The Value of Central Clearing

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September 2019
Motivation

- Financial frictions impede trading $\rightarrow$ Inefficient allocations
  - But agent design contracts to undo frictions (Allen & Gale, 1988)
  - In history: bill of exchange, insurance, intermediaries, limited liability
  - Causal impact on real outcomes is hard to identify

- This paper: **First appearance of a contracting innovation**
  - First central clearing counterparty (CCP) in history
  - CCPs: netting of transactions + insulation against counterparty risk
  - CCPs now widespread and mandatory worldwide post 2008-9
This paper

- Contractual innovation: **Central clearing of derivatives**
  - Introduced in Le Havre (France) in 1882 for coffee futures
  - Functioning extremely similar to modern CCPs
  - Key innovation: Insulation from counterparty risk, not netting

- Results I: **Significant effects of central clearing on trade flows**
  - More coffee imports, exports and stocks in Le Havre
  - ... relative to uncleared commodities and to other harbors
  - ... within France and across European countries

- Results II: **Two mechanisms at play**
  - Solve a “missing market” problem → For established traders
  - Reduce adverse selection → For new traders
  - Mechanisms unrelated to clearing are ruled out
H1: Central clearing increases trade flows in underlying goods

Underlying theory: Trading requires dealers to hold inventories
- Limited risk-bearing capacity of dealers impairs trading
- Better ability to hedge inventories increases trade

Why does central clearing improve hedging ability?
- Mechanism 1: Markets become more complete
- Mechanism 2: Lower adverse selection about counterparty risk
Historical background

- **“Northern range”: Most active trade area worldwide in 1880s**
  - London, Liverpool, Le Havre, Antwerp, Rotterdam, Hamburg, etc.
  - Free-trade policies + technological progress (steamboats)

- **Long-distance trade creates price risk**
  - Coffee exported after production (Brazil) and warehoused by dealers
  - Large inventories until coffee sold for consumption
  - Wide use of bilaterally traded forward/future contracts

- **Coffee crisis in 1880 → Caisse de liquidation (CLAM)**
  - Large decline in coffee prices → Failures and trade breakdown in US
  - Trade slows down in Europe → Reputation no longer sufficient
  - Coffee traders study institutions to stabilize trade
The functioning of the CLAM

- **After novation, CLAM bears all counterparty risk**
  - Membership: Counterparties must be brokers domiciled in Le Havre
  - Initial margins + daily variation margins
  - If failure on margin calls: Liquidate positions
  - If loss: Equity is impaired

- **CLAM starts operating on December 16th, 1882**
  - Fully private initiative (limited liability corporation)
  - Equity holders are commodity traders/dealers
  - Key innovation: Counterparty risk management
Data and archive sources

- **Institutional data**: Various archive centers
  - General assembly minutes, rulebooks, policy discussions [See]

- **Futures market data**: Daily *Bulletin de correspondance*
  - Future prices, trading volume and identity of traders [See]

- **Trade data**: Customs’ archive for each country [See]
  - France: Bilateral trade flows by commodity at harbor level
  - Europe: Bilateral trade flows by commodity and country pairs
  - Coverage: Belgium, France, Germany, Hamburg, Italy, Netherlands, Norway, Sweden

- **Consumption data**: Graham (US Department of Agriculture, 1912)
Trade flows - Identification strategy

- **H1:** Central clearing increases trade flows in underlying goods

- **Triple diff-in-diff with CLAM creation as experiment**

\[ Share_{cht} = \alpha + \beta_1 \cdot CCP_{ht} + \beta_2 \cdot Cleared_c \cdot Post_t + \beta_3 \cdot CCP_{ht} \cdot Cleared_c + \mu_t + \mu_{ch} + \epsilon_{cht} \]

- **Share\textsubscript{cht}:** Imports, exports, stocks of commodity \( c \) in harbor \( h \) at \( t \)
- **CCP\textsubscript{ht}:** Equals 1 if CCP in place in harbor \( h \) at \( t \)
- **Cleared\textsubscript{c}:** Equals 1 for commodities eventually cleared
- **Post\textsubscript{t}:** Equals 1 strictly after 1882

- **Control group:** “Colonial commodities”
  - Sugar, cocoa, pepper, tea, vanilla, tobacco
  - Not produced in continental Europe → Pure trade effect

- **Sample period:** 1877-1887
Trade flows - Exogeneity of treatment

- **Exogeneity 1**: Price dynamics similar across markets (telegraph)
- **Exogeneity 2**: No evidence of more severe 1880 crisis in Le Havre
  - Based on *Bulletin de correspondance* and local newspapers
- **Exogeneity 3**: Clearing was a debated innovation
  - Depitre (1907): “At the beginning, opinions were strongly divided in the commercial circles in Le Havre. A number of important trading houses refused to participate in the CLAM and a number of them avoided any relationship with it.”
  - Clearing also debated abroad for years
  - Unlikely traders could foresee what effects would be

