CDS as Insurance: Leaky Lifeboats in Stormy Seas

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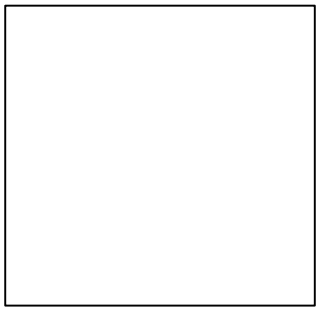
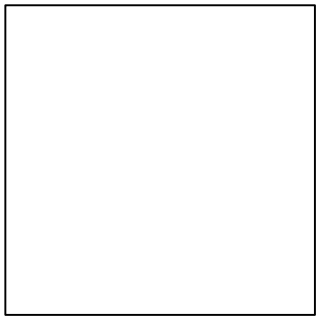
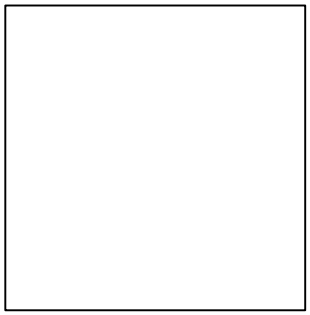
What are Credit Default Swaps (CDS)?



Underlying Debt





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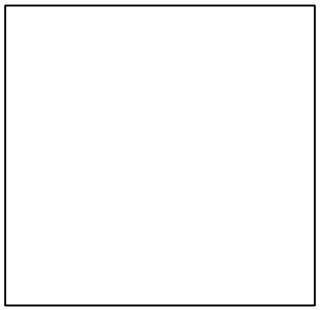

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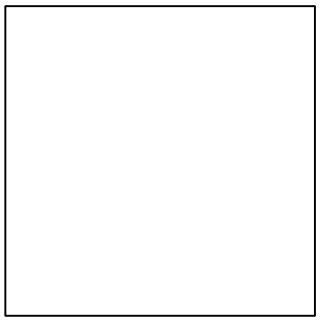
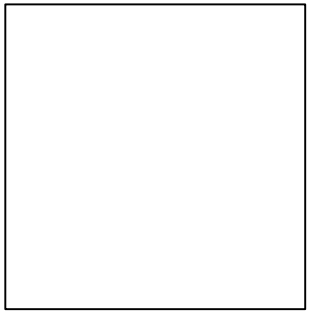


Bank



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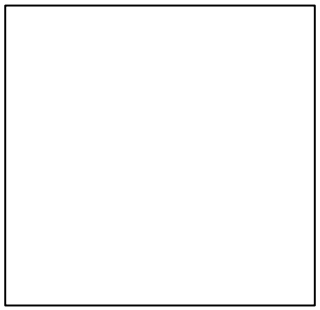

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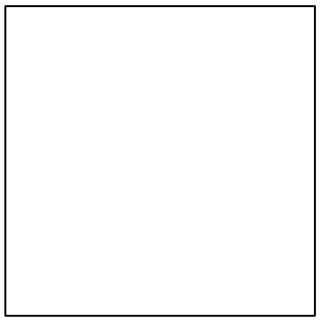

