A Large Speculator in Contagious Currency Crises

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Motivation

- The names of recent financial crises suggest a common feature.
  - The Mexican *Tequila* crisis in 1994
  - The Asian *Flu* in 1997
  - The Russian *Virus* in 1998
  - The Brazilian *Sneeze* in 1999
- The common feature is contagion.
- As an example, in the aftermath of the 1998 devaluation of the Russian ruble, the Brazilian stock market fell by over 50%.

Why can contagion happen across seemingly unrelated countries?

- Sometimes large speculators like George Soros are accused of being "the anarchists, self-serving rogues and international brigandage." (The then Malaysian prime minister, Mahathir Mohamad)

  – First, this is because they are often registered in so-called *tax havens*.

    * Is information disclosure necessary?

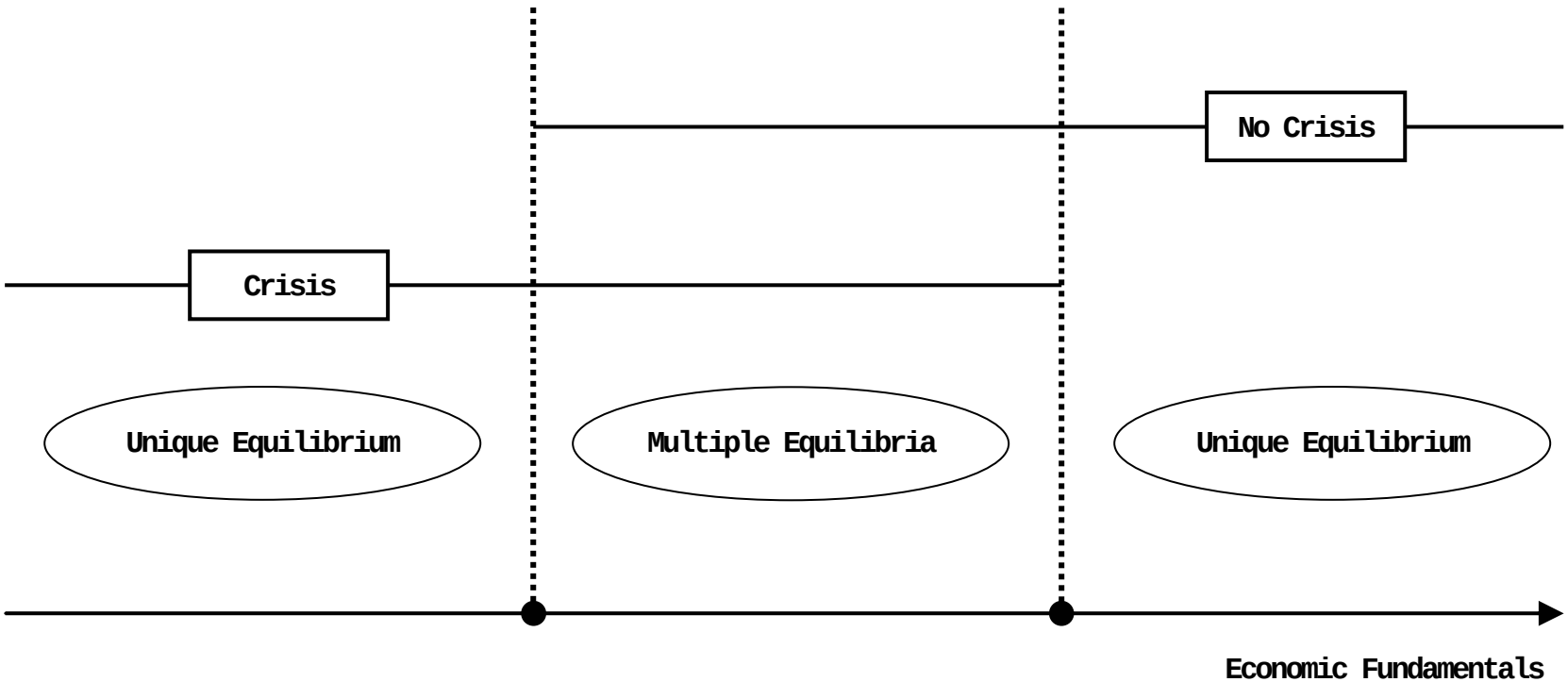
  – Second, this is because they are incredibly large. (Soros was dubbed "the man who broke the Bank of England" in 1992 ERM crisis.)

