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SDG&E Non-Residential Default Critical Peak Pricing Analysis of Enrollment Choices

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1 INTRODUCTION

In May 2008, SDG&E implemented a default critical peak pricing (CPP) tariff that applies to all non-residential, bundled service customers with peak demands exceeding 20 kW who have interval meters.[1] Once SDG&E has completed full deployment of advanced meters, this critical peak pricing will be the default for all commercial and industrial customers.[2] Customers defaulted onto the tariff were offered bill protection for the first year in order to provide them an opportunity to test the tariff without risk. Customers that chose to remain on the CPP rate were provided the opportunity to insure against bill volatility by protecting a portion of their load from the high energy prices during the peak period on critical event days. In 2009, roughly 600 additional customers were defaulted onto default dynamic pricing. In addition, 2008 enrollees whose bill protection was scheduled to expire were presented a shadow bill—a comparison of bills on default CPP and the opt-out time-of-use tariff—and asked to decide whether to remain on the default tariff.[3]

SDG&E was the first utility in California to implement default CPP pricing for non-residential customers. In addition to large non-residential customers (200 kW and up), SDG&E also defaulted approximately 600 medium customers (20-200kW) onto critical peak pricing, providing data for the first time regarding mass market customer choices and reaction to default CPP. The CPUC has directed PG&E to default customers above 200 kW onto default dynamic pricing in 2010 and to default all nonresidential customers who have the appropriate metering onto default critical peak pricing by 2011. SCE started to phase in default dynamic pricing starting in late 2009. In addition, the CPUC has directed all the California utilities to default small and medium customers onto default critical peak pricing.

As such, the analysis of the opt-out rates and the key drivers of the enrollment and capacity reservation decisions was designed to provide useful insight into the development of enrollment forecasts and ex-ante load impacts for SDG&E, PG&E, and SCE, and to other utilities and policy makers who may be considering similar pricing strategies.

The primary objectives of the research in this study are:

- To identify and quantify the drivers of customer decisions to stay on default CPP rather than opt out to the alternative time-of-use (TOU) tariff;

[1] Throughout this report the word customer is synonymous with service account.

[2] All customers in California with peak demands exceeding 200 kW have had interval meters installed since roughly 2002. In SDG&E's service territory many customers below 200 kW are also interval metered. Within a couple of years, SDG&E will have completed its advanced metering deployment, and all customers in the service territory will have interval meters.

[3] After customers had made their choices, the CPUC extended bill protection for 2008 enrollees for another year. Customers were not informed of the potential for extension of bill protection at the time they made their decisions. In other words, they made decisions about their tariff and capacity reservation levels as if the bill protection were about to expire.

- For those who elect to stay on default CPP, to identify and quantify the drivers of customer decisions regarding how much of their load, if any, to safeguard from higher critical peak period charges;
- To assess the effect of first year shadow bills on the customer decisions regarding whether to remain on or transition from default CPP after bill protection expired;
- To assess the effect of first year shadow bills on the customer decisions regarding the amount of load to insure against higher priced critical price periods; and
- To produce models that can be applied to estimate expected enrollment and capacity reservation level decisions for C&I customers that will be defaulted onto critical peak pricing in the future. The models were designed to adjust for factors such as industry mix, customer size, customer load shapes, and underlying rate design. They do not, however, control for differences in the enrollment process.

Customers defaulted onto the CPP rate in 2008 and 2009 had the option of opting out to their otherwise applicable tariff—a TOU rate with a peak demand charge. In 2008 and 2009, almost 2,400 customers were defaulted onto the CPP rate, and 1,765 (73.7%) stayed on the rate. Within that group of 2,400, 1,215 customers faced the second-year decision of whether to remain on the tariff after first year bill protection was scheduled to expire. Of these, 1,125 elected to remain on the tariff (92.6%).

Of the 2,400 customers defaulted onto the CPP rate, 70.2% percent of the customers made an active choice by either altering their insurance levels or by opting out of default CPP. For the remaining 29.8% of customers, it is not possible to distinguish whether customer decisions reflect inertia or active agreement with the defaults.

Customers that remained on the CPP rate had the opportunity to insure against bill volatility by protecting a portion of their load from the high energy prices during the peak period on event days. In exchange, customers paid a Capacity Reservation Charge (CRC) on a monthly basis for each unit of demand (kW) protected from critical peak period prices. Customers could accept the default level of demand protected from critical peak charges, which was set to 50% of the average monthly summer peak demand, or adjust the protected demand to a level of their choice (this process is described in detail below).

For the 1,765 customers defaulted onto CPP in 2008 and 2009 that remained on the tariff, approximately 970 (45%) adjusted the amount of load insured against CPP prices. Of the customers that made adjustments, over 90% elected to completely remove the load insurance and fully expose their load to critical peak prices.

The remainder of this report is structured as follows: Section Two provides a detailed overview of the rate history in California, the SDG&E default CPP and opt-out TOU rates, and the process employed to transition customers onto default CPP. Section Three describes the customer choices regarding default CPP and the key drivers of differences in the opt-out rates, including the effect of structural wins and losses on that decision. Section Four describes the customer choices regarding adjustments to the default amount of load insured from critical peak prices.

2 OVERVIEW OF RATES AND TRANSITION PROCESS

This section provides background on California's large non-residential tariffs, the rate options available to SDG&E customers, and the transition process. Although rates for individual utilities vary, several aspects of rate design are coordinated. More importantly, the CPUC provided guidance to investor-owned utilities regarding dynamic pricing tariff design and the transition process for default critical peak pricing. For utilities interested in using the predictive models, it is critical to understand similarities and differences in the enrollment process. Although the predictive models can control for differences in industry mix, customer size, customer load shapes, and underlying rate design, they cannot control for differences in the enrollment process.[4]

2.1 Overview of California Critical Peak Pricing Tariffs and History

Prior to 2008, all of the utilities' non-residential CPP rates were voluntary, "opt-in" rates. Beginning in May 2008, SDG&E implemented a default CPP tariff with an "opt-out" provision, and began transitioning previous volunteers onto the new default rate. SCE has proposed a default opt-out CPP rate to be implemented in late 2009, and PG&E was ordered to establish a default CPP tariff in 2010, with a transition period for customers in different size categories.

The utilities' voluntary CPP rates had similar structures, but differed in terms of price levels, hours of application, number of events that may be called, and months of applicability. The CPP rates at the three utilities typically had a "moderate" price, in the $0.30 to $0.50 per kWh range, for the first three hours (four hours for SDG&E), and a "high" price, in the $0.80 to $1.80 per kWh range, for the last three hours. PG&E's rate was tied to customers' otherwise applicable tariff (e.g., it provides *credits* during non-CPP on-peak and part-peak hours and *charges* on CPP days), and thus takes on different values for different rate classes and subclasses.

SCE offered two CPP tariffs. One, CPP – Volumetric Charge Discount ("CPP-VCD"), is of similar structure to the other utilities. The other, CPP – Generation Capacity Charge Discount ("CPP-GCCD"), was aimed at large (> 500 kW) customers, and involved a single high CPP price for the entire six-hour critical period on event days in return for a discounted summer on-peak demand charge.

Enrollment in CPP at PG&E expanded from 337 in 2006 and 656 in 2007, to 841 in 2008. Total CPP load amounted to 586 MW. Manufacturers, offices, schools, etc. continued to make up the bulk of PG&E's CPP enrollment. SCE's enrollment in CPP expanded from just 15 customers in 2006, to 44 in 2007, and 219 in 2008. Total demand amounted to about 164 MW. Manufacturers made up the bulk of SCE's CPP enrollment. SDG&E moved approximately

[4] A standard process was employed for defaulting customers onto CPP. Without observed variation in the processes, it is not possible to measure the effect of possible variations in the process used for defaulting customers onto CPP.

1,800 customers of size greater than 20 kW onto the new default CPP rate in May 2008. Approximately 600 additional customers greater than 20 kW were defaulted onto CPP rates between June 2008 and May 2009.

In 2009, the CPUC provided the utilities guidelines for rate design of dynamic pricing. The decision standardized several key elements of rate design in California for investor owned utilities:

- It made the default tariff for large, medium, and small commercial and industrial customers a dynamic pricing tariff;
- Default rates were to include a critical peak price during critical peak periods and time of use rates during non-critical periods;
- The opt out tariff for large, medium, and small commercial and industrial customers should be a time varying rate;
- The critical peak price should represent the cost of capacity used to meet peak energy needs plus the marginal cost of energy – in essence, all capacity value is loaded on critical peak hours;
- Dynamic pricing rates should include a capacity reservation charge, or a similar feature, that allows customers to protect a specific amount of load from higher critical prices; and
- The utilities should offer first year bill protection to customers defaulted onto dynamic pricing rates.

The decision also covered several other elements of rate design. In short, it standardized default tariffs, opt-out tariffs, and several components of the default process. As a result, the findings from SDG&E are clearly relevant for other California utilities and for customer segments that have not yet defaulted. Outside of California, it is necessary to compare the rates, default process, and ancillary rate design features (e.g., bill protection, insurance against higher critical prices) to fully understand the extent to which the SDG&E customer opt-out decisions are an indicator of how customers elsewhere would accept default critical-peak pricing.

2.2 Overview of SDG&E Default Critical Peak Pricing Rate Options

SDG&E customers were defaulted onto critical-peak pricing, but still had the option to opt out to a time-of-use tariff and/or adjust the amount of load they insured against high prices on event days. This section describes the critical peak pricing default tariff, the tariff to which customers could opt out and options regarding adjusting the amount of load insured against higher CPP prices on event days.

SDG&E's default CPP tariff applies to commodity service only and consists of a three-period rate. During the summer, the peak period is from 11 am to 6 pm on weekdays, and the semi-peak period is from 6 am to 11 am and 6 pm to 10 pm on weekdays. The off-peak period is from 10 pm to 6 am on weekdays and all day on weekends and holidays. Under default CPP, prices vary across rate periods on all weekdays, but are higher during the peak period on CPP event days than on normal weekdays. The maximum number of event days that can be called under the default CPP tariff is 18 and customers are notified by 3 pm the day before an event occurs. Customers were told to expect an average of nine events per year. Prices and rate periods vary seasonally[5] and the summer period is from May 1st to September 30th.

SDG&E's non-commodity service also has prices that vary by time of day according to the same rate periods. The non-commodity portion of the tariff has monthly charges as well as non-coincident demand charges and charges for maximum demand during the peak-rate period.

At the same time that the new default CPP tariff was introduced, SDG&E modified the opt-out TOU tariff for commodity service for 20 kW and above customers. Prior to May 2008, there was no on-peak demand charge for TOU commodity service, but the new opt-out tariff implemented in May 2008 had an on-peak demand charge. In exchange, the summer on-peak price was reduced by 3.2¢. Thus, when considering whether or not to stay on the default CPP tariff, the alternative that customers had to consider was not their prior tariff, with no commodity demand charges, but rather a new tariff with demand charges for the commodity and different prices for energy by rate period compared with the prior tariff.

To understand the price incentives inherent in tariffs that contain both demand and energy charges, it is instructive to combine the charges into a single measure of customers' effective energy charge. This is accomplished by allocating demand charges over time periods in a month in proportion to the likelihood of incurring an additional demand charge in those periods. In effect, the new tariff increased summer on-peak period prices by roughly 3.5¢, and lowered winter on-peak prices by the same amount.

Table 1.1 compares the commodity prices associated with the old TOU tariff, the new opt-out TOU tariff, and the default CPP tariff. Prices for the non-commodity portion of service do not vary across the three tariffs depicted in Table 1.1.

Another feature of the default CPP tariff is the opportunity to adjust the amount of load that is insured against higher CPP event day prices. This limits the amount of bill volatility experienced across years and months. Customers electing to protect a portion of their load pay a Capacity Reservation Charge (CRC) each month. The CRC price, shown in the first column of Table 1.1, is $6.20/kW per month or $74.4 per kW-year. If a customer does not proactively select a portion of their load to be protected by the CRC option, the CRC amount is set to 50% of their maximum on-peak demand recorded during the most recent full summer billing period. If the value cannot be determined for a customer, the default CRC level is set to zero.

[5] The complete tariff can be found at http://www.sdge.com/business/esc/documents/cppTariff.pdf .