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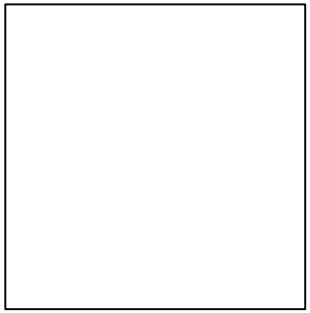
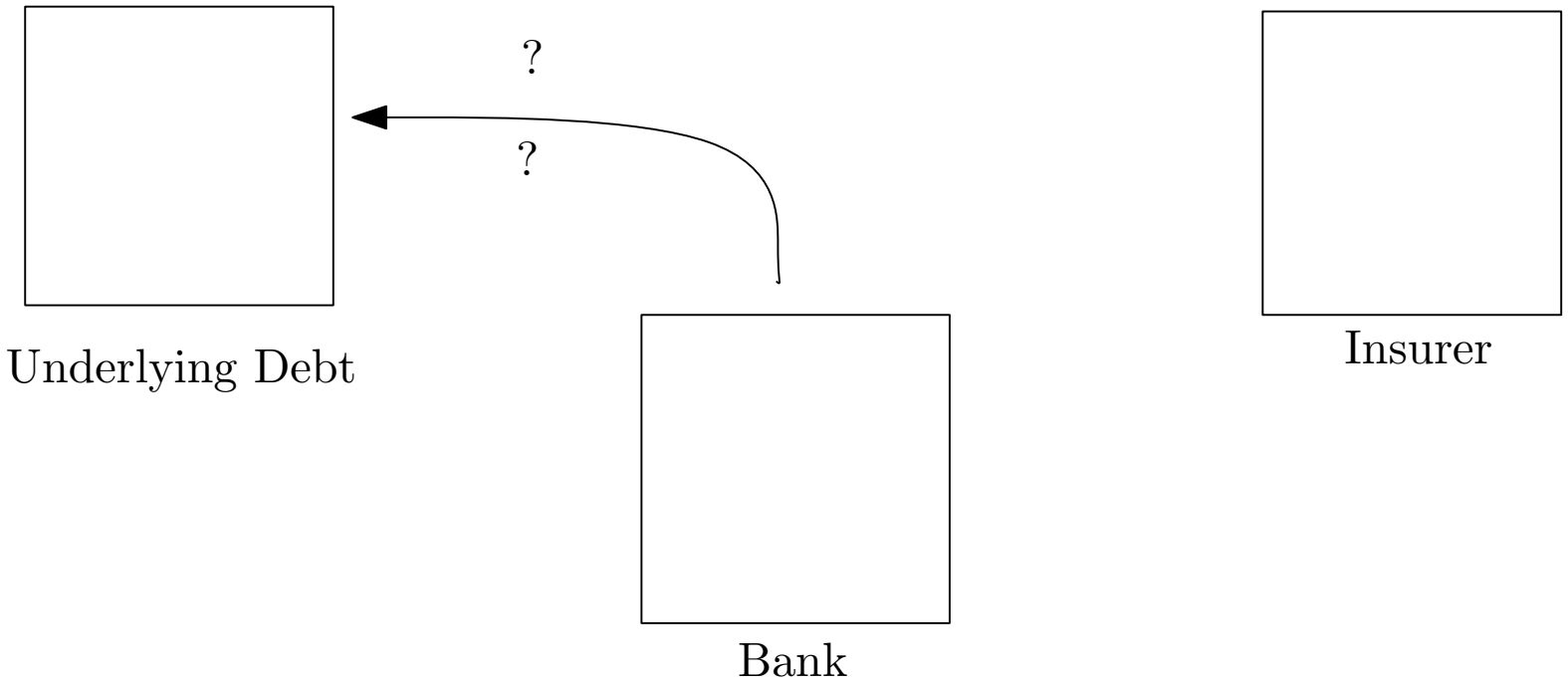


Insurer

What are Credit Default Swaps (CDS)?

