Price optimization in retail consumer lending

Experian Decision Analytics

An Experian Decision Analytics White Paper
# Table of contents

**Executive summary** ........................................................................................................... 1

**Background to price optimization** ......................................................................................... 3

- Setting the price ......................................................................................................................... 3
- Why differential prices are inevitable for a bank ................................................................. 4
- The role of risk-based pricing ................................................................................................... 4
- Why risk-based pricing isn’t always sufficient ........................................................................... 5
- Profit maximization for each customer ...................................................................................... 6

**Price optimization** ................................................................................................................. 7

- The impact of constraints .......................................................................................................... 7
- Financial constraints .................................................................................................................. 7
- Operational constraints ............................................................................................................ 8
- Uncertainty constraints .............................................................................................................. 8
- Legal constraints ...................................................................................................................... 9
- Reputation and relationship constraints ..................................................................................... 10
- Customer constraints .............................................................................................................. 10
- Bad debt constraints ................................................................................................................. 10
- Budget constraints .................................................................................................................... 10
- The implications of constraints ................................................................................................. 11

**How does price optimization work?** .................................................................................... 11

- What is price optimization? ...................................................................................................... 11
- What are the requirements? ....................................................................................................... 11
- Predictive models ..................................................................................................................... 12
- Historic data ............................................................................................................................. 12
- The profit equation .................................................................................................................. 12
- Profit model dimensions .......................................................................................................... 13
- Modeling loan take-up .............................................................................................................. 13
- Estimating different loss rates by price .................................................................................... 14
- Decision simulation .................................................................................................................. 15
- Optimization ............................................................................................................................ 15
- Operational deployment ............................................................................................................ 16
- Evaluation .................................................................................................................................. 16
# Table of contents

**Price optimization in practice** ................................................................. 18  
  Business challenge .................................................................................... 18  
  Business solution ...................................................................................... 18  
  Analyzing the trade-off .......................................................................... 20  

**Conclusions** ............................................................................................ 21  
  Price optimization delivers real benefit .................................................. 21  
  The benefits of price optimization .......................................................... 21  
  The challenges of optimization ................................................................. 21  

**Strategy Optimization solutions from Experian** ..................................... 22  
  Enterprise optimization solutions ............................................................ 22  
  Experian optimization software ............................................................... 22  
  Expert optimization consulting ............................................................... 22  
  Price optimization ................................................................................... 23  
  Getting started with price optimization .................................................. 23  

**About Experian Decision Analytics** ......................................................... 24
Executive summary

Most organizations now recognize that while all customers are equal, some customers are more equal than others. The reality is that different customers have different profitability, and an organization cannot afford to treat all customers identically.

If an organization offered the same price to all customers applying for a loan, then the same price for each customer would imply an “average price” for every customer. Low-risk customers would secure better rates with other organizations; lower-quality customers would not. As a result, only the relatively higher-risk customers will select the average product, skewing the population down and resulting in increased average losses and reduced profitability.

The combined effect of “average pricing” is two-fold: fewer low-risk customers and more high-risk customers.

Risk-based pricing addresses this issue by offering different prices for customers with different risk profiles. This works, to a degree, since it equalizes margins — but an increase in price will reduce business volume. The question is, by how much? Pricing based solely on risk does not address this issue, but to maximize profitability, the business needs to understand the price elasticity of customer demand. By understanding this dimension, the business can start to price each customer to maximize customer profitability, reflecting the fact that different customers are likely to take up differently priced loans — something that a simple risk-based approach usually does not consider.

But is profit always the sole driver in making customer decisions? Of course, in most organizations, maximizing profit is critical, but it is not the only factor. The business needs to operate within other operational, financial, regulatory and organizational constraints (such as volume, margin, bad debt), and balancing these different factors is an essential part of portfolio management. This requires a solution that enables an organization to make the best pricing decisions on each customer while maximizing overall profit within business constraints.

Price optimization not only delivers improved profitability, but also provides the business with a better understanding of the overall business performance. For many organizations, the real benefits are gained through improved operational and financial management and the ability to respond to changing economic and competitive environments more dynamically.
Specifically, price optimization enables an organization to improve its customer decisioning through:

- **Decisioning at a finer level of granularity** — Decisions can be taken based on the individual’s specific characteristics, not just based on a group of customers within a segment.

- **Taking more factors (or decision dimensions) into consideration when making a decision** — not only risk, but the propensity to take up the loan or lending facility, early settlement, insurance, value and term.

- **Dynamic response to different economic, operational or competitive environments** — The ability for price optimization to evaluate various scenarios and predict the likely outcome based on each means that changes to decisions can be evaluated and implemented more quickly.