Table 1.1:
Commodity-Related Charges for Default CPP and Opt-out TOU Tariffs[1]

Season	Type of Charge	Period	Default CPP	Opt out TOU	Pre-default TOU
Summer (Apr-Oct)	Energy Rates ($ per kWh)	CPP Event Period [2]	$1.03396	NA	NA
		On-Peak	$0.09283	$0.09783	$0.14033
		Semi-Peak	$0.07428	$0.79270	$0.08283
		Off-Peak	$0.05417	$0.05911	$0.05807
	On-Peak Demand Charge ($ per kW)	On-Peak	NA	$5.81	NA
	Capacity Reservation Charge ($ per kW/month)	Monthly charge	$6.25	NA	NA
Winter (Nov-Apr)	Energy Rates ($ per kWh)	CPP Event Period [2]	$1.03396	NA	NA
		On-Peak	$0.09027	$0.09521	$0.14033
		Semi-Peak	$0.08259	$0.08753	$0.08283
		Off-Peak	$0.06029	$0.06523	$0.05807
	On-Peak Demand Charge ($ per kW)	On-Peak	NA	$0.19	NA
	Capacity Reservation Charge ($ per kW)	Monthly charge	$6.25	NA	NA

[1] Illustrative secondary service voltage level rates

[2] Only applies to kW above capacity reservation

NA= Not applicable

2.3 Transition Process

Customers are defaulted onto the CPP tariff starting in early May and given 45 days to opt out or adjust the amount of load insured against CPP event-day prices. If a customer does not opt out of the rate, they are obligated to stay on the rate for 12 months. Customers who stay on the rate are given bill protection for the first 12 months of service following the default date.

At the end of the 12-month period, SDG&E calculates each customer's bill based on opt-TOU and compares the shadow bill for each month with the amount billed under the default CPP tariff. If the bill amount under CPP is greater than the amount under opt-out TOU, SDG&E refunds the difference. In all cases, at the end of the bill protection period, SDG&E sends a report summarizing the analysis and provides each customer 45 days from receipt of the report to opt-out of the rate or adjust the amount of load insured against CPP event day prices. If customers do not opt-out, they continue on the rate without bill protection.

Customers who register online are provided with access to a bill analysis tool they can use to determine what their bills would be under the CPP and opt-out TOU tariffs, based on their prior usage patterns, amount of load insured from higher CPP event day prices, and assumptions about the number of CPP event days and load reductions they might make during high-price periods. The billing analysis tool is also available to all customers through their assigned account representatives. In addition, customers who register online also have access to their interval data and load shape information through SDG&E's kWickview online energy monitoring tool.

3 OPT-OUT RESULTS AND DRIVERS OF CUSTOMER DECISIONS

3.1 Summary of Opt-out Results

Customers defaulted onto the CPP rate in 2008 and 2009 had the option of opting out to their otherwise applicable tariff—a TOU rate with a peak demand charge. In total, customers defaulted onto the tariff had approximately over 625 MW of demand coincident with high system loads, and customers remaining on default CPP had approximately 445 MW of demand coincident with high system loads.[6]

In 2008, the first year the default CPP tariff was implemented, 1,767 customers were defaulted onto the rate, and 1,320 (75%) stayed on the default CPP. Of those, 1,215 were provided a comparison of 1st year monthly bills to what they would have been charged under the opt-out TOU tariff, and asked to make a second decision when first-year bill protection was scheduled to expire.[7] In 2009, an additional 627 customers were defaulted onto CPP and made the first-year decision. Of those, 71% remained on default CPP. In total, 73.8% of customers that made a first-year decision regarding default CPP did not opt out of the tariff. Over 90% of customers faced with the second-year choice elected to remain on the tariff. The cumulative retention rate for customers that made a first and second year choice was 68.3%.

[6] Demand coincident with high system loads was calculated as the average from 12-6pm on the highest 10 system load days in the year prior to default CPP. The values are approximate.

[7] In total, 1,215 rather than 1,320 were offered the 2nd year choice. The difference is due to normal business account turnover.

Table 3.1:
Customer Default CPP Choices With and Without Bill Protection By Customer Size

Size Category[1]	1st Year Decision		2nd Year Decision [2]		
	Accounts	% Remaining on CPP-D	Accounts	% Remaining on CPP-D	Cumulative % Remaining on CPP-D
100 kW or less	380	72.6%	137	92.7%	67.3%
100 to 200 kW	307	74.9%	166	94.0%	70.4%
200 to 500 kW	1,062	74.9%	627	91.4%	68.5%
500 kW and up	494	72.5%	258	93.4%	67.7%
Unclassified	151	70.9%	27	100.0%	70.9%
TOTAL	**2,394**	**73.8%**	**1,215**	**92.5%**	**68.3%**

[1] Based on the average June-September monthly maximum on peak demand from the year prior. Unclassified customers lacked historical data over the time period.

[2] Customers facing a second year decision were provided monthly bill comparisons of the prior year under default CPP and opt out TOU rates. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

In total, 67% of first-year decisions involved a customer initiated action – customers either altered their insurance levels or opted out of default CPP. For the remaining 33% of customers, it is not possible to distinguish whether customer decisions reflect inertia or acceptance of the default tariff and amount of load insured against higher CPP event day prices.

Table 3-2 summarizes customer decisions regarding default CPP, by industry, with and without bill protection. In 2008 and 2009, a total of 2,398 customers made the first-year decision about whether to opt out of default CPP. Over 80% of accounts in the wholesale, transportation, and water district industries remained on default CPP. In contrast, 53.7% of hotels and apartments remained on default CPP. In almost all industries, over 90% of customers faced with the second year choice elected to remain on the tariff. The large exception is schools, where only 71% of accounts elected to continue on default CPP after the first year.

Table 3.2:
Customer Default CPP Choices With and Without Bill Protection By Industry Type

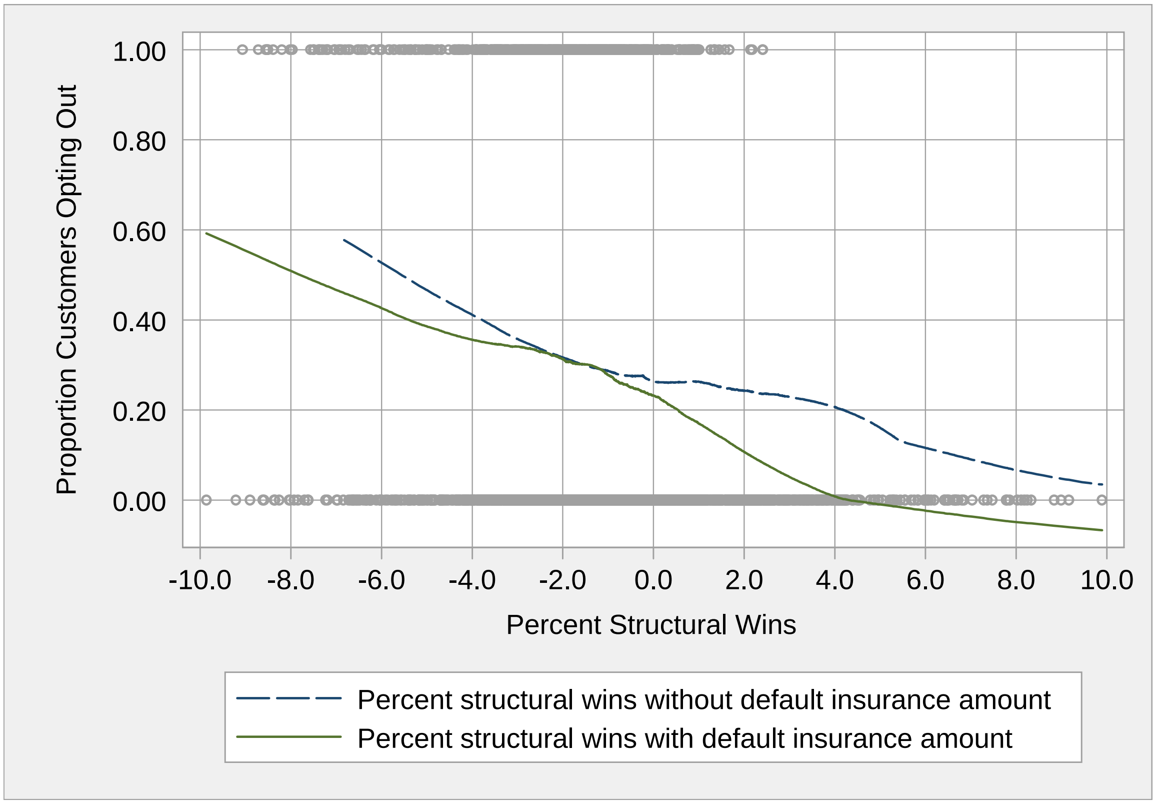
Industry	1st Year Decision		2nd Year Decision [1]		
	Accounts	% Remaining on CPP-D	Accounts	% Remaining on CPP-D	Cumulative % Remaining on CPP-D
Agriculture, Mining, and Construction	34	73.5%	19	89.5%	65.8%
Manufacturing	326	76.1%	175	93.1%	70.8%
Wholesale, Transportation	188	87.2%	143	95.8%	83.5%
Water Districts	165	80.0%	99	96.0%	76.8%
Retail stores	189	74.6%	107	98.1%	73.2%
Offices, Finance, and Services	530	74.7%	287	95.1%	71.0%
Hotels and Apartments	242	53.7%	89	92.1%	49.5%
Schools	424	74.3%	117	71.8%	53.3%
Institutional/Government	286	72.0%	169	93.5%	67.3%
Other or unknown	10	90.0%	10	100.0%	90.0%
Total	**2,394**	**73.8%**	**1,215**	**92.5%**	**68.3%**

[1] Customers facing a second year decision were provided monthly bill comparisons of the prior year under default CPP and opt out TOU rates. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

When customers were defaulted onto CPP, they were told to expect nine events per year, on average, with variation from year to year based on weather conditions. As a result, it is possible to compare how customer decisions varied as a function of structural wins and losses – that is wins and losses experienced under the expected number of events if customers do not change their behavior. The structural wins and losses are instructive because they allow for comparisons independent of the rate designs. In other words, structural wins and losses can be calculated for alternative critical peak pricing rate designs.

Figure 3-1 shows the relationship between opt-out rates and structural wins and losses. It reflects decisions in the initial default year and structural wins assuming the expected nine events per year. Regardless of whether structural wins and losses are calculated with or without a share of the load insured against critical peak period prices, customers with larger structural wins are less likely to opt-out. As expected, those with higher structural losses were most likely to opt-out of the default CPP tariff. In general, customers made rational decisions. Overall, the default CPP tariff produces net structural wins and losses of zero, with or without the default amount of load insured from higher critical peak prices. However, the default insurance mitigated volatility and the extent of wins and losses for individual customers.

Figure 3.1:
Relationship Between Opt-out Rates and Structural Wins/Losses



Structural wins/losses are not the only factors that affect opt-out rates, and it does not follow that structural losers automatically opt out of the tariff. Actual wins and losses are affected by the extent to which customers shift or reduce load and the number of critical peak pricing events during the year. Some structural losers can come out ahead if they are able to reduce or shift load.

3.2 Regression Model Development

To fully understand the factors associated with customer opt-out decisions, it is necessary to assess how customer characteristics are associated with the likelihood they opt out of default CPP while holding other factors constant. This is best accomplished through choice models. A choice model estimates the likelihood that a customer will choose between two or more options as a function of customer characteristics, the characteristics of the choices available, or both. These models not only identify the key factors associated with opt-out decisions but can control for differences in load shapes, industry type, customer size, and rate design—providing the ability to extrapolate to other service territories, or to additional customers within SDG&E's

service territory. This report section documents the choice models that were developed and that can be used by others to predict the percent of customers who are likely to stay on a similar rate.

The models described below estimate opt-out rates for both first year and returning customers. Importantly, they include customer decisions when bill protection expires, after customers have experienced the rate and have been presented with comparative information about wins and losses. However, SDG&E did not call any events in 2008. As a result, the level of variation in last year's actual wins and losses is narrow in comparison to a summer with multiple-event days. Variation in actual wins and losses occurred only due to differences in customer hourly electricity consumption patterns and the share of customer load insured against CPP event day prices. In short, it was possible to estimate the effect of actual wins and losses on customer decisions but results are less robust out of the small range of wins and losses observed in 2008–2009.

Two probit models were estimated for opt-out decisions. The first model was designed for wide application to different rate designs, potentially for utilities other than the SDG&E. The second model is based on the share of usage that occurs during the summer peak period. It was developed because it reflects the use of heuristics and because SDG&E had such information for all small and medium commercial customers as a by-product of existing time-of-use rates.

- **Bill Comparison Model**: The key variable in this model is percent structural wins – the difference between the customer's bill on the default CPP and opt-out TOU tariffs, divided by the opt-out TOU bill amount – assuming no change in electricity consumption patterns. This variable indicates whether or not a customer is a structural winner and the magnitude of that structural win or loss. Because customers were told to expect, on average, nine event days and the CPP tariff was designed based on nine event days, the structural wins were calculated assuming nine event days.
- **Percent Peak Load Model**: The key variable in this model is the percent of annual load that falls in the peak period on all summer days. All customers who were defaulted onto the CPP tariff were already on TOU rates. In addition, all SDG&E small and medium commercial customers scheduled for default are on TOU rates, making it feasible to apply this model to them using existing available monthly bill data. Unlike, the bill comparison model, hourly interval data is not a prerequisite for estimating the extent of structural wins and losses.