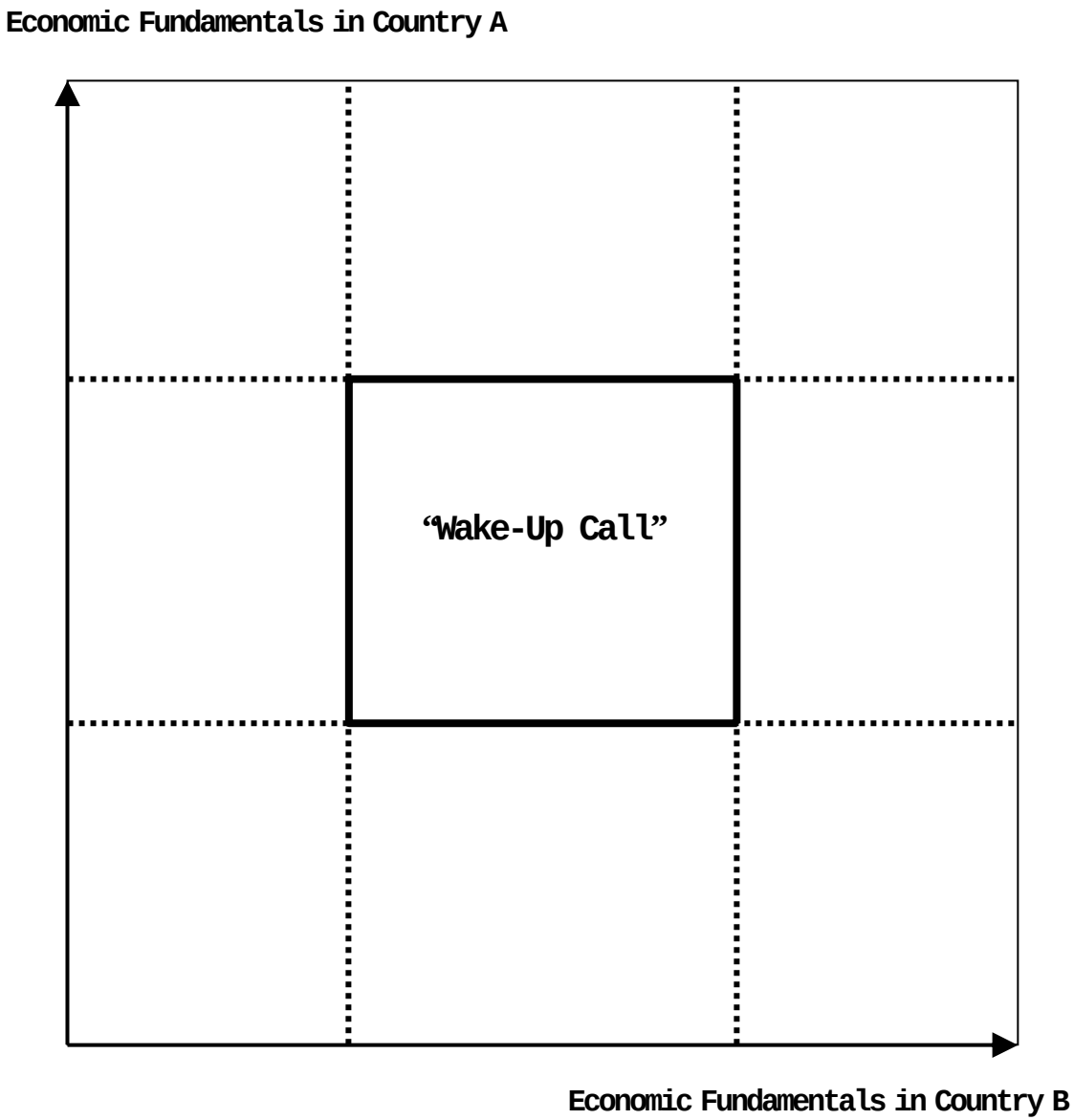
    * Is size regulation necessary?

Does a single "George Soros" make a difference?

The Literature

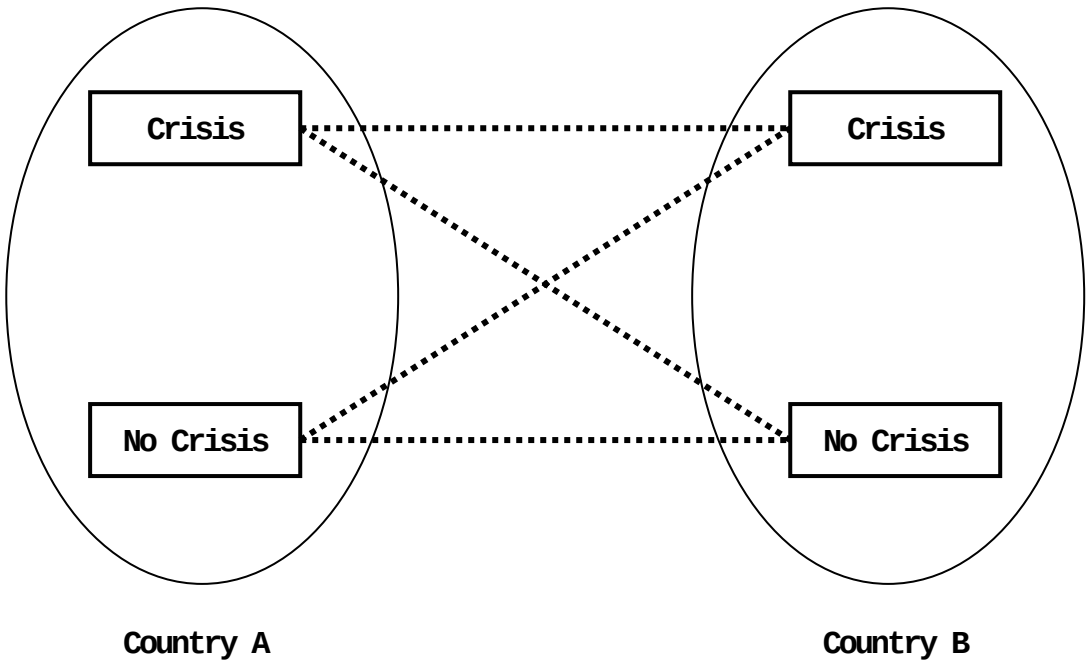
- Contagion
  - Jumps between multiple equilibria
    - Furman and Stiglitz (1998), Krugman (1999), Masson (1999a, 1999b)
- Large Speculator
  - A single large speculator makes countries more vulnerable to crises.
    - Theoretical Analysis: Corsetti, Dasgupta, Morris, and Shin (2004)
    - Experimental Analysis: Arikawa, Suzuki-Löffelholz, and Taketa (2005)