Bank may own underlying risk

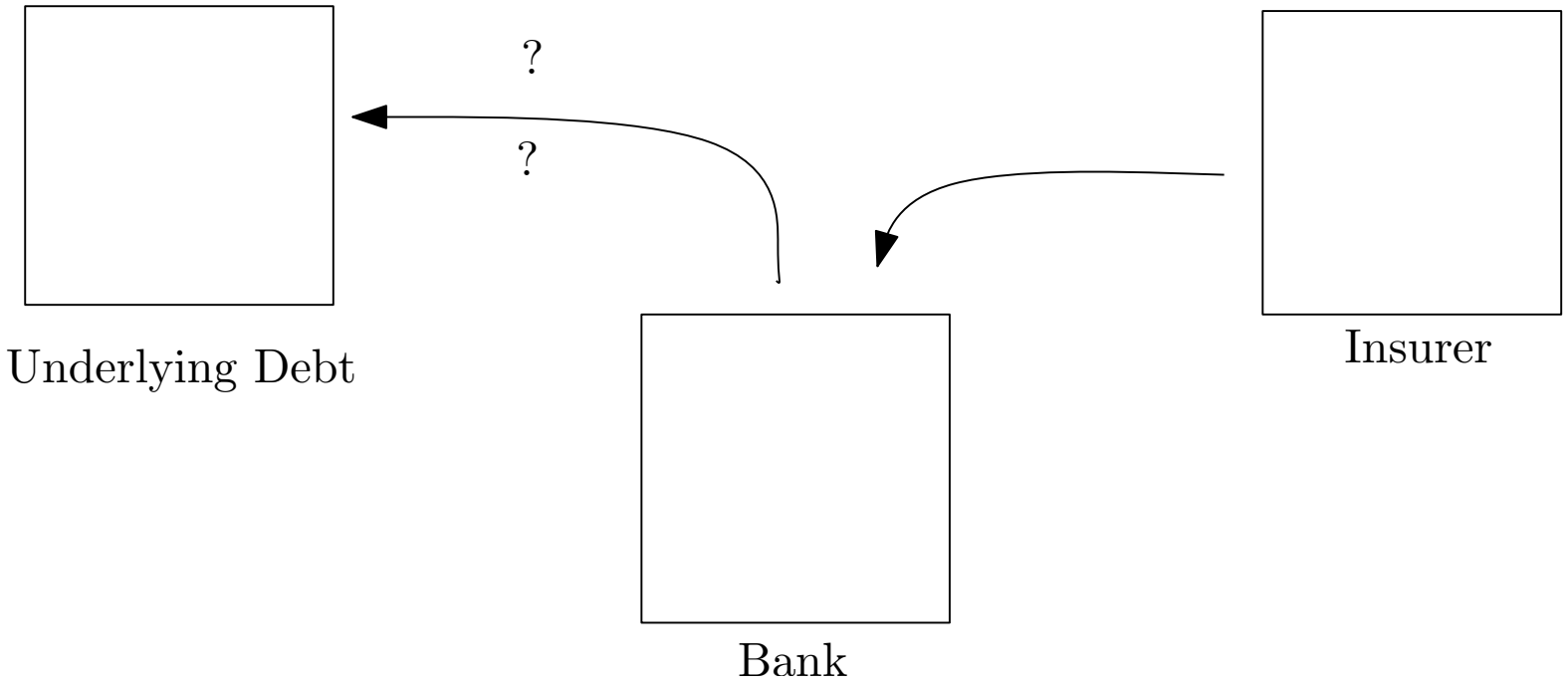


What are Credit Default Swaps (CDS)?

- 18th century England, insurance market was like the CDS market today.
- e.g., Merchants bought policies on other's ships.
- In 1746, Parliament passed the Marine Insurance act requiring insurable interest, and no over-insure.