Clearly, the key variables in both models are highly correlated, as the magnitude of structural wins and losses is largely a function of the percent load that is subject to high prices. An important advantage of the bill comparison model is that it can be used to reflect the impact of default and opt-out tariffs that differ from those that were used to estimate the model. That is, if PG&E or SCE has a different set of default and opt-out tariffs (e.g., higher or lower critical peak period prices) that produce different numbers of structural winners and losers, the model will reflect this difference in the forecasted participation rates for each option. However, if most customers rely on heuristic decision making, unless the alternative rates are extremely different from those underlying the estimating sample, the heuristic model may predict as accurately as the bill comparison model.

Both regression models are presented in the following section. However, the subsequent discussion focuses on the bill comparison model because it is more flexible and can be applied to a wider range of rate designs.

3.2.1 Methods and Explanatory Variables

To understand the key factors associated with customer choices about default critical peak pricing, we employed multivariate regression analysis. The regression model development was grounded in common sense, the accuracy of model estimates, robustness of the coefficients, the ability to produce opt-out likelihood estimates for customers outside the estimating sample, and the explanatory power of the model.

The model selection was done through backward elimination, which involves starting with all candidate variables and testing them one by one for statistical significance, deleting any that are not significant. For categorical variables or interactions, the decision is based on a joint test for significance. Presentation of the final model, along with several intermediate models, allows readers to assess the robustness of the coefficients. Robust coefficients are stable in magnitude and statistical significance across different models.

The regressions were estimated using probit models and the standard errors were corrected to reflect the fact that customer decisions across multiple facilities may be related and that second-year decisions are likely related to first-year decisions. Table 3-3 lists the variables tested in the analysis.

Table 3.3:
Explanatory Variables Tested in Opt-out Regression Models

Variable	Description
Online Account	Indicator for customers that had signed on for an online account which provided direct access to interval data and billing analysis tools. All customers, including those without an online account, could request interval data and bill comparisons from their account representative.
Percent Annual Structural Wins/Losses	Percent annual difference in bills between CPP-D and opt-out TOU assuming no change in customer behavior, the expected number of events (9), and the default capacity reservation level (50% of
Online Account x Percent Annual Structural Wins/Losses	The interaction between online account and the structural wins. Customers with direct access to billing tools were expected to be more engaged and better informed of their structural wins or losses.

Variable	Description
Dummy for Returning Customers	A variable to reflect the inertia from first year decisions.
Prior Year Structural Wins/Losses	Actual wins and losses experienced under dynamic pricing relative to opt-out TOU in the prior year. For customers making the first year decision, prior year actual wins and losses were zero.
Summer Peak Period Volatility	Volatility in summer peak period usage as measured by the normalized standard deviation. Peak period volatility affects demand charges and, though related, is not always due to weather sensitivity.
Industry Indicators	Indicator variables for ten industries. The base industry was set to the most common category: offices, finance, and services.
Natural log of summer peak to off-peak ratio	The peak to off peak ratio is a crude measure of customer load shape. It related to structural wins without capacity reservation, though not exclusively. It was included to capture potential decisions relying on heuristics - that is, rules of thumb about peaky loads.
Account Age	Years since establishment of the account. Older accounts were expected to be associated with more stable businesses and were more likely to have experienced other rate transitions such as mandatory TOU (2003).
Account age – squared	Years since account was established squared. The variable was included to capture non-linearities in the relationship between account age and customer decisions, if any.
Load factor	Load factor is a standard industry measure of load shape and volatility. It is the average demand divided by the maximum demand. Because the measure is not coincident to system peaking conditions, we did not anticipate a strong relationship to customer decisions and tested the hypothesis.
Load factor squared	Load factor squared. The variable was squared to capture non-linearities in the relationship between load factor and customer decisions, if any.
Natural log of annual consumption (MWh)	A measure of customer size. The natural log was employed because the effect of size, if any, was expected to diminish.

In addition to the variables above, we also tested binary variables representing each individual customer service representative assigned to an account. Collectively, these variables nearly doubled the explanatory power of the model and there was wide variation across account representatives in the percent of assigned accounts that stayed on the default rate after controlling for load shapes, industry mix, and size. However, we did not have access to any information about the activities that account representatives engaged in with customers, so it was not possible to assess whether certain activities that other utilities might engage in with customers would influence customer choice. Therefore, the version of the model that includes account representative variables cannot be used by other utilities to predict customer choice.

Table 3-3 provides the regression model coefficients for all models tested. The regression coefficients used in the final model are robust—the magnitude and statistical significance remains relatively constant as variables are added and removed. Not all variables in the final model are significant. As mentioned earlier, for categorical variables or interactions, the decision is based on a joint test for significance. Once we settled on the final model, the robustness of the coefficients were further tested by removing additional variables and assessing whether the magnitude or significance of the explanatory variables changed.

Table 3.4: Regression Model Coefficients

Variable	Model 1	Model 2	Model 3	Model 4	Final Model	Model 6	Model 7	Model 8
Online Account	0.171*	0.1550	0.1570	0.1560	0.1550	0.1680	0.1650	
Percent Annual Structural Wins/Losses	-0.094***	-0.091***	-0.091***	-0.091***	-0.097***	-0.101***	-0.084***	-0.072***
Online Account x Percent Annual Structural	-0.053*	-0.055**	-0.054*	-0.055*	-0.054*	-0.050*	-0.055*	-0.083***
Dummy for Returning Customers	-0.612***	-0.624***	-0.624***	-0.630***	-0.630***	-0.645***	-0.654***	-0.651***
Prior Year Structural Wins/Losses	-0.136***	-0.136***	-0.136***	-0.136***	-0.135***	-0.133***	-0.108***	-0.106***
Summer Peak Period Volatility	-0.390***	-0.371***	-0.372***	-0.371***	-0.379***	-0.352***		
Industry								
Agriculture, Mining & Construction	0.3230	0.3330	0.3290	0.3150	0.3460			
Manufacturing	0.0720	0.0720	0.0670	0.0610	0.0770			
Wholesale, Transport, other utilities	-0.0920	-0.0930	-0.0960	-0.0970	-0.0930			
Water Districts	0.2230	0.2220	0.2160	0.1970	0.1760			
Retail stores	-0.0380	-0.0300	-0.0310	-0.0370	-0.0370			
Offices, Finance, Services (Base)								
Hotels and Apartment Buildings	0.522***	0.529***	0.523***	0.514***	0.511***			
Schools	0.1670	0.1740	0.1690	0.1640	0.1960			
Institutional/Government	0.1940	0.2150	0.2110	0.2010	0.1920			
Other or unknown	-0.3490	-0.3350	-0.3360	-0.2600	-0.1960			
Natural log of summer peak to off-peak ratio	0.1200	0.1190	0.1090	0.1010				
Account Age	-0.0130	-0.0130	-0.0130					
Account age – squared	0.0000	0.0000	0.0000					
Load factor	0.2740	-0.1880						
Load factor squared	0.0330	0.2750						
Natural log of annual consumption (MWh)	-0.0720							
Constant	-0.5740	-0.916**	-0.924***	-0.988***	-0.893***	-0.775***	-0.863***	-0.790***
N	3,383	3,383	3,383	3,383	3,383	3,383	3,383	3,383
Log Likelihood	-1,436.6	-1,439.5	-1,439.6	-1,441.0	-1,441.7	-1,461.9	-1,476.5	-1,480.0
Pseudo R-squared	0.150	0.149	0.149	0.148	0.147	0.135	0.127	0.125

Legend: * p<.10; ** p<.05; *** p<.01

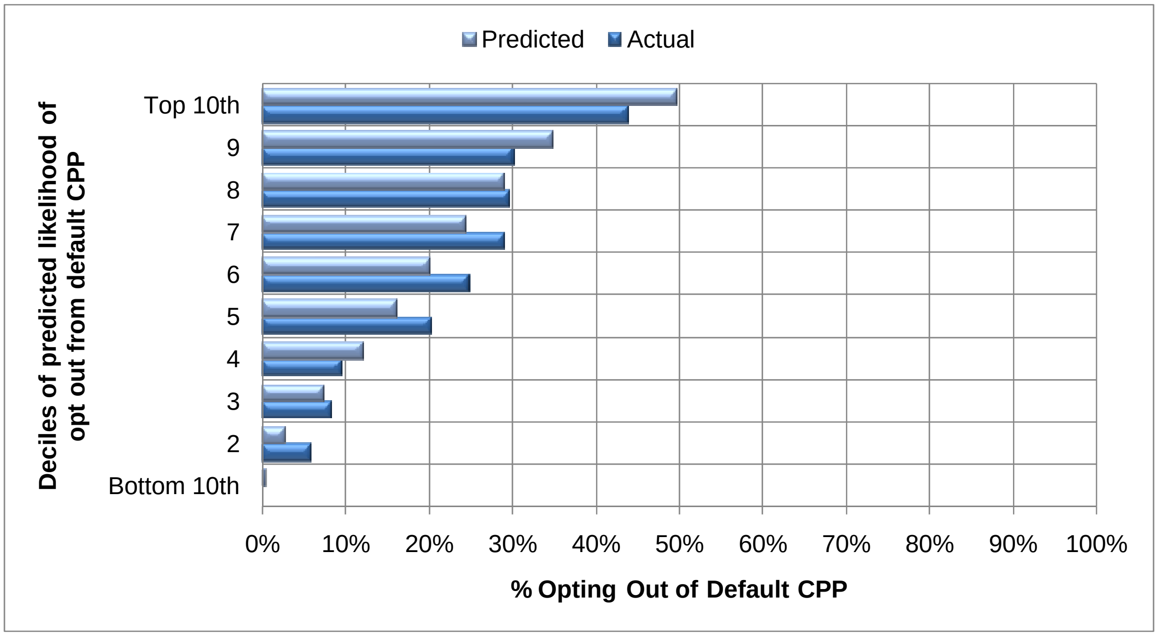
3.2.2 Accuracy and Predictive Capability of the Regression Models

Understanding the accuracy, predictive capability, and limitations of the default critical peak pricing enrollment model is important if the model is used to predict enrollments elsewhere. While the regression model can factor in differences in rate designs, load shapes, and industry mix, it cannot account for differences in the process used for defaulting customers. In light of the detailed CPUC dynamic pricing guidance, the California default process and rate designs must be relatively similar. Outside of California, differences in the process for defaulting customers onto critical peak pricing must be assessed and considered.

In assessing accuracy, we will apply a rigorous comparison of predicted and actual customer choices across a variety of customer characteristics. The comparison is best done using a split-sample approach. Individual customers are randomly assigned to a group, the regression model is estimated using half the customers, and used to predict opt-out rates for customers that were not used to estimate the regression. For both sets of customers, actual customer choices are known, making it possible to compare regression-model predictions to actual customer choices. When and if discrepancies between predicted and actual values are encountered, we explore the potential reasons behind them and modify the regression models until arriving at the final model.

Figure 3-2 compares whether customers expected to have high opt-out rates indeed have high opt-out rates. This is accomplished by classifying customers into 10 groups, ranked from lowest to highest by predicted likelihood of opting out. For each group, the predicted opt-out rates are compared to the actual opt-out rate. As can be seen, customers predicted to be more likely to opt out indeed had higher opt-out rates.

Figure 3.2:
Opt-Out Comparison of Actual and Predicted Choices by Predicted Opt-Out Rate Deciles



As seen in Figure 3-2, the model does an extremely good job of predicting the percent of customers who leave the default rate for each business type. The figure also shows clearly the variation in opt-out rates across business segments and the much higher opt-out rate for hotels and apartments.