No Crisis
Crisis
Unique Equilibrium
Multiple Equilibria
Unique Equilibrium
Economic Fundamentals


Economic Fundamentals in Country A
"Wake-Up Call"
Economic Fundamentals in Country B

- Coordination failure seems to fit recent financial crises episodes well.

- But multiple equilibria models provide only a weak explanation of contagion.
  - They are consistent with the absence of contagion.
  - Even if a crisis occurs in two countries, it may be a coincidence.
  - It is not very clear whether or not the crisis in one country in fact triggers the crisis in another country.


Crisis
No Crisis
Crisis
No Crisis
Country A
Country B

Equilibrium Refinement

- Global game: the switching strategy is the only equilibrium strategy which survives iterative elimination of dominated strategy.
  - Theoretical Analysis: Carlson and van Damme (1993), Morris and Shin (1998)
  - Experimental Analysis: Heinemann, Hagel and Ockenfels (2004), Arikawa, Suzuki-Löffelholz, and Taketa (2005)
- Applications of global game to explain contagion theoretically.
  - Dasugupta (2004), Goldstein and Pauzner (2004)

Contributions to the Literature

- Shows that the better the economic fundamentals in the country where the crisis originates, the more contagious the original crisis can be.
- Investigates both the issue of the large speculator and that of contagion in a unified framework.
- Shows that financial disclosure by speculators can eliminate contagion, but may make countries more vulnerable to crises.
- Shows that regulating the size of speculators makes countries less vulnerable to crises, but may make contagion more severe.

The Model

- There are two countries: country A and country B.
  - The government of each country pegs the currency at some level.
  - θ_j: A state of underlying economic fundamentals ($j = A, B$).
  - θ_j is randomly drawn from the real line, with each realization equally likely.
  - θ_A and θ_B are *independent*.

- Facing speculative pressure, the government defends the peg if and only if it is not too costly.
  - The cost is increasing in speculative pressure l_j, where l_j is a proportion of speculators who attack country j.
  - The cost is decreasing in θ_j.

Assumption 2 (Government's Optimization)

The government defends the peg if $l_j - \theta_j < 0$ (No Crisis). It abandons the peg if $l_j - \theta_j \geq 0$ (Crisis).

- Two groups of speculators: group 1 and group 2.

- Group 1 consists of a single large speculator ("Soros").
  - Two possible types of Soros: bull or chicken.
  - The type is its private information.
  - Probability of being the bull (the chicken) is q $(1-q)$.

- Group 2 consists of a continuum of small speculators.
  - Group 2's type is the bull.
  - The type is public information.

- Before their decision of whether or not to attack country j, each speculator i receives his private noisy signal about economic fundamentals of country j, x_{ji}.

Assumption 3 (Noisy Private Signal)