- **Exogeneity of treated commodity**: Coffee
  - Clearing also introduced in cotton → Consistent results
Trade flows - Sample of 22 French harbors
Trade flows - Within-France estimates

- Significant increase in coffee trade activity in Le Havre
  - ... relative to control commodities
  - Large economic magnitude: Explained by market structure

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Share of imports</th>
<th>Share of imports</th>
<th>Share of imports</th>
<th>Share of exports</th>
<th>Share of stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CCP_{ht} \cdot \text{Cleared}_c$</td>
<td>0.111***</td>
<td>0.092***</td>
<td>0.177***</td>
<td>0.247***</td>
<td>0.158***</td>
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<tr>
<td></td>
<td>(0.020)</td>
<td>(0.019)</td>
<td>(0.008)</td>
<td>(0.018)</td>
<td>(0.037)</td>
</tr>
<tr>
<td>$\text{Cleared}_c \cdot \text{Post}_t$</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.007***</td>
<td>-0.010***</td>
<td>-0.014</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.001)</td>
<td>(0.003)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>$CCP_{ht}$</td>
<td>0.049***</td>
<td>0.069***</td>
<td>-0.016***</td>
<td>0.013</td>
<td>0.029*</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.005)</td>
<td>(0.012)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Control group Incl. sugar</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Total</td>
<td>Total</td>
<td>Colonial</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.944</td>
<td>0.953</td>
<td>0.991</td>
<td>0.964</td>
<td>0.878</td>
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<td>N. Obs.</td>
<td>1,656</td>
<td>1,380</td>
<td>552</td>
<td>552</td>
<td>772</td>
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</tbody>
</table>
Central clearing for other commodities

- Cotton (1882) → Exogenous treatment
- Indigo (1887)

<table>
<thead>
<tr>
<th></th>
<th>Cotton (raw)</th>
<th>Cotton (raw and textiles)</th>
<th>Indigo</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CCP_{ht} \cdot Cleared_c$</td>
<td>0.142***</td>
<td>0.072***</td>
<td>0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.015)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>$Cleared_c \cdot Post_t$</td>
<td>-0.006</td>
<td>-0.003</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>$CCP_{ht}$</td>
<td>-0.171***</td>
<td>-0.036***</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.009)</td>
<td>(0.007)</td>
</tr>
</tbody>
</table>

Control group

<table>
<thead>
<tr>
<th></th>
<th>Raw</th>
<th>Raw and textiles</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>$R^2$</td>
<td>0.966</td>
<td>0.932</td>
<td>0.984</td>
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<tr>
<td>N. Obs.</td>
<td>552</td>
<td>1,380</td>
<td>414</td>
</tr>
</tbody>
</table>
Trade flows - Europe-level estimation

- **Triple diff-in-diff for each country** $i$

\[
Share^{i}_{cpt} = \alpha + \beta_1 \cdot CCP_{pt} + \beta_2 \cdot Cleared_c \cdot Post_t \\
+ \beta_3 \cdot CCP_{pt} \cdot Cleared_c + \mu_t + \mu_{cp} + \epsilon_{i,cpt}
\]

- $CCP_{pt}$: Equals 1 for France after 1882
- Counterparties $p$ and control commodities vary based on availability

- **Sample:** 7 countries $i$
  - UK imports from continental Europe not reported
  - Germany and Hamburg reported separately (*Zollverein*)
  - Exclude countries with no commodity-level flows
### Trade flows - Country-level regressions

**Diff-in-diff within imports coming from France**

- Significant increase for coffee relative to controls
- Economic magnitude: France’s trade share roughly doubles

<table>
<thead>
<tr>
<th></th>
<th>Belgium</th>
<th>Germany</th>
<th>Hamburg</th>
<th>Italy</th>
<th>Nether.</th>
<th>Norway</th>
<th>Sweden</th>
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</thead>
<tbody>
<tr>
<td>$CCP_{pt} \cdot Cleared_c$</td>
<td>0.062**</td>
<td>0.073*</td>
<td>0.029*</td>
<td>0.030</td>
<td>0.058**</td>
<td>0.047**</td>
<td>0.041*</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.044)</td>
<td>(0.017)</td>
<td>(0.027)</td>
<td>(0.029)</td>
<td>(0.023)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>$Cleared_c \cdot Post_t$</td>
<td>-0.002</td>
<td>-0.004</td>
<td>-0.000</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.011)</td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.007)</td>
<td>(0.004)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>$CCP_{pt}$</td>
<td>-0.005</td>
<td>-0.008</td>
<td>0.014**</td>
<td>-0.094***</td>
<td>-0.000</td>
<td>-0.051***</td>
<td>-0.019**</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.019)</td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.012)</td>
<td>(0.009)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Control group</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Colonial</td>
<td>Colonial</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.854</td>
<td>0.808</td>
<td>0.931</td>
<td>0.828</td>
<td>0.884</td>
<td>0.910</td>
<td>0.899</td>
</tr>
<tr>
<td>N. Obs.</td>
<td>1,648</td>
<td>864</td>
<td>3,735</td>
<td>4,080</td>
<td>1,368</td>
<td>1,728</td>
<td>2,484</td>
</tr>
</tbody>
</table>
Narrative evidence: Spread of contractual innovation

- Narrative evidence of large effect is widespread
  - “It is not disputable that the creation of the CLAM significantly contributed to maintain the preponderance and to foster the commercial development of the harbor of Le Havre.” (Depitre 1907)
  - Also in foreign countries (e.g., Hamburg Chamber of Commerce)

- Other harbors/markets introduced CCPs by mid-1890s
  - Paris (1885, 1887), Antwerp (1887), Hamburg (1887), Amsterdam (1888), Marseille (1888), Magdeburg (1889), Reims (1890), Leipzig (1890), Roubaix-Tourcoing (1892)
  - Adoption often explicitly motivated by the success of Le Havre
  - Not all of these CCPs succeeded
Channel - Preliminary evidence

- **Increase in completeness?** Four necessary conditions

- **I. Counterparty risk impairs trade before CCP**
  - 1880 crisis: drop in number of traders
  - Sayous (1898): “as the future looked highly uncertain, one needed [...] to find a way to reduce the risks for capitalists.”

- **II. CCP credibly reduces counterparty risk**
  - High margins, high equity, chairman with strong reputation

- **III. Investors use the CCP**
  - No requirement, but almost all trades cleared [See]

- **IV. Trading activity in futures increases**
  - Collect data on daily trading volume in futures
Trading volume increases significantly
Mechanism: “Missing market” or adverse selection channels?

Tests: Predictions about composition of pool of traders

- No data on futures transactions
- But trader-level data on physical transactions (*Bulletin*)
- Assumption: Better access to futures helps physical trade
- Yearly register of traders (*Almanach*): Know entry and exit dates

First test: Share of low quality traders

- Defined as traders exiting within 2 years
- Idea: If adverse selection large, their share drops after CCP

Second test: Share of new traders

- Defined as traders entering in preceding 2 years
- Idea: If adverse selection large, their share increases after CCP
## Channel - Deeper into the mechanism

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Share of trades by members near distress</th>
<th>Share of trades by recent members</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Post_t$</td>
<td>-0.004</td>
<td>0.099***</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.082***</td>
<td>0.048***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>-0.002</td>
<td>0.074</td>
</tr>
<tr>
<td>N. Obs.</td>
<td>577</td>
<td>577</td>
</tr>
</tbody>
</table>

- **Traders near distress**: Low before CCP (8.2%), does not increase
  - Inconsistent with large adverse selection
  - Long-established traders → Quality revealed?

- **New traders**: Share increases
  - Consistent with large adverse selection
  - CCP reduces informational barriers to entry

Guillaume Vuillemey

Value of Central Clearing
Number of traders continued to increase subsequently

- Incumbents established CCP but lost market share
- Suggests “missing market” problem was large
Concern 1: **Futures market’ liquidity improves**

Concern 2: **Price transparency improves**

Before clearing: “*One may have paid 46 to 46.50 fr. for Jacmel to deliver, and one talks about Port-au-Prince, also to deliver, around 41 fr., but there are no quotations for this.*”

Boost trade for agents fearing adverse selection / market power?
Channel - Other mechanisms

- **Traders valuing liquidity or price transparency could free-ride**
  - No requirement to use CCP and pay associated cost
  - Yet, most transactions were cleared
  - CLAM was profitable from first year

- **Effect localized in Le Havre**
  - Outside traders benefited from liquidity and price transparency
  - But access to clearing was more difficult
  - Due to requirements and margins posting

→ **Mechanism is linked to central clearing**
Conclusion

- Central clearing re-shaped trade flows Europe-wide
  - Significantly more trade flows in and out of Le Havre
  - Channels: Complete markets + reduce adverse selection
  - By end-1880s, many European harbors had CCPs

- Implications for current debates on clearing?
  - Clearing at the CLAM was voluntary → How about forced clearing?
  - CLAM was member-owned → Distortions in for-profit CCPs?
  - Theories of central clearing remain underdeveloped