by a lender in terms of the probability of take and the expected profits given that the

offer is taken. Because the probability of accepting an offer along a given iso-preference curve is the same, these curves in Figure 4 correspond to vertical lines in the lender consequence space of Figure 5. The maximum expected profit offer on the corresponding iso-preference curve is the top of the vertical line. For this illustration, we have assumed that offers A and B are those with the maximum expected profits along the respective consumer iso-preference curves and that the expected profit of offer B is greater than that of offer A. It is perhaps worth noting that except for those offers at the top of the lines in Figure 5, the other points do not represent a unique offer. For instance, there would be an offer below B on the same iso-preference curve that has the same probability of take and expected profits given take as offer B'.

Continuing in this same fashion, by analyzing different iso-preference curves in the consumer space, we could develop the associated curves for the lender as illustrated in Figure 6. The set of offers that correspond to the tops of the lines are those where the expected profits given the offer is taken is maximized for each particular level of the probability of take. It is worth noting that the maximum expected profit for some probabilities of take would be negative. Those correspond to iso-preference curves that are further to the left and up in Figure 4. Offers that have a higher credit line and lower interest rates are more preferable to the consumer and are, hence, more likely to be taken.

It is of course not the expected profit given the offer is accepted that an organization is concerned about maximizing, but rather the expected profit given the offer. We can easily convert the information in Figure 6 for

the conditional maximum expected profit given take to the unconditional expected profit. We illustrate this change in Figure 7, which simply involves multiplying the probability of take times the expected profit given a take to get the unconditional expected profit. Here we assume that if the offer was not taken, the expected profit is zero. Although we have not explicitly included acquisition costs in this graphical explanation of the model, it can and should be included in deciding how a loan organization should make acquisitions. However, once the acquisition is contacted and the lender is at the stage of what offer to make, the acquisition cost is essentially a sunk cost. The expected profit curve indicated in Figure 7 is the one to examine for potential offers. All offers under that curve would correspond to lower contribution to expected profit with the same probability of take and expected contribution to market share.

4. Deriving the Set of Win-Win Offers

The expected profit line in Figure 7 is redrawn in Figure 8, where the dominant set of offers from the lender's perspective are those corresponding to the thicker part of that expected profit line. Quite obviously, any offer that does not translate to a point on that line is inferior to some offers that are on that line. In general, an offer with a higher probability of take and higher expected profit is dominant, from the lender's perspective, to one with a lower probability of take and lower expected profits. Thus, the only offers a lender should seriously consider for a prospective customer are those in this dominant set.

We want to examine the consequences of this dominant set of offers for the consumer. To do this, let us consider the numerical example represented by Figure 9, where the capital letters refer to specific offers that have the corresponding expected profits and probabilities of take. The implications for consequences to the consumer are illustrated in Figure 10. Let us go through the logic that makes this translation.

At some point (i.e. offer) in the consumer's consequence space, there is a maximum expected profit offer C as indicated. It is the top of the hill of expected profits to the lender of the different offers. As one moves in all directions from offer C, the expected profit decreases monotonically.

From Figure 9, one can see that offers D and E each have an expected profit of $40 with different probabilities of take. These are illustrated in Figure 10 on the consumer space. As one goes up the iso-preference curve that includes offer C in Figure 10, there must be some point that also has an expected profit of $40 for the lender. As one decreases along that same iso-preference curve, there must be another point with an expected profit of $40 to the lender. Hence, in general, there is a shape represented by the oval here that corresponds to a contour on the expected profit hill where the expected profit is $40.

If one considers offers F and G in Figure 9, the same type of logic will lead to the larger contour in Figure 10. That larger contour includes offers F and G and has an expected profit of zero in our example. Offer H in Figure 9, which has an expected profit of -$20, is also shown in Figure 10.

By comparing Figures 8 and 9, one sees that the set of dominant offers corresponds to those that begin with offer C and continues to offers E, G, H, and beyond to offers with a higher probability of take and a greater negative expected contribution to profits. This set of dominant offers to the lender is indicated in Figure 11 in the consumer consequence space.

Consider offers X and Y in Figure 12 of the lender consequences space. Let's look at their implications for the consumer, as we know they are less desirable for the lender than offers on the dominant set. Offer X represents a general offer to the left of offer C in Figure 12 that naturally corresponds to a lower probability of take, which indicates that offer X is also less desirable to the consumer than offer C. Thus, any offer to the right or below the 0.35 iso-preference curve in Figure 13 is inferior to offer C from the customer's point of view.

