Reading group on Global Games
a.y. 2021/2022
Session # 6

GLOBAL GAMES
AND COLLECTIVE ACTION IN POLITICS

An Introduction

MILAN

February 23rd, 2022

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

- At a first glance, revolutions and political riots can be seen as special instances or interpretations of a canonical "threshold public good game".

- Palfrey and Rosenthal (1984) summarize the rules of the game as follows:

> *« […] a discrete public good is to be provided. Each individual may participate by making a fixed contribution. If a sufficient number of contributions are made, the good is provided. Otherwise, the good is not provided. »*
>
> *ibid*, p. 171

- At a first glance, revolutions and political riots can be seen as special instances or interpretations of a canonical "threshold public good game".

« Participation and the provision of discrete public goods: A strategic analysis »
Journal of Public Economics.

- Palfrey and Rosenthal (1984) summarize the rules of the game as follows:

> *« […] a discrete public good is to be provided. Each individual may participate by making a fixed contribution. If a sufficient number of contributions are made, the good is provided. Otherwise, the good is not provided. »*
>
> *ibid*, p. 171

- At a first glance, revolutions and political riots can be seen as special instances or interpretations of a canonical "threshold public good game".

« Participation and the provision of discrete public goods: A strategic analysis » Journal of Public Economics.

- Palfrey and Rosenthal (1984) summarize the rules of the game as follows:

« […] a discrete public good is to be provided. Each individual may participate by making a fixed contribution. If a sufficient number of contributions are made, the good is provided. Otherwise, the good is not provided. »

ibid, p. 171

Interpret the public good as a change in the political regime, or as the implementation, by the public authority, of a novel policy plan significantly different from the «status quo».

- At a first glance, revolutions and political riots can be seen as special instances or interpretations of a canonical "threshold public good game".

- Palfrey and Rosenthal (1984) summarize the rules of the game as follows:

> *« [...] a discrete public good is to be provided. Each individual may participate by making a fixed contribution. If a sufficient number of contributions are made, the good is provided. Otherwise, the good is not provided. »*
>
> *ibid*, p. 171

- If provided, the public good yileds $U = 1$ to all players, otherwise $U = 0$. Contribution entails a fixed cost $c > 0$.

Incentive to free-ride.

- If a player opts for contribution, the corresponding cost is **sunk**.

- At a first glance, revolutions and political riots can be seen as special instances or interpretations of a canonical "threshold public good game".

- Palfrey and Rosenthal (1984) summarize the rules of the game as follows:

> *« [...] a discrete public good is to be provided. Each individual may participate by making a fixed contribution. If a sufficient number of contributions are made, the good is provided. Otherwise, the good is not provided. »*
>
> *ibid*, p. 171

- If provided, the public good yileds $U = 1$ to all players, otherwise $U = 0$. Contribution entails a fixed cost $c > 0$.

Incentive to free-ride.

- If a player opts for contribution, the corresponding cost is **sunk**.

The strategy «contribute» is therefore risky.

- Rewrite the N-player public good game of Palfrey and Rosenthal (1984) as a continuum-player game, with a unitary mass of atomistic players, uniformly distributed over the unit interval and indexed by $i \in [0,1]$.

- As usual in the global-games literature, we indicate "participation" (i.e. "contribute") with $a_i = 1$, and "non-participation" (i.e. "not contribute") with $a_i = 0$, that is…

$$a_i = \begin{cases} 1 & contribute \\ 0 & not\ contribute \end{cases}$$

- The public good is indeed provided if the aggregate participation/contribution

$$A = \int_0^1 a_i \, \mathrm{d}i$$

exceeds a **known** threshold $.T \in (0,1)$.

- All action- and outcome-contingent individual payoffs can be summarized by the following matrix…

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 - c$	$-c$
$a_i = 0$ $(not\ contribute)$	1	0

- All action- and outcome-contingent individual payoffs can be summarized by the following matrix…

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 - c$	$-c$
$a_i = 0$ $(not\ contribute)$	1	0

… that clearly highlights the fact that participation (i.e. "contribute") is a – strongly – dominated by non-participation (i.e. "not contribute").

- All action- and outcome-contingent individual payoffs can be summarized by the following matrix…

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 - c$	$-c$
$a_i = 0$ $(not\ contribute)$	1	0

Free-riding prevails in equilibrium!

… that clearly highlights the fact that participation (i.e. "contribute") is a – strongly – dominated by non-participation (i.e. "not contribute").

- If revolutions and, more generally, political rioting are to be examined through the lenses of threshold public good games then, broadly speaking, what we *should* expect is that:

> *« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »*

- Do hard evidence support the theory when its prediction is tested against historical records ?

- If revolutions and, more generally, political rioting are to be examined through the lenses of threshold public good games then, broadly speaking, what we *should* expect is that:

> *« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »*

- Do hard evidence support the theory when its prediction is tested against historical records ? NO, of course!

- What's wrong, then, with the public-good-theory of revolutions?

