Strategic Default in the Coffee Value Chain

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May 2017
This paper:

1. provides a test for **strategic default** and
2. explores its consequences for **contract choice** and **efficiency** in the coffee value chain.
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Ability to enter binding agreements is essential to well-functioning markets.
Question

- This paper:
  1. provides a test for **strategic default** and
  2. explores its consequences for **contract choice** and **efficiency** in the coffee value chain

- Ability to enter binding agreements is essential to well-functioning markets.

- **Strategic default** - a situation in which one party reneges on an agreement just because it can get away with it - can then severely hampers market functioning.
This paper:
1. provides a test for **strategic default** and
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Ability to enter binding agreements is essential to well-functioning markets.

**Strategic default** - *a situation in which one party reneges on an agreement just because it can get away with it* - can then severely hampers market functioning.

Transacting parties adjust their behaviour and contracts in anticipation of **strategic default**

→ we need to understand both its direct manifestation (*default*) and indirect one (*contract choice*)
What do we need?

1. Observe *default* and *contract choice*

2. Exogenous changes in incentives when default choice is made
Environment

- This paper provides evidence for strategic default and its consequences in the international coffee market.

- **Pre-financing agreements**: working capital *loans* backed by *sales contracts*.

- Data on approx. 800 pre-financing agreements to 300+ coffee mills in 22 developing countries.
  - Intrinsic interest
  - Methodological Advantages

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Strategic Default

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Why is it difficult to distinguish?

1. Observe contract terms and defaults
   - Sales contracts → *fixed price vs. differential*
   - Loans → default is observed

2. Exogenous changes in incentives when default choice is made
   - Unanticipated fluctuations in international prices
   - Different timing of loan utilization vs. contract execution
Summary of Results

A simple model i) delivers testable predictions and ii) guides exploration of quantitative implications of strategic default.

1. Can we detect strategic default?
   - **YES** unanticipated increases in international prices increase likelihood of default on fixed price contracts
Summary of Results

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   YES  unanticipated increases in international prices increase likelihood of default on fixed price contracts

2. Does strategic default affect contract choice?
   YES  *price vs counterparty* risk
   ★ High relationship value → fixed price contract
   ★ Low relationship value → differential contract

---

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2. Does strategic default affect contract choice?
   **YES** price vs counterparty risk
   - High relationship value → fixed price contract
   - Low relationship value → differential contract

3. Does Strategic Default matter?
   **YES** Combining RDD & Model Calibration
   - Firms are credit constrained
   - SD generates externalities along the supply chain
   - Relational capital is large (approx. 70% of contract sale)
   - Removing SD would ↑ production by 28% and farmer welfare by 30%
Related Literature

- (Relational) Contracts:

- Credit Constraints (on larger firms), Credit and Exports, Trade Credit:

- Empirics of Contracts
  - Chiappori and Salanić (2002), Karlan and Zimman (2010), Adams et al. (2009), Townsend (et al., various)

- Industrial Organization of Agricultural Sector:
  - De Janvry et al. (2014), Dragusano and Nuun (2014), Macchiavello and Morjaria (2014), Casaburi and Reed (2017), Ghani and Reed (2014), Banerjee et al. (2001), Mullhainathan and Sukhatankar (2014), Fafchamps (et al., various)
Roadmap

- **Context & Data** ▶ Go
- **Model** ▶ Go

- **Empirics**
  - **Test 1:** Detecting Strategic Default ▶ Go
  - **Test 2:** Strategic Default & Contract Choice ▶ Go
  - Does Strategic Default matter?
    - RDD ▶ Go
    - Calibration & Counterfactuals ▶ Go

