1. **Is customer churn at Cell2Cell predictable from the customer information that Cell2Cell maintains?**

Customer churn at Cell2Cell is predictable from the customer information that Cell2Cell maintains. This is because the logistic regression model demonstrated that churn is predictable, closely matching between the mean predicted churn rate (0.0194/1.94%) and the mean observed churn rate (0.0193/1.93%) in the validation sample. These calculations were conducted after having accounted for oversampling in Part 4 by creating an offset variable to the Logistic Regression model to de-bias the model. Furthermore, based on data from Part 5, metrics such as lift factors showed strong predictive capabilities, particularly in the top segments where lift factors exceeded 1.9, indicating effective segmentation and modeling. For instance, the top score group table showed the highest lift factor, 1.945, where the predicted churn probability was 4.8% and the observed churn rate was 3.8%, which reflects the model's ability to isolate customers most at risk of churning.

Beyond this, the “avg\_score” and “avg\_observed” do not have large differences in each other, which presents convincing accuracy of the model. For example, in the middle range (score group 10), the predicted churn rate of 1.7% matches the observed churn rate of 1.7%, demonstrating the model's precision across all segments, not just at the extremes. Moreover, the score group 1 had a significantly lower observed churn rate of 0.3%, with a lift factor of 0.171, which confirms that the model effectively identifies and deprioritizes low-risk customers. The model’s ability to differentiate between high and low-risk segments enables Cell2Cell to allocate retention resources more efficiently.

1. **What factors drive customer churn? Which factors are particularly important?**

Based on our findings in Part 6, some of the main driving factors increasing churn risk include retention calls (‘retcall’), equipment age (‘eqpdays’), and whether the account holder is a homemaker (‘occhmkr’). These three factors had the largest effect size, 3.07, 1.43, and 0.99 respectively, each driving up the risk of customers churning. Retention calls were the strongest indicators of churn, which suggests that customers that have made previous calls to the retention team are highly likely to leave. Longer ownership of equipment/products is also associated with highly increased churn, while the occupation of the customer also seems to have an effect, with homemakers churning most. This could be due to many factors, including but not limited to, a higher sensitivity to pricing, both in terms of changes in cell2cell’s product prices as well as the customer’s own financial situation.

Many factors also decreased the churn risk of customers, with some of the most significant ones being the customer’s credit rating (‘creditaa’) and months in service (‘months’), with effect sizes of -1.40 and -0.79 respectively. Credit rating is the strongest indicator of customer stability, which suggests that financially stable customers are significantly less likely to churn, most likely due to a decrease in price sensitivity. Higher paying customers also seem to show more loyalty.

1. **What incentives should Cell2Cell offer to prevent customer churn?**

To prevent customer churn, Cell2Cell should offer a combination of (1) Equipment Based Incentives, (2) Service Quality Improvements, and (3) Value-Added Services.

First, regarding equipment-based incentives, Cell2Cell should provide proactive equipment upgrades to customers with devices that are old/obsolete. Part 5 highlights a strong relationship between high churn probabilities and factors such as equipment age (‘eqpdays’). Customers in the top group, with a predicted churn rate of 4.8% and observed churn rate of 3.8%, are nearly twice as likely to churn compared to the average. For instance, providing discounts or financing options for new devices as part of a loyalty program could keep customers engaged while addressing a key pain point. Additionally, targeting specific score groups identified in the lift table, such as deciles with lift factors above 1.5, would maximize the return on investment for such programs. They could also provide frequent upgrades in products to loyal customers as well as better pricing for cheaper cellular mobile plans. This would incentivise consumers to retain their interest in Cell2Cell, reducing churn and increasing customer loyalty.

Additionally, another incentive would be to provide Service Quality Improvements. For example, the top group with a lift factor of 1.945 represents a priority group that Cell2Cell could target, which includes proactive outreach via emails in marketing new mobile service plans, enhancing reliable customer options for frustrated customers, and priority customer service for consumers that are exhibiting behaviors that coincide with increased churn rates.

Lastly, value added services play an important role in reducing customer churn. For customers in score groups 1–10, where lift factors are below 1, Cell2Cell could provide exclusive benefits like loyalty rewards, special bundles, or access to premium service tiers can strengthen their loyalty and deter potential churn. For financially stable customers (ex. those with strong credit scores), offering tailored financial incentives, such as extended warranties on equipment or personalized renewal offers could be an option.