Figure 3.3:
Opt-Out Comparison of Actual and Predicted Choices by Industry

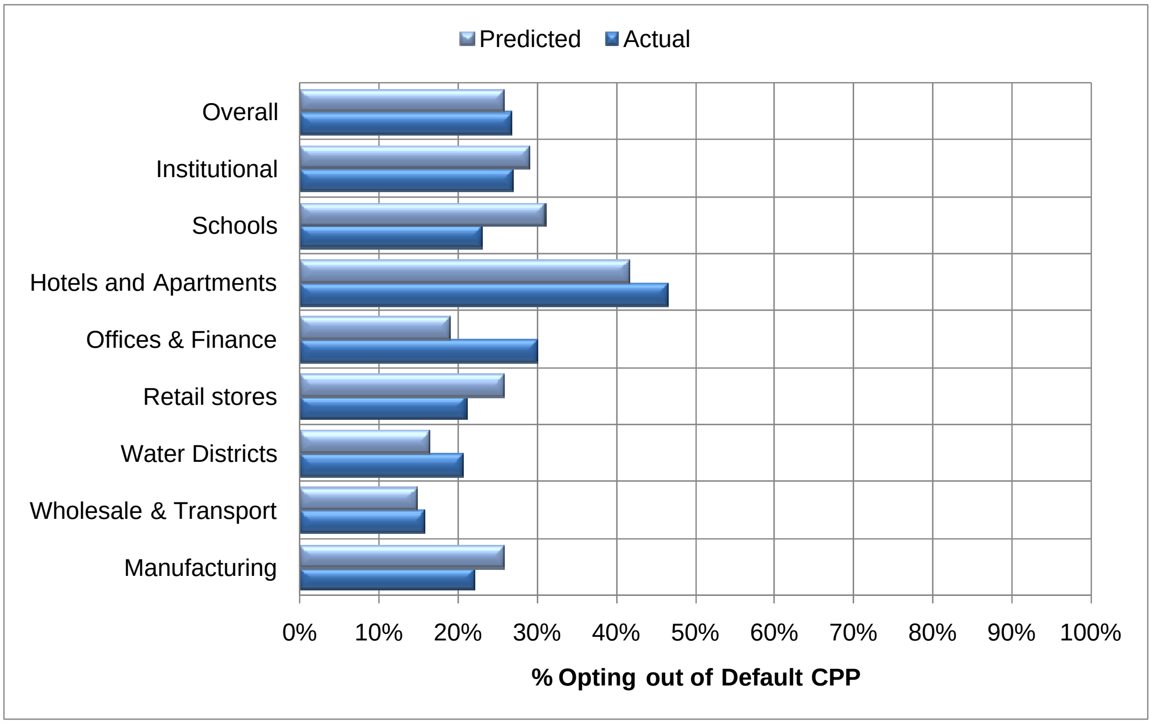
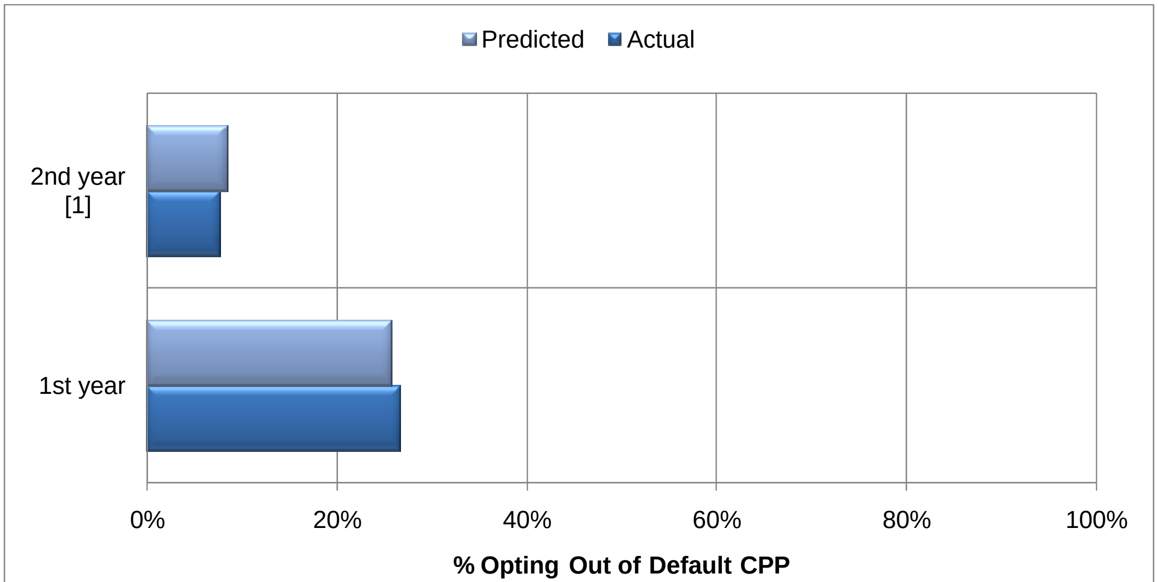


Figure 3-4 compares predicted and actual opt-out values for both first-year and returning customers. The model predicts accurately for both customer groups. This graph also depicts the discrepancy between first-year and returning opt-out rates. The majority of customers who opt out do so in the first year—roughly one quarter—with a smaller amount of customers opting out the following year. As default CPP continues, each additional year enriches the model and provides useful data to better understand customer decisions over the years.

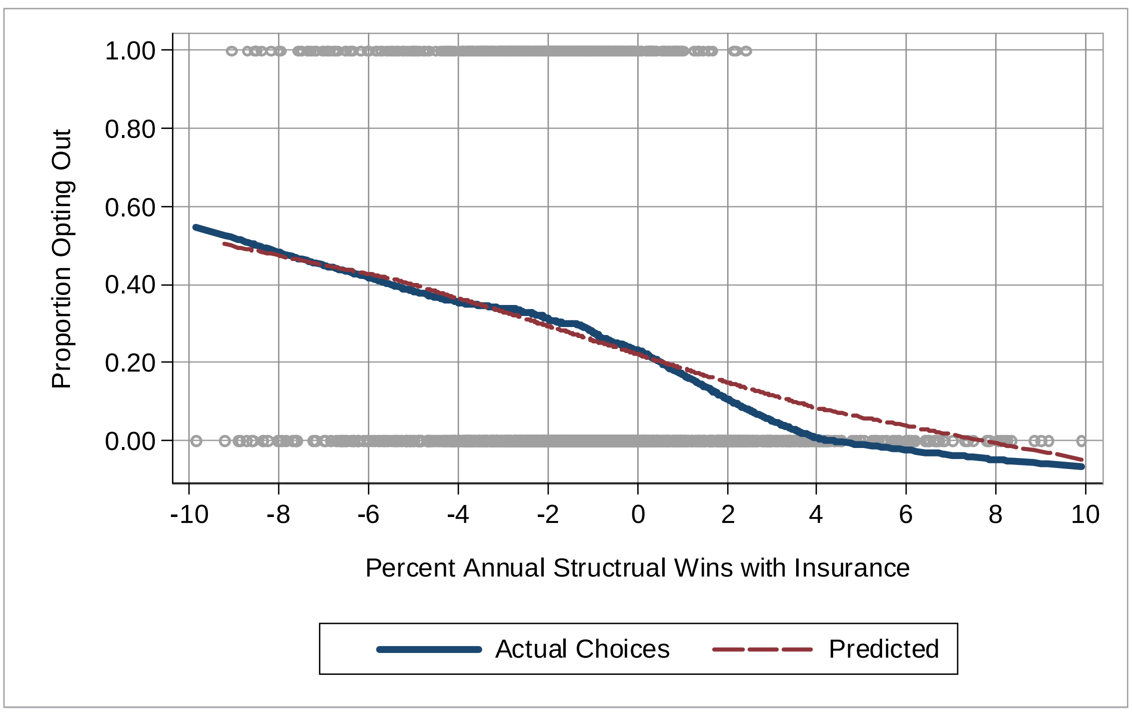
Figure 3-5 compares predicted and actual opt-out decisions for customers who are structural winners and losers for the first year. As indicated, structural losers have a much higher probability of choosing the opt-out TOU option than do structural winners, and the opt-out rate varies with the magnitude of the predicted structural wins and losses. The regression model predicts the relationship between structural wins and opt-out decisions relatively well.

Figure 3.4:
Opt-Out Comparison of Actual and Predicted Choices by Decision Year



[1] Customers facing a second year decision were provided monthly bill comparisons for the prior year under default CPP and the opt-out TOU tariff. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection an additional year after customers had made their second year decisions regarding default CPP.

Figure 3.5:
Opt-Out Comparison of Actual and Predicted Choices by Structural Wins



3.3 Interpreting Regression Model Results

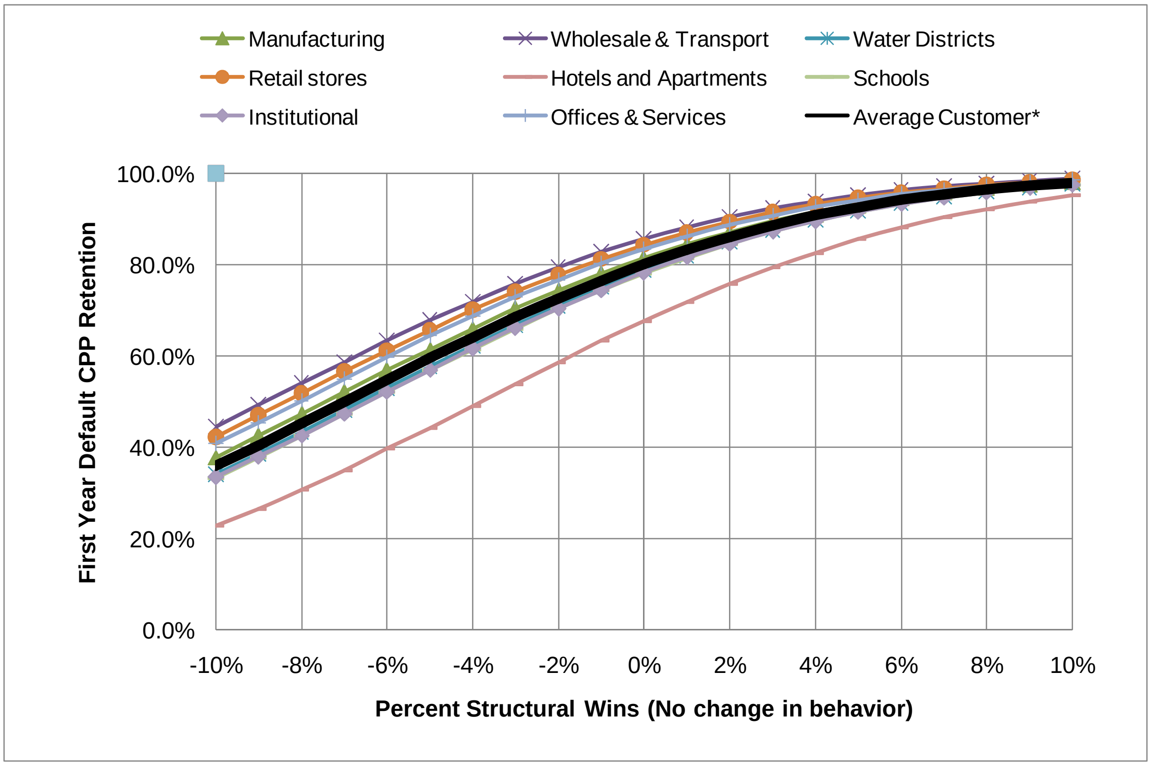
Probit models are designed for analysis of yes/no decisions such as whether or not customers remain on default CPP. One of their core strengths is that the impacts vary for customers depending on their starting points[8]. Policy tools such as incentives or first year bill protection can be expected to have only a small effect for customers who have mostly made up their mind about critical peak pricing; while those tools should have a stronger effect on more uncertain customers. The probit models customize the effects for each customer based on their predisposition for or against a default critical peak pricing tariff. This adds a layer of complexity to the interpretation of the coefficients, though. Appendix A contains the marginal effects of the regression model and average customer characteristics. However, the role of specific customer characteristics, structural wins, and actual wins are best understood by examining how changes in particular characteristics are associated with the likelihood that customers remain on default CPP while holding other variables constant.

3.3.1 Industry and Structural Wins

Figure 3-6 summarizes the effect of structural wins by industry and for the average SDG&E customer. Wins have a smaller effect than losses on likelihood of retention. Although this is partly a function of the type of non-linear technique employed, it mirrors actual customer decisions. All other factors held constant: customers with 5% structural losses, zero structural losses, and 5% structural wins, would have a 73.6%, 81.8%, and 88.1% likelihood of trying default CPP the first year. It is also noteworthy that with zero structural wins and losses, the model estimates 81.8% of customers would remain on default CPP for the first year. This differs from SDG&E's first year retention rate, 73.8%. On average, SDG&E customers were structural winners without factoring in the default amount of load insured from critical peak prices and associated charges. Average structural wins were approximately 0.9% without any load insured against critical peak prices and -3.6% with the insurance. The default amount of load insured was calculated as 50% of the non-coincident monthly summer demand averaged across the summer months. For many customers, the default load insured was too high because their monthly peaks were non-coincident with high system load. In general, their load rarely exceeded the default amount of load insured during peak periods of high system load. Lastly, the graph shows some differences in default CPP first-year retention by industry. In particular, hotels are less likely to remain on first year critical peak pricing than other business types after controlling for differences in structural wins.

[8] Technically, probit models bound estimated likelihood of decisions between zero and 100 percent. This is accomplished by using the cumulative normal or Gaussian distribution. The coefficient for each explanatory variable reflects the change in normalized standard deviations associated with a one unit change in the explanatory variables. The anchor or base likelihood can be customized for each individual.