- **Conclusion & Discussion** ▶ Go
### Lending Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Median</th>
<th>Mean</th>
<th>St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Assets (in 1,000,000$)</strong></td>
<td>136</td>
<td>1.09</td>
<td>2.43</td>
<td>3.52</td>
</tr>
<tr>
<td><strong>Sales (in 1,000,000$)</strong></td>
<td>136</td>
<td>1.36</td>
<td>2.64</td>
<td>4.38</td>
</tr>
<tr>
<td><strong>Cherries Purchases (in 1,000,000$)</strong></td>
<td>136</td>
<td>1.01</td>
<td>2.20</td>
<td>3.90</td>
</tr>
<tr>
<td><strong>Sales / Cherries Purchases</strong></td>
<td>136</td>
<td>0.66</td>
<td>0.71</td>
<td>0.39</td>
</tr>
<tr>
<td><strong>Permanent Employees</strong></td>
<td>136</td>
<td>10</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td><strong>Seasonal Employees</strong></td>
<td>136</td>
<td>12</td>
<td>105</td>
<td>266</td>
</tr>
<tr>
<td><strong>Growers Supplying Coffee</strong></td>
<td>136</td>
<td>434</td>
<td>1076</td>
<td>1575</td>
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<tr>
<td><strong>Number of Loans from Lender</strong></td>
<td>136</td>
<td>5.00</td>
<td>5.38</td>
<td>2.82</td>
</tr>
<tr>
<td><strong>Loan Amount (in 1,000,000$)</strong></td>
<td>136</td>
<td>0.46</td>
<td>0.58</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>Share Purchases Financed by Lender</strong></td>
<td>136</td>
<td>0.46</td>
<td>0.59</td>
<td>0.47</td>
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<tr>
<td><strong>Number of Loans from Lender (full sample)</strong></td>
<td>317</td>
<td>2.00</td>
<td>3.20</td>
<td>2.56</td>
</tr>
<tr>
<td><strong>Loan Amount (in 1,000,000$) (full sample)</strong></td>
<td>317</td>
<td>0.33</td>
<td>0.47</td>
<td>0.44</td>
</tr>
</tbody>
</table>

### Panel A: Mills Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Median</th>
<th>Mean</th>
<th>St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loan Amount (in 1,000,000$)</strong></td>
<td>781</td>
<td>0.33</td>
<td>0.47</td>
<td>0.52</td>
</tr>
<tr>
<td><strong>Interest Rate</strong></td>
<td>781</td>
<td>0.10</td>
<td>0.10</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Length Loan (days)</strong></td>
<td>781</td>
<td>257</td>
<td>251</td>
<td>69.7</td>
</tr>
<tr>
<td><strong>Renewal (=1), First Loan (=0)</strong></td>
<td>781</td>
<td>1.00</td>
<td>0.72</td>
<td>0.45</td>
</tr>
<tr>
<td><strong>Default (Write-Off, Restructured, Delay), %</strong></td>
<td>781</td>
<td>0.00</td>
<td>0.04</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Price Surprise</strong></td>
<td>781</td>
<td>1.05</td>
<td>1.09</td>
<td>0.29</td>
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<tr>
<td><strong>Africa</strong></td>
<td>781</td>
<td>0.00</td>
<td>0.12</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Central America</strong></td>
<td>781</td>
<td>0.00</td>
<td>0.36</td>
<td>0.48</td>
</tr>
<tr>
<td><strong>Latin America</strong></td>
<td>781</td>
<td>0.00</td>
<td>0.49</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>Fixed Price Contract</strong></td>
<td>598</td>
<td>1.00</td>
<td>0.59</td>
<td>0.49</td>
</tr>
<tr>
<td><strong>Numerical Score</strong></td>
<td>455</td>
<td>3.61</td>
<td>3.50</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Lending Model

FOREIGN BUYER

OUR LENDER

MILL

FARMERS
1. Buyer and mill negotiate a contract
Lending Model

1. Buyer and mill negotiate a contract

2. Lender extends loan to mill (formula + value of the contract)
1. Buyer and mill negotiate a contract

2. Lender extends loan to mill (formula + value of the contract)

3. Mill purchases cherries during harvest time.
Lending Model

1. Buyer and mill negotiate a contract
2. Lender extends loan to mill (formula + value of the contract)
3. Mill purchases cherries during harvest time.
4. After harvest mill delivers coffee to buyer
1. Buyer and mill negotiate a contract

