Regulating Consumer Financial Products: Evidence from Credit Cards

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Economics of Payments VII
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Motivation

• Surge of interest in **regulating consumer financial products** (CFPB)

• Proponents
  - Firms exploit behavioral biases, especially among the poor
  - Regulation and additional information can protect consumers

• Skeptics
  - Hard to transfer from producers to consumers (i.e., Whac-A-Mole)
  - “The reduced revenue stream to lenders from these fees would mean that other rates and fees would be adjusted to compensate” (Mullainathan et al., 2009)
CARD Act

- Introduced to “help protect consumers by prohibiting various unfair, misleading and deceptive practices in the credit card market”
- Signed by President Obama in May 2009
- Excludes small business credit cards
Key Implementation Phases

February 2010

- Restrict over limit fees (opt in)
- Some restrictions on late fees
- Payoff nudge

<table>
<thead>
<tr>
<th>If you make no additional charges using this card and each month you pay ...</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Only the minimum payment</td>
<td>10 years</td>
<td>$3,284</td>
</tr>
<tr>
<td>$62</td>
<td>3 years</td>
<td>$2,232 (Savings of $1,052)</td>
</tr>
</tbody>
</table>
Key Implementation Phases

February 2010

- Restrict over limit fees (opt in)
- Some restrictions on late fees
- Payoff nudge

August 2010

- Limit size of late fees

Other changes: Double billing cycle, notification period, some limits on rate increases, restrictions on solicitations at college campus
Preview of Results

Intended Effects

• Fee restrictions reduced costs by 1.7% of borrowing volume
  - Particularly large drop for borrowers with FICO scores below 660
  - Reduced annual borrowing costs by $12.6 billion

• Nudge had small but noticeable effect on payoff behavior
  - Reduced annual interest charges by at most $70 million

Unintended consequences

• No offset in interest charges, or other costs
• No decline in measures of credit volume
• Consistent with low fee salience and limited competition
Outline

• CARD Act description

• Data
  - Pre-CARD Act market overview

• Research design

• Intended effects
  - Fees
  - Payoff nudge

• Unintended consequences
  - Theory: Surplus transfer vs. offset
  - Evidence
Data

- OCC Credit Card Metrics dataset
- Near universe of credit cards issued by 8 largest US banks
  - 160 million credit card accounts, including $\sim$ 6 million small business
  - Approximately 30% of credit cards in market
  - Monthly from April 2008 to December 2012
  - Contract terms, utilization and payments
  - FICO and credit bureau information
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Revenue and Costs

- Credit card revenue
  - Interest charges
  - Fee revenue
  - Interchange income

- Credit card costs
  - Charge-offs (defaults)
  - Cost of funds
  - Rewards and fraud expenses
  - Operational expenses

Total fees (annualized percent of ADB) = \( \left(1 + \frac{\text{Total fees}}{\text{ADB}} \right)^{12} - 1 \)
Revenue and Cost: Pre-CARD Act

Finance Charge Income

Fee Income

Net Charge-offs

Interchange Income - Rewards Expense

Table
• Profits of CC portfolio: 1.6% of ADB (adjust for taxes to get ROA)
• Scale by leverage (≈ 10) to get return on equity
Key Takeaway:

- Credit card lending highly profitable even in middle of financial crisis
- Low-FICO score segment most profitable, significantly driven by fees
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Identification Strategy

• Difference-in-differences
  - Consumer vs. small business cards over time

• Identifying assumption is parallel trends
  - Parallel pre-CARD Act trends
  - Institutionally similar
    - Guaranteed by personal assets, underwritten on personal FICO score
    - Issued by same business units / jointly assessed by regulators
Econometric Model

- Consumer $\times$ month-specific coefficients

$$y_{it} = \sum_{t \neq \text{May 2009}} \beta_t C_i + X'_{it} \delta X + \delta_t + \epsilon_{it}$$

- $C_i$: Consumer card indicator
- $X_{it}$: Vector of covariants, including consumer card indicator
- $\delta_t$: Month FE
- Cluster standard errors by bank $\times$ product type
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Over Limit Fees: FICO <660

\[ \beta_{\text{Phase 2}} = -3.27 (1.53) \]
Over Limit Fees: FICO $\geq 660$

Annualized Over Limit Fees (% of ADB)

```
<table>
<thead>
<tr>
<th>Year</th>
<th>Consumer Accounts</th>
<th>Small Business Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008m1</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>2010m1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011m1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012m1</td>
<td></td>
<td></td>
</tr>
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</table>
```
Over Limit Fees: FICO $\geq$ 660