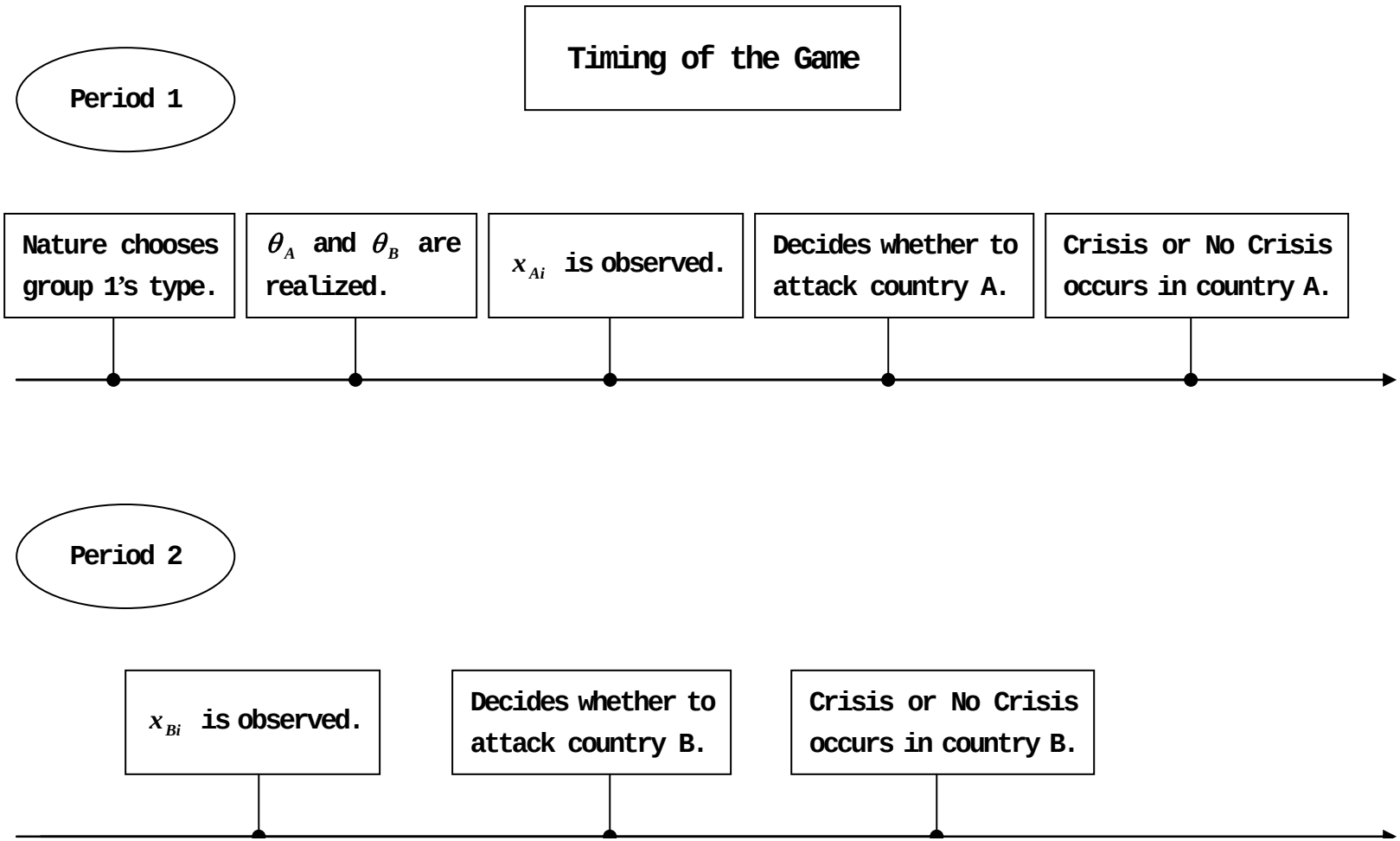
When the true state is θ_j $(j = A, B)$, a speculator i observes a private signal x_{ji} which is drawn uniformly from the interval $[\theta_j - \epsilon, \theta_j + \epsilon]$ for some small ϵ . Conditional on θ_j , the signals are identical and independent across individuals.