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

THREE APPROACHES

Prospective rioters are

NOT COMPLETELY RATIONAL

either as individuals or as a group (or both)

Social and/or group psychology

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

THREE APPROACHES

Prospective rioters are NOT COMPLETELY RATIONAL either as individuals or as a group (or both)	**The welfare effects of a regime change are NOT ENTIRELY OUTCOME-CONTINGENT for some are (in part) action-contingent**
Social and/or group psychology	Gordon Tullock, Mankur Olson and the «Public Choice» school

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

THREE APPROACHES

Prospective rioters are NOT COMPLETELY RATIONAL either as individuals or as a group (or both)	**The welfare effects of a regime change are NOT ENTIRELY OUTCOME-CONTINGENT for some are (in part) action-contingent**	**The welfare effects of a regime change are NOT SYMMETRIC ACROSS RIOTERS for preferences are heterogenenous**
Social and/or group psychology	Gordon Tullock, Mankur Olson and the «Public Choice» school	Tipping point and threshold models

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

Mark Granovetter (1978)

Thomas Schelling (1971,-72,-73)

THREE APPROACHES

Prospective rioters are NOT COMPLETELY RATIONAL either as individuals or as a group (or both)	**The welfare effects of a regime change are NOT ENTIRELY OUTCOME-CONTINGENT for some are (in part) action-contingent**	**The welfare effects of a regime change are NOT SYMMETRIC ACROSS RIOTERS for preferences are heterogenenous**
Social and/or group psychology	Gordon Tullock, Mankur Olson and the «Public Choice» school	Tipping point and threshold models

« if (i) prospective rioters are assumed (instrumentally) rational, and (ii) the change in individual welfare induced by a change of regime is symmetric across rioters and (iii) outcome-contingent but not action-contingent, then NO RIOT SHOULD EVER OCCUR. »

- What's wrong, then, with the public-good-theory of revolutions?

Mark Granovetter (1978)

Thomas Schelling (1971,-72,-73)

GLOBAL GAMES OF REGIME CHANGE

The welfare effects of a regime change are NOT ENTIRELY OUTCOME-CONTINGENT for some are (in part) action-contingent	The welfare effects of a regime change are NOT SYMMETRIC ACROSS RIOTERS for preferences are heterogenenous
Gordon Tullock, Mankur Olson and the «Public Choice» school	Tipping point and threshold models

WHAT'S WRONG WITH THE PUBLIC-GOOD THEORY OF RIOTS?

- Private Payoffs from Regime Change
- Cross-Sectional Heterogeneity

WHAT'S WRONG WITH THE PUBLIC-GOOD THEORY OF RIOTS?

- Private Payoffs from Regime Change
- Cross-Sectional Heterogeneity

- Oversimplifying, the argument put forward by Tullock states that private, action-contingent benefits drive individual participation into riots and revolutions.

- Oversimplifying, the argument put forward by Tullock states that private, action-contingent benefits drive individual participation into riots and revolutions.

- Augmenting the strategic form of the canonical threshold public good game with additional payoffs components…

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 - c$	$-c$
$a_i = 0$ $(not\ contribute)$	1	0

- Oversimplifying, the argument put forward by Tullock states that private, action-contingent benefits drive individual participation into riots and revolutions.

- Augmenting the strategic form of the canonical threshold public good game with additional payoffs components… participation ceases to be strategically dominated.

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 + b_i(1) - c$	$b_i(1) - c$
$a_i = 0$ $(not\ contribute)$	$1 + b_i(0)$	$0 + b_i(0)$

- Oversimplifying, the argument put forward by Tullock states that private, action-contingent benefits drive individual participation into riots and revolutions.

- Augmenting the strategic form of the canonical threshold public good game with additional payoffs components… participation ceases to be strategically dominated.

	$A \geq T$	$A < T$
$a_i = 1$ $(contribute)$	$1 + b_i(1) - c$	$b_i(1) - c$
$a_i = 0$ $(not\ contribute)$	$1 + b_i(0)$	$0 + b_i(0)$

WHAT'S WRONG WITH THE PUBLIC-GOOD THEORY OF RIOTS?

- Private Payoffs from Regime Change
- Cross-Sectional Heterogeneity

WHAT'S WRONG WITH THE PUBLIC-GOOD THEORY OF RIOTS?

Private Payoffs from Regime Change

Cross-Sectional Heterogeneity

- Granovetter (1978) outlines an elegant dynamic model of participation into riots that hinges on non-microfunded individual preferences. In a nuthshell:

> *« Different individuals require different levels of safety before entering a riot and also vary in the benefits they derive from rioting. The crucial concept for describing such variation among individuals is that of "threshold". A person's threshold for joining the riot is defined here as the proportion of the group he would have to see join before he would do so. A "radical" will have a low threshold. […] Some would be sufficiently radical to have a threshold of zero % – people who will riot even when no one else does. These are the "instigators". Conservatives will have high thresholds: the benefits of rioting are small or negative to them and the consequences of arrest high since they are likely to be "respectable citizens" rather than "known rabble-rousers". »*
>
> *ibid*, p. 1422

- The model builds heavily on Schelling's models of segregation and on the related notion of "tipping point".

- Each player's "type" is summarized by a unidimensional statistic $x_i \in X \supseteq [0,1]$, distributed according to a PDF $f(\cdot)$ common knowledge among all players.

- The model is dynamic: in each period $t = 1,2, \dots, +\infty$

  - each player observes the aggregate action of the previous period A_{t-1}, and…

  - …decides whether or not to join the riot to maximize his/her utility

$$u(\, a_i(t), x_i, A(t)\,) = \, a_i(t)(A(t) - x_i)$$

  - the decision to join is irreversible, i.e. rioters remains active until the riot ends.

- The initial condition for the aggregate participation is $A_0 = 0$.

- It is immediate to check that, for every t, a player defines his/her (optimal) course of action according to the rule

$$a_i^*(t) = \begin{cases} 1 & if\ A(t) \geq x_i \\ 0 & otherwise \end{cases}$$

- Aggregate participation A_t therefore evolves in time according to the following law of motion

$$A^*(t+1) = F\left(A^*(t)\right)$$

where $F(\cdot)$ is the CDF of types x_i.

- Note that a necessary condition for a riot to occur is that $f(0) > 0$, i.e. there must be some «instigators» for the participation cascade to start.