- **Considering factors other than profit as constraints** — The business can forecast profit components and manage profit within these constraints more effectively.

- **Making the best possible decision for the customer and the organization by taking a holistic view of the customer decision** — Traditional rule-based decisioning only considers one customer at a time; price optimization considers the effect of other customer decisions in order to work within operational and financial constraints.

- **Better management of key business groups** — Within a loan portfolio, there may be customers from different sources, for example different dealers, risk segments or channels. Within auto finance, the management of a third-party dealer is often essential to the business’s performance. Decisions cannot be taken on individual customers, without considering the wider impact on the dealer relationship.

- **Integrating pricing decisions and the operational process** — The business recognizes that decisions on new customers cost money. As a result, it should consider the costs of decisions for different customers in the context of the potential profitability of that customer.

- The ability to develop strategies that consider different economic outcomes and to try to ensure that the impact of a potential economic downturn is relatively small.
Background to price optimization

Setting the price
There are several ways to set price for any product. The following table from the Tower Group identifies a number of different approaches that retail banks are using to set pricing strategies.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-price pricing</td>
<td>One size fits all.</td>
</tr>
<tr>
<td>Cost-plus pricing</td>
<td>The costs associated with the product (marketing, operations, overhead, risk, etc.) are aggregated with an added markup for profit.</td>
</tr>
<tr>
<td>Market-based pricing</td>
<td>Pricing for a product or service is based on what the market will bear. Competitors are surveyed to understand the established pricing of a product or service in the market.</td>
</tr>
<tr>
<td>Index-based pricing</td>
<td>The pricing of a product or service is pegged to a moving index</td>
</tr>
<tr>
<td>Risk-based pricing</td>
<td>In this variation on cost-plus pricing, a risk assessment is added to the cost of a product or service based on the customer’s credit score. The strategy has a lending orientation.</td>
</tr>
<tr>
<td>Adjusted risk-based pricing</td>
<td>In this variation on risk-based pricing, supplemental information is factored in. Multidimensional scoring factors in debt-to-income ratios and other data.</td>
</tr>
<tr>
<td>Profit-based pricing</td>
<td>Pricing is based on a profit maximizing a combination of costs, risk, and customer price elasticity</td>
</tr>
</tbody>
</table>

Pricing strategies become more sophisticated and rely on more powerful analytics as the decisioning process increases in complexity.

Figure 1: Evolution of pricing strategies. Source: Tower Group

Organizations are developing ever more sophisticated approaches that recognize the need for pricing decisions to distinguish different customer profiles and needs. The development of advanced analytical techniques has enabled organizations to increasingly understand customers and therefore differentiate strategies accordingly.

Traditional economic theory teaches that price is set where supply meets demand. If lenders are able to raise price to increase margins, organizations make supernormal profits, and new suppliers will enter the market, increasing supply and subsequently reducing price. Conversely, if there is very high competition resulting in reduced prices and losses, some organizations will tend to leave the market, resulting in prices rising back to an equilibrium position.

In reality, there are many different markets — customers have different needs, have different risk profiles and behave in different ways. As a result, there are many different “submarkets,” each with its own theoretical equilibrium position.
Why differential prices are inevitable for a bank
Most banks offer a range of products and services in order to satisfy the needs of a wide range of customers: The concept of a “universal bank” is encouraged by governments wishing to ensure that the financially disadvantaged are not disenfranchised from financial services. Consequently, it is rare for a bank to focus on a narrow subset of customers (although private banks are perhaps exceptions), and most banks are usually in the business of developing long-term relationships throughout the customer’s life.

Critical to each business’s success is its ability to identify the specific customer potential based on better understanding the customer’s behavior. Over recent years, the increase in data availability, the ability to process it and the improved decisioning technology mean that there is a natural tendency for organizations to develop increasingly more sophisticated models to predict different customers’ profit.

But “universal banks” are not the only suppliers in a market. Niche competitors will specialize in lending to specific customer types. Often through greater availability of data, more sophisticated analytics, lower service costs and focused marketing, these organizations will “cherry pick” lower-risk customers, enabling them to make increased profit margins. In addition, the longer-term result is that other organizations are attracted to this market sector, competition increases and organizations then need to offer reduced rates to gain more or maintain business.

The net effect for an organization that deploys a single price across different customer risk profiles is that there are a reduced number of low-risk customers in its portfolio, and the average performance of its portfolio declines. In this situation, the organization has three options:

• **Reduce overall prices to restore the profile of its customers** — but accept that this may result in a loss or reduced profit margin

• **Increase prices to preserve overall margins** — This will shift its market position down further but will mean that it can maintain unit profits (although at reduced volumes)

• Introduce differential pricing by customer risk

The role of risk-based pricing
Risk-based pricing, by definition, allows organizations to vary the price charged to customers based on the customer’s credit risk.