$\beta_{\text{Phase 2}} = -0.30$ (0.11)

Annualized Over Limit Fees (% of ADB)
Late and Other Fees

- Smaller declines in late fees
  - Some recovery due to transition from $25 to $35 max late fee
- No increase in other fees (e.g., annual fees)

Key Take-Aways

- Total decline in fees: Annualized 1.7% of ADB
- Biggest decline for low-FICO consumers
  - FICO < 660: Approximately 5.5% of ADB
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Payoff Nudge

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- Idea: By showing people the cost of making minimum payment only, change their payoff behavior.
Pre-CARD Act Payoff Behavior by FICO

Minimum Payment or Less

- Overall: 27.9%
Months to Payoff: $T$

- Months to payoff cycle ending balance in equal payments:

$$T = 1 - \frac{\ln \left(1 - \frac{\text{APR} \text{ Cycle Ending Balance} - \text{Payment}}{12 \text{ Payment}}\right)}{\ln(1 + \frac{\text{APR}}{12})}$$

- Similar to equation for pricing annuities / fixed-rate mortgages
  - $T = 1$: full repayment
  - $T = 36$: 3.5% of balance. CARD Act disclosure amount.
  - $T = 83$: 2% of the balance. Typically minimum payment.
Histogram top-coded at share = 0.01, \( T \in [10, 60] \)
Change Around 36-Months Target: Small Business Accounts

Histogram top-coded at share = 0.01, $T \in [10, 60]$
Reduction in Interest Payments

- Regressions show nudge effect of 0.5 pp on base of 5.7%
  - ITT because not everyone sees nudge (e.g., online bankers)

- Q: Are consumers shifting from lower payments?
  - Approx 35% of consumers paying less than nudge
  - Not enough power detect 0.5 pp drop due to seasonality

- Upper bound: Assume shift from zero payments
  - $24.00 in annualized savings per switcher
  - Aggregate annualized savings of $71 million
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  - Fees
  - Payoff nudge
- **Unintended consequences**
  - Theory: Offset vs. transfer
  - Evidence
Model Setup

Draws on Weyl and Fabinger (2013), and Mahoney and Weyl (2013)

- Salient price: \( p_1 \)
- Non-salient price: \( p_2 \)
- Aggregate demand: \( Q(p_1 + \psi p_2) \)
  - \( \psi \in [0, 1] \) parameterizes the degree of salience

- Index degree of market power with conduct parameter \( \theta \in [0, 1] \)
Pricing Offset

- Q: How much of drop in $p_2$ will be offset by increase in $p_1$?

- Offset $\omega \equiv -\frac{dp_1}{dp_2}$ is given by

$$
\omega = \frac{1 - \psi \theta \mu'}{1 - \theta \mu}
$$

- If perfect comp ($\theta = 0$), price limit fully offset ($\omega = 1$)

- If $p_2$ perfectly salient ($\psi = 1$), price limit fully offset ($\omega = 1$)

Proposition (Offset)

The offset is converging toward full ($\omega \to 1$) as (i) the market becomes more competitive ($\theta \to 0$) and (ii) $p_2$ becomes more salient ($\psi \to 1$)
Volume of Credit

• Q: To what extent will drop in $p_2$ reduce equilibrium $q$?

• Quantity response $\nu \equiv -\frac{dq}{dp_2}$ is given by

$$\nu = \frac{dq}{dp_1} (\omega - \psi)$$

- Increasing (in absolute value) in the degree of offset ($\omega$)
- Decreasing in salience ($\psi$)
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Interest Charges: FICO < 660

Annualized Interest Charges (% of ADB)

2008m1 2009m1 2010m1 2011m1 2012m1

General Purpose
Small Business
Full offset: Interest charge increase needed to offset 5.5 pp reduction in fees

$\beta_{\text{Phase 3}} = -0.46 (1.83)$
Conclusion: Cost of Borrowing

• Overall profitability of lending declined as a result of the CARD Act

• Fees declined by an annualized 1.7 percentage points of ADB

\[ 0.017 \times \$744 \text{ billion} = \$12.6 \text{ billion} \]

• Consistent with low fee salience and limited competition
Volume of Credit

- Quantity response

\[ \nu = \frac{dq}{dp_1} (\omega - \psi) \]

- No evidence of interest charge offset \((\omega = 0)\)
- Implies fee drop non-salient \((\psi = 0)\)

\[ \Rightarrow \] No change in equilibrium quantity \((\nu = 0)\)
Credit Limits: FICO < 660