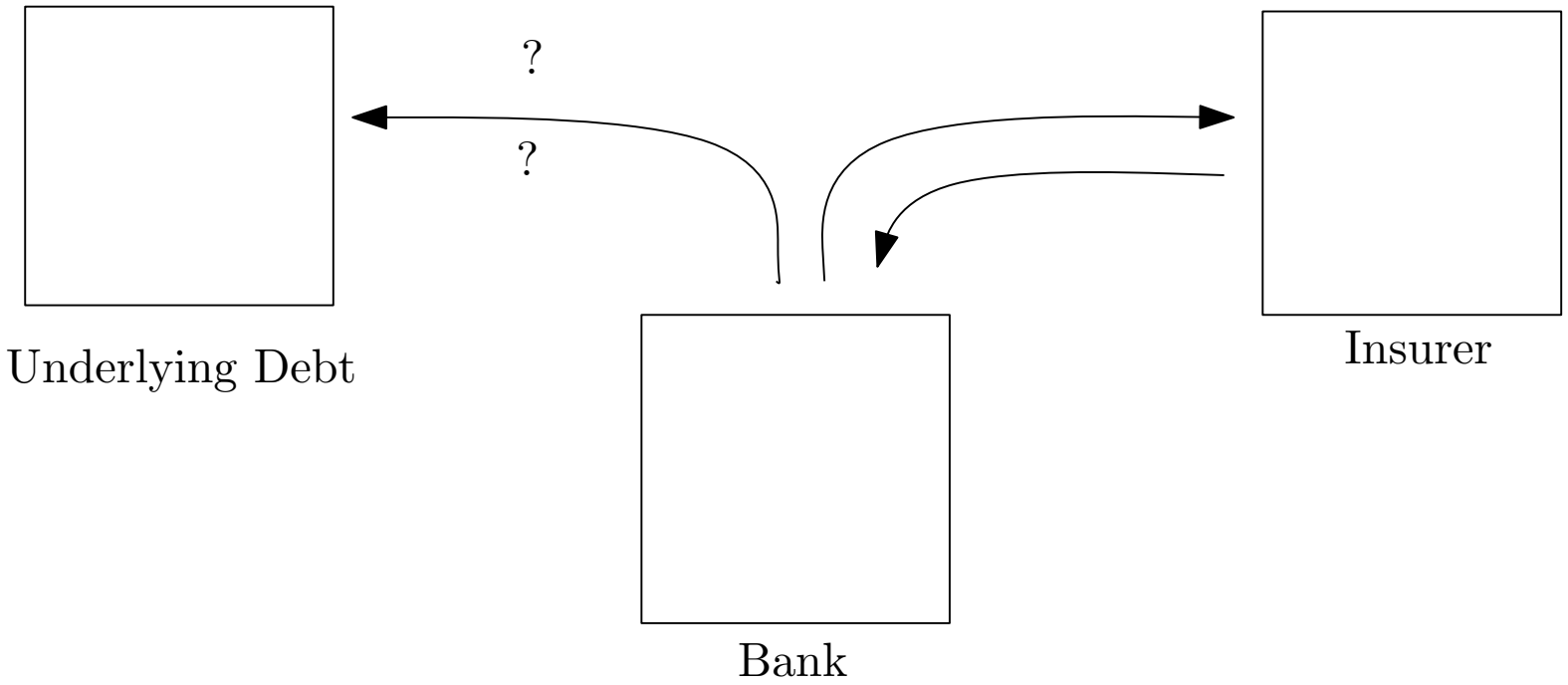
What are Credit Default Swaps (CDS)?

Bank insures with Insurer



What are Credit Default Swaps (CDS)?

Bank pays premium to Insurer



But what are they really?

- Roughly half of buyers use them purely for speculation, rest use for risk management/hedging.
  - Fitch Rating Agency 2009, 2010.
- China and Germany propose bans on trading without owning underlying.
  - Bloomberg Sept 13, 2010, June 14, 2010
- New York State trying to regulate CDS sellers as Insurers
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What we do

- Update the insurance economics framework to handle CDS.
- Contrast results with traditional insurance contracts.
- Use model to shed new light on Central Counterparty (CCP) debate.

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- UPDATE 2: Buyers (banks) can have differing motivations to purchase.
- UPDATE 3: No contract exclusivity *Time Permitting*

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Main Results

- Counterparty risk (usually) increases when insurers opaque. Increased competition among insurers can increase counterparty risk.
- CDS market characterized by lower quality insurers than traditional insurance due to speculators. Removing speculators may actually increase counterparty risk.
- With a CCP, stable insurers can lose competitive advantage and drop out of market in a *problem of the commons* type result.

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Players

- Insured Party (Bank)
  - Endowed with asset (e.g., loan) of size 1 that can default (prob $1 - p$).

- Two Insurers
  - Either 'good' or 'bad'
  - Both endowed with random portfolio
  - Both make investment decision. Good invests liquid, bad invests illiquid.

Bank

- Return from loan of R_B with probability p, nothing otherwise
- It insures entire loan of size 1 (indemnity of 1). As in Thompson (2010), suffers cost Z if no protection.

Insurers

- Portfolio (realized at interim period)

$$\int_0^{\overline{\theta}} \theta dF(\theta) + \int_{\underline{\theta}}^0 0 dF(\theta)$$

- Good insurer receives premium P_G.
  - Invests premium in liquid (storage) asset available at $t = 1$, return: 1.