- It is immediate to check that, for every t, a player defines his/her (optimal) course of action according to the rule

$$a_i^*(t) = \begin{cases} 1 & if\ A(t) \geq x_i \\ 0 & otherwise \end{cases}$$

- Aggregate participation A_t therefore evolves in time according to the following law of motion

$$A^*(t+1) = F\left(A^*(t)\right)$$

where $F(\cdot)$ is the CDF of types x_i.

$i.e.\ F(\tilde{x}) = \int_{\underline{x}}^{\tilde{x}} f(h)\,\mathrm{d}h$

- Note that a necessary condition for a riot to occur is that $f(0) > 0$, i.e. there must be some «instigators» for the participation cascade to start.

- It is immediate to check that, for every t, a player defines his/her (optimal) course of action according to the rule

$$a_i^*(t) = \begin{cases} 1 & if\ A(t) \geq x_i \\ 0 & otherwise \end{cases}$$

- Aggregate participation A_t therefore evolves in time according to the following law of motion

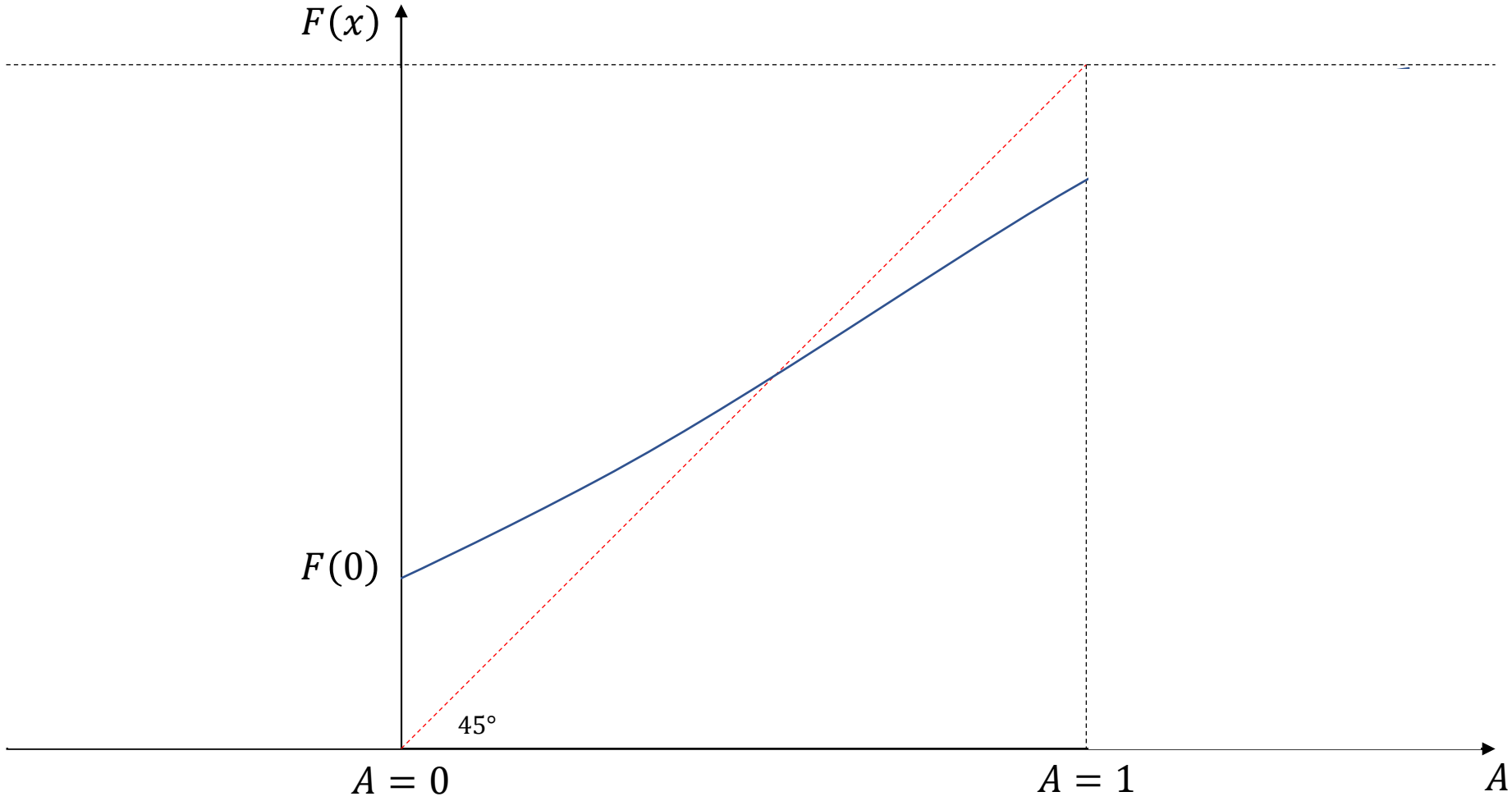
$$A^*(t+1) = F\big(A^*(t)\big)$$

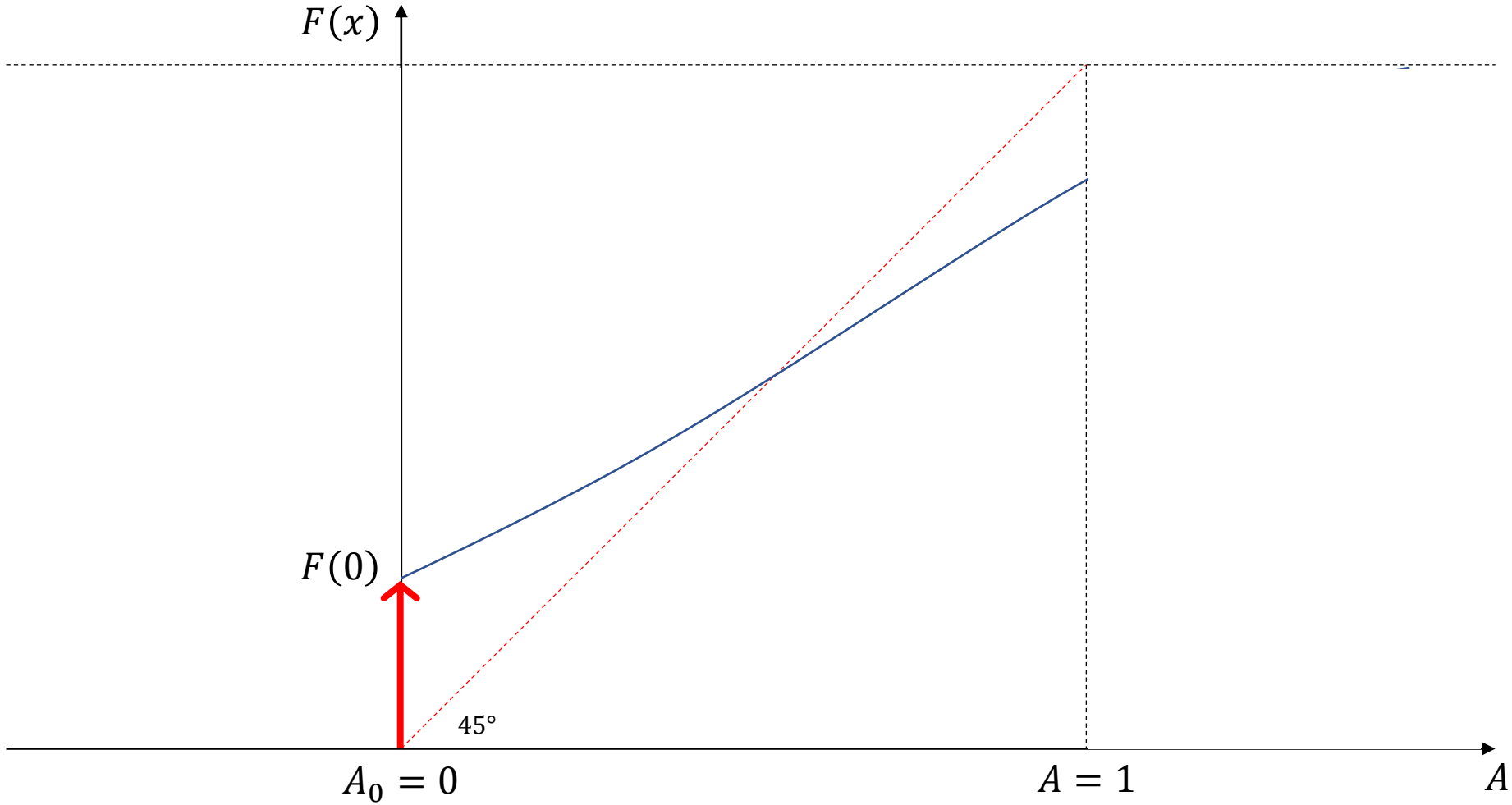
where $F(\cdot)$ is the CDF of types x_i.

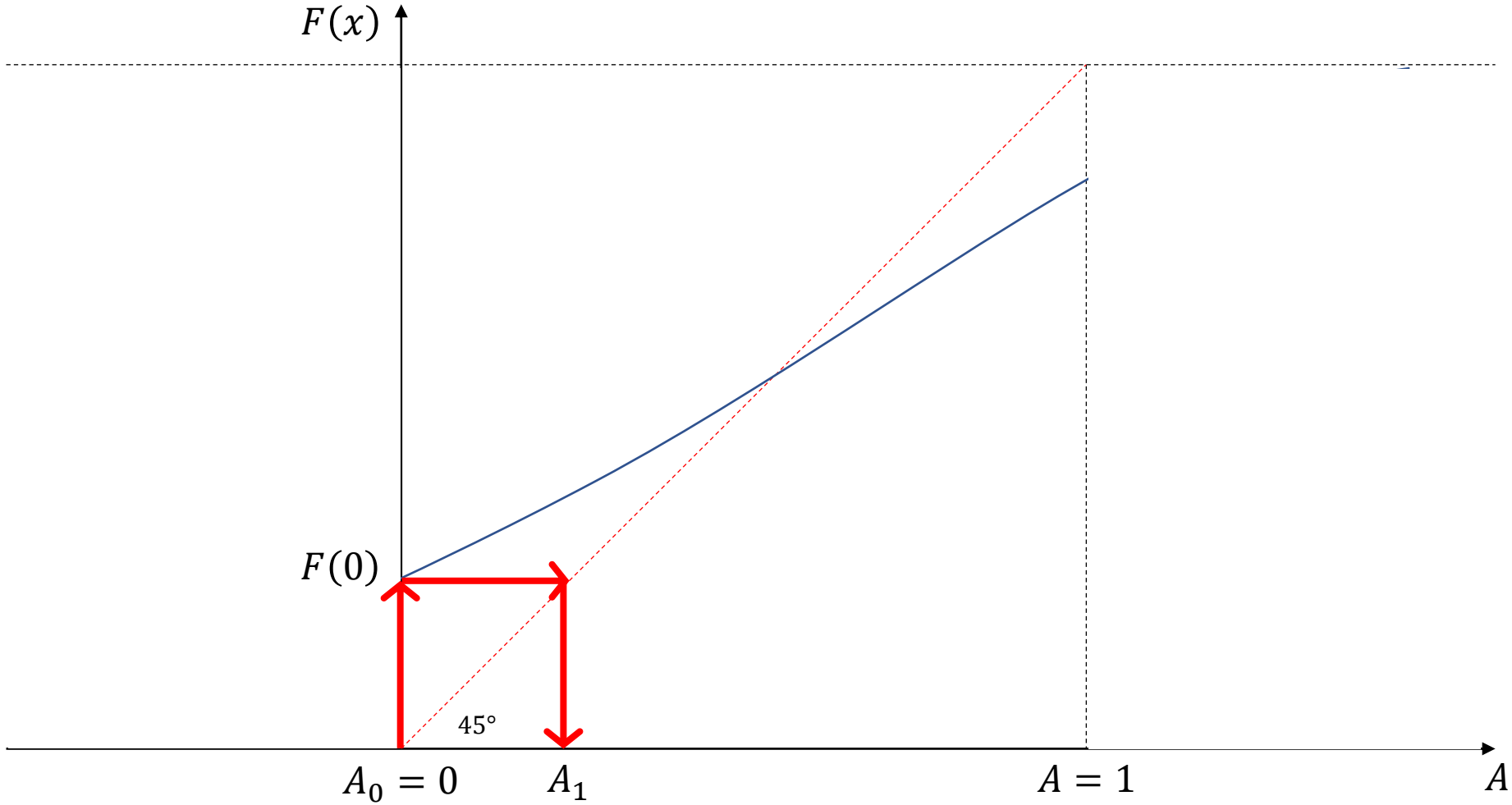
i.e. $F(\tilde{x}) = \int_{\underline{x}}^{\tilde{x}} f(h)\,\mathrm{d}h$