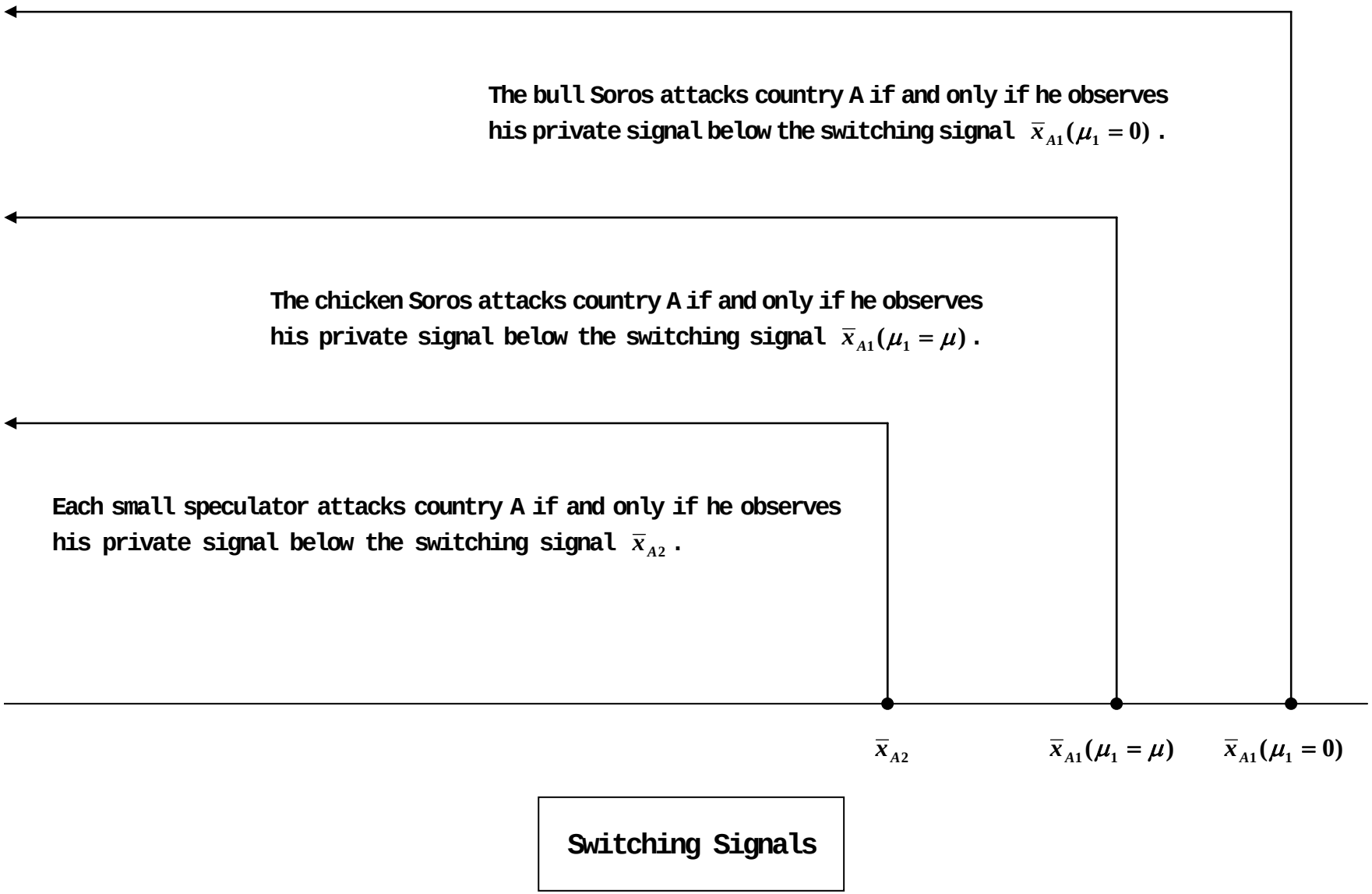
$$x_{ji} = \theta_j + \epsilon_i$$

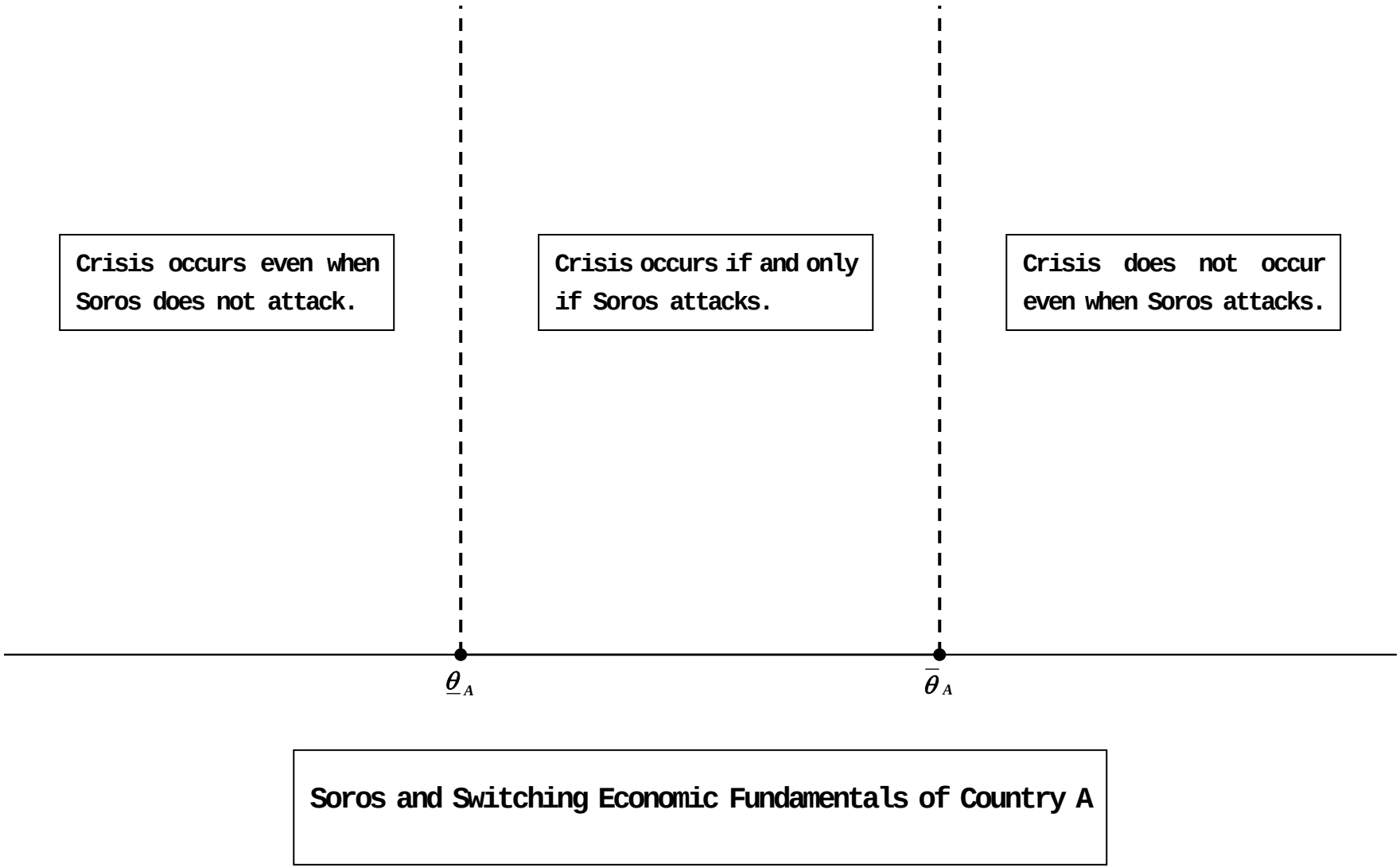
	Success	Failure
Attack	$D - c - \mu_i$	$-c - \mu_i$
Not Attack	0	0