It allows a business to increase its margins, cover bad debt charges and potentially lower its cutoffs to accept business that was previously marginally unprofitable.
Price optimization in retail consumer lending

Figure 2: By moving from a fixed price to a risk-based price, the business can increase revenues on marginal customers, enabling it to accept customers of a higher risk and maintain volumes.

Why risk-based pricing isn’t always sufficient
The limitation with the risk-based pricing approach is that as price increases, the propensity for customers to take up the loan at a given price decreases. For higher-risk customers, the price increase also results in smaller customer volumes, but the price charged to the customer should be sufficient to cover the losses.

Conversely, reducing price on lower-risk customers means an increased proportion of customers in this band. This reduces risk profiles but may also reduce the average rate (and potentially margin) on the customer base. However, there are key issues with this overall approach — especially on higher-risk customers which are priced. The problem is that the profile of customers that take up the loan is likely to be different to the population that does not take the loan. The result is that increasing the price not only reduces volume, but also increases loss rates to a greater level than that simply predicted by the risk score. Consequently, increasing prices increases losses and eventually reduces overall profits.
Profit maximization for each customer
Assuming we can predict how different customers respond to different prices, we can maximize the expected profit for each customer. If we maximize profit for each customer decision then, in theory, an organization can maximize its overall profitability by maximizing the individual decision for each customer.

The business volume, margins and profit can be plotted against price. As price increases, volumes decrease and margins increase, but the net impact on overall profitability is often an initial increase followed by a decline as the volume of business declines and revenues no longer cover operating and fixed costs.

Different customer groups will have different-shaped curves, and so having differential pricing strategies will deliver different profit results. However, any organization has constraints (such as volume, bad debt, market share, proportion priced) that prevent it from simply maximizing profit. This implies that the business needs to understand the impact of these constraints and determine the strategy that maximizes profit while operating within these constraints.

It is perhaps worthwhile to make a cautionary note at this point. Some organizations describe the maximization of profit for each customer as “optimization.” This is true if the business is able to make individual decisions without impacting the organization’s overall business goals. However, as previously identified, maximizing profit for each individual customer is not always possible because of the wider business constraints.

Maximizing individual customer profit is a good place to start, but is not the endgame. The use of the term “price optimization” should imply the desire to set price in such a way as to maximize profits within the portfolio through considering business and operational constraints.
Price optimization

To summarize, we have set out the different approaches to making pricing decisions. Customer pricing ranges from a simple portfolio approach to an individual price-based approach which maximizes profit within the business’s constraints.

As previously identified, where there are no portfolio-level constraints, individual customer profit maximization is sufficient, so when determining the type of solution that can be developed, it is important to understand the type of constraints that exist in an organization.

The impact of constraints
Constraints are of several different types. The key constraints for pricing are described here.

Financial constraints
Maximizing profit would imply that taking a decision that increases revenue by 1 euro (€) but costs only 99 cents would be desirable. In reality, organizations require a minimum return on equity or capital which means that such thin margins would be unacceptable.

Most organizations also have a mix of short-term and long-term profit objectives. For example, insurance revenues typically can be booked earlier than interest revenues. As a result, an organization, through adjusting the mix of business, may adjust the balance of short- and long-term revenues through pricing customers, taking insurance in a different way to those not doing so.

Similarly, certain customer groups may have greater cross-sell potential for additional products and services but generate lower short-term revenues. The business has the option of taking shorter or longer-term profits — a dollar of profit today is potentially more attractive than a dollar tomorrow, even when an appropriate discount factor has been applied.

From a similar perspective, most organizations are organized along product lines. Targets are set by product, but the long-term value of the business depends on the ability to cross-sell products across different customer groups. There is a compromise between the different objectives and definitions of profit within the business, and the relative trade-off needs to be effectively managed.

This trade-off is measured according to the different strategies the organization could take. This is shown in the diagram below, which demonstrates the trade-off between customer value and product value. Customer value may consider additional revenue generated from the lifetime customer relationship, while product value just considers the revenue generated from the product being priced.
Operational constraints
Making pricing decisions requires underwriters to manage referral decisions. The amount of resources available to manage the decision is invariably limited, so the ability of a business to fully assess all credit applications will be constrained. Ultimately, the business may choose to decline certain customer groups that are marginally profitable rather than spend considerable cost and resources determining which applications could be accepted.

Uncertainty constraints
Any pricing decision has a degree of uncertainty. The higher the uncertainty, the more risk the organization is taking and the more susceptible the business is to a change in situation. So, in assessing two different loan prices that generate the same expected profit but have different risks, it is likely that the lower-risk option would be selected.