2. Lender extends loan to mill (formula + value of the contract)

3. Mill purchases cherries during harvest time.

4. After harvest mill delivers coffee to buyer

5. Lender is paid directly by buyer
Lending Model: Remarks

- Similar to working capital loans based on account receivable:
  - Primary source of SME financing in US (Klepper (2004)), even more important in developing countries

- Extremely common practice in this (and related) industry:
  - Processors and exporters engage in pre-financing to secure future supplies of coffees (Coffee Exporter Guide, see also ITC, Larson and Varangis (2006), WB)
  - Data from Rwanda and Peru

- Lender’s Portfolio and Terms broadly representative
  - Portfolio
  - Collateral
  - Interest rates
Mill must jointly default on buyer and lender (this is the contractual innovation). Potentially two types of collusion:

A. mill-buyer against the lender: possible, not a problem
B. mill-lender against the buyer: possible, we can check

For now abstract from it. But see this and this.
Roadmap

- Context & Data  🔄 Go

- Model  🔄 Go

- Empirics
  - Test 1: Detecting Strategic Default  🔄 Go
  - Test 2: Strategic Default & Contract Choice  🔄 Go
  - Does Strategic Default matter?
    - RDD  🔄 Go
    - Calibration & Counterfacuals  🔄 Go

- Conclusion & Discussion  🔄 Go
Model

Two Goals:

1. Derive Qualitative Predictions
   - Test for strategic default, contract choice, heterogeneity

2. Guide Quantitative Exercise
   - Calibration and Counterfactuals
Set-Up

- A risk-averse mill and a risk-neutral buyer-lender

Cost of producing $q$ units:

$$C(q) = \gamma \times q \times p(q) = \gamma \times q \times p_0 \times q^n.$$  (1)
Set-Up

- A risk-averse mill and a risk-neutral buyer-lender
- Cost of producing $q$ units:
  \[ C(q) = \gamma \times q \times p(q) = \gamma \times q \times p_0 \times q^n. \] (1)
- Mill has ex-ante bargaining power but no cash
- Contract $\mathbf{C} = \{q_c, p_c \vee \Delta_c, L, D\}$ maximizes mill expected utility
  s.t.:
  - Lender and Buyer participation constraints
  - Mill LL and IC (if any)
Timing

Negative Cash Flows:
Ex-ante MH constraint

$t = 0$
Contract is negotiated

$t = 1$
Loan disbursed,
stations purchases
inputs or diverts

$t = 2$

$t = 3$
Timing

Negative Cash Flows:
Ex-ante MH constraint

\[ t = 0 \]
Contract is negotiated

\[ t = 1 \]
Loan disbursed, stations purchases inputs or diverts

\[ t = 2 \]
international price drawn from \( F(p) \) is realized

\[ t = 3 \]
Timing

$\textbf{Negative Cash Flows:}$

Ex-ante MH constraint

$\textbf{Positive Cash Flows}$

Ex-post MH constraint

$t = 0$
Contract is negotiated

$t = 1$
Loan disbursed, stations purchases inputs or diverts

$t = 2$
international price drawn from $F(p)$ is realized

$t = 3$
Station repays or side-sells (default)
Participation Constraints

**Buyer**

\[
(E[p - p_c] | delivery) \times q_c \geq 0
\]  

(2)
Participation Constraints

- **Buyer**

\[
(E[p - p_c]|\text{delivery}) \times q_c \geq 0
\]  

→ Under Fixed Price

\[
E[p_c|\text{delivery}] = p_c
\]
Participation Constraints

- **Buyer**

\[(\mathbb{E}[p - p_c | delivery] \times q_c) \geq 0\] \hspace{1cm} (2)

→ **Under Fixed Price**

\[\mathbb{E}[p_c | delivery] = p_c\] \hspace{1cm} (3)

→ **Under Differential**

\[\mathbb{E}[p_c | delivery] = \mathbb{E}[p | delivery] + \Delta_c\] \hspace{1cm} (4)
Participation Constraints

• **Buyer**

\[
(E[p - p_c | delivery]) \times q_c \geq 0
\]  
(2)

→ **Under Fixed Price**

\[
E[p_c | delivery] = p_c
\]  
(3)

