

**A Positive Analysis of Deposit  
Insurance Provision:  
*Regulatory Competition Among  
European Union Countries***

Merwan Engineer, Mark Gillis and  
Paul Schure

University of Victoria

# European Situation

- On September 30<sup>th</sup> 2009, in the midst of the credit crisis, the government of Ireland announced they would guarantee all deposits at their 6 largest banks for two years.
- On October 5<sup>th</sup> Germany followed suit and guaranteed all of their deposits.
- On October 7<sup>th</sup> a EU summit agreed to increase the unions' deposit insurance minimum from € 20,000 to € 50,000 temporarily. By January 1<sup>st</sup> 2011, members are to harmonize to minimum € 100,000.

# Economist Magazine Excerpt

"Germany's surprise decision to guarantee retail deposits came after it loudly denounced Ireland's beggar-thy-neighbour decision to guarantee the liabilities of its banks. Germany's volte-face may have been prompted by large numbers of electronic withdrawals of deposits at the weekend, says Nigel Myer, an analyst at Dresdner Kleinwort in London"

"Lifelines" – October 9<sup>th</sup> 2008

# Research Goals

To develop a model to explain:

- How does the level of deposit insurance affect deposit flows in times of financial stress
- Governments' choice of the level of deposit insurance in response to differences in coverage between the countries → can we explain the race to the top?
- Backdrop: the European situation

# Outline talk

- Related literature
- Model
- Subgame: the European situation
- Rationalizing Irish full deposit insurance  $d^*=1$ 
  - Attempt 1: when depositors coordinate
  - Attempt 2: when they panic
- Conclusion and discussion

# Theoretical Papers

## Multinational Banking Literature

Dalen and Olsen (2003); Calzolari and Loranth (2005)

- Prudential regulation is chosen to minimize the cost of providing full deposit insurance in non-cooperative games

## Hardy and Nieto (2008)

- National regulator chooses the level of deposit insurance and bank supervision
- Deposit insurance → negative externality
- Supervision → positive externality
- Greater cooperation → lower levels of deposit insurance and higher levels of supervision
- No modeling of deposit flows or individual and bank behaviour

# Empirical Studies

## Huizinga and Nicodème (2006)

- Depositors are attracted to countries with explicit deposit insurance schemes

## Demirgüç-Kunt, Kane and Laeven (2008)

- Find that internal politics and external pressures play a large role in the adoption of deposit insurance schemes.

# Our paper

Contribution our paper: Modelling cross-border deposits & the role of deposit insurance as a key policy variable affecting deposit flows

# Model

Countries - Home and Foreign, non-cooperatively set deposit insurance levels

Agents - Each country has a population of investors normalized to one.

Banks – Each country has a representative banking system.

# Agents

- Two types of risk-neutral investors:
  - *Homebound* Agents, proportion  $B$  → Never move deposits abroad
  - *Footloose* Agents, proportion  $1-B$  of the population → “Low” cost  $\varepsilon$  of moving deposits abroad
- Investment possibilities:
  - Deposit at Home Bank
  - Deposit at Foreign Bank -- Footloose only.

# Banking System

- Subject to a probability of failure,  $P(D)$
- Banks gross rate of return:
  - $r = 1$  with probability  $P(D)$  ;
  - $R > 1$  with probability  $1 - P(D)$
- An increase in  $D$  decreases probability  $P(D)$ :  
$$0 \leq P(D \geq 1) = p < P(B) = b \leq P(D = 0) = 1$$
- Note: we are making a short-cut here!

# Governments

- Choose level of deposit insurance,  $d$  and  $d^*$ , to maximize utilitarian welfare
- Deposit insurance is costly: paying out 1 unit costs  $1 + c > 1$

# Timing of the Game

Stage 1: Foreign government sets policy  $d^*$

Stage 2: Home government sets policy  $d$

Stage 3: Banking subgame; agents choose whether to deposit in the Home or Foreign banking sector

Solve recursively...

# European Context

Ireland (foreign country) sets full deposit insurance  $\rightarrow d^*=1$  in Stage 1

Germany (home country) responds with full deposit insurance  $\rightarrow d=1$  in Stage 2

## Stage 3 – Banking Subgame

Given:  $d^*=1$  and  $0 \leq d \leq 1$

Foreign: all depositors deposit abroad

Home:

- Homebound: Deposit at home ( $\varepsilon_B > R - 1$ )
- Footloose: deposit abroad when  $\max E[U_L] = \max[P(D)\max[1, dR] + (1 - P(D))R, R - \varepsilon] - T = R - \varepsilon - T \rightarrow \varepsilon < P(D)(R - \max[1, dR])$

To keep footloose at home, the home government must set:

$$d \geq d^\varepsilon \equiv 1 - \frac{\varepsilon}{P(D)R}$$

*Proposition 1.* Given policies  $d$  and  $d^*=1$ , Nash equilibrium deposit behaviour is as follows:

- (i) *Loose Leave Equilibrium.* If deposit insurance is not large enough,  $d < d_b^e$ , then an equilibrium exists in which home Type- $L$ s invest in the foreign bank,  $D_L^* = 1 - B$ , and other agents invest in their domestic banks,  $D = D_B = B$  and  $D^* = 2 - B$ .
- (ii) *Domestic Equilibrium.* If deposit insurance is large,  $d \geq d_p^e$ , then an equilibrium exist in which all agents invest domestically,  $D = D_B + D_L = 1$  and  $D^* = D_{B^*}^* + D_{L^*}^* = 1$ .

