These slides present ideas from the authors, which are not necessarily those of the Deutsche Bundesbank.
Motivation I

- **CDS premia are frequently used as the best market-based indicator for credit risk**
  - If the market for credit risk were frictionless, this would be appropriate
  - Early studies: CDS measure pure credit risk since impact of frictions is limited: Norden, Weber (JBF, 2004); Blanco, Brennan, Marsh (JF, 2005); Longstaff, Mithal, Neis (JF, 2005)

- **What if the market is not frictionless?**
  - Option prices exhibit liquidity effects if the underlying is illiquid (Cetin, Jarrow, Protter, Warachka; RFS, 2006)

- **Recent evidence: Frictions matter in CDS market!**
  - Hedge-based demand pressure (Garleanu, Pedersen, Poteshman; RFS, 2009)
  - Empirical evidence: CDS prices exhibit sizeable liquidity premia (Tang and Yan, 2009; Bongaerts, de Jong, Driessen; JF, 2011) which vary over time and with the creditworthiness of the underlying
Motivation II

- We have indirect evidence that there are frictions, but we do not know

1. The specific friction type: Stoll (JF, 2000) classifies real (inventory risk and market power) and informational (asymmetric information) frictions

2. Their price impact:
   a) studies so far have used indirect proxies and could not distinguish between frictions
   b) studies that try to measure frictions directly find no price impact
      - Counterparty risk (Arora, Gandhi, Longstaff; JFE, 2012) – negligible impact on CDS premia
      - Informed trading (Acharya and Johnson; JFE, 2007) – no price impact despite evidence for informed trading

- We are the first to precisely measure the price impact of frictions
Our Main Hypothesis

- **Frictions** play a central role for CDS premia

Frictions

- **Informational:**
  - asymmetric Information

- **Real:**
  - inventory risk
  - market power
Data

- 99% of all trades with German entities as underlying between 2009-2012 provided by the Depository Trust and Clearing Corporation
  - 70 underlyings, 432,650 transactions (new trades, assignments, terminations)
  - Most frequently traded: Daimler, Deutsche Telekom, Volkswagen
  - Total transaction volume 2.8 trn EUR, 1 trn new trades
  - Average premium change b/w two new trades 7 bps, new trade size 7 mn EUR
  - 595 unique buyers and sellers, 22 dealers participate in 87% of all transactions

- Individual time series of order flow:
  - Per reference entity/ISIN/seniority/currency/maturity combination
  - We consider change of premium in excess of market average; de-mean and standardize order flow to facilitate comparison across counterparties, reference entities

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Asymmetric Information

- Price impact of a protection sale

CDS trader: \( PD_{subj} \)

- Quotes 110 bps 90 bps
- Quotes 120 bps 100 bps

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Asymmetric Information

- Price impact of a protection buy

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Asymmetric Information

- H1: If CDS traders sell/buy protection, they increase/decrease prices to incorporate the information content of the trade

\[ \Delta prem_t = a + b \cdot \left( 1_{\text{sale}} - 1_{\text{buy}} \right) \]

- We analyze
  - The premium change between two transactions (Δ)
  - The markup in excess of the average market premium (M)

- We employ fixed effects to adjust for fundamental differences (b/w underlyings, submitter, etc.)

- We take relative values \((\Delta^{\text{rel}} / M^{\text{rel}})\) / add the av. premium change as a rhs variable to capture variation in fundamental values \((\Delta^{+\text{av}} / M^{+\text{av}})\)
Asymmetric Information

\[ \Delta \text{prem}_t = a + b \cdot (1_{\text{sale}} - 1_{\text{buy}}) \]

<table>
<thead>
<tr>
<th></th>
<th>(\Delta)</th>
<th>(\Delta^{+\text{av}})</th>
<th>(\Delta^{\text{rel}})</th>
<th>(M)</th>
<th>(M^{+\text{av}})</th>
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<td>(7.92)</td>
<td>(0.54)</td>
<td>(0.90)</td>
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<td>FE</td>
<td>Underlying, Submitter, Currency, Maturity</td>
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- CDS traders adjust premia by 18% more to reflect the transaction direction.

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Inventory Risk

- H2: If a transaction results in higher inventory risk for CDS traders, they adjust premia more strongly.

- We measure inventory risk in two ways:
  - as the **average market premium change**, signed with the transaction direction
  - as the size of the order flow (this may be also measure the degree of asymmetric information)
Inventory Risk

- Example: protection sale, market premium increases

CDS trader: $PD_{subj}$, market av. 100 bps

Quotes

- 110 bps
- 90 bps

Identical signal

$PD_{subj}$ ↑, market av. 105 bps ($PD_{market}$ ↑)

Quotes

- $120 + 5 + 3 = 128$ bps
- $100 + 5 + 3 = 108$ bps
Inventory Risk

- Example: protection sale, market premium drops

CDS trader: $PD_{subj}$, market av. 100 bps

Quotes:

110 bps

90 bps

Reverse signal

$PD_{subj}$ ↑, market av. 95 bps ($PD_{market}$ ↓)

Quotes:

120 - 5 - 3 = 112 bps

100 - 5 - 3 = 92 bps
Inventory Risk

$$\Delta prem_t = a + b \cdot (1_{\text{sale}} - 1_{\text{buy}}) + c \cdot \Delta market_t + d \cdot \Delta market_t \cdot (1_{\text{sale}} - 1_{\text{buy}})$$

<table>
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<tr>
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<th>$\Delta$</th>
<th>$\Delta^{av}(=\Delta)$</th>
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FE

<table>
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<td>Adj. $R^2$</td>
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➢ CDS traders adjust premia by 34% more to reflect inventory risk (and a.i.)

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Market Power

- CDS market players: a few large dealers and many buy-side investors
- Market structure suggests that dealers may have market power (e.g., due to search costs)
- Variation in trader type in our sample allows assessment of market power

- H3: CDS dealers pay smaller / earn larger premium adjustments compared to CDS buy-side counterparties
  - due to asymmetric information
  - due to asymmetric information and inventory risk
Market Power

\[ \Delta prem_t = a + b \cdot \left( 1_{\text{sale}} - 1_{\text{buy}} \right) + c \cdot \left( 1_{\text{sale}} - 1_{\text{buy}} \right) \cdot 1_{\text{dealer}} \]

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<tr>
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<th>( \Delta )</th>
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FE: Underlying, Submitter, Currency, Maturity

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◆ Higher premium adjustment for buy-side investors
Market Power

\[
\Delta \text{prem}_t = a + b \cdot (1_{\text{sale}} - 1_{\text{buy}}) + c \cdot (1_{\text{sale}} - 1_{\text{buy}}) \cdot 1_{\text{dealer}} + d \cdot \Delta \text{market}_t + e \cdot \Delta \text{market}_t \cdot (1_{\text{sale}} - 1_{\text{buy}}) + f \Delta \text{market}_t \cdot (1_{\text{sale}} - 1_{\text{buy}}) \cdot 1_{\text{dealer}}
\]

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**FE**  
Underlying, Submitter, Currency, Maturity

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- Significantly better trading conditions for dealers
Conclusion

- Our study is the first to document the price impact of frictions on CDS premia.
- We show that this impact is of considerable magnitude.
  - Asymmetric information increases changes by 18%.
  - Adding inventory risk increases the impact to 34%.
  - Buy-side investors pay significantly higher surcharges due to frictions, which is consistent with dealer market power.
- Our results have implications for market participants, supervisors, and academics concerned with credit risk management and derivatives' market microstructure.