→ **Under Differential**

\[
E[p_c | delivery] = E[p | delivery] + \Delta_c
\]  
(4)

• **Lender**

\[
L \leq \int p \; I[p] \times \min\{D, p_c q_c\} \, dF(p)
\]  
(5)
Ex-Post Incentive Constraint

Mill repays if ...

\[ q_c p_c - D + \delta V \geq (pq_c + \delta U) \]  \hspace{1cm} (6)

Rewrite as

\[ \underbrace{V}_{\delta(V-U)} \geq D + (p - p_c) q_c \] \hspace{1cm} (7)

Empirical Extension
Solution: Perfect Enforcement vs. Strategic Default

First Best: Perfect Contract Enforcement

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Solution: Perfect Enforcement vs. Strategic Default

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Strategic Default

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Predictions

**P1:** Unexpected increases in world prices lead to default under fixed price contracts but not under differential relationships with higher $V$ are more likely to sign fixed price contracts. Conditional on a fixed price contract, higher $V$ reduces strategic default.
Predictions

P1: Unexpected increases in world prices lead to default under fixed price contracts but not under differential

P2: Relationships with higher $V$ are more likely to sign fixed price contracts
Predictions

P1: Unexpected increases in world prices lead to default under fixed price contracts but not under differential.

P2: Relationships with higher $V$ are more likely to sign fixed price contracts.

(P3): Conditional on a fixed price contract, higher $V$ reduces strategic default.
Roadmap

- Context & Data  

- Model  

- Empirics
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    - RDD
    - Calibration & Counterfactuals

- Conclusion & Discussion
Test 1: Strategic Default
Test 1: Strategic Default

The graph shows the distribution of price ratios (shipment/closing) for different types of defaults. The x-axis represents the price ratio, while the y-axis shows the density of defaults. The graph includes lines and bars representing all defaults, fixed price defaults, and differential price defaults, along with the density of prices.
(Differential) Relationship is robust to regression analysis.
- Control for contracting / maturity time fixed effects.
- Control for mill fixed effects.
- Control for contract size and duration.
- Control for interactions with price surprise and with contract type.
- Different thresholds to define fixed contracts.
- Different definitions of default.

**NB:** default leads to worse relationship with lender.
### Strategic Default as a form of MH

<table>
<thead>
<tr>
<th>Ex-Ante MH</th>
<th>Ex-Post MH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit</td>
<td>Loan Diversion</td>
</tr>
</tbody>
</table>

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Strategic Default as a form of MH

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<tbody>
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<td>Credit</td>
<td>Loan Diversion</td>
<td>Strategic Default</td>
</tr>
<tr>
<td>Commercial</td>
<td>Costly Quality Provision</td>
<td>Side-Selling</td>
</tr>
<tr>
<td>Theory of Firm</td>
<td>Non-Contractible Investments</td>
<td>Ex-Post Haggling</td>
</tr>
</tbody>
</table>
Why is it important to distinguish?

1. Optimal contractual remedy depends on type of MH, e.g.:
   - Loan Diversion $\rightarrow$ Trade Credit (Burkart and Ellingsen (2004))
   - Strategic Default $\rightarrow$ Debt (Ellingsen and Johannson (2010))

2. Differently affected by changes in environment, e.g.:
   - market structure vs. technology

3. Differently welfare implications:
   - **Direct**: Deadweight loss vs. Transfer
   - **Indirect**: Contract Choice $\rightarrow$ which market is missing
Test 1: Strategic Default vs. Loan Diversion

- In general, we expect incentive to divert the loan to be lower when prices increases (reverse debt over-hang effect)
Test 1: Strategic Default vs. Loan Diversion

- In general, we expect incentive to divert the loan to be lower when prices increases (reverse debt over-hang effect)

- International coffee prices however might be transmitted to prices received by farmers → incentive to divert the loan might increase

  Strategy: distinguish prices increases occurring during harvest season from those happening after the end of harvest season:
  
  I During: potentially affect loan diversion decision
  I After: loan utilization decisions is sunk

