Can Regulatory Policies Foster Women’s Financial Inclusion? The Role of Loan Loss Provisioning

Alejandro Becerra-Ornelas (Banxico)  David Jaume
Thania Hernández  Martin Tobal

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The views expressed are those of the authors and not necessarily those of the Bank of Mexico
Outline

Introduction

Data

Empirical Strategy

Results

Robustness Checks

Conclusions
Introduction

Motivation

Literature

- Women may face higher obstacles than men when accessing credit (Demirgüç-Kunt et al., 2013).
  - Evidence suggest that women outperform men in terms of loan repayment (Perrin and Weill, 2022).
  - Greater financial inclusion could increase savings and raise the country’s entrepreneurial capacity (Allen et al., 2016; Aristei and Gallo, 2016).

The Mexican Case

- The gender gap in access to credit is more challenging in low- and middle-income economies (Demirguc-Kunt et al., 2022).
- The Mexican case may provide valuable insights for other countries where individuals face high entry barriers to credit markets.
This paper

Research question and design

Research question

▶ Can regulatory policies foster women’s financial inclusion?

Research design

▶ We assess the causal effect of a reform that reduced the loan loss provisions required for loans granted to women in Mexico.

▶ We use a proprietary dataset with information on the universe of consumer loans granted by commercial banks.

▶ This information allow us to estimate the causal effect at the loan level and exploit potential sources of heterogeneity.

▶ We take advantage of the exogenous nature of the reform to estimate the effects using DiD and Event Study designs.
The reform
A reduction in loan loss provisioning

Regulatory change

- Women may face higher obstacles than men when accessing credit.
- Implemented in July 2021.
- All new non-revolving consumer loans granted to women with no overdue payments.
- Granted by all commercial banks following the formula established by the regulator.
- Weighting factor in provisioning formula.
The reform
Provisioning formula

Provisioning formula

\[ Provisions_i = PD_i \times LGD_i \times EAD_i \] (1)

- PD = Probability of default.
- LGD = Loss given default.
- EAD = Exposure at default.

Weighting factor

\[ Provisions_i = PD_i \times W_i \times LGD_i \times EAD_i \] (2)
The reform
Provisioning formula with weighting factor

For new loans

\[ Provisions_i = PD_i \times W_i \times LGD_i \times EAD_i \]  \hspace{1cm} (3) 

- \( PD \) = ex-ante risk measure based on individual characteristics
- \( LGD \) = a coefficient determined by the regulator.
- \( EAD \) = the loan amount.
- \( W = 0.96 \) for personal and automotive loans.
- \( W = 0.98 \) for salary-based loans.

Provisions per borrowed peso

\[ Provisions_i = PD_i \times W_i \]  \hspace{1cm} (4) 

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Our analysis
Focus on personal loans

Non-revolving consumer loans
The reform was effective on personal, salary-based, and automotive loans

Personal loans

- The gender gap in credit conditions is more prevalent in this type of loans.
- Easy access loans, so any changes in this type of loans can potentially affect a larger pool of people.
- Any change in the required loan loss provisions would have a larger effect in this type of loans.

$$Provisions_i = PD_i \times W_i$$ (5)
Data
Consumer loans

Proprietary dataset

- Loan level.
- Bimonthly data for all new loans granted in 2021.
- Repeated cross-sections.
- Variables:
  - Provisions, interest rate, amount.
  - Probability of default, age.
  - Length of the client-bank relationship.
  - Payment mechanism, maturity, frequency of payments.
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Results

Robustness Checks

Conclusions
Empirical Strategy

Design

Treatment

- Exogenous.
- Binary (either treated or untreated).
- Rolled out at the same time (no variation in treatment timing).

Groups

- Treated: new loans granted to women.
- Control: new loans granted to men (never treated).
Empirical Strategy

Specifications

2x2 DiD

\[ y_{i,t} = \text{female}_i + \text{post}_t + \beta_{\text{female}_i} \times \text{post}_t + \theta C_i + \epsilon_{i,t} \]  \hspace{1cm} (6)

Event study

\[ y_{i,t} = \alpha_i + \gamma_t + \sum_{m=-G}^{M} \beta_m \text{female}_{i,t-m} + \theta C_i + \epsilon_{i,t} \]  \hspace{1cm} (7)
Results

New loans and share of credit

Increase in the share of credit and suggestive increase in the number of loans.
## Results

### 2x2 DiD: Provisions and credit conditions

**Improvement in credit conditions.**

<table>
<thead>
<tr>
<th></th>
<th>Loss Provisions (log)</th>
<th>Spread</th>
<th>Amount (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment effect</strong></td>
<td>-0.041***</td>
<td>-0.519***</td>
<td>0.020**</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.028)</td>
<td>(0.004)</td>
</tr>
<tr>
<td><strong>Female = 1</strong></td>
<td>-0.001***</td>
<td>0.264***</td>
<td>-0.048***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.017)</td>
<td>(0.003)</td>
</tr>
<tr>
<td><strong>Bank FE</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Municipality FE</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Credit Controls</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Individual Controls</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Time Interactions</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>871,638</td>
<td>871,639</td>
<td>871,639</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.990</td>
<td>0.827</td>
<td>0.579</td>
</tr>
</tbody>
</table>
Results
Event study: Provisions and credit conditions

Improvement in credit conditions.

Provisions (log)  Spread  Amount (log)

Panel A. Loan Loss Provisions
Panel B. Spread
Panel C. Loan Amount

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Results

2x2 DiD: Heterogeneous effects: probability of default

Concentrated on women with higher probability of default.