Now consider offer Y indicated in Figure 12. From the lender's perspective, Y is inferior to a set of offers corresponding to higher probabilities of take and higher expected profits that are up and to the right on the dominant set in Figure 12. An offer Y would have the consequences to the consumer as indicated in Figure 13. The vertical and horizontal lines through offer Y in Figure 12 translate into the iso-preference curve and the iso-profit curve drawn through offer Y in Figure 13. The offers between where the iso-preference line and iso-profit line cross the line from offer C to offer G are preferred by the consumer to offer Y. This is because they are all to the left of the iso-preference curve through offer Y. These are the same offers that correspond to those that are dominant over offer Y for the lender in Figure 12.

This demonstrates that the lender's set of dominant offers from C to H and beyond represented by the boldface line in Figure 12 is also a set of dominant offers for the consumer represented in Figure 13. In other words, this set of offers is a win-win set of offers. Given the preferences of the consumer and the objectives of profit and market share for the lender, these are the only offers that should be considered. Which of these specific offers the lender should make depends on the lender's value tradeoffs between profits and market share. These tradeoffs are discussed in the next section.

5. Implementation and Use Issues

Conceptually, the model has identified the set of offers that represent a "sweet spot" for each consumer. Relative to all possible offers represented by the set of points in Figure 13, the sweet spot of win-win offers is quite small. We now discuss how to implement the model to identify the win-win set of offers and then indicate how to select an appropriate offer for each individual consumer from this set.

To implement this model, we need three types of information: the consumer's preferences, the probabilities that consumers will accept various offers, and estimates of the consequences to the lender of various offers accepted by the consumer. We want to collect relevant data for assessing consumer preferences so that we can predict the consequences Models (references needed) in current use predict the expected profitability of a consumer given the consumer accepts a given offer. These calculations take into account the credit worthiness of the consumer, the amount of the loan

and interest rate, the economic conditions that prevail at the time the loan is made, how these conditions may change in the future, and other information about the consumer's credit record, financial situation, and personal management style. It is, of course, an additional step to gain information on consumer preferences and the probability that individuals will accept the offer, but that step is one that can and should be taken.

Consumer preferences have been assessed in numerous situations with success. Typically, the experience has been with expensive items, where an individual could take a reasonable amount of time to express their preferences. When one has products like loans where hundreds may be made in a given day, one can't take a lengthy period of time to determine preferences. However, it might be only relevant to determine a couple key components of a consumer's preferences. Specifically, the most important information regarding the model here is the relative importance that an individual consumer places on increments of the loan amount and increments of the interest level. This indicates whether the consumer iso-preference curves in Figure 2 are relatively steep (i.e. more vertical) or relatively flat (i.e. more horizontal) and the degree of curvature. It would be reasonable to parameterize a set of perhaps ten representations of iso-preference curves and then categorize individual consumers by asking questions to identify which set best represents their preferences. A typical question about credit card preferences may be something like the following: "Would you prefer a credit line of $25,000 with an interest rate of 14% or a credit line of $10,000 with an interest rate of 9%?" With the responses to a few good questions, one could identify a reasonably set of iso-preference curves.

To estimate the probability that individuals would accept different offers, one could directly ask the consumer or use general information of credit card portfolio managers about classes of consumers. Over time, by monitoring what offers individuals did accept and by categorizing individuals into types (i.e. such as by sets of iso-preference curves and financial status), one could build a useful model for the probability of acceptance.

It would be useful to assess more detailed information about corporate portfolio preferences than those for an individual consumer. On the other hand, one needs to make this assessment only once as it can be used repeatedly for evaluating offers to all prospective customers. Hence, it makes sense to spend a little effort generating this information. It is not unreasonable for an organization to think carefully about its tradeoffs between profits and market share of a credit card portfolio. There is significant experience in assessing such organizational preferences (Keeney, 1992) including preferences for the performance of card portfolios at American Express (Keeney and Lin, 2000).

For use of this model, a lender might proceed as follows. First, the institution must clearly define measures for the objectives of profits and market share. Suppose the chosen measures were "next year's profits" and "number of customers in the portfolio at the end of the year". Second, they should specify the operating point of their loan portfolio in terms of these measures. Then they can ask unambiguous value tradeoff questions such as: "Suppose that over the next year you could increase your loan portfolio by

10,000 customers and maintain your expected profit, or you could keep the size of your current portfolio fixed and increase your profit by amount M. How much would M have to be in order to be indifferent between these two changes?" Suppose M was determined to be $1 million. This tradeoff indicates that an increase of 10,000 customers is equally as important as an increase in $1 million profit to the lender organization.