# Stage-3 equilibria given $d$ and $d^*=1$

Interval	Equilibrium	Expected Utility	Welfare
$[0, d_p^\varepsilon)$ Loose Leave	(i)	$EU_B^{(i)} = b \max[1, dR] + (1-b)R$ $- (1+c)bB \max[0, dR-1]$ $EU_L^{(i)} = R - \varepsilon - (1+c)bB \max[0, dR-1]$	$W^{(i)} = R(1-bB) - (1-B)\varepsilon$ $+ bB(1-c \max[0, dR-1])$
$[d_p^\varepsilon, d_b^\varepsilon)$ Gamble	(i)  (ii)	$EU_B^{(ib)} = bdR + (1-b)R - (1+c)bB(dR-1)$ $EU_L^{(ib)} = R - \varepsilon - (1+c)bB(dR-1)$ $EU^{(ii)}$	$W^{(ib)} = R(1-bB) - (1-B)\varepsilon$ $+ bB(1-c(dR-1))$ $W^{(ii)}$
$[d_b^\varepsilon, 1]$ Domestic	(ii)	$EU^{(ii)} = EU_L^{(ii)} = EU_B^{(ii)}$ $= (1-p)R + p(1-c(dR-1))$	$W^{(ii)} = U^{(ii)}$

(i) Home Banking    (ii) Home and Foreign Banking

*Proposition 2.* Given policies  $d$  and  $d^*=1$ , the “essential banking equilibrium” is the:

*Loose Leave Equilibrium* if  $d < \bar{d}$

*Domestic Equilibrium* if  $d \geq \bar{d}$

where  $\bar{d} = \max \left[ d_p^\varepsilon, \min \left[ d^T, d_b^\varepsilon, \right] \right]$

and  $d^T = \frac{1}{R} \left[ 1 + \frac{\bar{\varepsilon} - \varepsilon}{bB(1+c) - pc} \right]$

is the threshold that equates  $EU_L^{(ib)} = EU^{(ii)}$

## Stage 2: Choice of $d$ given $d^*=1$

Practical objective: choose the minimum level of insurance  $d$  provided it meets the restriction for the desired equilibrium

Intuition: Welfare decreases in the level of deposit insurance (provided it is binding)

## Stage 2: Choice of $d$ given $d^*=1$

### *Proposition 3.*

When agents coordinate on the essential banking equilibrium, the government sets  $d = \bar{d}$  to choose the Domestic Equilibrium whenever the transaction cost  $\varepsilon$  is “large enough”

Otherwise,  $d \leq 1/R$  to choose Loose Leave Eqm.

Examples bound on  $\varepsilon$ : Decreases if (1) “stress ratio”  $b/p$  is large, (ii)  $B$  is small

## Beyond $d^*=1$

*Proposition 4.* An initial Domestic Equilibrium, in which all agents bank in their own country, exists for all combinations of deposit insurance  $(d_0, d_0^*)$  except:

- Home country insurance is relatively small,

$$\left( d_0 < d_0^* - \frac{\varepsilon}{pR}, d_0^* > \frac{1}{R} + \frac{\varepsilon}{pR} \right)$$

- Foreign country insurance is relatively small,

$$\left( d_0 > \frac{1}{R} + \frac{\varepsilon}{pR}, d_0^* < d_0 - \frac{\varepsilon}{pR} \right)$$

## Beyond $d^*=1$

*Proposition 5.*

Ineffective deposit insurance in both countries

$(d_0 \leq 1/R, d_0^* \leq 1/R)$  is an initial policy equilibrium when depositors coordinate on the essential banking equilibrium.

In the equilibrium, all agents deposit domestically.

This outcome maximizes utility for all agents.

## Towards justifying $d^*=1$

### 1. Change in beliefs

- Assume Home Loose continue to coordinate but the Foreign Loose panic, then excluding the Loose Leave Equilibrium requires  $d_0^* \rightarrow 1$  (even when  $d_0 < 1/R$ ).

This occurs when

- Stress ratio  $b/p$  is large
- Proportion of footloose  $1 - B$  is small
- Cost of banking abroad  $\varepsilon$  is high
- Cost of providing deposit insurance  $c$  is small

## Towards justifying $d^*=1$

Three other scenarios:

2. Changes in returns
3. Changes in probabilities of failure
4. Asset write offs

All four scenarios yield  $d^* \rightarrow 1$ ; however, only *asset write offs* is consistent with a beggar-thy-neighbour motivation

*Asset write-offs* can only generate  $d^* \rightarrow 1$  if the reaction by Home is not anticipated!

# Conclusions

Regulatory competition in the context of deposit insurance is complex:

- Tradeoffs when depositors leave
  - Home banking system more vulnerable
  - Insurance provision is cheaper
- Crucial aspect of the analysis is degree of coordination among depositors
  - We find that non-coordination / panic can rationalize move to full insurance & race to the top

# Conclusions

- Asset write-offs can also rationalize race to the top, but only if first mover is myopic
  - Ireland's move is difficult to explain if matched by Germany, unless the story has to do with panic, instead of asset write-offs
  - If the story involves panic, Ireland's move is not beggar-thy-neighbour, but an attempt to retain footloose depositors

# Further discussion

Extensions / current research:

- Endogenizing fraction of footloose depositors
- Ireland's move as a freeze on the footloose, i.e. deposit insurance to reduce international competitive pressure