The Basel Accords have attempted to address the whole issue of decision risk through determining the level of economic capital that an organization should hold in order to reflect the risk. The cost of holding the capital and the return on the capital is therefore an integral part of the decision process.
To a degree, the development of risk-adjusted performance measures has meant that an organization has already factored into its (economic) profit to calculate the degree of risk. However, any organization still has the option to assess the degree of risk it wishes to take.

**Legal constraints**

In some markets, such as the United Kingdom, there is a legal restriction on the proportion of customers that can be priced higher than an advertised or typical rate. If this constraint is based on a calculation using number of loans (as opposed to value), it also means that an organization is more likely to price those applications where there is a relatively high benefit of pricing. These tend to be long-term, high-value loans.

It also means that an organization may choose not to price some customers who may be marginally unprofitable just as it could price one customer who was very profitable. The profit of the priced customers being greater than the loss on the nonpriced customers meaning the net profit is positive and the constraint continues to be met.

![Figure 4: Consider three customers (A, B, and C). Customers A and C are marginally unprofitable when not priced, while customer B is highly profitable if priced. The result is a positive net profit.](image)

Incidentally, it is worth noting that as price is increased and the take-up of loans decreases, this creates the opportunity to increase the proportion offered a higher price above that of the proportion actually written.
Reputation and relationship constraints
Even where there is not a legal requirement to limit the amount of pricing, there is likely to be a risk to the organizational reputation when increasing prices on a high proportion of customers. For example, this would be the case if the organization received adverse comment in the press for its pricing strategy where it was demonstrated that only a small proportion of customers received an (attractive) advertised rate. As a result, the business may choose to constrain the amount of pricing it undertakes.

Where the organization works through intermediaries, there may be an implicit (or even explicit) contract between the loan provider and the intermediary or dealer to manage the proportion of customers who are priced or the average rate that is offered through the channel. While individual customers will be priced based on the individual deal, the overall agreement with the dealer may imply an agreed level of business, average price or number of loans.

Effectively, the lender needs to maximize profitability while meeting the contractual obligations for each dealer. But, of course, different dealers provide different quality and volume of business, so the overall terms of business for different dealers are also likely to be different.

Customer constraints
However good the analytics of an organization, it is unlikely that all factors in a decision can be considered in the profit value to be maximized. The implication is that the business will identify a range of offers for which the customer is eligible and not all prices will be offered to all customers. It simply does not make sense to offer the highest price to your most profitable customer — whatever the analytics may say.

Models are built on historical experience of past decisions. If these particular offers have not been made to similar customers, then it is not possible (with absolute certainty) to precisely predict the impact of the price. So any testing of different prices needs to be done with care and circumspection and certainly tested prior to wider rollout.

Bad debt constraints
Organizations are often constrained by the amount of bad debt that the organization can incur. This may be due to the perception created in the financial markets about the poor quality of lending, which creates uncertainty but also may impact the organization’s cost of funds required to service debt. Some organizations that have securitized their debts also have agreements to maintain bad debt rate levels within specified ranges.

This means that while the business could potentially achieve higher profits, it must take a more conservative approach to its pricing strategy.

Budget constraints
Recruiting customers costs money, and this is usually a key constraint in most businesses. While maximizing profit at the pricing decision is a key objective, sufficient revenues need to be generated to cover the cost of recruiting customers.
The implications of constraints
Ideally, an organization should consider the effect of different price offers within the real world constraints. However, managing multiple constraints at multiple levels (total portfolio, specific dealers or channel, for example) is a complex problem, particularly when trying to identify optimum profit. This is a classic optimization problem, but the challenge is to solve such a problem across a large number of customer records, with multiple price points and many constraints applied at different levels.

In addition, it is important not only to satisfy a constraint, but also to understand the cost in doing so. This cost may be in financial terms or in the use or requirement of other resources. It is important that the business understands the trade-off between different objectives in multiple potential scenarios and has the ability to evaluate many different scenarios quickly and then provide the ability to deploy into an operational environment.

The process of optimizing strategies should enable an organization to assess the effect of different actions, decisions, limits or terms on profit and other business metrics. It needs to provide insight into the trade-off between different decision scenarios to enable the business to understand the effect of different constraints on business profitability. Once the business has determined the best trade-off, it is essential that the solution enables the business to implement the results in the minimum time period.

How does price optimization work?

What is price optimization?
Price optimization allows a business to develop an overall pricing strategy that generates a high level of profit within its business constraints. The business can assess the best trade-off between competing objectives and then implement individual customer decisions to meet these objectives.