General Purpose
Small Business
Credit Limits: FICO < 660

\[ \beta_{\text{Phase 3}} = 150 (342) \]
New Accounts: FICO < 660

New Accounts (% of Pre-CARD Act Level)

2008m1 2009m1 2010m1 2011m1 2012m1

Consumer Accounts
Small Business Accounts

Consumer Accounts: Blue Line
Small Business Accounts: Dashed Line
New Accounts: FICO < 660

\[ \beta_{\text{Phase 3}} = 0.02 (0.28) \]
Average Daily Balances: FICO < 660

Average Daily Balance ($) vs. Year:
- 2008m1 to 2012m1
- General Purpose
- Small Business

Graph showing trends in average daily balances for General Purpose and Small Business across different quarters from 2008 to 2012.
Conclusion: Volume of Credit

- No effect on credit limits, new accounts, or ADB
  - New accounts effect less precisely estimated
- Consistent with model and limited price offset
CARD Act Conclusion

• Intended effects:
  - Fee limits reduced costs by 1.7 ppt of ADB ($12.6 billion)
    - Reduction of 5.5 ppt of ADB for low-FICO borrowers
  - Nudge had small but noticeable effect on payoff behavior

• Unintended consequences:
  - No offsetting increase in interest rates, reduction in credit volume

⇒ Regulation can transfer surplus to consumers
  - In particular in setting with non-salient fees and imperfect competition
Backup Slides
## Revenue and Cost: Pre-CARD Act

<table>
<thead>
<tr>
<th>FICO Score Range</th>
<th>Total</th>
<th>&lt;620</th>
<th>620-659</th>
<th>660-719</th>
<th>720-759</th>
<th>760-799</th>
<th>800+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Accounts</td>
<td>100.0%</td>
<td>17.3%</td>
<td>12.6%</td>
<td>24.6%</td>
<td>18.6%</td>
<td>19.2%</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

### Panel A: Capacity and Utilization

<table>
<thead>
<tr>
<th></th>
<th>Credit Limit</th>
<th>Average Daily Balance</th>
<th>Purchase Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8,042</td>
<td>2,025</td>
<td>1,410</td>
</tr>
<tr>
<td>Credit Limit</td>
<td>2,025</td>
<td>1,469</td>
<td>730</td>
</tr>
<tr>
<td>Average Daily Balance</td>
<td>1,410</td>
<td>2,029</td>
<td>1,019</td>
</tr>
<tr>
<td>Purchase Volume</td>
<td>1,820</td>
<td>1,651</td>
<td>1,110</td>
</tr>
</tbody>
</table>

### Panel B: Realized Profits (% of ADB)

<table>
<thead>
<tr>
<th></th>
<th>Total Income</th>
<th>Interest Charges</th>
<th>Total Fees</th>
<th>Interchange Income</th>
<th>Total Costs</th>
<th>Net Charge-offs</th>
<th>Cost of funds</th>
<th>Rewards and Fraud</th>
<th>Operational Costs</th>
<th>Realized Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.0%</td>
<td>14.3%</td>
<td>7.6%</td>
<td>3.2%</td>
<td>23.4%</td>
<td>15.6%</td>
<td>2.3%</td>
<td>2.2%</td>
<td>3.4%</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>45.7%</td>
<td>20.6%</td>
<td>23.3%</td>
<td>1.8%</td>
<td>37.8%</td>
<td>30.8%</td>
<td>2.4%</td>
<td>1.3%</td>
<td>3.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td></td>
<td>31.5%</td>
<td>19.2%</td>
<td>10.9%</td>
<td>1.5%</td>
<td>30.2%</td>
<td>23.4%</td>
<td>2.3%</td>
<td>1.0%</td>
<td>3.4%</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>21.0%</td>
<td>15.2%</td>
<td>4.1%</td>
<td>1.7%</td>
<td>22.5%</td>
<td>15.8%</td>
<td>2.2%</td>
<td>1.2%</td>
<td>3.4%</td>
<td>-1.6%</td>
</tr>
<tr>
<td></td>
<td>16.9%</td>
<td>11.8%</td>
<td>2.5%</td>
<td>2.6%</td>
<td>17.2%</td>
<td>9.7%</td>
<td>2.2%</td>
<td>1.8%</td>
<td>3.4%</td>
<td>-0.2%</td>
</tr>
<tr>
<td></td>
<td>17.1%</td>
<td>9.3%</td>
<td>2.4%</td>
<td>5.4%</td>
<td>15.6%</td>
<td>6.3%</td>
<td>2.2%</td>
<td>1.8%</td>
<td>3.4%</td>
<td>1.5%</td>
</tr>
<tr>
<td></td>
<td>19.9%</td>
<td>7.6%</td>
<td>2.9%</td>
<td>9.5%</td>
<td>16.8%</td>
<td>4.7%</td>
<td>2.2%</td>
<td>3.7%</td>
<td>3.4%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