  Event study to isolate strategic default (Go)

  Regression analysis also find no evidence of loan diversion. Why?
Test 1: Strategic Default vs. Loan Diversion

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- **Conclusion & Discussion**
Test 2: Contract Choice

[Graph showing relationship between fixed price contract and relationship score with buyer]
Test 2: Contract Choice, Robustness

Correlation between strength of relationship with buyer and contract choice is robust to regression analysis (Go)

- Control for contracting / maturity time fixed effects
- Control for mill and buyer fixed effects
- Control for contract size and duration (and joint estimation)
- Control for price surprise (placebo)
- Control for loan application scores

Remark: differential contracts get higher score from the lender - as expected
Further Results

- Heterogeneity (relationship importance, institutional quality, competition) (Go)
- Mill-Lender Collusion (Go)
Roadmap

- Context & Data ➤ Go
- Model ➤ Go

Empirics
- **Test 1:** Detecting Strategic Default ➤ Go
- **Test 2:** Strategic Default & Contract Choice ➤ Go
- Does Strategic Default matter?
  - RDD ➤ Go
  - Calibration & Counterfactuals ➤ Go

Conclusion & Discussion ➤ Go
Quantitative Implications

We have documented strategic default. Does it matter?

**Step 1:** RDD to test for credit constraints (and recover key parameters)
Quantitative Implications

We have documented strategic default. Does it matter?

**Step 1:** RDD to test for credit constraints (and recover key parameters)

**Step 2:** Model calibration

- All model’s parameter \((F(), \mu, \sigma, \alpha, \eta, \gamma_i)\) from the data
- Recover \(V\) for each observation by matching contract choice and loan interest rate

→ Are estimates consistent with strategic default generating credit constraint?
- Counterfactuals: \(V = \infty\), \(V = 0\)
Credit Constraints: Strategy

- A firm is credit constrained if additional supply of loan (at same r)
  - is used to expand input purchases and sales,
  - without (completely) substituting for existing more expensive loans

- Strategy: % of contract that is pre-financed depends on a score:
  A (score > 3.35): 60% of value of contract is pre-financed
  B (score < 3.35): 40% of value of contract is pre-financed

- Remarks:
  - Decision at the margin
  - Other loans can be substituted.
Credit Constraints: Experiment

Discontinuity at the letter score gives:

- approx. 20% higher loan $\rightarrow 100,000$ USD
- identical interest rate

Validity

- No sorting
- No sorting, details
- No sorting, placebos
## Credit Constraints: Results

**Table 7: Contract information associated with larger loan amounts**

<table>
<thead>
<tr>
<th></th>
<th>Loan Amount (1)</th>
<th>Other Loans (2)</th>
<th>Other Loans (3)</th>
<th>Other Loans (4)</th>
<th>Interest Rate (5)</th>
<th>Interest Rate (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal Bandwidth</td>
<td>84,383***</td>
<td>31,441</td>
<td></td>
<td></td>
<td>-0.00516</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(23,553)</td>
<td>(43,916)</td>
<td></td>
<td></td>
<td>(0.00917)</td>
<td></td>
</tr>
<tr>
<td>75% Optimal Bandwidth</td>
<td>113,709***</td>
<td>1,501</td>
<td></td>
<td></td>
<td>0.00534</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(41,027)</td>
<td>(114,677)</td>
<td></td>
<td></td>
<td>(0.00565)</td>
<td></td>
</tr>
<tr>
<td>125 % Optimal Bandwidth</td>
<td>88,017***</td>
<td>2,520</td>
<td></td>
<td></td>
<td>-0.0127</td>
<td></td>
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<tr>
<td></td>
<td>(4,632)</td>
<td>(27,893)</td>
<td></td>
<td></td>
<td>(0.0109)</td>
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<tr>
<td>Observations</td>
<td>575</td>
<td>575</td>
<td></td>
<td></td>
<td>575</td>
<td></td>
</tr>
</tbody>
</table>

- Loan increases by 85K
- Other Loans are *not* reduced
- Same

**Further remarks and results**

[Go]
Table 8: Purchases associated with larger loan amounts

<table>
<thead>
<tr>
<th></th>
<th>Purchases</th>
<th>log(Purchases)</th>
<th>log(Purchase Volume)</th>
<th>log(Purchases Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Optimal Bandwidth</td>
<td>113,941**</td>
<td>0.110**</td>
<td>0.175**</td>
<td>0.0391**</td>
</tr>
<tr>
<td></td>
<td>(50,712)</td>
<td>(0.0473)</td>
<td>(0.0828)</td>
<td>(0.0195)</td>
</tr>
<tr>
<td>75% Optimal Bandwidth</td>
<td>193,371</td>
<td>0.0882</td>
<td>0.0808***</td>
<td>0.0436*</td>
</tr>
<tr>
<td></td>
<td>(140,641)</td>
<td>(0.0649)</td>
<td>(0.0311)</td>
<td>(0.0247)</td>
</tr>
<tr>
<td>125% Optimal Bandwidth</td>
<td>101,440**</td>
<td>0.202**</td>
<td>0.230**</td>
<td>0.0413**</td>
</tr>
<tr>
<td></td>
<td>(48,886)</td>
<td>(0.0916)</td>
<td>(0.101)</td>
<td>(0.0205)</td>
</tr>
</tbody>
</table>

Cherry Purchases
↑ by 113K (≈85K),
≈11%

Prices paid to farmers ↑

Further remarks and results
## Calibration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F(p)$ (World) Price Surprise</td>
<td>Data Observed</td>
</tr>
<tr>
<td>$\mu$ Find Alternative Buyer</td>
<td>Late vs. Default Observed</td>
</tr>
<tr>
<td>$\gamma_i$ Scale</td>
<td>Audited Accounts Observed</td>
</tr>
<tr>
<td>$\eta$ Local Supply</td>
<td>RDD on prices to farmers Estimated</td>
</tr>
<tr>
<td>$\sigma$ Penalty for Late Punishment</td>
<td>Estimated</td>
</tr>
<tr>
<td>$\alpha$ Risk Aversion</td>
<td>Average Fwd Discount Calibrated</td>
</tr>
</tbody>
</table>

$V_i \quad \text{Solved}$
Relationship Value: Estimates (Preliminary !)

Mean = 0.82 , Median = 0.71

Removing strategic default at the average mill increases production by 18% and farmers welfare by 30%

Removing relational capital at the average mill decreases production by 43% and farmers welfare by 74%

Distirbution of Estimated $V$

Mean = 0.82 , Median = 0.71
Estimated $V_i$ match bounds from observed temptations and are in the region where credit constraints bind.
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Removing strategic default at the average mill increases production by 18% and farmers welfare by 30%.
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Roadmap

- Context & Data
- Model
- Empirics
  - Test 1: Detecting Strategic Default
  - Test 2: Strategic Default & Contract Choice
  - Does Strategic Default matter?
    - RDD
    - Calibration & Counterfactuals
- Conclusion & Discussion
Policy Implications I

- A common problem in a specific context:
  - Many developing countries heavily rely on export revenues generated in few, highly volatile, mineral/agricultural markets.
  - Yet access to risk-management tools is limited

- Counterparty risk a key constraints → financing and risk management are linked:
  - both involve promises to pay that are limited by collateral constraints

- In our context, collateral is relational capital $V$ → structure of formal contract → endogenous determination of missing market
Policy Implications II

- Can’t mill insure against price fluctuations buying options?
- Strategic default
  → Mill cannot credibly promise to pay back when price is high.
Can’t mill insure against price fluctuations buying options?

Strategic default
   → Mill cannot credibly promise to pay back when price is high.

OK. But, why not just buy a put option against low prices?
   → This already happens: *fair trade* contract

However:
   → counterparty risk on the buyer side (see de Javry et al. (2014))
   → low willingness to pay due to limited liability
Conclusions: What have we learned?

1. This paper provided a test for strategic default (ex-post MH)
   ▶ a trade-off between *price* and *counterparty* risk
Conclusions: What have we learned?

1. This paper provided a test for strategic default (ex-post MH)
   → a trade-off between *price* and *counterparty* risk

2. Friction is quantitatively important:
   → Large enough to generate credit (or insurance) constraints
   → Imposes externality on farmers upstream
   → Many valuable trade opportunity are lost
   → Heterogeneous missing markets across firms
Conclusions: What have we learned?

1. This paper provided a test for strategic default (ex-post MH) 
   - a trade-off between *price* and *counterparty* risk

2. Friction is quantitatively important:
   - Large enough to generate credit (or insurance) constraints
   - Imposes externality on farmers upstream
   - Many valuable trade opportunity are lost
   - Heterogeneous missing markets across firms

3. Formal contracts adapted to leverage scarce relational capital
Thank you!
As per contract, most loans are indeed repaid by buyer.
Variation in Contract Timing

Timing of Contracts: Closing and Maturity Dates

- Asynchronous harvest season timing across countries allows us to control for contract closing/maturity time FE, i.e., international coffee market conditions (e.g., coffee price volatility)
- Can also control for country FE / mill controls / interactions etc…

Blouin and Macchiavello
Strategic Default
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<table>
<thead>
<tr>
<th>Sample:</th>
<th>All loans (Not split by type)</th>
<th>Fixed Shipments</th>
<th>Fixed Shipments: Loans where all shipments are fixed</th>
<th>Differential Shipments (Not split by type)</th>
<th>All loans</th>
<th>Weighted OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Price Surprise</td>
<td>0.052</td>
<td>0.098</td>
<td>0.146</td>
<td>0.22</td>
<td>0.0501</td>
<td>0.0263</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.045)**</td>
<td>(0.058)**</td>
<td>(0.11)**</td>
<td>(0.0411)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Fixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-0.025)</td>
<td>(-0.182)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.529)</td>
<td>(0.076)**</td>
</tr>
<tr>
<td>Fixed x Price Surprise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.184</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.092)**</td>
</tr>
<tr>
<td>Futures Price</td>
<td>0.001</td>
<td>0.0015</td>
<td>0.00011</td>
<td>0.000631</td>
<td>-0.000781</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0007)</td>
<td>(0.0015)</td>
<td>(0.00021)</td>
<td>(0.000222)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price at Maturity</td>
<td>0.0001</td>
<td>-0.0003</td>
<td>0.00023</td>
<td>-0.000744</td>
<td>0.00075</td>
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</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0011)</td>
<td>(0.00022)</td>
<td>(0.000205)</td>
<td></td>
<td></td>
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<tr>
<td>Maturity Month Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maturity Year Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Closing Month Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Closing Year Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed Price Interactions</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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</table>
### Table 10: Punishment for Default

<table>
<thead>
<tr>
<th></th>
<th>Default</th>
<th>Restructured</th>
<th>90 Days Late</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
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<tr>
<td>Differential Prob. of Future Loan</td>
<td>-0.520***</td>
<td>-0.460***</td>
<td>-0.329***</td>
</tr>
<tr>
<td></td>
<td>(0.130)</td>
<td>(0.0983)</td>
<td>(0.0575)</td>
</tr>
<tr>
<td>Futures Price (mat.) at closing date</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Price at Closing</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Letter Score Fixed Effects</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Country Fixed Effects</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Closing Month Fixed Effects</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>907</td>
<td>907</td>
<td>907</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.334</td>
<td>0.331</td>
<td>0.323</td>
</tr>
</tbody>
</table>
Test for Strategic Default: Event Study

Prices jumps around maturity (event study)

Default rates on loans that had >15% price increase just before vs. just after maturity of loan

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Controlling Loan Diversion

Blouin and Macchiavello

Strategic Default

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## Test for Strategic Default

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship Score with Buyer</td>
<td>0.07</td>
<td>0.0646</td>
<td>0.0646</td>
<td>0.0662</td>
<td>0.0648</td>
</tr>
<tr>
<td></td>
<td>(0.0351)**</td>
<td>(0.0331)*</td>
<td>(0.0327)**</td>
<td>(0.0306)**</td>
<td>(0.0311)**</td>
</tr>
<tr>
<td>Number of observations</td>
<td>336</td>
<td>336</td>
<td>336</td>
<td>336</td>
<td>336</td>
</tr>
<tr>
<td>Cumulative business done to date between client-buyer (100,000)</td>
<td>0.0021</td>
<td>0.0028</td>
<td>0.0023</td>
<td>0.0023</td>
<td>0.0022</td>
</tr>
<tr>
<td></td>
<td>(0.00041)***</td>
<td>(0.00036)***</td>
<td>(0.00036)***</td>
<td>(0.00036)***</td>
<td>(0.00038)***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>379</td>
<td>379</td>
<td>379</td>
<td>379</td>
<td>379</td>
</tr>
</tbody>
</table>

- **Maturity Month Fixed Effects**: Yes
- **Maturity Year Fixed Effects**: Yes
- **Closing Month Fixed Effects**: Yes
- **Closing Year Fixed Effects**: Yes
- **Client Fixed Effects**: Yes
- **Number of Buyers**: Yes
- **Contract Value parameters**: Panel A
- **Letter Score**: No, Yes, Yes, Yes, Yes
- **Numerical Score**: No, No, Yes, Yes, Yes
- **Future Price at Signing**: No, No, No, Yes, Yes
- **Loan Length**: No, No, No, No, Yes
Further Results

Conditional on fixed contract, heterogeneity by relationship importance
- Buyer-Seller
- Control for contract size and duration (and joint estimation)

Conditional on fixed contract, heterogeneity by
- Institutional Quality
- Lender Competition \((in\ sample)\)
- Buyer Competition \((in\ sample)\)
Nearly 90% are indeed directly repaid by the buyer

When relationship btw. buyer and lender is weaker mill might default on sale contract while still repaying the loan

When this happens, we (should) observe:

- Repayment is made directly by the mill
- Relationship between buyer and lender is compromised
- Less likely to happen with buyers important for the lender
- More likely to happen with late repayment and at times of positive price surprise
$\hat{\beta} = 0.43^{***}$

Log(Loan Amount) vs. Score

$\log(\text{Loan Amount}) \approx 0.6 \times 500K - 0.4 \times 500K = 100K \approx 90K$
### RDD Design: Validity

#### No. of sig. estimates for score

<table>
<thead>
<tr>
<th>10% significance (1)</th>
<th>5% significance (2)</th>
<th>1% significance (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Station Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.25 threshold</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.35 threshold (B-A)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.45 threshold</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.71 threshold</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3.81 threshold (A-AA)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.91 threshold</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Observations per sub-score regression</td>
<td>575</td>
<td>575</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>34 Subscores</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.25 threshold</td>
</tr>
<tr>
<td>3.35 threshold (B-A)</td>
</tr>
<tr>
<td>3.45 threshold</td>
</tr>
<tr>
<td>3.71 threshold</td>
</tr>
<tr>
<td>3.81 threshold (A-AA)</td>
</tr>
<tr>
<td>3.91 threshold</td>
</tr>
<tr>
<td>Observations per sub-score regression</td>
</tr>
</tbody>
</table>
Further Results

- Sales increase to buyers \textit{not} on the contract, no effect on sales price
- Profits increase, suggesting MPK $\approx 20\text{-}30\% >$ interest rate

Heterogeneity

- Not enough power to run RDD by contract type (endogenous anyway)
- Second discontinuity A $\rightarrow$ AA
  - Relatively more differential contracts
  - No credit constraints: larger loan substitutes other loans
Mill repays on time if ...

$$q_c p_c - D + \delta V \geq \mu \left( p q_c + \delta U^D \right) + (1 - \mu) \left( q_c p_c - D + \delta U^L \right)$$  \hspace{1cm} (8)

Assume $U^D = U$, $U^L = \sigma V + (1 - \sigma) U$ and denote $\varphi = \frac{\mu}{1 - \sigma (1 - \mu)}$

Rewrite as

$$\underbrace{V}_{\delta (V - U)} \geq \varphi \times \left( D + (p - p_c) q_c \right)$$ \hspace{1cm} (9)