

# International Negotiations Games, Strategies and Negotiations

Case Study: the 2015 Greek debt negotiation  
Counter-terrorist games

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# A new prime minister

- ▶ In 25/1/2015 SYRIZA wins the elections and Alexis Tsipras becomes Prime Minister
- ▶ Tsipras had promised that, if elected, he would unilaterally renege on (abolish) the country's international agreements with its creditors

← **Ανάρτηση**

 **Αλέξης Τσίπρας - Alexis Tsipras** ✓  
@atsipras

Η μόνη ρεαλιστική και σωτήρια εναλλακτική πρόταση είναι η κατάργηση με ένα νόμο και σε ένα άρθρο, όλων των μέτρων λιτότητας [#syryza](#)

10:50 μ.μ. · 11 Νοε 2012

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**443** Αναδημοσιεύσεις **40** Παραθέσεις **188** Επισημάνσεις "Μου αρέσει"

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**2** Σελιδοδείκτες

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    2 

## A new prime minister

- ▶ In his 25/1/2015 victory speech at Propylaia, Alexis Tsipras repeated that the austerity would end



## A new negotiation plan

- ▶ The new approach to dealing with the country's partners/creditors would be simple:
- ▶ Greece was playing a "Hawk and Dove" (Chicken) game and SYRIZA would turn the equilibrium to a new strategy profile:
- ▶ Greece would play Hawk at any cost
- ▶ Greece had made sure with public declarations that they wouldn't back off
- ▶ from the outset it was known that Greece's approach would be hawkish in what they portrayed as a game of chicken

# A game of chicken

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## Greek games in theory and practice

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## *A Possible Day of Reckoning, Again, for Greece and Europe*

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Feb. 17, 2015

For anyone who spent the years 2010 to 2012 obsessing over the fate of the eurozone during the crisis set off by Greek debt, the last few days have been a time of uncomfortable déjà vu.

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But just because you feel like you've seen something before doesn't mean there won't be a different ending.

# A game of chicken

- ▶ Remember the payoffs of the “Hawk and Dove”?

		Greece	
		Hawk	Dove
EU	Hawk	-10, -10	10, 0
	Dove	0, 10	5, 5

# A game of chicken

- ▶ Two Nash Equilibria

		Greece	
		Hawk	Dove
EU	Hawk	-10, -10	10, 0
	Dove	0, 10	5, 5

# A game of chicken

- ▶ What would it take for Greece to have a favourable outcome in this negotiation?
  1. Get the setup of the game right (players, rules, dimensions, etc) (Level 1 of the negotiation)
  2. Make sure that there were no unexploited dimensions to increase value (Level 2)
  3. Get the payoffs of the players right (Level 3)
  4. navigate to the right equilibrium, that is DH, rather than HD! (Level 3)



# A game of chicken

- ▶ Let's start with the latter: navigate to the right equilibrium
- ▶ Greece took every possible step to convince everyone it wouldn't back off
  1. It had top ministers repeat publically they wouldn't back off, every chance they got
  2. It procrastinated with every chance possible in order to reach 22:00 GMT June 2015 when a large €1.5bn payment was to be paid
  3. getting as close to the deadline made the game virtually a static game
  4. In other words Greece did everything they could to win a Hawk and Dove game
  5. Problem: They got everything else wrong!

## Mistake No 1: “Get the payoffs right”

- ▶ Greece was convinced that they were playing a Hawk and Dove game
- ▶ But did they judge opponent's payoffs correctly?

		Greece	
		Hawk	Dove
EU	Hawk	-10, -10	10, 0
	Dove	0, 10	5, 5

- ▶ One could argue that Dove for the EU was far worse than Hawk: With a hawkish stance, the EU could send a signal to other potential rebels that “rules are rules”. Also, the EU had taken serious steps to isolate its banks' exposure to Greek debt by 2015. Playing Hawkish wouldn't have been a disaster
- ▶ Playing Dove would trigger a blackmail by much bigger players in trouble (Italy, Spain)

## Mistake No 1: “Get the payoffs right”

- ▶ So while Greece thought they were playing:

		Greece	
		Hawk	Dove
EU	Hawk	-10, -10	10, 0
	Dove	0, 10	5, 5

- ▶ they were in reality playing:

		Greece	
		Hawk	Dove
EU	Hawk	-4, -10	10, 0
	Dove	-20, 10	5, 5

## Mistake No 1: “Get the payoffs right”

- ▶ note that for the EU, playing Dove was a strictly dominated strategy

		Greece	
		Hawk	Dove
EU	Hawk	-4, -10	10, 0
	Dove	-20, 10	5, 5

- ▶ For anyone familiar with the perils facing the EU if it started accepting a relaxation of fiscal rules, playing Dove could have never been an option!
- ▶ Greece could at best get 0 by playing Dove, or could head for unilateral disaster if it attempted to play Hawk!