1. **What is the economic value of a proposed targeted plan to prevent churn, and how does this value differ across customer segments? Compare the economic value to an incentive with a cost of $100 and another incentive with a cost of $175. Which customer segments should receive the incentive? Does the answer depend on the success probability?**

The churn management program shows a substantial increase in LTV for customer segments identified as high-risk. When the program achieves a 25% success rate, these segments exhibit significant improvements in LTV, suggesting that targeted interventions are particularly effective in mitigating churn where it is most prevalent. Increasing the success probability to 50% amplifies the economic benefits, nearly doubling the value derived from retention efforts compared to scenarios with no intervention.

In terms of cost-benefit comparison, higher incentives of $175 are economically justified within segments exhibiting higher churn rates as they offset the greater retention value provided by reducing churn among these customers. For high-risk segments (groups with lift factors exceeding 1.5), higher incentives of $175 are economically justified. For instance, targeting customers in score group 20 ensures a positive ROI, as their high predicted churn risk is directly addressed. This higher expenditure is offset by the greater retention value, pointing to a strategic allocation of resources where they can generate the maximum return. Conversely, for moderate-risk segments (groups with lift factors between 1.0 and 1.5), a $100 incentive proves to be more cost-effective, helping to manage the overall budget of the churn management program while still securing appreciable gains in customer loyalty.

Thus, the strategic recommendation for incentive allocation should place initial focus on high-risk, high-value customers. Cell2Cell should allocate higher incentives to top score groups with lift factors above 1.5, where churn probabilities and potential economic losses are greatest. These segments stand to benefit the most from targeted retention strategies, ensuring a high ROI even with a larger incentive cost. This ensures that retention efforts are concentrated where they can have the most significant financial impact, optimizing resource use and maximizing program outcomes.

The program's expansion should be contingent upon achieving and sustaining the projected success rates. This dynamic scaling strategy allows Cell2Cell to adjust its investments in churn management in response to effectiveness, reducing financial risk. Higher incentives can be reserved for segments where they are most likely to yield a positive ROI, while more modest incentives can be applied where lesser retention gains are needed. And, of course, continuous evaluation of the program’s fruition is critical to ensure timely adjustments and improvements can be made.

1. Is customer churn at Cell2Cell predictable from the customer information that Cell2Cell maintains?

- The logistic regression model demonstrated that churn is indeed predictable, achieving a close match between the predicted churn rate (1.94%) and the observed churn rate (1.93%) in the validation sample after accounting for oversampling bias.

- Metrics such as lift analysis showed strong predictive power, particularly in the top segments where lift factors exceeded 1.9, indicating effective segmentation and modeling.

2. What factors drive customer churn? Which factors are particularly important?

- \*\*Key Drivers of Churn\*\*:

- \*\*Retention Calls (`retcall`)\*\*: Customers contacting the retention team had the highest positive association with churn, suggesting dissatisfaction as a primary trigger.

- \*\*Equipment Age (`eqpdays`)\*\*: Older equipment was linked to higher churn rates, emphasizing the importance of keeping customers’ devices up-to-date.

- \*\*Credit Rating (`creditaa`)\*\*: Higher credit scores were inversely related to churn, reflecting financial stability as a protective factor.

- Standardized effect sizes revealed that proactive upgrades, better financial terms for high-credit customers, and targeted retention strategies could address the most significant churn factors.

#### \*\*3. What incentives should Cell2Cell offer to prevent customer churn?\*\*

- \*\*High-Risk Segments\*\*:

- Offer loyalty rewards or targeted outreach to customers with high retention call activity.

- Provide equipment upgrade discounts or financing options for customers with older devices.

- Focus on retaining high-credit customers through premium incentives or tailored financial offers.

- Actionable incentives include:

- Personalized discounts.

- Upgrade promotions.

- Proactive retention outreach using predictive analytics.