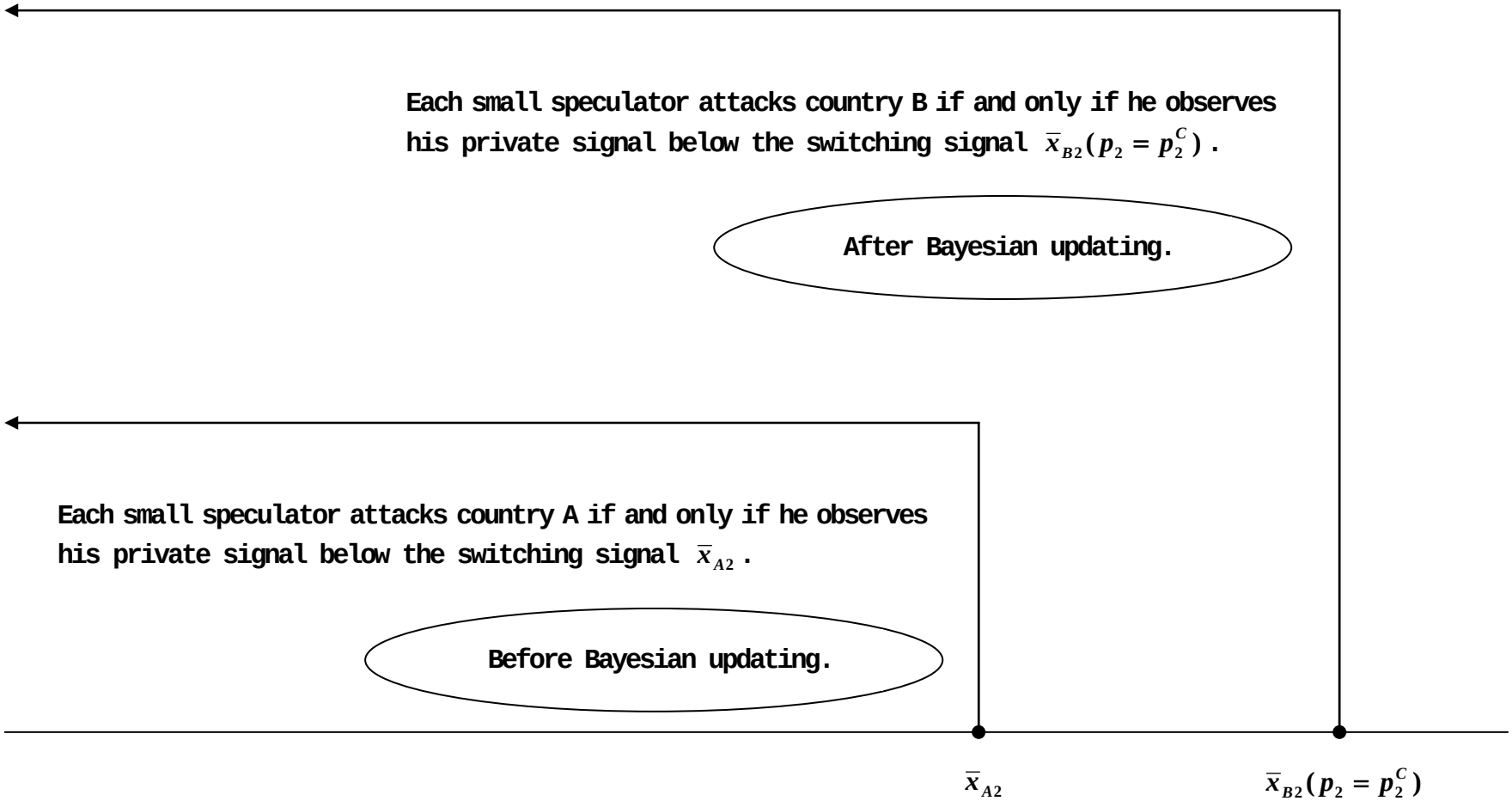
Table 1: Payoff Matrix

$$\mu_i = \begin{cases} \mu \ (> 0) & \text{only for the chicken} \\ 0 & \text{for anyone else} \end{cases}$$