Figure 3-6:
First Year Default Critical Peak Pricing Retention Rates by Structural Wins/Losses and Industry

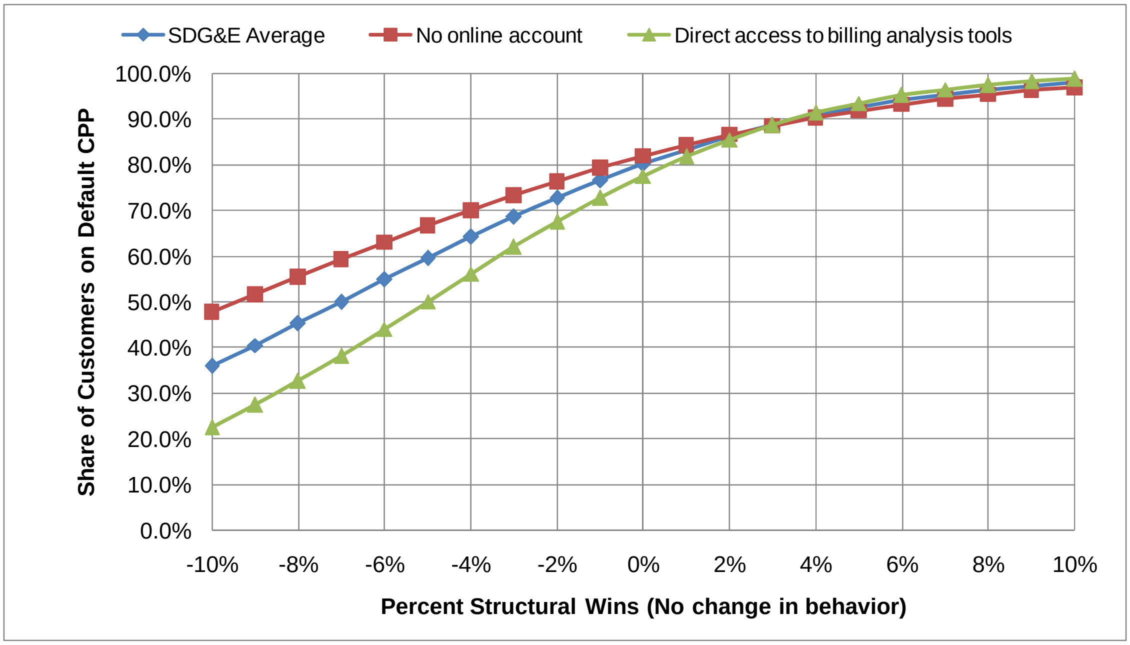


3.3.2 Direct Access to Billing Analysis Tools and Interval Data

A key driver of customer decisions was whether they had registered for an online account. Customers who registered online were provided with access to interval data and a bill analysis tool they could use to conduct scenario analysis under the default CPP and opt-out TOU tariffs. The bill analysis tool factored in historical hourly usage patterns, the amount of load insured from higher CPP event day prices, the assumed number of CPP event days, and load reduction scenarios for high-price periods. Billing analysis was also available to all customers through their assigned account representatives. Figure 3-7 shows the relationship between direct access to billing analysis tools through an online account and structural wins.

On its own, the presence of an online account did not help predict whether a customer would opt out of default CPP. However, the direct access to billing analysis tools was associated with a stronger relationship between opt-out decisions and structural wins and losses. Customers with direct access to the billing analysis tools were more sensitive to structural wins and losses than those without an online account. Both types of customers generally understood how the tariffs affected them and were more likely to opt out if they were structural losers. However, a customer with 5% structural losses and direct access to billing analysis tools was more likely to make the rational decision and opt out than a customer without an online account.

Figure 3.7: First Year Default CPP Retention Rates by Structural Wins/Losses and Online Account



The results suggest that better information helps customers make appropriate decisions. However, it is not possible to rule out self-selection of customers as the reason for the differences in sensitivity to structural wins. After all, customers elect whether or not to register for an online account and several unobservable factors that may affect selection—such as customer engagement and understanding of electricity—are potentially correlated with opt-out decisions.

3.3.3 Additional Predictors of First Year Opt-out Rates

A few additional predictors of first-year opt-out rates were volatility of summer on-peak maximum demand and the share of annual consumption that occurred outside of summer months. Customers with high volatility were more likely to remain on default critical peak pricing. This is partly explained by the fact that the opt-out alternative had a summer on-peak demand charge, which could have a substantial impact on customers with highly volatile monthly maximum demand. Holding all other factors constant, customers with 25th percentile volatility had a likelihood of remaining on default critical peak pricing of 71.9%. In contrast, the likelihood for customers with 75th percentile volatility was 75.9%. The share of annual usage in non-summer months was included to reflect the potential use of heuristics in customer decisions. A common assumption is that customers with a large share of summer usage are worse off under critical peak pricing. This is generally true prior to factoring in that the default insured load against higher critical peak prices. With the insurance, the relationship is less clear. The variable was included to quantify the use of this heuristic, and the effect was in the direction expected. Customers who consumed most of their electricity in non-summer months were more likely to remain on the default critical peak pricing tariff, though the variable was marginally significant.

3.3.4 Factors That Do Not Predict First Year Opt-out Rates

Several additional variables were tested but were not statistically significant, including the age of the account, load factor, customer size (annual kWh), and climate zone. In many ways, the factors that were not significant are as relevant as the predictors of opt-out decisions. Despite the wide range of customer size, after load shapes, structural wins, industry mix, and other factors were controlled for, customer size was not a statistically significant predictor of opt-out choices. This is contrary to the common assumption that small and medium customers make less optimal decisions because they are less sophisticated about electricity use. Importantly, the customers ranged in size from 20 kW annual peak demand to over 15,000 kW annual peak demand, and approximately 25% of customers defaulted onto critical peak pricing were under 200 kW.

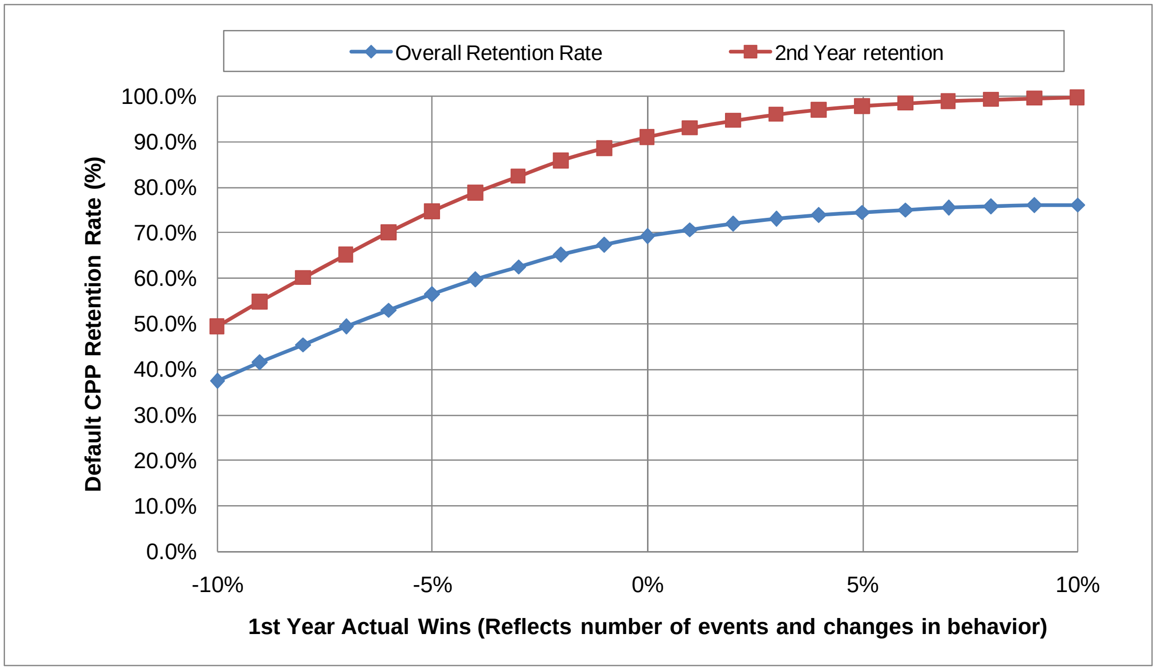
3.3.5 Retention of Customers on Default CPP After First Year

The decision to remain on default critical peak pricing when bill protection was scheduled to expire was influenced by the above factors plus experienced wins and losses in the first year. [9] At the end of the first year on default critical peak pricing, customers were provided a letter and report summarizing the annual and monthly bills under critical peak pricing and the opt-out TOU tariff. The regression model included a 2nd year indicator variable to quantify the "stickiness" of the first-year decision and a variable reflecting the percent wins or losses experienced in the first year.

Figure 3-8 compares the relationship between first-year actual wins and losses and the second-year retention rate. For reference, it also includes the overall retention rate, which factors in both first and second year opt-out decisions.

[9] Customers facing a second year decision were provided monthly bill comparisons of the prior year under default CPP and opt out TOU rates. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

Figure 3.8:
2nd Year Default CPP Retention Rates by Actual First Year Percent Wins and Losses



The actual wins and losses reflect several factors including the number of events called, customer adjustments to the amount of load insured against higher prices, and any changes in load patterns associated with critical peak pricing rate structure. A key limitation of the first-year experience from customers defaulted in 2008 is that no events were called. Despite the lack of events, there is still substantial variation in actual wins and losses due to the aforementioned factors – 98% of customers experienced bill differences between -5.1% and 12.2% in comparison to the opt-out TOU tariff. However, the lack of events limited the range of wins and losses observed. If the opt-out model is applied elsewhere to estimate opt-out after the first year, any comparisons outside of the observed range should be viewed with caution.

4 INSURING LOAD FROM CRITICAL PEAK PRICING – CAPACITY RESERVATION DECISIONS

Customers that remained on default critical peak pricing were provided the opportunity to insure against bill volatility by protecting a portion of their load from the high energy prices during the peak period on critical event days. The default amount of load insured was calculated as 50% of the non-coincident monthly summer peak demand averaged across the summer months. Customers could adjust the amount of load insured during the 45-day decision period. For about a third of customers, the default load insured was potentially too high because their relevant monthly peaks were non-coincident with high system load.

4.1 Summary of Opt-out Results

Overall, 54.7% of the 1,765 customers that tried default CPP adjusted their insurance levels for the first year. Among customers making the second year, post-bill protection decision, 56.9% adjusted their insurance levels. Of the customers that made adjustments, over 90% elected to completely remove the load insurance and fully expose their load to critical peak prices. In the second year, most of the customers that made adjustments in the first year, further reduced the amount of load insured, if they could. Table 4.1 summarizes customer decisions regarding whether to retain or adjust the default amount of load insured against high critical peak prices – also known as the capacity reservation charge (CRC).

Table 4.1:
Customer Load Insurance Choices With and Without Bill Protection by Customer Size

Size Category[1]	1st Year Decision (bill protection)		2nd Year Decision[2]	
	Accounts	% Remaining on default CRC	Accounts	% Remaining on default CRC
100 kW or less	276	25.8%	127	29.1%
100 to 200 kW	230	45.2%	156	43.6%
200 to 500 kW	794	57.2%	574	51.9%
500 kW and up	358	36.9%	241	30.3%
Unclassified	107	35.5%	27	33.3%
TOTAL	**1,765**	**45.3%**	**1,125**	**43.1%**

[1] Based on the average June-September monthly maximum on peak demand from the year prior. Unclassified customers lacked historical data over the time period.

[2] Customers facing a second year decision were provided monthly bill comparisons of the prior year under default CPP and opt out TOU rates. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

Table 4-2 summarizes customer decisions regarding adjustment to the default amount of load insured, by industry, with and without bill protection. Overall, wholesale, transportation, and water district industries were most likely to adjust the amount of load insured. They were also the most likely to remain on default CPP. In addition, institutional customers were also more likely than other industries to adjust the amount of load insured. At the other end of the spectrum, hotels and schools were more likely to retain the default amount of load insured against critical peak prices.

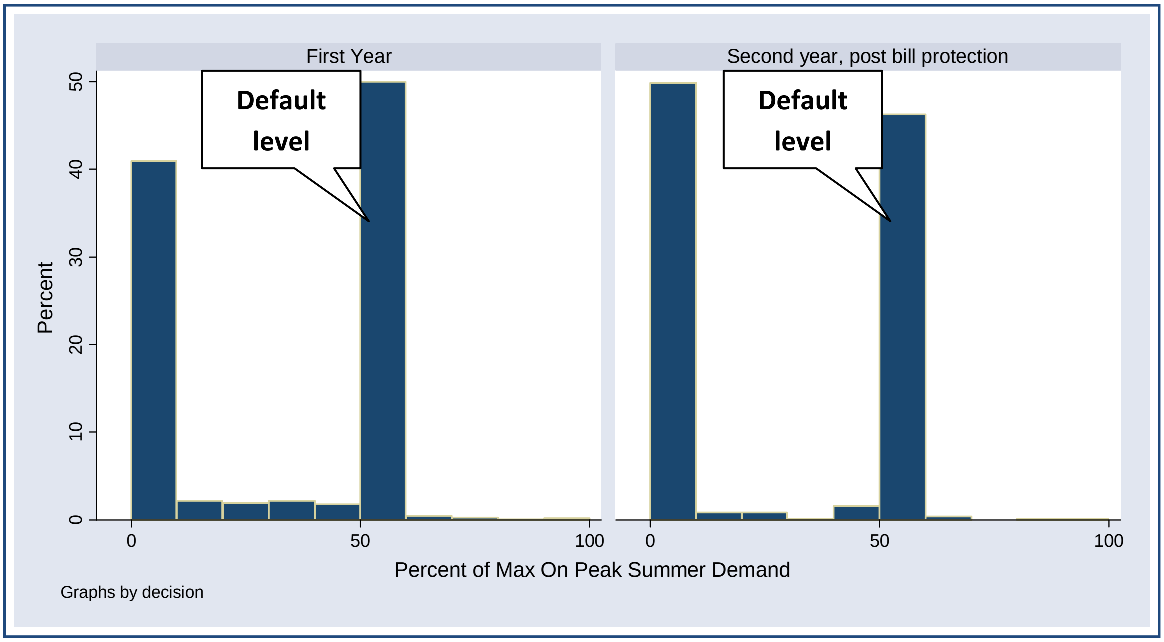
Table 4.2:
Customer Load Insurance Choices With and Without Bill Protection by Industry Type

Industry[1]	1st Year Decision		2nd Year Decision[2]	
	Accounts	% Remaining on default CRC	Accounts	% Remaining on default CRC
Agriculture, Mining, and Construction	25	64.0%	17	58.8%
Manufacturing	248	51.6%	163	39.9%
Wholesale, Transportation	164	29.9%	137	25.5%
Water Districts	132	12.9%	95	8.4%
Retail stores	140	52.1%	106	55.7%
Offices, Finance, and Services	396	47.7%	273	49.1%
Hotels and Apartments	130	59.2%	82	59.8%
Schools	315	56.5%	84	92.9%
Institutional/Government	206	32.0%	158	24.1%
Other or unknown	9	75.0%	10	90.0%
Total	**1,765**	**45.3%**	**1,125**	**43.1%**

[1] Customers facing a second year decision were provided monthly bill comparisons of the prior year under default CPP and opt out TOU rates. At the time of their decision, bill protection was scheduled to expire. The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

Figure 4-1 shows the relationship distribution of the amount of load insured, with and without bill protection, as a percent of average summer maximum demand. Clearly, most customers either retained the default amount of load insured or completely eliminated the load insurance. The graph also highlights that second-year customers were more likely to adjust the amount of load protected from critical peak pricing downward to zero.

Figure 4.1:
Distribution of Load Protected from Critical Peak Pricing by Decision Year



4.2 Regression Model Development

The share of the customer load insured against high critical peak prices is, technically, not a yes or no choice. However, customers generally behaved as if it were such a choice by either electing the default or no protection. Because of this, the customer decision was best modeled as a discrete yes or no choice.

As with the opt-out decision, to fully understand the drivers and factors associated with customer default load insurance decisions, it is necessary to assess how customer characteristics are associated with customer decisions while holding other factors constant. This is best accomplished through regression-choice models.

The models described below estimated acceptance of the default insurance settings for both first-year and returning customers. Second-year decisions reflect customer decisions when bill protection expires, after customers have experienced the rate, and after they were presented with comparative information about wins and losses.

Both regression models are presented in the following section. However, the subsequent discussion focuses on the bill comparison model because it is more flexible and can be applied to a wider range of rate designs.

4.2.1 Methods and Explanatory Variables

To understand the key factors associated with customer choices about the default amount of load to insure from critical peak prices, we employed multivariate regression analysis. The model selection was done through backward elimination, which involves starting with all candidate variables and testing them one by one for statistical significance, and then deleting any that are not significant. For categorical variables or interactions, the decision is based on a joint test for significance. Presentation of the final model along with several intermediate models allows readers to assess the robustness of the coefficients. Robust coefficients are stable in magnitude and statistical significance across different models.

The regressions were estimated using probit models and the standard errors were corrected to reflect the fact that customer decisions across multiple facilities may be related and second-year decisions are likely related to first-year decisions. Table 4-3 describes the variables tested in the model.

Table 4-3:
Explanatory Variables Tested in Default Insurance Regression Models

Variable	Description
Online Account	Indicator for customers that had signed on for an online account which provided direct access to interval data and billing analysis tools. All customers, including those without an online account, could request interval data and bill comparisons from their account representative.
Percent Annual Structural Wins/Losses	Percent annual difference in bills between CPP-D and opt-out TOU assuming no change in customer behavior, the expected number of events (9), and the default capacity reservation level (50% of average maximum monthly peak demand).
Online Account x Percent Annual Structural Wins/Losses	The interaction between online account and the structural wins. Customers with direct access to billing tools were expected to be more engaged and better informed of their structural wins or losses.
Dummy for Returning Customers	A variable to reflect the inertia from first year decisions.
Prior Year Structural Wins/Losses	Actual wins and losses experienced under dynamic pricing relative to opt-out TOU in the prior year. For customers making the first year decision, prior year actual wins and losses were zero.
Summer Peak Period Volatility	Volatility in summer peak period usage as measured by the normalized standard deviation. Peak period volatility affects demand charges and, though related, is not always due to weather sensitivity.
Industry Indicators	Indicator variables for ten industries. The base industry was set to the most common category: offices, finance, and services.

Variable	Description
Natural log of summer peak to off-peak ratio	The peak to off peak ratio is a crude measure of customer load shape. It related to structural wins without capacity reservation, though not exclusively. It was included to capture potential decisions relying on heuristics - that is, rules of thumb about peaky loads.
Account Age	Years since establishment of the account. Older accounts were expected to be associated with more stable businesses and were more likely to have experienced other rate transitions such as mandatory TOU (2003).
Account age – squared	Years since account was established squared. The variable was included to capture non-linearities in the relationship between account age and customer decisions, if any.
Load factor	Load factor is a standard industry measure of load shape and volatility. It is the average demand divided by the maximum demand. Because the measure is not coincident to system peaking conditions, we did not anticipate a strong relationship to customer decisions and tested the hypothesis.
Load factor squared	Load factor squared. The variable was squared to capture non-linearities in the relationship between load factor and customer decisions, if any.
Natural log of annual consumption (MWh)	A measure of customer size. The natural log was employed because the effect of size, if any, was expected to diminish.

Table 4-4 provides the regression model coefficients for all models tested. The regression coefficients used in the final model are robust—the magnitude and statistical significance remains relatively constant as variables are added and removed. After FSC determined the final model, the robustness of the coefficients were further tested by removing additional variables and assessing whether the magnitude or significance of the explanatory variables changed.

Table 4.4: Default Insurance* Regression Model Coefficients

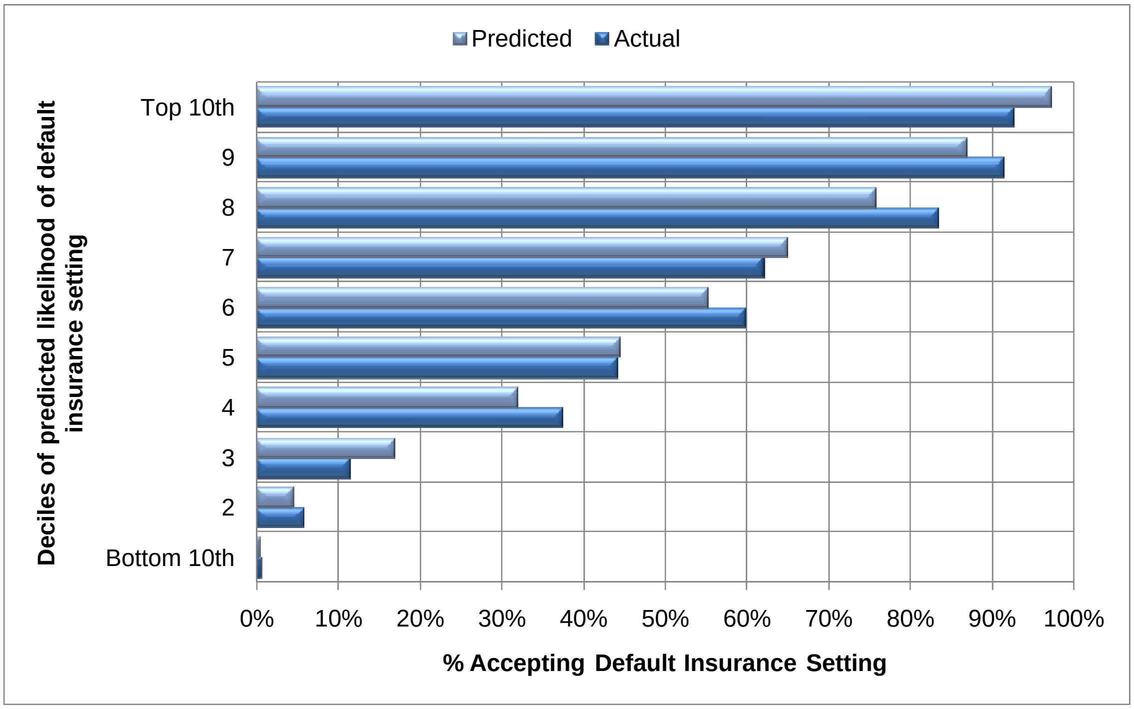
Variable	Model 1	Model 2	Model 3	Model 4	Final Model	Model 6	Model 7	Model 8
Online Account	0.171*	0.1550	0.1570	0.1560	0.1550	0.1680	0.1650	
Percent Annual Structural Wins/Losses	-0.094***	-0.091***	-0.091***	-0.091***	-0.097***	-0.101***	-0.084***	-0.072***
Online Account x Percent Annual Structural Wins/Losses	-0.053*	-0.055**	-0.054*	-0.055*	-0.054*	-0.050*	-0.055*	-0.083***
Dummy for Returning Customers	-0.612***	-0.624***	-0.624***	-0.630***	-0.630***	-0.645***	-0.654***	-0.651***
Prior Year Structural Wins/Losses	-0.136***	-0.136***	-0.136***	-0.136***	-0.135***	-0.133***	-0.108***	-0.106***
Summer Peak Period Volatility	-0.390***	-0.371***	-0.372***	-0.371***	-0.379***	-0.352***		
Industry								
Agriculture, Mining & Construction	0.3230	0.3330	0.3290	0.3150	0.3460			
Manufacturing	0.0720	0.0720	0.0670	0.0610	0.0770			
Wholesale, Transport, other utilities	-0.0920	-0.0930	-0.0960	-0.0970	-0.0930			
Water Districts	0.2230	0.2220	0.2160	0.1970	0.1760			
Retail stores	-0.0380	-0.0300	-0.0310	-0.0370	-0.0370			
Offices, Finance, Services (Base)								
Hotels and Apartment Buildings	0.522***	0.529***	0.523***	0.514***	0.511***			
Schools	0.1670	0.1740	0.1690	0.1640	0.1960			
Institutional/Government	0.1940	0.2150	0.2110	0.2010	0.1920			
Other or unknown	-0.3490	-0.3350	-0.3360	-0.2600	-0.1960			
Natural log of summer peak to offpeak ratio	0.1200	0.1190	0.1090	0.1010				
Account Age	-0.0130	-0.0130	-0.0130					
Account age – squared	0.0000	0.0000	0.0000					
Load factor	0.2740	-0.1880						
Load factor squared	0.0330	0.2750						
Natural log of annual consumption (MWh)	-0.0720							
Constant	-0.5740	-0.916**	-0.924***	-0.988***	-0.893***	-0.775***	-0.863***	-0.790***
N	3,383	3,383	3,383	3,383	3,383	3,383	3,383	3,383
Log Likelihood	-1,436.6	-1,439.5	-1,439.6	-1,441.0	-1,441.7	-1,461.9	-1,476.5	-1,480.0
Pseudo R-squared	0.150	0.149	0.149	0.148	0.147	0.135	0.127	0.125

4.2.2 Accuracy and Predictive Capability of the Regression Models

In assessing accuracy, we apply a rigorous comparison of predicted and actual customer choices across a variety of customer characteristics using a split-sample approach. Individual customers are randomly assigned to a group, the regression model is estimated using half the customers, and used to predict opt out rates for customers that were not used to estimate the regression. For both sets of customers, actual customer choices are known, making it possible to compare regression model predictions to actual customer choices.