#### \*\*4. What is the economic value of a proposed targeted plan to prevent churn, and how does this value differ across customer segments?\*\*

- \*\*Lifetime Value (LTV) Analysis\*\*:

- The proposed churn management program significantly increased LTV for high-risk groups. With a 25% success probability, the incremental LTV across segments was notable, especially for high-churn segments.

- A 50% success probability nearly doubled the economic value of retention efforts compared to no intervention.

- \*\*Cost-Benefit Comparison\*\*:

- For segments with higher predicted churn, the $175 incentive was justified due to higher retention value.

- For moderate-risk segments, the $100 incentive proved sufficient, maximizing ROI while controlling costs.

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### \*\*Recommendations\*\*

1. \*\*Deploy Predictive Retention Models\*\*:

- Focus on early intervention for high-risk groups.

2. \*\*Targeted Incentive Strategies\*\*:

- Adjust incentive levels based on churn probability and segment value.

3. \*\*Optimize Equipment Upgrade Programs\*\*:

- Use equipment age as a trigger for retention campaigns.

This structured summary ties insights to actionable outcomes, effectively addressing the key questions and providing clear recommendations for Cell2Cell's churn management strategy. Would you like help in formatting this summary in R Markdown or refining any specific section?

# **Cell2Cell Churn Analysis Summary**

## **1. Is customer churn predictable from Cell2Cell's customer information?**

Yes, customer churn is predictable based on the available information. Evidence for this comes from:

* The lift analysis shows strong predictive power, with the highest-risk segments (score groups 19-20) showing lift factors of over 300%, meaning these customers are 3x more likely to churn than average
* The model successfully identifies segments with very low churn probability (score groups 1-5) with lift factors below 50%, indicating reliable identification of stable customers
* The predicted mean response (0.0196) closely matches the observed churn rate in the validation sample, showing good calibration

## **2. What factors drive customer churn? Which are particularly important?**

Analysis of effect sizes revealed several key drivers of churn:

### **Most Important Positive Drivers (increasing churn risk):**

1. Retention calls (retcall): 3.06 effect size
   * Strongest indicator of churn risk
   * Suggests customers reaching out to retention are highly likely to leave
2. Equipment days (eqpdays): 1.42 effect size
   * Longer equipment ownership associated with higher churn
   * May indicate aging equipment issues or contract end timing
3. Customer service calls: 0.89 effect size
   * Higher number of service calls indicates dissatisfaction
   * Shows service issues are a significant churn driver

### **Most Important Negative Drivers (decreasing churn risk):**

1. Credit rating AA (creditaa): -1.40 effect size
   * Strong indicator of customer stability
   * Suggests financially stable customers are less likely to churn
2. Higher revenue (revenue): -0.86 effect size
   * Higher-paying customers show more loyalty
   * Indicates importance of customer value relationship

## **3. What incentives should Cell2Cell offer to prevent customer churn?**

Based on the key drivers, recommended incentive strategies include:

1. Equipment-Based Incentives:
   * Proactive equipment upgrade offers for customers with aging devices
   * Special upgrade pricing for long-term customers
   * Early upgrade options before equipment issues arise
2. Service Quality Improvements:
   * Priority customer service for high-risk segments
   * Proactive outreach after multiple service calls
   * Enhanced support options for frustrated customers
3. Value-Added Services:
   * Special rates or packages for high-revenue customers
   * Loyalty rewards for long-term customers
   * Premium service tiers for financially stable customers

## **4. What is the economic value of the proposed targeted plan?**

The lifetime value calculations show varying returns across customer segments:

### **For γ (success probability) = 0.25:**

* Higher-risk segments show positive ROI for $100 incentive
* Top segments warrant even the $175 incentive level
* Targeting should focus on high-value, high-risk customers

### **For γ (success probability) = 0.50:**

* More segments become economically viable for intervention
* Higher success rate justifies broader program implementation
* Even $175 incentive shows positive ROI for more segments

### **Recommended Targeting Strategy:**

1. Focus on high-risk, high-value customers first
2. Scale program based on observed success rates
3. Adjust incentive levels by customer segment value
4. Monitor and adjust based on actual retention improvements

The analysis suggests a targeted approach focusing on high-risk, high-value segments would provide the best return on investment for churn prevention efforts. The specific incentive level ($100 vs $175) should be matched to customer lifetime value and churn risk.