What are the requirements?
So far this paper has established that:
• Maximizing profit for each customer, although a desirable objective, is rarely the option selected by an organization
• There are many constraints that may influence the exact trade-off between profit and other measures such as volume, bad debt, margin, return on equity or capital and business risk
• These trade-offs are multidimensional and often have complex interactions

In order to manage across different constraints and to choose the best trade-off, it is necessary to predict the effect of different price approaches not only on profit, but also on each of the trade-off dimensions.
To do this, the following is required:

- **Models**: which predict the effect of different prices
- **Data**: past experience, which allows the business to understand the effect of different actions on similar customers
- **Simulation**: the ability to apply models to historical data, simulate the results and generate expected metrics
- **Optimization**: to determine the maximum profit, within the agreed constraints, and to enable the business to evaluate trade-offs
- **Operational deployment** through the creation of a rule set
- **Ongoing evaluation**

**Predictive models**
Optimization models must predict the effect of each price on each customer on the elements of profitability. So, rather than just predicting customer behavior, the models predict customer behavior based on a specific decision or action (e.g., different price points).

**Historic data**
Clearly, different customers respond in different ways to a different price. As a result, in order to evaluate the effect of different prices on similar customers, it is necessary to have offered a range of prices to customers or (at least) offered different prices across the portfolio from which an estimate can be made.

Consequently, when considering price optimization, it is desirable that the organization has previously undertaken differential pricing on similar customers in order to generate the experience and data to build the necessary models.

**The profit equation**
Each organization is likely to have its own definition of customer value or profitability. Some key issues that need to be addressed are:

- **Granular prediction**: Since we are determining customer profit for each price, average portfolio estimates are not sufficient. (Some of the components of profit may be generated at a segment level, but the overall profit needs to reflect different customer behaviors).
- **Forward looking**: We are predicting the future effect of a price decision, so historical costs of customer recruitment, say, are irrelevant.
- **Marginal or variable cost focused**: Fixed costs are only relevant to measure the overall portfolio profitability and do not impact the decision between competing price decisions.
- **Incorporate all significant dimensions of customer value**: or as many as can be practically factored into the decision, in order to measure the overall customer value and not just the value of the product being priced.
Profit model dimensions
The following dimensions could be considered for each loan price for each customer:

- Propensity to take up
- Loan value and term
- Loan insurance commission (if applicable)
- Propensity to take loan insurance
- Application decision cost
- Early settlement propensity
- Potential value of additional loan product sales
- Potential value of other product sales
- Bad debt losses
- Cost of capital

Often organizations have models that estimate these components but the models are typically relevant only to a portfolio or a business unit and do not reflect the difference in values associated with different customer profiles. Over-modeling should be resisted. For example, operating costs are often difficult to assign at such a granular level. The critical factor is whether through taking a specific action, this significantly impacts the cost or revenues assigned.

Modeling loan take-up
Clearly the biggest impact of changing price is on the propensity for the customer to take up the loan — although, from our experience, there is also a significant impact on bad debt losses with some effect on the early settlement rates and even the propensity to take insurance.

Different customers will be more or less likely to take up a loan at different rates. Trying to identify the relationship between price and take-up is critical to understanding the impact on customer profitability. Usually, credit risk is a key determinant of take-up — this is logical since a low-risk customer who is offered a high-rate loan still has the opportunity to go to a competitor to source the loan.

Clearly other factors will influence the customer propensity to go to an alternative organization for their loan, including the length of the existing customer relationship, the purpose of the loan, the customer perception of the organization (including the advertised rate), how time-critical the decision is for the loan, availability of other lenders to the customer (geographic and channel), the value and term of the loan (which would impact the magnitude of change in the monthly payment) and the competitive environment. For example, is the loan take-up based on a directly competitive environment, such as vehicle finance, where there may be several organizations competing directly for the same business?
Using external data, such as credit bureau data that focuses on customer risk, indebtedness and credit demand, enables improved estimates to be made of customer price elasticity for different customers. These estimates are then used to predict the effect on customer profitability. Given that customers have different “tolerance” to be priced at a given level, it is important to try to identify this tolerance and model the results.

Experian’s research has shown that, in addition to credit risk score, existing credit commitments and past payment behavior are a key predictor in estimating loan take-up (and other behaviors).

![Segment index at 6 months](image)

Figure 5

The example above demonstrates how a segmentation system based on external bureau data can be used to predict customer behavior over a 12-month outcome period. Outcomes include whether the customer takes up the loan, defaults, settles the loan, reduces or increases lending, or pays to term.