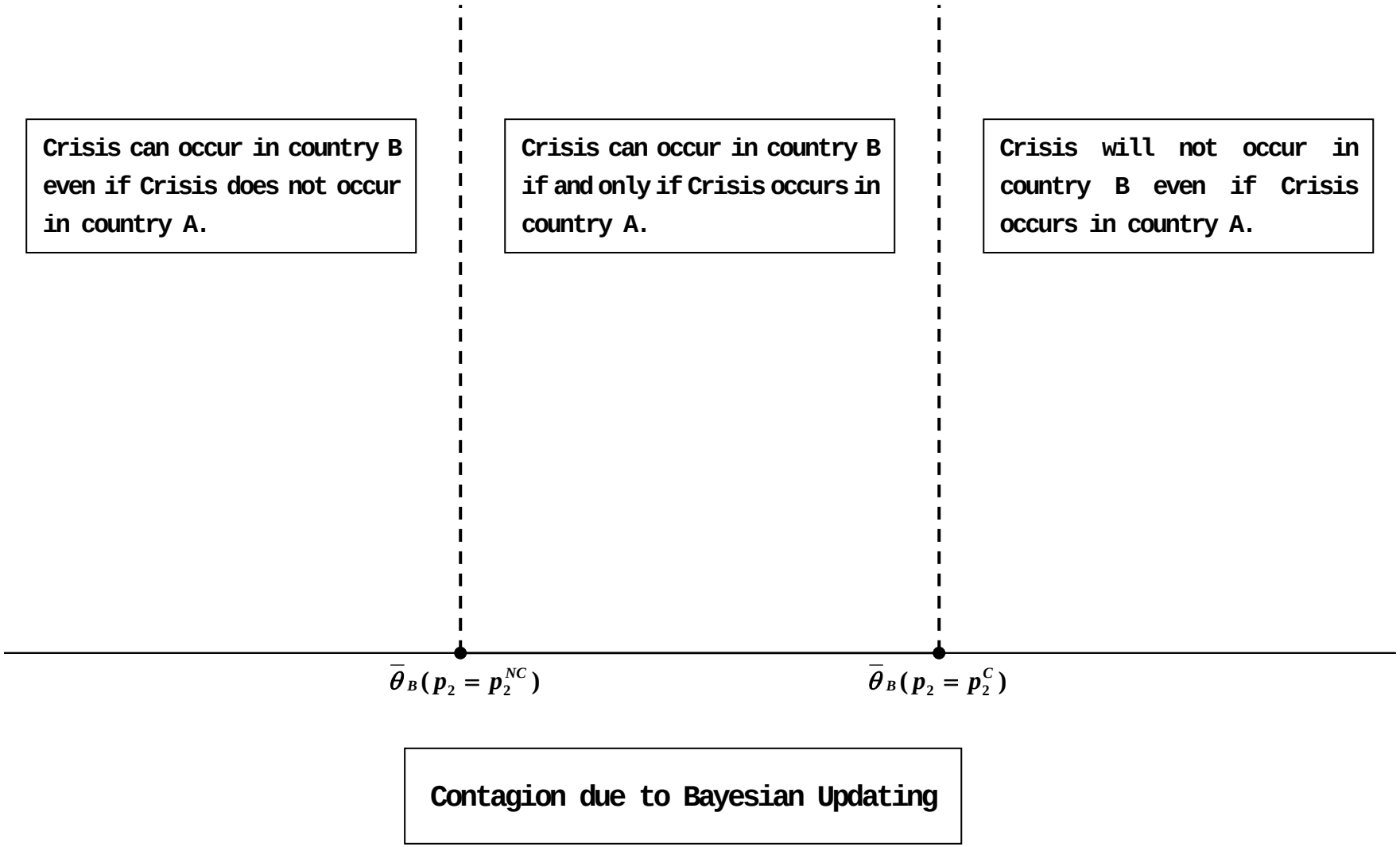

Timing of the Game
Period 1
Nature chooses group 1's type.
θ_A and θ_B are realized.
x_{Ai} is observed.
Decides whether to attack country A.
Crisis or No Crisis occurs in country A.
Period 2
x_{Bi} is observed.
Decides whether to attack country B.
Crisis or No Crisis occurs in country B.