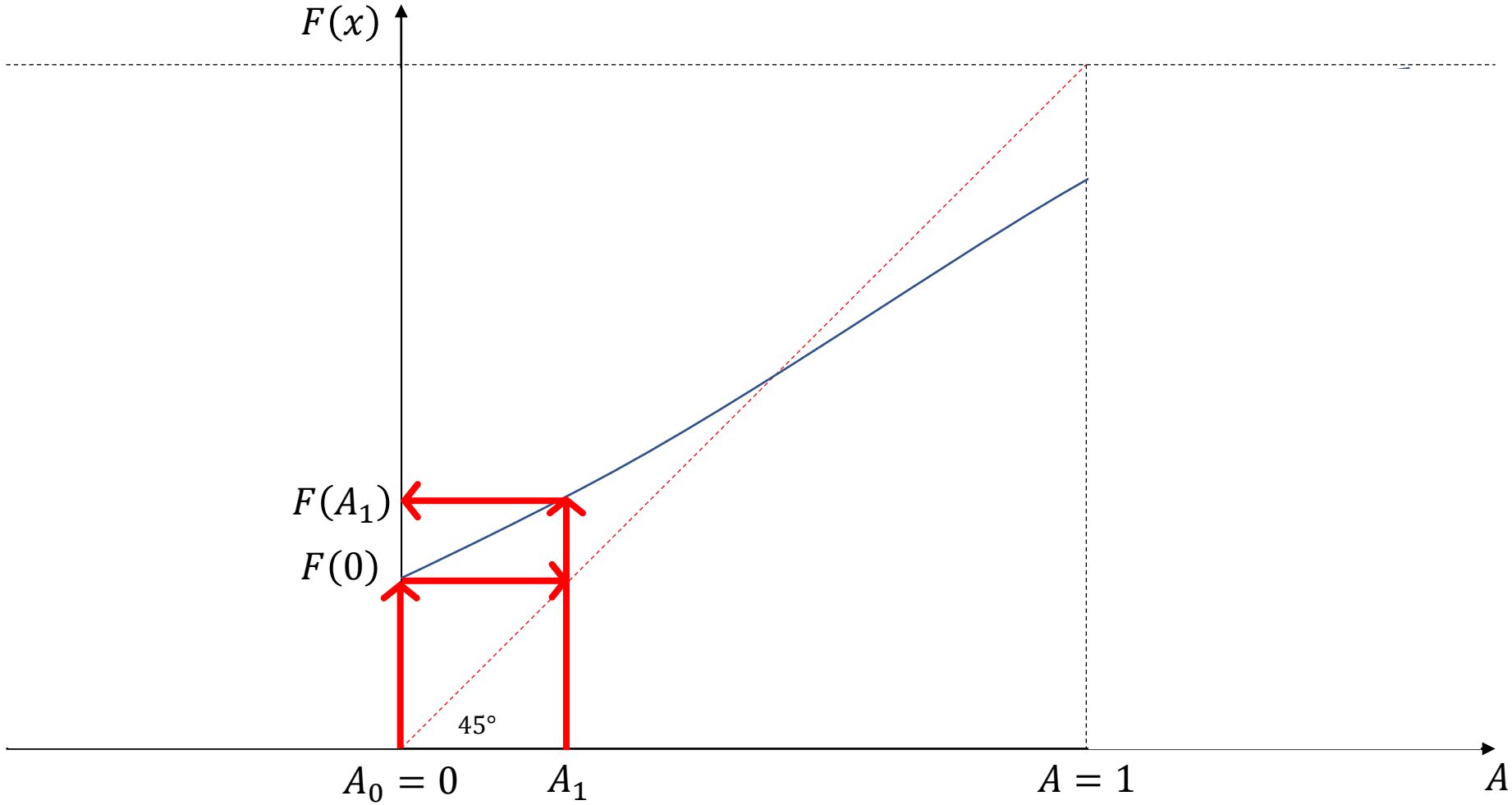
Hence, it also holds that $F(0) > 0$.

