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Political Regimes and Government's Reaction to Terrorism A Simple Model¹

by

Nicola Brugali², Paolo Buonanno³ and Mario Gilli⁴

ABSTRACT

Why do autocratic regimes have sometimes a weak reaction to terrorism, and conversely why do democratic regimes sometimes react harshly? More generally, what are the determinants of governments' reaction to terrorism? And, what are the determinants of terrorism and of its dynamic?

In the last years, there have been many empirical studies conducted on these questions. We believe, however, that a general theoretical model is missing, which would significantly help empirical research and its interpretation. This paper is a first attempt towards the construction of such a general model. In this model, individual human capital, government responsiveness and economic development are seen as potential factors influencing individual choice to use terrorism as a political strategy. In this paper, we elaborate a strategic model of terrorism with a specific focus on domestic terrorism, in which the individual choice of joining a terrorist organization is a way of pursuing specific political aims. This decision is in turn influenced by the interaction between terrorist' activity, political engagement and government policies. We are able to prove that three different political regimes form the equilibrium outcomes, and that there is not a simple monotonic relationship between a regime accountability and terrorism' repression. It is then also perfectly possible for a democratic regime to harshly repress terrorism and for an autocratic polity to be tolerant on terrorism.

Key Words: Terrorism, Accountability, Repression.

JEL Code: D74, D72, C72.

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² Department of Economics, University of Bologna

³ Department of Economics, University of Bergamo

⁴ Department of Economics, Management, and Statistics, University of Milan-Bicocca. E-mail: mario.gilli@unimib.it

1. Introduction

Why do autocratic regimes have sometimes a weak reaction to terrorism, and conversely why do democratic regimes sometimes react harshly? More generally, what are the determinants of governments' reaction to terrorism? And, what are the determinants of terrorism and of its dynamic?

In the last years, there have been many theoretical and empirical studies on terrorism in general, and on some of these questions in particular. We believe, however, that a general theoretical model connecting government accountability, counter-terrorism policies and structural parameters is missing. Such a model, should explain not only the observed non monotonic relationship between government accountability a strength of counter-terrorism policies, it should also connect observable government and terrorists choices to structural exogenous parameters, a result that would significantly help empirical research and interpretation. This paper is a first attempt towards the construction of a general model that consider individual human capital, government responsiveness and economic development as possible factors influencing why individual agents might decide to use terrorism as a political strategy to try to reach their political goals. In this work, we elaborate a strategic model of terrorism with a specific focus on domestic terrorism. In this model the individual choice of joining a terrorist organization is a peculiar way of pursuing specific political aims, and the interaction between terrorists' activity, political engagement and government policies plays a crucial role. We assume that terrorists are utility maximizers that use terrorism when the expected political gains minus the expected costs outweigh the net expected benefits of alternative forms of protest. Similarly, the government acts to maximize a weighted sum of citizens' utility and of its own political goal.

Within this frame, we are able to show that the terrorist game has three possible equilibrium outcomes, uniquely determined by structural parameters:

1. A **repressive regime** characterized by
 - i. No terrorism
 - ii. High repression
 - iii. Increasing protests.
2. A **changing regime**⁵ characterized by
 - i. Low terrorism which might increase or decrease according to the
 - ii. Random repressive reaction of the government
 - iii. Increasing protests if there is repression.
3. A **tolerant regime** characterized by
 - i. High terrorism
 - ii. No repression
 - iii. No protests.

In particular, we show that there is not a simple monotonic relationship between regime accountability and terrorism' repression, so that it is perfectly possible for a democratic regime to repress harshly and for an autocratic polity to be tolerant of terrorism.