---

**Back**
Late Fees: Overall Incidence

- **Late Fees Incidence (%)**
- **2008m1**
- **2009m1**
- **2010m1**
- **2011m1**
- **2012m1**

**Categories:**
- Consumer Accounts
- Small Business Accounts

Graph showing the late fees incidence for consumer and small business accounts over the years 2008 to 2012.
*APR increase of ≥ 1 pp on base APR ≥ 10%
Late and “Other” Fees

(a) Late Fees: FICO < 660

(b) Other Fees: FICO < 660

(c) Late Fees: FICO ≥ 660

(d) Other Fees: FICO ≥ 660

Late fees
Total Fees: FICO < 660

\[ \beta_{\text{Phase 3}} = -5.52 \text{ (2.60)} \]
Total Fees: $FICO \geq 660$

\[ \beta_{Phase\ 3} = -0.51 (0.19) \]
### Fee Regressions

<table>
<thead>
<tr>
<th></th>
<th>Over Limit Fees (1)</th>
<th>Late Fees (2)</th>
<th>Other Fees (3)</th>
<th>Total Fees (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer X Phase 2</td>
<td>-3.27 (1.53)</td>
<td>-0.63 (0.39)</td>
<td>-0.66 (0.42)</td>
<td>-4.56 (2.24)</td>
</tr>
<tr>
<td></td>
<td>[0.04]</td>
<td>[0.11]</td>
<td>[0.12]</td>
<td>[0.05]</td>
</tr>
<tr>
<td>Consumer X Phase 3</td>
<td>-3.35 (1.54)</td>
<td>-1.57 (0.73)</td>
<td>-0.60 (0.38)</td>
<td>-5.52 (2.60)</td>
</tr>
<tr>
<td></td>
<td>[0.03]</td>
<td>[0.04]</td>
<td>[0.12]</td>
<td>[0.04]</td>
</tr>
<tr>
<td>Pre-CARD Act, Consumer Mean</td>
<td>3.77</td>
<td>5.85</td>
<td>5.05</td>
<td>14.68</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.75</td>
<td>0.94</td>
<td>0.96</td>
<td>0.91</td>
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### Panel A: FICO < 660

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<td>-0.30 (0.11)</td>
<td>-0.10 (0.07)</td>
<td>-0.07 (0.10)</td>
<td>-0.48 (0.14)</td>
</tr>
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<td></td>
<td>[0.01]</td>
<td>[0.16]</td>
<td>[0.49]</td>
<td>[0.00]</td>
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<tr>
<td>Pre-CARD Act, Consumer Mean</td>
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<td>1.27</td>
<td>1.50</td>
<td>3.17</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.73</td>
<td>0.91</td>
<td>0.76</td>
<td>0.88</td>
</tr>
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### Panel B: FICO 660+

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<td>0.76</td>
<td>0.88</td>
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Controls: Consumer, month FEs; fully interacted bank, product type, FICO score FEs
## Interest Charges Regressions

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<th>Offset</th>
<th>Total Income</th>
<th>Costs Excluding Chargesoffs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Consumer X Anticipation</td>
<td>0.26</td>
<td>0.05</td>
<td>-0.13</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>(1.38)</td>
<td>(0.25)</td>
<td>(1.43)</td>
<td>(0.16)</td>
</tr>
<tr>
<td></td>
<td>[0.85]</td>
<td>[0.85]</td>
<td>[0.93]</td>
<td>[0.80]</td>
</tr>
<tr>
<td>Consumer X Phase 2</td>
<td>0.15</td>
<td>0.03</td>
<td>-4.59</td>
<td>-0.51</td>
</tr>
<tr>
<td></td>
<td>(2.24)</td>
<td>(0.41)</td>
<td>(2.16)</td>
<td>(0.24)</td>
</tr>
<tr>
<td></td>
<td>[0.95]</td>
<td>[0.95]</td>
<td>[0.04]</td>
<td>[0.04]</td>
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<tr>
<td>Consumer X Phase 3</td>
<td>-0.46</td>
<td>-0.08</td>
<td>-6.70</td>
<td>-0.66</td>
</tr>
<tr>
<td></td>
<td>(1.83)</td>
<td>(0.33)</td>
<td>(2.35)</td>
<td>(0.26)</td>
</tr>
<tr>
<td></td>
<td>[0.80]</td>
<td>[0.81]</td>
<td>[0.01]</td>
<td>[0.01]</td>
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### Controls

**Main Effects**
- Consumer Card FE
- Month FE

**Additional Covariates (Fully Interacted)**
- Bank FE
- Product type FE
- FICO Score FE

| Pre-CARD Act, Consumer Mean | 19.14 | N/A   | 35.40 | 3.65 |
| R-Squared                   | 0.83  | N/A   | 0.53  | 0.32 |
## Interest Charges Regressions, High FICO and New Accounts

<table>
<thead>
<tr>
<th></th>
<th>Dep Var: Interest Charges (% of ADB)</th>
<th>FICO &lt; 660</th>
<th>FICO 660+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Accounts</td>
<td>New Accounts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Consumer X Anticipation</td>
<td>0.26</td>
<td>-2.25</td>
<td>-1.06</td>
</tr>
<tr>
<td></td>
<td>(1.38)</td>
<td>(1.81)</td>
<td>(1.13)</td>
</tr>
<tr>
<td></td>
<td>[0.86]</td>
<td>[0.23]</td>
<td>[0.36]</td>
</tr>
<tr>
<td>Consumer X Phase 2</td>
<td>0.15</td>
<td>-3.86</td>
<td>-1.40</td>
</tr>
<tr>
<td></td>
<td>(2.24)</td>
<td>(1.57)</td>
<td>(1.77)</td>
</tr>
<tr>
<td></td>
<td>[0.95]</td>
<td>[0.03]</td>
<td>[0.44]</td>
</tr>
<tr>
<td>Consumer X Phase 3</td>
<td>-0.46</td>
<td>0.05</td>
<td>-1.77</td>
</tr>
<tr>
<td></td>
<td>(1.83)</td>
<td>(1.73)</td>
<td>(1.69)</td>
</tr>
<tr>
<td></td>
<td>[0.81]</td>
<td>[0.98]</td>
<td>[0.31]</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Main Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Card FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Month FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Additional Covariates (Fully Interacted)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Product type FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>FICO Score FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Pre-CARD Act, Consumer Mean</strong></td>
<td>19.14</td>
<td>7.69</td>
<td>12.29</td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
<td>0.83</td>
<td>0.71</td>
<td>0.87</td>
</tr>
</tbody>
</table>
## Credit Volume

<table>
<thead>
<tr>
<th></th>
<th>Credit Limits ($)</th>
<th>New Accounts (% of Pre-CARD Act Level)</th>
<th>Average Daily Balances ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer X Anticipation</td>
<td>52.15</td>
<td>0.17</td>
<td>-107.57</td>
</tr>
<tr>
<td></td>
<td>(174.83)</td>
<td>(0.11)</td>
<td>(62.40)</td>
</tr>
<tr>
<td></td>
<td>[0.77]</td>
<td>[0.14]</td>
<td>[0.11]</td>
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<tr>
<td>Consumer X Phase 2</td>
<td>125.25</td>
<td>0.26</td>
<td>-96.96</td>
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<tr>
<td></td>
<td>(316.02)</td>
<td>(0.14)</td>
<td>(145.93)</td>
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<tr>
<td></td>
<td>[0.70]</td>
<td>[0.08]</td>
<td>[0.52]</td>
</tr>
<tr>
<td>Consumer X Phase 3</td>
<td>150.54</td>
<td>0.02</td>
<td>-13.89</td>
</tr>
<tr>
<td></td>
<td>(342.42)</td>
<td>(0.28)</td>
<td>(188.39)</td>
</tr>
<tr>
<td></td>
<td>[0.67]</td>
<td>[0.94]</td>
<td>[0.94]</td>
</tr>
</tbody>
</table>

### Controls

- **Main Effects**
  - Consumer Card FE: X
  - Month FE: X

- **Additional Covariates (Fully Interacted)**
  - Bank FE: X
  - Product type FE: X
  - FICO Score FE: X

### Additional Information

- **Pre-CARD Act, Consumer Mean**
  - 2,807.88
  - 0.25
  - 1,159.29

- **R-Squared**
  - 0.99
  - 0.67
  - 0.89