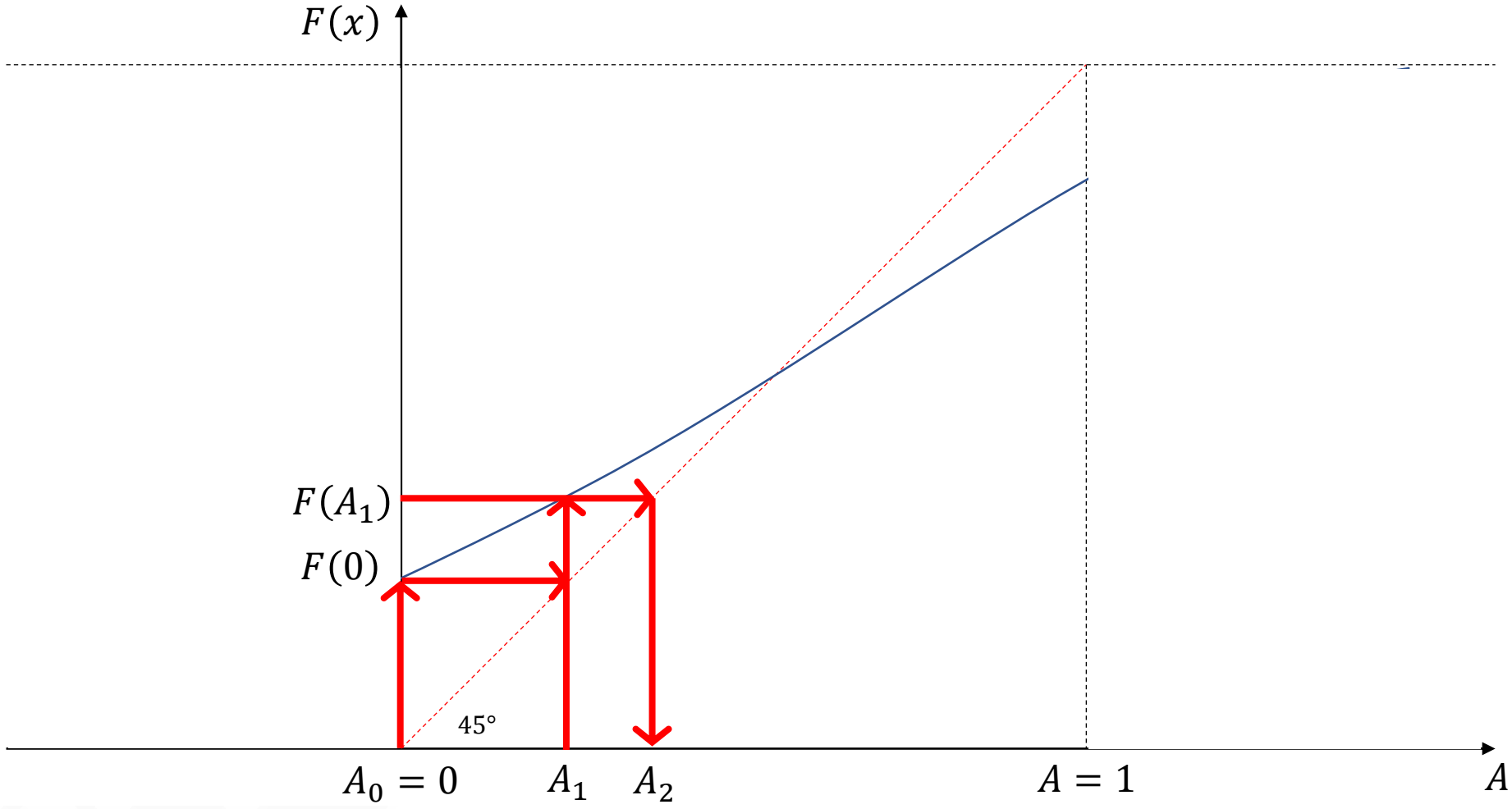
- Note that a necessary condition for a riot to occur is that $f(0) > 0$, i.e. there must be some «instigators» for the participation cascade to start.