To stress that these questions and results are relevant, let us consider four countries variously affected by terrorism in the last 40 years, with different degree of democratic accountability and different government reactions, where our statements are based on Crenshaw (2001) and Whittaker (2012). As democratic countries, consider Italy and Israel. In the seventies the Italian government's reaction was first tolerant, then harsh, while Israel always react very harshly to any terrorist attack. Two main differences between these two countries are probably the intermediate human capital of Italian terrorists, while Palestinian terrorists are characterized by high human capital and, above all, the significant high political heterogeneity of Palestinian

⁵ This outcome is random because is generated by a mixed strategy equilibrium.

activists with respect to Israeli citizens. As autocratic countries, consider Nigeria, where the government's reaction to terrorism is sometime weak, sometimes harsh, and Russia, where the government reaction has always been extremely harsh. From the point of view of our explanatory variables, these countries are significantly different: low economic development in Nigeria, significant economic development in Russia, intermediate political heterogeneity in Nigeria, high political heterogeneity in Russia, low terrorists' human capital in Nigeria, intermediate in Russia.

2. The Model

2.1 The Structure of the Model

In the following notation the subscript denotes the role of the player, while the apex denotes the time. The model we propose is sequential; at the beginning of each stage all the players are informed of the choices made by all players in previous stages and within each stage the players play simultaneously.

2.1.1 The Timing of the Game

1. FIRST STAGE: The citizens $i \in \{1, \dots, P\}$ are characterized by tastes for a drastic change in the government⁶ $\gamma_i \in (-\infty, \infty)$ and human capital $H_i \in [0, 1]$,⁷ that affects i 's productivity in all possible activities, terrorism, political and labor efforts. At this first stage, each citizen $i \in \{1, \dots, P\}$ has to decide whether to join one of three different groups, i.e. terrorists T^1 , political activists A^1 , or conservative⁸ C^1 , with the following consequences:
 - each $i \in T^1$ chooses the terrorism effort $E_i = H_i$ and thus the labor supply $L_i = H_i - E_i = 0$;
 - each $i \in A^1$ chooses the terrorism effort $E_i = \frac{1}{2} H_i$ and thus the labor supply $L_i = H_i - E_i = \frac{1}{2} H_i$;
 - each $i \in C^1$ chooses the terrorism effort $E_i = 0$ and thus the labor supply $L_i = H_i - E_i = H_i$.
 - Citizen i 's income Y_i is determined by the production function $f(L) = \alpha L$, where $\alpha \in (0, \infty)$ is the labor's productivity. Hence, i 's first period consumption is $c_i^1 = Y_i^1 = \alpha L_i^1 = \alpha(H_i - E_i)$.
 - Finally, denote by
 - N_T^1 , N_A^1 and N_C^1 the number of, respectively, terrorists, activists and conservatives at stage 1 as a consequence of individual decisions
 - n_T^1 , n_A^1 and n_C^1 the average number (percentage) of terrorists, activists and conservatives at stage 1 as a consequence of individual decisions
 - h_T^1 , h_A^1 and h_C^1 the average human capital of terrorists, activists and conservatives at stage 1.
2. SECOND STAGE: The government G observes (n_T^1, n_A^1, n_C^1) then chooses the amount of repression ρ . Since the government is subject to the public budget constraint: $t \sum_{i=1}^P Y_i = \rho$, the choice of the amount of repression ρ is equivalent to choosing the tax rate $t \in [0, 1]$.
3. THIRD STAGE: each citizen $i \in \{1, \dots, P\}$ after observing government repression t , has to decide whether to join one of three different groups, i.e. terrorists T^2 , political

⁶ We will write also of a taste for revolution, as in many works on terrorism, see. e.g. De Mesquita (2005=).

⁷ Without loss of generality the human capital is normalized to 1.

⁸ We use this terminology to indicate the supporter of the government in charge.

activists A^2 , or conservative C^2 , with the same consequences of period 1 on citizens' efforts and income.

• Finally, denote by

- N_T^2 , N_A^2 and N_C^2 the number of, respectively, terrorists, activists and conservatives at stage 2 as a consequence of individual decisions
- n_T^2 , n_A^2 and n_C^2 the average number (percentage) of terrorists, activists and conservatives at stage 2 as a consequence of individual decisions
- h_T^2 , h_A^2 and h_C^2 the average human capital of terrorists, activists and conservatives at stage 2.

4. FINAL OUTCOMES: The game ends with two possible final outcomes, Revolution or Status Quo, with probability, respectively, R and $1-R$:

$$\hat{\Pi} = \begin{cases} \text{Revolution} & \text{prob } R \\ \text{Status quo} & \text{prob } 1-R \end{cases}$$

The timing of the model is represented in figure 1:

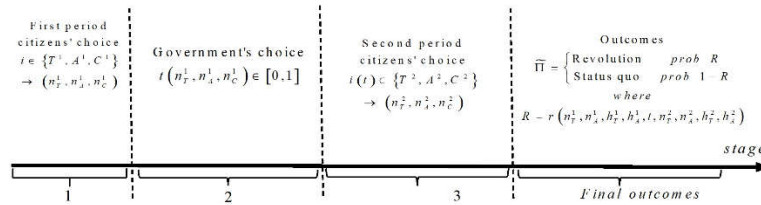


Figure 1

2.1.2 Structural Assumptions

The Conflict Technology:

A crucial aspect of this model is the specification of how the players' choices affect the probability of Revolution. We assume the following linear conflict technology

$$R = \min \left\{ \left(1 - \frac{\rho}{\sum_{i=1}^P Y_i} \right) \left(\frac{\sum_{i \in T^1} E_i + \sum_{i \in T^2} E_i}{P} \right) + a \left(\frac{\sum_{i \in A^1} E_i + \sum_{i \in A^2} E_i}{P} \right), 1 \right\}.$$

This conflict technology represents in the simplest way the idea that the probability of revolution increases linearly with the percentage of global terrorists' activity, but is at the same time reduced by governments' level of repression. Also, active participation in protests increases the likelihood of a revolution, however the effects of such protests is smaller with respect to the effect of terrorism acts.⁹

Using the previously introduced notation, we can rewrite the probability of successful revolution as follows:

$$R = \min \left\{ (1-t)(n_T^1 h_T^1 + n_T^2 h_T^2) + \frac{1}{2} a (n_A^1 h_A^1 + n_A^2 h_A^2), 1 \right\}.$$

⁹ This smaller effect is represented by a parameter $a \in (0,1)$.

To simplify, from now on we take $(1-t)(n_T^1 h_T^1 + n_T^2 h_T^2) + \frac{1}{2} a(n_A^1 h_A^1 + n_A^2 h_A^2) \leq 1$ and we will check ex post that this inequality is satisfied.

The Players' Payoff Functions

The final outcome is associate to the following public payoff

$$\Pi = \begin{cases} 1 & \text{if Revolution} \\ 0 & \text{if Status quo} \end{cases}$$

which in turn affect the players' payoffs linearly, as follows:

1. the citizens' utilities are

$$u_i(c_i^1, c_i^2, \Pi) = c_i^1 + c_i^2 + \gamma_i \Pi \Rightarrow E[u_i(c_i^1, c_i^2, \Pi)] = c_i^1 + c_i^2 + \gamma_i R$$

where

$$\gamma_i \in \left[-\frac{m}{2}P, \frac{m}{2}P \right]$$

is an individual parameter that describes a citizen's position towards revolution: higher γ_i means a high propensity for revolution, while lower γ_i denotes a taste for status quo;

2. the government objective function is

$$u_G(u_{i \in P}, \Pi) = \delta \left[\frac{1}{P} \sum_{i=1}^P (c_i^1 + c_i^2) \right] + (1-\delta)(1-\Pi)$$

where δ is an index of democratic accountability of the government: the more δ goes to 1, the more the government is democratic and vice versa. Then the government expected payoff is

$$E[u_G(u_{i \in P}, \Pi)] = \delta \left[\frac{1}{2} n_A^1 h_A^1 + \frac{1}{2} n_A^2 h_A^2 + n_C^1 h_C^1 + n_C^2 h_C^2 \right] + (1-\delta)(1-R).$$

Table 1 shows the exogenous and endogenous variables of the explained model, and their meaning

Exogenous variables	
Notation	Meaning
$P \in \{0, \dots, \infty\}$	Population size
$m \in (0, \infty)$	Measure of political heterogeneity
$\alpha \in (0, \infty)$	Measure of political development
$a \in (0, 1)$	Measure of effectiveness of political activism
$\gamma_i \in \left[-\frac{m}{2}P, \frac{m}{2}P \right]$	Citizens' political position
$\delta \in [0, 1]$	Measure of government's accountability
$h_j^t \in [0, 1]$	Average human capital of group $J \in \{T, A, C\}$ in period $t=1,2$
Endogenous variables	
$n_j^t \in [0, 1]$	Percentanges of citizens in group $J \in \{T, A, C\}$ in period $t=1,2$
$t \in [0, 1]$	Tax rate established by the governments, measure of repression

Table 1

To simplify calculations and interpretation, we make the following hypotheses on the model's parameters.

Conditions:

1. Uniform distribution of citizens' tastes: γ_i is uniformly distributed;
2. Increasing heterogeneity with increasing economic development: $m \geq 2\alpha$;
3. Stationary: $h_C^1 = h_C^2 = 1/2$; $h_T^1 = h_T^2 = h_A^1 = h_A^2 = h$;
4. Strong protests $a = 1/2$.

The first condition is just to simplify the calculations. The second condition means that the ratio of political heterogeneity of the population over productivity is bounded by the level of economic development. This condition is not only plausible but also simply the calculus. The stationary condition is useful to get a closed form solution. The stationary condition means that the human capital of terrorist and activists is equal, stationary and it is greater or smaller than the human capital of conservatives depending on $h \geq 1/2$. Finally, the fourth condition means that activism is quite a strong way to oppose the government.

3. Solution of the Game

As solution concept, we use Subgame Perfect Equilibria (SPE).

3.1.1 Citizens' Choice in the Second Period

In the online Appendix, we establish the following result

Lemma 1

The percentages of the groups in the second period are:

$$\left\{ \begin{array}{lll} n_T^2 = \frac{1}{2} - \frac{\alpha}{m} & n_A^2 = 0 & n_C^2 = \frac{1}{2} + \frac{\alpha}{m} \quad \text{if } t \in \left[0, \frac{1}{2}\right] \\ n_T^2 = \frac{1}{2} - \frac{2\alpha(1-t)}{(3-4t)m} & n_A^2 = \frac{4\alpha(1-t)(2t-1)}{(3-4t)m} & n_C^2 = \frac{1}{2} + \frac{2\alpha(1-t)}{m} \quad \text{if } t \in \left[\frac{1}{2}, \frac{3m-4\alpha}{4(m-\alpha)}\right] \\ n_T^2 = 0 & n_A^2 = \frac{1}{2} - \frac{2\alpha(1-t)}{m} & n_C^2 = \frac{1}{2} + \frac{2\alpha(1-t)}{m} \quad \text{if } t \in \left[\frac{3m-4\alpha}{4(m-\alpha)}, 1\right] \end{array} \right.$$

The percentages of citizens in each of these three categories is represented in figure 1.

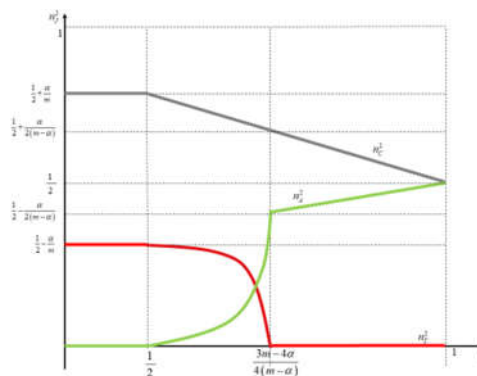


Figure 1: citizens' choices as a function of government policy

3.1.2 Government's Choice

In the Appendix, we derive the following sequential best reply of the government.

Lemma 2

The sequential best reply of the government is

$$t^*(n_T^1) = \begin{cases} 0 & \text{if } n_T^1 \in \left[0, \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m}\right] \\ \frac{3m-4\alpha}{4(m-\alpha)} & \text{if } n_T^1 \in \left[\frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m}, \frac{\alpha\delta(1+h)}{4(1-\delta)h} + \frac{\alpha}{2m}\right] \\ 1 & \text{if } n_T^1 \in \left[\frac{\alpha\delta(1+h)}{4(1-\delta)h} + \frac{\alpha}{2m}, 1\right] \end{cases}$$

where the intervals can be empty for specific values of the parameters.

3.1.3 First Period Citizens' Choice

The citizens' sequential best reply in the first period, is characterized by the following lemma, which we derive in the Appendix:

Lemma 3

The percentages of the groups in the second period are:

$$\left\{ \begin{array}{llll} n_T^1 = 0 & n_A^1 = \frac{1}{2} - \frac{2\alpha}{m} & n_C^1 = \frac{1}{2} + \frac{2\alpha}{m} & \text{if } \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} \leq 0 \\ n_T^1 = \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} & n_A^1 = 1 - \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{2\alpha}{m} & n_C^1 = \frac{1}{2} + \frac{\alpha}{m} & \text{if } \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} \in \left[0, \frac{1}{2} - \frac{\alpha}{m}\right] \\ n_T^1 = \frac{1}{2} - \frac{\alpha}{m} & n_A^1 = 0 & n_C^1 = \frac{1}{2} + \frac{\alpha}{m} & \text{if } \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} \geq \frac{1}{2} - \frac{\alpha}{m} \end{array} \right.$$

Now we are able to characterize the set of Subgame Perfect equilibria of the terrorist game, as a function of the structural parameters.

Proposition 1

The model is characterized by the following Sub Game Perfect Equilibrium outcomes:

1. When $\frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} \leq 0$ then there is a **repressive political regime**

where

$$\left\{ \begin{array}{l} n_T^1 = n_T^2 = 0 \\ n_A^1 = \frac{1}{2} - \frac{2\alpha}{m} < n_A^2 = \frac{1}{2} - \frac{\alpha}{2(m-\alpha)} \\ n_C^1 = \frac{1}{2} + \frac{2\alpha}{m} > n_C^2 = \frac{1}{2} + \frac{\alpha}{2(m-\alpha)} \\ t^* = \frac{3m-4\alpha}{4(m-\alpha)} \end{array} \right.$$

2. When $\frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m}\right) - \frac{1}{2} + \frac{\alpha}{m} \in \left[0, \frac{1}{2} - \frac{\alpha}{m}\right]$ then there is **changing political regime** where

$$\left\{ \begin{array}{l} n_T^{1*} = \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m} \right) - \frac{1}{2} + \frac{\alpha}{m} \\ n_T^{2*} = \begin{cases} \frac{1}{2} - \frac{\alpha}{m} > n_T^{1*} & \text{prob. } 1-\tau \\ 0 < n_T^{1*} & \text{prob. } \tau \end{cases} \\ n_A^{1*} = 1 - \frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m} \right) - \frac{2\alpha}{m} \\ n_A^{2*} = \begin{cases} 0 < n_A^{1*} & \text{prob. } 1-\tau \\ \frac{1}{2} - \frac{\alpha}{2(m-\alpha)} > n_T^{1*} & \text{prob. } \tau \end{cases} \\ n_C^{1*} = \frac{1}{2} + \frac{\alpha}{m} \\ n_C^{2*} = \begin{cases} \frac{1}{2} + \frac{\alpha}{m} = n_T^{1*} & \text{prob. } 1-\tau \\ \frac{1}{2} + \frac{\alpha}{2(m-\alpha)} < n_C^{1*} & \text{prob. } \tau \end{cases} \\ t^* = \begin{cases} 0 & \text{prob. } 1-\tau \\ \frac{3m-4\alpha}{4(m-\alpha)} & \text{prob. } \tau \end{cases} \end{array} \right.$$

3. When $\frac{\alpha\delta}{(1-\delta)h} \left(\frac{1}{4} + \frac{2\alpha}{m} - \frac{16\alpha h}{9m} \right) - \frac{1}{2} + \frac{\alpha}{m} \geq \frac{1}{2} - \frac{\alpha}{m}$ then is a **tolerant political regime** where

$$\left\{ \begin{array}{l} n_T^{1*} = n_T^{2*} = \frac{1}{2} - \frac{\alpha}{m} \\ n_A^{1*} = n_A^{2*} = 0 \\ n_C^{1*} = n_C^{2*} = \frac{1}{2} + \frac{\alpha}{m} \\ t^* = 0. \end{array} \right.$$

It is interesting to see that in a tolerant regime there is no repression, which goes at the costs of accepting a certain amount of terrorist activity. Additionally, it is interesting to see that in the equilibrium we might have repression even if there is no terrorist activity. It is exactly the government's repression that avoids terrorism activities. The only situation, in which we see both terrorism and repression is when the regime is changing. In these regimes terrorist activity triggers repression with a strictly positive probability.

4. Remarks on the results and conclusion

Proposition 1 has interesting implication on the relationships between terrorism, government's reaction and the structural parameters. In particular

1. When we have a **repressive regime**, then
 - i. The likelihood of having this kind of regime is increasing in heterogeneity and decreasing in economic development;
 - ii. an increment in heterogeneity increases repression and political activism;
 - iii. an increment in economic development reduces repression and increases conservatism;

2. When we have a **tolerant regime**, then
 - iv. Its likelihood decreases in heterogeneity and increases in economic development;
 - v. an increment in heterogeneity increases terrorism and reduces conservatism;
 - vi. an increment in economic development reduces terrorism and increases conservatism;

The three political regimes and their properties are represented in the following picture in which we use the democracy index $\delta \in [0, 1]$ as the independent variable against, respectively, terrorists/activists human capital $h \in [0, 1]$, the index of economic development $\alpha \in [0, m/2]$ and the amount of political $m \in [2\alpha, +\infty)$.

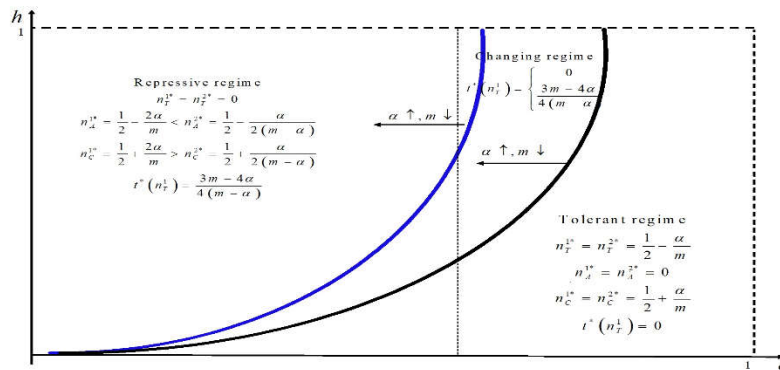


Figure 2: Political regimes, government accountability and terrorists' average human capital

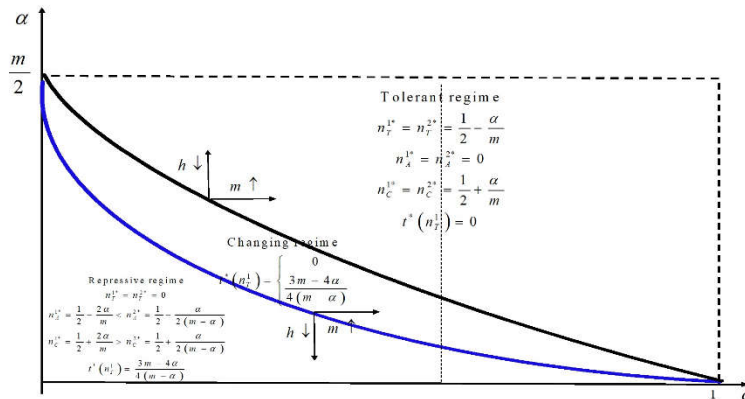


Figure 3: Political regimes, government accountability and economic development

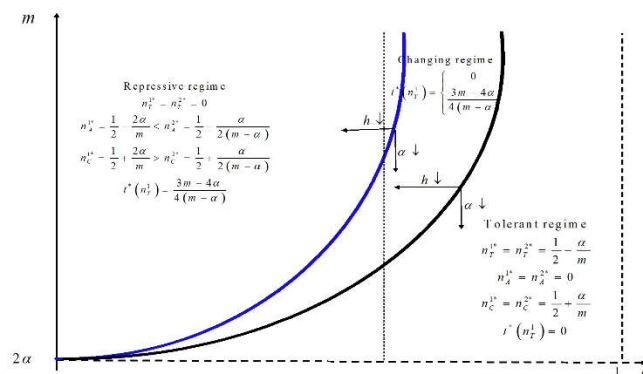


Figure 4: Political regimes, government accountability and terrorists' average human capital

These three figures illustrate the relationship between our explanatory variables and political regimes. In particular, we map the government's accountability with respect to the other three explanatory variables, terrorists' average human capital, economic development and citizens' political heterogeneity. In particular, they show the role of terrorists' human capital and of citizens' political heterogeneity in increasing the possibility of a repressive regime, as well as the role of economic development in increasing the possibility of a tolerant regime. One particular result that is worth emphasizing is that figure 4 shows that even a highly democratic government might react with repression to an increase in the population political heterogeneity, while figure 3 shows that a reduction in economic growth or, as shown in figure 2, an increment in the terrorist education increases the likelihood of a repressive political regime. These results help to provide tentative answers to our starting questions:

1. Autocratic regimes have sometimes a weak reaction to terrorism and, conversely, democratic regimes react sometimes harshly because government's accountability towards citizens. However, this accountability is just one determinant of the strength of the reaction, other crucial factors are economic development, terrorists' human capital and, crucially, political heterogeneity;
2. more generally, important determinants of governments' reaction to terrorism are
 - i. the government's accountability towards citizens: the greater accountability, the smaller the likelihood of harsh repression
 - ii. the level of economic development: the more developed is a country, the smaller the likelihood of harsh repression
 - iii. the terrorists' human capital: the greater terrorists' human capital, the greater the likelihood of harsh repression
 - iv. the level of political heterogeneity: the greater political heterogeneity, the greater the likelihood of harsh repression;
3. finally, terrorism activity is increasing with political heterogeneity, decreasing with economic development and decreasing with government repression.

To conclude, if we go back to the four countries we proposed as case studies, we can collocate these countries in previous figure 4 in terms of the democracy index and of political heterogeneity. The yellow points with the country denominations, show how our results can help to explain the differences in their counter-terrorist policies.

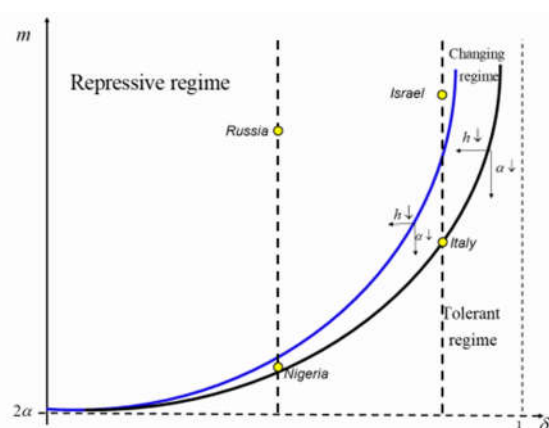


Figure 5: The four case studies in terms of government's accountability and of political heterogeneity

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