By translating this value tradeoff from significant amounts down to the individual level, this information implies that each additional customer added to the portfolio is as important as each additional $100 of expected profit added to the portfolio. This further implies that a 0.5 probability of gaining a customer is equally valuable as an increase profit of $50. It is this value tradeoff that is used in evaluating which of the alternative offers from the win-win set is best for the lender to offer.

Suppose a financial loan portfolio was currently quite profitable and the lender wished to stress the objective of increasing the size of the portfolio. Their tradeoff may be $200 per gained customer. This suggests that an offer closer to G in Figure 12, and perhaps even an offer that corresponded to H with a negative contribution to expected profits, would be the preferred offer . If another organization wished to stress expected profit and was not particularly concerned about their market share, they may have a value tradeoff of $25 per increased customer. This would lead one to make offers that corresponded closely to those of offer C in Figure 12. If an organization said that its only objective was to maximize profits, its value tradeoff would de facto be $0 per additional customer, and the best offer to make would be offer C.

The assessed corporate value tradeoff implies the slope of linear iso-preference curves appropriate for individual consumer offers that can be used with the win-win set of offers in Figure 12 to select the optimum offer for each individual consumer. This offer is where the iso-preference curve is tangent to the win-win set of offers. However, the appropriate offer for the lender to make to an individual consumer might not necessarily be the optimum offer, as the lender may wish to have only a specific set of available offers (e.g. forty offers). In this case, the lender's value tradeoff will indicate the best offer from the specific set to better satisfy the consumer and to best contribute to the lender's portfolio objectives. If the set of available offers is sufficiently rich, this tailoring should lead to a significant contribution to the profits and market share of the lender's portfolio.

To effectively implement such a model, one would obviously need to automate it with software. Conceptually, this would not be difficult given the information on the lender organization's preferences and consumer preferences. It may naturally be a difficult task in practice. Again, the component parts of the model that estimate the potential performance of consumers are available in many cases. What is needed is to gather the information on consumer preferences and have that automatically input to the model, similar to the way that the information on the consumers' financial status gathered in interviews and from data sources is input. Also, one needs to incorporate the value tradeoffs of the lending organization into the model. One could adjust the corporate tradeoffs over time as the status

on the loan portfolio performance changed and as the relative contribution of this portfolio to the operation of the organization as a whole changed.

6. Summary

Methodologies and procedures currently exist for the assessments of preferences required by our model (Keeney and Raiffa, 1993). Utility analysis can be used to quantify company preferences for different profit and market share levels. For consumers, individuals can be asked a few questions on their application forms for loan products that would provide very useful information. Alternatively, a website could be designed to help individuals express their consumer preferences. Software could then naturally integrate these preferences with the technical analysis of the various potential products that could be offered, a market analysis that describes the likelihood of different consumers accepting different offers, and a financial analysis that examines the implications of those offers for the contribution to company profits and market share. Based on this integrative analysis, a set of win-win offers could be identified and specific offers selected for individual consumers that met their priorities and best contributed to the bottom line concerns of the lender organization.

The benefits of such a model for the consumer are obvious. Quite simply, they can get more desirable offers. Also, there can be faster response to consumers requesting a credit card.

There are numerous benefits to the lender. The overall benefit is that the model could significantly contribute to the bottom line performance of the portfolio. It can help identify the offers that are going to allow one to better increase profits and market share. It can make better offers to consumers and thereby improve one's reputation with consumers. It would be significant to be known as a company who is explicitly responsive to the preferences of individual consumers. This would naturally allow an organization to be more competitive in their offers and make better offers more quickly since the entire system could be automated. This would also reduce the costs inherent in that process.

When this methodology is used for situations with more than two objectives, the likelihood of identifying creative desireable alternatives increases. These concepts are relevant to many classes of consumer as well as business products. The greatest advantage may be for products that can be easily custom designed to meet consumer desires. One general situation where this design is very easy is when the quality characteristics of a product can be changed electronically, as with personal financial products. Other examples would involve telecommunication services (i.e. phone and online service plans) and airline travel, where quality is perhaps indicated by the time and route available to fly for a given price.

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