Figure 4-2 compares whether customers expected to have a high likelihood of remaining on the default insurance settings do so. This is accomplished by classifying customers into 10 groups, ranked from lowest to highest by predicted likelihood of remaining with the default insurance settings. For each group, the predicted actual rates of remaining on the default insurance settings are compared. The regression predicted estimates are relatively accurate across all ranges.

Figure 4.2:
Default Insurance Regression Comparison of Actual and Predicted Choices by Deciles



As seen in Figure 4-3, the model does an extremely good job of predicting the percent of customers who leave the default rate for each business type. The figure also clearly shows the variation in opt-out rates across business segments. Figure 4-4 provides a comparison of the actual and predicted share of customers retaining the default insurance setting by structural wins. The model predicts relatively well with the exception of the largest structural loser category (-8% to -6%). However, those customers are less than 5% of the total.

Figure 4-3:
Default Insurance Regression Comparison of Actual and Predicted Choices by Industry

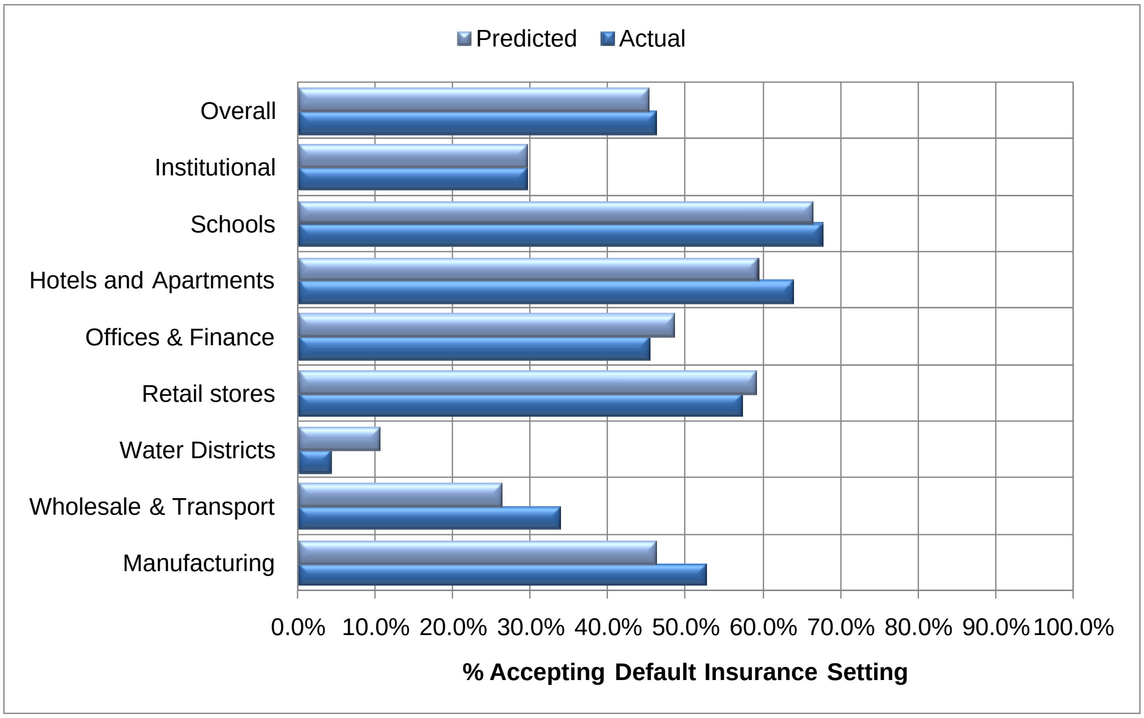


Figure 4-4:
Default Insurance Regression Comparison of Actual and Predicted Choices by Percent Annual Structural Wins

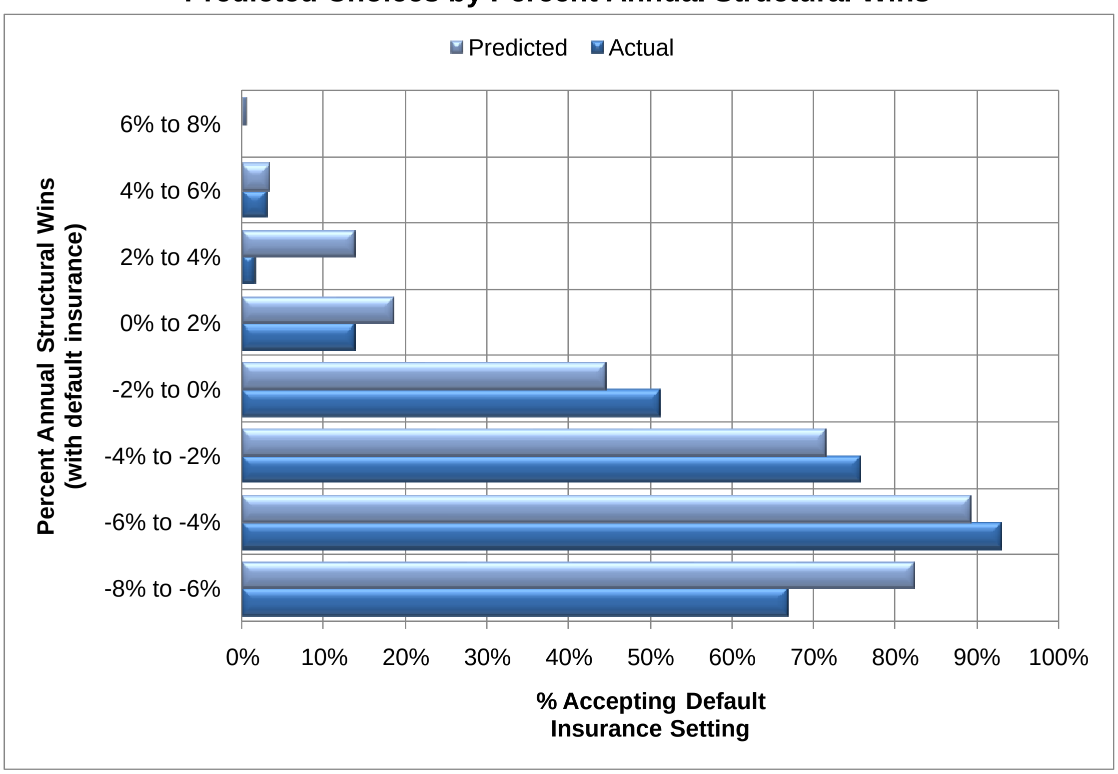
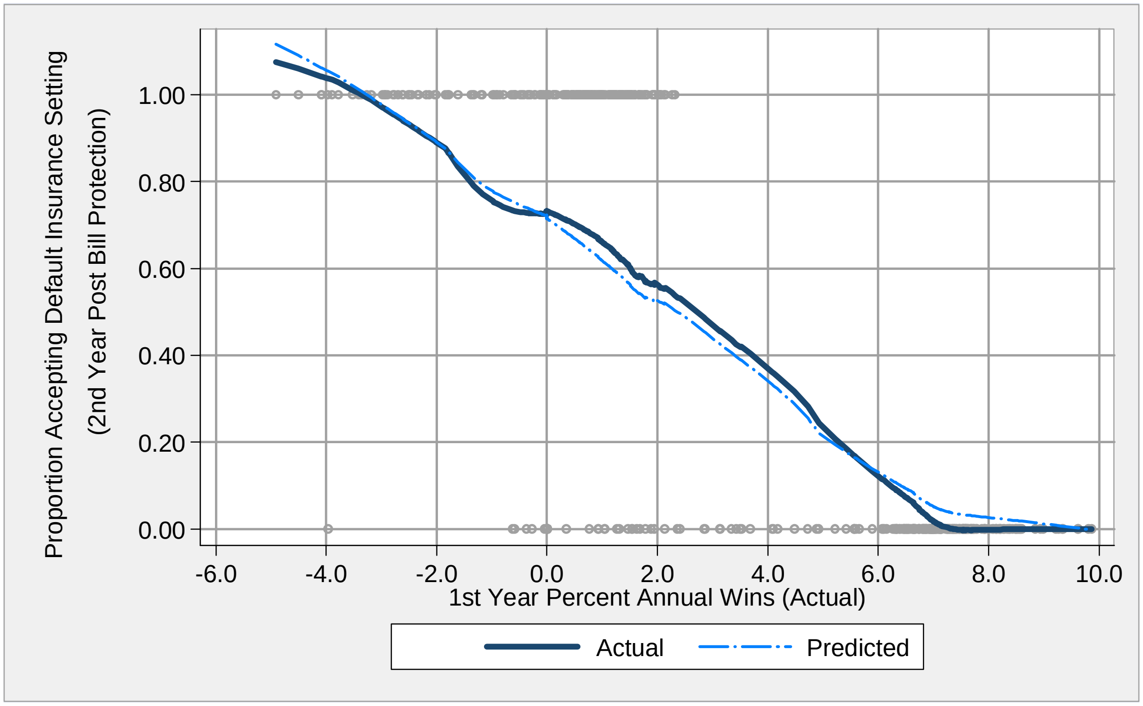


Figure 4-5 compares predicted and actual share of customers with default insurance settings for second-year customers. These customers experienced actual wins and losses as a result of their underlying load shape and first year insurance decision. As expected, customers that experienced large gains the first year are less likely to retain the default insurance setting.

Figure 4-5:
Default Insurance Regression Comparison of Actual and Predicted Choices by First Year Actual Percent Wins



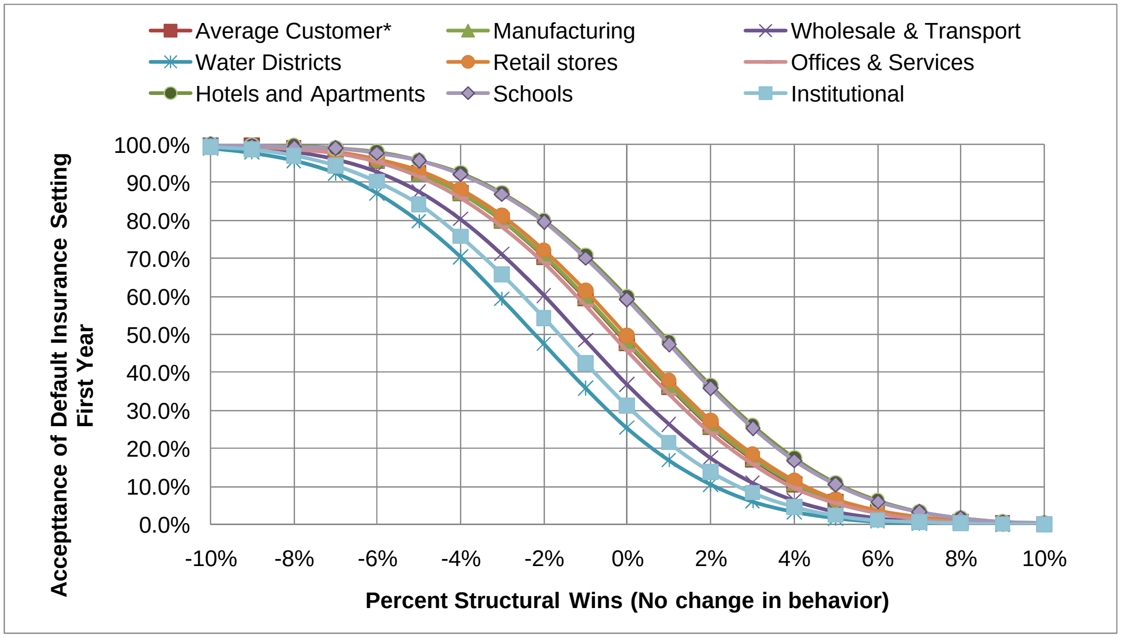
4.3 Interpreting Regression Model Results

As noted earlier, probit models customize the effects for each of their customers based on their predisposition for or against a default critical peak pricing tariff. This adds a layer of complexity to the interpretation of the coefficients. The role of specific customer characteristics, structural wins, and actual wins, are best understood by examining how changes in particular characteristics are associated with the likelihood that customers remain on default CPP while holding other variables constant. For more technically oriented readers, Appendix B contains the marginal effects of the regression model and a full description of the estimating sample customer characteristics.

4.3.1 Industry and Structural Wins

Figure 4-6 summarizes the effect of structural wins by industry and for the average SDG&E customer. The effect of structural wins on whether customers retained default insurance settings is pronounced. Holding all else constant, for the average customer, a change in structural wins from -2% to +2% is associated with a change from 69.0% to 24.3% in the likelihood of remaining with the default insurance settings. The graph also shows some differences in first-year insurance decisions by industry. All else being equal, schools and hotels are more likely than average to retain insurance against higher critical peak prices. In contrast, water districts, institutional, and wholesale and transport customers are less likely to retain insurance.