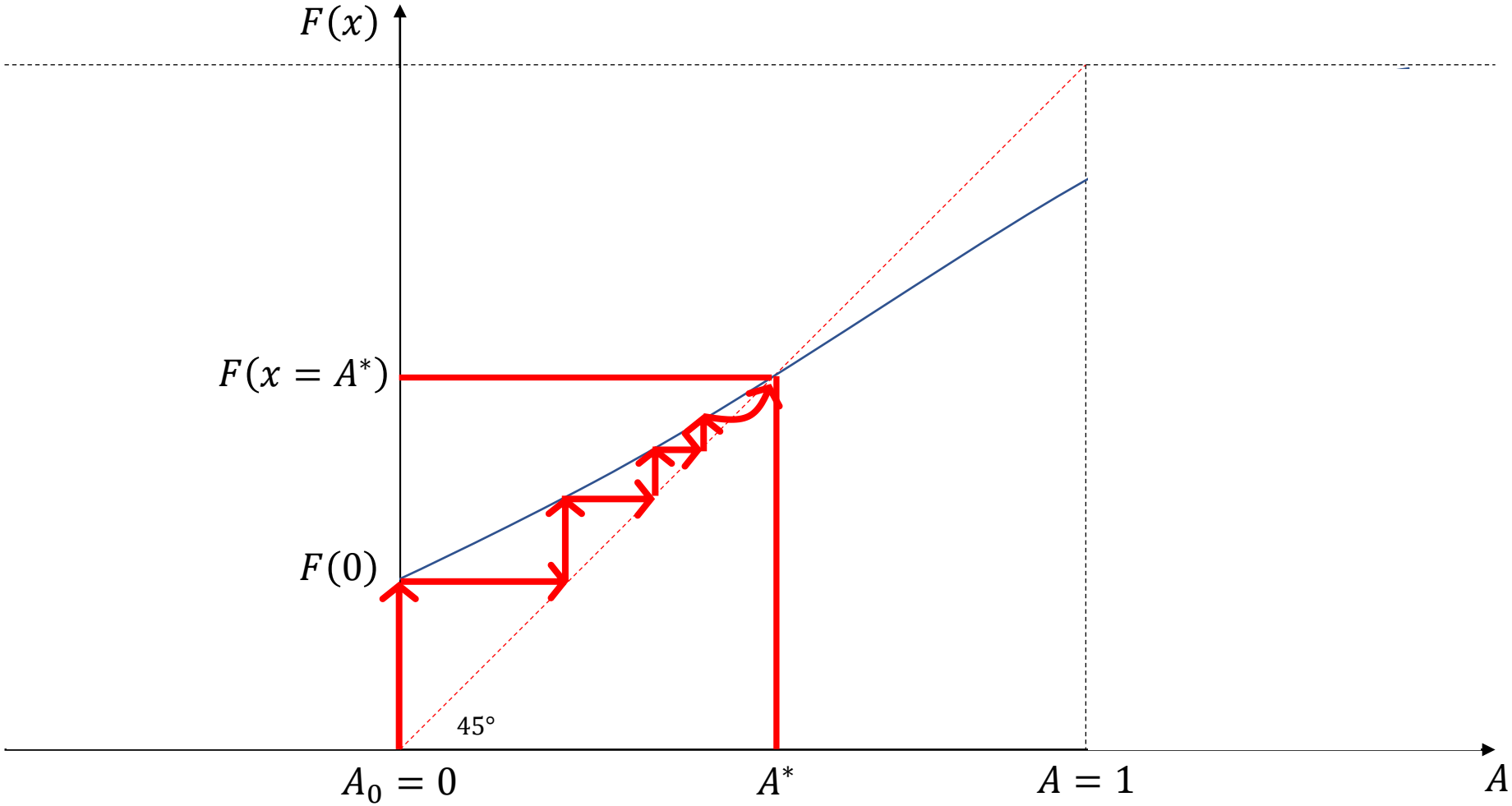

$F(x)$
$F(0)$
45°
$A = 0$
$A = 1$
A


$F(x)$
$F(0)$
45°
$A_0 = 0$
$A = 1$
A

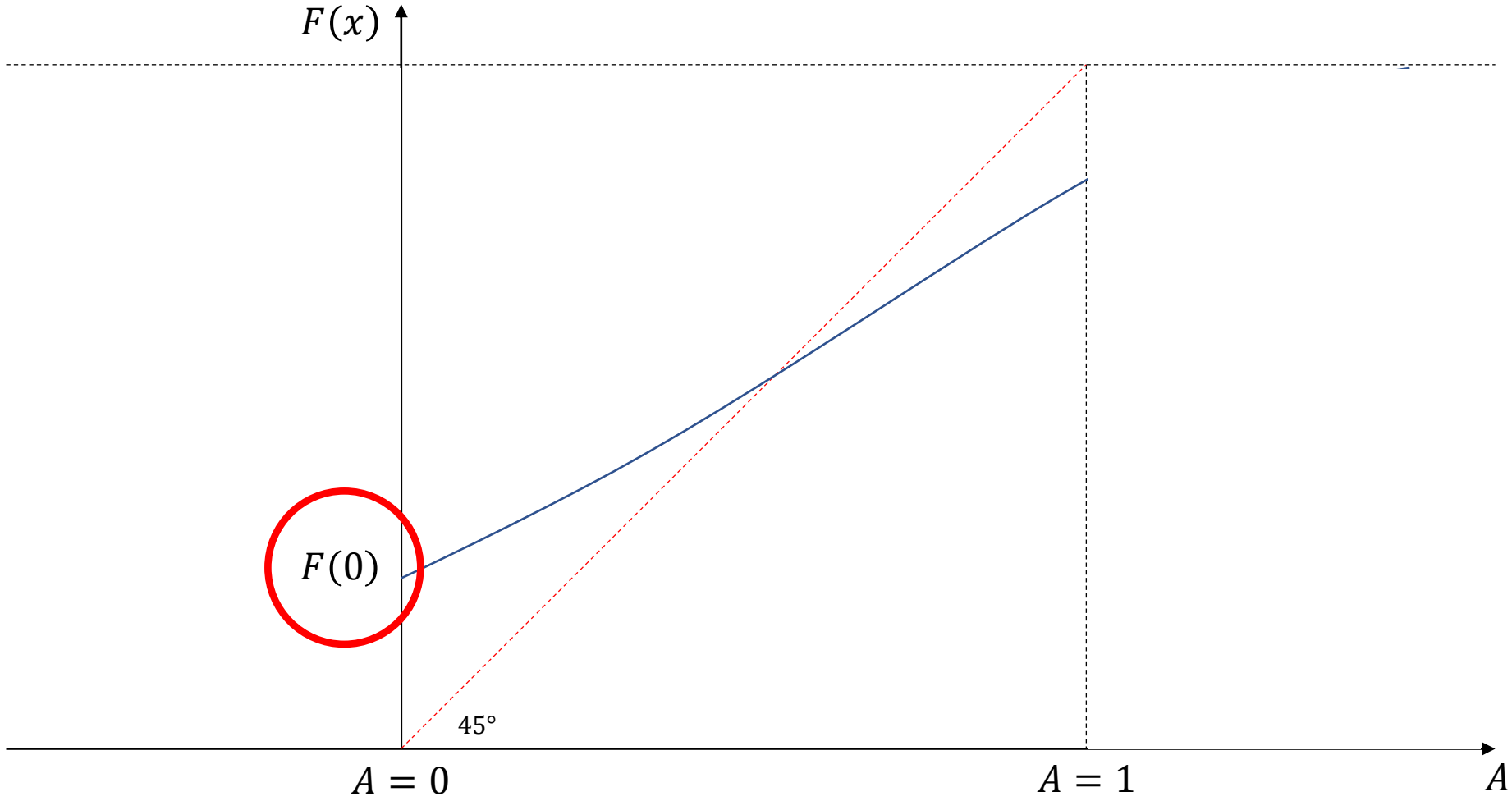

$F(x)$
$F(0)$
45°
$A_0 = 0$
A_1
$A = 1$
A


$F(x)$
$F(A_1)$
$F(0)$
45°
$A_0 = 0$
A_1
$A = 1$
A

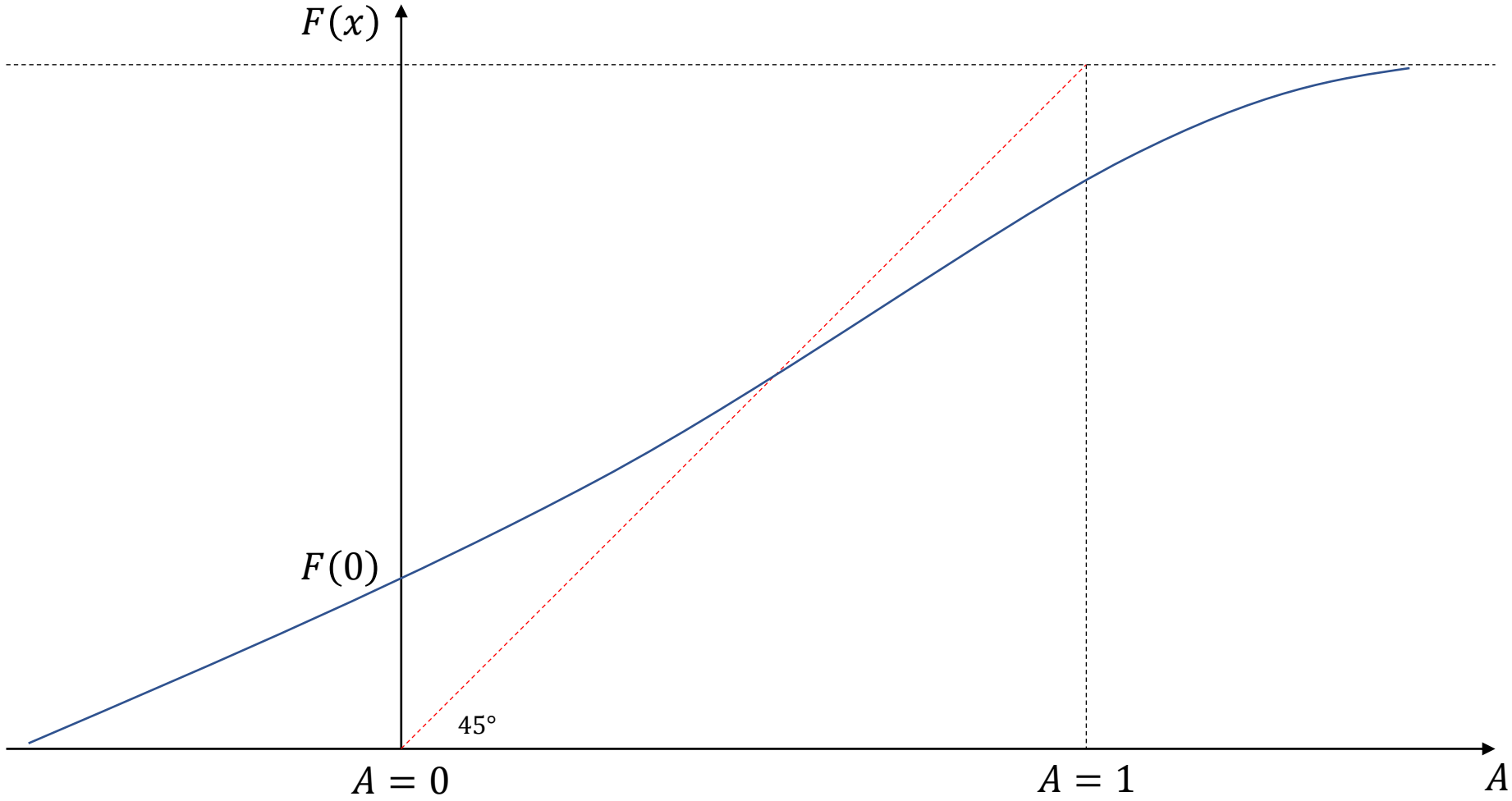

$F(x)$
$F(A_1)$
$F(0)$
45°
$A_0 = 0$
A_1
A_2
$A = 1$
A


$F(x)$
$F(x = A^*)$
$F(0)$
45°
$A_0 = 0$
A^*
$A = 1$
A

- Note that the necessary condition $F(0) > 0$ is almost equivalent to the requirement that there exsists a lower dominance region…



- It is immediate to check that, for every t, a player defines his/her (optimal) course of action according to the rule



GLOBAL GAMES AND COLLECTIVE ACTION IN POLITICS

An Introduction

MILAN

February 23rd, 2022

Thank You!

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA