Mandatory Central Clearing and Financial Risk Exposure

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Paper Overview

Core Trade-Off

OTC Derivatives:

- Bilateral contracts over future transfers, given the (future) realized state of an underlying asset.
- Buyers use them to hedge risky assets.
  $\rightarrow$ **market risk exposure**.
- Holding derivatives exposes buyers to seller default risk
  $\rightarrow$ **credit risk exposure**.
- Central counterparties (CCPs) offer counterparty default insurance (central clearing).

Mandatory Central Clearing:

- Post financial crisis, insurance became mandatory for some derivatives classes.
- Significant increase in share of insured OTC derivatives and collateral.
- Smaller buyers reported difficulties to access the market.

Higher Market Risk Exp. $\Longleftrightarrow$ Lower Credit Risk Exp.

Market Microstructure

Market Risk Hedging:

- Large firms, hedge funds, investment funds and pension funds hold risky assets.
- They buy OTC derivatives from banks or broker-dealers to hedge their asset risk.

Credit Risk Exposure:

- Sellers can and do default on OTC transfers, e.g. Lehman Brothers.
- Due to OTC derivatives, or more likely, other business losses.

Central Clearing:

- For-proft central counterparties (CCPs) provide counterparty default insurance.
- Ex ante, they collect collateral to lower default risk.
- Upon default they manage and ensure contracted payments.

Research Agenda

What is the effect of the mandatory counterparty default insurance of OTC derivatives on aggregate financial risk exposure?

1. Model the competition in the markets of OTC derivatives and their insurance.
2. Analyze a monopolistic CCP's ability to influence the market outcome under both mandatory and voluntary insurance.
3. Quantify the effect of a regime shift on credit risk and market risk exposure.

Conclusion

- The effect of mandatory central clearing depends on buyer size distribution.
- It substantially increases the aggregate financial risk exposure in OTC markets dominated by many small buyers.
- One should refrain from introducing it for these markets.
- Example: The still unregulated EuroDollar FX derivatives market.

Theoretical Analysis

Model Environment

Risk-Averse Buyers:

- Have mean-variance utility
- Endowed with heterogeneous number of risky assets.
- Buy derivatives to hedge asset risk.
- Matched with one seller and switching to other sellers is costly.

Risk-Neutral Sellers:

- Protected by limited liability allowing for strategic default.
- Endowed with risky profits from other business lines.
- Matched with a single buyer, but compete over all buyers.
- Choose between two business models:
  - Clearing members can access the CCP services (costly).
  - Non-clearing members can only sell derivatives (cost free).

Monopolistic For-Profit CCP:

- Decides whether to enter the market.
- Upon entry, sets a two-part tariff system:
  - Fixed clearing membership fee
  - Variable insurance fee.
- Insures buyers against clearing member defaults.

SPNE with Incomplete Information

	Voluntary Insurance	Mandatory Insurance
$t=0$	CCP sets fees and collateral; sellers become clearing members.	
$t=1$	Buyers choose whether and from which seller to purchase **derivative(s)**. Buyers decide whether to additionally purchase the **default insurance.**	Buyers decide whether and from which seller to purchase **the bundle** of derivative and its insurance.
$t=2$	Transfers given buyer allocation, seller default and **product choices**.	

Theoretical Results

- Mandatory insurance empowers the monopolistic **for-profit** CCP to set higher prices.
- Therefore, **smaller** buyers and sellers **exit** the market
  $\rightarrow$ Increased market risk.
- **Larger** buyers and sellers **insure more** of their derivatives
  $\rightarrow$ Decreased credit risk.

$\Rightarrow$ Buyer size distribution determines the aggregate effect of mandatory insurance.

Calibration and Evaluation

Calibration

- Parameterize the model for EuroDollar FX OTC derivatives.
- Here, insurance is still voluntary.

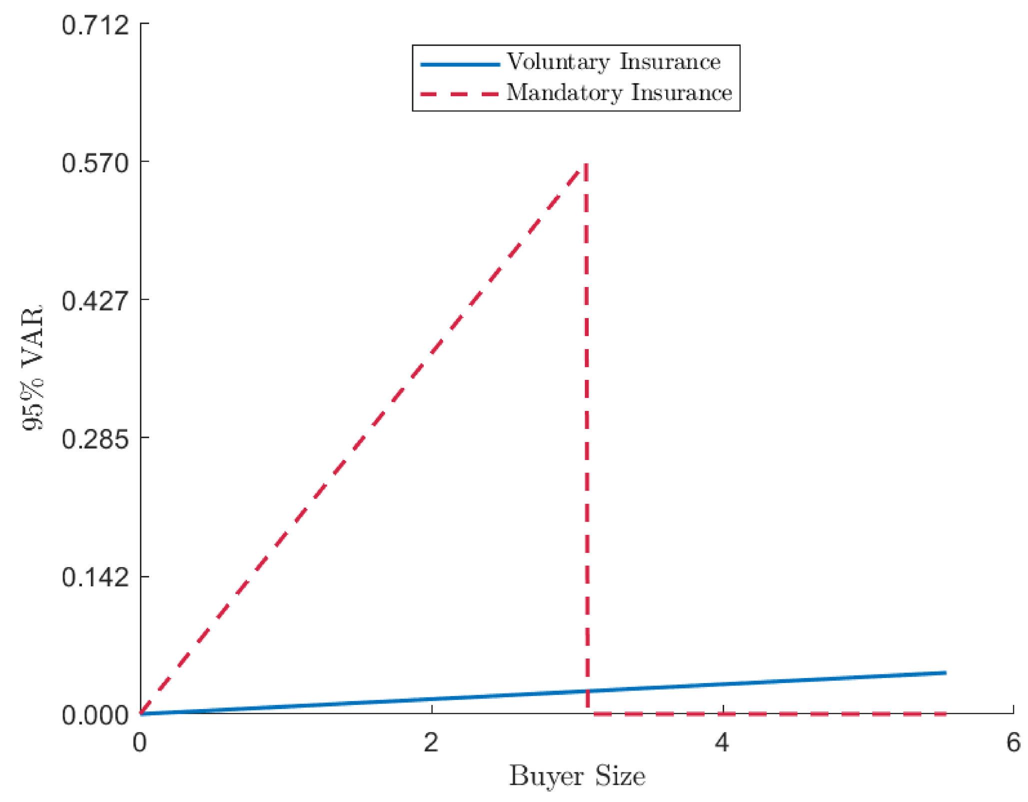
Table: Buyers' Notional Asset Outstanding (in €mn)

	p10	p25	p50	p75
Data Moments (Hau et al., 2021)	0.025	0.100	0.450	2.850
Simulated Moments (SMM) $a_b \sim Wbl(\lambda = 0.686, k = 0.689)$	0.020	0.091	0.357	0.989

Counterfactual Policy Evaluation

- Solve the equilibrium under **voluntary** insurance and verify
  $\rightarrow$ Model confirms absence of CCP in this market.
- Perform a counterfactual analysis of **mandatory** insurance .
  $\rightarrow$ Model predicts CCP entry and clearing of large sellers/buyers.
- Compare buyers' 95th percentile value-at-risk (VAR).

Figure: Comparing Buyers' 95% VAR (in €mn)



Buyers' Financial Risk Exposures

- Decompose the VAR into market risk (MR) and credit risk (CR):

$$95\%\, VAR = 1.96 \cdot [MR + CR] \quad (1)$$

- Compare **average buyer's** exposure to market and credit risk.

Table: The Effect of Mandatory Counterparty Default Insurance

Avrg. CR Change	Avg. MR Change	Avg. VAR Change (%)
$\Delta CR = -0.00324$	$\Delta MR = 0.05836$	$\Delta VAR = 1701.45\ \%$

Credit Risk Externality

- No uninsured and more insured sales lowers seller default.
- Compare the **average seller's** default risk improvements:

$$\Delta D = -0.00009 \quad (2)$$

Calibration Results

- The EuroDollar FX Market is populated by many small buyers.
- Insurance provides little additional value even to large buyers.

$\Rightarrow$ Mandatory insurance for EuroDollar FX derivatives would result in a substantial increase in financial risk exposure.

[1]Disclaimer
The views expressed are those of the author and do not necessarily reflect the official position of De Nederlandsche Bank.

References
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