Figure 4.6:
First Year Default Insurance Retention Rates by Structural Wins/Losses and Industry

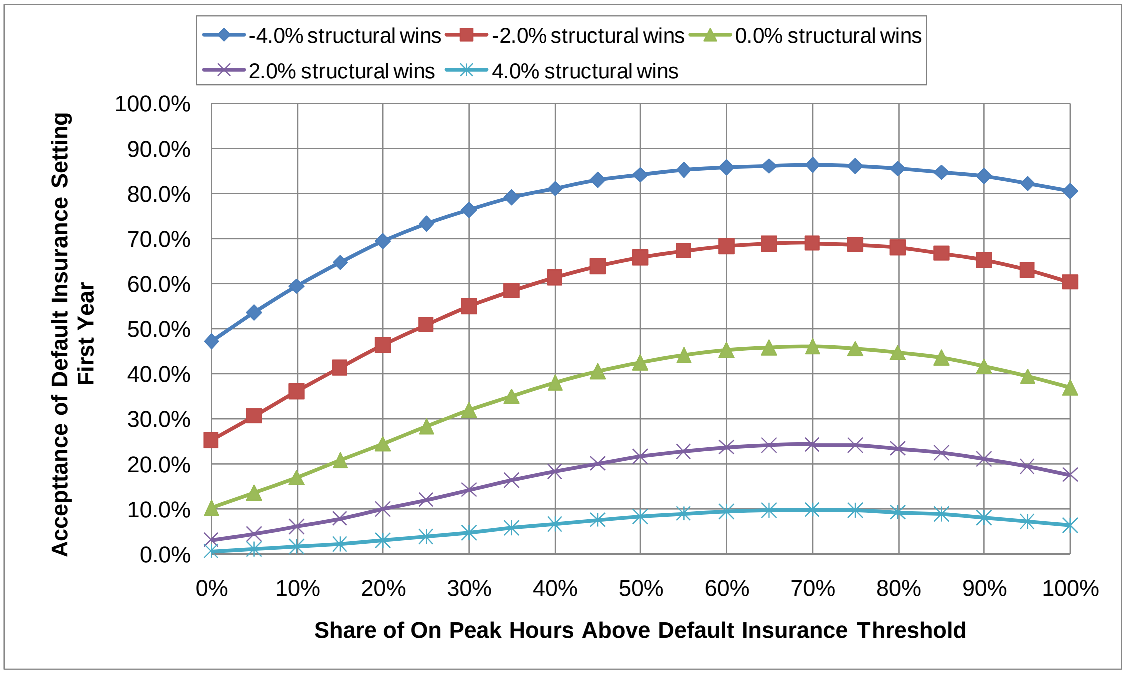


4.3.2 Exceeding the Default Amount of Load Insured

The default amount of load insured is based on a common metric for customers – the average of the maximum on-peak monthly demand for summer months. Without going into detail, the actual calculations (which are simpler than they sound), is a non-coincident measure. Some customer loads always exceed the amount of load insured during the summer on-peak hours, while other customers almost never exceed the default. Logically, we would expect the first set of customers to want insurance more and the second set to care less for it, particularly since they are over-insured.

Figure 4-7 shows the relationship between the need for the default threshold of insurance and customer decisions about whether to, in essence, retain or reject insurance. Customers who rarely exceed the default amount of load insured during on-peak summer hours are less likely to remain with the default insurance settings. While the relationship, depending on the extent to which customers are structural winners or losers, a significant amount of defaulted customers typically had load below the default insurance setting. Roughly 30 out of 100 customers exceeded the default amount of load insured during less than 50% of the summer on-peak hours.

Figure 4.7:
First Year Default Insurance Retention Rates By Share of Summer Peak Hours that Exceed the Default Threshold



Setting optimal default insurance levels is critical but also requires balancing multiple priorities. Whether or not load exceeds the amount of insured load has implications not only for insurance decisions, but, potentially, for load impacts. Customers that are unlikely to exceed the amount of insured load either do not face the marginal critical peak price during events or alternatively have a limited amount of load exposed to the higher critical peak prices. It is unclear whether or not those customers realize it but, technically, they have little or no incentive to engage in load reductions.

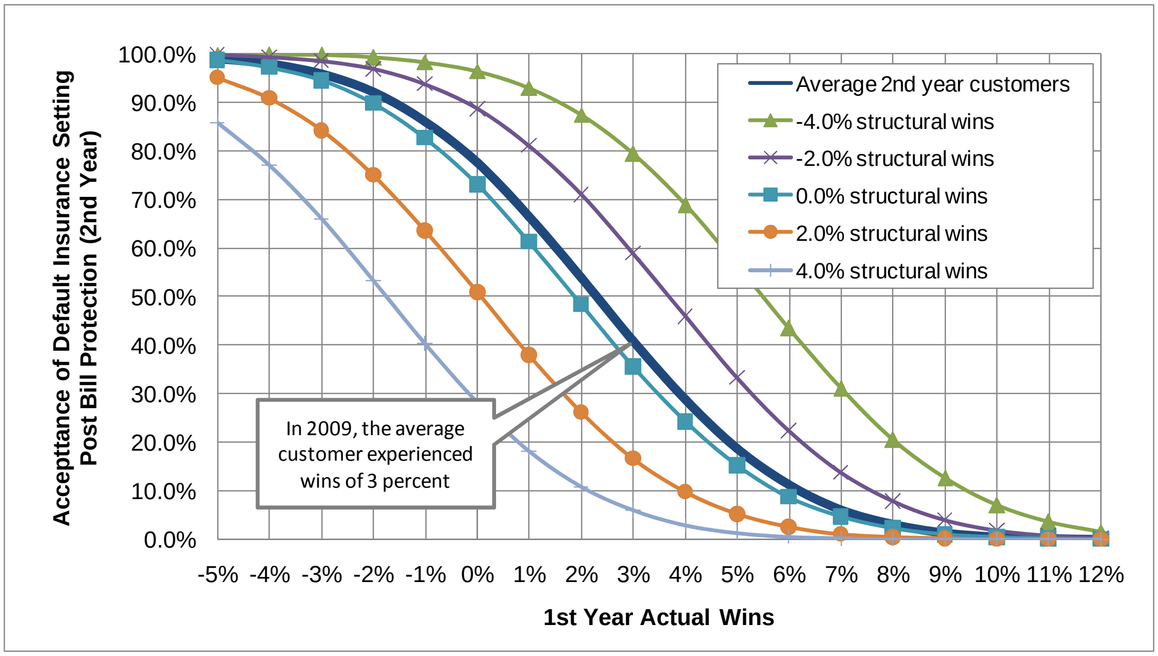
4.3.3 Insurance Decisions After First Year

Despite the lack of events, customers experienced wins and losses in comparison to the opt-out TOU due to their underlying load shapes and first-year adjustments to default insurance settings (or lack thereof). The actual wins and losses reflect several factors including the number of events called, customer adjustments to the amount of load insured against higher prices, and any changes in load patterns associated with critical peak pricing rate structure. Importantly, all customers who elected the default critical peak pricing tariff were provided a letter and report comparing the annual and monthly bills under critical peak pricing and the opt-out TOU tariff. In addition, at the time second year customer made their choice, bill protection was scheduled to expire.[10]

As in the opt-out mode, the insurance regression model included a second year indicator variable to quantify the "stickiness" of the first-year decision and a variable reflecting the percent wins or losses experienced in the first year.

Figure 4-8 compares the relationship between first-year actual wins and losses and the share of second-year customers that retain the default insurance setting. The relationship is presented separately for specific amount of structural wins—the other big factor—and for the average second-year customer.

Figure 4-8:
2nd Year Default CPP Retention Rates by Actual First Year Percent Wins and Losses



Not surprisingly, wins experienced in the first year have a substantial effect on second year default insurance decisions. The graph shows the range of percent annual wins actually experienced in 2009, when approximately 98 out of every 100 customers experienced actual annual wins between -5% to 12%. The variation allowed us to estimate the effect of first year wins and losses (i.e., experience) on customer decisions about insurance for higher critical peak price periods. The overall 2009 results were affected by the lack of 2009 events. On average, second-year customers experienced wins of 3% due, in part, to the lack of events. Approximately 42% of them elected to retain the default insurance amount the second year.

[10] The CPUC extended bill protection and additional year after customers made their second year decisions regarding default CPP.

The model implies that if the average customer wins and losses were lower—at 0%, for example—the share of customers insuring against the higher prices would be significantly higher. In addition, the lack of events limited the range of wins and losses observed.

Although second-year customers made 2009 opt-out and default-insurance decisions as if bill protection expired, SDG&E extended bill protection an additional year due, in part, to the lack of events and customer experience with events. During the summer of 2009, SDG&E called eight events, nearly the expected average of nine events per season. The results affected May 2010 decisions, which provide additional evidence of the effect of customers actual wins and losses experienced on both opt out and default insurance decisions.

APPENDIX A ESTIMATING SAMPLE STATISTICS – DEFAULT CPP OPT-OUT CHOICE MODEL

Variable	1st year N=		2nd Year N=		Both N=	
	Mean	Sd	Mean	Sd	Mean	Sd
Opt out rate	26.3%	44.0%	7.7%	26.6%	19.8%	39.9%
Online Account	43.8%	49.6%	46.3%	49.9%	44.7%	49.7%
Percent Annual Structural Wins/Losses	-3.7%	5.8%	-3.2%	5.6%	-3.5%	5.7%
Online Account x Percent Annual Structural Wins/Losses	-1.6%	3.8%	-1.2%	3.6%	-1.4%	3.8%
Percent of Annual kWh During Winter	58.6%	12.2%	63.4%	5.8%	60.3%	10.7%
Summer Peak Period Volatility (normalized sd)	0.41	1.01	0.37	0.74	0.40	0.93
Prior Year Structural Wins/Losses	0.0%	0.0%	3.0%	4.6%	1.0%	3.0%
Dummy for Returning Customers	0.0%	0.0%	100.0%	0.0%	34.5%	47.5%
Agriculture, Mining & Construction	1.3%	11.5%	1.4%	12.0%	1.4%	11.7%
Manufacturing	13.2%	33.9%	13.8%	34.5%	13.4%	34.1%
Wholesale, Transport, other utilities	7.4%	26.2%	11.2%	31.6%	8.7%	28.2%
Water Districts	6.6%	24.8%	8.1%	27.3%	7.1%	25.7%
Retail stores			9.1%	28.8%	7.9%	26.9%
Offices, Finance, Services	7.2%	25.9%				
Hotels and Apartment Buildings	10.3%	30.4%	7.5%	26.3%	9.3%	29.1%
Schools	18.4%	38.8%	9.7%	29.6%	15.4%	36.1%
Institutional/Government	12.1%	32.6%	14.1%	34.8%	12.8%	33.4%
Other or unknown	0.3%	5.6%	0.9%	9.2%	0.5%	7.1%

APPENDIX B ESTIMATING SAMPLE STATISTICS – DEFAULT CPP INSURANCE DECISIONS CHOICE MODEL

Variable	1st year		2nd Year		Both	
	Mean	Sd	Mean	Sd	Mean	Sd
CRC default rate	46.2%	49.9%	42.9%	49.5%	44.9%	49.7%
Online Account	41.6%	49.3%	46.7%	49.9%	43.6%	49.6%
Percent wins with CRC	1.0%	2.8%	0.7%	2.4%	0.9%	2.6%
Percent of peak hours kw is greater than default CRC	68.3%	38.4%	73.6%	35.8%	70.4%	37.5%
Percent of peak hours kw is greater than default CRC - squared	61.5%	43.1%	67.0%	41.3%	63.6%	42.5%
Prior Year Structural Wins/Losses	0.0%	0.0%	3.2%	4.1%	1.3%	3.0%
Returning customers dummy	0.0%	0.0%	100.0%	0.0%	39.7%	
Agriculture, Mining & Construction	1.3%	11.2%	1.4%	11.6%	1.3%	11.4%
Manufacturing	13.4%	34.0%	13.9%	34.6%	13.6%	34.3%
Wholesale, Transport, other utilities	8.2%	27.5%	11.6%	32.0%	9.6%	29.4%
Water Districts	7.4%	26.2%	8.6%	28.0%	7.9%	26.9%
Retail stores	7.4%	26.1%	10.0%	30.0%	8.4%	27.8%
Offices, Finance, Services (Base)						
Hotels and Apartment Buildings	7.7%	26.6%	7.5%	26.3%	7.6%	26.5%
Schools	19.0%	39.2%	7.9%	27.0%	14.6%	35.3%
Institutional/Government	12.3%	32.9%	14.6%	35.3%	13.2%	33.9%