- Bad insurer receives premium P_B.
  - Invests premium in illiquid asset available only at $t = 2$, return: $r > 1$.

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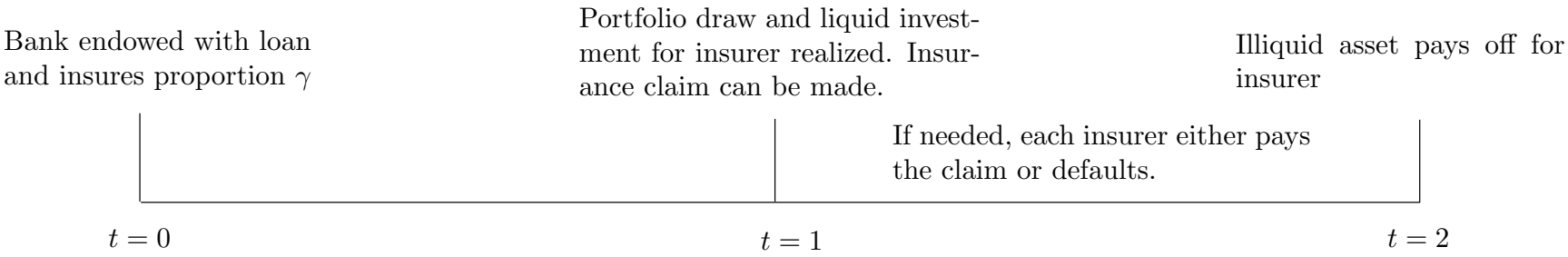
Timing


Bank endowed with loan and insures proportion γ
Portfolio draw and liquid investment for insurer realized. Insurance claim can be made.
Illiquid asset pays off for insurer
If needed, each insurer either pays the claim or defaults.
$t = 0$
$t = 1$
$t = 2$

Insurers

- Good insurer:
  - Premia used to pay claims: Counterparty risk (q_G) decreasing in P_G
- Bad insurer:
  - Premia cannot be used to pay claims: Counterparty risk (q_B) independent of P_B

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Insurers

Lemma

There exists a return r^*, such that for all $r > r^*$, $P_G^0 > P_B^0$, where P_G^0 and P_B^0 are the zero profit premia.

- Intuition: higher return on investment = less needed to break even.
- Assume $r > r^*$

Equilibrium - Premium

- Competition between insurers determines equilibrium premium

Equilibrium - Market

Lemma

1. *The good insurer provides insurance when*

$$(1-p)(1+Z)(q_G - q_B) \geq P_G^0 - P_B^0,$$

where $P_G^* \geq P_G^0$ *such that above holds with equality.*

2. *The bad insurer provides insurance when*

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Competition

- When we add insurer types, this can increase counterparty risk: Forces good insurer to compete more on premium.

Unknown Insurer

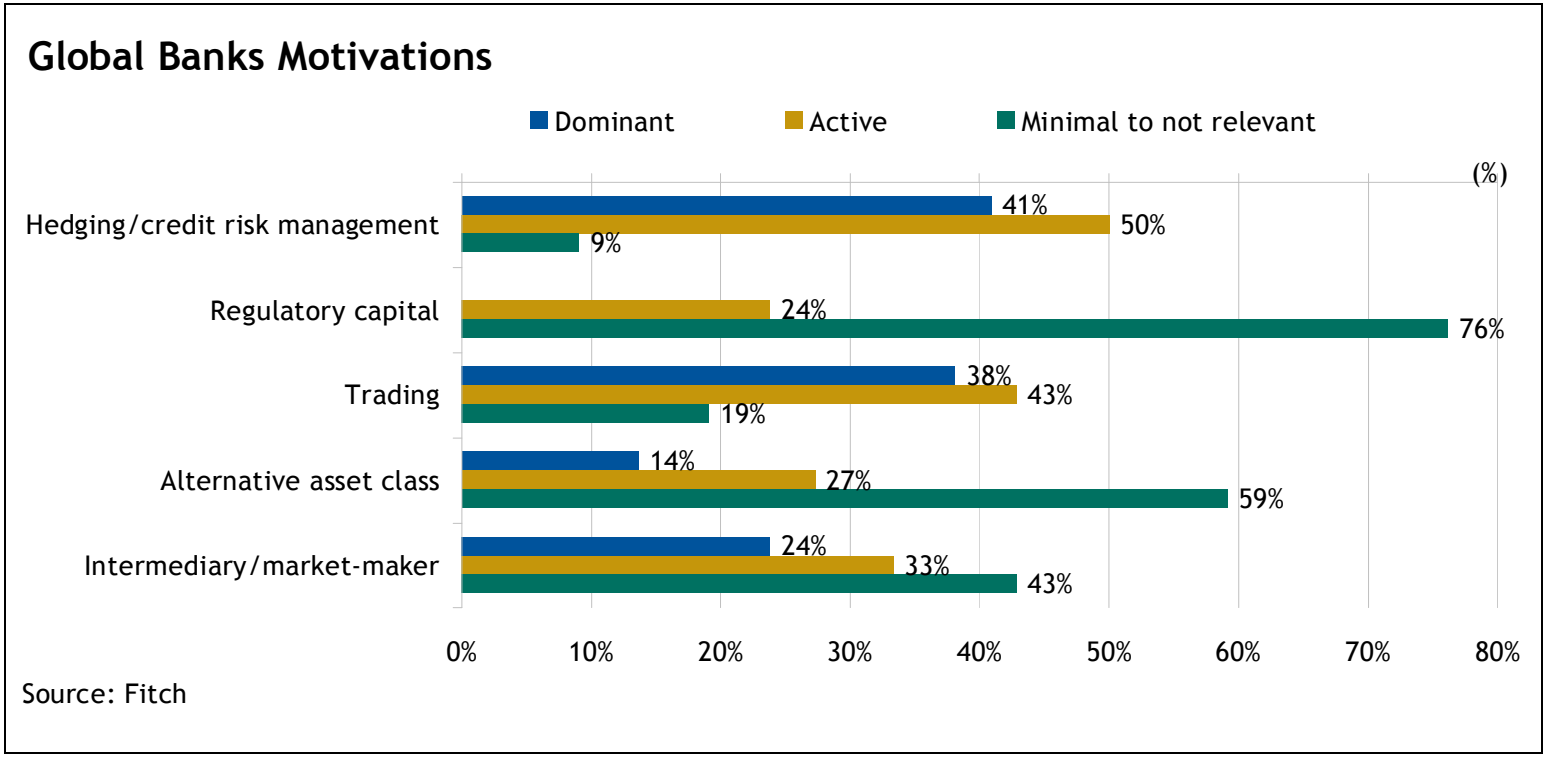
- market counterparty risk is expected/average counterparty risk of insurers in market. vspace5pt
- Consider when good insurer dominates with perfect info.

Proposition

Good insurer becomes riskier and market counterparty risk unambiguously increases.

Why buy protection?

Fitch 2009 Credit Derivatives survey of global banks...