## Mistake No 1: “Get the payoffs right”

- ▶ Greece made several lethal mistakes in the calculation of the parties' payoffs
  1. We didn't estimate correctly the repercussions of a Grexit on the EU. The impact of the announcement of the Greek referendum on European markets was negligible. Europe had prepared hard for 5 years to isolate its financial system from a collapse in Greece
  2. We misrepresented the effects of a Grexit on the Greek economy. Greece was a country heavily dependent on foreign trade, with weak exports and strong currency and zero fiscal margins. The impact of a Grexit would have been devastating

## Mistake No 1: “Get the payoffs right”

3. Even possible long-term gains from a Grexit (something very doubtful given the country's poor institutions and mediocre infrastructure), were really far in the future. Greece needed at least 6 months to a year, under the best circumstances to develop its own currency
  4. We had no alternative plan. Ministers' travels to Russia to discuss the possibility of using rubles as currency were at best a joke. The last-minute announcement by the finance minister that there would be an IOU currency through taxisnet was equally laughable.
- ▶ In a static game framework, this means that we thought we were playing Hawk and Dove while we were in fact playing a completely different game!

## Mistake No 2: Don't treat interaction with long-term partners as a static game

- ▶ Greece's negotiation strategy was a sloppy and unconvincing attempt to convince the world that it had committed to Hawk in a Hawk and Dove game
  1. Greece was stalling in negotiations until the large IMF payment was due in 30 June 2015
  2. The Greek delegation showed up in Eurogroups unprepared, without any suggestions or plan for finding a solution to the country's debt problem
  3. Greece made a smaller payment of €310 million to IMF and pushed brinkmanship towards June 30 when a larger payment of €1.5bn to the IMF was due
  4. The whole setup was pointing towards a static game at the last moment. Television was broadcasting the countdown in days, hours and minutes to the default

## Mistake No 2: Don't treat interaction with long-term partners as a static game

- ▶ But were the two parties really playing a static game?
- ▶ Europe was playing a dynamic game with many players: Lurking behind were even bigger threats such as the debts of Portugal, Spain, Ireland and particularly Italy (PIGS or PIIGS crisis)
- ▶ It would take more sophisticated tools to construct a multiparty game but showing weakness to Greece would probably signal an end to EU fiscal rules and threaten the whole institution
- ▶ Greece was not really playing a once-off game with the EU: they are long-term partners in many aspects (see dimensions below)



## Mistake No 2: Don't treat interaction with long-term partners as a static game

- ▶ To see just one aspect of how mistaken it was to misrepresent a dynamic game as a static one, let's suppose that Greece would come to play again the Hawk and Dove game with Europe over a series of other issues in many years to come

		Greece	
		Hawk	Dove
EU	Hawk	-10, -10	10, 0
	Dove	0, 10	5, 5

## Mistake No 2: Don't treat interaction with long-term partners as a static game

		Greece		
		H	D	
EU	H	-10, -10	10, 0	$p = 1/3$
	D	0, 10	5, 5	$q = 2/3$
		$p = \frac{1}{3}$	$q = \frac{2}{3}$	

- ▶ Clearly playing always Hawk would not suit. Europe, a much stronger player would never accept losing repeatedly. If anything a more plausible outcome would be a Nash Equilibrium in mixed strategies (playing randomly) in this game:
- ▶ The unique mixed strategies NE in the game above is the following probabilities: each player plays Hawk with probability  $p = \frac{1}{3}$  and Dove with probability  $q = \frac{2}{3}$

## Mistake No 2: Don't treat interaction with long-term partners as a static game

- ▶ The average payoff of each player in each stage would be  $\frac{30}{9}$
- ▶ We can see that both players can achieve better than that by playing Dove in each stage, provided that they are patient enough (Folk Theorems)
- ▶ Another possibility would be to alternate hawk and dove: this time I play Hawk and you play Dove. Next period vice versa and so on for ever

## Mistake No 2: Don't treat interaction with long-term partners as a static game

- ▶ If P1's discount factor  $\delta_1 \geq \frac{1}{2}$  and  $\delta_2 \geq \frac{3}{4}$ , then the following strategy profile can be a SPNE of the infinitely repeated game:

P1: start with H and if P2 has played the opposite strategy (D when you play H and H when you play D), then in each period alternate H and D. Otherwise play the mixed strategy

P2: start with D and if P2 has played the opposite strategy (D when you play H and H when you play D), then in each period alternate H and D. Otherwise play the mixed strategy eqm

## Mistake No 3: Complete disregard of other dimensions

- ▶ The obsessive focus of the Greek side on a Hawk & Dove approach, disregarded other important dimensions of the Greece-EU relationship and possible negotiation
- ▶ EU provides knowhow, security and expertise in many aspects that Greece is particularly invested in
- ▶ For example 4 years later (2019) a rather acute Greek-Turkish crisis emerged on two fronts (Aegean and immigration)
- ▶ An isolated Greece would be much more vulnerable compared with a country that shares European solidarity. In fact France signalled its affiliation by sending part of the French fleet, including an airplane carrier
- ▶ Also during the Covid19 crisis, the EU secured vaccines for all countries on an equal basis, protecting in essence countries with less resources

## Mistake No 4: Getting the setup/players/incentives wrong

- ▶ By focusing on a bilateral game, Greece disregarded the game that the EU was playing
- ▶ The EU was facing a much larger crisis than the Greek debt. If a Greek debt relief was handleable, the Italian or Spanish debts were impossible to forgive
- ▶ By focusing on the bilateral game, Greece disregarded the true, bigger problems and incentives of the EU negotiators

## A long list of mistakes

- ▶ The list of mistakes made by the Greek side could go on and on
- ▶ We listed mistakes made from a game-theoretical point of view. Many more mistakes were made on a negotiating level!
- ▶ In fact, it is possible that a whole course could be dedicated to studying the lessons learned from the mistakes made by the Greek side
- ▶ Harvard Business School declared the Greek debt negotiation as the worst negotiation of 2015
- ▶ In fact they might have been very generous, the negotiation could have been the worse negotiation of the century so far
- ▶ It cost the Greek economy a minimum of €85 billion (by the government's admission), but most likely much closer to €200 billion or more if all kinds of damages are factored in!

# The worst negotiation of 2015

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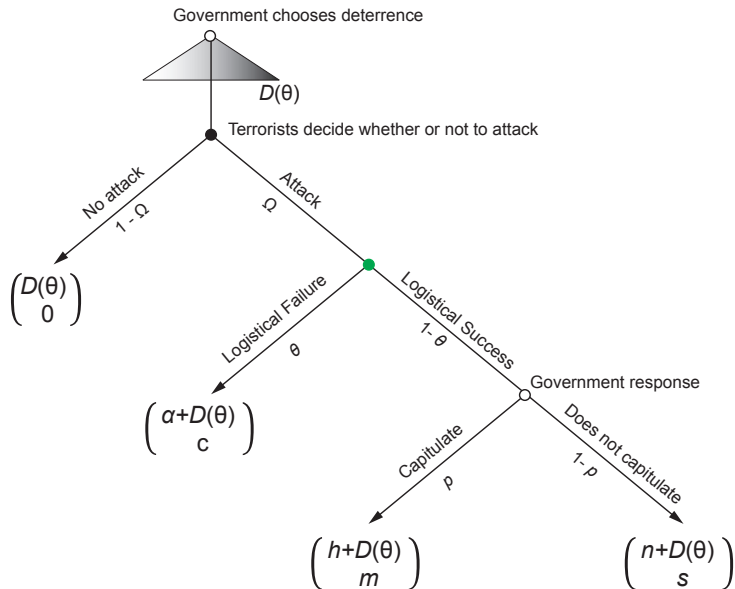
## Game theoretic approaches to terrorism

- ▶ Cases of terrorism often have strong strategic connotations/effects
- ▶ For example, what actions do different West nations take against terrorism?
- ▶ How do they coordinate?
- ▶ Will or should a government capitulate to terrorists' demands and why/when?
- ▶ What strategic effects are in the way of ending Middle East cycle of violence
- ▶ The issues are numerous and perhaps very complicated to be analysed by simple games. However, game theory can sometimes shed some light on strategic aspects of global geopolitics or cases of terrorism Sandler and Arce [2007]

## Game theoretic approaches to terrorism

- ▶ Sandler and Arce [2007] present several game-theoretic models of terrorism
- ▶ We will briefly discuss one or two models and try to understand how game theory can shed some light on strategic concerns arising in situations of terrorism
- ▶ Let's focus on a terrorist hostage situation from Sandler and Arce [2007]
- ▶ The government begins by taking some deterrence action  $D(\theta)$
- ▶ Then the terrorists decide on whether to attack
- ▶ An attack might be successful or not
- ▶ If successful, the government must decide whether to capitulate to terrorists' demands

# Sandler and Arce's (2007) terrorism game



## Sandler and Arce's (2007) terrorism game

- ▶ In Sandler and Arce's (2007) terrorism game,  $c$  is the benefit to terrorists of an attack that didn't succeed (e.g. publicity),  $h$  is the benefit of capitulating for the government,  $m$  is the payoff to terrorists when a government capitulates and  $n$  and  $s$  are the payoffs to government and terrorists from capitulating

## Sandler and Arce's (2007) terrorism game

- ▶ Depending on the fundamentals of the game, it might be profitable for the terrorists to either attack or not
- ▶ Similarly, in some cases governments might find it optimal to stick to a “never negotiate” rule
- ▶ But in the once-off game, the threat to not negotiate is not always credible: sometimes governments might earn more from negotiating
- ▶ Even against a government that can credibly commit to not negotiating, some terrorists might find it profitable to attack
- ▶ In repeated games, reputation effects make the “never negotiate” strategy of the government more credible through a reputation effect

## Counter-terrorist game between two allies. From Arce and Sandler [2005]

- ▶ Counter-terrorist policies involve:
  1. *preemptive* policies: proactive policies to prevent the formation of groups (eg punish sponsors, attack terrorist camps, freezing assets etc)
  2. *detering* policies: making attacks more difficult or punishing perpetrators (metal detectors, metal barriers, fortification works etc)
- ▶ Preemptive policies reduce terrorism globally
- ▶ Detering policies move targets to states with less deterrence. So if I make it more difficult to attack my country, I increase the probability that they attack yours!
- ▶ How do two ally states choose between preemptive and detering policies?

## Counter-terrorist game between two allies

- ▶ Let's consider first the pre-emptive game:

		EU	
		Preempt	Status quo
US	Preempt	2, 2	-2, 4
	Status quo	4, -2	0, 0

- ▶ Pre-emption costs each nation  $c = 6$  and benefits each nation  $B = 4$  with externalities (my pre-emption helps you as well)

Table: Preemption: the parametric model

		EU	
		Preempt	Status quo
US	Preempt	$2B - c, 2B - c$	$B - c, B$
	Status quo	$B, B - c$	0, 0

## Counter-terrorist game between two allies

- ▶ The game reminds us of a very well-known game. Doesn't it?

		EU	
		Preempt	Status quo
US	Preempt	2, 2	-2, 4
	Status quo	4, -2	0, 0



## Counter-terrorist game between two allies

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		Preempt	Status quo
US	Preempt	2, 2	-2, 4
	Status quo	4, -2	0, 0

## Counter-terrorist game between two allies

- ▶ Deterrence works differently: With deterring an attack at home, both nations suffer public costs  $C$ , but only the deterrer benefits with benefits  $b$
- ▶ The terrorists are the passive player: they attack the more vulnerable nation (one that doesn't deter) and flip a coin if both are equally vulnerable
- ▶ .

		EU	
		Status quo	Deter
US	Status quo	0, 0	-C, b-C
	Deter	b-C, -C	b-2C, B-2C

## Counter-terrorist game between two allies

- ▶ With  $C = 4, b = 6,$
- ▶ .

		EU	
		Status quo	Deter
US	Status quo	0, 0	-4, 2
	Deter	2, -4	-2, -2

- ▶ Clear case of prisoner's dilemma!

## Counter-terrorist game between two allies

- ▶ With  $C = 4, b = 6$ ,

		EU	
		Status quo	Deter
▶ US	Status quo	0, 0	-4, 2
	Deter	2, -4	-2, -2

- ▶ Clear case of prisoner's dilemma!

## Counter-terrorist game between two allies

- ▶ When the nations have a choice between preemption, status quo or deterrence, things get quite worse:

▶

		EU		
		Preempt	Status quo	Deter
US	Preempt	$2B-c, 2B-c$	$B-c, B$	$B-c-C, B+b-C$
	Status quo	$B, B-c$	$0, 0$	$-C, b-C$
	Deter	$B+b-C, B-c-C$	$b-C, -C$	$b-2C, B-2C$

## Counter-terrorist game between two allies

- ▶ With the parameterisation used above:

		EU		
		Preempt	Status quo	Deter
US	Preempt	2, 2	-2, 4	-6, 6
	Status quo	4, -2	0, 0	-4, 2
	Deter	6, -6	2, -4	-2, -2

## Counter-terrorist game between two allies

- ▶ With the parameterisation used above:

		EU		
		Preempt	Status quo	Deter
US	Preempt	2, 2	-2, 4	-6, 6
	Status quo	4, -2	0, 0	-4, 2
	Deter	6, -6	2, -4	-2, -2

- ▶ Unique N.E. is the worst possible scenario!

## Bibliography

- Daniel G. Arce and Todd Sandler. Counterterrorism: A game-theoretic analysis. *The Journal of Conflict Resolution*, 49(2):183–200, 2005.
- Todd Sandler and Daniel G. Arce. Chapter 25 terrorism: A game-theoretic approach. In Todd Sandler and Keith Hartley, editors, *Handbook of Defense Economics*, volume 2 of *Handbook of Defense Economics*, pages 775–813. Elsevier, 2007.