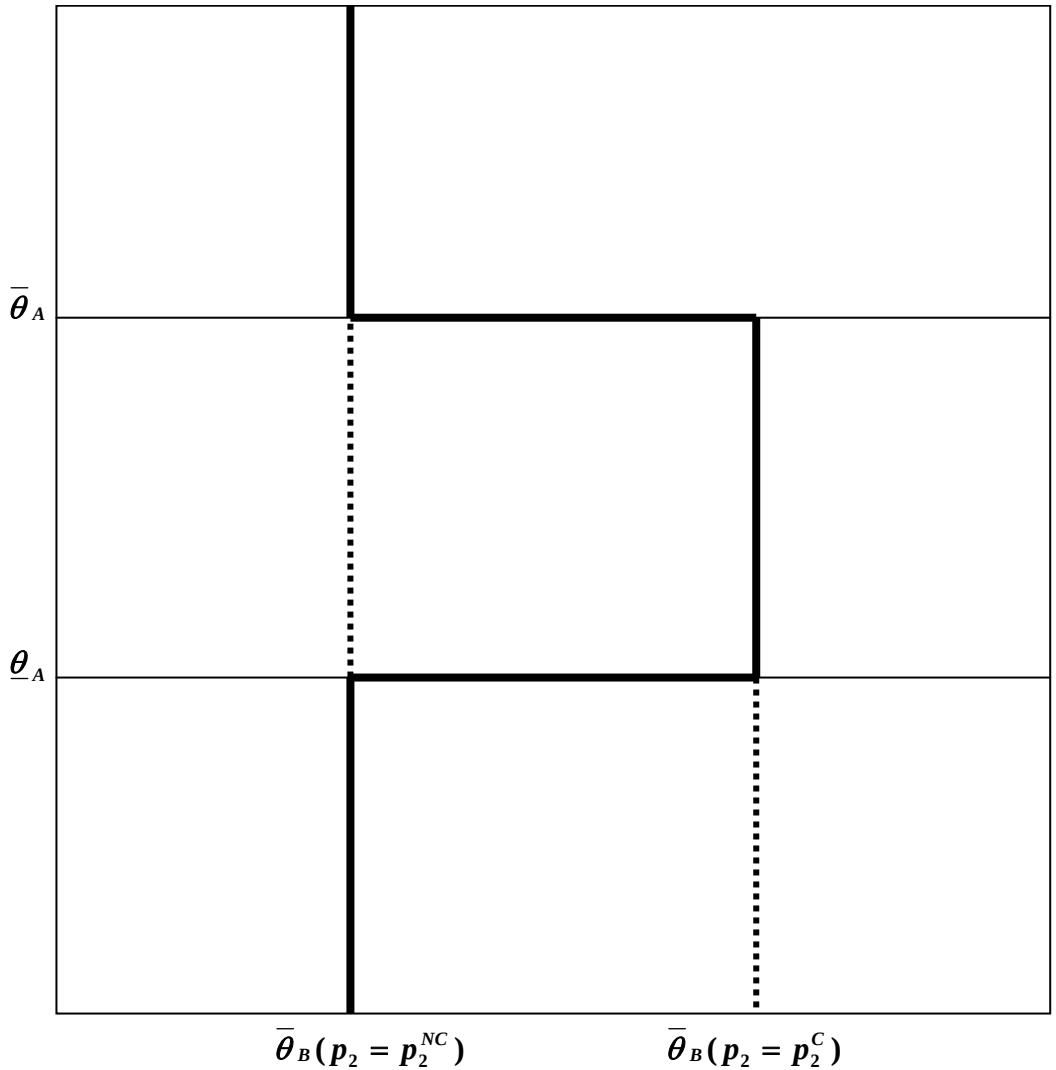

The bull Soros attacks country A if and only if he observes his private signal below the switching signal $\bar{x}_{A1}(\mu_1 = 0)$.
The chicken Soros attacks country A if and only if he observes his private signal below the switching signal $\bar{x}_{A1}(\mu_1 = \mu)$.
Each small speculator attacks country A if and only if he observes his private signal below the switching signal $\bar{x}_{A2}$.
$\bar{x}_{A2}$
$\bar{x}_{A1}(\mu_1 = \mu)$
$\bar{x}_{A1}(\mu_1 = 0)$
Switching Signals


Crisis occurs even when Soros does not attack.
Crisis occurs if and only if Soros attacks.
Crisis does not occur even when Soros attacks.
$\underline{\theta}_A$
$\overline{\theta}_A$
Soros and Switching Economic Fundamentals of Country A



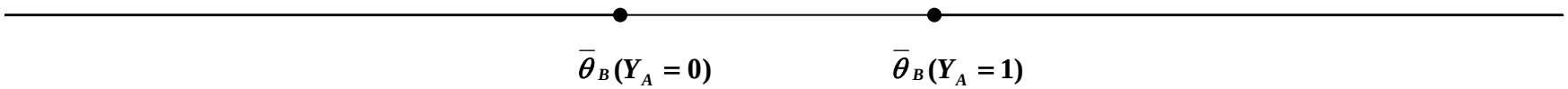
Change in group 2's aggressiveness when Crisis occurs in country A for $\theta_A \in [\underline{\theta}_A, \bar{\theta}_A]$


Crisis can occur in country B even if Crisis does not occur in country A.
Crisis can occur in country B if and only if Crisis occurs in country A.
Crisis will not occur in country B even if Crisis occurs in country A.
$\bar{\theta}_B(p_2 = p_2^{NC})$
$\bar{\theta}_B(p_2 = p_2^{C})$
Contagion due to Bayesian Updating

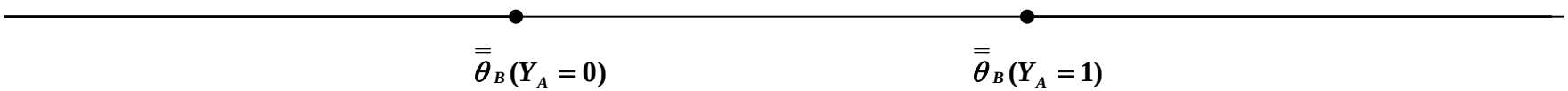

$\bar{\theta}_A$
$\underline{\theta}_A$
$\bar{\theta}_B(p_2 = p_2^{NC})$
$\bar{\theta}_B(p_2 = p_2^{C})$

- What if group 1 consists of a continuum of small speculators rather than Soros?
  - Two possible types of group 1: bull or chicken.
  - The type is its private information.
  - Probability of being the bull (the chicken) is q $(1-q)$.

One-Soros Case



No-Soroses Case



$Y_A = 0$: No Crisis in Country A

$Y_A = 1$: Crisis in Country A

Policy Implications

- Financial disclosure by speculators can eliminate contagion, but may make countries more vulnerable to crises.

- Regulating the size of speculators makes countries less vulnerable to crises, but may make contagion more severe.

Future Research

- Toward a "more dynamic" model. (Chamley (2003))
- Another large player, "IMF." (Corsetti, Guimaraes, and Roubini (2003))
- What if the existence of Soros itself is private information?
- Empirical estimation.
- Experimental Analysis: Arikawa, Suzuki-Löffelholz, and Taketa (2005)