<table>
<thead>
<tr>
<th>Treatment effect</th>
<th>Loan Loss Provisions (log)</th>
<th>Spread</th>
<th>Loan Amount (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low PD</td>
<td>High PD</td>
<td>Low PD</td>
</tr>
<tr>
<td>Treatment effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.039***</td>
<td>-0.040***</td>
<td>-0.279***</td>
<td>-0.670***</td>
</tr>
<tr>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.054)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Female=1</td>
<td>-0.002***</td>
<td>-0.0000</td>
<td>0.200***</td>
</tr>
<tr>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.034)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Bank FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Municipality FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Credit Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Obs</td>
<td>373,585</td>
<td>496,333</td>
<td>373,585</td>
</tr>
<tr>
<td>R2</td>
<td>0.995</td>
<td>0.994</td>
<td>0.864</td>
</tr>
</tbody>
</table>
Results

2x2 DiD: Heterogeneous effects: length of the client-bank relationship

Concentrated on women who related with the bank for the first time.

<table>
<thead>
<tr>
<th>Loan Loss Provisions (log)</th>
<th>Spread</th>
<th>Loan Amount (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 New Client</td>
<td>2 Previous Client</td>
<td>3 New Client</td>
</tr>
<tr>
<td>Treatment effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.039***</td>
<td>-0.036***</td>
<td>-0.800***</td>
</tr>
<tr>
<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>Female=1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.000</td>
<td>-0.002**</td>
<td>0.335***</td>
</tr>
<tr>
<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.015)</td>
</tr>
</tbody>
</table>

Bank FE: YES
Municipality FE: YES
Credit Controls: YES
Individual Controls: YES
Time Interactions: YES

Obs: 524,757 345,164 524,757 345,164 524,757 345,164
R-squared: 0.998 0.992 0.811 0.868 0.377 0.560
**Results**

2x2 DiD: Heterogeneous effects: labor informality

Larger effects in municipalities with high levels of labor informality.

<table>
<thead>
<tr>
<th>Loan Loss Provisions (log)</th>
<th>Spread</th>
<th>Loan Amount (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal</td>
<td>Formal</td>
<td>Informal</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-0.042***</td>
<td>-0.714***</td>
</tr>
<tr>
<td>Female=1</td>
<td>-0.001**</td>
<td>0.167***</td>
</tr>
<tr>
<td>Bank FE</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Municipality FE</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Credit Controls</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time Interactions</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Obs</td>
<td>397,500</td>
<td>397,500</td>
</tr>
<tr>
<td>R2</td>
<td>0.990</td>
<td>0.837</td>
</tr>
</tbody>
</table>

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Results
Event study: Financial inclusion

Improved the likelihood of getting subsequent personal loans with better credit conditions.

Getting another personal loan

Spread of the next personal loan

Amount of the next personal loan
Results

Event study: Financial inclusion

No effects on the likelihood of moving from personal to automotive or salary-based loans.

Getting an auto or salary-based loan

Panel D. Getting an auto or salary loan in the following year
## Results

### 2x2 DiD: Financial stability

No negative effects on financial stability.

<table>
<thead>
<tr>
<th></th>
<th>Probability of default (log)</th>
<th>Impact on risk measures</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-0.002 (0.003)</td>
<td>-0.014*** (0.001)</td>
<td>-0.006*** (0.001)</td>
<td>-0.004*** (0.000)</td>
<td>-0.002*** (0.000)</td>
<td></td>
</tr>
<tr>
<td>Female = 1</td>
<td>0.001 (0.002)</td>
<td>-0.017*** (0.001)</td>
<td>-0.021*** (0.001)</td>
<td>-0.003*** (0.000)</td>
<td>-0.005*** (0.000)</td>
<td></td>
</tr>
<tr>
<td>Bank FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Municipality FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Credit Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Individual Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Time Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Credit Conditions with Bank Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

N | 871,638 | 829,484 | 829,484 | 829,484 | 829,484 |
R-squared | 0.528 | 0.116 | 0.132 | 0.188 | 0.214 |
Results

Event study: Financial stability

No negative effects on financial stability.

Probability of default

At least one default in the following year

Share of periods in default in the following year
Results
Other types of credit

Findings
- We find no economically relevant results neither for automotive nor for salary-based loans.

Hypothesis
- Loans with lower probability of default compared to personal loans.
- Design of the reform.

\[ Provisions_i = PD_i \times W_i \] (8)
Outline

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Conclusions
Robustness Checks
Non-affected banks

To rule out contemporaneous shocks.

Provisions (log)  Spread  Amount (log)
To rule out seasonality.

Robustness Checks

Provisions (log)

Spread

Amount (log)
Conclusions

Summary of findings

Research question

- Can regulatory policies foster women’s financial inclusion?

Findings

- Improved credit conditions (lower interest rate and higher loan amount).
- Concentrated on women with higher probability of default.
- Concentrated on women who related with the bank for the first time.
- Larger effects in municipalities with high levels of labor informality.
- Improved the likelihood of getting subsequent personal loans with better credit conditions.
- No effects on the likelihood of moving from personal to automotive or salary-based loans.
- No negative effects on financial stability.
Reducing provisions can have a positive, but limited effect on fostering financial inclusion.

The effects on financial inclusion may be nonlinear and require further analysis.
Thanks!
Alejandro Becerra-Ornelas
alejandro.becerra@banxico.org.mx