**Estimating different loss rates by price**

Changing price usually has a relatively small impact on the monthly payment and hence loan payments, so one could assume that the effect on loss rates is also relatively small. Unfortunately, this is not always the case. In practice, a change in rate can have a significant effect on the loss rate. This effect is not just generated from the change in monthly payment, but also from the change in the population that takes up the loan. Customers that take up loans at a given price are an intrinsically different risk from those that don’t — even if they have the same score.
This may come as a shock to some credit analysts, and perhaps you can hear them shouting, “Surely, the score should predict the risk,” but it does and individuals still hold additional information that is not captured in the score. This is factored into the customer’s decision to take up the loan or source it from another provider at a better rate. Risk scores typically don't estimate the customer’s attitude or need.

The result is that the loss rate that one would expect from 100 customers priced at a low rate is lower than that from the same customers at a higher rate because the higher-risk customers tend to take up at the higher rates while the lower risk customers don’t. This phenomenon is sometimes called “adverse selection.”

**Decision simulation**

Once models have been built, they need to be applied to historical data in order to generate data for decision design. This process may be frequently repeated with different data sets, price points, customers eligible for different prices and different subpopulations. Also, some models, such as bad debt predictions, need a long outcome but the models need to be applied to recent data to reflect recent customer profiles.

**Optimization**

Once models have been applied to a relevant data set, the output can be used to develop an optimization decision. An optimization technique needs to be able to:

- Consider all dimensions of profitability
- Apply constraints at the portfolio and subportfolio level (such as risk band, channel, customer type)
- Assess many potential prices
- Modify the eligibility rules assigned for different price offers to different customers
- Analyze the trade-off between different objectives
- Determine the effect of different constraints
- Analyze the effect of different exogenous factors to assess the solution’s stability
- Consider many customers

The output should be an algorithm that can be deployed within the operational environment. The output could take many forms (rules, scorecard, tree) but should reflect the modification of the maximum profit caused through the application of constraints. However, where there are multiple decision points, it is unlikely that a conventional rule-based system would provide sufficient discrimination to allow all rates to be allocated using all profit dimensions.

However, it is likely that changes to the deployed solution will be required on a regular basis due to changes in factors such as market position, base rates, targets and customer profiles. As a result, the regeneration of the decision should be rapid and implemented within hours and days — not weeks and months.
Operational deployment
The requirement for rapid deployment means that evaluation, testing and analysis of any potential strategy should be undertaken in an analytical environment. Testing of strategies in the operational environment should be confined to ensure that the operational test environment generates the same decisions as the simulation environment. This means the analysis of appropriate strategies can be undertaken in advance and the final check undertaken just before the decision to move a new strategy to a live environment.

In addition, the operational deployment needs to support Champion/Challenger testing (on both optimized strategies against rule-based strategies and different optimized strategies), management of price options and eligibility, scorecards (applied to price options, not just customers) and generation of the profit equations.

Evaluation
Once the strategy has been deployed, the effect of customer action needs to be evaluated and compared to the existing Champion and/or against the design of experiment Challenger strategies.

As part of the optimization process, estimates of all the components of profitability should be made. This enables a direct comparison between the estimated and actual results at each stage. However, optimization relies on past data in order to generate an algorithm for deployment. As a result, the population distribution may also affect the overall results of the solution. Clearly there will be differences — no model is perfect — and it will be necessary to update the models periodically.

The first step in evaluation is to measure the actual performance of each profit metric against the values predicted in the model development and optimization processes. This is similar to the bad debt reporting currently undertaken — but undertaken over all relevant dimensions of profit. Clearly where there are differences between actual and forecast, this deviation needs to be assessed and passed back into the optimization evaluation process.

But evaluation also has a critical role to play in generating the data for future model development. The design of any strategy is based on models, which are based on historical data, so the better the data, the better the models. Ideally, similar customers should be offered different rates.
For the purpose of model development, it would be ideal if customers were randomly chosen for different prices and the effect monitored. In practice, this is not feasible, but what may be possible is applying a test whereby customers are allocated different prices on a test basis around a typical price band. This band could be set by risk and would reflect the boundary of potential prices set through optimization.

![Price Optimization Diagram]

**Figure 6:** This chart shows how the business may set a suitable range of potential prices for different risk bands. In order to determine the effect of an optimized strategy and to evaluate the effect of different prices on different customers, assigning a price randomly but within the defined price range would generate a data set for use for future model development.
Price optimization in practice

Price optimization has been operationally deployed within the personal loan sector. It enables businesses to maximize profit within (multiple) constraints and to determine the best trade-off between profit, volume, return on investment and bad debt.

The following case study represents the decision process an organization deploying optimization would go through in developing an optimized strategy.

Business challenge
The business challenge was to improve profitability through better pricing decisions in order to set the most appropriate rate for each customer which maximized revenues within constraints.

Some of the constraints that were considered included:
• Take-up rates
• Proportion of customers priced
• Bad debt rates
• Early settlement rates
• Insurance revenues
• Decision refer rates
• Channel volumes
• Return on investment

Business solution
The solution comprised a fully integrated price optimization system that includes:
• Predictive models
• Marketswitch Optimization® technology
• Strategy management business rules engine
• Analytical reporting system
Current decision

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</tbody>
</table>

Figure 7: The current decision rules generated a profit of £91.6 million. The percentage priced was constrained to be 34 percent of take-up volumes. This was a legal constraint.

Unconstrained baseline

<table>
<thead>
<tr>
<th>Unconstrained</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profit</strong></td>
<td>£131M</td>
</tr>
<tr>
<td><strong>Default rate</strong></td>
<td>8.5%</td>
</tr>
<tr>
<td><strong>Decline rate</strong></td>
<td>27%</td>
</tr>
<tr>
<td><strong>% priced</strong></td>
<td>33.5%</td>
</tr>
<tr>
<td><strong>Take up rate</strong></td>
<td>78.6%</td>
</tr>
<tr>
<td><strong>Change</strong></td>
<td>+42%</td>
</tr>
<tr>
<td><strong>Default rate</strong></td>
<td>+7%</td>
</tr>
<tr>
<td><strong>Decline rate</strong></td>
<td>−29%</td>
</tr>
<tr>
<td><strong>% priced</strong></td>
<td>−1.5%</td>
</tr>
<tr>
<td><strong>Take up rate</strong></td>
<td>−12%</td>
</tr>
</tbody>
</table>

Figure 8: This approach increased estimated profit by 42 percent but also resulted in an increase in the default rate and a substantial reduction in the take-up rate.

Application of constraints

Using the Marketswitch Optimization software, a revised solution has been created with the constraints applied to both these factors.

<table>
<thead>
<tr>
<th>Bad debt constrained</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profit</strong></td>
<td>£114.7M</td>
</tr>
<tr>
<td><strong>Default rate</strong></td>
<td>7.4%</td>
</tr>
<tr>
<td><strong>Decline rate</strong></td>
<td>30%</td>
</tr>
<tr>
<td><strong>% Priced</strong></td>
<td>30.3%</td>
</tr>
<tr>
<td><strong>Take up rate</strong></td>
<td>89%</td>
</tr>
<tr>
<td><strong>Change</strong></td>
<td>+25%</td>
</tr>
<tr>
<td><strong>Default rate</strong></td>
<td>−7%</td>
</tr>
<tr>
<td><strong>Decline rate</strong></td>
<td>−20%</td>
</tr>
<tr>
<td><strong>% Priced</strong></td>
<td>−11%</td>
</tr>
<tr>
<td><strong>Take up rate</strong></td>
<td>−0%</td>
</tr>
</tbody>
</table>

Figure 9: The application of constraints results in a reduction in profitability but also a reduction in default rate and the same take-up rate as previously achieved.
Analyzing the trade-off
The above scenario would be a more attractive position than a simple maximization of profit. However, there is still another consideration. That is, what is the trade-off between profitability and default rates or, put another way, could I reduce default rates without significantly impacting profitability?

In order to achieve this, a range of different optimization scenarios were executed in Marketswitch Optimization. The result shows the trade-off between bad debt and profitability. This is done by evaluating different optimization objective functions which compare the objective of maximizing profit with that of reducing default rates.

![Optimized profit variation](image)

**Figure 10:** The diagram above shows how the business could identify a range of different decision points within a given set of constraints to identify the best trade-off between two dimensions.

This is particularly important when the business is concerned that the default estimates may be optimistic, which may occur when the economy is about to enter a recession. In this case, selecting a strategy with a more conservative bad debt estimate would be prudent.
Conclusions

Price optimization delivers real benefit
Organizations are considering how best to address key business challenges in customer decisioning, and price optimization is increasingly viewed as a key part of that change process.

Pricing is a complex customer decision that needs to reflect the dynamic market conditions and individual customer behavior.

The benefits of price optimization
Price optimization is a true game-changer because it enables an organization to work from a top-down perspective — rather than a bottom-up one. The business is able to understand the trade-offs between different scenarios and measure the effect of applying constraints.

Price optimization enables an organization to determine the best price for each customer and to manage its wider business goals and objectives. Not only can it be used in price decisioning, but the same methodology can be applied to most customer decisions across the Customer Life Cycle.

Price optimization allows the management of business change to be directly addressed. Organizations can better plan how to incorporate decisioning into the wider strategic, operational and competitive environment.

The challenges of optimization
Optimization is a different approach to customer decisioning. It challenges conventional wisdom since it requires the business to score the offer, not the customer. As a result, optimization will require smarter model building and more governance since organizations are now able to simulate many different business scenarios and evaluate the merits of each. Of course, an advanced analytics team should aspire to this goal anyway. Organizations should aim to set strategies without understanding the incremental effect of the actions on different customer groups.

But the result is that business strategists will be able to understand the benefits of changing customer strategies and implement the changes with a far greater degree of certainty, and this will give them increased status and influence in organizations.
Strategy Optimization solutions from Experian

**Figure 11:** The Experian Optimization solutions comprise two key components, expert consulting and advanced software.

**Enterprise optimization solutions**
Experian® offers a range of optimization solutions that help organizations maximize the value of every action taken, across marketing and credit activities.

**Experian optimization software**
Experian Decision Optimization platform includes two software solutions: Marketswitch Optimization and Strategy Tree Optimization. Marketswitch Optimization develops optimal, data-driven decisioning strategies at the individual customer level, and Strategy Tree Optimization helps clients quickly design optimized decision strategy trees to deploy into an existing business rules engine. Both solutions use patented, mathematical, constrained optimization technology. Each product can be used on its own or as a component integrated with most analytical tools, decision automation engines and customer management applications.

**Expert optimization consulting**
Our optimization experts provide best practice solution design and implementation services, including specialist analytical services to help you define and implement an analytical framework for testing, modeling and tracking the decision inputs.

We work with you to identify appropriate processes, resources and skill sets required to operate the solution, or we can manage the solution on your behalf. We can provide data discovery and enhancement and analysis services as well as develop, implement and manage any models that are required.
Price optimization

Experian can deliver a range of services to assist organizations to adopt and deploy price optimization solutions. It offers a consulting-led proposition that is backed up using world-leading technology, data and analytics.

The approach is to deliver flexible user-maintained technology supported by consulting and analytical resources to provide maximum benefit as early as possible. The solution can be incorporated into existing decision processes and application processing systems and can be used to manage all aspects of customer decisioning. Key to the solution is the ability to integrate the key processes of analysis, optimization, deployment and evaluation. This enables optimized strategies to be updated and rapidly deployed.

Optimization requires a relevant set of historical data based on specific customer profiles, possible prices that may be offered to each customer, models and lending policy. The generation of relevant data requires the ability to simulate different combinations using recent loan applications. The Experian solution includes the ability to simulate the effects of different models, price options, policy and profit equation by applying appropriate parameters to historical data before passing the results into Marketswitch Optimization.

Getting started with price optimization

Experian consultants provide a range of consulting services to enable organizations to progress rapidly to price optimization deployment. These are summarized below.

Readiness audit
• How close is the business to realizing benefit price strategy optimization?
• Assessment of the business readiness for price strategy optimization

Road map
• How do we start price strategy optimization from where we are today?
• Attain price strategy optimization through a customized plan of initiatives

Proof of concept
• What is the potential benefit of using price strategy optimization?
• Evaluation of price strategy optimization through low-impact analysis Implementation
• How to deploy/integrate price strategy optimization in the business
• Full production deployment of the Marketswitch Optimization software

Best practice review
• Ongoing refinement of the price strategy optimization framework
• Update of models
Price optimization in retail consumer lending

About Experian Decision Analytics

Experian Decision Analytics enables our clients to make analytics-based customer decisions that support their strategic goals, so they can achieve and sustain significant growth and profitability. Through our unique combination of consumer and business information, analytics, decisions, and execution, we help clients to maximize and actively manage customer value.

Meaningful information is key to effective decision-making, and Experian is expert in connecting, managing, interpreting and applying data, transforming it into information and analytics to address real-world challenges. We collaborate closely with clients to identify what matters most about their business and customers, then create and implement analytics-based decisions to manage their strategies over time.

In today’s fast-paced environment where developing, implementing, and sustaining an effective strategy is imperative, Experian Decision Analytics helps organizations unlock a wealth of benefits immediately — and set the stage for long-term success.

Increased revenue: Our products and services enable clients to increase revenue by providing the insight and agility they need to find and engage the right customers, target products more effectively, and grow market share.

Controlled risk: A broad range of risk-management products and services help our clients to verify identity and manage and detect fraud, optimize collection and recovery, and balance risk and reward.

Operational efficiency: Experian Decision Analytics helps our clients to quickly integrate various information and processes to enhance operational efficiency and boost agility. Our flexible, collaborative approach helps organizations increase speed to market, enhance business agility and improve the quality of customers’ experiences.

Compliance as differentiation: Proven expertise lets clients use compliance as a source of competitive advantage. Experian Decision Analytics helps ensure compliance with essential regulations, while helping organizations better understand customers.