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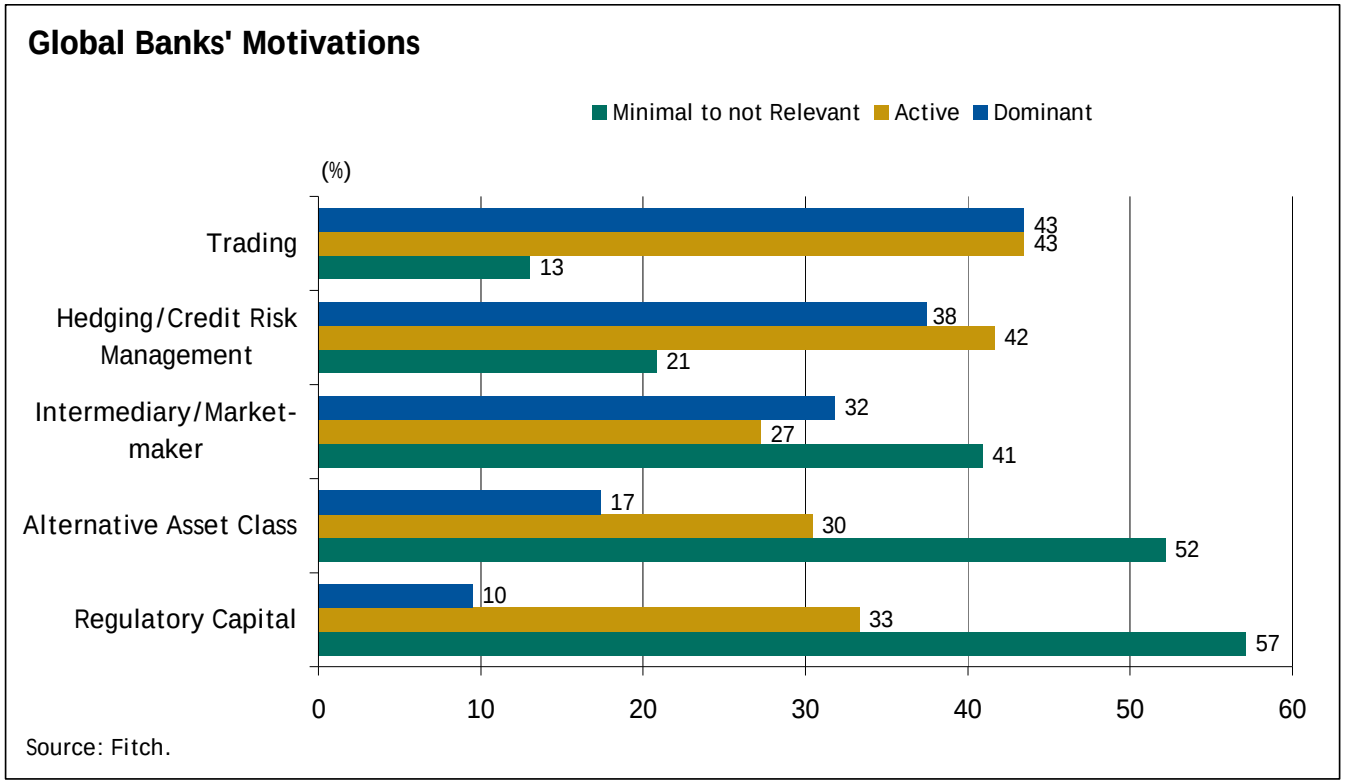

Why buy protection?

- size of most outstanding single name CDSs are multiples of total bonds outstanding.
- Data is sketchy, but majority do not own the underlying.

Lemma

There exists a $\hat{Z}$ such that a bank for which $Z < \hat{Z}$ insures with bad insurer, and $Z \geq \hat{Z}$ insures with good insurer.

- Z_L is speculator, Z_H is hedger. $Z_L = 0$ is risk neutral $Z_H > 0$ is risk averse (the normal case of insurance)
- Simplest setting: 2 banks ($Z_H > \hat{Z}$, $Z_L < \hat{Z}$), 2 insurers (G, B)
  - Assume each bank insures with it's own insurer.
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- Consider the policy of removing speculators
- Two cases: Bertrand competition within each insurer type, No Bertrand competition with insurer type

Proposition

In case 1, a policy that removes Z_L banks will decrease market counterparty risk.
In case 2, this policy will make the good insurer riskier and consequently may increase or decrease market counterparty risk.

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Multiple Bank Risk Types

- Traditional Insurance: can restrict your purchase of insurance elsewhere.
  - Not true in life insurance
- Certainly not true in CDS.
- Precludes traditional method of separation of insured party types à la Rothschild and Stiglitz (1976).
- First, assume bank asset is of two types with equal probability, (R)isky or (S)afe.
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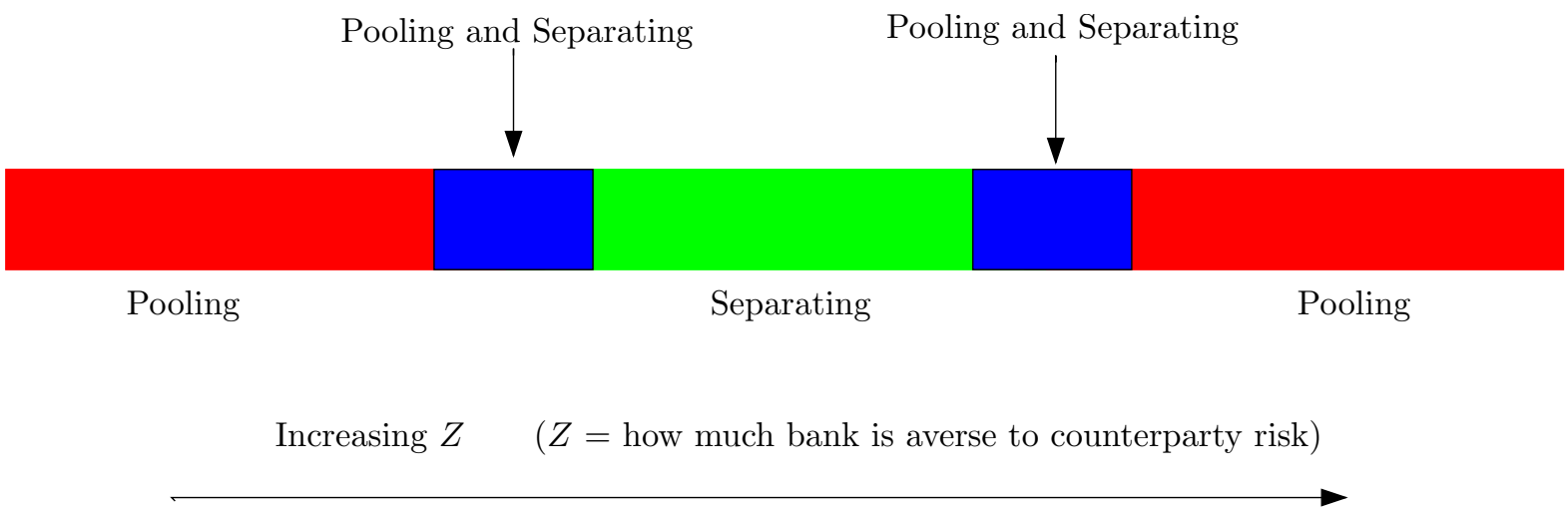
Pooling and Separating
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Separating
Pooling
Increasing Z (Z = how much bank is averse to counterparty risk)

Lemma

There are three equilibria:

1. *The good insurer Dominates:*

$$(1 - p_S)(1 + Z)(q_G - q_B) \geq P_G - P_B.$$

2. *The good insurer Dominates:*

$$(1 - p_R)(1 + Z)(q_G - q_B) < P_G - P_B.$$

3. *Separation*

$$(1 - p_S)(1 + Z)(q_G - q_B) \leq P_G - P_B$$
$$(1 - p_R)(1 + Z)(q_G - q_B) > P_G - P_B$$

No Mutual Exclusion

- Is the separating result robust? CDS is not mutually exclusive!
- Let there be many insurers of both types (independent draws). Banks can insure with as many as they chose.
- Let there be aggregate risk that bad insurers cannot protect against: $q_B = \widetilde{q_B} + q_A$.
- Re-define aversion to c-party risk: $Z(x)$ where x is % of bank's insurers that fail. $Z' > 0$, $Z'' > 0$, $Z(0) = 0$.

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No Mutual Exclusion

Lemma

The bank will insure with as many insurers as possible.

Proposition

There exists a separating equilibrium when the insurance market is non-exclusive.

Central Clearing Counterparties

- The CCP becomes the buyer to every seller, and the seller to every buyer.
- Dodd-Frank Bill in U.S., EMIR in Europe.
- CCP requires capital up front, and can force transfers ex-post. CCP pools counterparty risk. Basically, a mutual insurer.
- Pirrong (2009) reports that RM for CCP is mainly on underlying asset, and not counterparty risk.
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- Consider very simple CCP function: every seller must fail before the CCP fails

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- A policy to remove speculators can cause market counterparty risk to increase.
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